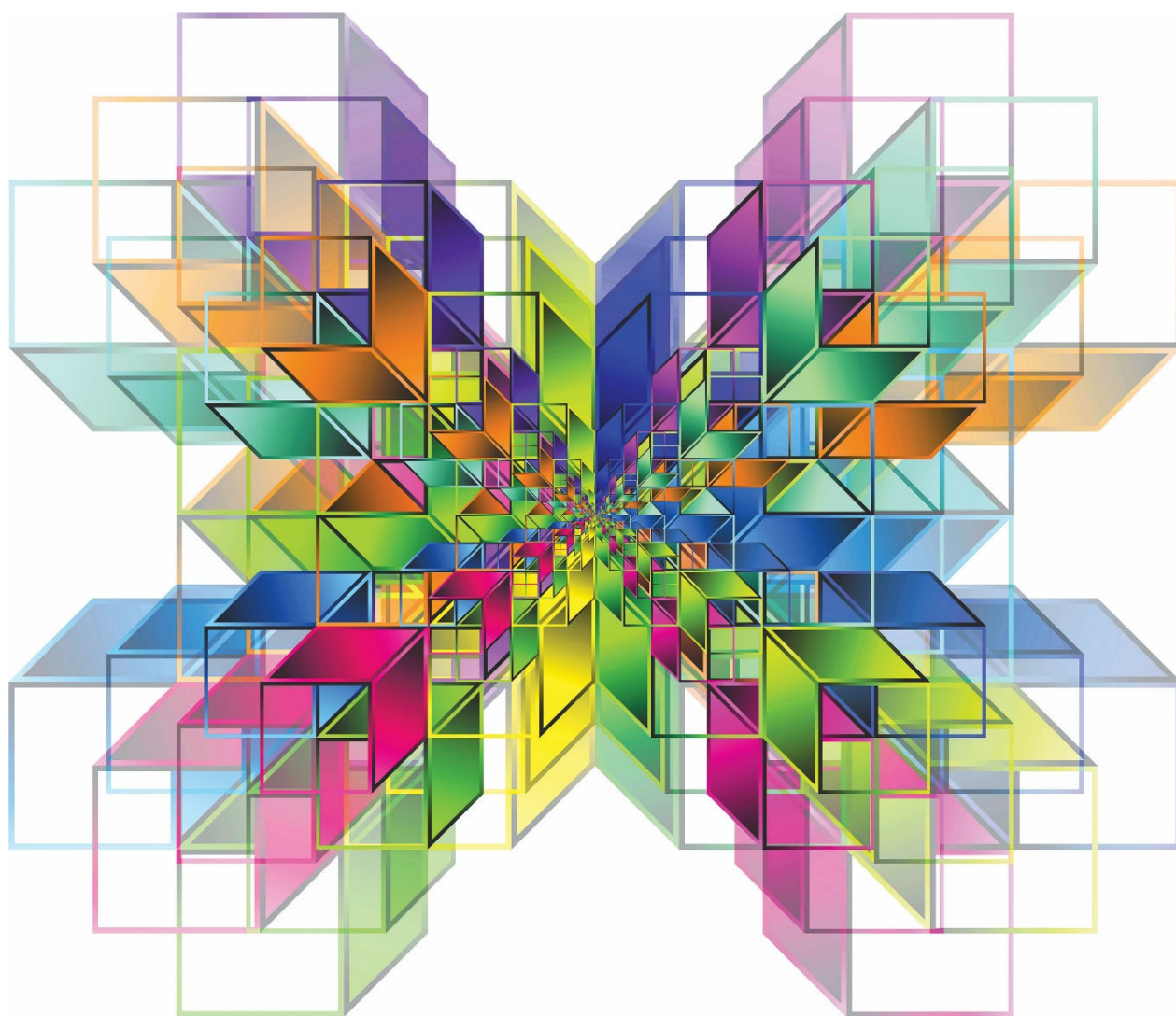


GCSE MATHEMATICS

Hub school network meetings

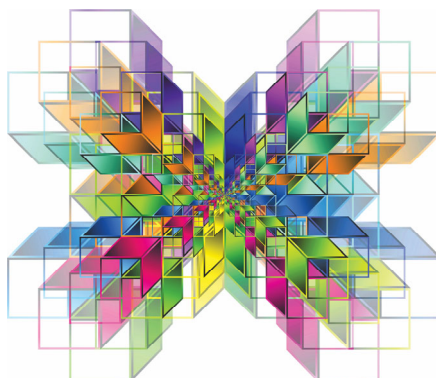
Presentation slides booklet

Published: Spring 2020



GCSE Maths Hub school networking meeting

Spring 2020



This meeting will be recorded

Exam boards have an Ofqual requirement to record event audio.

Recordings are kept for the lifetime of the specification and not shared as an accompaniment to session resources.

The recording will begin now.

Contents

- [Revision tips and planning](#)
- [Revision techniques and resources](#)
- [Exam tips](#)

Revision tips and planning

Revision means

- Relooking at – not necessarily reteaching!
- Perhaps doing something different revisiting the same content.
- Supporting students with a plan, materials and developing independent learning skills.

Plan

- Corbett maths etc
corbettmaths.com/2016/05/03/revision-checklists-for-gcse-maths/
- Timetable
- AQA Teaching guidance document ([All About Maths](#))

Algebra: Example of DfE's subject content

Plot graphs of equations that correspond to straight-line graphs in the coordinate plane; use the form $y = mx + c$ to identify parallel lines and perpendicular lines; find the equation of a line through two given points, or through one point with a given gradient.

GCSE Mathematics specification

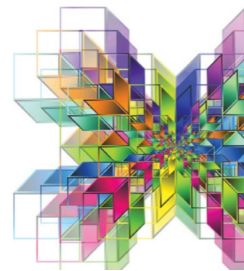
So AQA brought out our specification to look like this...



GCSE MATHEMATICS (8300)

Specification
For teaching from September 2015 onwards
For exams in May/June 2017 onwards

Version 1.0 10 September 2014



Extract from AQA specification 8300

A9

Basic foundation content	Additional foundation content	Higher content only
plot graphs of equations that correspond to straight-line graphs in the coordinate plane	use the form $y = mx + c$ to identify parallel lines find the equation of the line through two given points, or through one point with a given gradient	use the form $y = mx + c$ to identify perpendicular lines

Plain text

Plain text underlined

Bold text

AQA GCSE Teaching guidance

Please see the *AQA Teaching guidance* section in the *Supporting GCSE Mathematics revision booklet*.

Page 4 shows the support for our algebra section.



GCSE MATHEMATICS GCSE 0300

Teaching guidance
For teaching from September 2015 onwards
For GCSE exams in June 2017 onwards
Version 2.1, November 2019



AQA GCSE Teaching guidance

- Notice the bold is missing so this is for all students sitting either tier.
- The 'students should be able' section might be useful to students.
- The short questions give clarity and can be used by students.



A9 Plot graphs of equations that correspond to straight-line graphs in the coordinate plane, use the form $y = mx + c$ to identify parallel lines, find the equation of the line through two given points, or through one point with a given gradient

Teaching Guidance

- Students should be able to:
- recognise that equations of the form $y = mx + c$ correspond to straight-line graphs in the coordinate plane
 - draw graphs of functions in which y is given explicitly or implicitly in terms of x
 - complete tables of values for straight-line graphs
 - calculate the gradient of a given straight-line given two points or from an equation
 - manipulate the equations of straight lines so that it is possible to tell whether lines are parallel or not
 - work out the equation of a line, given two points on the line or given one point and the gradient.

Notes

Tables of values may or may not be given.
See A10

Examples

- 1 Draw the graph of $y = 3x - 1$ (both with and without a table of values).
- 2 Draw the graph of $x + 2y = 10$
- 3 Show clearly that the lines $2x + y = 5$ and $4x + 2y = 10$ are parallel.
- 4 A has coordinates (3, -5). B has coordinates (8, 7).
Work out the equation of the straight line AB.

AQA GCSE Teaching guidance

- Notice the labelling is A9h so the guidance focuses on the bold text (for higher work).
- Again, the short questions are a useful source of material to support revision.

GCSE MATHEMATICS 3300 TEACHING GUIDANCE

A9h Plot graphs of equations that correspond to straight-line graphs in the coordinate plane; use the form $y = mx + c$ to identify parallel lines and perpendicular lines; find the equation of the line through two given points, or through one point with a given gradient

Teaching Guidance

Students should be able to:

- work out the gradients of lines that are parallel and perpendicular to a given line
- show that two lines are parallel or perpendicular using gradients
- manipulate the equations of straight lines so that it is possible to tell whether or not lines are perpendicular
- know that the gradients of perpendicular lines are the negative reciprocal of each other.

Notes

Tables of values may or may not be given.

See A10h.

Examples

- 1 Work out the gradient of a line that is perpendicular to the line $2x + 5y = 6$
- 2 A is (2, 3), B is (5, 8), C is (7, 6) and D is (1, -4). Show that ABCD is a trapezium.

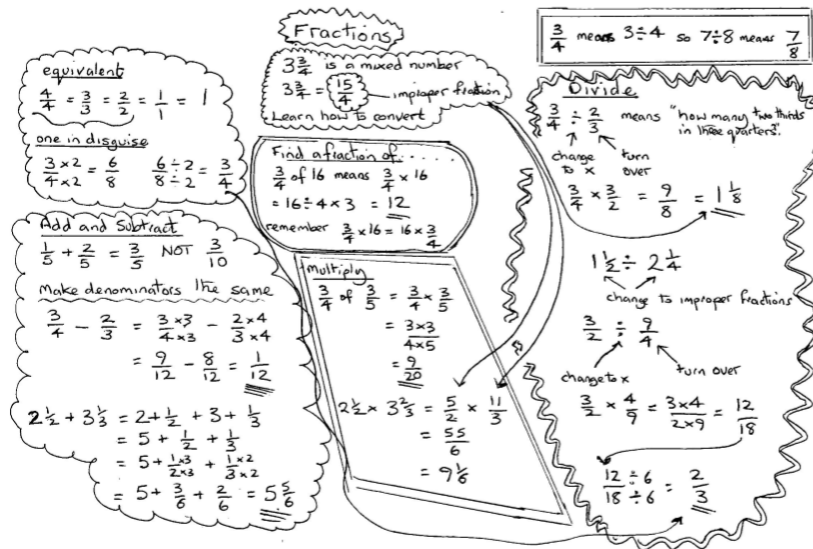
Version 2.1

55

Big picture – for key topics

- One idea, that many pupils value, is creating a big picture overview for a topic.
- Ideally this may have been created as part of earlier teaching to gather facts and processes together.
- Organised students will have a good set of notes that they have collected; others won't.
- The next slide shows an example.

Big picture – for key topics



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Big picture – for key topics.

Fractions example

Already created as an ongoing teaching resource.

Created with students as a revision aid.

Given as reference resource with a set of problems.

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Big picture – questions/problems

- Questions could be drawn from the teaching guidance, the AQA topic tests, exam questions or just a text book or internet source.

Fractions problems

Please see the
*Supporting GCSE
Mathematics revision
booklet.*

Fractions.



1. Show how you would work out $\frac{2}{3}$ of an hour.

2. A plastic supermarket container holds $2\frac{1}{4}$ litres of milk.
If one litre of milk is $1\frac{3}{4}$ pints, how many pints of milk are in the container?

3. John says $\frac{1}{3}$ of an hour plus $\frac{1}{2}$ of an hour plus $\frac{1}{6}$ of an hour, is 56 minutes.
Show why he is wrong.

4. A kitten weighs $\frac{5}{8}$ kg. If it increases its weight by $\frac{1}{5}$ kg each week.
How much will the kitten weigh in 3 weeks' time?

5. I want to cut a piece of wood $4\frac{1}{2}$ metres long into lengths each $\frac{3}{4}$ of a metre long?
How many lengths can be cut?

6. Put these fractions in order, smallest first $\frac{1}{2}, \frac{4}{5}, \frac{3}{4}, \frac{2}{3}$

7. An athlete weighed $14\frac{1}{2}$ stones before training for a marathon.
After training she lost $1\frac{2}{7}$ stones. How much did she weigh after training?

Transformations activity

Please see the transformations activity in the *Supporting GCSE Mathematics revision booklet*.

- Complete the boxes giving the four types of transformation.
- Now complete the other boxes.
- What feedback do you have?

Assessment Objective 1

Use and apply standard techniques

Students should be able to:

- accurately recall facts, terminology and definitions
- use and interpret notation correctly
- accurately carry out routine procedures or set tasks requiring multi-step solutions.





Weighting: F 50% H 40%

The underlined text highlights where many students struggle and where they need support in memory tasks.

Revision cards

- Revision cards can be useful and are easy to design and make.
- You may want to use the 'revision cards knots' (see next slide).
- Example mathematical sets can be found in the *Supporting GCSE Mathematics revision booklet*.






Revision card knots

 <p>Name the knot and one use.</p>	<p>Overhand knot.</p> <p>Used to make other knots.</p>
 <p>Name the knot and one use.</p>	<p>Figure of eight knot.</p> <p>Used as a stop knot.</p>
 <p>Name the knot and one use.</p>	<p>Reef knot.</p> <p>Used to join two similar diameter ropes.</p>
	<p>Sheet bend knot.</p> <p>Used to join two different diameter ropes.</p>

Revision card knots

- Cut out the four cards from each page. Fold along the centre lines and glue back to back (so each card has its answer on the back).
- Study the cards and the answers, then with a partner or on your own, test yourself.
- Any you can't recall put to one side and study them. Then shuffle the cards and try again.
- Students can create lots of games with the cards.

Revision card maths

	What is the equation of this curve?	$y = x^2$
	What is the equation of this curve?	$y = x^2 + 2$
	What is the equation of this curve?	$y = x^2 - 2$
	What is the equation of this curve?	$y = -x^2$
	Is the equation of the curve likely to be $y = (x + 2)^2$ or $y = (x - 2)^2$?	$y = (x - 2)^2$

Revision techniques and resources

Revision techniques


Make the best use of free exam resources and past paper questions to aid revision

- Corbett maths 5-a-day
- Revision mats
 - [Jo Morgan](#)
 - [Missbsresources](#)
 - [JustMaths](#)
- Revision clocks
- Same Surface, Different Deep (SSDD)

Foundation GCSE – breakfast warm-up

Foundation Maths GCSE: Breakfast Warm Up 1

Calculator A

Write $\frac{14}{50}$ as a percentage	Calculate $\frac{0.85 \times 21}{0.5^2}$	Maddie leaves home at 8.18am. She arrives at work at 9.41am. How many minutes was her journey?	List the first five prime numbers	Write $\frac{2}{5}$ as a decimal
Find 57% of £124	 Work out the area.	Find $\frac{3}{8}$ of 40	How many centimetres are in 75 metres?	Write $5\frac{1}{4}$ as an improper fraction
You can buy 10 pencils for 80p. How much will it cost to buy 15 pencils?	Solve $4x + 7 = 35$	The probability that Mark passes his driving test is 0.75. What is the probability that Mark does not pass his driving test?	A car increases its speed from 50 mph to 80 mph. Work out the percentage increase.	Expand $4x^2(2x + 3)$
A fair dice is rolled 60 times. How many times would you expect to roll a six?	Catherine's salary is £36,000. She gets a 12% pay rise. What's her new salary?	A cup of coffee costs £1.20. A cup of tea costs £1.15. I buy two cups of coffee and four cups of tea. How much change should I get from a £10 note?	Find the area of a circle with radius 5cm.	Find the value of y when $x = 2$ $y = x^2 + 5x - 6$



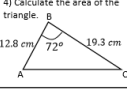



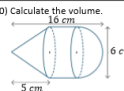
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Missbsresources

Final Countdown Higher Revision Mat

<p>1) Calculate the volume.</p>  <p>Radius of cone 4cm Height of cone 10cm</p>	<p>2) The point C on AB such that AC : CB = 2 : 1. Find $\frac{OC}{AB}$ in terms of a and b.</p> 	<p>3) Make m the subject of the formula.</p> $\frac{m}{l+m} = \frac{n}{p}$	<p>4) Calculate the area of the triangle.</p> 	<p>5) Millie travelled 190 miles to the nearest ten miles to London at an average speed of 67.4 mph correct to 3 significant figures. What was the quickest time possible for her to complete her journey?</p>						
<p>6) By eliminating y, find the solutions to the simultaneous equations</p> $x^2 + y^2 = 25$ $y = x - 7$	<p>7) Expand and simplify</p> $(\sqrt{5} - \sqrt{7})(\sqrt{5} + 3)$	<p>8) Calculate the area of the shaded region inside the equilateral triangle to 3 sf. M & N are midpoints.</p> 	<p>9) y is directly proportional to x^2. $y = 300$ when $x = 5$. Calculate the value of y when $x = 9$</p>	<p>10) Express 0.3547 as a fraction in its simplest form.</p>						
<p>11) Calculate the size of angle a.</p> 	<p>12) A school inspector takes a stratified sample of 60 students. How many students in year 8 are in the sample?</p> <table border="1" data-bbox="572 1621 700 1666"> <thead> <tr> <th>Year 7</th> <th>Year 8</th> <th>Year 9</th> </tr> </thead> <tbody> <tr> <td>176</td> <td>188</td> <td>86</td> </tr> </tbody> </table>	Year 7	Year 8	Year 9	176	188	86	<p>13) Write $\frac{\sqrt{8} + 6}{\sqrt{2}}$ in the form $p + q\sqrt{2}$, where p and q are integers.</p> 	<p>14) Solve $12x^2 - 10x - 5 = 0$</p>	<p>15) Evaluate $125^{\frac{2}{3}}$</p>
Year 7	Year 8	Year 9								
176	188	86								
<p>16) Work out $(3.7 \times 10^6) \times (4.8 \times 10^7)$</p>	<p>17) Rationalise $\frac{\sqrt{3} + 4}{\sqrt{2} - 5}$</p>	<p>18) x is inversely proportional to t. $s = 8$ when $t = 2$ Calculate the value of s when $t = 4$.</p>	<p>19) Prove using algebra the sum of four consecutive numbers is always even.</p>	<p>20) Calculate the volume.</p> 						



Challenge

There are 'n' students in a class. 6 of the students are girls. Miss B selects a students name at random to go on a trip out of all and places the name to one side. Miss B then selects another student at random for the names in the hat. The probability Miss B selects two girls is $\frac{5}{9}$. Show that $n^2 - n - 75 = 0$



www.missbsresources.com



Challenge
There are 'n' students in a class. 6 of the students are girls. Miss B selects a student's name at random to go on a trip out of a hat and places the name to one side. Miss B then selects another student at random for the names in the hat. The probability Miss B selects two girls is $\frac{2}{5}$. Show that $n^2 - n - 75 = 0$

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JustMaths countdown calendar

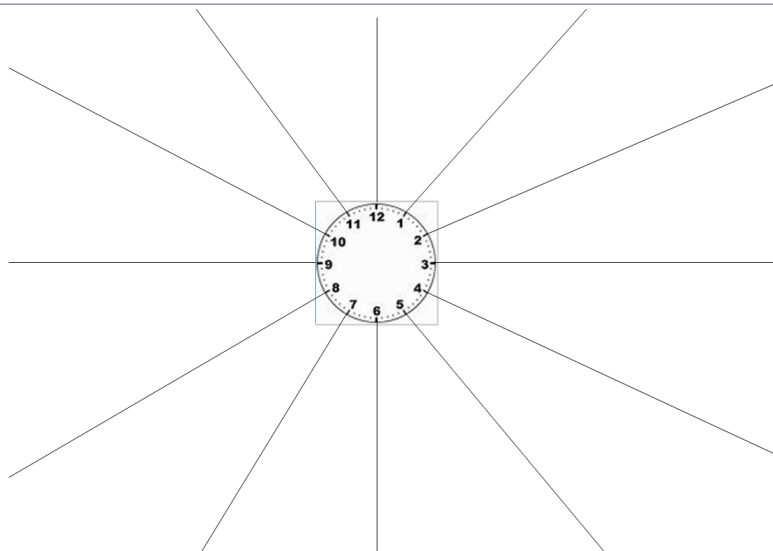
A LITTLE BIT OF MATHS EVERY DAY ... (CROSSOVER)						
MONDAY	TUESDAY	WEDNESDAY	THURSDAY	FRIDAY	SATURDAY	SUNDAY
 <h1>JUNE 2019</h1>				1 Find the product of the sixth prime number and the third triangular number.	2 A box is on a table. The area of the box in contact with the table is 1500 cm^2 . The pressure on the table is 28 newtons/m^2 . Work out the force exerted by the box on the table.	3
4 Factorise fully: $15xy^2 + 27x^2y + 9xy$ $x^2 - 169$	5 Work out the value of: $(3 \times 10^8) \div (6 \times 10^7)$	6 Round 0.000608765 to three significant figures	7 Town B is on a bearing of 065° from Town A. What is the bearing of Town A from Town B?	8 Simplify fully: $\frac{m^2 \times m^{-5}}{m^{-3}}$	9 Work out the shaded area.	10 
11 What is the size of an interior angle of a pentagon?	12 Solve: $4x - 7 = 21$	13 I invest £1200 in an account that pays compound interest of 1.5% per annum. How much interest will I earn in 3 years?	14 Write 185 as a product of its prime factors	15 Factorise: $x^2 - 7x + 12$	16 The total cost of 3 pens and 4 pencils is £1.84. The total cost of 5 pens and 2 pencils is £1.76. Work out the cost of one pen and the cost of one pencil.	17
18 Change 4.2 m^2 into mm^2	19 What is the lowest common multiple of 8, 12 and 15?	20 Calculate: $2\frac{3}{5} + \frac{3}{8}$	21 Expand and simplify: $(2x - y)(3x + 2y)$ $3y^2(2x - 3)$	22 A number "x", is rounded to 9.5 correct to 2 significant figures. What is the error interval of x?	23 There are a total of 220 counters in a box. There are three times as many red counters as blue counters. Work out the number of red counters in the box.	24
25 Simplify: $4(x + 3) - 2(x - 2)$	26 Find the median: 12, 14, 15, 9, 13, 15, 17, 10, 12	27 What is the surface area of a cube with side length 3cm?	28 A water container has 29.5 litres of water in it. A cup holds 220 ml of water. How many cups of water can be filled from the water container?	29 Is $15a + 2b$ in the sequence? $n^2 + 3$.	30 Find the mean: 12, 14, 11, 9, 13, 15, 17, 10, 12	REMEMBER: THE BEST WAY TO REVISE MATHS IS TO "DO MATHS"!

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Resource TES, revision clocks



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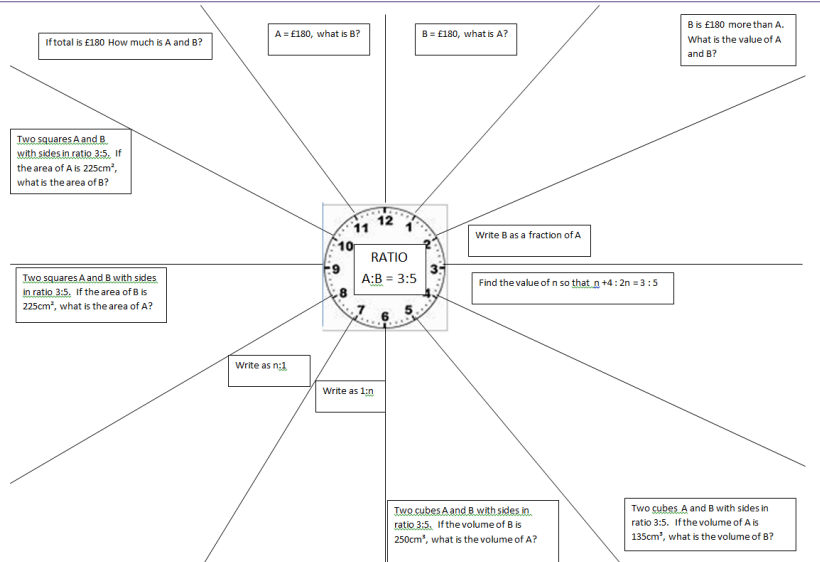
Revision clocks

- These can be used as a template in the classroom.
- The idea is to set 12 x 5 minute questions for a revision lesson on a themed topic or a spread (eg multi-choice questions).
- You can use revision mats or past exam papers to set the questions (see later example).

Revision techniques SSDD

- Same Surface, Different Deep.
- This encourages students to read the question properly and understand the skills and knowledge they need.
- They explore some of the possible tasks which offer a different depth of knowledge starting with a common point or 'theme'.
- Five topics to demonstrate the technique:
 - ratio
 - quadratics
 - pie charts
 - sequences
 - triangles.

Revision clock – SSDD ratio



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Quadratics SSDD

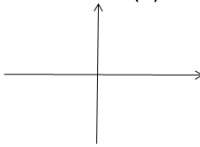
- Factorise
- Solve
- Sketch
- Draw
- Complete the square
- Transform from $Y = X^2$
- Location of turning point
- Line of symmetry
- Formula

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Quadratics SSDD: $f(x) = x^2 + bx + c$

$f(x) =$	Find $f(x+3)$	Complete the square $f(x) = (x-a)^2 + b$	Complete a table of values for $-4 \leq x \leq 4$
Factorise $f(x)$	Equation of the line of symmetry?	Describe fully the transformations from $Y = x^2$ to $Y = f(x)$	State the coordinates of the minimum point.
Solve $f(x) = 0$ $X =$ $X =$	Find $f(-6)$	Sketch $Y = f(x)$ 	Use the formula to solve $f(x) = 0$

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Quadratics SSDD: $f(x) = x^2 + bx + c$

- Please see the template in the *Revision techniques, Same Surface Different Deep (SSDD) booklet*.
- The degree of difficulty can be varied, depending on the given starting point.
- The same sheet can be used for a series of home learning tasks, starting at different points.

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Quadratics SSDD: $f(x) = x^2 + bx + c$

Here are three different suggested starting points.

$$f(x) = x^2 + 2x - 15$$

$$\text{Solve } f(x) = 0$$

$$x = -2$$
$$x = 4$$

Describe fully the transformations from $y = x^2$ to $y = f(x)$

Translation $\begin{pmatrix} 3 \\ -16 \end{pmatrix}$

Pie charts

- Read
- Draw
- Compare angle with fraction/proportion
- Use of algebra

Pie charts – see exam questions

- S19 3F Q17(b) Draw pie chart
- N18 3F Q2 Equate fraction with angle
- S18 3F Q19 Complete and read pie chart
- N17 1F Q30 Use algebra

Sequences

- Term to term rule forwards, backwards
- Different types of sequences
- n th term given, find terms
- Terms given, find n th term

Sequences – see exam questions

See the *Revision techniques, Same Surface Different Deep (SSDD) booklet* for examples.

- S19 2F Q28 Find n th term
- N18 1F Q14 Use n th term
- N18 3F Q14 Term to term rule
- S18 2F Q23 Types of sequences

Triangles

- Types of triangles
- Angles
- Area
- Perimeter
- Pythagoras
- Trigonometry
- Use of algebra

Triangles – see exam questions

See the *Revision techniques, Same Surface Different Deep (SSDD) booklet* to explore a small range of suggested starting points.

- S19 3F Q29
- S19 3F Q30
- N18 2F Q25
- S19 2F Q22
- S18 2F Q16(a)

Exam tips

General well-being

Students need to be prepared, mentally and physically:

- eating and sleeping well; having slow release energy food
- being on time
- having all the equipment
- relaxing during the exam.

Some general approaches

There are general approaches for all maths papers.

- Don't cram; space out revision before the exam.
- Carefully read the instructions – twice!
- Plan timings – decide which questions to do first.
- Think carefully about what the question is asking.
- Underline key words.
- Estimate what the answer should be.

Some general approaches

- Show your working – even for multiple choice questions.
- Make sure working follows a logical pattern and isn't haphazard.
- Think about presentation.
- Keep going to the end of the paper – resilience.
- Leave time for checking – 1 minute per mark.

Some specific approaches

For multiple choice questions:

- cover up the choices and read the stem
- think of the answer
- uncover the choices – read them carefully
- guess if you can't decide.

Some specific approaches

Structured questions

- Plan a step-by-step route through the problem
 - What do I know?
 - What do I need to find?
 - How do I get there?
- A diagram might help
- Draw on the diagram

Common errors

Student who gains grade 3 – errors seen include:

- addition, subtraction, multiplication, division, fractions, decimals, percentages, scale, ratio.

The first 8 questions of Foundation – errors seen include:

- transcribing errors
- simple multiplication errors – in particular times tables
- fractions, decimal, percentage equivalence.

Common errors

Higher – errors seen include:

- attempting a question more than once; not indicating the final answer
- recalling and using correct formulae
- 'show that' questions
- proof questions.

Accessing a question

In pairs suggest ways students could access the questions so that they succeed in:

- 1F Q21(a) and 21(b)
- 2F Q22
- 3F Q25
- 1H Q20(a) and 20(b)
- 2H 20
- 3H 27.

Calculator use

Proficient use of a calculator is vital:

- correct mode
- use of function keys
- brackets
- memory function
- order of operations.

A calculator has to be used for specific questions.

Mock exam analyser

A demonstration of the mock exam analyser, Foundation Paper 1.

Useful resources

- Examiner reports
- Mock exam analysers
- [Tips to unlock GCSE Maths resits](#)
- [Tips for perfecting exam technique](#)
- [GCSE Maths exams and revision: what you need to do](#)
- Exam wrappers
 - [researchschool.org.uk/sandringham/blog/exam-wrappers-a-reflection](#)
 - [cmu.edu/teaching/designteach/teach/examwrappers/](#)
 - [theconfidentteacher.com/2016/06/confidence-tests-exam-wrappers/](#)

Any questions?



Event materials

The electronic materials from this event will be made available to you in the customer portal of our online booking system.

Once we receive notification that you have attended the course, you will be sent a certificate of attendance email. When you receive the email, please log in to your account and the materials will be available on the 'my resources' tab on the welcome screen.

How did we do?

Please take a moment to complete a brief evaluation form for today's event. Your feedback is very important to us as it helps us improve and plan future training.

You should have been emailed the evaluation form. Please check your inbox (possibly your junk mail folder). If you haven't received it please give your trainer your name, centre name/number and email address so that we can look into it for you.

Thank you.

Get in touch

Our friendly team will be happy to support you between 8am and 5pm, Monday to Friday.

Tel: 0161 957 3852

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Contact us

Our friendly team will be happy to support you between 8am and 5pm, Monday to Friday.

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