HERMITAGE
ACADEMY

YEAR 9

KNOWLEDGE ORGANISER

Charts and averages Student Knowledge Organiser

Key words and definitions

Frequency – How many times a value occurs

Cumulative Frequency – Frequency added together

Ascending – Going up from smallest to biggest

Median – Middle value in an ascending list of data

Mode/Modal value – most common value in the data

Mean - The total of the numbers divided by how many numbers there are.

Range – Biggest number – smallest number

Sum - addition of values

Averages from lists

7 babies weigh the following amounts:
2.5 kg, 3.1 kg, 3.4 kg, 3.5 kg, 3.5 kg, 4 kg, 4.1 kg

- $\text{mean} = \frac{2.5+3.1+3.4+3.5+3.5+4+4.1}{7} = \frac{24.1}{7} = 3.44\ (2\text{ dp})$
- 2.5 kg, 3.1 kg, 3.4 kg, **3.5 kg**, 3.5 kg, 4 kg, 4.1 kg
  The median weight of these babies is 3.5 kg.
- 2.5 kg, 3.1 kg, 3.4 kg, **3.5 kg, 3.5 kg,** 4 kg, 4.1 kg
  The modal weight is 3.5 kg.

Hegarty Maths Links

Pie charts - 427, 428, 429

Averages – 413, 419, 417,418, 416, 415, 404, 409, 406

Scatter Graphs – 453, 454

Averages from table

	Number of Goals	Frequency	Cumulative Frequency
	0	2	2
	1	3	5
	2	5	10
	3	1	11
Total		11	

Mode = category with biggest frequency = **2 goals**

Median = value in the $\frac{Total+1}{2}$ position = 6th position = **2 goals**

Mean = $\frac{Sum\ of\ frequency \times number\ of\ goals}{Total} = \frac{0\times2+1\times3+2\times5+3\times1}{11}$

$= \frac{16}{11}$ = **1.5 goals** (1.d.p)

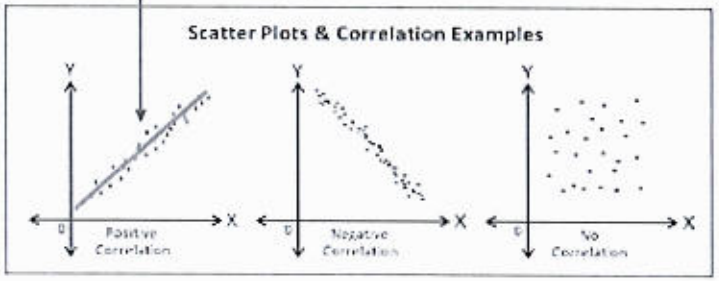
For grouped data,

$0 \le m < 4$	12

use the middle value when multiplying the data by the frequency when calculating the mean.

Scatter Graphs

Use a line of best fit to show correlation and to estimate values using the scatter graph



Reverse mean

The mean height jumped by a high jumper after 10 jumps is 1.81m. He jumps another jump at 1.73m, what is his new mean height?

1.81 x 10 = 18.1m = Sum of all 10 jumps

Mean of 11 jumps = $\frac{Sum\ of\ 11\ jumps}{Total\ no.of\ jumps}$

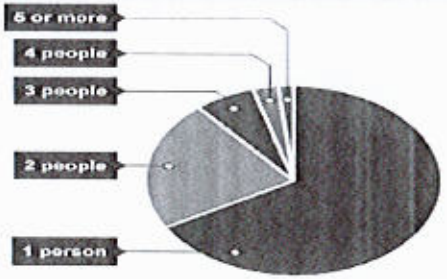
$= \frac{18.1+1.73}{11}$ = 1.80m (2.d.p)

Pie Charts

To draw a pie chart, find the proportion of 360° :

1 item/frequency = $\frac{360°}{Total\ Frequnecy} = \frac{360°}{180} = 2°$

People travelling in a vehicle	Frequency	Calculation	Angle
1 person	120	2 × 120	240°
2 people	40	2 × 40	80°
3 people	13	2 × 13	24°
4 people	5	2 × 5	10°
5 or more people	2	2 × 2	4°
Total	180		



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Charts and averages Student Knowledge Organiser

Averages from lists

Here are 12 test scores of Jessica.

8 9 8 7 9 6 5 5 8 7 5 8

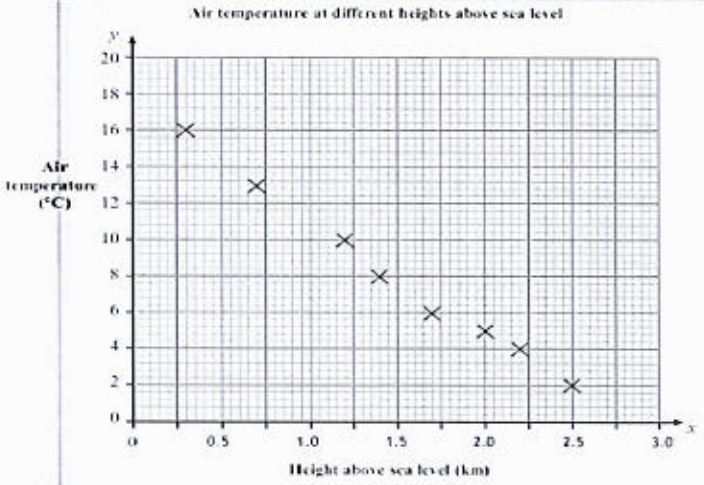
a) Find the mean

b) Find the median

c) Find the mode

d) Find the range

Scatter Graphs



a) Draw a line of best fit

b) State the type of correlation between the air temperature and height above sea level.

c) Estimate the value of the air temperature at a height of 1.8m above sea level

Pie Charts

The table gives information about the numbers of fish in a lake.

Fish	Frequency	
Perch	10	
Bream	23	
Carp	39	

Draw an accurate pie chart to show this information.

Averages from tables

Number of drawing pins	Frequency	
29	2	
30	5	
31	2	
32	1	

Time taken (m minutes)	Frequency
$0 < m \leq 10$	3
$10 < m \leq 20$	8
$20 < m \leq 30$	11
$30 < m \leq 40$	9
$40 < m \leq 50$	9

For each table above, calculate

a) Mean b) Median c) Mode

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Reverse means

Q1. The mean number of goals scored by 3 players is 18. Another player joins, having scored 6 goals. What is the mean number of goals scored by the 4 players?

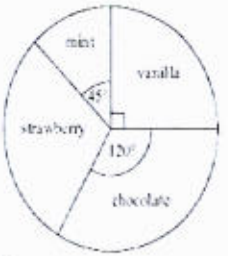
Q2. The mean of 9 numbers is 1.5. Another number is added. The mean is now 1.6.
What number was added?

Applying Knowledge

Q1. Four numbers have a mean of 8 and a median of 8, but none of the numbers is 8. Give an example of what the four numbers could be.

Q2.

Some children were asked to name their favourite flavour of ice cream.
The pie chart and table show some information about their answers.



Use the pie chart to complete the table.

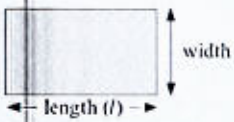
Flavour	Number of children	Angle of sector
vanilla	12	90°
mint	.....	45°
strawberry	14	.....
chocolate	.....	120°

Area and volume Knowledge Organiser

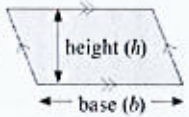
Key words and definitions

Perimeter: total distance around the edge of a shape
Perpendicular: two straight lines at right-angles to each other
Radius: distance from the centre to outer edge of a circle – notation is r
Diameter: distance from one side of a circle to the other passing through the centre – notation is d
Circumference: total distance around a circle
Arc: part of the circumference
Sector: part of a circle, cut from the centre to the edge (a pizza slice)
Π: Pi – mathematical value used when calculating with circles/curved shapes
Prism: 3D shape with constant cross-section through the entire length

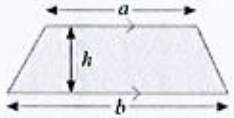
Area



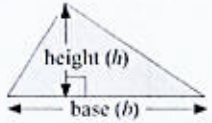
Area = length × width



$A = bh$



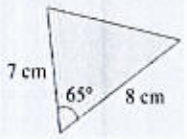
$A = \frac{1}{2}(a+b) \times h$



Area = $\frac{1}{2}$ × base × perpendicular height

You can also find the area of a triangle using Sine. You must know 2 sides and the angle formed between them.

$Area = \frac{1}{2}ab \sin C$



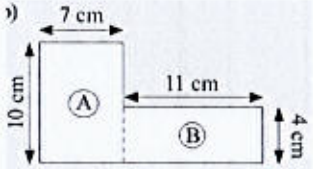
Area = $(\frac{1}{2} \times 7 \times 8)\sin 65°$
= 25.38 cm² (to 2 d.p.)

Hegarty Maths Links

Area: 44, 45, 48, 49
Sine rule: 337
Compound area: 41
Circles: 40, 59, 60
Sectors: 46, 58
Volume: 355 – 358
Surface area: 310 – 312, 315

Compound shapes – formed by merging multiple shapes

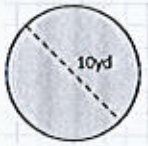
Split the shape up into basic shapes. Find the area of each, then add together.



Area of rectangle A = 10 × 7 = 70 cm²
Area of rectangle B = 11 × 4 = 44 cm²
Total area of shape = 70 + 44 = 114 cm²

Circles – Circumference & Area

$C = \pi d$ $A = \pi r^2$



$C = \pi d$
$= \pi \times 10yd$
$= 10\pi$ yd
$= 31.4yd$

$A = \pi r^2$
$= \pi \times 5^2$
$= \pi \times 25$
$= 78.5cm^2$

Sectors

Length of arc = $\frac{\theta}{360}$ × circumference of circle = $\frac{\theta}{360} \times 2\pi r$

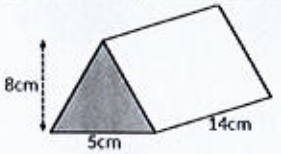
Area of sector = $\frac{\theta}{360}$ × area of circle = $\frac{\theta}{360} \times \pi r^2$

Area of sector = $\frac{60}{360} \times \pi \times 3^2 = \frac{1}{6} \times 9\pi = \frac{3}{2}\pi$ cm²

Length of arc = $\frac{60}{360} \times (2 \times \pi \times 3) = \frac{1}{6} \times 6\pi = \pi$ cm

Volume of Prisms – example shown of triangular prism

Volume of a prism = area of cross section x length of prism



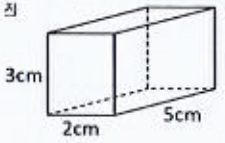
This volume formula works for all prisms. Only the formula for the cross-section area will change dependent on the shape.

Area of Δ = $\frac{5 \times 8}{2}$ = 20cm²

Volume = 20cm² × 14 = 280cm³

Surface area of Prisms – examples of cuboid & cylinder

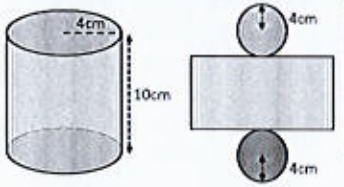
Surface area of a prism = sum of the areas of all the faces



Front = 2 x 3 = 6
Back = 2 x 3 = 6
Top = 2 x 5 = 10
Base = 2 x 5 = 10
Left side = 3 x 5 = 15
Right side = 3 x 5 = 15

Total surface area = 62 cm²

Surface area of cylinder = $2\pi r^2 + \pi dh$ *special case



The 2 dimensions of the rectangular face are the circumference of the circular end and the height. So, the area of this face is π x d x h.

Area of ○ = πr^2 = $\pi \times 4^2$ = 16π
○ + ○ = 16π × 2 = 32π
Area of □ = 8π × 10 = 80π
Total SA = 32π + 80π = 112π cm²

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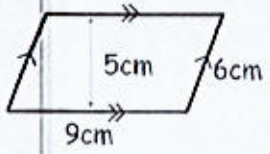
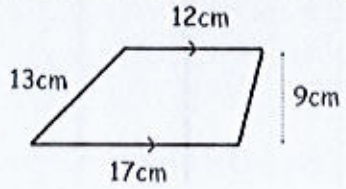
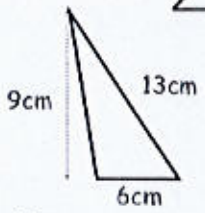
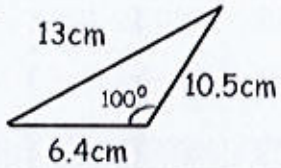
Area and Volume Knowledge Organiser

Area – Find the area of each shape

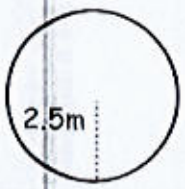


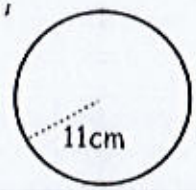




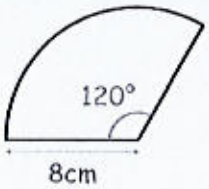


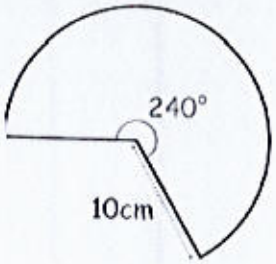
Circles – Find the area and circumference of each circle



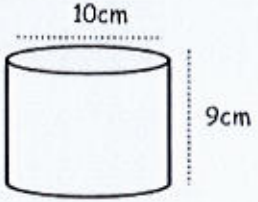


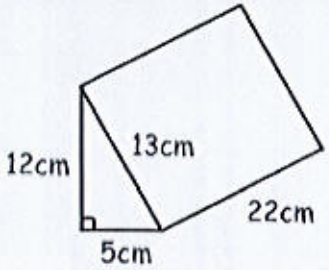
Sector – Find the area and arc length of each sector

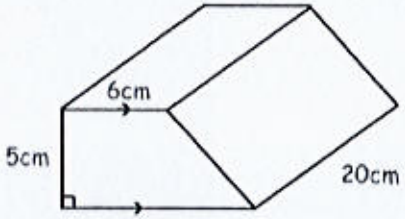


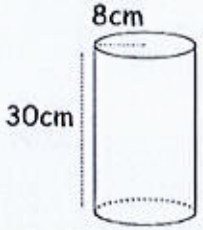


Volume – Find the volume of each 3D shape



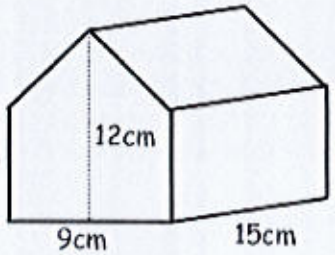


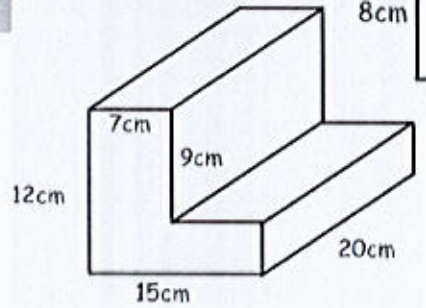




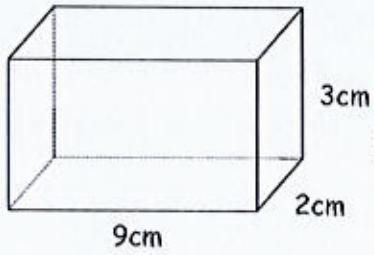
Volume – Find the volume of each compound 3D shape

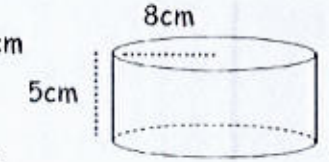
Remember to split the compound cross-sections into basic shapes first.

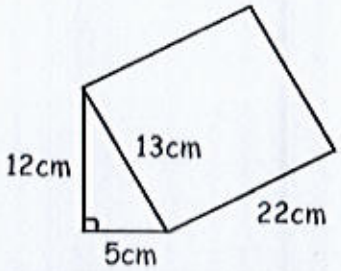


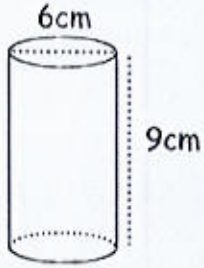


Surface Area – Find the surface area of each 3D shape

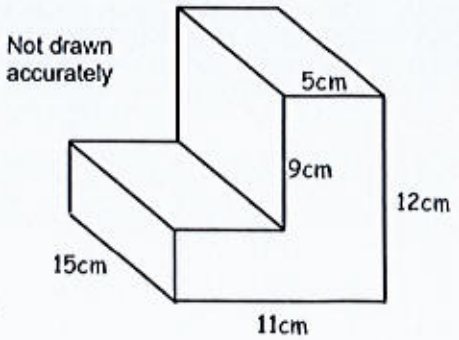








Surface Area – Find the surface area of the compound 3D shape



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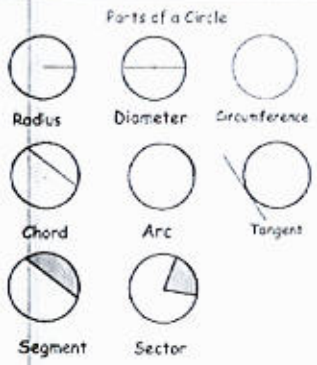
Area and volume Student Knowledge Organiser

Key words and definitions



Volume
A measure of the amount of space occupied by an object.

Surface area
The area of all the faces in a 3D shape added together.

Compound shape
A shape made up of two or more basic shapes.

Prior Knowledge

Understand what is meant by area of a shape.

Understand what is meant by perimeter of a shape.

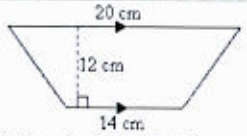
Calculate the area of a rectangle.

Calculate the area of a triangle.

Calculate the volume of a cuboid.

Calculate the volume of a prism.

Area



$a = 20$ cm, $b = 14$ cm, $h = 12$ cm

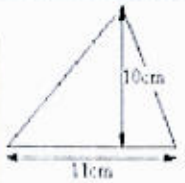
$A = \frac{1}{2}(a+b)h$

$= \frac{1}{2}(20+14)\times 12$

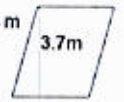
$= \frac{1}{2}\times 34\times 12$

$= 204$

So, the area of the trapezium is 204cm²



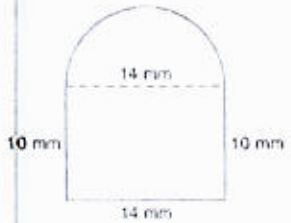
Area of tringle
$= \frac{bh}{2}$
$= \frac{11\times 10}{2}$
$= 55\text{cm}^2$



Parallelogram
Area = bh
Area = 3.2m x 3.7m
Area = 11.84m²

3.2 m

Compound area



This figure can be separated into a rectangle and a semicircle. Find the area of each.

Rectangle: $A = L \times W$

$A = 10 \times 14$

$A = 140mm^2$

Semicircle: $A = \frac{\pi \times r^2}{2}$

$A = \frac{3.14\times 7^2}{2}$

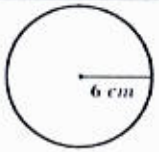
$A = \frac{3.14\times 49}{2}$

$A = 76.93mm^2$

Area = 140 + 76.93

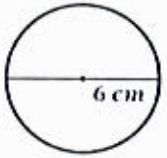
Area = 216.93mm^2

Circumference and area of a circle



$A = \pi r^2$
$= 3.142 \times 6^2$
$= 3.142 \times 36$
$= 113.11\ \text{cm}^2$

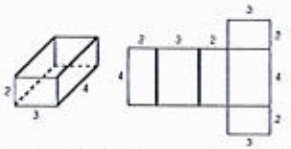
In terms of π
$= \pi \times 6^2$
$= 36\pi$



$C = \pi d$
$= 3.142 \times 6\ \text{cm}$
$= 18.85\ \text{cm}$

In terms of π
$= \pi \times 6$
$= 6\pi$

Surface area of a prism

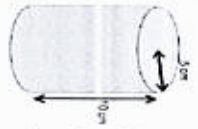


S.A. = 2(2 x 4) + 2(3 x 4) + 2(2 x 3)

S.A. = 2(8) + 2(12) + 2(6)

S.A. = 16+ 24+ 12

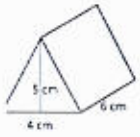
S.A. = 52



- Area of rectangle = 2πrh = 2 x 3.14 x 5 x 10 = 314 cm²
- Area of two ends = 2πr² = 2 x 3.14 x 5 x 5 = 157 cm²
- Total surface area is 2πrh + 2πr²
- Total surface area = 314 + 157 = 471 cm²

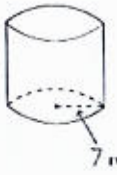
Volume of a prism

Volume of prism: $V = area\ cross\ section \times length$



Area of triangle = ½ x 5 x 4
= ½ x 20
= 10 cm²

Volume = area x length
= 10 X 6
= 60 cm³



$V = Bh$
$V = \pi r^2 h$
$= \pi(7\text{m})^2(10\text{m})$
$= \pi(49\text{m}^2)(10\text{m})$
$= 490\pi\ \text{m}^3$

Hegarty Maths Links

Area of triangle	557, 558
Area of parallelogram	556
Area of trapezium	559
Circumference of circle	534, 535
Area of circle	539, 540
Volume of prism	570, 571, 572, 573, 574
Surface area of prism	585
Compound shapes	555

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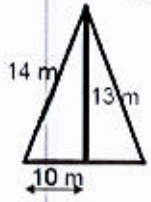
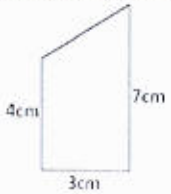
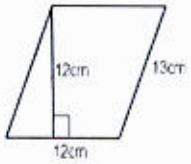
Area and volume Student Knowledge Organiser

Area

Calculate area of the following shapes.

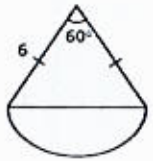






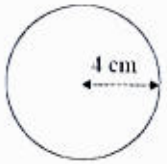
Compound area

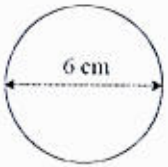
Calculate area of the shape.



Circumference and area of a circle

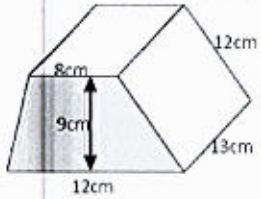
Calculate the circumference and area of the circles.





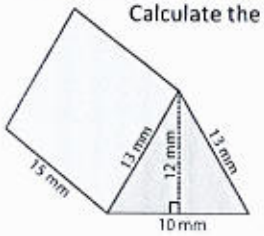
Volume of a prism

Calculate the volume of the trapezoid prism.



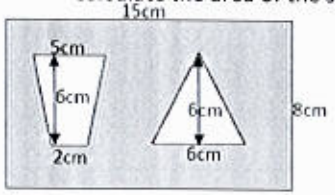
Surface area of a prism

Calculate the surface area of the triangular prism.



Applying knowledge

Calculate the area of the shaded area.



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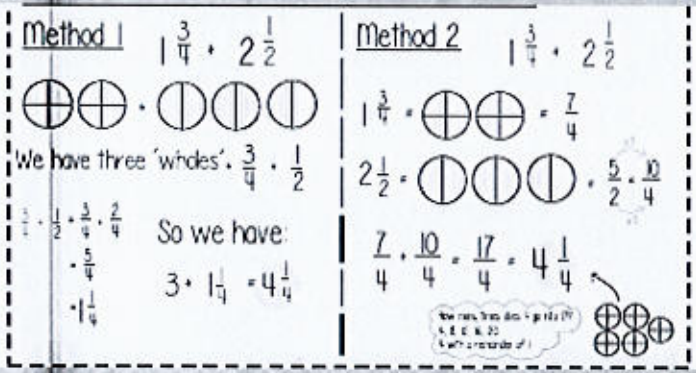
Fractions, decimals and percentages Student Knowledge Organiser

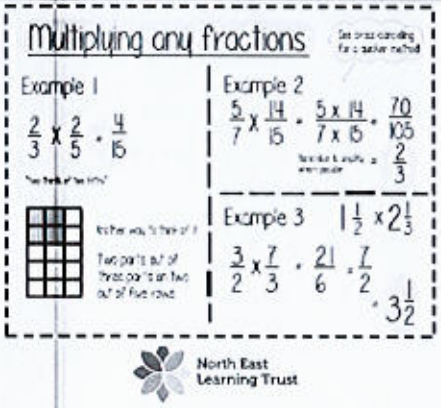
Key words and definitions

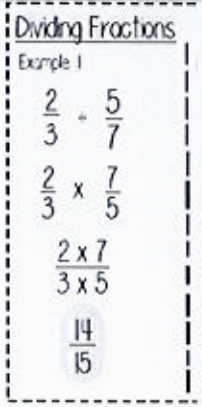
- Reciprocal – The reciprocal of a number is 1 divided by the number
- Simple Interest – Interest calculated as a percentage of the original amount
- Compound Interest – Interest calculated on the amount borrowed plus previous interest
- Equivalent – Of equal value
- Recurring Decimal – A decimal number with a digit, or group of digits, that repeat forever

Adding and Subtracting Mixed Numbers



Multiplying and Dividing Fractions





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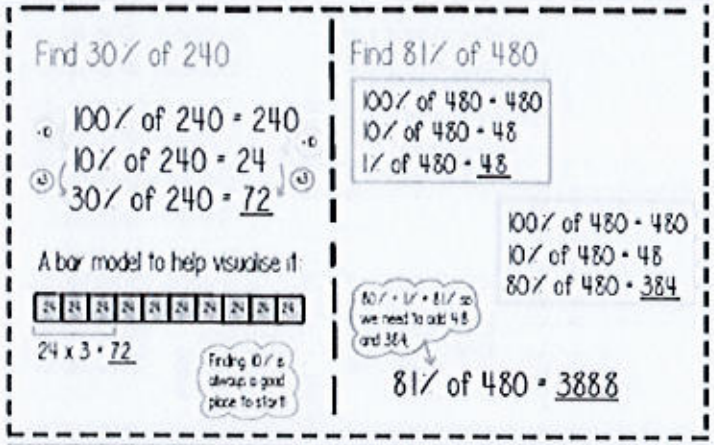
Percentages of Amounts



Reverse Percentages

60% of a number is 48
What is the number?

60% of x = 48
10% of x = 8
100% of x = 80

A pair of shoes are on sale for 87.5% off. The sale price is £49.50, how much did they cost originally?

125% of x = £49.50
25% of x = £99
100% of x = £396

Hegarty Maths Links

- Recurring decimals to fractions: 53, 54
- Converting FDP: 72–76, 82–85
- Adding and Subtracting Fractions: 66
- Multiplying Fractions: 67, 68, 69
- Dividing Fractions: 70
- Percentages of amounts: 86, 87, 89
- Compound Interest: 94
- Percentage Change: 97
- Reverse Percentages: 96

Compound Growth and Decay

I put £1000 in a bank account it earns compound interest of 10% per year. How much will be in the account after 5 years?

INTEREST
Compound interest means we work out the interest each year and the original amount plus any interest in the account

- 10% of £1000 = £100

So after year 1, the account will have £1100

- 10% of £1100 = £110

So after year 2, the amount is £1210 etc.

If we are increasing by 10% each time, this is the same as finding 110% of the amount, or multiplying by 1.1 (see multipliers). So another way we can work this out is

£1000 x 1.1 x 1.1 x 1.1 x 1.1 x 1.1

Or £1000 x 1.1^5 = £161.051 (5 years)

For compound decay or depreciation questions we would do the same thing, just our multiplier at the start is calculated by subtracting rather than adding

Recurring decimals to fractions

Example (TWO RECURRING DIGITS)

Convert $0.\dot{3}\dot{5}$ to a fraction

$x = 0.353535...$

$100x = 35.353535...$

Because we have two digits that are repeating we need to multiply it by 100

$99x = 35 \rightarrow x = \frac{35}{99}$

Example

Convert $0.2\dot{5}$ to a fraction

$x = 0.255555...$

$10x = 2.5555555...$

$100x = 25.55555...$

25.555... - 2.55 = 23

Here, we cannot just take 2.555 away from 0.255 as we will not reduce it to an integer

100x - 10x = 90x

$90x = 23 \rightarrow x = \frac{23}{90}$

Fractions, decimals and percentages Student Knowledge Organiser

Adding and Subtracting Fractions

Work out the following. Answers should be simplified and written as mixed numbers where necessary

(a) $\frac{3}{4}+\frac{1}{2}$ (b) $\frac{5}{9}+\frac{2}{3}$ (c) $\frac{7}{10}+\frac{1}{3}$

(d) $\frac{4}{5}-\frac{2}{3}$ (e) $\frac{8}{9}-\frac{1}{3}$ (f) $\frac{2}{3}+\frac{1}{6}$

Work out the following. Answers should be simplified and written as mixed numbers where necessary

(a) $1\frac{1}{2}+\frac{2}{3}$ (b) $\frac{7}{9}+1\frac{1}{3}$ (c) $1\frac{3}{5}-\frac{3}{4}$

(d) $1\frac{5}{8}-1\frac{1}{4}$ (e) $2\frac{1}{2}+1\frac{1}{3}$ (f) $2\frac{2}{9}-1\frac{1}{3}$

Multiplying and Dividing Fractions

Work out the following. Answers should be simplified and written as mixed numbers where necessary

(a) $\frac{1}{2}\times\frac{1}{5}$ (b) $\frac{1}{2}\times\frac{3}{4}$ (c) $\frac{1}{4}\times\frac{3}{5}$

(d) $\frac{2}{3}\div\frac{5}{6}$ (e) $\frac{1}{10}\div\frac{4}{9}$ (f) $\frac{6}{11}\div\frac{5}{6}$

Work out the following. Answers should be simplified and written as mixed numbers where necessary

(a) $1\frac{2}{3}\times\frac{1}{4}$ (b) $4\frac{3}{5}\times1\frac{2}{3}$ (c) $3\frac{1}{8}\times2\frac{1}{2}$

(d) $\frac{2}{3}\div1\frac{4}{5}$ (e) $2\frac{1}{3}\div5\frac{1}{2}$ (f) $4\frac{1}{3}\div2\frac{9}{10}$

Percentages of Amounts

Calculate the following. You should **not** use a calculator to complete these questions.

(a) 10% of 70m (b) 25% of 16 seconds (c) 10% of 400kg (d) 50% of 26g

(e) 3% of $9000 (f) 40% of 75 seconds (g) 15% of 90 hours (h) 5% of 14kg

(i) 90% of 1250ml (j) 76% of £80,000 (k) 85% of 90 hours (l) 12% of £6

Calculate the following. You should use calculator methods to complete these questions

(a) 15% of 80ml (b) 9% of 205kg (c) 45% of £135 (d) 17% of 540km

(e) 0.3% of 44km (f) 85.2% of 6000 marks (g) 0.25% of $840 (h) 3.175% of 52g

Reverse Percentages

1. A camera costs £180 in a 10% sale. What was the pre-sale price?
2. After fuel prices rose by 15%, a family's annual heating bill was £1654. What would the bill have been without the price increase?
3. The cost of a holiday, including VAT at 20% is £540. What is the pre-VAT price?
4. The world's tiger population has decreased by 95% since 1910 and is now believed to be as low as 3200. If these figures are correct, what was the tiger population in 1910?
5. The sale price of a television is £420 after a 15% reduction. What was the price before the sale?
6. After a 6.5% pay rise an engineer's salary is £36,700. What was the salary before the increase?
7. Due to falling orders a company reduces its workforce by 12% to 792. What was the original number of employees?
8. An engine modification improved the fuel consumption of a car by 27% to 17.2 km per litre. What was the fuel consumption before the modification?

Compound Growth and Decay

1. If £500 is invested for 3 years at a rate of compound interest of 4% per annum, how much will be in the account after 3 years?
2. Dave invests £3000 at a rate of interest of 6% a year. How much is in his account after 5 years?
3. Annie invests £1500 at a rate of compound interest of 2.5% for 6 years. How much is in her account after the six years?
4. Harry invests £1000 at a rate of interest of 5% a year. After how many years will he have doubled his investment?
5. John buys a house for £219000. The house depreciates in value at 6% each year. What is the value of the house after 7 years?
6. Sam bought his car 13 years ago for £14000. It has depreciated at 26% each year. How much is it now worth?
7. The value of a car depreciates by 15% each year. At the end of 2007, the value of the car was £8490. Work out the value of the car at the end of 2010.
8. Bob's new machine for work cost him £6700. It will depreciate at 28% each year. After how many years will it be worth less than £1000?

Recurring Decimals to Fractions

Convert the following recurring decimals to fractions. You should give each answer in its simplest form

(a) $0.\dot{2}$ (b) $0.\dot{8}$ (c) $0.\dot{1}\dot{8}$

(d) $0.\dot{5}\dot{3}$ (e) $0.\dot{7}\dot{5}$ (f) $0.\dot{6}\dot{3}$

(g) $0.1\dot{1}\dot{2}$ (h) $0.\dot{3}3\dot{9}$ (i) $0.\dot{1}7\dot{1}$

Convert the following recurring decimals to fractions. You should give each answer in its simplest form. Think carefully about which parts are recurring.

(a) $0.2\dot{8}$ (b) $0.0\dot{3}$ (c) $0.9\dot{6}$ (d) $0.5\dot{2}\dot{1}$

(e) $0.39\dot{0}$ (f) $0.12\dot{3}\dot{5}$ (g) $0.12\dot{6}$ (h) $0.50\dot{3}\dot{5}$

Ratio Student Knowledge Organiser

Key words and definitions

Compound measure: Compound measures are measures that are made up of two or more other measures. For example, speed is a compound measure, It is made up of distance and time.

Ratio: A ratio shows how much of one thing there is compared to the other.

Direct proportion: Direct proportion is when two (or more) quantities increase or decrease in the same ratio.

Indirect proportion: Inverse proportion is when an increase in one quantity results in a decrease in another quantity.

Hegarty maths links

Speed, density & pressure: 716 – 738
Ratio: 328 – 338
Proportion: 339 - 348

Speed, density & pressure.

Speed Distance Time

$\text{Speed} = \frac{\text{Distance}}{\text{Time}}$

Distance = Speed x Time

$\text{Time} = \frac{\text{Distance}}{\text{Speed}}$

Mass Density Volume

$\text{Volume} = \frac{\text{Mass}}{\text{Density}}$

$\text{Density} = \frac{\text{Mass}}{\text{Volume}}$

Mass = Density x Volume

Force Area Pressure

$\text{Pressure} = \frac{\text{Force}}{\text{Area}}$

$\text{Area} = \frac{\text{Force}}{\text{Pressure}}$

Force = Area x Pressure

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Simplifying ratio.

Example 1

There are 15 fiction books and 10 non-fiction books on a shelf.
Write down the ratio of fiction books to non-fiction books in its simplest form.

1. Write down the ratio and divide both sides by the same number. $\div 5 \left(\begin{matrix}15:10\\3:2\end{matrix}\right) \div 5$
2. Stop when you can't divide any further. The simplest form is **3 : 2**

Dividing a ratio into parts.

Example 1

Nigel is going to split £40 between his two children. He shares the the money between Matthew and Emily in the ratio 2:3. How much money do Matthew and Emily receive?

40				
8	8	8	8	8

2 + 3 = 5 total shares

1 share = 40 ÷ 5 = £8

Matthew's share
2 shares = £8 × 2
= £16

Emily's share
3 shares = £8 × 3
= £24

Example 2

To make purple paint, red paint and blue paint are mixed in the ratio 3:5. Richard uses 720mL of paint altogether. How much blue paint does he use?

720							
90	90	90	90	90	90	90	90

3 + 5 = 8 total parts

1 part = 720 ÷ 8 = 90

Red paint
3 shares = 90 × 3
= 270mL

Blue paint
5 shares = 90 × 5
= 450mL

Richard uses 450mL of blue paint.

Calculating a part of the ratio, given another.

Example 1

Laura makes some orange juice by mixing orange cordial and water in the ratio 3:10. She uses 42mL of orange cordial.
How much water does she use?

14		
14	14	14	14	14	14	14	14	14	14

3 parts = 42mL

1 part = 42 ÷ 3 = 14mL

10 parts = 14 × 10 = 140mL

Laura uses 140mL of water.

Example 2

Michael and Justine share some money in the ratio 5:3. Justine gets £108.
How much money did they share?

Michael	36	36	36	36	36		
Justine	36	36	36				

3 parts = £108

1 part = 108 ÷ 3 = £36

5 + 3 = 8 total parts

8 parts = 36 × 8 = £288

Michael and Justine shared £288.

Direct proportion

Example 1

y is directly proportional to x.
Fill in the gaps in the table

x	3	5	10	12	
y			25		100

1. Write the proportionality statement and make it into an equation. $y \propto x$, so $y = kx$
2. The table shows that when $x = 10$, $y = 25$. Use this to find k. $25 = k \times 10$, $k = 25 \div 10 = 2.5$, So $y = 2.5x$
3. Use the equation to complete the table:

x	3	5	10	12	$100 \div 2.5 =$ **40**
y	$2.5 \times 3 =$ **7.5**	$2.5 \times 5 =$ **12.5**	25	$2.5 \times 12 =$ **30**	100

Example 2

m is directly proportional to e. Given that $m = 72$ when $e = 6$,

a) find the constant of proportionality,
1. Write the proportionality statement and make it into an equation. $m \propto e$, so $m = ke$
2. Use the given values to find k. $72 = k \times 6$, so $k = 72 \div 6$, **$k = 12$**

b) calculate the value of e when $m = 37$.
1. Put the value of k from part a) into the equation $m = ke$. $m = 12e$
2. Substitute $m = 37$ into the equation and solve for e. $37 = 12e$, $e = 37 \div 12 =$ **3.08** (to 2 d.p.)

Inverse proportion

Example 1

y is inversely proportional to x.
Fill in the gaps in the table.

x	1	5	10	
y			20	100

1. Write the proportionality statement and make it into an equation. $y \propto \frac{1}{x}$, so $y = \frac{k}{x}$
2. The table shows that when $x = 10$, $y = 20$. Use this to find k. $20 = \frac{k}{10}$, $k = 20 \times 10 = 200$, So $y = \frac{200}{x}$
3. Use the equation to complete the table:

x	1	5	10	$200 \div 100 =$ **2**
y	$200 \div 1 =$ **200**	$200 \div 5 =$ **40**	20	100

Example 2

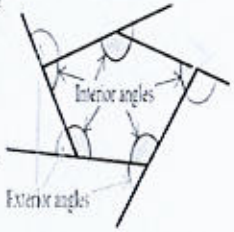
y is inversely proportional to x and $x = 4$ when $y = 15$.

a) Find y when $x = 10$.
1. Write the proportionality statement and make it into an equation. $y \propto \frac{1}{x}$, so $y = \frac{k}{x}$
2. Use the given values to find k. $15 = k \div 4$, so $k = 15 \times 4 = 60$
3. Put $k = 60$ into the equation. $y = \frac{60}{x}$
4. Substitute $x = 10$ into the equation and solve for y. $y = \frac{60}{x} = \frac{60}{10} =$ **6**

Shapes and angles Student Knowledge Organiser

Key words and definitions

Interior angle – angle inside the shape
Exterior angle- angle on the outside.

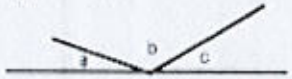


Polygon- shape with all straight sides.
Regular polygon- all sides and angles are equal

Angles around a point, on a straight line and in a triangle.

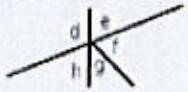
Angles on a straight line add up to 180°

$a+b+c=180°$

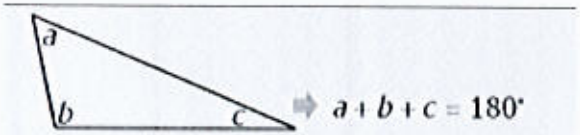


Angles around a point add up to 360°

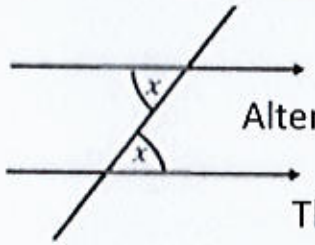
$d+e+f+g+h=360°$



Angles in a triangle sum to 180°



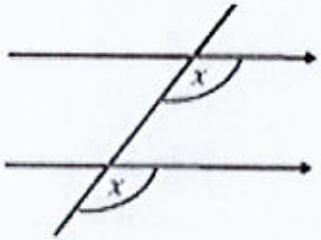
Alternate angles



Alternate angles are equal

They form a Z shape

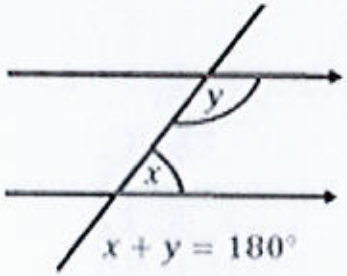
Corresponding angles



Corresponding angles are equal

They form a F shape

Co-interior angles



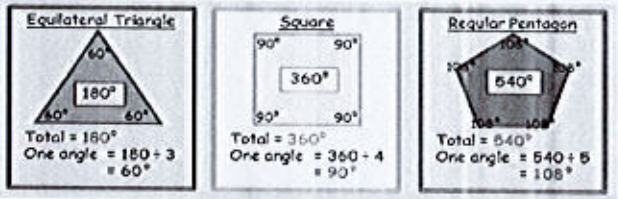
Co-interior angles add to 180°

They form a C shape

Interior angles sum of polygons

A polygon with n number of sides
Angle sum = $(n-2)\times180°$

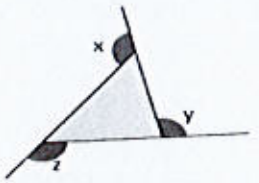
An angle of a regular polygon = $\frac{(n-2)\times180°}{n}$



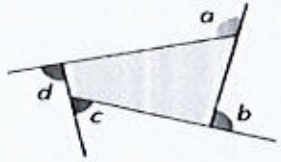
Exterior angles

The sum of the exterior angles of any polygon is 360°.

The exterior angle of a regular n-sided polygon is $\frac{360°}{n}$



$x + y + z = 360°$



$a + b + c + d = 360°$

Hegarty Maths Links

Angles in parallel lines 481 – 483
Angles around a point 812-814
Angles on a straight line 477-478
Angles in a triangle 486-487
Interior angles 560-562
Exterior angles 563-564

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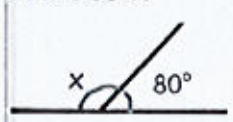
Shapes and angles Student Knowledge Organiser

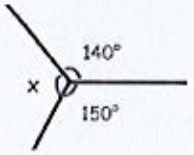
Angles around a point and on a straight line

Calculate x

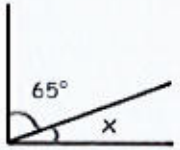
(a)



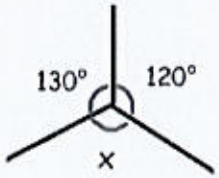
(b)



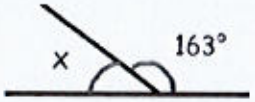
(c)



(d)



(e)



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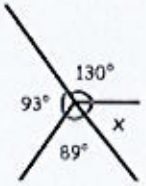


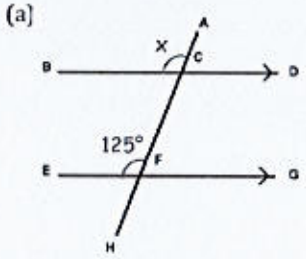
Calculate y

Work out the size of angle y.

Angles in parallel lines

Calculate x

(a)



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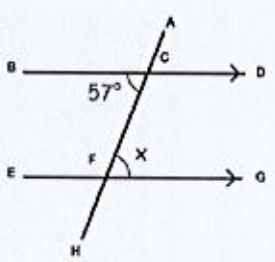
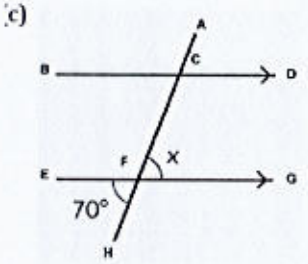


(c)



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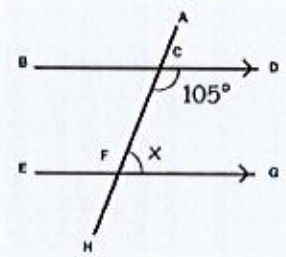

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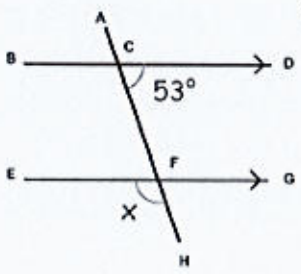

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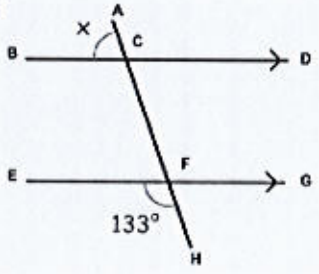


Interior angles

Work out the sum of the interior angles for polygons with

(a) 10 sides (b) 14 sides (c) 20 sides (d) 45 sides

Each of the polygons below are regular.
Calculate the size of each interior angle, x.

(a)

regular pentagon

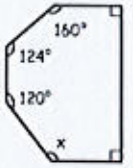
(b)

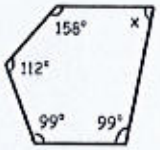
regular hexagon

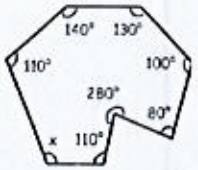
(c)

regular octagon

Find the missing angle in each irregular polygon







Exterior angles

Each of the polygons below are regular.
Calculate the size of each exterior angle, y.

(a)

regular pentagon

(b)

regular hexagon

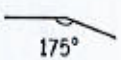
(c)

regular octagon

Shown below is one interior angle from regular polygons.
Calculate how many sides the polygons have.

(a)

(b)



(c)

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Fractions, decimals and percentages Student Knowledge Organiser

Key words and definitions

Numerator - the top number of a fraction.
Denominator – the bottom number of a fraction, represents the number of parts to make one whole.
Equivalent – worth the same amount.
Simplify – reducing a fraction to an equivalent fraction with the lowest possible numerator and denominator.
Reciprocal – is one of a pair of numbers that when multiplied together gives the answer equal to 1.
Depreciation – the decrease in the value of something over time.
Interest - is money that is paid regularly at a particular percentage, usually when money has been lent or borrowed.

Multiply, divide, add and subtract fractions

$$\frac{2}{3} \times \frac{3}{5} = \frac{6}{15} = \frac{2}{5}$$

Simplify first?
Multiply numerator
Multiply denominator
Simplify?

$$\frac{2}{15} \div \frac{4}{5} = \frac{2}{15} \times \frac{5}{4} = \frac{1}{6} = \frac{10}{60}$$

Flip the second fraction (reciprocal) and change to x
Multiply the fractions
Simplify?

$$\frac{2}{7} + \frac{3}{5} = \frac{10}{35} + \frac{21}{35} = \frac{31}{35}$$

Make common denominator
Do same to numerator as the denominator
Add/subtract numerators – keep the same denominator
Simplify?

$$\frac{7}{9} - \frac{3}{4} = \frac{28}{36} - \frac{27}{36} = \frac{1}{36}$$

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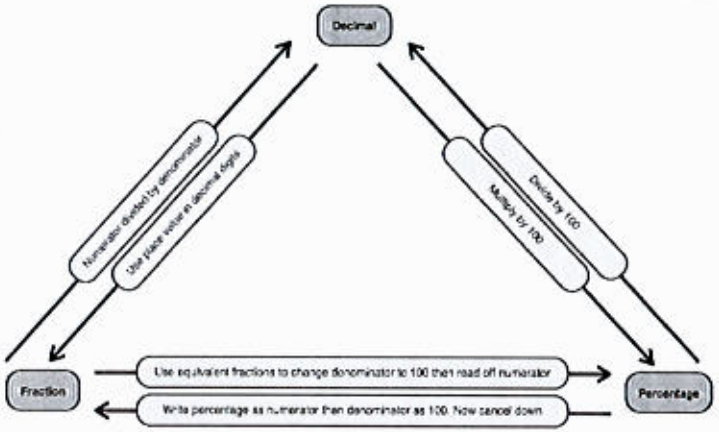
Equivalent fractions, decimals and percentages



Percentage increase and decrease and percentage change.

Increase £240 by 15%

100% of £240
15% of £240 +
115% of £240
= 240 × 1.15
= £276

Or multiply by 1.15

Decrease £90 by 12%

100% of £90
12% of £90 −
88% of £90
= 90 × 0.88
= £79.20

Or multiply by 0.88

$$\%\ change = \frac{change}{orig\ value} \times 100$$

Equivalent Fractions

Fractions that have the same value, eg → $\frac{2}{5} = \frac{20}{50}$

"What I do to the top, I do to the bottom"

Place the following in order $\frac{3}{8}$ $\frac{2}{5}$ $\frac{1}{4}$

Equivalent fractions with a common denominator are $\frac{15}{40}$ $\frac{16}{40}$ $\frac{10}{40}$

Answer $\frac{1}{4}$ $\frac{3}{8}$ $\frac{2}{5}$

Reverse Percentages

The cost of a television is £540 including a 20% sales tax. Work out the cost of the television without tax.

original price × 1.2 = 540
original price = 540 ÷ 1.2
original price = £450

The cost of a holiday is reduced by 15% to £833. What was the original price of the the holiday?

original price × 0.85 = 833
original price = 833 ÷ 0.85
original price = £980

Hegarty Maths Links

Adding, subtracting,	65, 66
Multiplying and dividing fractions	68, 69, 70
FDP	73, 74, 75, 76, 82, 83, 149
Equivalent fractions	59
Percentage increase and decrease	88, 89, 90
Percentage change	97
Reverse percentages	96

Fractions, decimals and percentages Student Knowledge Organiser

Multiply, divide, add and subtract fractions

1. $\frac{3}{8} \times \frac{3}{4}$
2. $\frac{4}{5} \div \frac{2}{10}$
3. $\frac{2}{9} + \frac{4}{6}$
4. $\frac{3}{4} - \frac{3}{10}$
5. $4\frac{1}{4} \times \frac{1}{5}$
6. $3\frac{9}{10} \div 2\frac{2}{3}$
7. $6\frac{2}{5} + 2\frac{2}{3}$
8. $4\frac{5}{11} - 1\frac{1}{2}$

Equivalent fractions, decimals and percentages

In each of the following, four of the values are equal to each other. Which are they?

a) $\frac{7}{10}$	0.375	$\frac{7}{20}$	0.720	$\frac{3}{8}$	$37\frac{1}{2}\%$
71%	$\frac{17}{20}$	38%	56%	0.3750	27%
b) $\frac{3}{5}$	0.035	37%	$\frac{3}{9}$	73%	0.731
65%	0.600	$\frac{3}{40}$	60%	0.6	$\frac{1}{6}$
c) $\frac{2}{7}$	0.071	0.27	$\frac{27}{100}$	0.654	27%
$\frac{54}{200}$	54%	0.876	0.027	$\frac{6}{54}$	$2\frac{7}{10}\%$
d) 63%	$\frac{3}{16}$	0.603	$\frac{6}{13}$	36%	0.72
$\frac{9}{25}$	0.925	0.036	0.36	$\frac{18}{50}$	40%

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Percentage increase and decrease and percentage change.

Increase £20 by 52%

Increase £32.10 by 17%

Increase 92kg by 110%

Decrease 21 kg by 7%

Decrease 110 lbs by 53%

Increase £110 by 7%, then reduce by 5%

Increase £400 by 6%, then by 6% again

1 Find the percentage increase when:
   a) a price of £10 is increased to £12.
   b) a price of £20 is increased to £52.

2 Find the percentage decrease when:
   a) a price of £10 is decreased to £8.
   b) a price of £25 is decreased to £22.

Equivalent Fractions

Find the missing numbers to make equivalent fractions

(a) $\frac{6}{7} = \frac{42}{\quad}$ (b) $\frac{9}{20} = \frac{63}{\quad}$ (c) $\frac{5}{12} = \frac{35}{\quad}$ (d) $\frac{7}{8} = \frac{\quad}{64}$

Arrange the fractions in order, smallest first.

(a) $\frac{3}{4}, \frac{2}{3}, \frac{5}{6}, \frac{1}{3}$ (b) $\frac{1}{4}, \frac{3}{8}, \frac{1}{6}, \frac{5}{12}$

Reverse Percentages

1: 20% of all the children in a class are left handed.
4 children are left handed.
How many children are there in the class altogether?

2: 30% of the members of a tennis club are pensioners.
36 members are pensioners.

(a) How many members are there in total?
(b) How many members are not pensioners?

Applying Knowledge

Shown below is a "magic square"
Each column, row and diagonal has the same total.
Work out the missing fractions.

$\frac{1}{10}$		$\frac{3}{10}$
$\frac{9}{20}$		
$\frac{1}{5}$	$\frac{3}{20}$	

Leonie bought a hat and a coat.
The hat cost £6
She sold both items for a total of £45
Leonie made 300% profit on the hat and 125% profit on the total cost.
Work out her percentage profit on the cost of the coat.

Ratio Student Knowledge Organiser

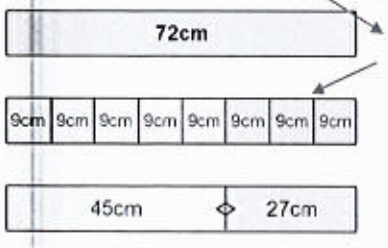
Key words and definitions

Ratio – ratio compares the size of one part to another part.
Proportion – compares the size of one part to the size of the whole.
Speed – the rate at which something moves.
Density – the mass of a substance per unit volume.
Pressure – the force per unit area exerted on an object.

Sharing in a ratio

Share 72cm in the ratio 5:3.

Draw a bar model to calculate how much one part is worth.



5 + 3 = 8 parts
72cm ÷ 8 = 9cm per part

5 parts x 9cm = 45cm

3 parts x 9cm = 27cm

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Simplifying a Ratio

Ratios can be simplified, similar to fractions, by dividing each number in the ratio by their highest common factor (HCF).

Simplify the Ratio 6 : 15

Divide both our number values by HCF (3)

3 ↺ 6 : 15 ↻ 3
3 ↺ 2 : 5 ↻ 3

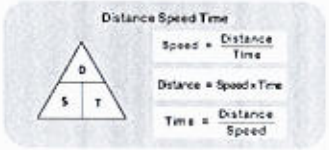
The simplified Ratio Answer is **2 : 5** ✓

Proportion Problems - Recipes

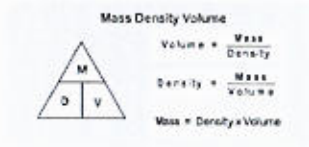
When solving recipe problems, find out how many ingredients are needed to make 1 of something, then multiply by how many you need.
Eg. To make 3 sponge cakes...

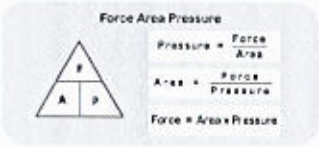
To make 2 sponge cakes		÷2		x3	
½ pint	milk		1 cake		3 cakes
2 lb	plain flour		¼ pint		¾ pint
4	eggs		1 lb		3 lb
20 ounces	sugar		2		6
20 ounces	butter		10 oz		30 oz
			10 oz		30 oz

Speed, Density and Pressure



Using each triangle, cover the measurement that you are trying to find. This will derive the given formulae.





Timetables

The table shows part of a bus timetable from Shotton to Alton.

Shotton	07 30	08 00	09 00	10 00	11 00
Crook	07 45	08 15	09 15	10 15	11 15
Prudhoe	07 58	08 28	09 28	10 28	11 28
Hexham	08 15	08 45	09 45	10 45	11 45
Alton	08 30	09 00	10 00	11 00	12 00

Serena lives in Crook. She has to be in Hexham by 11:15.
What is the time of the latest bus she can catch from Crook to arrive in Hexham by quarter past 11?
The bus, which arrives in Hexham at 10:45, leaves Crook at 10:15.

Ratio Problems - Maps

When solving problems with map scales, label the ratio "map : real life" and scale up/down as needed.
Eg. If the scale is 1cm : 200m, what is the distance from the golf club to the cricket club?

Map : real life

x2 ↺ 1cm : 200m ↻ x2
2cm : 400m

Hegarty Maths Links

Ratio: 328-338
Proportion: 339-342
Recipe Problems: 739-742
Scale Diagrams: 864-871
Speed, Density and Pressure: 716-738

Ratio Student Knowledge Organiser

Simplifying a Ratio

Write out and simplify the following ratios:

For every 6 women,
the school employs 8 men.

women : men

..... : .....

red squares: green circles

15cm to 75cm

400m to 1.5km

Ellie is making a cake.
The instructions say that the ratio of sugar to flour should be 1 : 3
Ellie uses 250g of sugar and 650g of flour.
Has Ellie used the correct ratio of sugar to flour?

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Sharing in a Ratio

Share £60 in the ratio 5:1.
Divide £48 in the ratio 5:3.
Share £72 in the ratio 4:5.
Divide £40 in the ratio 3:5.
Share £132 in the ratio 8:3.

- The angles in a triangle are in the ratio 1:5:6. Work out the angles in degrees.

- The ratio of boys to girls in a class is 3:5.

  Explain why there could not be 30 pupils in the class.

- William has a collection of coins. Each of the coins is either silver or bronze.

  The ratio of the number of bronze coins to the number of silver coins is 4 : 1.

  William has 12 **more** bronze coins than silver coins. Work out the total number of coins in his collection.

- Over the course of a season, a football team won, drew and lost matches in the ratio 2 : 1 : 5.

  The team lost 12 **more** matches than they won.

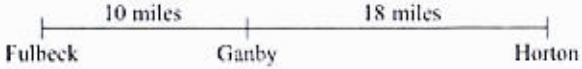
  Work out how many matches the team drew in the season.

Speed, Density and Pressure

- A bus travels 222 miles in 6 hours.
  What was the average speed of the bus?

- Mr Jenkins catches the 11:45am bus from London to Glasgow.
  The distance between the two cities is 407 miles.
  The bus travels at an average speed of 55mph.
  What time should he arrive in Glasgow?

- The distance from Fulbeck to Ganby is 10 miles.
  The distance from Ganby to Horton is 18 miles.



  Raksha is going to drive from Fulbeck to Ganby.
  Then she will drive from Ganby to Horton.
  Raksha leaves Fulbeck at 10 00
  She drives from Fulbeck to Ganby at an average speed of 40mph.
  Raksha wants to get to Horton at 10 35
  Work out the average speed Raksha must drive at from Ganby to Horton.

- A cube of ice has side length of 5cm.
  The mass of the cube of ice is 114.5g.

  Find the density of ice.
  Give your answer in g/cm^3

- A box is placed on the floor.

  The area of the box in contact with the floor is $2.4m^2$
  Pressure exerted on the floor 16 newtons/m^2

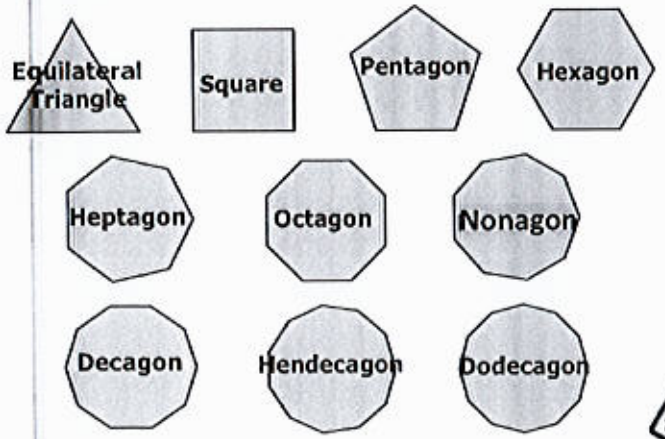
  Work out the force exerted by the box on the floor.

Shapes and angles Student Knowledge Organiser

Key words and definitions

Polygon – a plane figure with at least three straight sides and angles, and typically five or more.
Quadrilateral – 4 sided shape.
Pentagon – 5 sided shape.
Hexagon - 6 sided shape.
Heptagon – 7 sided shape.
Octagon – 8 sided shape.
Nonagon – 9 sided shape.
Decagon - 10 sided shape.
Hendecagon – 11 sided shape.
Dodecagon – 12 sided shape.

Polygons



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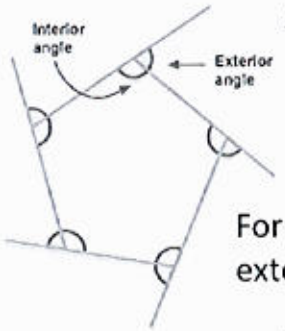
Prior Knowledge

Angles on straight lines/internal angle sums in polygons
Angles in parallel lines

Interior and exterior angles of polygons

Sum of interior angles $= 180^{o} \times (n - 2)$

n = number of sides

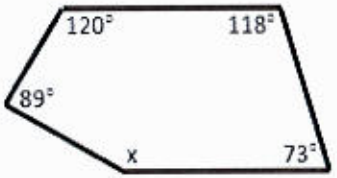


For all polygons the exterior angles total 360°

A regular polygon has an exterior angle of 20°.

How many sides does it have?

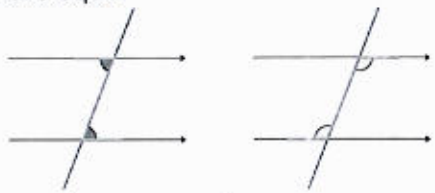
Number of sides
= 360° ÷ 20°
= 18 sides



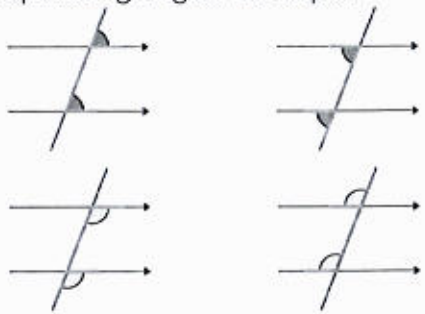
Sum of angles
= 89°+120°+118°+ 73°
= 400°
Sum of interior angles
= 180° x (5-2)
= 540°
x = 540° - 400°
= 140°

Angles in parallel lines

Alternate angles are equal



Corresponding angles are equal



Vertically opposite angles are equal

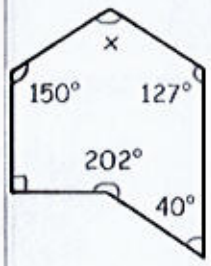
Hegarty Maths Links

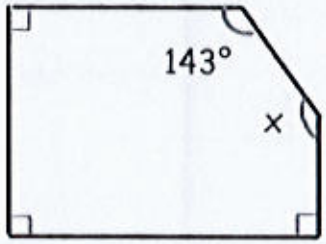
Angles in polygons	561, 562, 563, 564, 565
Vertically opposite angles	480
Alternate angles	481
Corresponding angles	483

Shapes and angles Student Knowledge Organiser

Interior and exterior angles of polygons

Find the missing angle in each irregular polygon

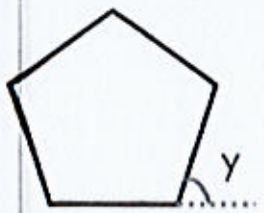




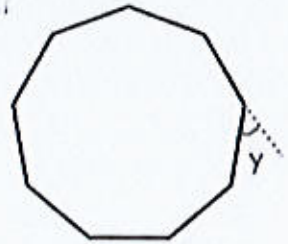
Work out the number of sides of polygons with these sum of interior angles

(a) 1260° (b) 2880° (c) 3960°

Each of the polygons below are regular.
Calculate the size of each exterior angle, y.



regular pentagon



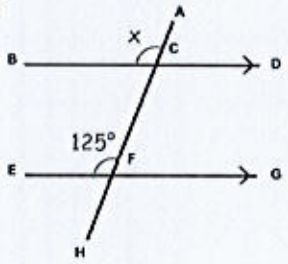
regular nonagon

North East Learning Trust

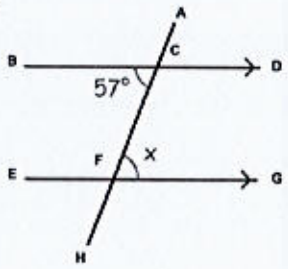
Angles in parallel lines

Find the angle x in each question below.
Give reasons for your answer.

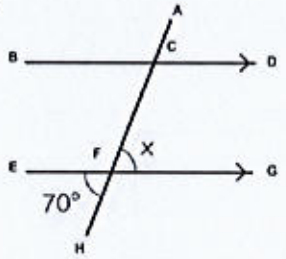
(a)



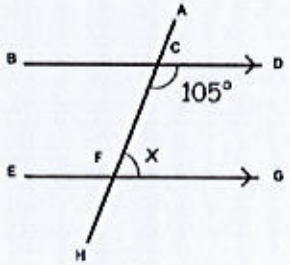
(b)



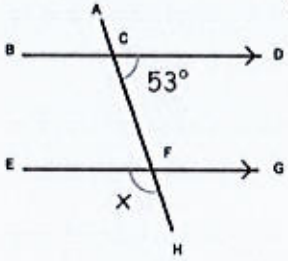
(c)



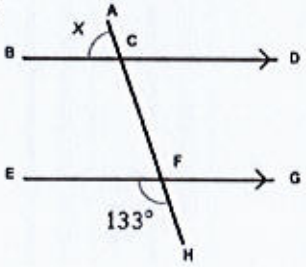
(d)



(e)

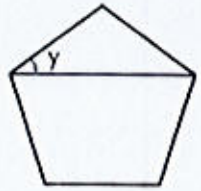


(f)

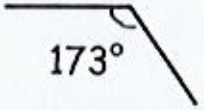


Applying knowledge

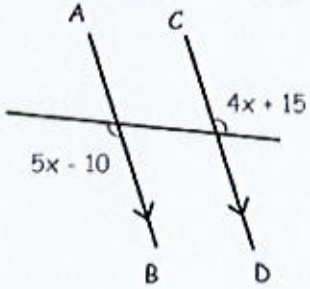
Shown is a regular pentagon.
Find y.



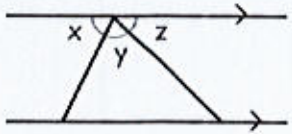
Explain why this cannot be an interior angle from regular polygons.



Find x



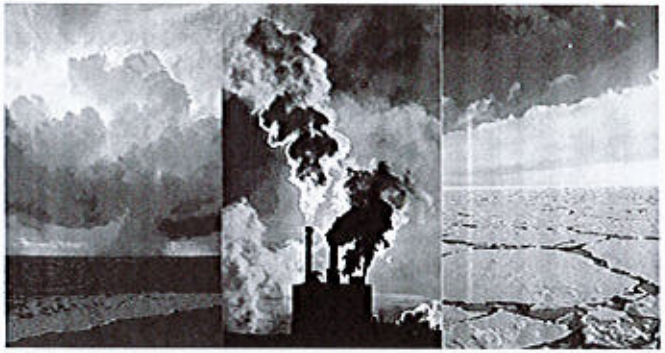
Matilda is proving that the angles in a triangle add up to 180°.
She has started with this diagram.
Complete her proof.



Origins of the universe and human responsibility

Key Terms

The Universe = The universe is all of space and time and their contents, including planets, stars, galaxies, and all other forms of matter and energy.
The Big Bang Theory = The Big Bang Theory is the leading explanation about how the universe began.
Creation = the action or process of bringing something into existence.
Fundamentalist = a person who believes in the strict, literal interpretation of scripture in a religion.
Liberal = Christians who interprets and reforms Christian teaching by taking into consideration modern knowledge, science and ethics
Evolution =Evolution is change in the heritable characteristics of biological populations over successive generations.
Pollution =Pollution is the introduction of harmful materials into the environment.
Global warming = Global warming is the long-term heating of Earth's climate system



Global warming and climate change

The global climate has been changing since time began and will continue to change into the future. The Earth's temperature has fluctuated in the last few hundred years. However, since around 1950 there has been a dramatic increase in global temperatures. This increase is known as global warming.

Stewardship and Dominion

Christians believe that God appointed human beings to oversee what he created, and to care for the world as responsible custodians. Then God said, 'Let us make man in our image, after our likeness. And let them have dominion over the fish of the sea and over the birds of the heavens and over the livestock and over all the earth and over every creeping thing that creeps on the earth.' (Genesis 1:26)

Many Christians understand this as evidence that humans have **dominion** over God's creation. This could suggest that humans have the power to use the world and its resources as they like, but it does not mean that humanity should exploit the Earth's resources.

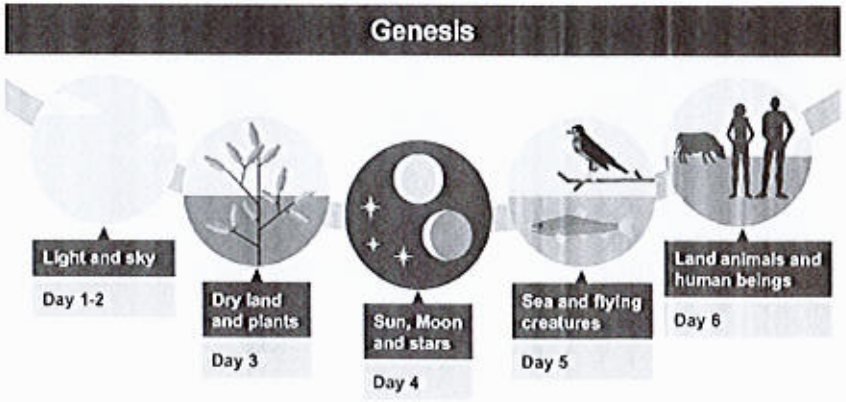
This teaching suggests that humanity's purpose is to look after the world that God has created. This is known as **stewardship**.
The Lord God took the man and put him in the Garden of Eden to work it and take care of it. (Genesis 2:15)

The Big Bang Theory

According to the **Big Bang** theory, about 13.8 billion years ago the whole Universe was a very small, extremely hot and dense region. From this tiny point, the whole Universe expanded outwards to what exists today.

Evidence from red-shift
Astronomers have discovered that, in general, the further away a galaxy is, the more red-shifted its light is. This means that the further away the galaxies are, the faster they are moving. This is similar to an explosion, where the bits moving fastest travel furthest from the explosion. Red-shift data provides evidence that the Universe, including space itself, is expanding.

How do you think the Universe was created?

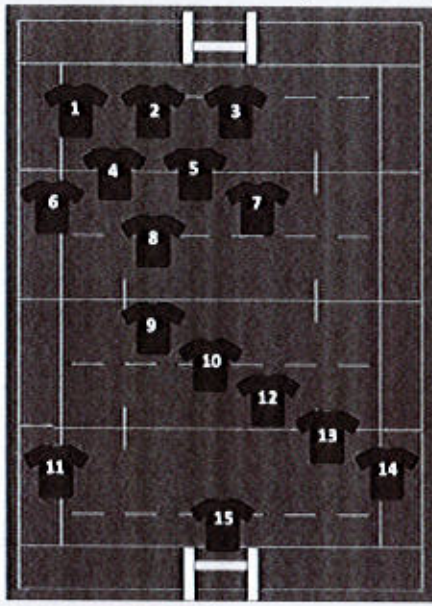


Subject Knowledge Organiser
Rugby – Laws, Player Positions & Pitch Dimensions

Laws

- The rugby game is broken down into two 40-minute halves with a 10-minute rest period in between.
- The time during a game can be stopped for an incident. Therefore, the game stops on exactly 80 minutes.
- The game must have one referee and two touch judges.
- The game is stopped if a player is fouled and there is no subsequent advantage. Unlike most sports, a referee can wait to see how an incident unfolds before deciding whether the attacking had an advantage.
- A tackle cannot be made above the nipple line or by tripping a player with your feet.
- A lineout is called if the ball travels past the side-line.
- A lineout consists of up to seven players and players can be lifted in order to catch the ball.
- At a lineout, both teams can compete to win the ball.
- To successfully covert a kick, the ball must travel the top section of the goal.
- If a ball, when kicked, hits the post and bounces in field, then play can continue.
- In order to stay onside in rugby, the attacking players must remain behind the ball of the player passing to them.
- A referee may award a foul if they believe an unfair act is committed by a player. A foul contravenes the laws of the game and can be for a range of offences (kicking the player, offside, dropping the ball).
- In cases of foul play, a referee can award players with either a yellow or red card. A yellow card provides a player with a warning about their conduct (sin binned for 10 minutes) and a red card requires them to leave the pitch immediately.

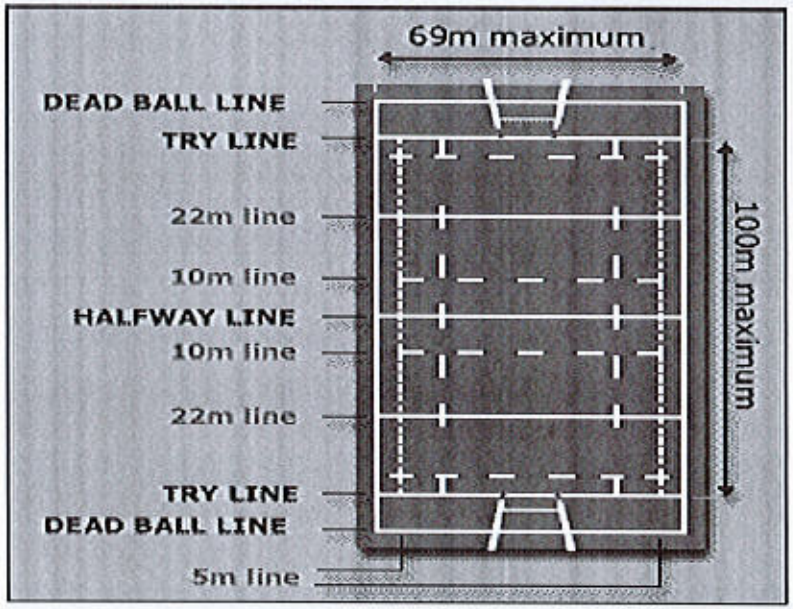
Player Positions



Forwards
1 Loosehead Prop
2 Hooker
3 Tighthead Prop
4 Lock (Second Row)
5 Lock (Second Row)
6 Blindside Flanker
7 Openside Flanker
8 Number 8

Backs
9 Scrum Half
10 Fly Half
11 Left Wing
12 Inside Centre
13 Outside Centre
14 Right Wing
15 Full Back

Pitch Dimensions



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Subject Knowledge Organiser
Rugby – Tackle, Grubber Kick, Spin Pass & High Ball Catch

Tackle

- ❑ The tackle is an essential skill for winning the ball back in rugby or stopping an attacking player. It is very important to complete it with good timing and technique to prevent injury or accidents.
- ❑ Position your body to the opponent's right-hand side (safe side).
- ❑ Position your left foot forward into a slight opposition.
- ❑ Make contact by putting your right shoulder into the opponent's mid-right thigh.
- ❑ Make sure your head is on the other side of the ball carrier so their body is between your shoulder and head.
- ❑ Bring your arms up and wrap them around the ball carrier, just above their knees (do not lock your hands together).
- ❑ Squeeze your arms and pull the ball carrier into your body.
- ❑ As you squeeze, push your shoulder into the ball carrier, as though you are trying to push him away with your head.
- ❑ Continue pushing until both you and the ball carrier fall to the ground.
- ❑ Keep your head as close as you can to their thigh throughout.

Grubber Kick

- ❑ The grubber kick is a simple low kick that aims to move the ball past defences for attacking players to try and retrieve. It is very good at breaking defensive positions and forces defenders to turn around and chase.
- ❑ Stand in opposition on the balls of your feet, with the non-kicking foot in front.
- ❑ Lean forward so the head and chest should be comfortably over the ball.
- ❑ Hold the ball vertically at waist height, with hands either side of the ball.
- ❑ Extend arms fully so the ball is half a metre out in front.
- ❑ Drop the ball and point toes towards the ground.
- ❑ Keep the knee bent and over the ball.
- ❑ Strike the upper half of the ball with the laces, just before it bounces.
- ❑ Extend the leg through so it is straight, with toes pointing at the target.

Spin pass

- ❑ A spin pass enables a team to quickly pass a ball and help maintain possession.
- ❑ Stand on balls of feet in opposition (left foot forward), knees slightly bent with body facing forward.
- ❑ Hold the ball out in front of you with extended arms.
- ❑ Put the right hand on the bottom half of the right hand side of the ball.
- ❑ Point the thumb up along the seam of the ball and spread the fingers around the side of the ball.
- ❑ Put the left hand on the top half of the left hand side of the ball.
- ❑ Point the thumb up along the seam of the ball and spread the fingers around the side of the ball.
- ❑ Bring the ball in towards your waist and flex your elbows at a 90° angle.
- ❑ Rotate your shoulders round until your left shoulder is pointing forward.
- ❑ Draw the ball back across to the right hip, keeping your elbows slightly bent.
- ❑ Sweep the ball across your body, keeping the elbows close to your body and shift your weight from your back leg to your front foot.
- ❑ Release the ball when arms are nearly fully extended with a flick of the wrists and fingers.
- ❑ Follow through with your fingers pointing to the target.

High ball catch

- ❑ A high ball catch is an attacking and defending skill. It is useful for attackers when completing an up and under kick or as a defender to stop an attacking team's momentum by safely winning possession back.
- ❑ Call for the ball.
- ❑ Get in line with the ball's path and keep your eyes on the ball at all times.
- ❑ Move towards the ball and extend your arms out in front of you at chest height.
- ❑ Slightly bend your elbows and have your palms facing up and fingers spread.
- ❑ Jump up off one foot.
- ❑ As you are about to catch the ball, turn slightly to one side, so the side of the body is pointing downfield.
- ❑ Raise the other knee up towards the waist to generate additional upward momentum.
- ❑ Catch the ball with the hands at or above eye level.
- ❑ Bring the ball into your body.
- ❑ Secure the ball against your body as you land on the ground.
- ❑ Land on one to two feet.

https://www.bbc.com/bitesize/topics/zp2m7hv

Subject Knowledge Organiser

Netball – Rules, Officials, Scoring, Player Positions & Court Dimensions

Rules

- ❑ Players are not allowed to travel with the ball.
- ❑ A team can have up to 12 players but only seven are allowed to play on court.
- ❑ Defending players are unable to snatch or hit the ball out of another player's hands.
- ❑ A defending player is only allowed to stand beside the player with the ball until it has left their hands.
- ❑ A defending player must stand three feet away from the person with the ball.
- ❑ An attacking player is unable to hold the ball for more than three seconds.
- ❑ Players must remain within their designated zones.
- ❑ The team retaining possession after the ball goes out of play have three seconds at the side-line to get the ball back into play.

Officials

During a competitive game of netball there are two referees and up to two scorekeepers and timekeepers officiating.

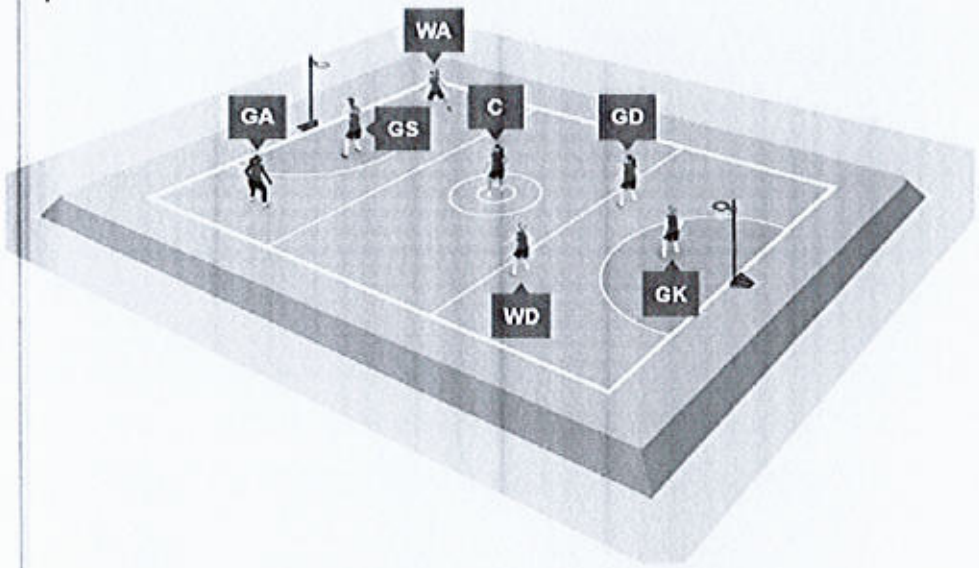
Scoring

In a game of netball there are two clear ways to score points:

1.In open play, if a shot is successfully scored from inside the goal circle, the team gains one point.

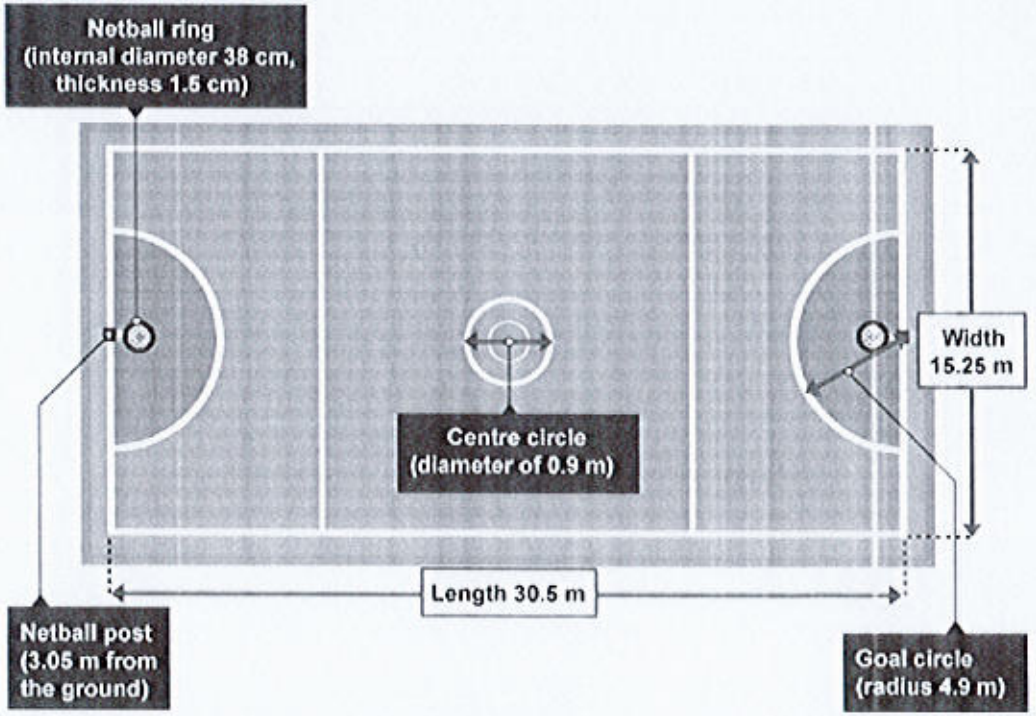
2.If the team is awarded a technical foul then they will receive a free shot at the net. A successful shot will be awarded with one point.

Player Positions



GS	Goal shooter	GA	Goal attack	WA	Wing attack
C	Centre	WD	Wing defence	GD	Goal defence
GK	Goal keeper				

Court Dimensions



Subject Knowledge Organiser
Netball – Bounce Pass, Chest Pass, Shoulder Pass & Pivoting

Bounce Pass

A bounce pass is a short pass that enables the player to find a teammate in a crowded area. The height of the ball makes it difficult for the opposition to reach and intercept.

Stage one
Feet shoulder-width apart in opposition, with knees bent. Place hands each side and slightly behind the ball, with the fingers comfortably spread. Hold the ball at waist level, with elbows tucked in.

Stage two
Step in the direction of the pass, through extending your legs, back and arms. The wrist and fingers should be forced through the ball releasing it off the first and second fingers of both hands. Follow through with the arms fully extended, fingers pointing at the target and thumbs pointing to the floor.

Chest Pass

A chest pass is a very fast and flat pass which enables a team to move quickly up a court in a precise and accurate fashion.

Stage one
Stand with feet shoulder width apart and on the balls of your feet, with back straight and knees slightly bent. Place hands on the sides of the ball with the thumbs directly behind the ball and fingers comfortably spread.

Stage two
The ball should be held in front of the chest with the elbows tucked in. Step in the direction of the pass, by extending their legs, back, and arms. Push the ball from the chest with both arms (not from one shoulder). Fingers are rotated behind the ball and the thumbs are turned down.

Stage three
The back of the hands face one another with the thumbs straight down. Make sure the ball is released off the first and second fingers of both hands. Follow through to finish up with the arms fully extended, fingers pointing at the target and thumbs pointing to the floor.

Shoulder Pass

A shoulder pass is a very dynamic, fast and long pass which enables a team to switch positions on court very quickly to either find a player in space or break defensive screens.

Stage one
Player's feet should be shoulder width apart in opposition. Opposite foot forward to throwing arm. Stand on balls of feet with toes pointing toward target, and knees slightly bent. Hold the ball at head height, slightly behind your head. Elbow should be at a 90° angle. Fingers spread behind the ball.

Stage two
Step in the direction of the pass by transferring your body weight from back foot to front foot. Pull the arm through with the elbow leading. To follow through, fully extend your arm and wrist. Point your fingers in the same direction as the pass, with palms facing down.

Pivoting

The pivoting action is a swivel movement that allows the player to move on a fixed axis to either pass or shoot.

Stage one
Run towards the ball and jump by extending the legs and ankles. Keep your eyes firmly fixed on the ball. Bring your hands out in front of your body at chest height with fingers spread open and pointing up.

Stage two
In the air catch the ball with thumbs an inch or two apart making a 'W' shape. Land on the ball of one foot on the ground. Flex your knee and ankle as your foot hits the floor.

Stage three
Stand with knees slightly bent and your feet shoulder width apart. Bring the ball into your body to protect it. Pivot by rotating yourself on the ball of your landing foot. Keep your upper body straight and head up. Make sure the hip of your pivoting leg is pointing in the direction you are aiming to pass the ball in. You can move or step with the other foot any number of times. You are not allowed to lift the foot you are pivoting on before you release the ball.

Subject Knowledge Organiser
Basketball – Rules, Scoring, Officials, Court Dimensions & Player Positions

Rules

- ❑ A basketball team can have a maximum of five players on the court.
- ❑ Player substitutions can be made at any time and there is no restriction on the number of substitutions made.
- ❑ A ball can travel through dribbling or passing.
- ❑ A player is no longer able to dribble with the ball once the player puts two hands on the ball. At this point, a player must either pass or shoot.
- ❑ If a team wins possession back in their own half, they have ten seconds to get it into their opponent's end or a foul will be called.
- ❑ An attacking team has 24 seconds from gaining possession of the ball to shoot
- ❑ After the shot is taken, the clock is restarted for another 24 seconds.
- ❑ After a team scores a basket, the ball is returned back to the opposition to start again.
- ❑ All fouls that are committed throughout a game are to be accumulated and when a certain number is reached, the umpire will award a free throw.
- ❑ Depending on where a technical foul is committed, the umpire may award a number of free throws a player will receive.
- ❑ Violations can be awarded by the officials in basketball for player handling errors. These include travelling, double dribble, goal-tending and back court violation.

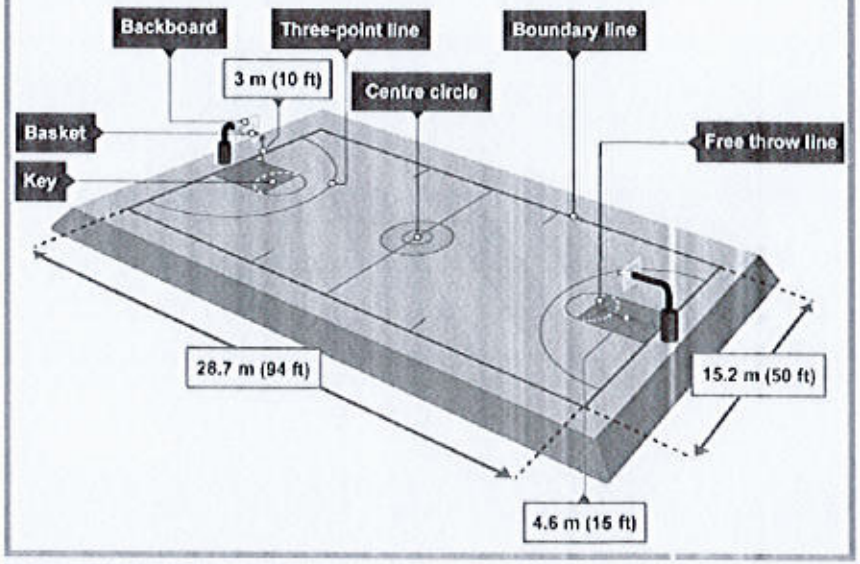
Scoring

In a game of basketball there are three clear ways to score points. If a shot is successfully scored from outside of the three-point line, three points are awarded. If a shot is successfully scored from inside of the three-point line, two points are awarded. If a team is awarded a technical foul then they will receive between one and three free shots. Each shot scored will be awarded with one point.

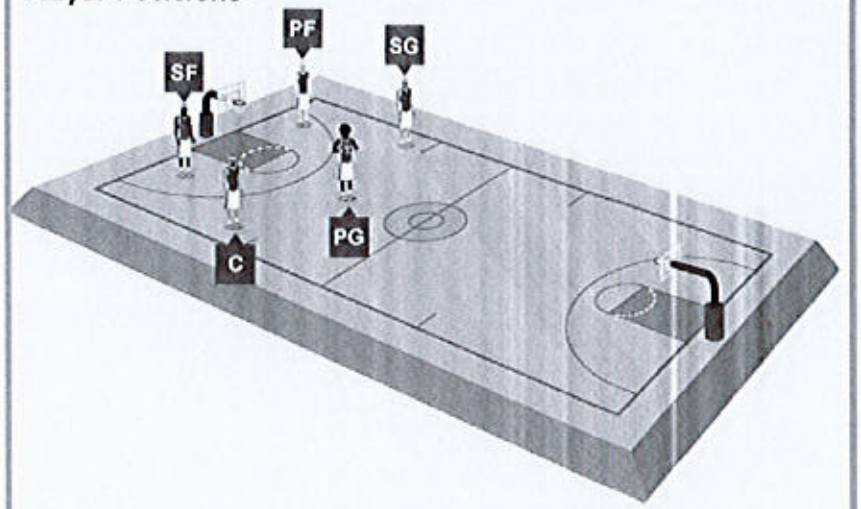
Officials

During a competitive game of basketball there are two referees, a scorekeeper, timekeeper and a shot clock operator. To ensure that everybody is aware of a decision made, the referees perform a series of hand and arm signals.

Court Dimensions



Player Positions



SF Small forward | PF Power forward | SG Shooting guard

C Centre | PG Point guard

Subject Knowledge Organiser
Basketball – Bounce Pass, Chest Pass, Jump Shot & Lay-up

Bounce Pass

A bounce pass is a short pass that enables the player to find a teammate in a crowded area. The height of the ball makes it difficult for the opposition to intercept.

Stage one
Feet shoulder width apart in opposition, with knees bent. Place hands each side and slightly behind the ball, with the fingers comfortably spread. Hold the ball at waist level, with elbows tucked in.

Stage two
Step in the direction of the pass, through extending your legs, back and arms. The wrist and fingers should be forced through the ball releasing it off the first and second fingers of both hands. Follow through with the arms fully extended, fingers pointing at the target and thumbs pointing to the floor.

Chest Pass

A chest pass is a very fast and flat pass. This enables a team to move quickly up a court in a precise and accurate fashion.

Stage one
Stand with feet shoulder width apart, on the balls of your feet with back straight and knees slightly bent. Place hands on the sides of the ball with the thumbs directly behind the ball and fingers comfortably spread. The ball should be held in front of the chest with the elbows tucked in.

Stage two
Step in the direction of the pass by extending your legs, back and arms. Push the ball from the chest with both arms (not from one shoulder). Fingers are rotated behind the ball and the thumbs are turned down. The back of the hands face one another with the thumbs straight down.

Stage three
Make sure the ball is released off the first and second fingers of both hands. Follow through to finish up with the arms fully extended, fingers pointing at the target and thumbs pointing to the floor.

Jump shot

The purpose of the jump shot is to allow the shooter to take aim from a higher position and therefore prevent a defender from blocking it.

Stage one
Place feet shoulder width apart, toes pointing straight ahead, and knees bent. Place non-shooting hand on the side of the ball and the shooting hand at the back of the ball, with the elbow tucked in. Hold the ball at chest height.

Stage two
Extend the legs/ankles by jumping straight up. Whilst in flight, extend back, shoulders and elbow. Flex the wrist and fingers forwards and release the ball at the highest point. After release, fingers should be pointed at the target, with the palm facing down.

Lay-up

A lay-up provides a player with the opportunity to drive at the opponent's basket, jump close to the target and release the ball safely at the backboard. When used effectively it has the highest percentage chance of scoring points.

Stage one
Dribble to the side of net. When a few metres away from the basket, hold the ball with both hands on the shooting hands side of the body. Place the non-shooting hand on the side of the ball, and shooting hand on top of the ball.

Stage two
The last step before the lay-up jump should ensure that take off foot is opposite to the shooting hand (left foot/right hand). Flex the knee at take-off.

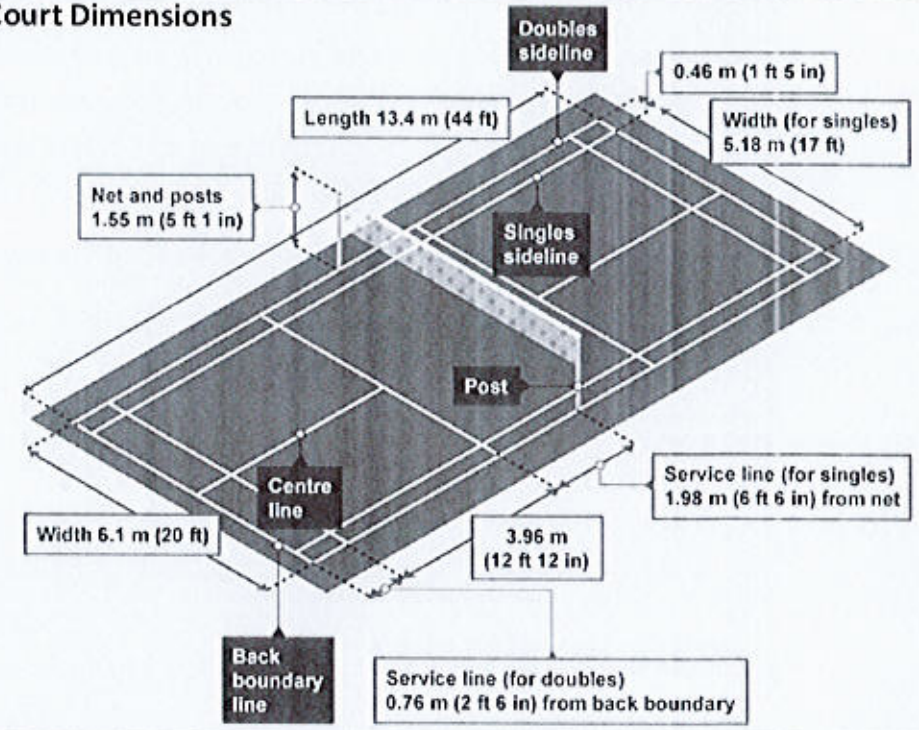
Stage three
Whilst jumping, extend the shooting knee and raise the ball up. Bring the ball between the shoulder and ear. Direct the wrist and fingers straight at the basket and release the ball at the highest point. Complete the follow through with the arm up and palm facing down, and hold until the ball has reached the basket.

Subject Knowledge Organiser
Badminton – Rules, Scoring & Officials

Rules

- A match consists of the best of three games of 21 points.
- The player/pair winning a rally adds a point to its score.
- At 20-all, the player/pair which first gains a 2-point lead wins that game.
- At 29-all, the side scoring the 30th point wins that game.
- The player/pair winning a game serves first in the next game.
- A badminton match can be played by two opposing players (singles) or four opposing players (doubles).
- A competitive match must be played indoors utilising the official court dimensions.
- A point is scored when the shuttlecock lands inside the opponent's court or if a returned shuttlecock hits the net or lands outside of the court the player will lose the point.
- At the start of the rally, the server and receiver stand in diagonally opposite service courts.
- A legal serve must be hit diagonally over the net and across the court.
- A badminton serve must be hit underarm and below the server's waist height with the racquet shaft pointing downwards, the shuttlecock is not allowed to bounce. After a point is won, the players will move to the opposite serving stations for the next point.
- The rules do not allow second serves.
- During a point a player can return the shuttlecock from inside and outside of the court.
- A player is not able to touch the net with any part of their body or racket.
- A player must not deliberately distract their opponent.
- A player is not able to hit the shuttlecock twice.
- A 'let' may be called by the referee if an unforeseen or accidental issue arises.
- A game must include two rest periods. These are a 90-second rest after the first game and a 5-minute rest after the second game.

Court Dimensions



Scoring

In recent years, badminton has changed how players can score a point. In 2006, the rules were changed to a rally point system and this now allows both players to score a point during a rally, regardless of who served.

In competitive adult matches, all games are played to a best of three games. To win a game, a player must reach 21 points. However, if the game is tied at 20-20 (or 20-all) then you are required to win by two clear points. Unlike most sports, however, if the score becomes 29-29 (or 29-all), the player or team to score the 30th point will win the game.

Subject Knowledge Organiser

Badminton – Forehand Clear, Forehand Drop Shot & Forehand Smash

Forehand Clear

The forehand clear shot enables players to move their opponent to the back of the court, creating space in the mid and front court to exploit.

Stage one

Stand in position on the balls of your feet, with knees slightly bent. Turn sideways with your left foot pointing towards the target and your right foot parallel to the baseline. The left shoulder and fully extended elbow will be pointing towards the shuttlecock. The racket elbow should be extended backwards behind the head at 90° with the face of the racket above head height. Transfer weight onto the back foot.

Stage two

Keep your eyes on the shuttlecock. Flex your wrist and elbow backward until the racket is parallel with the floor. Rotate your body and step forward towards the shuttle with your racket leg, transferring your weight through the shot. Extend your racket elbow upwards into a throwing position.

Stage three

Keep your eyes on the shuttlecock. Extend your racket elbow quickly towards the shuttlecock, with the non-racket arm rotating backwards. Make contact with the shuttlecock as high as possible in front of your body. Extend your elbow and flex your wrist on contact, to allow for a 'whip' action. Drive the shuttlecock with a high trajectory towards the back of the court.

Stage four

Your body should have fully rotated with your racket foot now bearing all the weight and facing towards the target. The racket will follow through finishing to the left hand side of your body. Return back to ready position for the next shot.

Forehand Drop Shot

The forehand drop shot enables players to move their opponent to the front court to either win a point or create space in the mid and back court to exploit.

Stage one

As the shuttlecock is returned, stand in position on the balls of your feet, with knees slightly bent. Turn sideways with your left foot pointing towards the target and your right foot parallel to the baseline. The left shoulder and fully extended elbow will be pointing towards the shuttlecock. The racket elbow should be extended backwards behind the head at 90° with the face of the racket above head height. Transfer weight onto the back foot.

Stage two

Keep your eyes on the shuttlecock. Flex your wrist and elbow backward until the racket is parallel with the floor. Rotate your body and step forward towards the shuttlecock with your racket leg, transferring your weight through the shot. Extend your racket elbow upwards into a throwing position.

Stage three

Keep your eyes on the shuttlecock. Extend your racket elbow towards the shuttlecock, with non-racket shoulder rotating backwards. Make contact with the shuttlecock as high as possible in front of your body. Extend your elbow and flex your wrist on contact. Slice across the shuttlecock with the face of the racket slightly open, or just before contact, slow the speed of the racket down, tapping the shuttle gently over the net. Hit the shuttlecock at a flat trajectory, allowing it to drop just over the net.

Stage four

Your body should have fully rotated with your racket foot now bearing all the weight and facing towards the target. The racket will follow through, finishing to the left hand side of your body. Return back to ready position.

Forehand Smash

The forehand smash shot is hit with power and speed downward into the opponent's court. The angle/steepness of the shuttlecock's trajectory make it hard for the opponent to return.

Stage one

As the shuttlecock is returned, stand in position on the balls of your feet, with knees slightly bent. Turn sideways with your left foot pointing towards the target and your right foot parallel to the baseline. Left shoulder and fully extended elbow will be pointing towards the shuttlecock. The racket elbow should be extended backwards behind the head at 90° with the face of the racket above head height. Transfer weight onto the back foot.

Stage two

Keep your eyes on the shuttlecock. Flex your wrist and elbow backward until the racket is parallel with the floor. Rotate your body and step forward towards the shuttle with your racket leg, transferring your weight through the shot. Extend your racket elbow upwards into a throwing position.

Stage three

Keep your eyes on the shuttlecock. Extend your racket elbow quickly towards the shuttlecock, with the non-racket elbow extended and shoulder rotating backwards. Make contact with the shuttlecock as high as possible in front of your body. Extend your elbow and flex your wrist on contact, to allow for a 'whip' action. Drive the shuttlecock downwards towards the floor of your opponent's court with a low trajectory.

Stage four

Your body should have fully rotated with your racket foot now bearing all the weight and facing towards the target. The racket will follow through, finishing to the left hand side of your body. Return back to ready position for the next shot.

Subject Knowledge Organiser
Table Tennis – Rules, Scoring, Officials & Table Dimensions

Rules

- To start a point, the server must stand at the back of the table and can serve either forehand or backhand. The ball must be thrown up either equal to or above the height of the net before striking the ball and the ball must be thrown from an open palm to stop finger spin.
- If the ball hits the net on a serve but continues over the other side then a 'let' is played.
- Players are allowed to hit the ball around the side of the net.
- The ball must bounce on a player's side of the table before playing their shot.
- During play, competitors are not allowed to touch the table with their non-bat hand. If they do, the point is conceded.
- Players must swap ends at the end of a game, and in the final match players will switch ends after five points.

Scoring

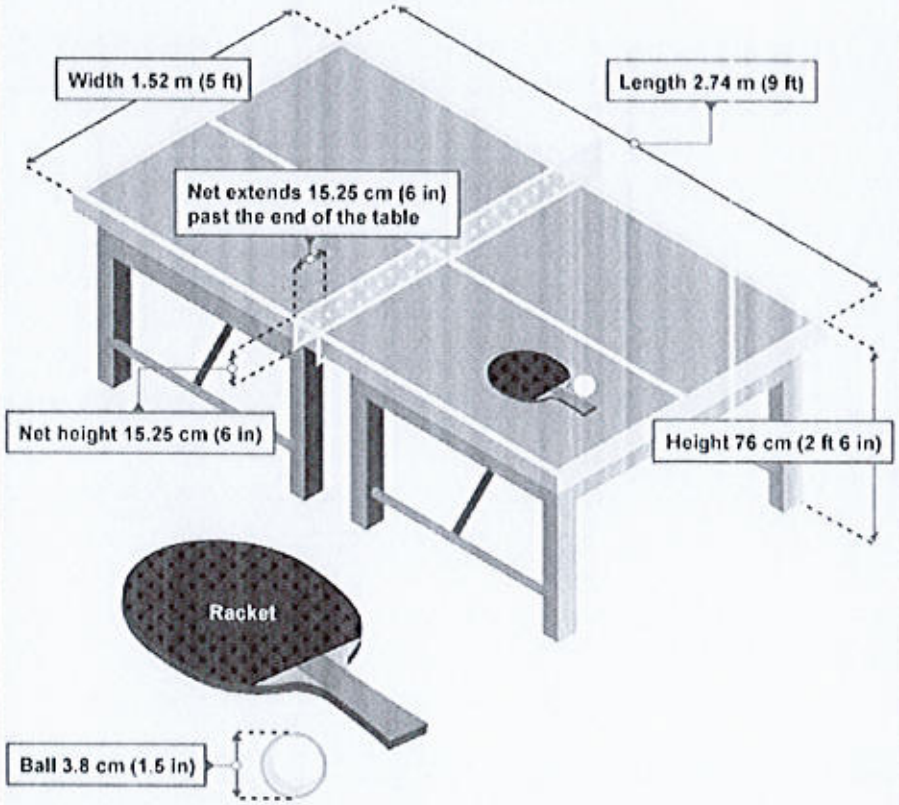
A competitive game of table tennis is played to the best of five or seven games. The first player to get to 11 points in a game is the winner. However, if a game is tied at 10-10, a player must win a game by two clear points. You do not lose service if you lose a point - each player must serve for two points in a row before handing the service over to their opponent.

Officials

For every table tennis competition, a referee is appointed with a deputy who can act on their behalf. The referee is required to be present at the venue throughout a tournament and is required to uphold the rules. During a table tennis match, an umpire is appointed to decide on the result of each point or rally. The umpire is required to use their judgement when applying the laws and regulations of the ITTF. Where the umpire is officiating alone, their decision is final and they should be seated about 2–3 metres from the side of the table and in line with the net.

Table Dimensions

A competitive table tennis table should measure 2.74 m (9 ft) long, 1.525 m (5 ft) wide and be 76 cm (2 ft 6 in) high. The surface of a table tennis table must be the same dark colour across the court and be of a matt appearance.
The net is 15.25 cm (6 in) high and extends 15.25 cm (6 in) past the end of the table. A competitive table tennis ball should bounce 23 cm high when dropped from a height of 30 cm. In all competitions, the playing area for a full size table should be 8 m long by 4 m wide. This is essential to safely allow the players to chase around the table after well-placed shots.



Subject Knowledge Organiser

Tennis Tennis – Serve, Forehand Drive, Forehand Push, Forehand Smash & Block

Forehand Serve

The tennis serve is the shot selected to begin a point in tennis. A table tennis serve can be hit either forehand or backhand. It must be thrown up from a flat palm into the air to a minimum height of six inches and visible to their opponent at all times.

Stage one

Stand in position on the balls of your feet, with knees slightly flexed. Face sideways with your shoulder pointing towards the target. Hold the ball in front of your body with left hand, right hand held back. Body weight should be on the back foot. Keep low.

Stage two

Throw the ball gently into the air (about 6 inches) with the palm of your hand. As the ball begins to drop, hold a forward stance and strike the ball flat with a fast arm in the middle of the ball. Transfer body weight from back to front foot.

Stage three

Follow through with the bat pointing towards the intended target. Return back to ready position for the next shot.

Forehand Drive

A forehand drive in table tennis is an offensive stroke that is used to force errors and to set up attacking positions. A successful shot should land close to your opponent's baseline or side-line.

Stage one

As the ball is returned, stand in position on the balls of your feet, with knees slightly flexed. Face sideways with your shoulder pointing towards the target. Body weight should be on the back foot.

Stage two

When ready to strike the ball, point your free arm towards the ball. At impact, rotate your body quickly to face forwards. Aim to hit the ball at its highest point. Transfer body weight from back to front foot.

Stage three

Follow through with the bat pointing towards the intended target. Return back to ready position for the next shot.

Forehand Push

A forehand push is a difficult defensive shot that requires the player to strike downwards on the back and underneath the ball to create backspin. When performed correctly, a forehand push is used to change the pace of an exchange or to return the ball in a very low manner.

Stage one

Stand square to the table in slight position and keep your feet shoulder width apart. Slightly flex your knees, leaning forward and hold your arms out in front. Keep close to the table.

Stage two

When ready to strike the ball, draw the bat backwards to the side of the body (strongest side). Hold the bat in an open angle with a straight wrist and your playing arm just in front of the body.

Stage three

On impact, bring the arms forward and ensure that power comes from the elbow and forearm (it is not a swing shot). Aim to hit the ball at its highest point. Transfer body weight from back to front foot.

Stage four

After impact, point the bat to where you want to hit the ball. Ensure that your arm does not swing across your body to the left. Return back to ready position for the next shot.

Forehand Smash

The forehand smash is a fast, hard and powerful stroke that aims to force the opponent away from the table or to win a point outright. However, the shot is not always about force and requires the player to use good timing, technique and precision simultaneously.

Stage one

As the ball is returned, stand in position on the balls of your feet, with knees slightly flexed. Face sideways with your shoulder pointing towards the target. Body weight should be on the back foot.

Stage two

When ready to strike the ball, point your free arm towards the ball. Raise the racket to a high position to generate downwards and forwards power.

Stage three

As the ball bounces off the table, rotate your body quickly to face forwards. Aim to hit the ball at its highest point. Transfer body weight from back to front foot. Return back to ready position for the next shot.

Block

The block shot is a defensive stroke that allows a player to use the speed of their opponent's shot against them. It needs to be completed straight after the bounce to ensure that the player maintains control of the ball.

Stage one

Stand square to the table in slight position and keep your feet shoulder width apart. Slightly flex your knees, leaning forward and hold your arms out in front. Keep close to the table.

Stage two

When ready to strike the ball, draw the bat backwards to the side of the body (strongest side). Hold the bat in an open position with a straight wrist and your playing arm just in front of the body.

Stage three

On impact, bring the arms forward and ensure that power comes from the elbow and forearm (it is not a swing shot). Aim to hit the ball at its highest point. Transfer bodyweight from back to front foot.

Stage four

After impact, point the bat to where you want to hit the ball. Ensure that your arm does not swing across your body to the left. Return back to ready position for the next shot.

Year 9- Computing - Advanced Image Editing Knowledge Organiser

Key Words	
Vector Image	• Is created in graphics packages and consist of shapes called objects. • Even if an object in a vector graphic is quite large, it doesn't need a lot of computer. memory. Therefore the file size of a vector graphic is often very small. • Are scalable - i.e. when you resize them, they do not lose quality.
Bitmap (raster) Image	• Is composed of many tiny parts, called pixels. The pixels are often many different colours. • It is possible to edit each individual pixel. • Since the computer has to store information about every single pixel in the image, the file size of a bitmap graphic is often quite large. • Are NOT scalable - i.e. when you resize a bitmap graphic, it tends to lose quality.
Manipulation	• Transforming or altering an asset using methods/techniques to achieve desired results.
Composition	• Is the result of 2 or more images that have been combined or overlaid.
Layer	• Photoshop layers are like sheets of stacked acetate. • Transparent areas on a layer let you see layers below. You use layers to perform tasks such as compositing multiple images, adding text to an image, or adding shapes.
Client brief	• Outlines the client's objectives, expectations, target audience, budget, timeline, and any specific requirements or constraints that must be considered
Target audience	• A group of people identified as likely customers of a product. The product should be developed with them in mind so they are more likely to buy.

Why someone might use Photoshop to manipulate an image.

- To improve it in some way, e.g. by removing a spot from a supermodel's nose!
- To use as proof that something actually happened, e.g. UFO flying over your house!
- To provoke a shock reaction.
- To create a piece of art.

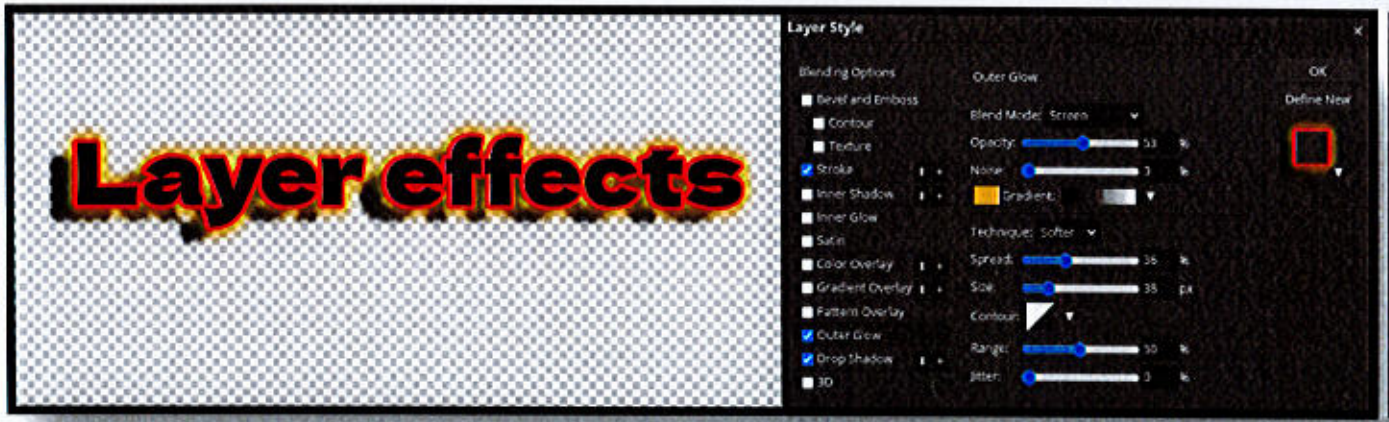
File Types.

- . JPG (Lossy) - Joint Photographic Experts Group, does not keep transparency.
- . PNG (Lossless) - Portable Network Graphic, good for images in colour, larger file size than a jpeg, keeps transparency.
- . TIFF (Lossless) - Tagged Image File Format, not used on the WWW due to its very large file size, file standard in printing.

Shortcuts

Ctrl + D	Deselect
Ctrl + T	Free transform
Ctrl + alt + z	Go backwards a step
Ctrl + "-" (or use +)	Zoom in and out

Layer effects

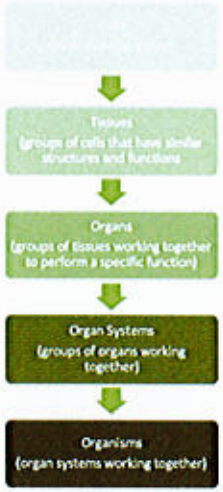


Warping Text

Cells and Organisation 2B
Knowledge Organiser

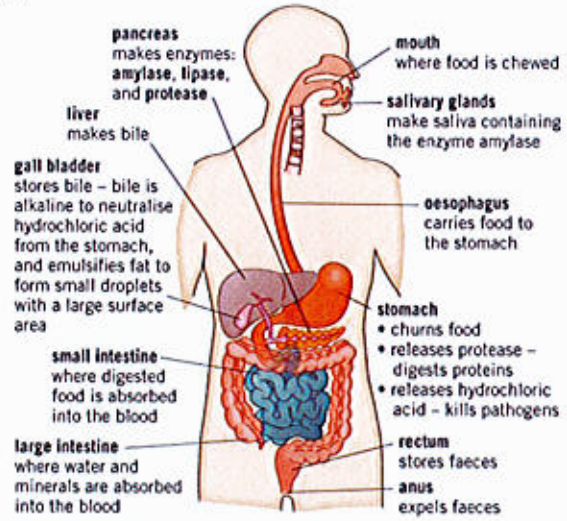
Organisation of living things

There are five levels of organisation in living organisms:



The Digestive System

The role of the digestive system is to break large insoluble molecules into smaller soluble molecules. Here are the organs that make up the digestive system and their roles in digestion.



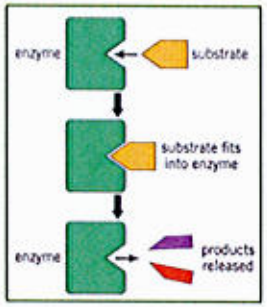
Enzymes

Enzymes are large proteins that catalyse (speed up) reactions. Enzymes are not changed in the reactions they catalyse.

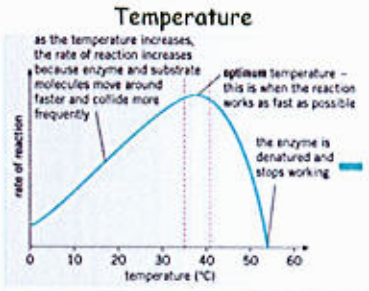
Lock and Key Model

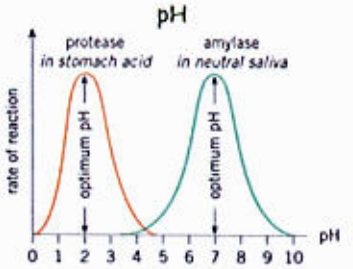
This is a simple model of how enzymes work:

1) The enzyme's active site (where the reaction occurs) is a specific shape.
2) The enzyme (the lock) will only catalyse a specific reaction because the substrate (the key) fits into its active site.
3) At the active site, enzymes can break molecules down into smaller ones or bind small molecules together to form larger ones.
4) When the products have been released, the enzyme's active site can accept another substrate molecule.



Factors affecting enzymes





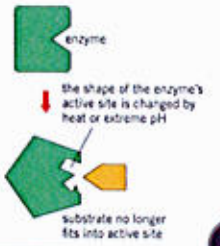
Digestive Enzymes

Enzyme	Sites of production	Reaction catalysed
Amylase	salivary glands pancreas small intestine	Starch → glucose (a simple sugar)
Proteases	stomach pancreas small intestine	Proteins → amino acids
Lipases	pancreas small intestine	Lipids → fatty acids and glycerol

Denaturation

At extremes of pH or at very high temperatures the shape of an enzyme's active site can change.

The substrate can no longer bind to the active site, so the enzyme cannot catalyse the reaction – the enzyme has been denatured.



Key terms

active site amylase catalyse denatured enzyme lipase optimum protease substrate

Cells and Organisation 2B
Knowledge Organiser

The blood

The blood is a tissue made up of four main components:

1. **Red blood cells** – bind to oxygen and transport it around the body.
2. **Plasma** – transports substances and blood cells around the body.
3. **Platelets** – form blood clots to create barriers to infections.
4. **White blood cells** – part of the immune system to defend the body against pathogens.

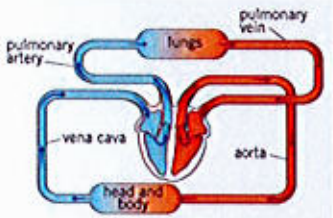
The blood vessels

Vessel	Function	Structure	Diagram
artery	carries blood away from the heart under high pressure	- Thick, muscular and elastic walls - Walls that stretch to withstand high pressure - Small lumen	
vein	carries blood to the heart under low pressure	- Have valves to stop blood flowing the wrong way - Thin walls - Large lumen	
capillary	carries blood to tissues and cells and connects arteries and veins	One cell thick – short diffusion distance for substances to move between the blood and tissues (e.g., oxygen into cells and carbon dioxide out) - Very narrow lumen	

Double circulatory system

The human circulatory system is described as a double circulatory system because blood passes through the heart twice for every circuit around the body:

- The right ventricle pumps blood to the lungs where gas exchange takes place
- The left ventricle pumps blood around the rest of the body.



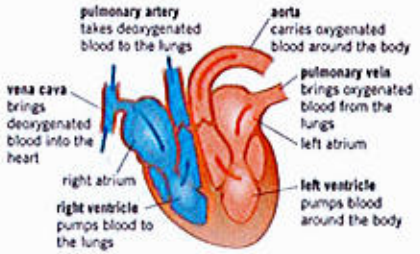
Key terms

stent statins cholesterol transplants Artificial hearts alveoli aorta atrium bronchi bronchiole coronary plasma platelet pulmonary vein vena cava ventricle capillary

The heart

The heart is an organ that pumps blood around your body. It is made from **cardiac** muscle tissue, which is supplied with oxygen by the **coronary artery**.

Heart rate is controlled by a group of cells in the right **atrium** that generate electrical impulses, acting as a pacemaker. Artificial pacemakers can be used to control irregular heartbeats.



Coronary heart disease

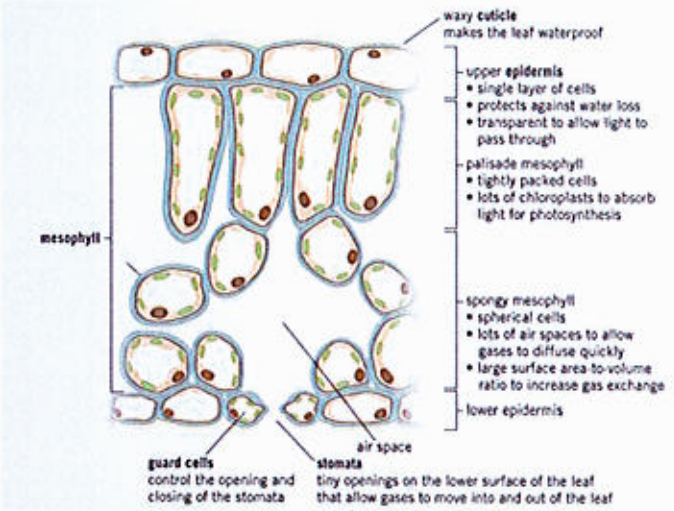
Coronary heart disease (CHD) occurs when the coronary arteries became narrowed by the build-up of layers of fatty material within them. This reduces the flow of blood, resulting in less oxygen for the heart muscle, which can lead to heart attacks.

	Description	Advantages	Disadvantages
Stent	Inserted into blocked coronary arteries to keep them open.	- Widens the artery – allows more blood to flow - Less serious surgery	- Can involve major surgery – risk of infection, blood loss and blot clots - Risks from anaesthetic
Statins	Drugs that reduce blood cholesterol levels, slowing down the deposit of fatty material in the arteries	- Effective - No need for surgery - Can prevent CHD from developing	- Possible side effects such as muscle pain, headaches and sickness - Cannot cure CHD, so patient will have to take tablets for many years.
Replacement heart valves	Heart valves that leak or do not open fully, preventing control of blood flow though the heart, can be replaced with biological or mechanical valves.	- Allows control of blood flow through the heart - Long-term cure for faulty heart valves	Risks related to surgery (as with stents)
Transplants	If the heart fails a donor heart, or heart and lungs, can be transplanted. Artificial hearts can be used to keep patients alive whilst waiting for a transplant, or to allow the heart to rest during recovery.	- Long-term cure for the most serious heart conditions - Treats problems that cannot be treated in other ways.	- Transplants may be rejected if the donor is not a match. - Lengthy process - Risks related to surgery (as with stents)

Cells and Organisation 2B
Knowledge Organiser

Tissues in a leaf

Leaves are organs because they contain many tissues that work together to perform photosynthesis.



Stomata

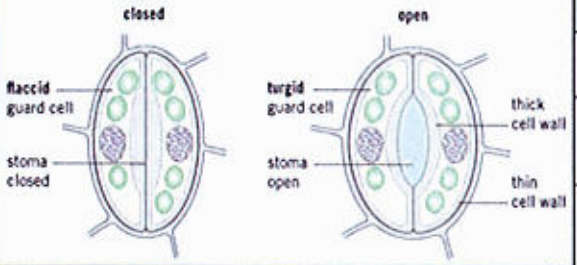
Stomata are tiny openings in the undersides of leaves - this placement reduces water loss through evaporation.

They control gas exchange and water loss from leaves by:

- Allowing diffusions of carbon dioxide into the plant for photosynthesis
- Allowing diffusion of oxygen out of the plant

Guard cells are used to open and close the stomata.

When a plant has plenty of water, the guard cells become turgid. The cell wall on the inner surface is very thick, so it cannot stretch as much as the outer surface. So as the guard cells swell up, they curve away from each other, opening the stoma.



Key terms

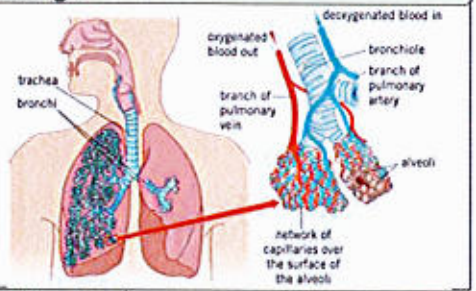
cuticle epidermis flaccid mesophyll stomata phloem xylem turgid translocation transpiration guard cell

The lungs

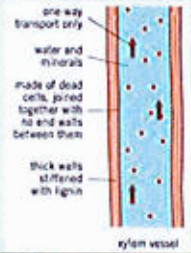
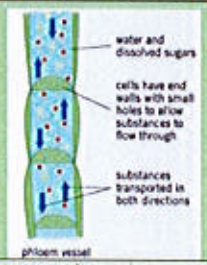
When breathing in air moves:

1) Into the body through the mouth and nose
2) Down the **trachea**
3) Into the **bronchi**
4) Into the **bronchioles**
5) Into the **alveoli** (air sacs).

Oxygen then diffuses into the blood in the network of capillaries over the surface of the alveoli.



Transportation in plants

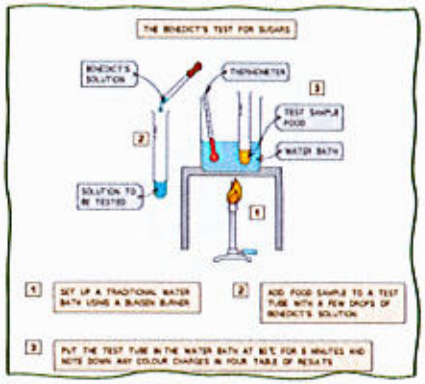
	Transpiration	Translocation
Description	Water is lost through the stomata by evaporation. This pulls water up from the roots through the xylem and is called transpiration. The constant movement of water up the plant is called the transpiration stream.	The movement of dissolved sugars from the leaves to the rest of the plant through the phloem.
Importance	Provides water to cells to keep them turgid. Provides water to cells for photosynthesis Transports mineral ions to leaves.	Moves dissolved sugars made during photosynthesis to other parts of the plant. This allows for respiration, growth and glucose storage.
Specialised Tissues		

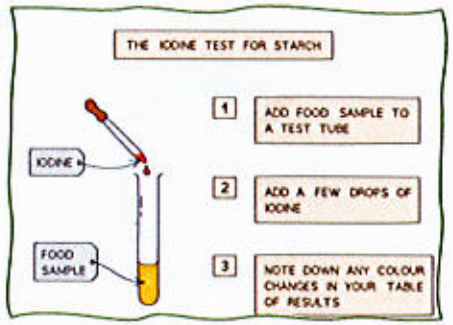
Factors affecting the rate of transpiration

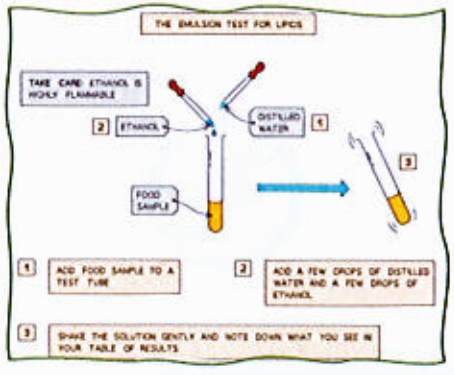
Factor	Effect on transpiration	Because...
temperature	higher temperatures increase the rate of transpiration	water evaporates faster at higher temperatures
humidity	lower humidity increases the rate of transpiration	the drier the air the steeper the concentration gradient of water molecules between the air and the leaf
wind speed	more wind increases the rate of transpiration	wind removes the water vapour quickly, maintaining a steeper concentration gradient
light intensity	Higher light intensity increases the rate of transpiration	stomata open wider to let more carbo dioxide into the leaf for photosynthesis

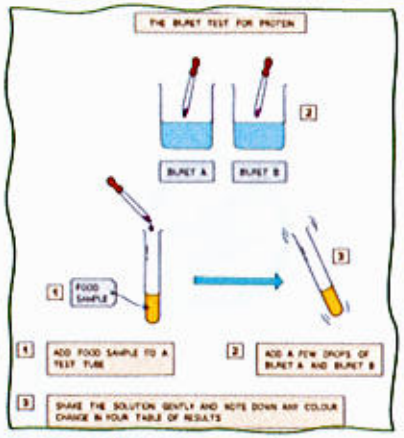
Cells and Organisation 2B
Knowledge Organiser

Testing Foods







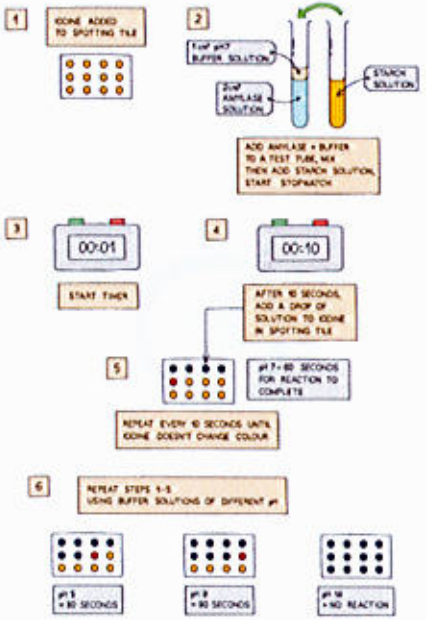


Food Test	Colour of reagent	Positive test result	Negative test result
Iodine for starch	orange-brown	blue-black	orange-brown (no change)
Benedict's for sugar	light blue	green to brick-red	light blue (no change)
Ethanol for lipid	colourless	cloudy emulsion	colourless (no change)
Biuret for protein	blue	lilac-purple	blue (no change)

Investigating Enzymes

Method

- Place single drops of iodine solution in rows on the tile
- Label a test tube with the pH to be tested
- Use the syringe to place 2cm3 of amylase in the test tube
- Add 1cm3 of buffer solution to the test tube using a syringe
- Use another test tube to add 2cm3 of starch solution to the amylase and buffer solution, start the stopwatch whilst mixing using a pipette
- After 10 seconds, use a pipette to place one drop of the mixture on the first drop of iodine, which should turn blue-black
- Wait another 10 seconds and place another drop of the mixture on the second drop of iodine
- Repeat every 10 seconds until iodine solution remains orange-brown
- Repeat experiment at different pH values - the less time the iodine solution takes to remain orange-brown, the quicker all the starch has been digested and so the better the enzyme works at that pH



Key terms

active site amylase catalyse denatured enzyme lipase optimum protease substrate

Knowledge Organiser Describing forces and motion 2

Key vocabulary:

- Vector- has magnitude and direction
- Scalar- magnitude only
- Magnitude- size
- Displacement- distance in a direction
- Newton- unit of force
- Driving force forwards force from an engine
- Friction- a force that acts when two surfaces are in contact
- Resultant force- a single force with the same effect as all of the forces acting
- Balanced forces- forces are the same size and opposite direction
- Unbalanced forces- the force on one side is not the same side as the force on the other side
- Weight- downwards force when gravity acts on an objects mass
- Air resistance- friction between air and another object
- Stretching force (tension) a force applied to a string or a rope
- Gravity- 9.8N/kg on Earth
- Moments- a turning force

Forces

Forces are everywhere and anywhere that two objects are interacting. Whenever you push, pull, stretch, squash, lift or throw an object, you are exerting a force.
Forces can act to change the speed of an object, the direction it is moving in, or its shape.

Contact forces:

- **Friction**
- **Air resistance**
- **Tension**
- **The normal contact force**

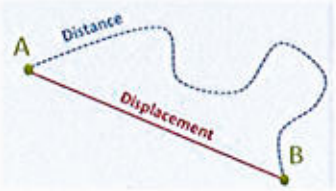
Non- contact forces:

- **Magnetism**
- **Gravitational force**
- **Electrostatic force**

Figure 2 Overcoming friction

Speed and Velocity

Speed is a **scalar** quantity; it is how fast something travels, it has the unit m/s.
Velocity is a **vector** quantity. It is speed in a given direction, it has the unit m/s.
Distance is a **scalar** quantity, and it is how far something has travelled and has the unit m.
Displacement is a vector quantity, and it is distance in a direction. If an object returns to its starting point the displacement is zero.



Speed= distance/ time
(m/s) (m) (s)

Typical speeds of people:

- **walking ~ 1.5 m/s**
- **running ~ 3 m/s**
- **cycling ~ 6 m/s**

Resultant force

A resultant force is a single force that has the same effect as all the forces acting.
Balanced forces- Same size and opposite direction
Unbalanced forces- The movement depends on the size and direction of the resultant force.

= 20N to the right

Balanced forces, resultant force is zero:

- objects at rest remains stationary
- object moving keeps moving at a constant speed

Unbalanced forces:

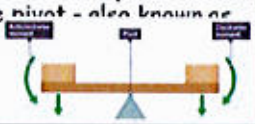
- Depends on the size and direction of the resultant force

Work done

Work is done by a force when an object is moved a distance.
Work done is energy transferred and has the unit joules, J.

Moment

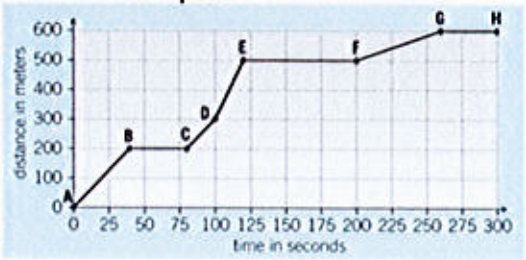
A force or system of forces may cause an object to turn.
A moment is the turning effect of a force. Moments act about a point in a clockwise or anticlockwise direction. The point chosen could be any point on the object, but the pivot - also known as the fulcrum - is usually chosen.



moment of a force = force × distance
(Nm) (N) (m)

Distance time graphs

The gradient on a distance time graph represents the speed.
A-B shows **constant speed** as it is a straight line
B-C shows the object is **stationary** as the distance is not changing
C-D is also **constant speed** but as the gradient is **steeper** is a greater constant speed



Pure and impure substances
Knowledge Organiser

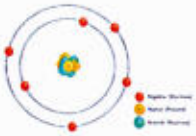
Atoms

All substances are made of atoms. An atom is the smallest part of an element that can exist.

Atoms are very small, having a radius of about 1×10^{-10}m. The radius of the nucleus us less than 1/10000 of that of the atom.

In an atom, the number of electrons is equal to the number of protons in the nucleus, Atoms have no overall electric charge.

Particle	Relative Mass	Relative Charge
Proton	1	+1
Neutron	1	0
Electron	Very small	-1



Atomic Number and Mass Number

The number of protons in an atom of an element is its **atomic number.**
All atoms of a particular element have the same number of protons.
The sum of the protons and neutrons in an atom is its **mass number.**

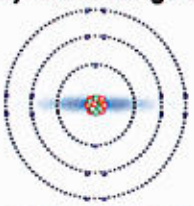
Electronic structure

The electrons in an atom occupy the lowest available energy level. The electronic structure can be represented by numbers or by a diagram. For example, the electronic structure of carbon (above) is 2,4.

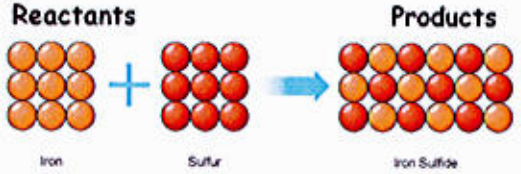
Electronic configuration

Electrons are arranged in shells. The way they are arranged is called the *electron configuration*.

1st shell holds a maximum of 2 electrons.
2nd shell holds a maximum of 8 electrons.
3rd shell holds a maximum of 8 electrons



Chemical reactions



Development of the atomic model

Scientist	Period	Discovery	Model
John Dalton	1808	Atoms described as solid spheres	
JJ Thomson	1897	Plum Pudding model - the atom is a ball of positive charge with scattered electrons	
Ernest Rutherford	1911	Alpha Scattering - concentrated positive mass in the centre. Atoms are mostly empty space.	
Niels Bohr	1913	Electrons are in shells orbiting the nucleus	
James Chadwick	1932	Neutrons in the nucleus	

Key terms

atom | atomic number | compound | electron | mass number | neutron | nucleus | proton | element

Atoms and periodic table
Knowledge Organiser

Periodic table

In the early 1800s, elements were arranged by **atomic weights**. The periodic table was not complete because some of the elements had not been found and some elements were put in the wrong group.

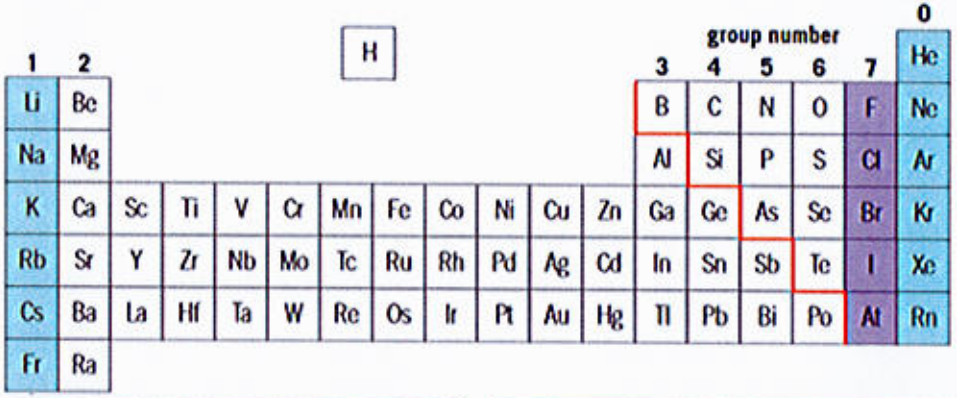
Dimitri Mendeleev (1869) left gaps in the periodic table to account for elements he thought had not yet been discovered. He put them in order of **atomic number**. Elements with properties predicted were discovered and filled the gaps. The existence of isotopes supported ordering by atomic number.

Modern Periodic table

The red step shows the divide between metals and non-metals. **Metals** are on the **left** and **non-metals** on the right.

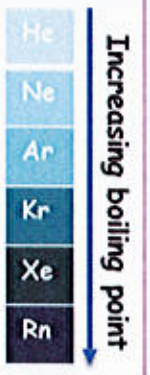
Groups are the columns in the periodic table - they go downwards. The group number shows the number of **electrons** in the **outer shell**. Elements in the same group normally follow the same trends in properties.

Periods are the rows in the periodic table - they go sideways. Each **period** shows another full shell of electrons.



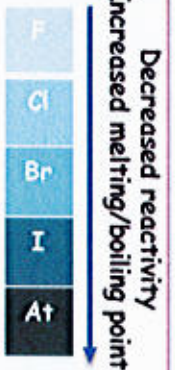
Group 0 - Noble gases

Noble gases include: **helium, neon** and **argon**. They are all **non-metals** with **low** melting and boiling points. The boiling points all increase as they go down the group due to greater intermolecular forces.
They are colourless gases at room temperature.
Group 0 elements are typically unreactive.



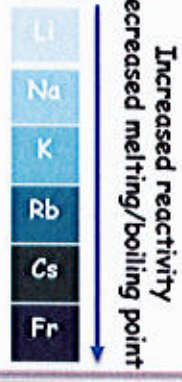
Group 7 - Halogens

Halogens include: fluorine, chlorine, bromine and iodine. They are all **non-metals**. The reactivity **decreases** as they go down the group due to an increase in difficulty gaining an extra electron. The melting and boiling points become **higher** down the group.



Group 1 - Alkali metals

Alkali metals include: lithium, sodium, potassium and rubidium. They are all soft reactive **metals**. The reactivity **increases** as they go down the group. They get bigger and it is easier for them to lose and electron if it is further from the nucleus. The melting and boiling points become **lower** down the group.



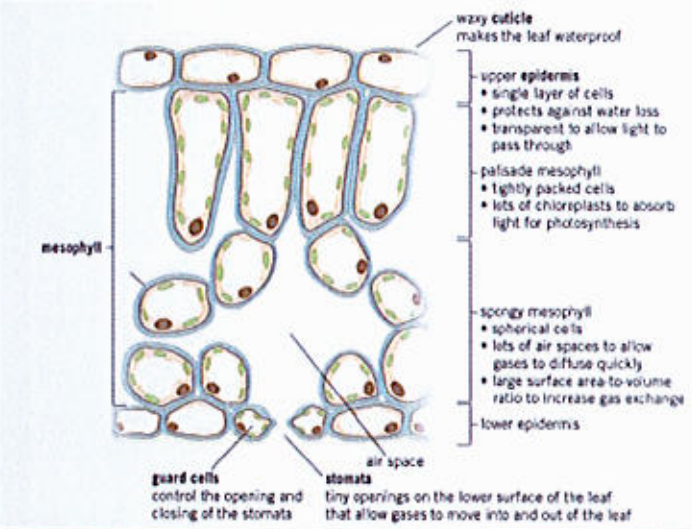
Key terms

alkali metals | group 1 | group 7 | group 0 | halogen | noble gas | Period | Trend

Photosynthesis and cellular respiration Knowledge Organiser

Tissues in a leaf

Leaves are organs because they contain many tissues that work together to perform photosynthesis.



Stomata

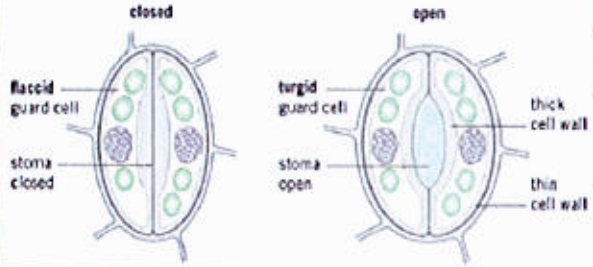
Stomata are tiny openings in the undersides of leaves - this placement reduces water loss through evaporation.

They control gas exchange and water loss from leaves by:

- Allowing diffusions of carbon dioxide into the plant for photosynthesis
- Allowing diffusion of oxygen out of the plant

Guard cells are used to open and close the stomata.

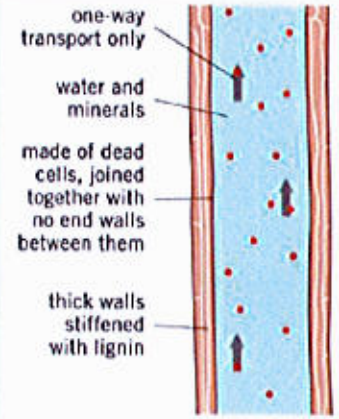
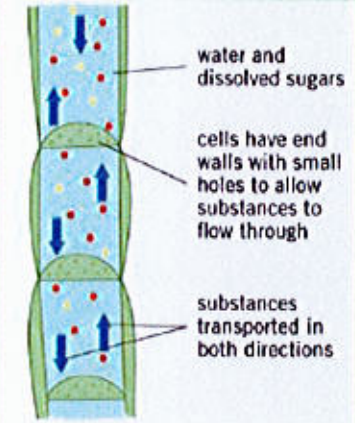
When a plant has plenty of water, the guard cells become turgid. The cell wall on the inner surface is very thick, so it cannot stretch as much as the outer surface. So as the guard cells swell up, they curve away from each other, opening the stoma.



Key terms

cuticle epidermis flaccid mesophyll stomata phloem xylem turgid translocation transpiration guard cell

Transportation in plants

	Transpiration	Translocation
Description	Water is lost through the stomata by evaporation. This pulls water up from the roots through the xylem and is called transpiration. The constant movement of water up the plant is called the transpiration stream.	The movement of dissolved sugars from the leaves to the rest of the plant through the phloem.
Importance	Provides water to cells to keep them turgid. Provides water to cells for photosynthesis Transports mineral ions to leaves.	Moves dissolved sugars made during photosynthesis to other parts of the plant. This allows for respiration, growth and glucose storage.
Specialised Tissues	 xylem vessel	 phloem vessel

Factors affecting the rate of transpiration

Factor	Effect on transpiration	Because...
temperature	higher temperatures increase the rate of transpiration	water evaporates faster at higher temperatures
humidity	lower humidity increases the rate of transpiration	the drier the air the steeper the concentration gradient of water molecules between the air and the leaf
wind speed	more wind increases the rate of transpiration	wind removes the water vapour quickly, maintaining a steeper concentration gradient
light intensity	Higher light intensity increases the rate of transpiration	stomata open wider to let more carbo dioxide into the leaf for photosynthesis

Photosynthesis
Knowledge Organiser

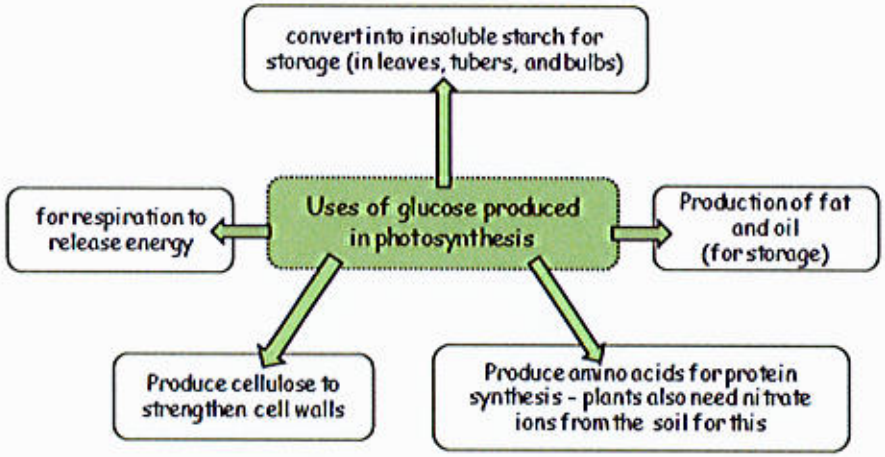
Photosynthesis reaction

Photosynthesis is a chemical reaction in which energy is transferred from the environment as light from the Sun to the leaves of a plant. This is an endothermic reaction.

Chlorophyll, the green pigment in chloroplasts in the leaves, absorbs the light energy. Leaves are well adapted to increase the rate of photosynthesis when needed.

carbon dioxide + water $\xrightarrow{\text{light}}$ **glucose** + oxygen

$6CO_2 + 6H_2O \xrightarrow{\text{light}} C_6H_{12}O_6 + 6O_2$



Inverse square law

As the distance of a light source from a plant increases, the light intensity decreases - this is called an inverse relationship. This relationship is not linear, as light intensity varies in inverse proportion to the square of the distance:

$$\text{light intensity} \propto \frac{1}{\text{distance}^2}$$

For example, if you double the distance between a light source and a plant, light intensity falls by three quarters.

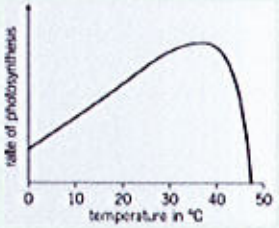
Rate of photosynthesis

A limiting factor is anything that limits the rate of a reaction when it is in short supply.

The limiting factors for photosynthesis are
- Temperature
- Carbon dioxide concentration
- Light intensity
- Amount of chlorophyll

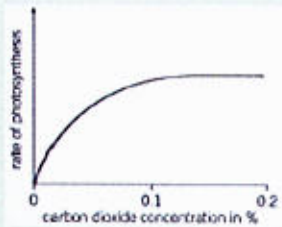
Less chlorophyll in the leaves reduces the rate of photosynthesis. More chlorophyll may be produced by plants in well-lit areas to increase the photosynthesis rate.

Limiting factors and photosynthesis rate



At low temperatures the rate of photosynthesis is low because the reactant molecules have less kinetic energy.

Photosynthesis is an enzyme-controlled reaction, so at high temperatures the enzymes are denatured and the rate quickly decreases.



Carbon dioxide is used up in photosynthesis, so increasing carbon dioxide concentration increases the rate of photosynthesis.

At a certain point, another factor becomes limiting.

Carbon dioxide is often the limiting factor for photosynthesis.

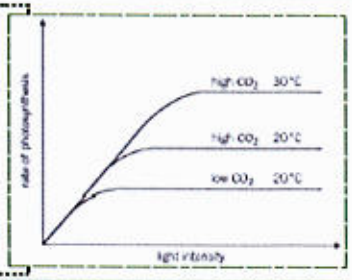
Light energy is needed for photosynthesis, so increasing light intensity increases the rate of photosynthesis.

At a certain point, another factor becomes limiting.

Photosynthesis will stop if there is little or no light.

Interaction of limiting factors

Limiting factors often interact, and any one may be limiting photosynthesis.
For example, on the graph the lowest curve has both carbon dioxide and temperature limiting photosynthesis. Temperature is limiting for the middle curve, and the highest curve shows photosynthesis rate increases when both temperature and carbon dioxide are increased until another factor becomes limiting.



Greenhouse economics

Commercial greenhouses control limiting factors to get the highest possible rates of photosynthesis so they can grow plants as quickly as possible or produce the highest yields, whilst making a profit.

Key terms: carbon dioxide, chlorophyll, chloroplast, endothermic, glucose, inverse square law, limiting factor, photosynthesis

Investigating Photosynthesis
Knowledge Organiser

Aim

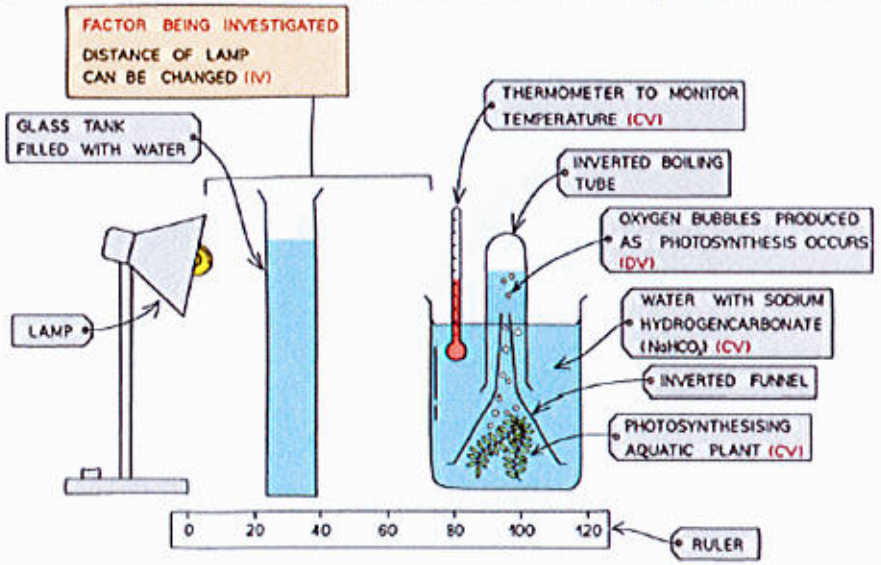
Investigate the effect of light intensity on the rate of photosynthesis using an aquatic organism such as pondweed

Variables

Dependent - The number of bubbles / volume of oxygen produced
Independent - Distance between light source and plant / light intensity.
Control - Temperature (can be controlled using and LED bulb or a heat shield, carbon dioxide concentration, type of plant, length of plant, mass of plant.

Method

Place a piece of pondweed (Elodea or Cabomba are often used), into a beaker of water
Use a light a set distance from the plant
Record the number of bubbles observed in three minutes
Repeat steps for different distances



Improvements

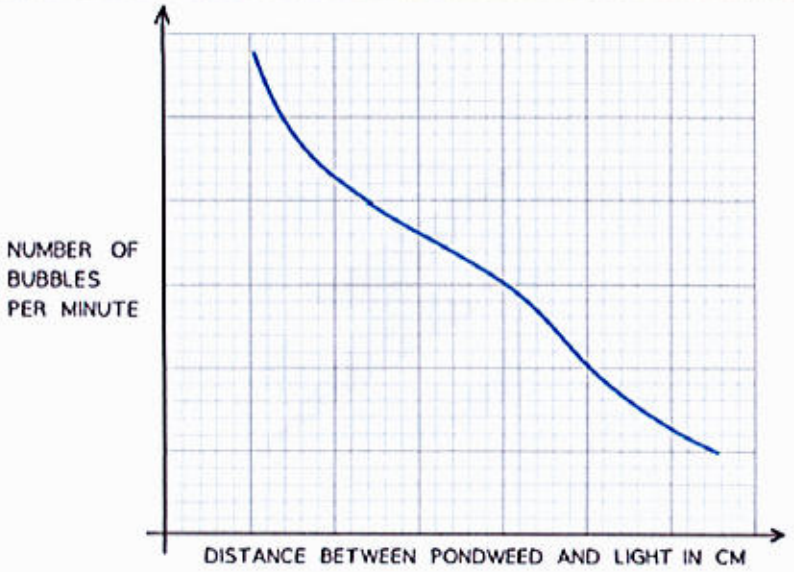
- Use a gas syringe to collect the volume of gas produced
- Repeat the experiment at least twice for each distance and calculate the mean number of bubbles
- Use of a glass tank between lamp and plant to prevent heating of the plant, or using an LED bulb that releases very little heat energy

Changing the Independent Variable

- To investigate the impact of carbon dioxide concentration the concentration of sodium hydrogen carbonate can be changed.
- Use different temperatures of sodium hydrogen carbonate solution.

Results

- As the distance between the plant and light source increases the number of bubbles decreases. This shows that the rate of photosynthesis decreases at lower light intensities.



Key terms: carbon dioxide, chlorophyll, chloroplast, endothermic, glucose, inverse square law, limiting factor, photosynthesis

Respiration
Knowledge Organiser

Cellular respiration

Cellular respiration is an exothermic reaction that occurs continuously in the mitochondria of living cells to supply the cells with energy.

The energy released during respiration is needed for all living processes, including

- chemical reactions to build larger molecules, for example, making proteins from amino acids
- muscle contraction for movement
- keeping warm

Respiration in cells can take place aerobically (using oxygen) or anaerobically (without oxygen).

Type of respiration	Oxygen required?	Relative amount of energy transferred
aerobic	✔	Complete oxidation of glucose - large amount of energy is released
anaerobic	✘	Incomplete oxidation of glucose - much less energy is released per glucose molecule than in aerobic respiration

Aerobic respiration

glucose + oxygen → carbon dioxide + water

$C_6H_{12}O_6 + 6O_2 \rightarrow 6CO_2 + 6H_2O$

Anaerobic respiration in muscles

glucose → lactic acid

$C_6H_{12}O_6 \rightarrow 2C_3H_6O_3$

Fermentation

Anaerobic respiration in plant and yeast cells is represented by the equation:

glucose → ethanol + carbon dioxide (energy transferred to the environment)

Anaerobic respiration in yeast cells is called fermentation.

The products of fermentation are important in the manufacturing of bread and alcoholic drinks.

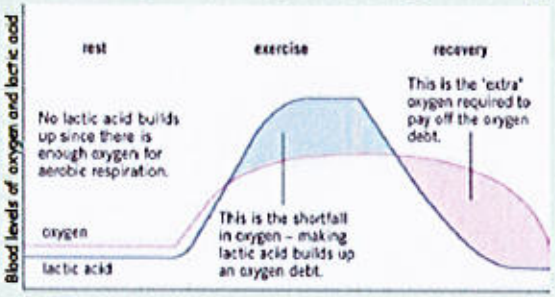
Response to exercise

During exercise the human body reacts to the increased demand for energy.

To supply the muscles with more oxygenated blood, heart rate, breathing rate, and breath volume all increase.

If insufficient oxygen is supplied, anaerobic respiration takes place instead, leading to the build up of lactic acid.

During long periods of vigorous exercise, muscles become fatigued and stop contracting efficiently.



After exercise, the lactic acid accumulated during anaerobic respiration needs to be removed. Oxygen debt is the amount of oxygen needed to react with the lactic acid to remove it from cells.

Removal of lactic acid

Lactic acid in the muscles

⇩

Transported to the liver in the blood

⇩

Lactic acid is converted back to glucose

Key terms: aerobic, anaerobic, exothermic, fermentation, lactic acid, metabolism, mitochondria, oxidation, oxygen debt, respiration

Chemical Reactions 2
Knowledge Organiser

Reactivity series

Reaction with water	Reaction with acid	Reactivity series		Extraction method
		Metal	Reactivity	
Fizzes, gives off hydrogen gas	Explodes	Potassium	High reactivity	Electrolysis
		Sodium		
		Lithium		
	Fizzes, gives off hydrogen gas	Calcium		
Reacts very slowly		Magnesium		
		Aluminium (carbon)		
		Zinc		Reduction with carbon
		Iron		
No reaction	Reacts slowly with warm acid	Tin		
		Lead (hydrogen)		
	No reaction	Copper		
		Silver		Mined from Earth's crust
		Gold	Low reactivity	

Displacement reactions

In a **displacement reaction**, the **more** reactive element takes the place of the **less reactive** element.
For example, **Potassium is more reactive than calcium**, so potassium displaces the calcium in calcium chloride

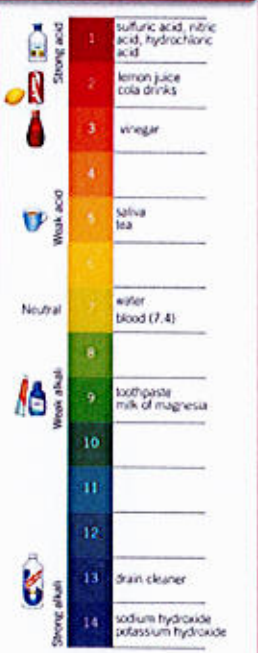
Calcium chloride + Potassium → Potassium chloride + Calcium

$CaCl_2 + 2K \rightarrow 2KCl + Ca$

Acids and alkalis

Acids are compounds that release H^+ ions when in an aqueous form. The three acids are sulfuric acid, nitric acid and hydrochloric acid. They have a pH below 7.
Alkalis are compounds that release OH^- when in aqueous form. They have a pH above 7.
Neutral solutions have a pH of 7.
The pH scale is a measure of how acidic or alkaline a substance is. It is a scale from 1 to 14.
Indicators, such as **universal indicator or a pH probe** can be used to determine the pH of a solution.
When an acid and alkali react, **neutralisation can occur.**

Acid + alkali → metal salt + water



Reactions of acids

Reactions of acids with metals
Acids react with **metals** to form metal salts and **hydrogen gas**

Reaction of acids with metal oxides and hydroxides
Acids react with **metal hydroxides/oxides** to form metal salts and **water**

Reaction of acids with metal carbonates
Acids react with **metal carbonates** to form metal salts, **water** and **carbon dioxide**

Metal extraction

Metals that are **more reactive** than carbon are extracted using a process called **electrolysis.**
Metals that are **less reactive** than carbon are extracted by reduction with carbon
Metals that are **unreactive** are found as pure metals and are mined from the Earth's crust.

Salts

Hydrochloric acid forms a **chloride salt** e.g. Sodium chloride (NaCl)
Sulfuric acid forms a **sulfate salt** e.g. Sodium sulfate (Na_2SO_4)
Nitric acid forms a **nitrate salt** e.g sodium nitrate ($NaNO_3$)

Key terms Acid alkali base crystallisation displacement metal neutralisation ore oxidation pH reactivity

Year 9 Knowledge Organiser Current and Static 2

SCIENCE

Key vocabulary:

Potential difference – the work done in moving one coulomb of charge from one point in the circuit to another.

Current – a flow of electrons.

Charge – the rate of flow of electrons.

Resistance – the opposing of a current.

Power – how much energy is transferred (work done) in a certain amount of time.

Series – all components in a circuit follow on directly from each other.

Parallel – the current has alternate pathways to possibly take in a circuit.

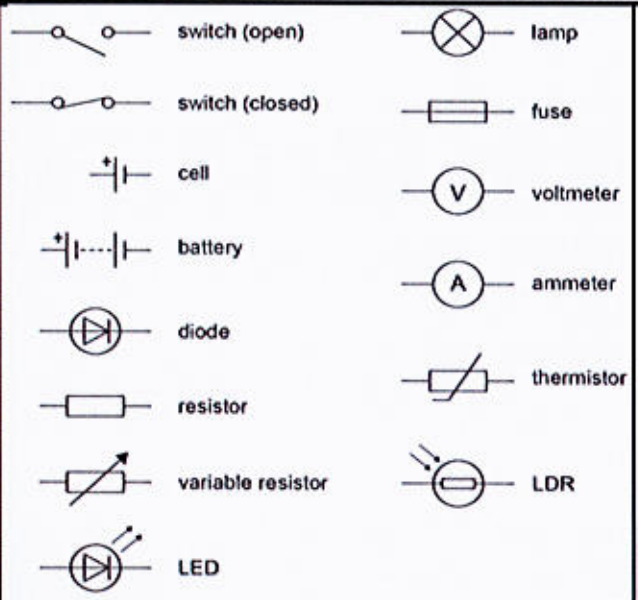
Free (or delocalised) electrons – electrons that are free to move through the conductor (eg metal).

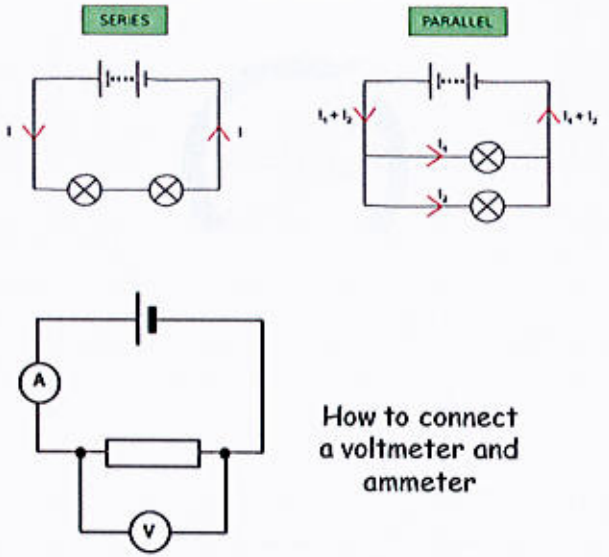
Key equations:
Q = It (charge = current x time)

V=IR (potential difference= current x resistance)

Total resistance = R1 + R2

Key Units:
Current-Amps **(A)**
Potential difference-volts **(V)**
Charge-coulombs **(C)**
Resistance-ohms **(Ω)**





How to connect a voltmeter and ammeter

Series circuits – all components follow on directly from each other. The current only has one pathway to follow.
The current is the same all the way around a series circuit. The potential difference is shared between the components in the circuit.

Parallel circuit – the electricity has more than one pathway to take. The current will take the path of least resistance.
The current will be shared between the branches in the circuit. The potential difference will be the same across each component in the circuit.

Resistance – caused by the collision between free electrons and metal ions. The more collisions the greater the resistance. Factors that can affect resistance are:

- Length – double length, double resistance: directly proportional
- Temperature – increase temperature, increase resistance
- Diameter – bigger diameter, less resistance
- Material – number of free electrons

Natural FORMS

Year 9

What will you learn?

In this 3D focused project, you will develop your knowledge of shape and form by learning new drawing skills including 'sculpting on a page.' Using your knowledge of 3D drawing processes, you will investigate and respond to the work of ceramic artist Alice Ballard.

Click the links to read the stories

Reading

The Climbers
- Keith Gray

Fire Girl Forest Boy
-Chloe Daykin

In Darkling Wood
- Emma Carroll

Education

Ceramics

BA (Hons) Ceramic Design | UAL (arts.ac.uk)

Product, furniture & ceramics

Product, Furniture, Ceramics - Staffordshire University (staffs.ac.uk)

Careers http://www.creativejourneyuk.com

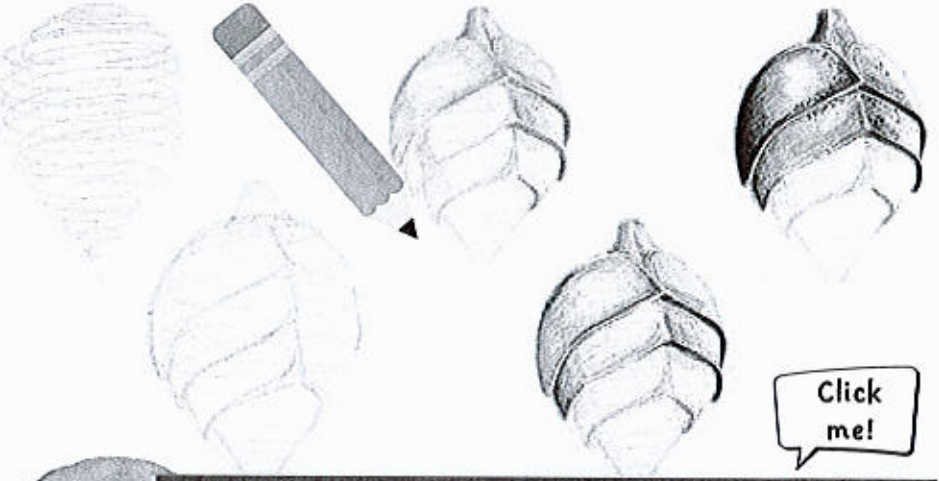
- **Ceramic artist**
- **3D designer**
- **Sculptor**

POST-16

CAREERS

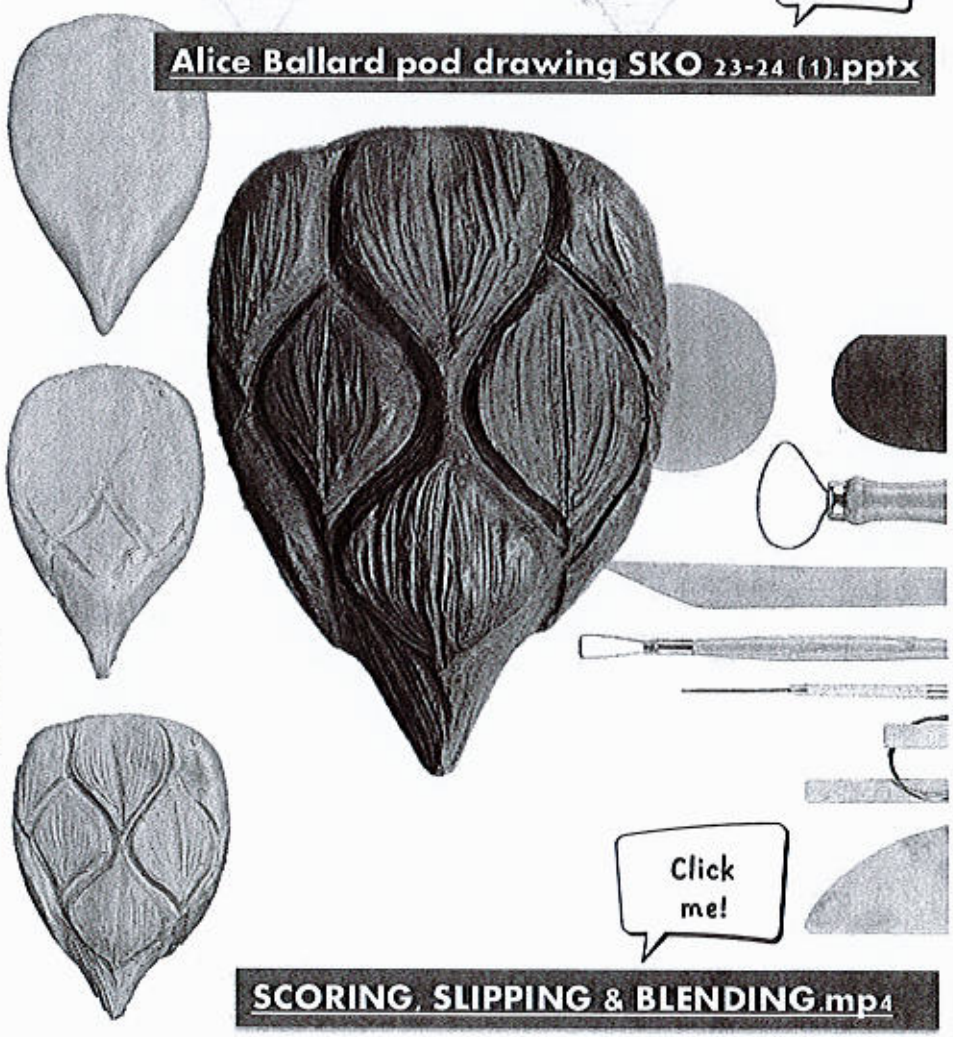
Key Words

- Shape
- Tone
- Texture
- Detail
- Form
- Pattern
- Mark-making
- Layering
- Shadows
- Highlights
- Natural
- Organic
- Abstract
- 3-Dimensional
- Sculpture
- Ceramic
- Environmental
- Seasonal
- Pod
- Carve
- Slip & score



Click me!

Alice Ballard pod drawing SKO 23-24 (1).pptx



Click me!

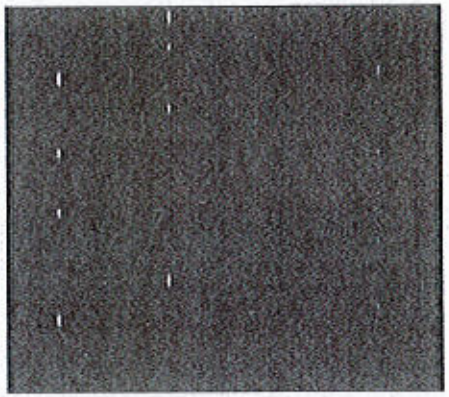
SCORING, SLIPPING & BLENDING.mp4

Alice Ballard

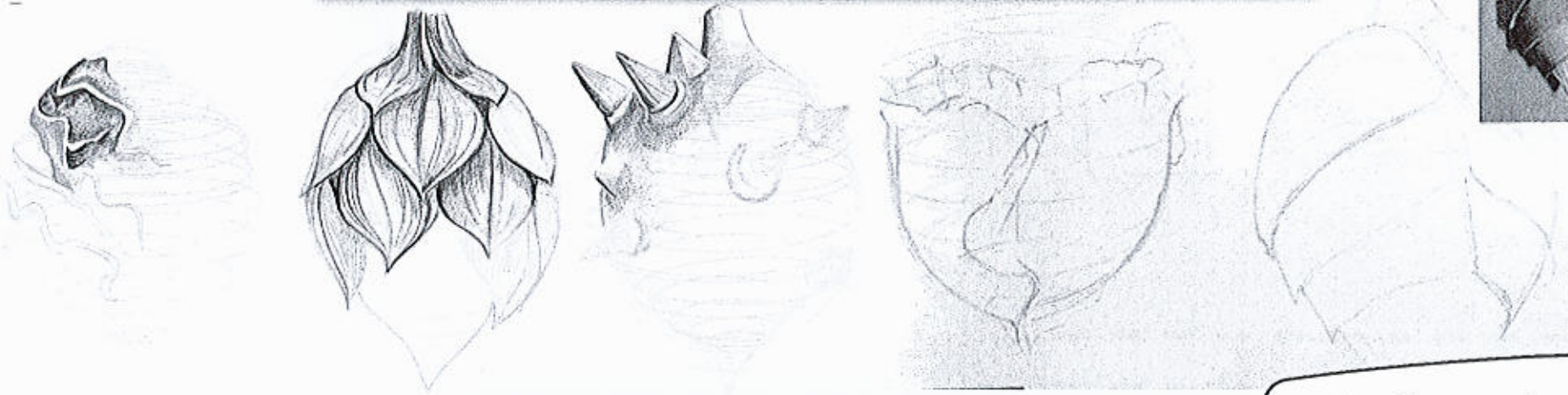
"Alice Ballard stands out as one of the masters of ceramic sculpture in our state. Her treatment of natural, organic forms succeeds in transforming the common and familiar into eloquent explorations of forms and innovative, thoughtful designs. Her work exhibits a keen mastery of her material with a refined sense of craftsmanship. She blends sculptural form, scale and surface texture with a subtle color palette. Ballard's presentation of her forms produces delightful spatial compositions that enliven any space."

Home — Alice Ballard

Click me!



HERMITAGE STUDENT POD



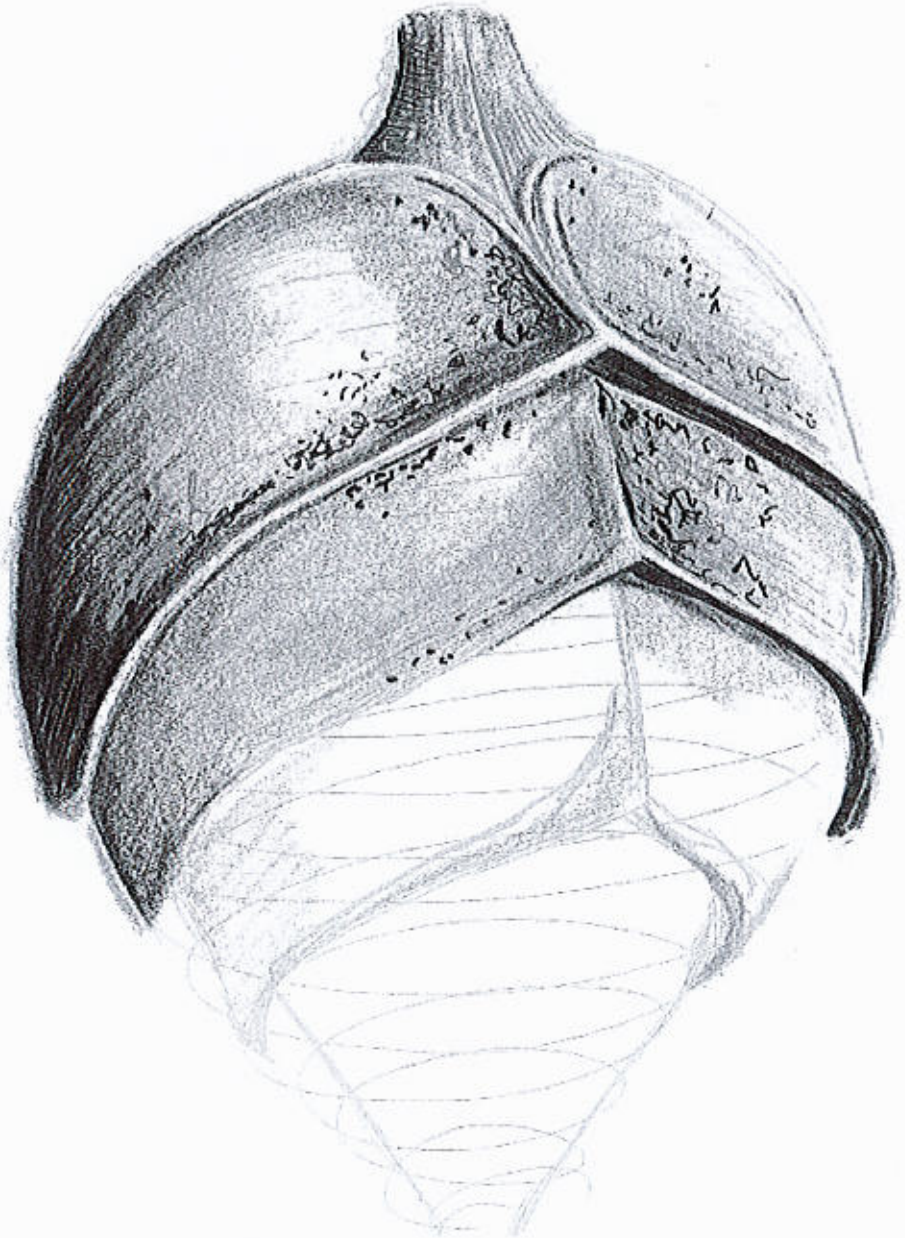
What is the subject of the work?
- The subject of the work is.....
- [Artist name] produces [media] based on the subject of....

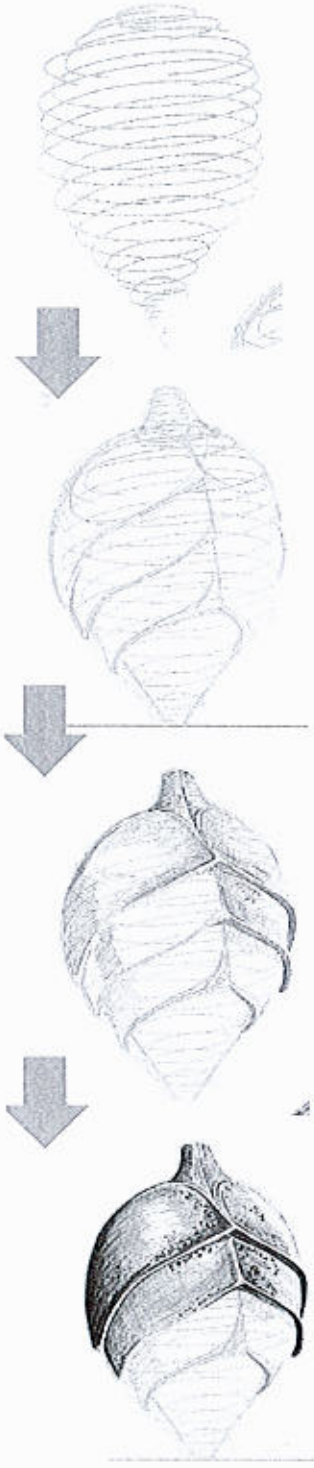
How is the work produced?
- The work is produced by...
- [Artist's name] produces their work by...

Why has the artist chosen to use these materials, techniques or processes?
- The artist has chosen to use these materials because...
- [Artist's name] has chosen to use these techniques and processes in order to...

Use these sentence starters to sound like an expert and have a postcard sent home!

Natural FORMS





Step 1 – Light pencil outline

To begin with, you will need to sketch out the shape of your object. You will need to make sure that you use light pencil to sketch outlines and basic shapes. You may want to use the grid method to help you draw your shapes accurately.

Step 2 – Building tonal values

Next, you will need to start applying tone. Start by applying light tonal values and gradually build these up using layering and different pressures with your pencil. Remember to use the correct line direction in order to show the shape of the object.

Step 3 – Mark-making & layering

To add texture and surface quality to your work you will need to combine and apply layers of mark-making types. Think very carefully about the line types you use and make sure that they follow the shape of the object

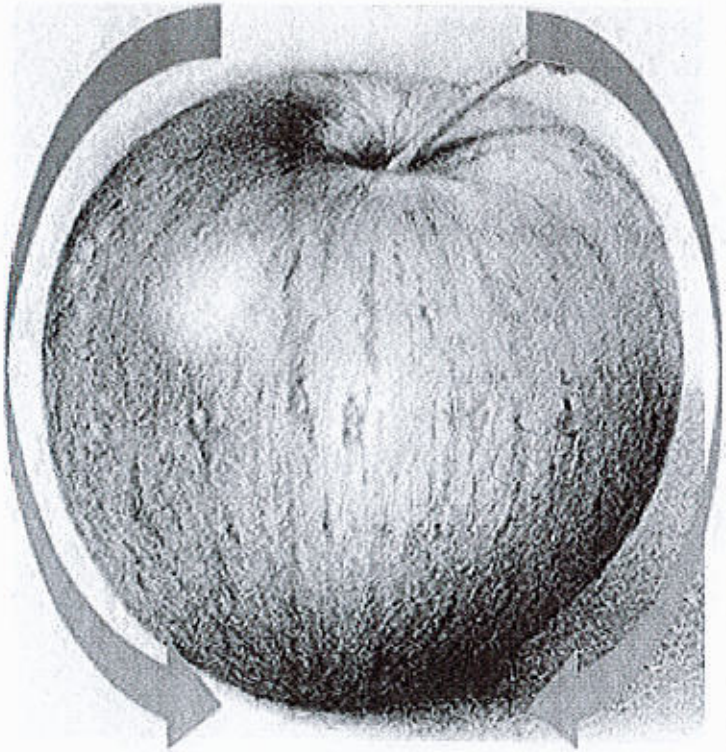
Step 4 – Shadows & highlights

Finally, you will need to think carefully about fine details. Using a rubber and an extra sharp pencil, add the small highlights and shadows to your drawing to make it look more realistic

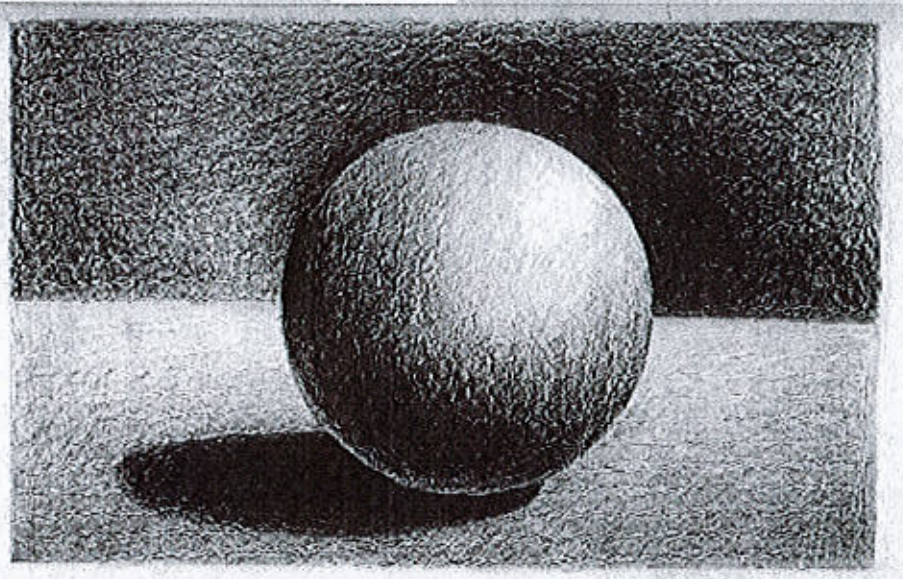
TONE

Tonal Range

In art and design, tone refers to how light or dark something is. Tones could refer to black, white and the grey tones between. It could refer to how light or dark a colour appears. In real life tone is created by the way light falls on an object.



Line Direction is very important to think about when applying tone as it allows you to show the shape of the object and make it look 3D



When applying tone, you need to think about the amount of pressure you are using with your pencil.
Heavy pressure = Dark tones Light pressure = Light tones

Key Words

- Tone
- Tonal
- Value
- Light
- Dark
- Gradient
- Tonal Range
- Contrast
- Light
- Dark
- Pressure

Year 9: World War Two

Key Vocabulary	Definitions
The Blitz	German air raids on Britain, September 1940-May 1941.
Blitzkrieg	German for 'lightning war.' Hitler would attack quickly and try to take over a country before it had time to fight back.
Nazi Party	The **National Socialist Party**, led by **Adolf Hitler**.
Evacuation	Moving from an area of danger to a safe place
Rationing	Controlling the supply of food, clothes, petrol and other things.
Propaganda	Controlling news media (such as radio) to show your side in the best way.
The Phoney War	Period of time from September 1939 to April 1940 when, after Germany attacked Poland, seemingly nothing happened.
Allies	Countries (including Britain, France, USSR, USA) who joined forces to fight the Axis Powers.
Axis Powers	Germany, Japan, Italy and other countries that were allies in World War 2
Policy of Appeasement	Giving in to Hitler's demands **to avoid war.**

The evacuation of Dunkirk (May-June 1940)
British mission **to rescue Allied soldiers** from the beaches of Dunkirk, France. Over **300,000** Allied soldiers were trapped there by the German army. Evacuation ended after 9 days. In total 200,000 British soldiers & 140,000 French soldiers escaped to Britain.

The Home Front

All civilian life was affected by WW2. People hid in **air raid shelters** (communal shelters & in their homes & gardens). They had to carry **A gas mask** with them at all times. Parents were encouraged to **evacuate** their children to rural areas. People had to cover windows and doors at night with **blackout** curtains. Propaganda posters told people **to save food** and to do their bit to help the **war effort**.

Winston Churchill

Prime Minister during most of WW2 (took over after **Chamberlain resigned** in May 1940). His leadership helped Britain to **stand strong against Hitler**. He is famous for his inspiring speeches and quotes e.g. **'we shall fight them on the beaches.'**

The Battle of Britain (July-October 1940)
Germany's air force, the **Luftwaffe** failed to gain **air superiority** over the **RAF** despite months of bombing **Britain's** air bases & military posts. The main fighter planes used were the **Messerschmitt** by the Luftwaffe, & **Hurricane & Spitfire** by the RAF. Germany had more planes but the British won as they had the advantage of fighting over their own land & had **radar**.

Battle of Stalingrad (July 1942- February 1943)
One of the largest & deadliest battles in WW2 . It was a **turning point** in the war. After losing the battle, the **German army lost so many soldiers** and took such a defeat that they never quite recovered. Around 750,000 German soldiers died & 500,000 Russians.

Pearl Harbour 7th December 1941

Japanese airplanes made a **surprise attack on the US Navy**. They destroyed many ships & killed over 2,390 Americans. This **forced the US to enter WW2.**

D Day, 6th June 1944
The day that US, Canadian & British forces attacked German forces on the shores of **Normandy** in France, with a huge force of over 150,000 soldiers. **A turning point** in WW2 as the Allies defeated the Germans.

The Atomic Bomb, August 1945
After WW2 in Europe was over, **Japan would not surrender**. The US was contemplating an invasion of Japan. **President Truman** chose to drop the atomic bomb instead. On August 6 ***Little Boy*** was dropped on **Hiroshima** by a plane named the **Enola Gay**. **Emperor Hirohito** still refused to surrender.

On August 9 another atomic bomb, ***Fat Man***, was dropped on **Nagasaki**. Around **200,000** Japanese people were killed in total. For years after the bombs, many survivors suffered the devastating effects of **radiation sickness**.

Japan surrendered on August 15th.

1939	1940	1941	1942	1943	1944	1945
3 September: Britain declares war on Germany	Battle of Britain The Blitz begins	Germany invades Russia USA enters WW2	Battle of El Alamein Battle of Stalingrad	Italy surrenders	V weapons campaign 6 June: D Day	VE Day: 8th May VJ Day: 15 August

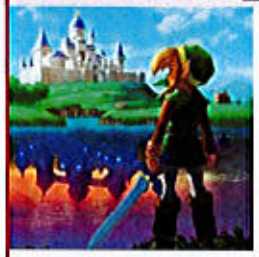
Video Game Music Knowledge Organiser

Computer and Video Game Music

Early Computer and Video Game Music

Early video game music consisted primarily of **SOUND EFFECTS** (an artificially created or enhanced sound used to emphasize certain actions within computer and video games), **CHIPTUNES** or **8-BIT MUSIC** (a style of electronic music which used simple melodies made for programmable sound generator (PSG) sound chips in vintage computers, consoles and arcade machines) and early sound **SYNTHESISER** technology (an electronic musical instrument that generates audio signals that may be converted to sound). **SAMPLING** (the technique of digitally encoding music or sound and reusing it as part of a composition or recording) began in the 1980's allowing sound to be played during the game, making it more realistic and less "synthetic-sounding".

How Computer and Video Game Music is used within a Game



Music within a computer or video game is often used for **CUES** (knowing when a significant event was about to occur).

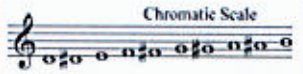
Video game music is often heard over a game's title screen (called the **GROUND THEME**), options menu and bonus content as well as during the entire gameplay. Music can be used to **INCREASE TENSION AND SUSPENSE** *e.g. during battles and chases*, when the player must make a decision within the game (a **DECISION MOTIF**) and can change, depending on a player's actions or situation *e.g. indicating missing actions or "pick-ups".*

Musical Features of Computer and Video Game Music

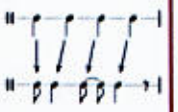
JUMPING BASS LINE
Where the bass line often moves by **LEAP (DISJUNCT MOVEMENT)** leaving 'gaps' between notes

STACCATO ARTICULATION
Performing each note sharply and detached from the others. Shown by a dot.

CHROMATIC MOVEMENT
Melodies and bass lines that ascend or descend by semitones.



SYNCOPATION
Accenting the weaker beats of the bar to give an "offbeat" jumpy feel to the music.



How Computer and Video Game Music is Produced

Fully-orchestrated **SOUNDTRACKS** (video game music scores) are now popular – technology is used in their creation but less in their performance. The composer uses **MUSIC TECHNOLOGY** to create the score, it is then played by an **ORCHESTRA** and then digitally converted and integrated into the game. Video game **SOUNDTRACKS** have become popular and are now commercially sold and performed in concert with some radio stations featuring entire shows dedicated to video game music.

Character Themes in Computer and Video Game Music

Characters within a video game can also have their own **CHARACTER THEMES** or **CHARACTER MOTIFS** – like **LEITMOTIFS** within Film Music. These can be manipulated, altered and changed – adapting the elements of music – **ORCHESTRATION** (the act of arranging a piece of music for an orchestra and assigning parts to the different musical instruments), **TIMBRE, SONORITY, TEXTURE, PITCH, TEMPO, DYNAMICS** – depending on the character's situation or different places they travel to within the game.

Famous Computer and Video Game Music Composers and their Soundtracks

Koji Kondo
Super Mario Bros. (1985)
The Legend of Zelda (1986)

Michael Giacchino
The Lost World: Jurassic Park (1997)
Medal of Honour (1999)
Call of Duty (2003)

Mieko Ishikawa
Dragon Slayer (1993)

Martin O'Donnell and Michael Salvatori
Halo (2002)

Daniel Rosenfield
Minecraft (2011)

Rom Di Prisco
Fortnite (2017)

Reggae

Origins...

*Reggae originated in **Jamaica** in the 1960s

*The style incorporates jazz, R and B, traditional *mento* and the earlier genre known as *ska*

***Ska** music sounds like Reggae and also originated in Jamaica. They sound very similar however Reggae is slower and more laidback

***Mento** is a style of Jamaican folk music that traditionally uses acoustic instruments.

The Style...

*Reggae is instantly recognisable as it has an off-beat rhythm played by a rhythm guitarist. This 'off-beat' is called 'skank.' The bass drum hits on the second and fourth beat of each bar. These are called the 'drop.'

For example: Count **1 and 2 and 3 and 4 and**

And' is the off-beat and the 'skank;' 2 and 4 is the 'drop'

*Reggae music is linked with a religion that developed in Jamaica called **Rastafarianism**

*The lyrics in Reggae music are often about news, social problems, religion and politics

*Famous instruments in reggae music are drums, guitar, saxophone, trumpet and trombone

*Reggae songs often have lots of backing singers.

Jamaica...

*Jamaica is the fourth largest island in the **Caribbean** and **Kingston** is its capital city

*Jamaica is tropical and prone to hurricanes

*Jamaica was a British colony from 1655 when Britain captured it from the Spanish. Jamaica became an independent country in 1962

*Jamaica exports bananas, coffee and sugar

*Athlete **Usain Bolt** is Jamaican

Bob Marley...

*Robert Nesta Marley was an important Jamaican musician in the 70s and 80s who made reggae very popular all over the world

*His music told stories of his home and the Rastafarian religion he followed. Some songs were also about politics

*Bob's dad was a white man called Norvall Marley originally from *Sussex* but living and working in Jamaica when he met his mum

*Bob started his music career in the 1960s with his group **The Wailers**

*Bob toured England and the US in the 70s and had his first international hit in 1975 with *'No Woman No Cry'*

*Other hits of his include *"Three Little Birds", "Africa Unite", "Buffalo Soldier"*, and *"One Love"*. His most popular studio album was called **Legend,** which includes his greatest hits.

*Bob had over 11 children. Most of these have gone on to become well-known reggae artists in their own right

*Bob was only 36 when he sadly died of skin cancer

Key music and artists to listen to...

THE ALBUM 'LEGEND' - Bob Marley!!!!!

Desmond Dekker and the Aces—Israelites

Toots and the Maytals—Pressure Drop

Magic! - Rude

UB40 –Red Red Wine

Lee 'Scratch' Perry—I Chase the Devil

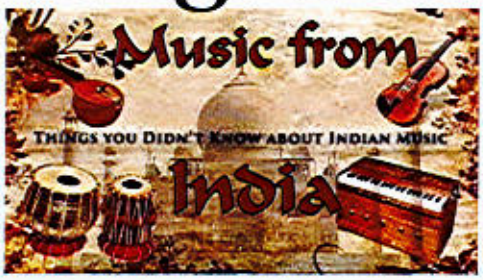
Jimmy Cliff—Many Rivers to Cross

The Melodians—Rivers of Babylon

Jason Mraz—I'm Yours

The Abyssinians—Satta Massagana

Bhangra Music



Classic Indian Style

*There are lots of different styles of music played in India: pop, folk, rock, classical, film and more

*Indian classical music has been passed down from generation to generation for more than 3000 years. Although the music varies between the North and South of India, music shares three common ideas: Raga, Tala and Drone

***Raga** is the pattern of notes and is the tune. A **sitar** might play the melody. A sitar is a plucked string instrument

***Tala** is the rhythm and is usually played on the **tabla**. Sounds are produced by playing with fingers and the palm of your hand. Sounds can be described in words—Ta, Ghe, Gha, Tin, Dha and Te. Rhythms are not written down but memorised

*A constant, held, sustained note which harmonises with the Raga is called the **drone**. An instrument called a **tambura** might play the drone. This is another string instrument

*Musicians learn how to play by imitating and memorising the music from their teachers. This is called *Oral Tradition*

Bhangra

*Bhangra started as a folk dance to celebrate the coming of the harvest

*It is now performed throughout the year, throughout the world for many weddings, parties and special occasions

*Dancers wear bright, colourful and baggy clothes, the men wear turbans and the women wear beautiful jewellery

*People dance and sing to the sound of the **dohl** drum. The drum is worn around the body and can be really big. Both ends of the drum are played with two sticks. One is called the *daga* and plays the bass beat and the *tili* plays the treble

*Bhangra music fuses pop music, film music and folk music. Listen to : **Punjabi MC Knight Rider**

*Bhangra is happy and makes you smile!

Bollywood

*This is the name of the Indian film industry based in Mumbai

*Bollywood films are like musicals. Song and dance numbers play an important part in the script

*Stories include lovers and villains, family and kidnapping. They are very melodramatic (over the top!)

*India produces the largest amount of films each year in the world and is worth billions. Hollywood however makes more money each year

Bass	Sounds in the lower frequency—low pitch
Treble	Sounds in the higher
Musical	A play or a film in which singing and dancing have an essential part in telling the story

Ravi Shankar

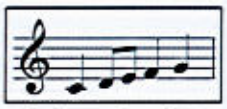
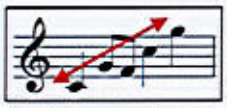
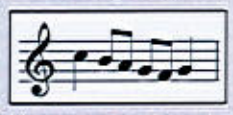
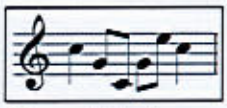
*Ravi Shankar was a composer and musician of Indian classical music

*He was best known for playing the sitar. He toured America and Europe in the 50s and played at Woodstock (see Musical Genre 5). He introduced the world to the sitar and this influenced many musicians. **George Harrison* from **The Beatles** (see Key Composer 7), was so impressed with the sitar, he learnt to play one and used it in his song *Norwegian Wood*

*Anoushka Shankar, Ravi's daughter, is also a world famous sitar player. Anoushka lives in London. She has been nominated for many Grammy awards. She performed at a tribute concert for George Harrison one year after his death

General Music Terminology – Knowledge Organiser

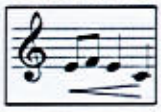
Melody - the main tune

Ascending	Descending	Range	Conjunct	Disjunct
				
Going up in pitch.	Going down in pitch.	The difference between the highest and lowest note - wide or narrow	Moves up or down by step.	Moves in big leaps.

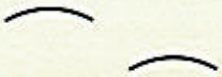
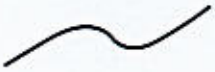
Articulation - how the notes are played

Legato	Staccato
	
Smooth and flowing.	Detached, spiky.

Dynamics - how loud or soft the music is played

Piano	Forte	Diminuendo	Crescendo
			
Quiet	Loud	Getting quieter	Getting louder

Texture - the layers of sound and how they fit together

Unison	Imitation	Monophonic	Polyphonic	Melody and Accompaniment
				
All doing the same thing at the same time	When one part copies another	A single voice or instrument	Different parts that interweave together	A main melody with all other parts in the background

Structure - the sections and how they are ordered

Intro	Contrasting section	Repeated section	Coda
The beginning section	A section that has new ideas in it	A section where you hear the same music again	The end section

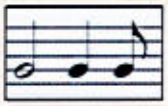
Harmony - the chords used in a piece

Chord	Major	Minor
	Music which sounds 'bright'	Music which sounds 'dark'
Two or more notes played together	joyful, heroic, brave, excited	serious, sinister, angry, upset

Instrumentation - the instruments used

Orchestra	Rock Band	Vocal	String	Brass	Woodwind	Percussion
						Timpani Snare Drum Cymbal Tambourine Triangle Bass Drum
Strings, brass, woodwind and percussion instruments	Vocals, electric guitar, bass guitar, drum kit	Male and/or female singer	Violin, viola, cello, double bass	Trumpet, french horn, trombone, tuba	Flute, oboe, clarinet, bassoon, saxophone	

Rhythm - the pattern of notes against the beat

Beat	Note value	Time Signature
		
Steady pulse of the music	How long a note lasts	How many beats in a bar

Tempo - the speed of the music

Presto	Allegro	Andante	Adagio	Largo
				
Very quick	Quick	Walking pace	Leisurely	Slow and stately

Student Knowledge Organiser 9.3 – Le Collège

Modal Verbs – Pouvoir and Devoir

These verbs are useful when talking about school rules. They are irregular

Pouvoir – to be able (can)	Devoir – to have to/must
je peux – I can	je dois – I must
tu peux – you can	tu dois – you must
il peut – he can	il doit – he must
nous pouvons – we can	nous devons – we must
vous pouvez – you can (p)	vous devez – you must (p)
ils peuvent – they can	ils doivent – they must

Je dois porter l'uniforme – **I have to/must** wear the uniform
Je peux manger dans la cour – **I am able to/can** eat in the yard

Notice that the second, underlined verb is always an infinitive –this is the second verb infinitive rule.

aill – travaille (eye)	**que** – musique (k)	**'h'** – heure (silent)

Be CaReFuL	Only pronounce **C, R, F, L** at the **end** of a word
SFC	All other letters are **S**ilent **F**inal **C**onsonants

Colours

Colours are adjectives, so they follow the noun they describe and the spelling matches the gender and number of the noun.

masculine	feminine	masc. pl	fem. pl
blanc	blanc**he**	blancs	blanches
bleu	bleue	bleus	bleues
noir	noire	noirs	noires
rouge	rouge	rouges	rouges
vert	verte	verts	vertes
jaune	jaune	jaunes	jaunes

Reflexive verbs – Reminder!

je **me** dispute	nous **nous** disputons
tu **te** diputes	vous **vous** disputez
il **se** dispute	ils **se** disputent

Translating 'would' – The Conditional

The conditional is used to translate 'would', e.g. 'If I were the head teacher I would abolish the uniform! To form the conditional, you use the infinitive and add the conditional endings.

Je changer**ais**	I would change
Tu changer**ais**	You would change
Il changer**ait**	He would change
Nous changer**ions**	We will change
Vous changer**iez**	You will change (p)
Ils changer**aient**	They will change

Irregular Verb – Prendre (apprendre/comprendre follow same rules)

Je prends – I take	nous prenons – we take
tu prends – you take	vous prenez – you take (p)
il prend – he takes	ils prennent – they take

Model Text

Mon collège s'appelle Émile Galle et il se trouve à Strasbourg.	My school is called Émile Galle and is located in Strasbourg.
Il y a environ huit cent élèves et soixante profs.	There are around 800 pupils and 60 teachers.
En général, je l'aime mais parfois les profs sont trop stricts à mon avis.	Generally, I like it but sometimes the teachers are too strict in my opinion.
Ma matière préférée c'est l'informatique car c'est vraiment utile	My favourite subject is IT because it's really useful
et je ne m'ennuie jamais pendant les cours.	and I never get bored in the lessons.
Cependant je déteste le dessin parce que je ne suis pas créatif.	However, I hate art because I'm not creative.
Malheureusement, lundi à neuf heures j'ai dessin – quelle horreur!	Unfortunately on Mondays at 9.00 I have art – how awful!
Au collège il est interdit d'utiliser les portables qui est très strict.	At school, it's forbidden to use mobile phones which is very strict.
Cependant on n'a pas d'uniforme alors je peux porter mon jean tous les jours.	However, we don't have uniform, so I can wear my jeans every day.
Je détesterais porter un uniforme!	I would hate to wear a uniform!
Bien sûr il faut arriver à i'heure et respecter les profs qui est juste.	Of course you must arrive on time and respect the teachers, which is fair.
Si j'étais directeur je changerais le gymnase.	If I were the headteacher, I would change the gym.
Dans mon collège idéale je construirais un gymnase moderne.	In my ideal school, I would build a modern gym.
Il y aurait une piscine et un terrain de foot énorme.	There would be a pool and an enormous football pitch.
Tous les profs seraient super sympas et le collège serait parfait!	All the teachers would be super nice and school would be perfect!

North East Learning Trust

Student Knowledge Organiser 9.3 – Le Collège

Key Questions	
Quelle est ta matière préférée? Pourquoi?	What's your favourites subject? Why?
Tu n'aimes pas quelle matière? Pourquoi?	What subject don't you like? Why?
Parle-moi des règles au collège	Tell me about the school rules.
Que penses-tu des règles?	What do you think of the rules?
Décris l'uniforme scolaire. Tu l'aimes?	Describe the school uniform. Do you like it?
Comment est ton collège?	What is your school like?
Comment serait ton collège idéale?	What would your ideal school be like?

Les Matières	Subjects
la choix	choice
les cours	lessons
l'anglais	English
l'EPS	PE
le français	French
la géographie	geography
l'histoire	history
l'informatique	computing
les langue	languages
les maths	maths
la musique	music
la religión	religion
les sciences	science
la technologie	technology
le théâtre	drama

Les Opinions	Opinions
Ma matière préférée c'est	My favourite subject is
affreux	awful, horrible
capable	able, capable
difficile	difficult
ennuyeux	boring
facile	easy
faible	weak
fort	strong , loud
inutile	useless
méchant	naughty, mean
nul	rubbish
paresseux	lazy
passionnant	exciting, thrilling
pratique	practical
strict	strict
sympa	nice
terrible	terrible
travailleur	hard-working
utile	useful

L'emploi du temps	Timetable
le matin	in the morning
l'après-midi	in the afternoon
après le collège	after school
lundi	on Monday
mardi	on Tuesday
mercredi	on Wednesday
jeudi	on Thursday
vendredi	on Friday
à huit heures trente	at 8.30
à huit heures cinquante cinq	at 8.55
à neuf heures quinze	at 9.15
à quinze heures cinq	at 15.05
d'abord	first of all
puis	then
après	after school
finalement	finally
la journée	the day
les cours	the lessons
la récré	break
la pause déjeuner	lunchtime
commencer	to start
terminer	to finish

Useful Verbs			
améliorer	to improve	encourager	to encourage
apprendre	to learn	étudier	to study
choisir	to choose	expliquer	to explain
comprendre	to understand	lire	to read
construire	to build	organiser	to organise
se coucher	to go to bed	quitter	to leave
demander	to ask for	répéter	to repeat
écrire	to write	se lever	to get up
emprunter	to borrow	travailler	to work
s'ennuyer	to be bored	voyager	to travel

Un collège idéale	An ideal school
il y a	there is/are
il y aurait	there would be
c'est	it's
ce serait	it would be
ils sont	they are
ils seraient	they would be

Le Règlement	Rules
il est interdit de	it's forbidden
il faut	you must
on doit	you must
on peut	you can
utiliser	to use
avoir	to have
porter	to wear
faire	to do
respecter	to respect
arriver	to arrive
portable	phone
règle	rule, ruler
sac	bag, sack
stylo	pen
en retard	late
à l'heure	on time
strict/e	strict
juste	fair

L'Uniforme	Uniform
les vêtements (m)	clothes
des chaussettes (f)	socks
des chaussures (f)	shoes
un blazer	blazer
un manteau	coat
un pantalon	trousers
un pull	jumper
une chemise	shirt
une cravate	tie
une jupe	skirt
une veste	blazer
à la mode	fashionable
démodé	old-fashioned

Les gens	People
ami/e	friend
directeur/directrice	head teacher
élève	pupil
étudiant/e	student
président	president
prof	teacher

Mon collège	My school
la cour	the yard
la salle	room
le collège	secondary school
l'école	school
l'éducation	education
l'équipement	equipment
les devoirs	homework
les toilettes	toilets
l'espace	space
l'ordinateur	computer
quatrième	year 9
un gymnase	gym
un terrain de foot	football pitch

Les numéros			
un	1	quinze	15
deux	2	seize	16
trois	3	dix-sept	17
quatre	4	dix-huit	18
cinq	5	dix-neuf	19
six	6	vingt	20
sept	7	vingt-et-un	21
huit	8	vingt-deux	22
neuf	9	trente	31
dix	10	trente-cinq	35
onze	11	quarante	40
douze	12	quarante-cinq	45
treize	13	cinquante	50
quatorze	14	cinquante-cinq	55

Flashback to 7.4 for more on this topic!

Year 9: Interwar Period 1918-1939

Key Word	Definition
Abdicate	To stand down from power.
Kaiser	The German Emperor.
Constitution	A set of rules which explains how a country is run.
Reichstag	The German government building.
Tsar	The former Russian leader.
Communism	The political idea proposed by the Bolsheviks.
Bolshevik	The Communists that led the Russian Revolution.
Autarky	Being economically self-sufficient.
Fascism	The political idea proposed by Mussolini and Hitler.
Democracy	When a country allows its people to vote.
Weimar Republic	The democratic government established in Germany after WW1.
Republic	A country without an emperor or royal family.
Treaty of Versailles	The peace treaty signed in 1919 that officially ended WW1 and imposed harsh terms on Germany.
Hyperinflation	A severe economic crisis where the value of the German currency became worthless due to rapid inflation.
Putsch	A violent attempt to overthrow a government.
Dictator	A state / country ruled by one person with absolute power.

Why was the Weimar Republic created?
Between 11th November 1918 to July 1919, a new German Republic was created. It was called the Weimar Republic after the town where the new government was formed. Erbert knew he had to make sure Germany stayed peaceful and to re-gain the confidence of the German people after signing the hated armistice. To do this, they created a **constitution** which looked to make Germany more democratic.

1923:
The Weimar Republic faced many problems in 1923. The government struggled to pay their reparations and as a result the French invaded the Ruhr region. They also faced the problem of hyperinflation, where the value of money became worthless due to extreme inflation. By 1923, Hitler was confident enough to attempt a risky coup of Germany – to try and take over the country. Hitler thought that he would have the support of the local people but most stayed loyal to the Weimar government. Due to this, Hitler and the Nazis were outnumbered and this led to Hitler's arrest. Hitler used his arrest to broadcast his views nationally, and eventually wrote Mein Kampf in prison.

The Wall Street Crash
In October 1929, share prices began to fall on Wall Street stock exchange. Falling share prices meant that peoples investments fell in value. People rushed to sell their shares to recover some money before the value of the shares fell. Germany's economic recovery was heavily reliant on US loans, and so when the USA went through an economic crisis, they demanded their money back. This led to a return of the economic problems Germany had faced earlier in the decade and marked the end of the period of 'Golden Years' that was achieved due to the work of Gustav Stresemann.

Hitler's rise to power

In January 1933, Hitler is made Chancellor by President Hindenburg, however, his power was limited. On the 27th February 1933, the Reichstag building was set on fire with the Communists being blamed. Hitler used this to extend his powers and began arresting Communists. Following this, he passed the Enabling Act which allowed him to make laws without the consent of the Reichstag. This marked the end of democratic rule and the beginning of Hitler's dictatorship.

Russian Revolution
Following the abdicator of the Tsar in March 1917, Russia was in turmoil as they were led by the Provisional Government. In October 1917, the Bolsheviks, a Communist group, led by Vladimir Lenin stormed the Winter Palace and declared a new Communist government. This was not met favourably by all, within months, Russia had descended into civil war, with the Bolsheviks (Reds) fighting the Tsar's supporters (Whites)


THE EVENING MISSOURIAN

ARMISTICE IS SIGNED

STATE DEPARTMENT SAYS GERMANY GAVE IN TO THE ALLIES' TERMS AT 5 A. M.

EXTRA

KAISER WILL ABDICATE, SAYS BERLIN WIRELESS

Stalinist Russia
Vladimir Lenin died in 1924, this left a position as leader. Joseph Stalin carefully outmanoeuvred his competition to establish himself as the leader of the Soviet Union. This began a spell of terror in which there was extreme industrialisation and intense measures placed upon the agricultural sector. Any opponents to the regime were scouted by the Cheka (secret police) and sent to the gulags. Stalin ruled by fear and used every vice available to do this. Stalin eliminated all of his opponents and so began installing a "cult of personality" around himself. Stalinist rule dominated all parts of the Russian people's lives, they were to serve the regime and do so unquestionably.

Mussolini's rise to power
Benito Mussolini was the Fascist leader of Italy from 1922 till 1945. In October 1922, Mussolini threatened to march on Rome to take control of the government through violent force if it was not handed over. King Victor Emmanuel and the government were slow to act, eventually dispatching troops, though Fascists had already seized control of some local governments. In 1935, Mussolini invaded Abyssinia and incorporated this into his own empire. He also proposed a system of 'autarky' which promoted self-sufficiency in the Italian economy. Mussolini had fully attempted to implement fascism as quickly as possible.

1917	1918	1922	1923	1924	1929	1933	1935
Abdication of the Tsar and October Revolution.	Treaty of Versailles is signed.	Mussolini marches on Rome.	Hyperinflation, Munich Putsch and Invasion of the Ruhr.	Lenin dies, beginning the power struggle.	Wall Street Crash.	Hitler is made Chancellor. Reichstag Fire. Enabling Act.	Invasion of Abyssinia by Italy.

Student Knowledge Organiser

Polymers (Plastics)

What is the difference between a thermoforming plastics and a thermosetting plastics?

Thermoforming polymers can be *reheated and* remoulded due to their molecular structure.

Thermosetting polymers can only *be moulded once* and therefore can't be recycled. They are therefore less environmentally friendly.

The source for most synthetic polymers (most plastics) is ***Crude oil***.

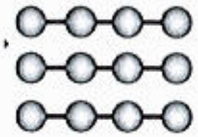
The Sustainability of Plastic Products

Most plastics are made from Crude Oil (see above). Crude Oil is a Nonrenewable/finite resource which means that we will eventually run out of it. End of life considerations are also important for plastic products as most plastics take so long to decompose. Many responsible companies produce a Product Life Cycle Assessment which informs them of the environmental impact there products will have. The information they gather helps them decide how best to source, manufacture and dispose of their products to limit their environmental impact. Extracting Crude Oil uses extremely high levels of energy which is created by burning fossil fuels. These fossil fuels release high amounts of CO_2 into the earths atmosphere which contributes to Global Warming.

The situation is similar when manufacturing plastic products. The polymers need to be heated to high temperatures in order to mould them. This is again achieved by burning fossil fuels, which releases more CO_2 and contributes to Global Warming.
At the end of a plastic product's life there are several options to consider. Firstly, plastic products can be reused as they're typically easy to repair and maintain which means they can survive longer than wooden or metal based products.

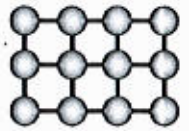
Most plastics are also recyclable, this means the material can be melted down and then put back into production to become a new product. This saves the material from ending up in landfill and also prevents us from sourcing more plastics from crude oil.
The final option is to throw the product into Landfill. This causes significant environmental issues as plastics take hundreds of years to decompose and since the material hasn't been recycled, we must then create new plastic products using more crude oil, putting even more strain on the planet's nonrenewable resources.

Thermoforming plastics



Thermoplastics are the most common types of plastics we see on a daily basis. They are generally the most flexible, especially when heated. This is due to their physical structure. Their polymer chains (see below) are loose which means they can slide past each other when heated. This allows them to be reformed multiple times.
Thermoplastics are usually very easy to recycle due to the fact they can be remoulded multiple times.

Thermosetting plastics



Thermosets are more rigid and once they have been formed and set once, they are stuck in that shape forever. The polymer chains in thermosets have more 'cross links' between them which stops the plastic moving when heated. As a result, thermosets are more brittle and harder than thermoplastics. Thermosets have good resistance to heat and make good electrical insulators. They are however difficult to recycle as they burn rather
than melt.

Examples of Thermoplastics

HIPS

High Impact Polystyrene
Properties: Flexible, Impact resistant, Lightweight, Food safe.
Common Uses: Food containers, Household Electronic casings.

HDPE

High Density Polyethylene
Properties: Lightweight, Rip and Chemical resistant.
Common Uses: Milk bottles, Pipes,
Buckets, Bins, Household Bottles.

ACRYLIC/PERSPEX

Properties: Tough but Brittle.
Common Uses: Commonly used in Schools, Display Stands, Car Lights and Modern baths.

Examples of Thermosetting plastics

Urea Formaldehyde

Properties: Heat resistant, Good electrical insulator, Hard, Brittle.
Common Uses: Electrical fittings, casings, buttons and handles.

Polyester Resin

Properties: Strong, Heat resistant, Good electrical Insulator.
Common Uses: Waterproof coatings,
Flooring, Fibreglass lamination

Melamine Formaldehyde

Properties: Lightweight, Hard, Brittle, Food Safe.
Common Uses: Kitchenware, Heat Resistant surfaces, Furniture.

YEAR 9 Afternoon Tea SKO

Presentation plates and ideas:
Select plates/stands and dishes that will showcase your dishes. Think about how the dishes will allow you to plate up and the ease in which the customer will be able to select the dishes to eat.

KEY VOCABULAR	
Fine Dining	Caters to an upscale clientele and provides the highest quality of food. A fine dining restaurant has a formal atmosphere, is almost always a sit down restaurant, and has a
Afternoon tea	Afternoon Tea is a tea-related ritual, introduced in Britain in the early 1840s. It evolved as a mini meal to stem the hunger and anticipation of an evening meal at 8pm.
Presentation techniques	Techniques used to make food look more attractive and appetising.
Creaming method	Cake making method where the butter and sugar is mixed together first, then the egg added and then the flour folded in gently
All-in one method	Cake making method where all the ingredients are whisked together.
Finger sandwich	Sandwich that is easy to handle and can be eaten in two-three bites.
Egg wash	A beaten egg is used to brush the top of bread/ pastry prior to baking.

POINTS TO CONSIDER	
Skills of staff	Dishes can only be put on the menu if the staff have the skills to produce them.
Themes	If there is a theme to the menu every element of the dish on the menu must fit with that theme. As this is what the customer will expect.
Seasonality	Seasonal foods that foods that are grown naturally in the in each season e.g. asparagus in spring, pumpkin in autumn.
Ingredients/equip ment available	Dishes can only be put on the menu if the kitchen have the ingredients and equipment available to make those dishes
Types of customer	Different customers will have different needs and requirements from a product: Customers are people who purchase and/or consume the product.

Piping	Using piping bags and different nozzles to create different patterns using buttercream/ fresh cream or meringue by squeezing the filled bag.
Modelling	Use fondant icing to create shapes for decoration
Feathering	Where you cover your baked item with one colour of icing and then pipe thin parallel lines using a different coloured icing. Then you drag a skewer through the lines to create a wavy effect.
Lattice	Criss-crossing pattern of strips. Weaving lines of pastry over and under other strips of pastry.
Glazing	Coating of food such as bread or pastry before baking used egg, milk or another liquid to create an attractive finish
Crimping	Crimping the edges of pastry not only looks pretty but it helps keep the filling inside.
Positioning	The way you position the food on a plate can dramatically alter it's appearance. Centre foods that are the same shape as the plate.

RESEARCH

Remember that this does not need to be in written format BUT photographs of displays, printouts from the computer, leaflets, etc. must be produced as evidence that you have carried out the research or investigation. Answer the following questions using the internet to find out:

What is afternoon tea?
·Where does it originate from? · What time is it eaten?
· How is it served? What beverages are served with afternoon tea?
· How much does it cost for 2 people to eat afternoon tea at e.g. Betty's or Harvey Nichols?
· How is afternoon tea presented?
· What does it look like?
· Consider the nutritional content of afternoon tea products. Analyse the nutritional content of a few items . Use bbcgoodfood.com (i.e. Mini quiche, ham and mustard sandwich, profiteroles). Comment whether these products are high in fat, salt, sugar, low in fibre, contain vitamins/minerals/protein are a carbohydrate etc.
· How are the products decorated?
· Draw a mind map of different dishes that could be served.
· Produce a table of suitable recipes you could make for the task.
· List the level of skill; high, medium or basic.
· Make an image board to show recipe ideas.
· Trial and test recipes in practical lessons.
· Watch demonstrations of recipes.
· Carry out a survey of varieties of products available for sale. Record your results in a table.
· Taste testing of different dishes suitable for afternoon tea.
· Make a fact file or information leaflet that could be used in a Hotel or restaurant to promote afternoon tea

REASONS FOR CHOICE

JUSTIFICATION AND REASONS FOR CHOICE Research recipes and choose what you will make in the practical session. Remember the practical carries the most marks so make sure your choice is: • Suitable for the brief – each recipe must be suitable for afternoon tea. • You have the time, skill and equipment to make. • Recipes show a variety of colour, texture and flavours. • Show skills which reflect your ability.

Higher Level Skills: · Pastry making – short crust, pate sucre, choux · Roux based sauces · Meringues and pavlovas · Meat and fish cookery (using high risk foods) · Decorated cakes and gateaux · Rich yeast doughs including pizza, shaped bread rolls. · Complex accompanime nts and garnishes e.g. piping cream, coulis sauce, vegetable accompaniments.

Medium Level Skills: · Puff pastry items that need shaping but use readymade pastry · Vegetable and fruit dishes requiring even sizes · Cheesecakes and similar desserts · Simple sauces e.g. red wine sauce · Simple cakes, biscuits, cookies and scones · Complex salad with a homemade dressing such as mayonnaise

Basic Skills: · Crumbles · Sandwiches · Pizza with readymade base · Jacket potatoes · Simple salads · Assembling products e.g. using prepared sauces, bought meringue nests etc.

JUSTIFICATION AND REASONS FOR CHOICE Create a table with your 4 chosen dishes in. List the skills and cooking methods for each product. Write an introduction to the dishes you are going to make. Did you trial any of these dishes?

Dish	Skills	Cooking methods
Victoria sandwich cake	Creaming method Decorating, piping	Baking
Strawberry Gateau	Whisking method, fruit preparation, piping cream and making chocolate curls.	Baking and chilling.
Stilton & vegetable quiche	Shortcrust pastry, making custard, vegetable preparation.	Baking and sauté.
Shortbread biscuits	biscuit made by the rubbing in method	baking.

Write a paragraph for each product you are making. Explain why you are making the product, and how it is suitable for afternoon tea. i.e. Victoria Sandwich Cake Read the examples below and tailor these to your dish. This dish shows a variety of colours; state the colours used in each dish. I have trialled this dish so I know how long it will take to make/I know what it will look lke. This dish is nutritionally balanced (contains carbohydrates, protein, vitamins and mineral's, is low in salt, low in fat) This dish shows a variety of textures; chewy, crunchy, soft, crisp etc. This dish will demonstrate a range of skills such as....(creaming, pastry making, whipping, proving) This dish shows a variety of flavours. · Cost – state how economical the dishes chosen are. Use of staple or store cupboard ingredients, ingredients which are in season etc. ·This dish can be made in time available. This dish look attractive with accompaniments and/or garnishing. This dish is saleable – customers in restaurant would want to buy them. This dish is easy to portion control and to serve. State how you will portion dishes; use of spoons, ladles etc. This dish would be suitable for making in bulk. This dish can be chilled/frozen for use another time. Chilled at 1-5GC and frozen at -18GC. Make a menu card to show the dishes you are making. Present attractively. You will need to display this with your food during the practical .

Terms for Analysis: The poem...			
Achieves	Advances	Affects	Symbolises
Allows	Alludes to	Builds	Transforms
Concludes	Confirms	Conveys	Typifies
Denotes	Develops	Demonstrates	Reinforces
Displays	Justifies	Exaggerates	Offers
Encourages	Enhances	Establishes	Presents
Exemplifies	Emphasises	Explores	Portrays
Exposes	Forces	Generates	Questions
Highlights	Hints	Identifies	Provokes
Ignites	Illustrates	Impacts	Signifies
Implies	Identifies	Indicates	Juxtaposes

Year 9 English Poetry KO

5 Steps for Amazing Unseen Poetry Analysis

1. Look at the title
2. Look at the first and last lines
3. Examine the turning point
4. What changes throughout the poem?
5. Pick out three things to comment on...
   ... then find three things to say about each of those things

Structural Techniques	
Rhythm	The beat of the poem
Volta	The point in the poem where the mood changes
Caesura	A deliberate break or pause in a metric line
Enjambment	Sentences running on over more than one line
Stanza	A group of lines in a poem
Rhyme	Words that have the same rhyming sound
Rhyme Scheme	Patterns of rhyming words
Meter	The pattern of stressed and unstressed syllables
Free Verse	Lines of poetry that do not follow any regular metrical structure
Blank Verse	Lines of poetry that are unrhymed but follow a regular meter
Repetition	Repeated words or phrases
Anaphora	The repetition of words or phrases at the beginning of a line or sentence

Language Techniques	
Simile	A comparison using *like* or *as*.
Metaphor	A comparison using *is*, *was* or *were*.
Imagery	When the writer creates a mental picture or image.
Symbolism	The use of "symbols" to signify or connote particular (usually well-established) ideas.
Motif	A recurring image in a poem.
Personification	Giving human attributes to something non-human.
Zoomorphism	Giving animal attributes to something which is not an animal.
Oxymoron	Two words which directly contrast, placed together.
Alliteration	Repeating the same letter.
Connotations	Associated words or meanings.
Pathos	Creating a strong emotional effect.
Semantic field	A group of words related by meaning.
Emotive Language	Language which appeals to the emotions.
Hyperbole	The use of exaggeration for dramatic effect
Imperatives	Command words which direct the reader.
Syntax	The order of words within a line.
Sibilance	Repetition of the S sound.
Euphony/ Cacophony	Pleasant sounds/ Harsh and discordant sounds

Poetry Key Terms	
Word classes	Nouns, adjectives, adverbs, verbs, pronouns
Language	Word choices made by the poet
Structure	How the poem appears - the order and flow
Form	Physical layout of the poem, what kind of poem it is
Tone	How a text sounds, e.g. humorous or serious
Mood	How readers feel or respond to texts, e.g. playful, lonely, warm
Theme	Underlying messages, or "big ideas"

Number of lines in or within a poem			
		Couplet	2
		Rhyming Couplet	
Tercet	3	Sestet	6
Quatrain	4	Septet	7
Quintet	5	Octave	8
Sonnet	A 14-line poem		

Year 9 English TRAGEDY KO

WORD	DEFINITION
Tragedy	A play dealing with tragic events and having an unhappy ending, especially one concerning the downfall of the main character.
Tragic hero	A tragic hero is the protagonist of a tragedy. They gain the sympathy of the audience but often have a fatal flaw.
Regicide	The killing, murder or assassination of a monarch (a King or Queen.)
Prophecy (n) **Prophesy (v)**	A prophecy is a prediction of what will happen in the future. To prophesy is to make a a prediction of what will happen in the future.
Hamartia	A fatal flaw leading to the downfall of a tragic hero or heroine.
Mimesis	The imitation of real life in art and literature.
Peripeteia	A sudden reversal of fortune or change in circumstances.
Anagnorisis	The discovery of a truth – i.e. the character realising their **hamartia** or discovering a prophecy or act of fate.
Catharsis	A release of emotions in order to feel purified and cleansed.
Jacobean	The period of time from 1603-1625 when James I was King of England (and Scotland.)
Eponymous	An eponymous character will have their name in the title of the play, novel or poem they appear in.
Machiavellian	Machiavelli was an Italian politician who wrote a book explaining how to be cunning. Machiavellian can mean evil or devious.

CONVENTIONS OF TRAGIC HEROES

Hamartia	• All tragic heroes have a single character flaw which leads to their undoing • Often, their discovery of this flaw leads to their death
High born/noble	• They tend to be high born or noble, e.g. kings or important soldiers • This emphasises the fall from grace
Neither good nor evil	• Tragic heroes are never entirely pure or evil • This makes tragedy a complicated and interesting form of literature
Relatable and understandable	• Audiences can relate to and understand the actions of tragic heroes • We feel sorry for tragic heroes even when they behave badly

CONTEXT

Ancient Greece	• c.1200 BC to 343 BC • Aristotle, a Greek philosopher, defined the features of tragedy • Greek literature often features stories from mythology, about gods, goddesses and fantastical creatures • Greek drama featured a chorus, who commented on the action
The Jacobean Era	• James I became King in 1603 following the death of Elizabeth I • He was the first King of England AND Scotland in 1603 • He was Shakespeare's patron, and so his plays were often written to please the King • James I was superstitious and hated witches • Life in the Jacobean era was difficult for Black people, something we see in *Othello*
The Holocaust	• The genocide of 6 million European Jews during World War II – almost two-thirds of Europe's Jewish population • 1941 and 1945 • Jews were sent to concentration camps set up by Hitler

PLAY	SUMMARY OF THE PLOT
Oedipus Rex **Sophocles** **429 BC** Set in Thebes during the time of Greek myths	By leaving his home in Corinth, Oedipus thinks he has escaped a terrible prophecy that says that he will kill his father and marry his mother. On the way to Thebes, Oedipus kills a fellow traveller. He then defeats the Sphinx and marries queen Jocasta. When Oedipus finds out he has fulfilled the prophecy, he blinds himself.
Othello **Shakespeare** **1603** Set during the Ottoman-Venetian war 1570-1573 in Cyprus	Iago is furious about being overlooked for promotion and plots to take revenge against his General; Othello, the Moor of Venice. Iago manipulates Othello into believing his wife Desdemona is unfaithful, stirring Othello's jealousy. Othello allows jealousy to consume him, murders Desdemona, and then kills himself.
The Shawl **Cynthia Ozick** **1980** Set during the Holocaust, in a concentration camp	The story follows Rosa, her baby Magda, and her niece Stella on their march to a Nazi Concentration camp in the middle of winter. Rosa hides Magda in a shawl which she sucks on for food. One day, Stella takes Magda's shawl away to warm herself. Magda begins screaming for her "Ma." Rosa is too late and watches as the Nazi guards pick Magda up and throw her into the electric fence, killing her. Rosa stuffs the shawl into her mouth to stop herself from screaming.

KEY CHARACTERS

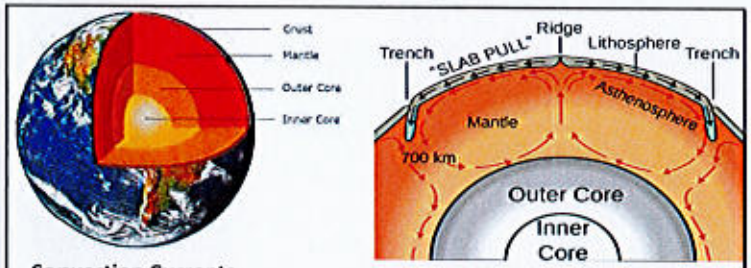
Oedipus	• Oedipus' hamartia is his ignorance, or his inability to see the truth • He is a King by birth and then when he saves Thebes, making him a noble hero • Oedipus is punished when he blinds himself, perhaps symbolising his ignorance or lack of knowledge
Othello	• Othello is a 'Moor', an old-fashioned term which referred to someone from North Africa • He is Shakespeare's only black hero • Othello begins the play as a noble soldier and loving husband, but ends the play as a violent and jealous husband who murders his own wife • His hamartia is his jealousy or perhaps his gullibility • Othello's punishment is his own suicide
Iago	• Iago is a Machiavellian villain who seems to have little motive for his plans except pure evil • Iago hates Othello, although we're not sure why • Iago tells Othello that Desdemona is having an affair with Cassio • This causes Othello to kill his wife, and then himself
Stella	• Stella is initially described as starving, weak and defenceless • Her decision to steal Magda's shawl causes the baby's death • Stella is 'always cold' afterwards, suggesting she always felt guilty

What is a Natural Hazard?

A natural hazard is an event that is not caused by humans, which could cause damage to people and to property (The risk increases if near more people/ more powerful).

Types of hazard

- *Geological* - These are hazards caused by land and tectonic processes i.e. Earthquake.
- *Atmospheric* - These are hazards caused by weather and climate i.e. Tropical Storm



Convection Currents

1. The core is the hottest part of the earth at 6000°C and heats the mantle above it.
2. The mantle heated by the core starts to rise as it is hotter than the rock around it.
3. The rising rock hits the crust and some pushes through the crust to form volcanoes.
4. Some of the mantle is forced to the sides and pulls the crust with it as it moves and cools
5. As the rock in the mantle cools it sinks pulling the crust down into the mantle with it.
6. As the rock sinks it is heated again by the core which will cause it to rise again.

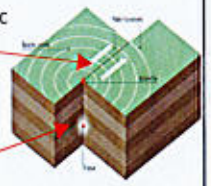
Causes of an Earthquake

Earthquakes are caused when two plates become **locked** causing **friction** to build up. From this **stress**, the **pressure** will eventually be released, triggering the plates to move into a new position. This movement causes energy in the form of **seismic waves**, to travel from the **focus** (underground), towards the **epicentre** (surface). As a result, the crust vibrates triggering an earthquake.

The point directly above the focus, where the seismic waves reach first, is called the **EPICENTRE**.

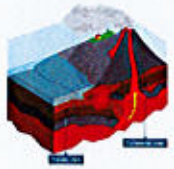
SEISMIC WAVES (energy waves) travel out from the focus.

The point at which pressure is released is called the **FOCUS**.



Destructive Margin

When the denser oceanic plate **subducts** beneath the continental place, friction causes it to **melt and become molten magma, adding pressure**. The magma forces its ways up to the surface to form a volcano. This margin is also responsible for **devastating earthquakes**.

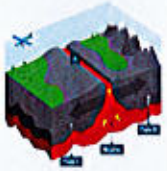


Constructive Margin

Here two plates are **moving apart** causing new magma to reach the surface through the gap. Volcanoes formed along this crack cause a submarine mountain range, such as those in the **Mid Atlantic Ridge**.

Conservative Margin

A conservative plate boundary occurs where plates **slide past each other** in opposite directions, or in the same direction but at different speeds. This is responsible for earthquakes such as the ones happening along the San Andreas Fault, USA.



Collision Margin – When 2 continental plates collide, causing the land to fold upwards and create mountains such as the Himalayas. Here, large earthquakes occur.

Y9 Geological World - Knowledge Organiser (Earthquakes)

Case Example – Japan Earthquake (HIC) – 11th March 2011

Causes

Category 9.0 shallow earthquake in the Pacific Ocean (destructive margin), caused a large Tsunami with waves reaching 135ft.

Primary Effects (Caused by the ground shaking)

- 15,883 deaths
- Nuclear power disaster with thousands evacuated
- Over 190,000 homes were left without clean running water or electricity.

Secondary Effects (Are a result of the primary effects)

- Some schools and offices could not open even after 1 year, affecting education and incomes.
- People could not return home due to radiation

Case Example – Nepal Earthquake (LIC) – 25th April 2015

Causes

On a collision plate margin, involving the Indian and Eurasian plates. The magnitude 7.8 earthquake was 60-80km from the capital Kathmandu. Epicentre was Gorkha. It was only 15km below the surface

Primary Effects (Caused by the ground shaking)

- 9000 have died and a further 20,000 are injured
- 3 million people are left homeless when homes were destroyed
- 1.4 million people needed food water and shelter weeks after
- 7000 schools destroyed

Secondary Effects (Are a result of the primary effects)

- Avalanches on Everest killed at least 19 people and 250 are missing
- A landslide blocked the Kali river causing flooding of homes, leading to evacuations.
- Road were blocked, restricting relief and leaving villages abandoned

Responses (How the hazard was dealt with after it happened)

A lack of wealth has led to the desperate need for international aid to support.

- Search and rescue teams, water and medical support arrived quickly from countries such as UK, India and China.
- Half a million tents were needed to provide shelter for the homeless
- In June 2015, Nepal hosted an international conference to discuss reconstruction and seek technical advice from other countries.

How Earthquakes are measured?

The **Richter scale** is a measure of the magnitude (power) of the earthquake from 1-10. It is logarithmic, meaning each number is 10 x more powerful than the last! Whilst this clearly indicates the force, it does not assess damage.

The **Mercalli scale** assesses the damage that is caused by an earthquake, which is better at measuring the impact to humans, but it is subjective as it is personal opinion.

Earthquake Management Strategies

Prediction - Earthquakes occur without any warning so they are very hard to monitor. However, you can use a seismometer to detect them and record the results as lots of smaller earthquakes may result in a larger one.

Protection – Earthquake proof buildings. The steel crossed frame sway with the movement of the earthquake. The window shutters automatically comes down to protect the glass. People should drop, cover and hold on!

Planning - In Japan they have a Disaster Prevention Day, emergency drills so people and emergency services know how to react.

Distribution of Tropical Storms.

They are known by many names, including hurricanes (North America), cyclones (India) and typhoons (Japan and East Asia). They all occur in a band that lies roughly 5-15° either side of the Equator.

High and Low Pressure

Low Pressure	High Pressure
Caused by hot air rising. Causes stormy, cloudy weather.	Caused by cold air sinking. Causes clear and calm weather.

Formation of Tropical Storms

1	The sun's rays heats large areas of ocean in the summer and autumn. This causes warm, moist air to rise over the particular spots
2	Once the temperature is 27°, the rising warm moist air leads to a low pressure. This eventually turns into a thunderstorm. This causes air to be sucked in from the trade winds.
3	With trade winds blowing in the opposite direction and the rotation of earth involved (Coriolis effect), the thunderstorm will eventually start to spin.
4	When the storm begins to spin faster than 74mph, a tropical storm (such as a hurricane) is officially born.
5	With the tropical storm growing in power, more cool air sinks in the centre of the storm, creating calm, clear condition called the eye of the storm.
6	When the tropical storm hits land, it loses its energy source (the warm ocean) and it begins to lose strength. Eventually it will 'blow itself out'.

CLIMATE CHANGE MAY AFFECT TROPICAL STORMS

As global temperatures more of the worlds oceans could be above 27°c, so more places in the world may experience tropical storms.

Oceans will stay at 27°c or higher for more of the year – so the **number** of tropical storms each year could increase.

Higher temperatures also mean tropical storms will be **stronger**, meaning they could cause more damage.

Changing pattern of Tropical Storms

Scientist believe that global warming is having an impact on the frequency, distribution and strength of tropical storms. This may be due to an increase in ocean temperatures.

Management of Tropical Storms

Protection	Aid
Preparing for a tropical storm may involve construction projects that will improve protection.	Aid involves assisting after the storm, commonly in LIDs.
Development The scale of the impacts depends on the whether the country has the resources cope with the storm.	**Planning** Involves getting people and the emergency services ready to deal with the impacts.
Prediction Constant monitoring can help to give advanced warning of a tropical storm	**Education** Teaching people about what to do in a tropical storm.

Primary Effects of Tropical Storms

- The intense winds of tropical storms can destroy whole communities, buildings and communication networks.
- As well as their own destructive energy, the winds can generate abnormally high waves called storm surges.
- Sometimes the most destructive elements of a storm are these subsequent high seas and flooding they cause to coastal areas.

Secondary Effects of Tropical Storms

- People are left homeless, which can cause distress, poverty and ill health due to lack of shelter.
- Shortage of clean water and lack of proper sanitation makes it easier for diseases to spread.
- Businesses are damaged or destroyed causing employment.
- Shortage of food as crops are damaged.

WHAT IS THE EVIDENCE for more extreme UK weather ?

2003 - heatwave	The UK recorded its highest every temperature at 40.3°c in Lincolnshire. Over 2,000 people died due to the heat, railway tracks buckled and in places the roads melted!
2010 heavy snow	Much of the UK was hit by heavy snowfall in December. Northern Ireland recorded a record low temperature of -18.7°c at Castlederg.
2015/16 floods	Severe storms and exceptionally heavy rainfall caused devastating floods (Storm Desmond, Cumbria). December 2015 was the wettest and warmest month ever recorded in the UK. (For December)

Reasons for different climate types

Cloudy and wet in the UK
This puts the UK close to the boundary of cold polar air moving down from the north and warm sub-tropical air moving up from the south. Here there is rising air and low-pressure belts (the sub-polar low) on the ground. Rising air cools, condenses and forms cloud and rain. This is why it is often cloudy and wet in the UK.

Hot and humid at the Equator
Air is rising and there is another low pressure belt where the sun directly overhead. Equatorial regions, such as central Africa and south-east Asia, experience hot, humid conditions. It is often cloudy with high rainfall. This is the region where tropical rainforests are found.

Hurricane Sandy (HIC) 2012

Effect
$71 Billion damages
18 000 flights cancelled
286 deaths
600 000 homes damaged or destroyed
70%crops destroyed in Haiti
8.5million businesses without power

Haiti – insufficienct prediction/protection. Cou[illegible]s still trying to recover from 2010 earthquake

USA – national hurricane cetner predicted strom and then issued warnings so people could evacuate >100 000 people
President Obama went to T.V to encourage people to leave.

Case Study: Typhoon Haiyan 2013

Causes
Started as a tropical depression on 2nd November 2013 and gained strength. Became a Category 5 "super typhoon" and made landfall on the Pacific islands of the Philippines.

Effects
- Approx 6,300 deaths.
- 5000,000 homes destroyed. 4.1 million homeless
- Water and sewage systems destroyed had caused diseases.
- Emotional grief for dead.
- 30 000 boats destroyed
- Tacloban airport badly destroyed
- $53 million in lost rice crops

Management
- 800 000 evacuated
- The UN raised £190m in aid.
- USA & UK sent helicopter carrier ships deliver aid remote areas.
- Education on typhoon preparedness.
- "Cash for work" programme to rebuild
- Cyclone shelters were built for evacuated people

Modelling and CAD Development

What is modelling?

Modelling is an inexpensive tool designers use to refine and communicate their ideas to clients and manufacturing companies.

It allows designs to be moved forward and improved.

Modelling can also help you test:

- Ergonomics
- Materials
- Construction

Types of Models

Quick Modelling - These are the first initial models you will make of an idea. You will use materials that are easy to hand, such as paper and card.

Prototyping - This is a type of modelling that happens later on in the project. When the idea is more refined. The model will be an accurate reflection of what the final idea will look like and how it will work. It will help manufacturers to determine dimensions and a final product spec.

CAD Modelling - Ideas can be modified rapidly, shared electronically, and even involve virtual testing!

Using ICT as a Design Tool:

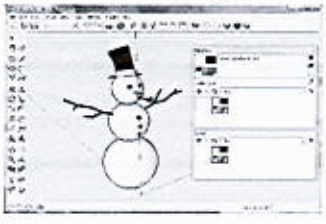
Computer Aided Design (CAD) allows designers use many different software programmes to help develop ideas.

CAD can help you "render" an idea, giving it a realistic colour or material effect.

CAD can allow you to run simulations of constructing the ideas, or testing materials and how they stand up to various forces.

It can also help you to see all the different components separately, in what we call an "exploded view".

Manufacturers find CAD modelling vital, as they can find out accurate dimensions and other details of the product from a single "engineering drawing" – which can be produced at the click of a button from a CAD programme.



Types of Modelling Materials:

Paper and Card	Easy to cut and fold Paper not as rigid as card
Corrugated Card	Easily available Good for large scale models Not easy to fold
Polystyrene Foam	Good for shaping in solid block shapes Lightweight and glues well
Foamboard	Clean and crisp models Can be cut with a knife
Balsa and Jelutong	Can be cut in a school workshop Sanding gives smooth finish
Wire and Straws	Good for representing piping and tubing Wire easily bent into complex shapes
Polymorph	Can be reused Easy to shape by hand or by using moulds Can be painted

Text Book Alert!

Be able to describe the advantages and disadvantages of using modelling to communicate.

Look on pg. 91-95 to learn more about modelling and the different types.