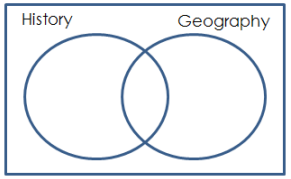
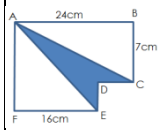
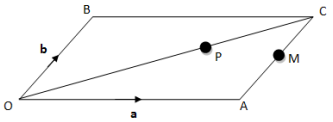
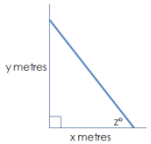
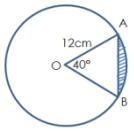
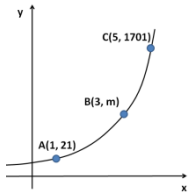
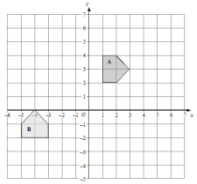
A BIT OF MATHS EACH DAY – HIGHER TIER – FEBRUARY 2018

MONDAY	TUESDAY	WEDNESDAY	THURSDAY	FRIDAY	SATURDAY	SUNDAY
			1st	2nd	3rd	4th
February			Solve the pair of simultaneous equations 5x + 3y = 11 3x – 4y = 24	x and y are proportional to each other. Andrea is unsure whether $y \propto x$ or $y \propto x^2$ or $y \propto x^3$ She knows that when x = 3, y = 108 and when x = 4, y = 256. (a) Which of the 3 possible proportionalities is correct? Show how you came by your answer. (b) Write down an equation for y in terms of x.	 There are 80 students in a year group. 38 study History, 29 study Geography and 12 study both. (a) Complete the Venn diagram. (b) What is the probability, a student chosen at random studies neither History or Geography?	
5th	6th	7th	8th	9th	10th	11th
The cylinders are mathematically similar. Cylinder A has a surface area of 99cm² and cylinder B has a surface area of 275cm². If cylinder B has a volume of 40500cm³ what is the volume of cylinder A?	Find the nth term to the sequence 3, 9, 17, 27, 39, …	The area of shape ABCDEF is 248cm².  What is the perimeter of the shaded shape ACDE?	Terri has put £620 in a bank account which pays 1.8% compound interest per annum. How much will she have in the bank account if she leaves it there for 4 years?	Darren is investigating the population of fish in a lake. One day he catches 40 fish and tags them all. The next day he catches 35 fish and 2 have a tag on them. Estimate the number of fish in the lake.	OACB is a parallelogram. $\overrightarrow{OA}$ is represented by the vector **a**. $\overrightarrow{OB}$ is represented by the vector **b**. P is the point such that OP:PC = 2:1, and M is the mid-point of $\overrightarrow{OC}$. Show that B, P and M lie on the same straight line. 	
12th	13th	14th	15th	16th	17th	18th
 The safety instructions of a ladder say that y should me no more than 3.5x. (a) Find the value of z when y = 3.5x. (b) Find an expression, in terms of x, for the length of the ladder when y = 3.5x.	Solve the equation $3x - 2 = \frac{6}{x}$ giving your answers correct to 2 decimal places.	A has coordinate (-6, 7). B has coordinate (21, 2). C is a point between A and B such that AC : CB = 2:7. Find the equation of the line which is perpendicular to AB and goes through point C.	A region is defined by the following inequalities x ≤ 5 x + y ≥ 6 3y ≥ x + 12 Draw a graph to show this region and label it R.	In a particular house in a school there are 103 boys and 109 girls. A house captain for the boys and a deputy house captain for the boys is to be chosen. A house captain for the girls and a deputy house captain for the girls is to be chosen. They each have to be different people. How many different ways can this be done?	Paul is looking at buying a suite online. He has found a suit he likes and it is sold in three different countries. In the UK it costs £165. In China it costs 1300 yuan In the US it costs $195. £1 = $1.19 1 yuan = 12.6p. Where should he order is suit from? Show how you came by your answer. If Paul lives in the UK why might your answer not be the best answer?	
19th	20th	21st	22nd	23rd	24th	25th
In a bag there are red counters and blue counters. The ratio of red to blue counters is 3:1. Two counters are removed from the bag. The probability both are blue is $^1/_{19}$. How many blue counters were in the bag?	(a) Write 5.2301 x 10^5 as a normal number. (b) Write 0.000401 in standard form. (c) Work out the answer to the calculation (3.2 x 10^{-3}) ÷ (6.11 x 10^{-6}) giving your answer in standard form correct to 2 significant figures.	A shop sells shirts. In January they reduce the price of all their shirts by 50%. In February they decide to increase the price of all their shirts by 50%. In March they decide to reduce the price of their shirts by 50% again. What is the overall change in price of the shirts in the shop?	 The diagram shows a circle with centre O and radius 12cm. Angle AOB is 40°. What percentage of the circle is shaded?	 (a) Write down the inequality shown on the number line. (b) Solve the inequality 9x + 7 > 5 (c) Write down the integer values which satisfy both (a) and (b)	 The graph shows three points, A, B and C with coordinates (1, 21), (3, m) and (5, 1701) respectively. They all lie on the curve with equation $y = pq^x$. Find the value of m.	
26th	27th	28th				
(a) Write down the first 4 terms to the sequence described by the nth term $2^n - 1$ (b) Paul says 1025 is a term in this sequence. Is he correct? Explain how you came by your answer.	a : b = 7 : 4 b : c = 5 : 3 Find the ratio a : b : c giving a, b and c as integers and the ratio in its simplest form.	 Describe fully the transformation which maps A onto B.			The best way to learn mathematics is to DO mathematics. If you do something regularly on a daily basis you will make a bigger difference than leaving it till just before your exams. If you need help there are some fantastic videos at www.corbettmaths.com Or you can always tweet me **@mrchadburn**	