



S5 Mathematics 6 periods

Exam 2021 part B

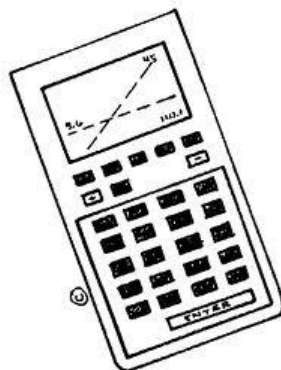
Date: 16.06.2021

Time: 10:00

Duration: 90 minutes

Course: S5Ma6En

Teacher: Cookdale



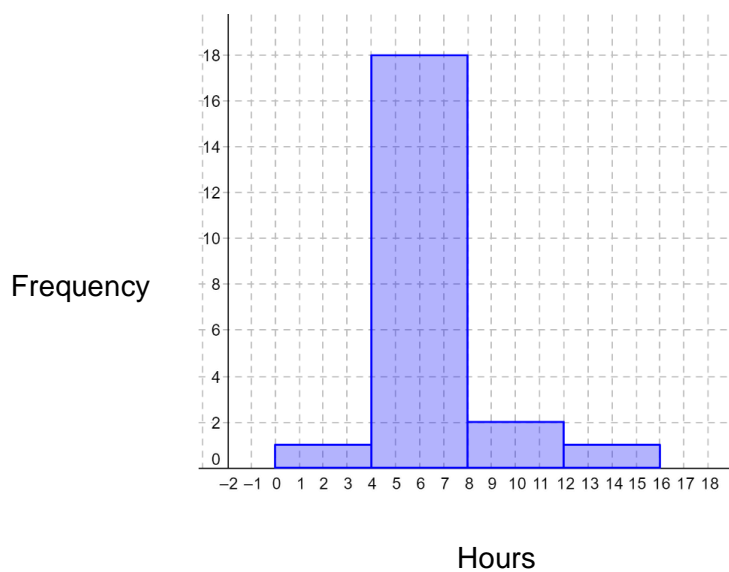
	Part B	Page 1/3	Marks
1)	<p>The points $A(2,5)$ and $B(7, -7)$ are given.</p> <p>a) Calculate $\ \overrightarrow{AB}\$</p> <p>b) Find the coordinates of point C if you know that $\overrightarrow{AC} = \begin{pmatrix} -1 \\ 9 \end{pmatrix}$</p> <p>c) Calculate the angle between vectors \overrightarrow{AB} and \overrightarrow{AC} if you know that $\overrightarrow{AC} = \begin{pmatrix} -1 \\ 9 \end{pmatrix}$. Write your answer in degrees, accurate to two decimal places.</p> <p>d) Find the parameter k, so that the vector $\vec{u} = \begin{pmatrix} 12 \\ k \end{pmatrix}$ is perpendicular to \overrightarrow{AB}.</p>		<p>3</p> <p>4</p> <p>4</p> <p>4</p>
2)	<p>The vectors \vec{u} and \vec{v} are given, with $\vec{u} = \begin{pmatrix} 3 \\ -1 \end{pmatrix}$ and $\vec{v} = \begin{pmatrix} 6 \\ 2 \end{pmatrix}$.</p> <p>Express vector $\vec{w} = \begin{pmatrix} 0 \\ 4 \end{pmatrix}$ as a linear combination of vectors \vec{u} and \vec{v}.</p>		5
3)	<p>In the coffee bar <i>Dolve Vita</i> the coffee is served at a temperature of 90°C. The temperature T (in $^\circ\text{C}$) of the coffee in the coffee cup is given by the following formula:</p> $T(t) = 20 + 70 \cdot 0.87^t$ <p>Where t is the time (in min) after the coffee was served.</p> <p>When does the coffee reach a temperature of 50°C? Write your answer accurate to the nearest minute.</p>		5
4)	<p>Independent events A and B are such that $P(A) = 0.45$ and $P(A \cap B) = 0.18$.</p> <p>Find:</p> <p>a) $P(B)$</p> <p>b) $P(A \cup B)$</p> <p>c) $P(B A)$</p>		<p>3</p> <p>3</p> <p>3</p>

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5)	<p>Sandro has four possible ways home from school.</p> <p>From school he takes either a bus or a train. The probability that he will go by train is $\frac{3}{5}$</p> <p>If he goes by train, he completes the second part of the journey by walking or by getting a lift. The probability that he gets a lift is $\frac{1}{4}$</p> <p>If he catches a bus, the second part of his journey can be complete by catching another bus or he can walk. The probability that he will walk is $\frac{7}{8}$</p> <p>a) Draw a tree diagram showing all of the possible outcomes of Sandro's journey from school</p> <p>Using the tree diagram calculate the probability that Sandro:</p> <p>b) Catches a bus from school and then walks</p> <p>c) Walks for part of his journey home</p> <p>d) Given that he walks the second part of the journey, what is the probability that he caught the bus?</p>		<p>3</p> <p>3</p> <p>3</p> <p>3</p>
6)	<div data-bbox="276 1144 635 1397" data-label="Image"> </div> <p>A campsite offers 'ready made' tents complete with a bed. The tents have wooden frames in the shape of an equilateral triangle with a base of 3m. The bed frame is 2.6m wide and exactly fits the width of the tent.</p> <p>A simplified view of the tent is shown in this diagram.</p> <div data-bbox="691 1424 1235 1816" data-label="Diagram"> </div> <p>a) What is the maximum height of the tent, measured from the base?</p> <p>b) Calculate the height, h, of the bed frame.</p>		<p>5</p> <p>5</p>
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- 7) A class is carrying out an experiment, testing the life of two brands of batteries. 22 batteries of each brand are connected to electric fans and the class records how long the batteries last before the fan stops. The table below shows the results of the measurements for brand 1:

Battery life (hours)	Brand 1 Frequency
$0 \leq h < 4$	1
$4 \leq h < 8$	7
$8 \leq h < 12$	10
$12 \leq h < 16$	4

- a) Calculate the mean and standard deviation of the life of brand 1.
 b) Below are the results for brand 2. Show that the mean battery life is 6.5 hours and the standard deviation is 2.2 hours



- c) The slogan for one brand is '4 hours guaranteed!' and for the other brand the slogan is 'The longest lasting'. Which brand uses which slogan? Use your results to justify your answers.