

3. [Maximum mark: 6]

In an arithmetic sequence, $u_1 = -5$ and $d = 3$.

- (a) Find u_8 . [2]

(b) Find the value of n for which $u_n = 67$. [4]



4. [Maximum mark: 6]

Let $b = \log_2 a$, where $a > 0$. Write down each of the following expressions in terms of b .

- (a) $\log_2 a^3$ [2]
(b) $\log_2 8a$ [2]
(c) $\log_8 a$ [2]



2. [Maximum mark: 6]

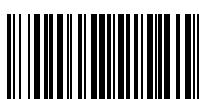
The following table shows the hand lengths and the heights of five athletes on a sports team.

Hand length (x cm)	21.0	21.9	21.0	20.3	20.8
Height (y cm)	178.3	185.0	177.1	169.0	174.6

The relationship between x and y can be modelled by the regression line with equation $y = ax + b$.

- (a) (i) Find the value of a and of b .
(ii) Write down the correlation coefficient.

(b) Another athlete on this sports team has a hand length of 21.5 cm. Use the regression equation to estimate the height of this athlete.

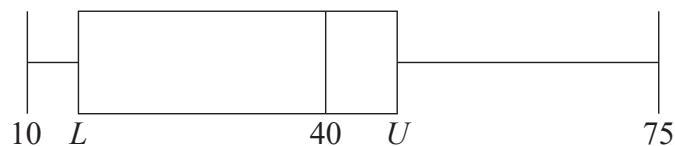


- 4.** [Maximum mark: 5]

May 2021 Paper 1 TZ1

A research student weighed lizard eggs in grams and recorded the results. The following box and whisker diagram shows a summary of the results where L and U are the lower and upper quartiles respectively.

diagram not to scale



The interquartile range is 20 grams and there are no outliers in the results.

- (a) Find the minimum possible value of U . [3]

(b) Hence, find the minimum possible value of L . [2]



- 5.** [Maximum mark: 6]

The sum of an infinite geometric sequence is 33.25. The second term of the sequence is 7.98. Find the possible values of r .



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May 2021 Paper 1 TZ2

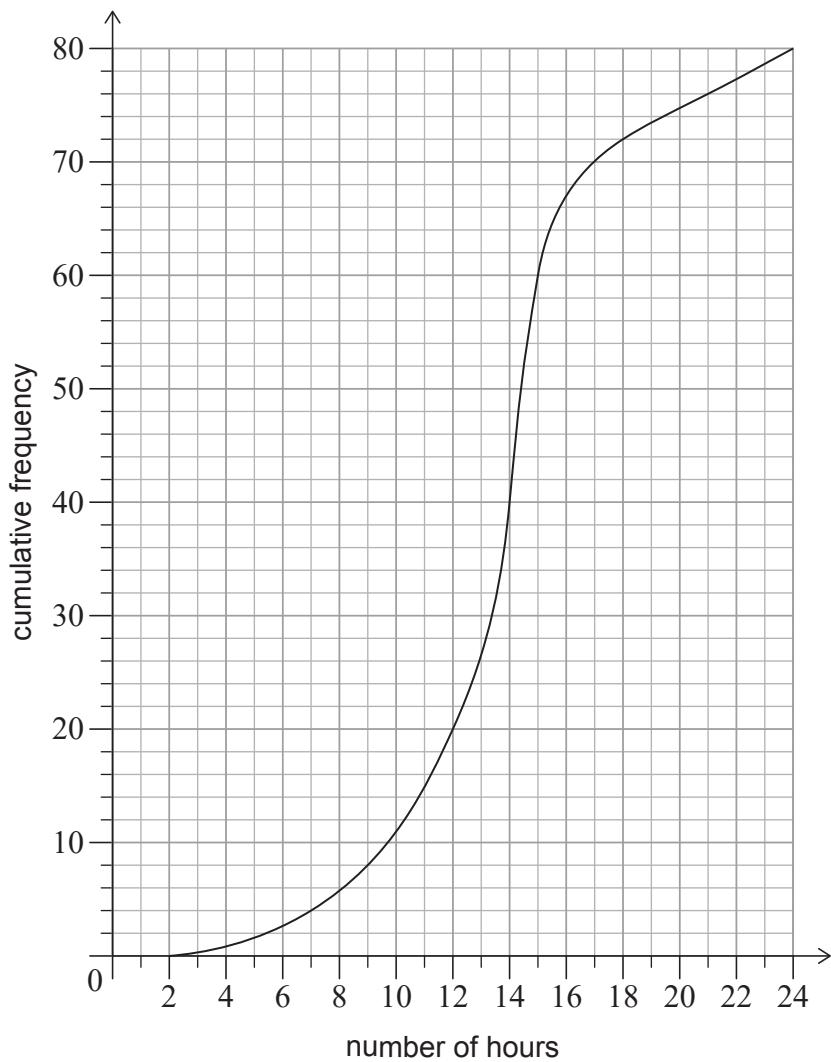
Section B

Answer **all** questions in the answer booklet provided. Please start each question on a new page.

7. [Maximum mark: 14]

A large school has students from Year 6 to Year 12.

A group of 80 students in Year 12 were randomly selected and surveyed to find out how many hours per week they each spend doing homework. Their results are represented by the following cumulative frequency graph.



(This question continues on the following page)



12EP08

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(Question 7 continued)

- (a) Find the median number of hours per week these Year 12 students spend doing homework. [2]
- (b) Given that 10% of these Year 12 students spend more than k hours per week doing homework, find the value of k . [3]

This same information is represented by the following table.

Hours (h) spent doing homework	$2 < h \leq 7$	$7 < h \leq 15$	$15 < h \leq 21$	$21 < h \leq 24$
Frequency	4	p	16	q

- (c) Find the value of p and the value of q . [4]

There are 320 students in Year 12 at this school.

- (d) Estimate the number of Year 12 students that spend more than 15 hours each week doing homework. [3]
- (e) (i) Explain why this sampling method might not provide an accurate representation of the amount of time **all** of the students in the school spend doing homework.
- (ii) Suggest a more appropriate sampling method. [2]



12EP09

Turn over

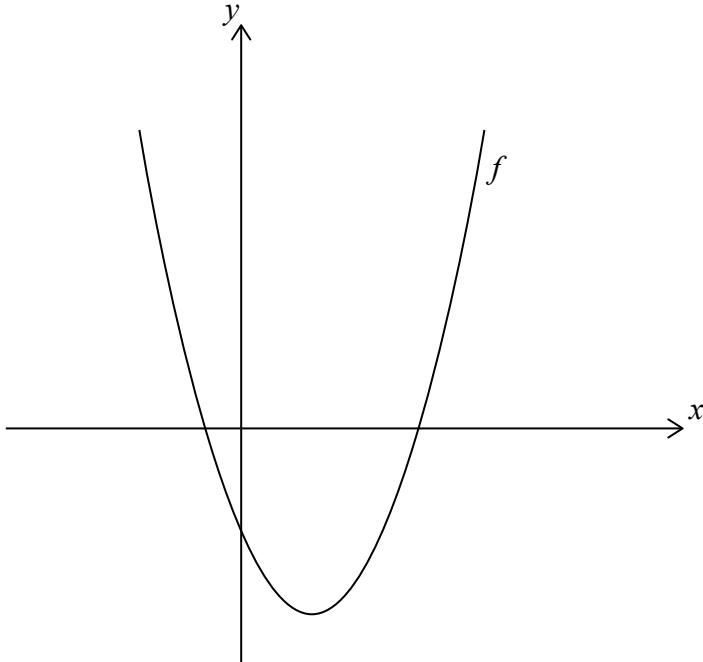
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Section B

Answer **all** questions in the answer booklet provided. Please start each question on a new page.

8. [Maximum mark: 16]

Let $f(x) = x^2 - 4x - 5$. The following diagram shows part of the graph of f .



- (a) Find the x -intercepts of the graph of f . [5]
- (b) Find the equation of the axis of symmetry of the graph of f . [2]
- (c) The function can be written in the form $f(x) = (x - h)^2 + k$.
- (i) Write down the value of h .
 - (ii) Find the value of k . [4]

The graph of a second function, g , is obtained by a reflection of the graph of f in the y -axis, followed by a translation of $\begin{pmatrix} -3 \\ 6 \end{pmatrix}$.

- (d) Find the coordinates of the vertex of the graph of g . [5]

