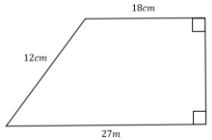
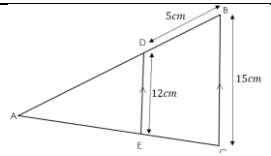
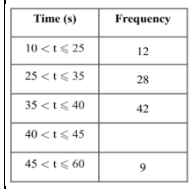
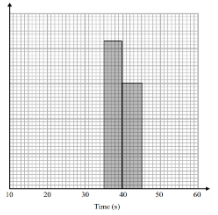
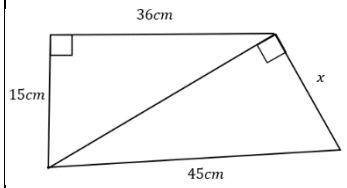
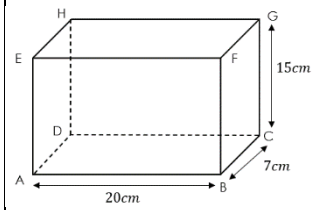
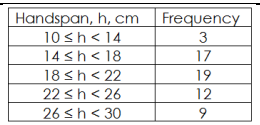
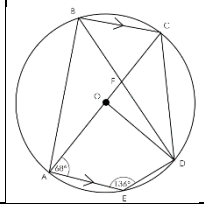
A BIT OF MATHS EACH DAY – HIGHER TIER – MAY 2023 – CALCULATOR

MONDAY	TUESDAY	WEDNESDAY	THURSDAY	FRIDAY	SATURDAY	SUNDAY
1st	**2nd**	**3rd**	**4th**	**5th**	**6th**	**7th**
Solve the pair of simultaneous equations $y - 2x = 3$ $x^2 + y^2 = 18$	 Find the area of this trapezium.	$M = 2r - 3p^2$ Find the value of M when $r = 10$ and $p = -4$	 (a) Prove that triangles ABC and ADE are similar. (b) Find the length AB.	Ann, Ben, Chris and Denise have some marbles. Ben has three times as many marbles as Ann. Chris has seven fewer than Ben. Denise has 13 more than Ann. Chris and Denise have the same number of marbles. How many marbles do they	 **Time (s)** / **Frequency** $10 < t \leqslant 25$ — 12 $25 < t \leqslant 35$ — 28 $35 < t \leqslant 40$ — 42 $40 < t \leqslant 45$ — $45 < t \leqslant 60$ — 9 	The table shows the time taken for some people to complete a puzzle. (a) Complete the table and the histogram. (b) Estimate the median time.
8th	**9th**	**10th**	**11th**	**12th**	**13th**	**14th**
Make r the subject of the formula $p = \frac{3r^2 - n}{5}$	Show that $\frac{1}{6x^2 + 5x - 4} \div \frac{1}{9x^2 - 16}$ simplifies to $\frac{ax + b}{cx + d}$ where a, b, c and d are integers to be found.	Solve the equation $32^{1-x} = 8^{3x+5}$	Make m the subject of the formula $r = \frac{3m - 5}{7 - 2m}$	$b = \frac{c}{\sqrt{d}}$ c = 32.72 (correct to 4 s.f.) d = 3210 (correct to 3 s.f.) By considering the bounds of accuracy of c and d, find the value of b to an appropriate degree of accuracy. Give a reason for your answer.	 Find the length of x.	
15th	**16th**	**17th**	**18th**	**19th**	**20th**	**21st**
A rectangle has a length of 1.8m and width of 65cm. (a) Write the ratio of width to length in the form 1 : n. Another rectangle is in the same proportion. Its width is 90cm. (b) What is its length?	The code to a safe is a four-digit number. The first digit is a prime number, and the 4-digit number is a multiple of 5. How many possible four-digit numbers could the code be?	Find the values of a and b if $\binom{3a+5}{5b} + \binom{2b-1}{5-4a} = \binom{9}{52}$	The population of the Isle of Bramall increases at the rate of 12% each year. In 2021 the population was 225,792. What was the population in 2019?	There are red and white counters in a bag. There are 9 white counters and n red ones. Two counters are taken out (the first without replacement). The probability that both are red is $^{11}/_{38}$. (a) Prove that $3n^2 - 25n - 88 = 0$ (b) Hence find the number red counters originally in the bag.		The diagram shows cuboid ABCDEFGH. Find the size of angle AGC.
22nd	**23rd**	**24th**	**25th**	**26th**	**27th**	**28th**
Line L_1 passes through the points A(-14, 4) and B(6, 20). The line L_2 is perpendicular to L_1 and passes through the midpoint of AB. Find the equation of line L_2.	Expand and fully simplify (a) $5(3x + 1) + 2(5 - 2x)$ (b) $(x + 9)(2x - 3)$	The value of a car depreciates at a rate of X% each year. Three years ago it was bought for £12,000. It has just been valued at £9345. Find the value of X correct to 1 decimal place.	 Handspan, h, cm / Frequency $10 \leq h < 14$ — 3 $14 \leq h < 18$ — 17 $18 \leq h < 22$ — 19 $22 \leq h < 26$ — 12 $26 \leq h < 30$ — 9 The table shows the handspan of 60 men. Draw a frequency polygon to illustrate the data.	It takes 6 painters 4 days to paint 12 rooms. How long will it take 3 painters to paint 15 rooms?	(a) Show that the equation $x^3 - 3x = 42$ has a solution between x = 3 and x = 4. (b) Show that the equation $x^3 - 3x = 42$ can be re-arranged to give $x = \sqrt{\frac{42+3x}{x}}$. (c) Starting with $x_0 = 3.5$ use the iteration formula $x_{n+1} = \sqrt{\frac{42+3x_n}{x_n}}$ three times to find an estimate for the solution to $x^3 - 3x = 42$.	
29th	**30th**	**31st**				
A bag contains 7 red, 5 white and 4 blue counters. Three counters are removed from the bag without replacement. What is the probability that exactly one of these counters was red?	Find the size of angle CFB giving geometric reasons for each stage of your working. 	Gladys does an iron-woman event involving swimming 2km, running 5km and cycling 20km. She swims at a speed of 1.4km/hr, runs at 6km/hr and cycles at 15km/hr. How long does she take to complete the event? Give your answer in hours and minutes to the nearest minute.	**May Calculator**	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**		