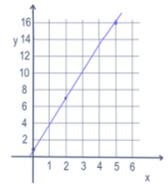
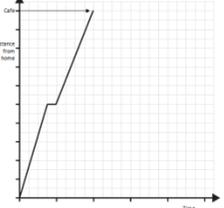
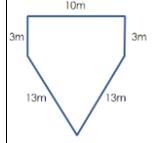
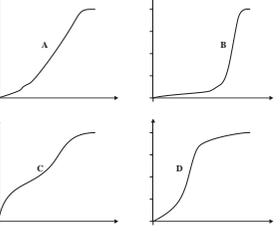
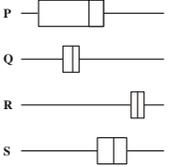
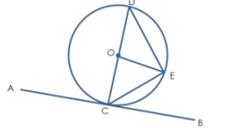
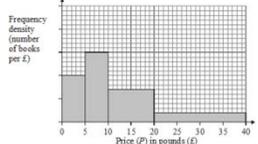
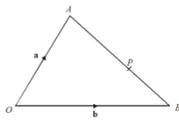
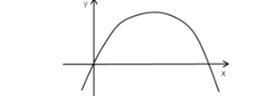
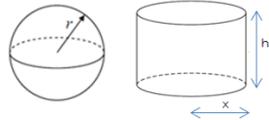


A BIT OF MATHS EACH DAY – HIGHER TIER – JANUARY 2018 – NO CALCULATOR ALLOWED

MONDAY	TUESDAY	WEDNESDAY	THURSDAY	FRIDAY	SATURDAY	SUNDAY
1 st	2 nd	3 rd	4 th	5 th	6 th	7 th
<p>The population of the Isle of Blades has increased by 12% in 2016 because it is such a nice place to live. 720 extra people made the Isle their home in 2016. What was the population at the start of 2016?</p>	<p>Eric, Ernie and Des share £300. The ratio of the amount Eric gets to the amount Des gets is 2 : 7. Des gets £120 more than Eric. What percentage of the £300 does Ernie get?</p>	<p>Simplify fully...</p> <p>(a) $6x^3y^6 \times 4x^8y$</p> <p>(b) $\frac{32x^7y}{24x^3y^5}$</p>	<p>Two buckets are mathematically similar. The volume of bucket A is 60cm^3 and the volume of bucket B is 480cm^3. The area of the base of bucket B is 32cm^2. What is the area of the base of bucket A?</p>	<p>Ann is making home-made crackers. She is putting a toy and a hat in each cracker. The toys come in packs of 12 and the hats in packs of 16. She wants to buy the same number of toys and hats.</p> <p>(a) how many packs of each will she buy?</p> <p>(b) each cracker requires 1 piece of card. How many pieces of card does she need?</p>	 <p>The graph on the left shows the fare charged by a taxi company in pounds on the y-axis against the length of the journey in miles.</p> <p>(a) Interpret the y-intercept</p> <p>(b) Interpret the gradient</p> <p>(c) Find the equation of the line in the form $y = mx + c$.</p>	
<p>Make r the subject in the formula</p> $p = \frac{5 - 2r}{3r + 7}$	<p>If $f(x) = 4x - 3$ and $g(x) = x^2 + 2$</p> <p>(a) find $fg(5)$</p> <p>(b) find an expression for $gf(x)$ in the form $ax^2 + bx + c$ where a, b and c are integers.</p> <p>(c) hence find $gf(-2)$</p>	<p>(a) In a shop, a TV had a normal price of £236. It is sold in a sale at £188.80. What was the percentage reduction?</p> <p>(b) The population of Owl Isle has reduced in 2016 by 10%. At the end of 2016 the population of 8838. What was the population at the start of 2016?</p>	<p>Shape A is translated by the vector $\begin{pmatrix} -4 \\ 3 \end{pmatrix}$ to produce shape B. Shape B is then translated by the vector $\begin{pmatrix} 2 \\ -1 \end{pmatrix}$ to produce shape C. Shape C is then translated by the vector $\begin{pmatrix} -1 \\ -6 \end{pmatrix}$ to produce shape D. What single transformation maps shape A onto shape D?</p>	<p>Write 0.446 as a fraction in its simplest form.</p>	 <p>Alan left home at 12noon to go for a cycle ride. He cycled at a constant speed and stopped for a 15minute break. He then cycled at a constant speed of 10km/hr until he reached a café at 2pm. He stopped at the café for 45 minutes. He then cycled home at an average speed of 16km/hr.</p> <p>(a) How far had he travelled when he had his first break?</p> <p>(b) Complete the graph – when does he arrive home?</p>	
<p>Estimate the value of $\frac{31.7^2 \times \sqrt{103.5}}{0.11 \times 0.294}$</p> <p>Show how you came by your estimate.</p>	 <p>The diagram shows a pentagon with one line of symmetry. Find its area.</p>	<p>The first 6 terms of a sequence are</p> <p>5.25, 6, 7.25, 9, 11.25, 14</p> <p>Find the nth term of the sequence and hence calculate the 100th term.</p>	<p>On Monday Dawn travelled by train from Sheffield to London. She set off at 09:35 and arrived in London at 12:05. The average speed of the train was 106 mph. On Wednesday, Rachael did the same journey, setting off at 09:35. Her train was diverted via Birmingham which meant she had to travel an extra 67 miles. She arrived in London at 13:35. What is the difference in the average speed of the two train journeys?</p>	<p>Show that $\frac{5 - \sqrt{3}}{5 + \sqrt{12}}$ can be written as $\frac{31 - 15\sqrt{3}}{13}$</p>	 <p>Match each cumulative frequency graph with its box plot.</p>	
<p>Evaluate $4\frac{4}{7} - 2\frac{3}{8}$</p>	<p>James is going to cover his rectangular floor with carpet tiles. His floor measures 4.8m by 7.2m. Each tile measures 80cm by 60cm. He decides to tile with a mix of red, white and black tiles. $\frac{3}{8}$ of the tiles are to be red. White and black are in the ratio 4:5. Assuming there are no gaps, how many of each colour will he need?</p>	 <p>AB is a tangent to a circle at C. CD is the diameter of the circle. Angle BCE = 38°. Find angle OEC, giving a reason for each stage of your working.</p>	<p>Find the value of...</p> <p>(a) $125^{-2/3}$</p> <p>(b) $\left(\frac{81}{16}\right)^{-3/4}$</p>	 <p>The histogram gives information about the price of books sold in a shop on a Saturday. 40 books were sold for £5 or below. What is the probability a book cost between £5 and £10?</p>	<p>(a) Martin expands $(x+2)(3x-1)(2x-1)(x+3)$ to give $6x^4 + 25x^3 - 38x^2 - 25x - 6$. Without expanding the expression, explain why Martin must be wrong.</p> <p>(b) $\vec{OA} = \mathbf{a}$, $\vec{OB} = \mathbf{b}$ and $\vec{AP} : \vec{PB} = 3 : 2$. Martin works out $\vec{PB} \dots$</p> $\vec{AB} = \vec{AO} + \vec{OB} = -\mathbf{a} + \mathbf{b} = \mathbf{b} - \mathbf{a}$ $\vec{PB} = \frac{2}{5}\vec{AB} = \frac{2}{5}(\mathbf{b} - \mathbf{a})$ <p>Evaluate Martin's method and if necessary provide him with a correct full solution.</p> 	
<p>A factory manufactures light bulbs. A company orders some light bulbs from the factory. The factory has 10 machines and it will take 6 days to complete the order – all the machines work at the same rate. For 3 days only 5 of the machines are working. From the 4th day all the machines are working. How long will it take to complete the order?</p>	 <p>The area between the curve and the x-axis is the cross section of a tunnel. The curve has an equation $y = 2x - \frac{x^2}{3}$ and x and y are measured in metres. Find the height of the tunnel.</p>	<p>A sphere of radius r is to be melted down to produce 81 identical cylinders. The cylinders are to have a height three times their radius. The radius of each cylinder is to be x cm. Find an expression for the radius of the sphere, r, in terms of x in its simplest form.</p> 	<h1 style="color: red;">January</h1>		<p>The best way to learn mathematics is to DO mathematics.</p> <p>If you do something regularly on a daily basis you will make a bigger difference than leaving it till just before your exams.</p> <p>If you need help there are some fantastic videos at www.corbettmaths.com</p> <p>Or you can always tweet me @mchadburn</p>	