# Numeracy

Numeracy for Learning

- Being good at numeracy is not just for maths.
- You will need maths skills in all subjects from history, geography, sports studies, music, product design, food, science and computer science etc
- In this session we will look at
  - Using your calculator effectively
  - where maths comes up across a range of subjects
  - Some ideas to help with exam technique
  - Key formulae etc
  - Revision ideas

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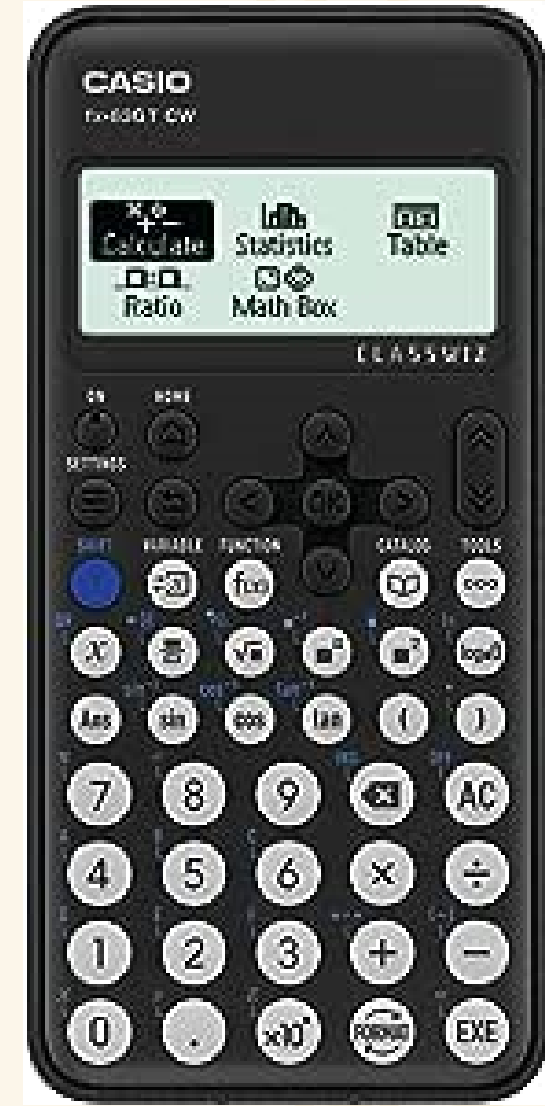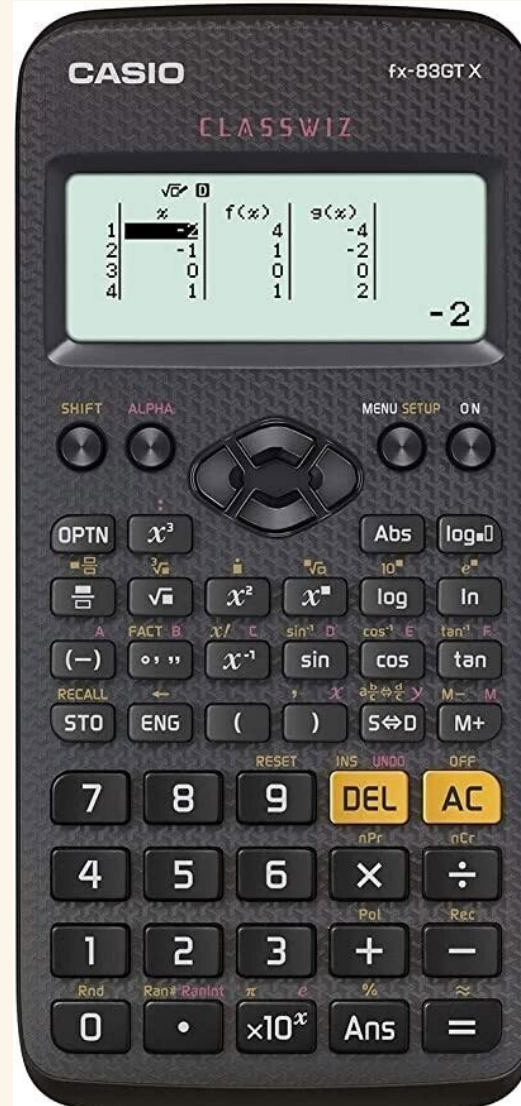GEOGRAPHY

the circle of Product Design
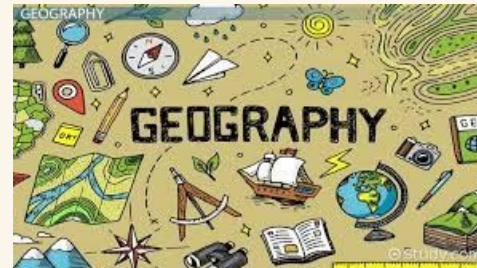
You need a scientific calculator and you need to know how to use it!!!

Do you know where to find:
- The fraction button
- The S=D / Format button
- The roots and powers buttons
- π
- Answer button

Do you know how to RESET your calculator?

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Now you can look at some questions from a variety of subjects. You can use your calculator!

Examples of exam questions across subjects - Science

(b) The ball has an average speed of 11 m/s

The ball takes 0.25 s to travel the same distance as the length of the table.

Calculate the length of the table.

Use the equation:

distance travelled = speed × time

(2)

(b)

*an answer of 2.75 scores **2** marks*

s = 11 × 0.25

1

s = 2.75 (m)

allow 2.8 (m)

1

(c) $\frac{75}{100}$ × 30.0

allow any correct method of determining 75% of 30

1

22.5 (cm)

1

(25.1 > 22.5) therefore the ball can be used

(c) A table tennis ball should only be used if it bounces to at least 75% of the height it was dropped from.

A manufacturer tested a table tennis ball.

The table shows the results.

Height ball was dropped from in cm	Height of bounce in cm
30.0	25.1

Determine whether the ball can be used.

Use the data from the table above.

(3)

Exam questions – Science

(e)   Calculate the percentage by mass of oxygen in ammonium nitrate (NH_4NO_3).

Relative atomic masses (A_r):   H = 1   N = 14   O = 16

Relative formula mass (M_r): NH_4NO_3 = 80

(3)

(e)   3 × 16 **or** 48   1

$\dfrac{48}{80}$ (×100)   1

60 (%)   1

an answer of 60 (%) scores **3** marks

an answer of 20 (%) scores **2** marks for:

$\dfrac{16}{80}$ (× 100)   (1)

= 20 (%) (1)

Exam questions – DT

2 You have marked out and cut a design to a measurement of 100 x 100mm with a tolerance of ±2mm. Which one of the following measurements is in tolerance?

A   97.9 x 100.58mm

B   98.2 x 102.56mm

C   99.9 x 101.07mm   **X**

D   102.58 x 96.2mm

[1 mark]

22 . 1 You have been asked to redesign your chosen product to make it suitable for a child aged between 3 and 5 years old.

The data in the table below shows the preferred colour scheme according to 250 children aged between 3 and 5 years old.

Calculate the missing percentages.

[2 marks]

	Number of children	Percentage of total
Pastel colours	55	22%
Primary colours	105	42 %
Fluorescent colours	50	20%
Subtle colours	30	12 %
Metallic colours	10	4%
Total	250	

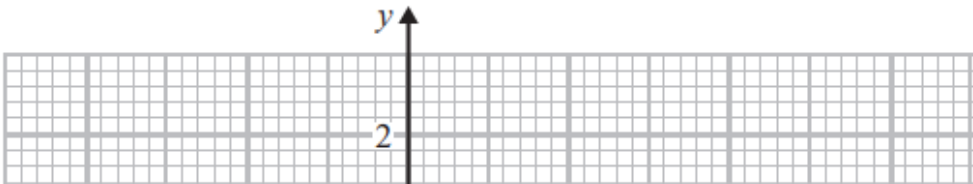Exam technique: Check you know how to get the correct answer by trying one of the ones already given

Exam questions – Maths

13 (a) Complete the table of values for $y = \frac{1}{2}x - 1$

x	−2	−1	0	1	2	3
y	−2				0	

(2)

(b) On the grid, draw the graph of $y = \frac{1}{2}x - 1$ for values of x from −2 to 3

(−2) −1.5 −1	B2	for a fully correct table
−0.5 (0) 0.5	[B1	for 2 or 3 correct entries]
Correct line	M1	for correctly plotting at least 5 of their points (provided B1 scored in part (a)) or for a straight line with gradient 0.5 or for a straight line through (0,−1) with a positive gradient
	A1	for a correct line between $x = -2$ and $x = 3$

Exam questions – Geography

Location X Sediment size (cm)	Location Y Sediment size (cm)
12	9
10	4
9	2
15	3
8	2
13	6
Mean: 11.2	Mean: **4.3**

Exam technique: Check you know how to get the correct answer by trying one of the ones already given

0	3	.	2

Complete the table in **Figure 12** by calculating the mean sediment size, in cm, for location **Y**.

[1 mark]

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Students measured the flow of water in two different rivers over 7 days. **Figure 7** shows the results, in rank order, for the two rivers.

Figure 7

	River A (Flow in cubic metres/second)	River B (Flow in cubic metres/second)
	6.2	11.8
Upper quartile	6.0	10.4
	5.6	8.7
	5.2	5.1
	5.0	2.1
Lower quartile	4.5	1.4
	3.7	1.2
Median	5.2	5.1
Interquartile range	1.5	9

| 0 | 4 |.| 7 | Complete the table (**Figure 7**) by calculating the interquartile range for River B.

[1 mark]

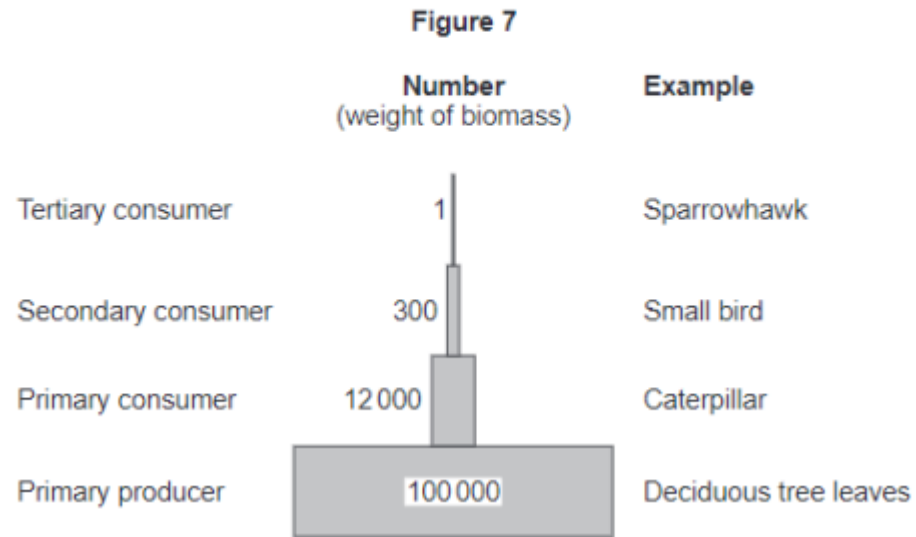Exam technique: Check you know how to get the correct answer by trying one of the ones already given

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Study **Figure 7**, a graph showing the biomass at different levels of a food chain.

Figure 7

	Number (weight of biomass)	**Example**
Tertiary consumer	1	Sparrowhawk
Secondary consumer	300	Small bird
Primary consumer	12 000	Caterpillar
Primary producer	100 000	Deciduous tree leaves

Biomass is the total quantity or weight of organisms in a given area.

| 2 |. | 4 | Calculate the percentage loss in biomass between the primary consumer and secondary consumer levels.

Shade **one** circle only.

[1 mark]

A   2.5%   ⭕

B   97.5%   ☒

C   25.2%   ⭕

D   95.5%   ⭕

Study **Figure 8**, information about the planned spending on transport infrastructure in England's regions 2016–2021.

Figure 8

Region	£ per person per year
North East	222
North West	682
Yorkshire and the Humber	190
East Midlands	221
West Midlands	254
East of England	413
London	1943
South East	226
South West	212

4363 / 9
485

| 0 | 2 |.| 9 |

Using **Figure 8**, calculate the mean planned spending per person per year 2016–2021 in the nine English regions.

[2 marks]

Get in the habit of writing what format your answer should be in next to the answer line…

E.g.

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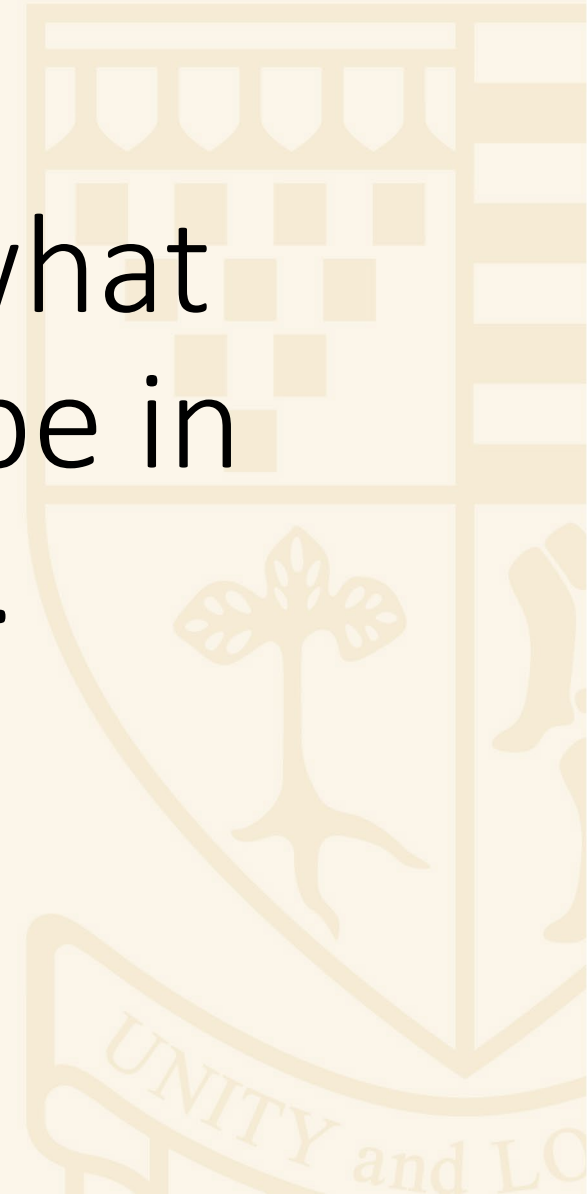
22 Work out $4\dfrac{1}{5} - 2\dfrac{2}{3}$

Give your answer as a mixed number.

....

(Total for Question 22 is 3 marks)

25 Here is a right-angled triangle.

8 mm

10 mm
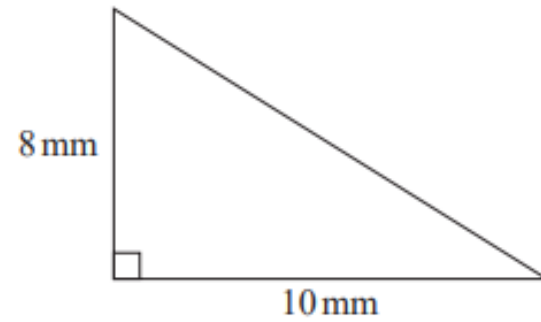
The shaded shape below is made from two of these triangles.

8 mm

8 mm

10 mm
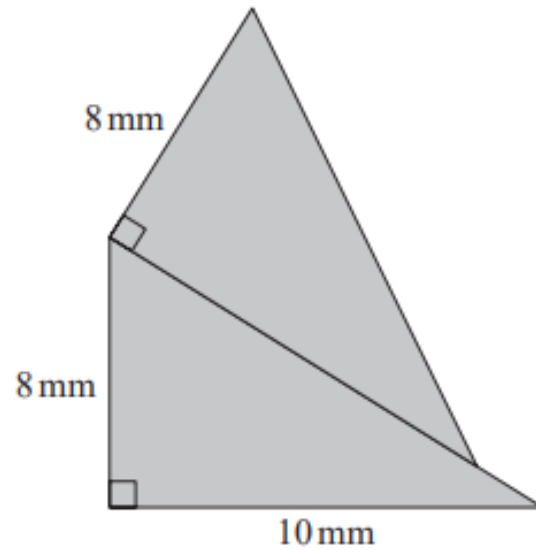
Work out the perimeter of the shaded shape.
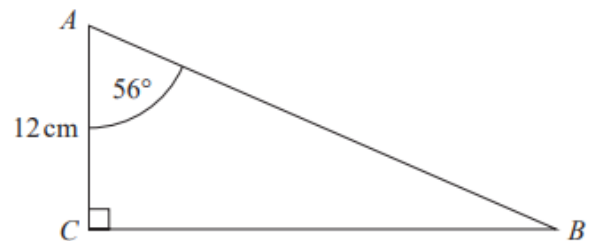Give your answer correct to 3 significant figures.

.... mm

(Total for Question 25 is 4 marks)

26 *ABC* is a right-angled triangle.

(a) Work out the length of *BC*.
   Give your answer correct to 1 decimal place.

.... cm

(2)

(c) Work out $4.2 \times 10^3 + 5.3 \times 10^2$

Give your answer in standard form.

....

(2)
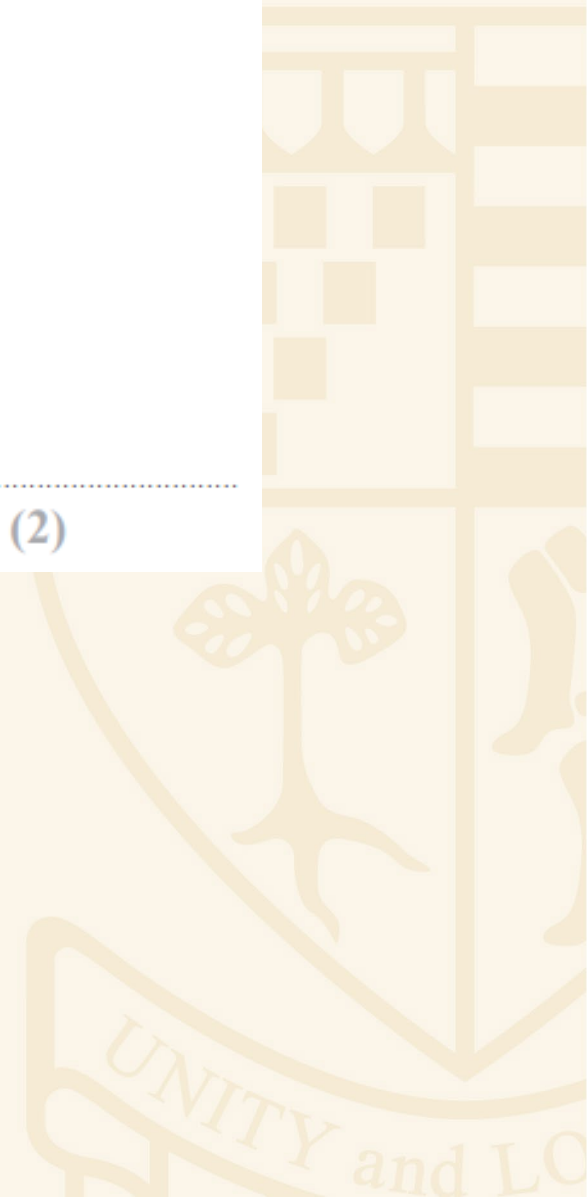
25 *ADC* is a triangle.
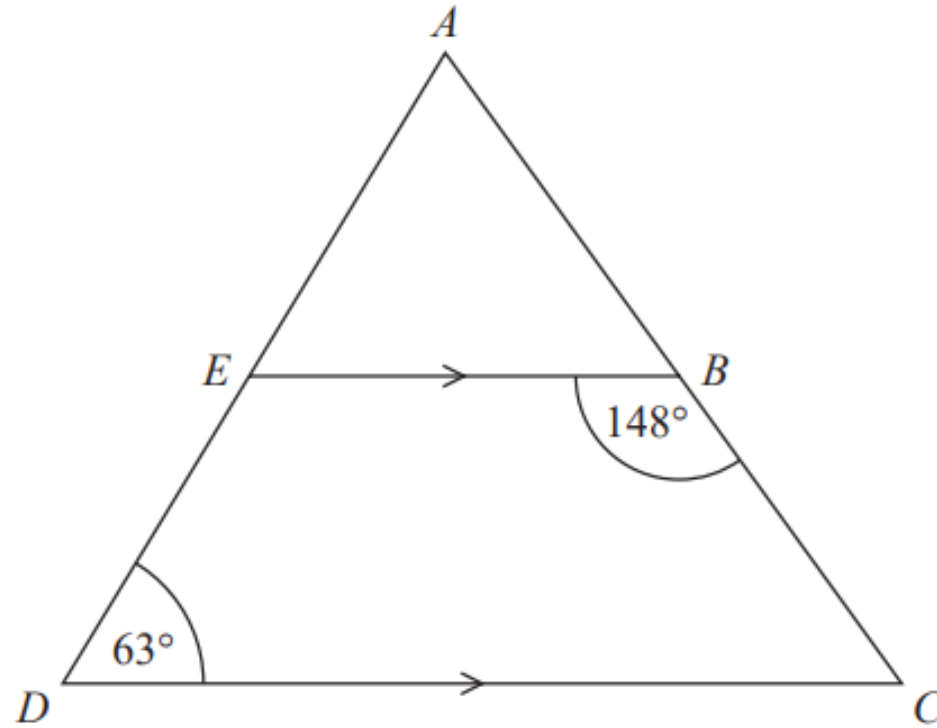
AED and *ABC* are straight lines.
EB is parallel to *DC*.

Angle *EBC* = 148°
Angle *ADC* = 63°

Work out the size of angle *EAB*.
You must give a reason for each stage of your working.

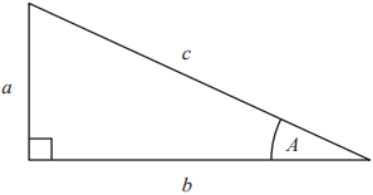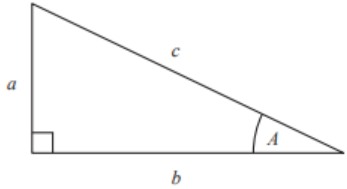Read the question carefully. The correct numerical answer only gets you 3/5 marks on this question
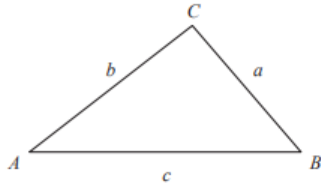
Exam aid – Use it!

Foundation Tier Formulae Sheet

Perimeter, area and volume

Where a and b are the lengths of the parallel sides and h is their perpendicular separation:

Area of a trapezium = $\frac{1}{2}(a+b)h$

Volume of a prism = area of cross section × length

Where r is the radius and d is the diameter:

Circumference of a circle = $2\pi r = \pi d$

Area of a circle = πr^2

Pythagoras' Theorem and Trigonometry

In any right-angled triangle where a, b and c are the length of the sides and c is the hypotenuse:

$a^2 + b^2 = c^2$

In any right-angled triangle ABC where a, b and c are the length of the sides and c is the hypotenuse:

$\sin A = \frac{a}{c} \quad \cos A = \frac{b}{c} \quad \tan A = \frac{a}{b}$

Compound Interest

Where P is the principal amount, r is the interest rate over a given period and n is number of times that the interest is compounded:

Total accrued = $P\left(1+\frac{r}{100}\right)^n$

Probability

Where P (A) is the probability of outcome A and P (B) is the probability of outcome B:

P $(A$ or $B)$ = P (A) + P (B) – P $(A$ and $B)$

END OF EXAM AID

Higher Tier Formulae Sheet

Perimeter, area and volume

Where a and b are the lengths of the parallel sides and h is their perpendicular separation:

Area of a trapezium = $\frac{1}{2}(a+b)h$

Volume of a prism = area of cross section × length

Where r is the radius and d is the diameter:

Circumference of a circle = $2\pi r = \pi d$

Area of a circle = πr^2

Quadratic formula

The solution of $ax^2 + bx + c = 0$

where $a \neq 0$

$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$

Pythagoras' Theorem and Trigonometry

In any right-angled triangle where a, b and c are the length of the sides and c is the hypotenuse:

$a^2 + b^2 = c^2$

In any right-angled triangle ABC where a, b and c are the length of the sides and c is the hypotenuse:

$\sin A = \frac{a}{c} \quad \cos A = \frac{b}{c} \quad \tan A = \frac{a}{b}$

In any triangle ABC where a, b and c are the length of the sides:

sine rule: $\frac{a}{\sin A} = \frac{b}{\sin B} = \frac{c}{\sin C}$

cosine rule: $a^2 = b^2 + c^2 - 2bc \cos A$

Area of triangle = $\frac{1}{2} a b \sin C$

Compound Interest

Where P is the principal amount, r is the interest rate over a given period and n is number of times that the interest is compounded:

Total accrued = $P\left(1+\frac{r}{100}\right)^n$

Probability

Where P (A) is the probability of outcome A and P (B) is the probability of outcome B:

P $(A$ or $B)$ = P (A) + P (B) – P $(A$ and $B)$

P $(A$ and $B)$ = P $(A$ given $B)$ P(B)

END OF EXAM AID

There will also be one in some of your science papers

Lines

Vertically opposite angles are equal.

Angles on a straight line add up to 180°.

Angles at a point add up to 360°.

Triangles and quadrilaterals

Angles in a triangle add up to 180°.

Base angles of an isosceles triangle are equal.

Angles in an equilateral triangle are equal.

Angles in a quadrilateral add up to 360°.

An exterior angle (of a triangle) is equal to the sum of the internal opposite angles.

Polygons

Exterior angles of a polygon add up to 360°.

The interior and exterior angle of any polygon add up to 180°.

Parallel lines

Alternate angles are equal.

Corresponding angles are equal.

Allied (or co-interior) angles add up to 180°.

Circle theorems

The tangent to a circle is perpendicular (90°) to the radius.

Tangents from an external point are equal in length.

Angles in a semicircle are 90°.

Angles in the same segment are equal.

The angle at the centre of a circle is twice the angle at the circumference.

Opposite angles of a cyclic quadrilateral add to 180°.

Alternate segment theorem.

But there are some things you need to remember

The Paper Society

Maths Revision for Y11

UNITY and LOYALTY

Wednesday afternoons in the Refectory

Practice past papers and get support from your friends and the Mathematics faculty. Biscuits provided.

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Revision & support

- Do multi-topic revision (e.g. past or practice papers) & mark them. There are hand-written and video solutions to support you.

https://www.mathsgenie.co.uk/papers.html

- Targeted topic revision – e.g. Corbett Maths, MathsGenie (this is in the revision booklet)

https://www.mathsgenie.co.uk/gcse.html
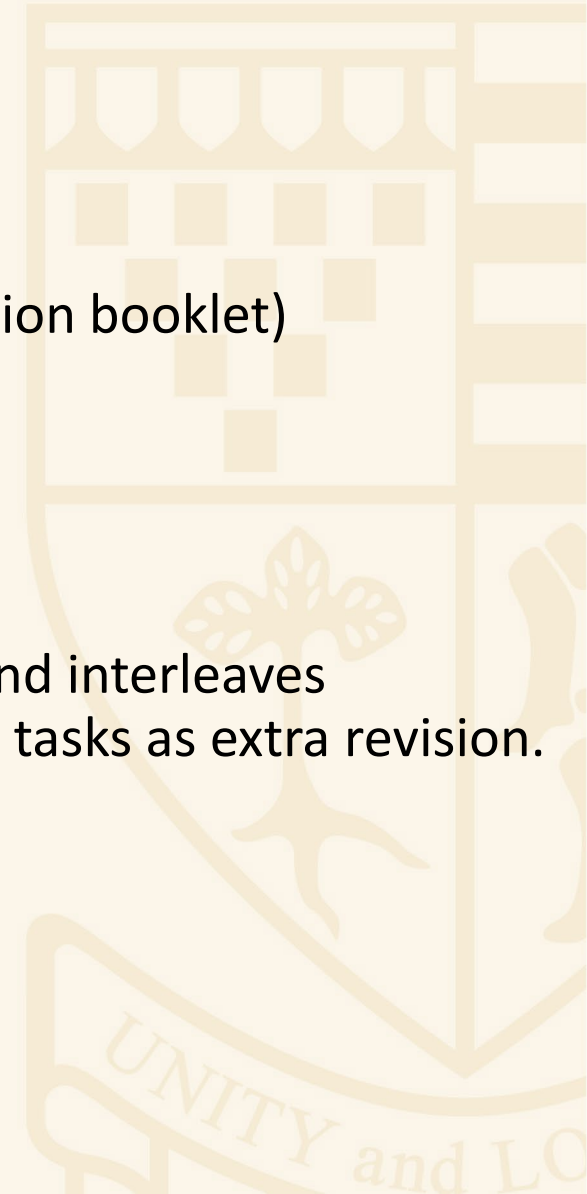
https://corbettmaths.com/contents/

- Keep doing your Sparx homework each week. This practises older content and interleaves different things to support revision. You can also do the Target and XP Boost tasks as extra revision.

- Paper Society – Wednesdays in the Refectory, 3-4pm
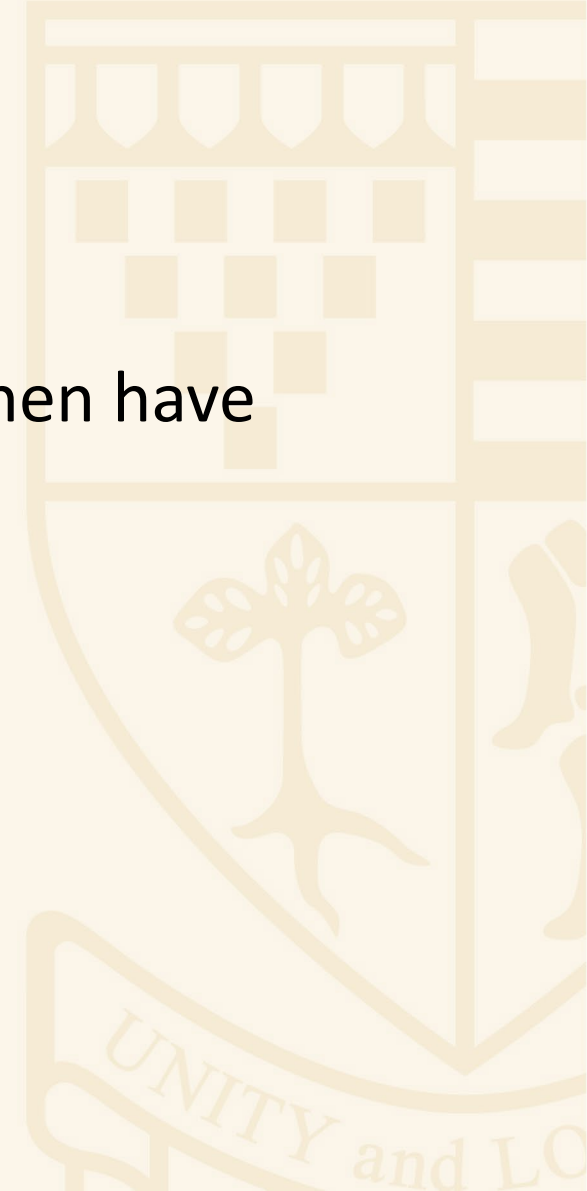
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Maths Exam information

- 3 papers, each 1.5 hrs long

- Paper 1 is non-calculator

- Papers 2 and 3 are calculator

Any topics could theoretically come up on any paper. We then have some 'best guess' papers after Papers 1 & 2.

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Songs and mnemonics

Averages song - https://www.youtube.com/watch?v=maKjEISDOko
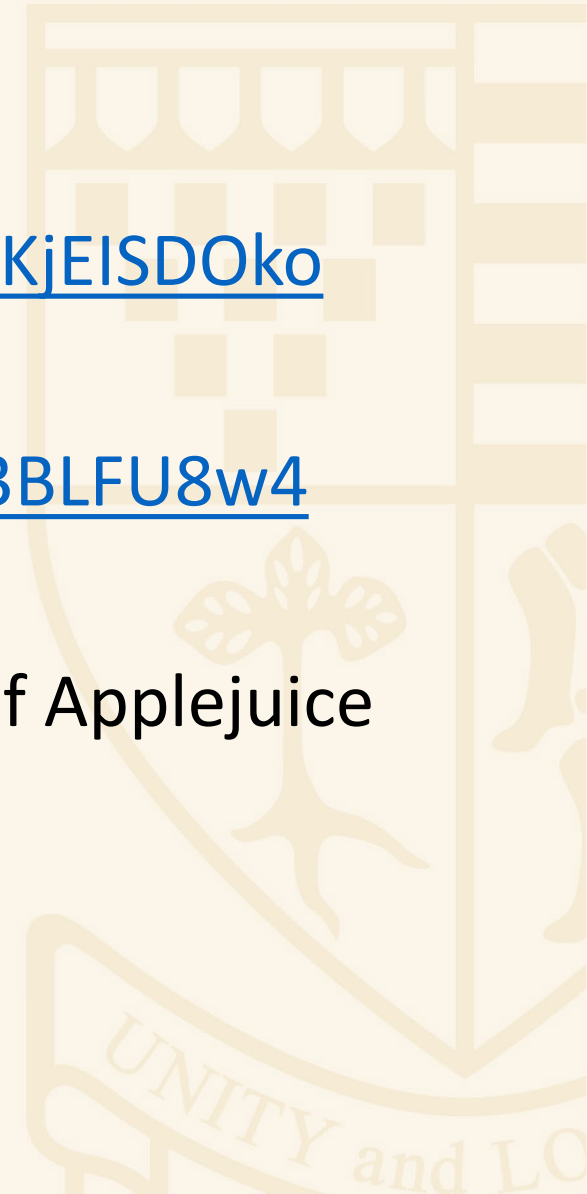
Circles song - https://www.youtube.com/watch?v=mAL3BLFU8w4

SOH CAH TOA - She Offered Her Cat A Heaped Teaspoon Of Applejuice

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