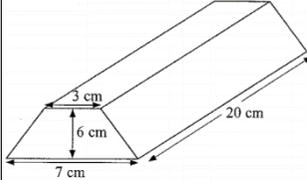
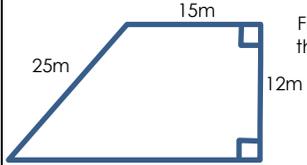
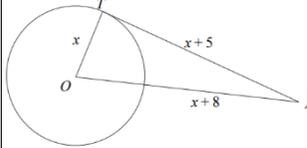
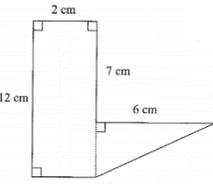
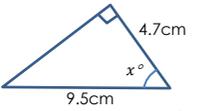
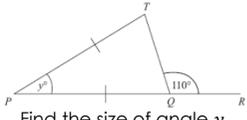
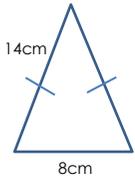
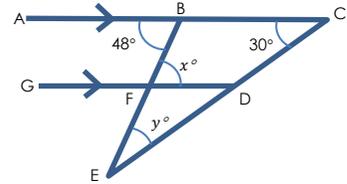
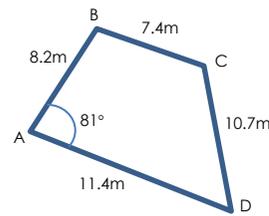


## A BIT OF MATHS EACH DAY – SUMMER BOOST 2020 – HIGHER TIER

MONDAY	TUESDAY	WEDNESDAY	THURSDAY	FRIDAY	SATURDAY	SUNDAY
<h1 style="color: red; font-family: cursive;">July</h1>		1 <sup>st</sup>	2 <sup>nd</sup>	3 <sup>rd</sup>	4 <sup>th</sup>	5 <sup>th</sup>
		<p>Frank says that "For any whole number n, the value of <math>6n - 1</math> is always prime". Is Frank correct? Justify your answer.</p>	<p>WITHOUT USING A CALCULATOR and giving your final answer in standard form, calculate the following...</p> <p>(a) <math>(7 \times 10^4) - (3.21 \times 10^3)</math> (b) <math>(5.1 \times 10^3) \times (2 \times 10^{-1})</math> (c) <math>(2 \times 10^{-1}) \div (8 \times 10^{-4})</math></p>	<p>Make m the subject of the formula <math>r = 5m^2 - n</math></p>	 <p>This prism is made of material with a density of <math>2.3\text{g/cm}^3</math>. Work out its mass</p>	
6 <sup>th</sup>	7 <sup>th</sup>	8 <sup>th</sup>	9 <sup>th</sup>	10 <sup>th</sup>	11 <sup>th</sup>	12 <sup>th</sup>
<p>Solve the pair of simultaneous equations...</p> $3x + 2y = 11$ $4x - 3y = 26$	<p>5, 11, 17, 23, 29, ... (a) Find the nth term for this sequence. Diane says that 185 is a number in this sequence. (b) Is Diane correct? Justify your answer.</p>	<p>(a) Expand and simplify <math>(4x - 3)(2x + 5)</math> (b) Factorise fully <math>x^2 - 9x - 36</math> (c) HENCE, solve the equation <math>x^2 - 9x - 36 = 0</math></p>	<p>WITHOUT USING A CALCULATOR, write down the value of</p> <p>(a) <math>7^{-2}</math> (b) <math>\left(\frac{4}{25}\right)^{-\frac{3}{2}}</math></p>	<p>Work out... <math>\sqrt{\frac{1.21 - \cos 124}{12.3}}</math></p> <p>(a) Write down ALL the figures on your calculator (b) Write your answer to (a) to an appropriate degree of accuracy. Explain why you have chosen this accuracy.</p>	<p>The population of the town of Swillsborough is declining at a rate of 8% per year. In 2018 the population was 75,440. (a) What was the population in 2017? (b) If the population keeps declining at this rate, what will the population be in 2021?</p>	
13 <sup>th</sup>	14 <sup>th</sup>	15 <sup>th</sup>	16 <sup>th</sup>	17 <sup>th</sup>	18 <sup>th</sup>	19 <sup>th</sup>
<p>WITHOUT USING A CALCULATOR, work out the answer to the following...</p> <p>(a) <math>4\frac{2}{7} - 2\frac{3}{5}</math> (b) <math>\frac{5}{8} \div 1\frac{3}{4}</math></p>	<p>Martin writes down 4 numbers. Their mean is 8. The range is 6. The largest value is 11. There is no mode. Write down the four numbers.</p>	<p>The scale on a map is 1 : 25 000 (a) On a map, a distance measures 5cm. What is this in real life? Give your answer in kilometres. (b) In real life a distance is 2.2km. What would this be in the map in centimetres?</p>	<p>A line passes through the points (0, 4) and (4, 16). (a) Write down the equation of the line (b) Write down an equation which is perpendicular to this line and which goes through the point (6, -1)</p>	<p>The nth term of a sequence is <math>\frac{3n^2 - n + 1}{7 - 3n}</math> Write down the first four terms in the sequence, giving your answers as simplified fractions.</p>	 <p>Find the perimeter and area of this trapezium.</p>	
20 <sup>th</sup>	21 <sup>st</sup>	22 <sup>nd</sup>	23 <sup>rd</sup>	24 <sup>th</sup>	25 <sup>th</sup>	26 <sup>th</sup>
<p>WITHOUT USING A CALCULATOR and showing all your working, <b>estimate</b> the value of the following calculation...</p> $\frac{88.52 \times 13.2}{0.312 \times 0.018}$	<p>Use the information that <math>37 \times 9.4 = 347.8</math> To write down the answer to (a) <math>370 \times 94</math> (b) <math>0.37 \times 94</math> (c) <math>3478 \div 0.094</math> In each case show how you have used the given calculation.</p>	<p>(a) Write 240 as a product of prime factors (b) Write 400 as a product of prime factors Use your answers to (a) and (b) to find.. (c) The LCM of 240 and 400 (d) The HCF of 240 and 400</p>	<p>WITHOUT USING A CALCULATOR and showing how you came by your answer, find 9.4% of £672</p>	<p>Draw the graph of <math>y = 5 - 2x</math> Between <math>x = -2</math> and <math>x = 4</math></p>	 <p>AT is a tangent to the circle with centre O. <math>OT = x</math>, <math>TA = x + 5</math> and <math>OA = x + 8</math> Calculate the area of triangle OTA</p>	
27 <sup>th</sup>	28 <sup>th</sup>	29 <sup>th</sup>	30 <sup>th</sup>	31 <sup>st</sup>		
<p>8 boys and 6 girls sit a mathematics test. The mean score for the boys is 33. The mean score for the girls is 34. What is the mean score for all the students?</p>	<p>Andy, Brenda and Charlotte share the monthly rent on their house in the ratio 5 : 3 : 7 Brenda pays £224 less than Charlotte. How much do they each pay?</p>	<p>Solve the equations...</p> <p>(a) <math>4(3x - 1) = 9</math> (b) <math>3x - 8 = 4 - 5x</math></p>	<p>The distance from Aberdeen to Sheffield is 383 miles. Joanne calculates that her average speed for the journey will be 45 miles per hour. She thinks she will need three breaks of half an hour each during the journey. She wants to be in Aberdeen by 9pm. What is the latest time she could leave Sheffield?</p>	<p>A circle has a circumference of 400cm. What is its area?</p>	<p>You have a long break between now and returning full time to school (hopefully in September). If you are going to be successful at the end of Year 11 in your GCSE exam, it is massively important that you keep ticking along and don't forget all the mathematics you have learned so far. The <b>best way to learn mathematics is to DO mathematics</b> and if you do a small bit (5-10 minutes) each day, it will make a big difference when you return to school. Try and use this calendar to give you some regular practice over the summer holidays. If you need help there are some fantastic videos at <a href="http://www.corbettmaths.com">www.corbettmaths.com</a> Or you can always email me at <a href="mailto:w.chadburn@allsaintslearning.co.uk">w.chadburn@allsaintslearning.co.uk</a> <b>Enjoy the summer and keep doing some mathematics!</b></p>	

## A BIT OF MATHS EACH DAY – SUMMER BOOST 2020 – HIGHER TIER

MONDAY	TUESDAY	WEDNESDAY	THURSDAY	FRIDAY	SATURDAY	SUNDAY												
<b>31<sup>st</sup></b>					<b>1<sup>st</sup></b>	<b>2<sup>nd</sup></b>												
<p>Solve the equation <math>4x^2 + 8x - 7 = 0</math> giving your answers correct to 3 significant figures.</p>	<h1 style="color: red; font-size: 2em;">August</h1>		<p>You have a long break between now and returning full time to school (hopefully in September). If you are going to be successful at the end of Year 11 in your GCSE exam, it is massively important that you keep ticking along and don't forget all the mathematics you have learned so far. The <b>best way to learn mathematics is to DO mathematics</b> and if you do a small bit (5-10 minutes) each day, it will make a big difference when you return to school. Try and use this calendar to give you some regular practice over the summer holidays. If you need help there are some fantastic videos at <a href="http://www.corbettmaths.com">www.corbettmaths.com</a></p> <p>Or you can always email me at <a href="mailto:w.chadburn@allsaintslearning.co.uk">w.chadburn@allsaintslearning.co.uk</a></p> <p style="text-align: center;"><b>Enjoy the summer and keep doing some mathematics!</b></p>		<p>The table shows the distribution of ages of 160 employees of a steel company.</p> <table border="1" style="margin-left: auto; margin-right: auto;"> <thead> <tr> <th>Age (A) in years</th> <th>Frequency</th> </tr> </thead> <tbody> <tr> <td><math>15 &lt; A \leq 25</math></td> <td>44</td> </tr> <tr> <td><math>25 &lt; A \leq 35</math></td> <td>56</td> </tr> <tr> <td><math>35 &lt; A \leq 45</math></td> <td>34</td> </tr> <tr> <td><math>45 &lt; A \leq 55</math></td> <td>19</td> </tr> <tr> <td><math>55 &lt; A \leq 65</math></td> <td>7</td> </tr> </tbody> </table> <p>(a) What is the modal group?                      (b) In which group does the median lie?                      (c) Estimate the mean age of the employees.</p>		Age (A) in years	Frequency	$15 < A \leq 25$	44	$25 < A \leq 35$	56	$35 < A \leq 45$	34	$45 < A \leq 55$	19	$55 < A \leq 65$	7
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<p>A town has 15,400 inhabitants. 7,350 are male.</p> <p>(a) What percentage of the inhabitants are female?                      14% if the inhabitants are below the age of 18, 12% are above the age of 65.</p> <p>(b) How many inhabitants are between 18 and 65 years old?</p>	<p>£1 = €1.10                      £1 = 1.20 Swiss Francs</p> <p>Doreen is travelling within Switzerland. She buys a rail ticket and can pay either in Euro's or Swiss Francs. She pays either €20 or 22.30 Swiss Francs. Which currency should she use? Explain your answer.</p>	<p>Put the numbers in order of size, from smallest to largest, showing clearly how you did this...</p> <p style="text-align: center;"><math>0.4, 38.7\%, \frac{5}{12}, \frac{19}{50}</math></p>	<p>Tom measures the length of a book as 26cm to the nearest centimetre.</p> <p>What is the smallest and largest length the book could be?</p>	<p>There are 300 people in a cinema.</p> <p><math>\frac{1}{6}</math> of them are boys.                      30% are girls.                      The rest are adults.</p> <p>Write the ratio of boys to girls to adults in its simplest form.</p>	 <p>The diagram shows a 6-sided shape made up of a rectangle and a right angled triangle.</p> <p>(a) Calculate the total area of the shape                      (b) Calculate the perimeter of the shape.</p>													
<b>10<sup>th</sup></b>	<b>11<sup>th</sup></b>	<b>12<sup>th</sup></b>	<b>13<sup>th</sup></b>	<b>14<sup>th</sup></b>	<b>15<sup>th</sup></b>	<b>16<sup>th</sup></b>												
<p>A school buys 27 calculators for a total cost of £142.29. If the school buys over 50 calculators in one order they get a 10% discount. The school therefore order another 55 calculators. How much will these 55 cost?</p>	 <p>Calculate the value of <math>x</math>.                      Give your answer correct to 2 decimal places.</p>	<p>(a) Solve the inequality <math>6x - 1 &lt; 20</math>                      (b) Another inequality is <math>-4 \leq x &lt; 5</math></p> <p>What integer values satisfy BOTH (a) and (b).</p>	<p>A barrel holds 45 litres. Water flows at a rate of 120cm<sup>3</sup> per minute. How long does it take to completely fill the barrel? (1cm<sup>3</sup> = 1ml)</p>	<p>Solve the following equations...</p> <p>(a) <math>\begin{pmatrix} x \\ 5 \end{pmatrix} + \begin{pmatrix} 8 \\ 3y \end{pmatrix} = \begin{pmatrix} 5 \\ 14 \end{pmatrix}</math>                      (b) <math>2 \begin{pmatrix} x \\ -6 \end{pmatrix} - 3 \begin{pmatrix} -2 \\ y \end{pmatrix} = \begin{pmatrix} 14 \\ -y \end{pmatrix}</math></p>	<p>56 students were asked if they watched football on TV yesterday.</p> <p>20 of the students were boys.                      15 girls watched football.                      7 of the boys did not watch football.</p> <p>(a) A student was chosen at random. What is the probability that this student was a girl?                      (b) What percentage of the students did not watch football?</p>													
<b>17<sup>th</sup></b>	<b>18<sup>th</sup></b>	<b>19<sup>th</sup></b>	<b>20<sup>th</sup></b>	<b>21<sup>st</sup></b>	<b>22<sup>nd</sup></b>	<b>23<sup>rd</sup></b>												
<p>R is proportional to the cube of M.</p> <p>When R is 2, M is 160.                      Find the value of M when R is 3</p>	<p style="text-align: center;"><math>v = u + at</math></p> <p>If <math>v = -4.1</math>, <math>u = 1.2</math> and <math>a = -0.8</math>, find the value of <math>t</math>.</p>	 <p>Find the size of angle <math>y</math>.                      Give full geometric reasons.</p>	 <p>The diagram shows an isosceles triangle. Calculate the area of the triangle.</p>	<p>A quadratic is of the form <math>y = x^2 + bx + c</math></p> <p>When the graph of the function is drawn, it intersects the <math>x</math>-axis at -3 and 4.</p> <p>What are the values of <math>b</math> and <math>c</math>?</p>	 <p>Find the values of angles <math>x</math> and <math>y</math>, giving correct geometric reasons for each.</p>													
<b>24<sup>th</sup></b>	<b>25<sup>th</sup></b>	<b>26<sup>th</sup></b>	<b>27<sup>th</sup></b>	<b>28<sup>th</sup></b>	<b>29<sup>th</sup></b>	<b>30<sup>th</sup></b>												
<p>Prove that <math>(3n + 1)^2 - (3n - 1)^2</math> is a multiple of 4 for all positive integer values of <math>n</math>.</p>	<p>Put these numbers in order, from smallest to largest, showing clearly how you have decided how to do this...</p> <p>A: 71                      B: <math>3.9 \times 10^2</math>                      C: <math>817 \times 10^{-1}</math>                      D: <math>0.1 \times 10^3</math></p>	<p>Simplify fully <math>\frac{x^2 - 8x + 15}{2x^2 - 7x - 15}</math></p>	<p>Paul has a bag with 3 blue counters and 7 red counters. He takes a counter out of the bag, notes its colour and does not replace it. He repeats the process one more time.</p> <p>(a) Draw a tree diagram to show this                      (b) What is the probability he gets counters of different colour?</p>	<p>Wendy invests £1200 in a bank account for three years. The bank pays <math>x\%</math> interest at the end of each year. At the end of the third year she has £1280.96. If the value of <math>x</math> hasn't changed and Wendy hasn't deposited or withdrawn any money over this period, what is the value of <math>x</math>?</p>	 <p>A field is in the form of a quadrilateral as shown in the diagram.                      Find the total area of the field.</p>													