SUMMER NO CALC HL1 *[48 marks]*

In an arithmetic sequence, the third term is 10 and the fifth term is 16.

1a. Find the common difference. *[2 marks]*

1b. Find the first term. *[2 marks]*

1c. Find the sum of the first 20 terms of the sequence. *[3 marks]*

The number of apartments in a housing development has been increasing by a constant amount every year.

At the end of the first year the number of apartments was 150, and at the end of the sixth year the number of apartments was 600.
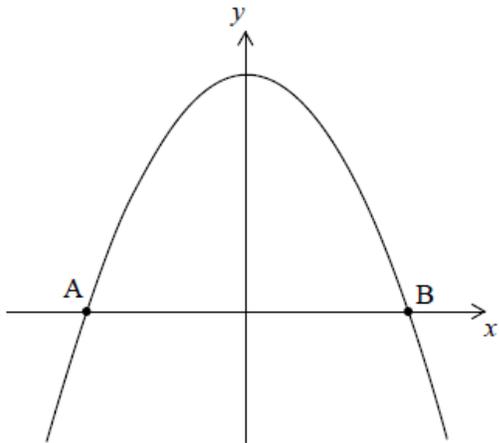
The number of apartments, y, can be determined by the equation $y = mt + n$, where t is the time, in years.

2a. Find the value of m. *[2 marks]*

2b. Find the value of n. *[2 marks]*

3. Solve $\log_2(2\sin x) + \log_2(\cos x) = -1$, for $2\pi < x < \frac{5\pi}{2}$. *[7 marks]*

Let $f(x) = 5 - x^2$. Part of the graph of f is shown in the following diagram.

The graph crosses the x-axis at the points A and B.

4. Find the x-coordinate of A and of B. [3 marks]

Consider the quadratic function, $f(x) = px(q - x)$, where p and q are positive integers.

The graph of $y = f(x)$ passes through the point $(6, 0)$.

5a. Calculate the value of q. [2 marks]

5b. The vertex of the function is $(3, 27)$. [2 marks]

Find the value of p.

5c. The vertex of the function is $(3, 27)$. [2 marks]

Write down the range of f.

Let $f(x) = (x - 5)^3$, for $x \in \mathbb{R}$.

6. Find $f^{-1}(x)$. [3 marks]

7. Celeste wishes to hire a taxicab from a company which has a large number of taxicabs. [6 marks]

The taxicabs are randomly assigned by the company.

The probability that a taxicab is yellow is 0.4.

The probability that a taxicab is a Fiat is 0.3.

The probability that a taxicab is yellow or a Fiat is 0.6.

Find the probability that the taxicab hired by Celeste is **not** a yellow Fiat.

The time, in minutes, that students in a school spend on their homework per day is presented in the following box-and-whisker diagram.
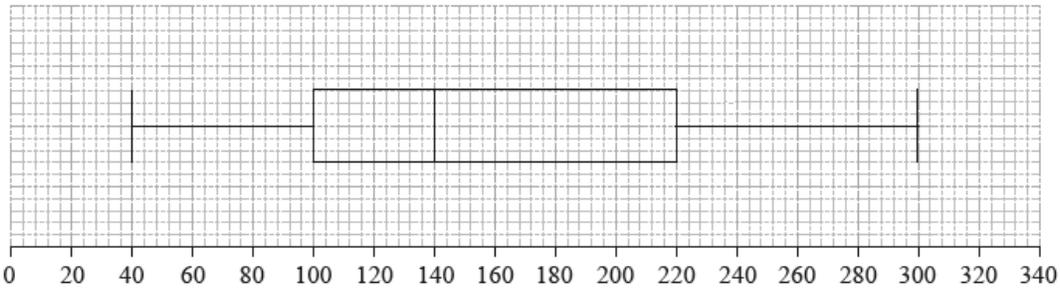
Time, in minutes, students spend on their homework per day

8a. Find [3 marks]

(i) the longest amount of time spent on homework per day;

(ii) the interquartile range.

8b. State the statistical term corresponding to the value of 140 minutes. [1 mark]

8c. Find the percentage of students who spend [2 marks]

(i) between 100 and 140 minutes per day on their homework;

(ii) more than 100 minutes per day on their homework.

In an international competition, participants can answer questions in **only one** of the three following languages: Portuguese, Mandarin or Hindi. 80 participants took part in the competition. The number of participants answering in Portuguese, Mandarin or Hindi is shown in the table.

		Languages			
		Portuguese	Mandarin	Hindi	**Total**
Participants	Boys	20	18	5	**43**
	Girls	18	7	12	**37**
	Total	**38**	**25**	**17**	**80**

9a. State the number of boys who answered questions in Portuguese.   *[1 mark]*

A boy is chosen at random.

9b. Find the probability that the boy answered questions in Hindi.   *[2 marks]*

9c. Two girls are selected at random.   *[3 marks]*

Calculate the probability that one girl answered questions in Mandarin and the other answered questions in Hindi.