

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]

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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]

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2. [Maximum mark: 6]

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

<b>Hand length (<math>x</math> cm)</b>	21.0	21.9	21.0	20.3	20.8
<b>Height (<math>y</math> cm)</b>	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.

[4]

(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.

[2]

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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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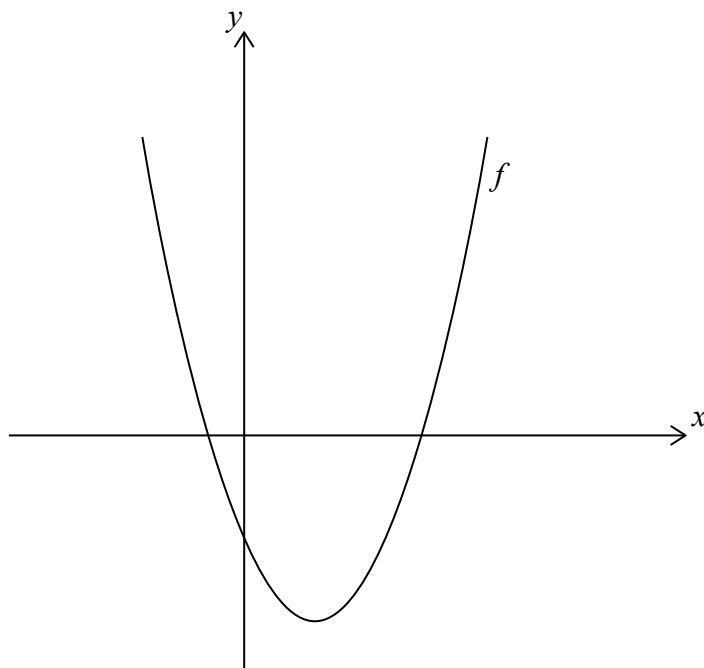
Do **not** write solutions on this page.

## 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]



**(Question 3 continued)**

The grouped frequency table summarizes the examination results of this group of students.

<b>Examination result (<math>x</math>)</b>	$0 < x \leq 20$	$20 < x \leq 40$	$40 < x \leq 60$	$60 < x \leq 80$	$80 < x \leq 100$
<b>Frequency</b>	150	350	1100	1400	200

- (c) Write down
- (i) the modal class;
  - (ii) the mid-interval value of the modal class. [3]
- (d) Calculate an estimate of
- (i) the mean examination result;
  - (ii) the standard deviation, giving your answer correct to **three decimal places**. [3]

The teacher sets a grade boundary that is one standard deviation below the mean.

- (e) Use the cumulative frequency graph to estimate the number of students whose final examination result was below this grade boundary. [3]