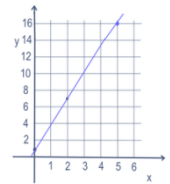
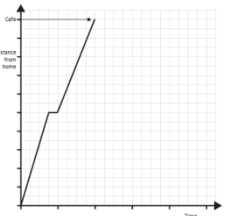
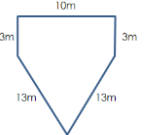
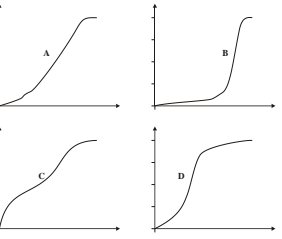
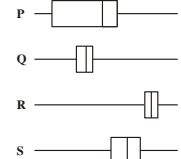
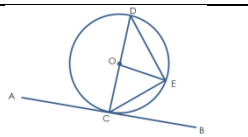
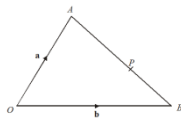
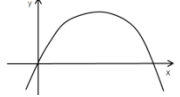
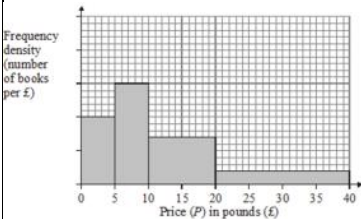


A BIT OF MATHS EACH DAY – HIGHER TIER – JANUARY 2023 – NO CALCULATOR ALLOWED

MONDAY	TUESDAY	WEDNESDAY	THURSDAY	FRIDAY	SATURDAY	SUNDAY	
30th	31st	<h1 style="color: red; font-size: 2em; margin: 0;">January</h1> <h2 style="color: red; font-size: 1.5em; margin: 0;">NON-CALCULATOR</h2>	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		31st December 2022	1st January 2023	
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. (a) how many packs of each will she buy? (b) each cracker requires 1 piece of card. How many pieces of card does she need?	A delivery company uses 240 cars and vans, which are in the ratio 5 : 7. The vehicles use diesel, petrol or electricity. 20% of the vans use diesel. $\frac{2}{7}$ of the vans use electricity. The rest use petrol. How many vans uses petrol?						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. (a) Interpret the y-intercept (b) Interpret the gradient (c) Find the equation of the line in the form $y = mx + c$.
2nd	3rd	4th	5th	6th	7th	8th	
Make r the subject in the formula $p = \frac{5 - 2r}{3r + 7}$	If $f(x) = 4x - 3$ and $g(x) = x^2 + 2$ (a) find $fg(5)$ (b) find an expression for $gf(x)$ in the form $ax^2 + bx + c$ where a, b and c are integers. (c) hence find $gf(-2)$	(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? (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?	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?	Write 0.446 as a fraction in its simplest form.		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. (a) How far had he travelled when he had his first break? (b) Complete the graph – when does he arrive home?	
9th	10th	11th	12th	13th	14th	15th	
Estimate the value of $\frac{31.7^2 \times \sqrt{103.5}}{0.11 \times 0.294}$ Show how you came by your estimate.		The diagram shows a pentagon with one line of symmetry. Find its area.	The first 6 terms of a sequence are 5.25, 6, 7.25, 9, 11.25, 14 Find the nth term of the sequence and hence calculate the 100 th term.	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?	Show that $\frac{5 - \sqrt{3}}{5 + \sqrt{12}}$ can be written as $\frac{31 - 15\sqrt{3}}{13}$		
					Match each cumulative frequency graph with its box plot.		
16th	17th	18th	19th	20th	21st	22nd	
Evaluate $4\frac{4}{7} - 2\frac{3}{8}$	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?		Find the value of... (a) $125^{-2/3}$ (b) $\left(\frac{81}{16}\right)^{-3/4}$	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?	(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. (b) $\vec{OA} = \mathbf{a}$, $\vec{OB} = \mathbf{b}$ and $\vec{AP} : \vec{PB} = 3 : 2$. Martin works out $\vec{PB} \dots$ $\vec{AB} = \vec{AO} + \vec{OB} = -\mathbf{a} + \mathbf{b} = \mathbf{b} - \mathbf{a}$ $\vec{PB} = \frac{2}{3}\vec{AB} = \frac{2}{3}(\mathbf{b} - \mathbf{a})$	Evaluate Martin's method and if necessary provide him with a correct full solution.	
							
23rd	24th	25th	26th	27th	28th	29th	
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 4 th day all the machines are working. How long will it take to complete the order?		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.	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?	Simplify fully... (a) $6x^3y^6 \times 4x^8y$ (b) $\frac{32x^7y}{24x^3y^5}$	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?		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?