Exercise 1 Calc. : ✓

The points A(2, 5) and B(7, −7) are given.

1. Calculate $\left\|\overrightarrow{AB}\right\|$. — 3 marks
2. Find the coordinates of point C if you know that $\overrightarrow{AC} = \begin{pmatrix} -1 \\ 9 \end{pmatrix}$. — 4 marks
3. Find 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. — 4 marks
4. Find the parameter k, so that the vector $\vec{u} = \begin{pmatrix} 12 \\ k \end{pmatrix}$ is perpendicular to $\overrightarrow{AB}$. — 4 marks

Exercise 2 Calc. : ✓

The vectors $\vec{u}$ and $\vec{v}$ are given, with $\vec{u} = \begin{pmatrix} 3 \\ -1 \end{pmatrix}$ and $\vec{v} = \begin{pmatrix} 6 \\ 2 \end{pmatrix}$.

Express vector $\vec{w} = \begin{pmatrix} 0 \\ 4 \end{pmatrix}$ as a linear combination of vectors $\vec{u}$ and $\vec{v}$. — 5 marks

Exercise 3 Calc. : ✓

In the coffee bar *Dolce Vita* the coffee is served at a temperature of 90°C. The temperature $T(t)$ (in °C) of the coffee in the coffee cup is given by the following formula:

$$T(t) = 20 + 70 \cdot 0.87^t$$

Where t is the time (in min) after the coffee was served.
When does the coffee reach a temperature of 50°C? Write your answer accurate to the nearest minute. — 5 marks

Exercise 4 Calc. : ✓

Independent events A and B are such that $P(A) = 0.45$ and $P(A \cap B) = 0.18$. Find:

1. $P(B)$ — 3 marks
2. $P(A \cup B)$ — 3 marks
3. $P(B|A)$ — 3 marks

Exercise 5 Calc. : ✓

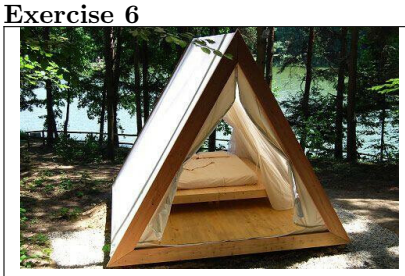
Sandro has four possible ways home from school.
From school he takes either a bus or a train. The probability that he will go by train is $\frac{3}{5}$.
If he goes by train, he completes the second part of the journey by walking or by getting a lift. The probability that he gets a lift is $\frac{1}{4}$.
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 $\frac{7}{8}$.

1. Draw a tree diagram showing all of the possible outcomes of Sandro's journey from school. — 3 marks

Using the tree diagram calculate the probability that Sandro:

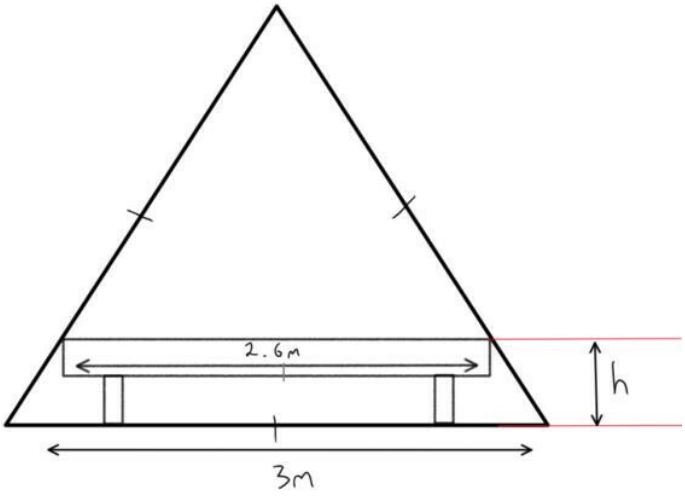
2. Catches a bus from school and then walks — 3 marks
3. Walks for part of his journey home — 3 marks
4. Given that he walks the second part of the journey, what is the probability that he caught the bus? — 3 marks

Exercise 6 Calc. : ✓



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 3 m. The bed frame is 2.6 m wide and exactly fits the width of the tent.

A simplified view of the tent is shown in this diagram.



1. What is the maximum height of the tent, measured from the base? 5 marks
2. Calculate the height h of the bed frame. 5 marks

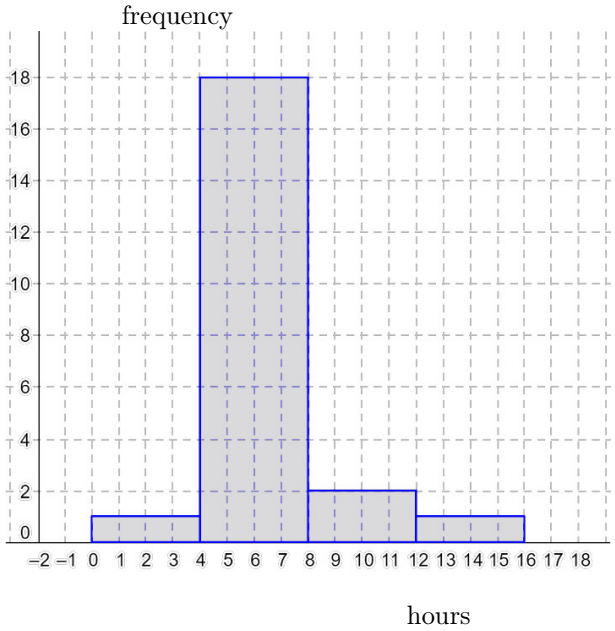
Exercise 7 Calc. : ✓

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)	Frequency of Brand 1
$0 \leq h < 4$	1
$4 \leq h < 8$	7
$8 \leq h < 12$	10
$12 \leq h < 16$	4

1. Calculate the mean and standard deviation of the life of brand 1. 3 marks

2. 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. 3 marks



3. 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. 3 marks