Stage 7 Knowledge Organiser (Corbett Maths video numbers in brackets)

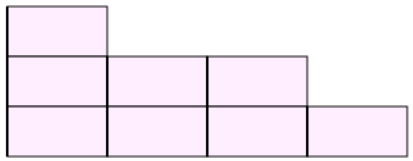
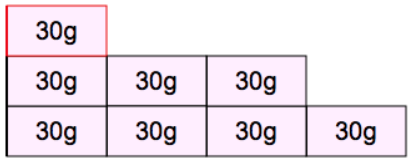
1. Find HCF and LCM for two or more numbers (218, 219)
2. Convert between mixed numbers and improper fractions (139, 140)
3. Order fractions, decimals, percentages and negatives (131, 208)
4. Collect like terms (9)
5. Multiply out a single bracket (13)
6. Substitute into an expression (20)
7. Solve 2 step equations (110, 114)
8. Add, subtract, multiply and divide mixed numbers (133, 134, 139, 140, 142)
9. Increase by a percentage using a multiplier (239)
10. Write and simplify a ratio (269)
11. Share a total into a ratio (270)
12. Find the nth term of a linear sequence (288)
13. Round to 1 significant figure (279a)
14. Construct triangles (81, 82, 83)
15. Calculate the area of a trapezium (48)
16. Find the surface area of a cube or cuboid (310)
17. Find missing angles in special triangles (37)
18. Rotate a shape on a coordinate grid (275)
19. Understand and Read a pictogram (162)
20. Calculate the mean, median, mode and range of a list of data (50, 53, 56, 57)

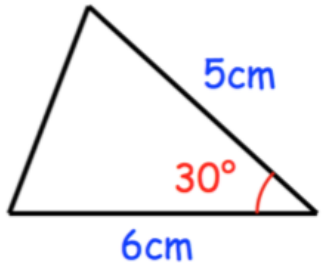
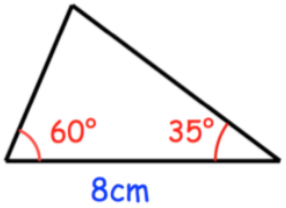
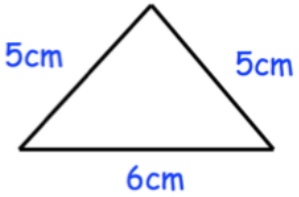
Skill	Method	Keywords/Definitions
701	Finding the Highest Common Factor (HCF) The HCF is the biggest number that is a factor of both numbers. List factors of both numbers and find the common factors in both lists. The HCF is the largest one of these. Example: find the HCF of 12 and 20 Factors of 12 Factors of 20 1x12 1x20 2x6 2x10 3x4 4x5 4 is the biggest factor of both numbers so this is the HCF of 12 and 20 Find the Lowest Common Multiple (LCM) The LCM is the smallest number that is a multiple of both numbers (in both times tables). List out the first few multiples of each number and look for the smallest number that appears in both lists. Example: Find the LCM of 6 and 8 Multiples of 6 include: 6 12 18 24 30 36 42 48 Multiples of 8 include: 8 16 24 32 40 48 Both 24 and 48 are common multiples here and as 24 is the smallest this is the LCM of 6 and 8	Factors of a number can divide equally into that number. Multiples of a number are found by multiplying the number by another whole number (the times tables)
702	Converting Between Mixed Numbers and Improper Fractions Both of these things represent values that are bigger than 1 but not a whole number. The trick to understanding these is to know how many of your fractions make up one whole: there are 3 thirds in a whole, 4 quarters in a whole, 5 fifths in a whole 10 tenths in a whole etc) Example: Write $2\frac{2}{3}$ as an improper fraction As the fraction part of this is in thirds, we need to find out how many thirds there are in total here (in the 2 wholes and in the 2 thirds).  The top two rows here that are fully shaded in represent the 2 wholes and the bottom row represents the $\frac{2}{3}$ as only 2 out of the 3 blocks are shaded. Counting up the number of thirds we can see that 8 are shaded, so $2\frac{2}{3}$ is $\frac{8}{3}$ as an improper fraction. (the quick method is to do the big number, multiplied by the bottom number of the fraction then add the top number 2x3+2=8 so it must be $\frac{8}{3}$)	Mixed number – a mixture of a whole number and a fraction for example $2\frac{2}{5}$ Improper fraction – a fraction where the numerator is larger than the denominator Remember that fractions can be thought of as a divide, that's where the divide symbol comes from, it represents a fraction ÷

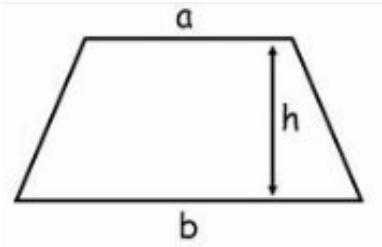
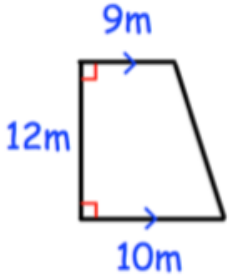
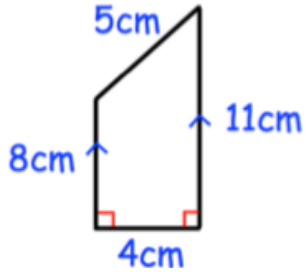
	Example: Write $\frac{20}{7}$ as a mixed number. Treat this as a divide sum and do 20÷7=2 r6 so the remainder of 6 must also be divided by the 7 and we can write that as a fraction: $\frac{20}{7} = 20 \div 7 = 2\,r6 = 2\frac{6}{7}$	
703	Order Fractions, Decimals, Percentages and Negatives With FDP turn them all into percentages to put them in order. For negatives remember that the closer to zero a negative number gets, the bigger it is. Example: put the following in ascending order 3 -5 -3 9 -10 -10 -5 -3 3 9 Example: put the following in ascending order $\frac{3}{5}$ 0.7 63% 0.65 Turn each into a percentage $\frac{3}{5}$ multiply top and bottom by 20 so this gives 60%, 0.7 = 70% (remember the hundredths column is the second after the decimal place so there's effectively an invisible zero there!) and 0.65 = 65% Then put them into ascending order: 60% 63% 65% 70% $\frac{3}{5}$ 63% 0.65 0.7	Ascending means smallest to biggest
704	Simplify an Expression by Collecting Like Terms Group the like terms together and reduced them to a single term each, being careful with negatives. Simplify the following expression: $6x + 7y - 9 + 2x - 10y$ There are 3 different 'types' of term here: the x terms, the y terms and the number term Collect the like terms together, paying close attention to whether each term is a + or a – (if there's no sign it's a +) $6x + 2x + 7y - 10y - 9$ Now simplify the x terms and the y terms $8x - 3y - 9$	Like terms have the same collection of letters attached to them, for example 5xy and -9xy are like terms, but 6x and $4x^2$ are not like terms. Expression a collection of numbers and letters but NO equals sign.
705	Multiply Out a Single Bracket (expand a bracket) Multiply each term in the bracket by the term directly in front of it.	Terms are the separate 'bits' of an expression or equation: for example 5x is a term

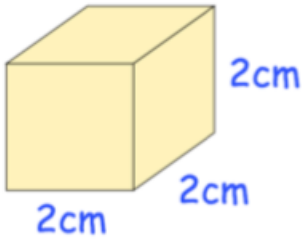
	Example: Multiply out $5(3x + 7)$ Multiply both terms in the bracket by the 5 $15x + 35$	8 is a term and $-4xy^2$ is a term.
706	Substitute Into an Expression Substitution in maths means replacing the letters with given numbers to work out the numerical value of an algebraic term or expression. Example: find the value of $7x + 4y - 10$ if $x = 3$ and $y = -2$ The highlighted parts of this act like a key to find the value of the expression given at the start. Start by writing out the expression, replacing any x with a 3 and any y with a -2 and putting these in brackets: $7(3) + 4(-2) - 10$ Now multiply the brackets by the terms directly in front of them and work out the sum you are left with $21 - 8 - 10 = 3$	Expression- something with letters and numbers but NO equals sign. Remember that terms like 7x mean 7 multiplied by x
707	Solve Two Step Equations Use inverse operations to find the value of the letter (missing number) remembering that to keep the equation balanced you must do the same thing to each side of the equation. Examples: Solve $6x - 8 = 46$ Get rid of the -8 first by adding 8 to each side of the equation $+8 \quad +8$ This will 'delete' the -8 on the left hand side and add 8 to the 46 on the right hand side $6x = 54$ To get rid of the 6, divide both sides by 6 (remember there is an invisible times sign between the 6 and the x!) $\div 6 \quad \div 6$ $x = 9$ Solve $32 = 7x + 9$ The x term is now on the right hand side of the equation, so we need to get rid of the numbers on that side $-9 \quad -9$ This will delete the +9 on the right hand side and subtract 9 from the 32 on the left hand side $23 = 7x$ Again divide by 7 here, but as we won't get a whole number answer, write the answer as a fraction $\div 7 \quad \div 7$ $\frac{23}{7} = x$	Equation – something with letters numbers and an equals sign.

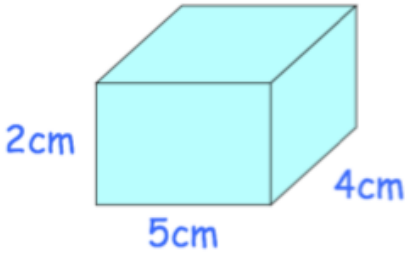
708	Adding, Subtracting, Multiplying and Dividing Mixed Numbers Turn the mixed number into an improper fraction, do the sum then turn the answer back into a mixed number if you can. Example: Calculate $2\frac{1}{3} \times 1\frac{3}{7}$ turn both mixed numbers into improper fraction $\frac{7}{3} \times \frac{10}{7}$ then multiply as normal fractions $\frac{70}{21}$ this is an improper fraction so we can turn it back into a mixed number $3\frac{7}{21}$ and we can simplify the fraction part of this so our final answer is $3\frac{1}{3}$	Mixed number- a mixture of a whole number and a fraction for example $2\frac{4}{5}$ Improper fraction – a fraction where the numerator is bigger than the denominator
709	Increasing a Value by a Percentage Using a Multiplier Find the multiplier that will do the increase for you and the multiply your amount by the multiplier. Example: Increase £140 by 16% 100%+16%=116% which is 1.16 as a decimal So do 1.16 x £140 =£162.40 Note: you will get the same answer here if you find the 16% first and add it on, but it is important to be able to do this using a multiplier both to save time and to be able to calculate further percentage change problems.	A multiplier is a decimal number that will increase or decrease am amount by a percentage. Remember you always start with 100%
710	Write and Simplify a Ratio Write the ratio (making sure the order you write mirrors the order the question gives) then simplify in the same way you would a fraction Example: In a class there are 18 boys and 12 girls. Write the ratio of boys to girls in its simplest form. Boys : girls 18 : 12 Use the numbers given in the question. Both of these can be divided by 6 3 : 2 These can no longer be simplified so this is the fully simplified ratio.	A ratio shows a mixture. It is very similar to fractions, but it doesn't show the total the way a fraction does.
711	Share a Total into a Ratio Draw the ratio out using blocks, share the total into the corresponding boxes and count up each row. Example: Share 240g in the ratio 1:3:4	The reason we divide by the total number of blocks here is because we are sharing a total

	 This diagram represents the 1:3:4 parts of the ratio. It also shows that in total we have 8 blocks. So, if we have a total of 240g to share, we need to share it equally between these 8 blocks. 240g÷8=30g in each block  Now we just need to count up each row to give our answer of 30g : 90g : 120g	
712	Find the n^{th} Term of a Linear Sequence The n^{th} term formula links the position of the term to the term itself. Example: Find the n^{th} term of the following sequence 2, 8, 14, 20, 26 As this is going up in 6s it is linked to the 6 times table $(6n)$ so write $6n$ above our sequence: $6n = 6, 12, 18, 24, 30$ $2, 8, 14, 20, 26$ -4 Our sequence is always 4 less than the numbers in $6n$ So, out sequence has n^{th} term: $6n - 4$	A linear sequence is a sequence that goes up or down by the same number each time. $n = 1, 2, 3 \ldots.$ $2n = 2, 4, 6 \ldots..$ $3n = 3, 6, 9 \ldots..$
713	Round to 1 Significant Figure Find the column that contains the first significant figure and round the number to that column. Example: Round to 1 significant figure 45 293 the 4 is the first significant figure here and it's in the 10 000 column so rounding to the nearest 10 000 45 293≈50 000 (the 4 has a 5 in the column directly next to it so we round upP 0.003204 the 3 is the first significant figure here and it's in the 3rd decimal place ($\frac{1}{1000}s$ column) so rounding to 3 dp gives $0.003204 \approx 0.003$ (the 3 had a 2 in the column directly next to it so we round down)	Significant Figures are the digits that make up the number. Zero can be a significant figure, just not the first significant figure. $\approx$ means 'is approximately'
714	Construct Triangles There are 3 types of triangle to construct, each one gives a different combination of sides and angles and we have to draw these accurately using rulers, protractors and compasses. The three types are Side Angle Side; Angle Side Angle; Side Side Side	Construct in maths means draw accurately using rulers, protractors and compasses.

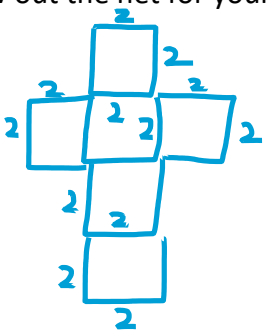
	Examples SAS  Draw the base line (6cm) in first. Put the protractor on the right end of the line and measure a 30° angle and mark with a dash. Draw a line from the end of the base going through the dash that is 5cm long. Then join up to complete the triangle. ASA  Draw the base line (8cm) in first. Then put the protractor on the left end of the line and measure a 60° angle, putting a dash to mark the 60°. Draw a line (longer than you think you'll need) from the left end of the base through this dash. Next, put the protractor on the right end of the base and measure the 35° putting a dash to mark where this would be. Daw a line from the right end of the base, through this dash so that it crosses the other line at 60° to complete the triangle. SSS  Draw the base line (6cm) in first. Set you compass to 5cm from point to pencil. Put the point in one end of the line and draw an arc that goes above the line and through the middle of the diagram. Keep the compass at 5cm and put the point in the left end of the line and draw another arc that crosses the first one. Join each end of the base line up to where the arcs cross to complete the triangle.	An arc is part of a circle drawn with a compass. All the points on an arc are the same distance from where its been drawn from so they are useful when we know the length of a line, but not the angle it needs to be drawn at.
715	Calculate the Area of a Trapezium A trapezium is a quadrilateral with only one pair of parallel sides.	A Quadrilateral has four sides.

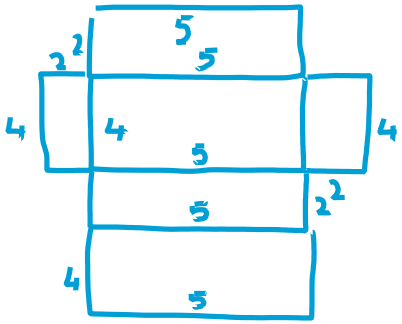
	The formula for the area of a trapezium is as follows:  $area = \frac{1}{2}(a + b)h$ there is an invisible multiply sign just before the h Another way to think of it is to add and half the two parallel sides the multiply by the height (or width if the trapezium is on its side). Examples  The parallel sides here are 9m and 10m And the height is 12m $area = \frac{1}{2}(9 + 10) \times 12$ $area = 114m^2$  The parallel sides here are 8cm and 11cm and the height (width in this case) is 4cm $area = \frac{1}{2}(8 + 11) \times 4$ $area = 38cm^2$ The 5cm isn't used here at all as it's a slanty height.	
716	Calculating the Surface Area of a Cube or Cuboid Surface area is the total area of the faces of a shape. To calculate the surface area imagine the net of the shape and find its total area. Examples	A face on s 3D shape is one flat side, so a cube has 6 faces; all of them are squares. The net of a 3D shape is the 2D shape that would fold up to make the 3D shape.





Draw out the net for your shape marking on lengths





Work out the area of each separate face (using length x width as they're all rectangles or square) and add them all together:

$4 + 4 + 4 + 4 + 4 + 4 = 24cm^2$

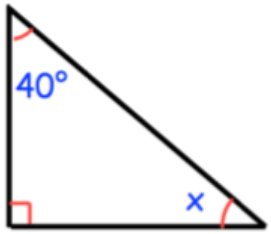
$10 + 8 + 20 + 8 + 10 + 20 = 76cm^2$

717

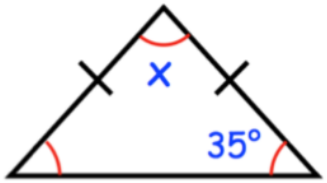
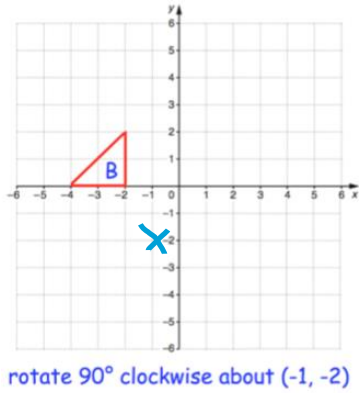
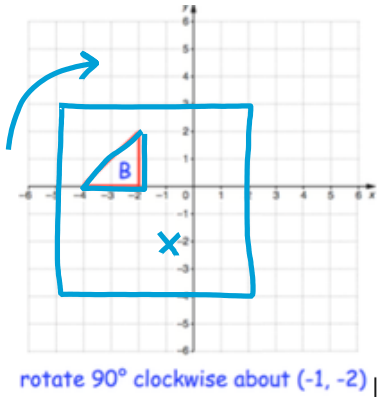
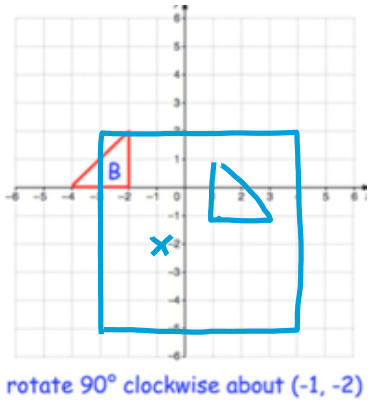
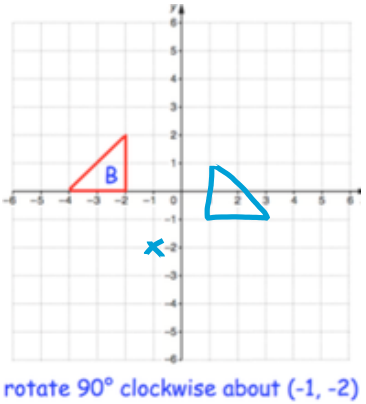
Finding Missing Angles in Special Triangles

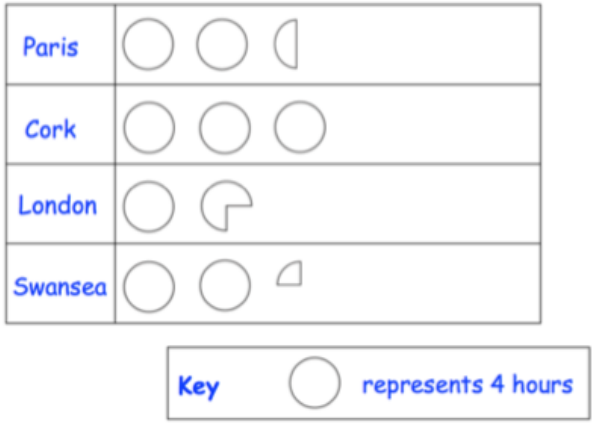
Isosceles Triangles have two equal angles.
Right angle triangles have one right angle.
Equilateral triangles have three 60° angles in them.

Examples: Find the missing angle x



The square in the bottom left corner here tells you it's a right angle worth 90°. So, we use angles in triangles add up to 180 to calculate x. 40 +90 =130 180 – 130 = 50 so x = 50

	 The two dashes mean those two lines are equal, which also means the ***angles at the end of those lines*** are equal. This means the angle in the bottom left must also be 35. Therefore, we can do 35 + 35 = 70. And 180 – 70 =110. So x=110°	
718	Rotate a Shape on a Coordinate Grid Use tracing paper to trace the shape and the centre of rotation then rotate the tracing paper to see where the shape needs to end up. Example  Mark on the centre  Trace the shape and put Your pen on the centre  Rotate the tracing paper 90° clockwise  Draw in the shape	Rotate means turn. Centre of rotation means the point about which you will turn. Clockwise:  Anti-clockwise: 
719	Understand and Read a Pictogram A Pictogram is similar to a bar chart, but it uses shapes or pictures to represent the frequencies instead of bars. Pictograms always have a key to show you what each picture is worth. Example: The Pictogram below show the number of hours of sunshine in different cities on a certain day. How many hours of sunshine were there in total across the four cities?	



If each circle represents four hours, Paris has 2 full circles (4+4) and one-half circle (2) so Paris had 10 hours.
Cork has 3 full circles (4+4+4) so Cork had 12 hours.
London Has one full circle (4) and three quarters of a circle (3) so London had 7 hours.
Swansea has two full circles (4+4) and one quarter of a circle (1) so Swansea had 9 hours.
Altogether then there were 10 + 12 + 7 + 9 =38 hours of sunshine.

720

Calculate the Mean, Median, Mode and Range for a List of Numbers

Mean $=\frac{total}{count}$ Median is the middle value once they're in order. Mode is the one that happens the most
Mean, Median and Mode are all types of average so give a typical value for the group.
Range is biggest – smallest
The Range shows how spread out the data is, the bigger the range the more spread out it is. The smaller the range the more consistent the data is.

Example: Find the Mean, Median, Mode and Range for this list of numbers
5, 2, 8, 3, 5, 10, 2, 5, 7, 9, 3

Mean$=\frac{total}{count}=\frac{5+2+8+3+5+10+2+5+7+9+3}{11}=\frac{59}{11}=5.4$

Median: put the data in order first
2, 2, 3, 3, 5, 5, 5, 7, 8, 9, 10 now cross off number from each end to be left with the median in the middle.
~~2, 2, 3, 3, 5,~~ 5 ~~, 5, 7, 8, 9, 10~~ so, the median = 5

An average is a typical value for the group.

You can have more than one mode, if a few different numbers all appear the same amount of times. You can also have no mode, if all numbers appear the same amount of times.
If you are left with two numbers in the middle for the median, find the

	Mode: find the number that occurs the most The mode is 5 Range: Find the biggest number and the smallest number and subtract them 10 – 2 =8 so the range is 8	middle of these numbers.