CANDIDATE NAME	

CENTRE NUMBER						CANDIDATE NUMBER				

MATHEMATICS **6880/03**

Paper 3   Calculator Structured Questions (Extended) **October/November 2020**

2 hours 30 minutes

Candidates answer on the Question Paper.

Additional Materials: Scientific calculator
Geometric instruments
Mathematical tables (optional)
Tracing paper (optional)

READ THESE INSTRUCTIONS FIRST

Write your Centre number, candidate number and name on the spaces provided.
Write in dark blue or black pen in the spaces provided on the Question Paper.
You may use a pencil for any diagrams or graphs.
Do **not** use staples, paper clips, highlighters, glue or correction fluid.

Answer **all** questions.

All working should be clearly shown below that question.
The number of marks is given in brackets [ ] at the end of each question
or part question.

Marks will be given for working which shows that you know how to solve
the problem even if you get the answer wrong.

Scientific calculators should be used.
If the degree of accuracy is not specified in the question, and if the
answer is not exact, give the answer to three significant figures.
Give answers in degrees to one decimal place.
For π, use either your calculator value or 3.142.
The total of the marks for this paper is 100.

For Examiner's Use	
1	
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Total	

This document consists of **15** printed pages and **1** blank page.

[Turn over

1   Siphokazi bought a house.
She paid a deposit of E102 000, which is equivalent to 12% of the selling price of the house.

Find the selling price of the house.

Answer (a) E .... [2]

(b)   Sikhumbuzo invested E600 000 with a bank.
The bank paid him 9% per annum compound interest.

Calculate the total amount Sikhumbuzo will receive at the end of three years

Answer (b) E .... [3]

2   f(x) = $4x^2 - 9$ and g(x) = $2x + 3$.

(a)   Evaluate fg(-1)

Answer (a) .... [3]

(b) Find, in its simplest form,

(i) gf(x).

Answer (b)(i) .... [2]

(ii) $\dfrac{f(x)}{g(x)}$.

Answer (b)(ii) .... [2]

(c) Find the values of x if f(x) = g(x).

Answer (c) x = ... or *x =* .... [4]

3 A survey was conducted on 54 women to find out which of the following three contraception methods they had used in the past.

P: The pill
Q: The injection
R: The implant

The results of the survey were as follows:

4 women had used all three methods,
12 women had used both *P* and *Q*,
9 women had used both *Q* and *R*,
8 women had used both *P* and *R*,
21 women had used *P*,
32 women had used *Q*,
20 women had used *R*,
6 women had not used any of these methods.

A Venn diagram representing the above information is shown below.
The letters *d*, *e*, and *f* represent the number of elements in the regions they are in.
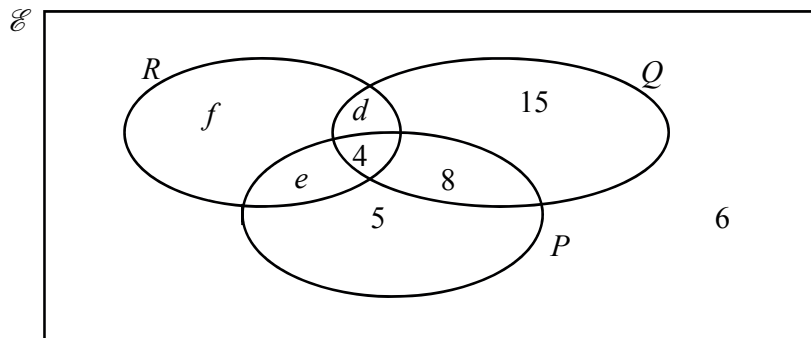
(a) Find the values of *d*, *e* and *f*.

Answer (a) d = ... [1]

e = ... [1]

f = ... [1]

(b) Find

    (i) $\text{n}(P \cup Q \cup R)'$,

Answer (b)(i) .... [1]

    (ii) $\text{n}((P \cup Q) \cap R')$.

Answer (b)(ii) .... [2]

(c) **(i)** A woman was chosen at random.

       Find the probability that she used method Q but not method R.

Answer (c)(i) .... [2]

    (ii) Two women are chosen at random.

       Find the probability that one used method Q only and the other used none of the three methods.

Answer (c)(ii) .... [3]

4 **(a)** Factorise completely.

$$xy + 2x - 7y - 14$$

Answer (a) .... [2]

(b) Solve the equation.

$$3x^2 + 2x - 7 = 0$$

Answer (b) x = ... or *x =* .... [4]

5
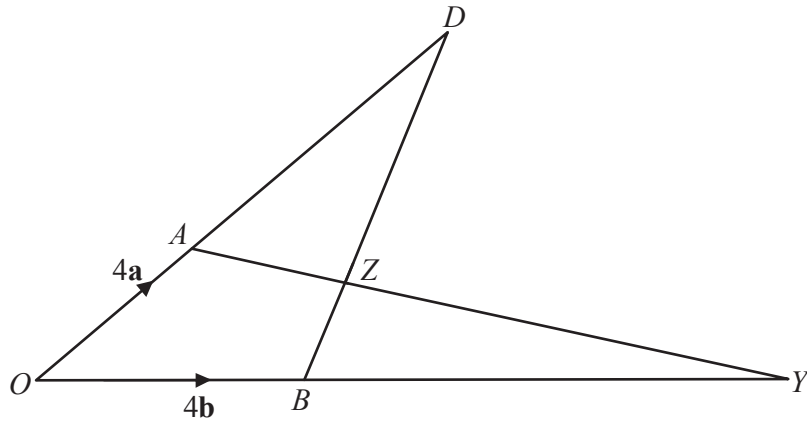
In the diagram,

$\overrightarrow{OA} = 4\mathbf{a}$ and $\overrightarrow{OB} = 4\mathbf{b}$,

OAD, *OBY* and *BZD* are straight lines,
OA : AD = 1 : 2 and *BZ : ZD* = 1 : 3.

(a) Find, in terms of **a** and **b**, the vectors which represent

(i) $\overrightarrow{BD}$,

Answer (a)(i) .... [2]

(ii) $\overrightarrow{AZ}$.

Answer (a)(ii) .... [2]

(b) You are given that $\overrightarrow{BY} = 8\mathbf{b}$.

Show that *A*, *Z* and *Y* are collinear.

....

....

....

....

.... [3]

6 In shape *ABCD*, *AB* = 61 m, *BD* = 55 m and *AC* = 125 m.
Angle *ABD* = 115° and angle *ACB* = 25°.

NOT TO SCALE
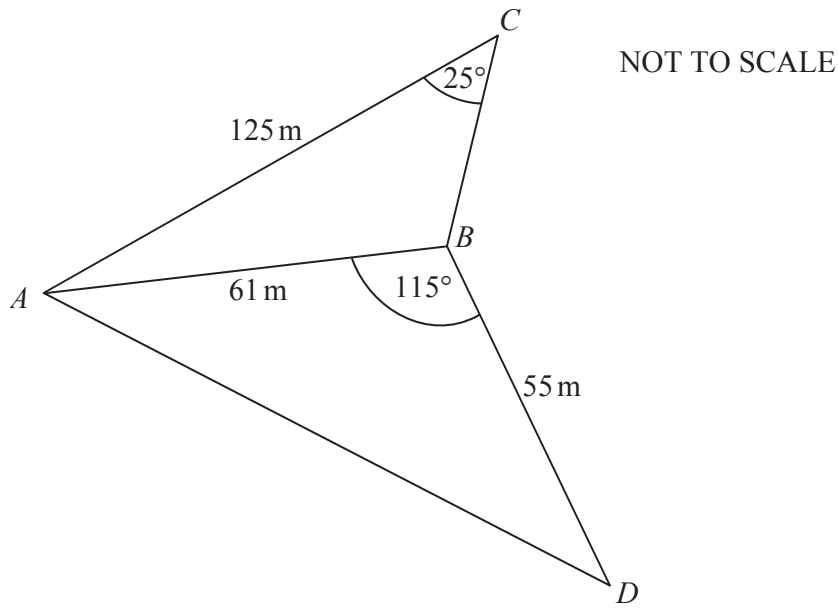
(a) Calculate obtuse angle *ABC*.

Answer (a) .... ° [3]

(b) Calculate the length of *AD*.

Answer (b) .... m [4]

(c) Calculate the area of triangle *ABD*.

Answer (c) .... m² [2]

7 The Headteacher of Sikhombe Secondary School wants to buy chairs and tables for the school.
The school can spend up to E24 000.
The cost of a chair is E60 and the cost of a table is E80.

Let *x* represent the number of chairs and *y* represent the number of tables to be bought.

(a) Show that $3x + 4y \leqslant 1200$.

....

.... [1]
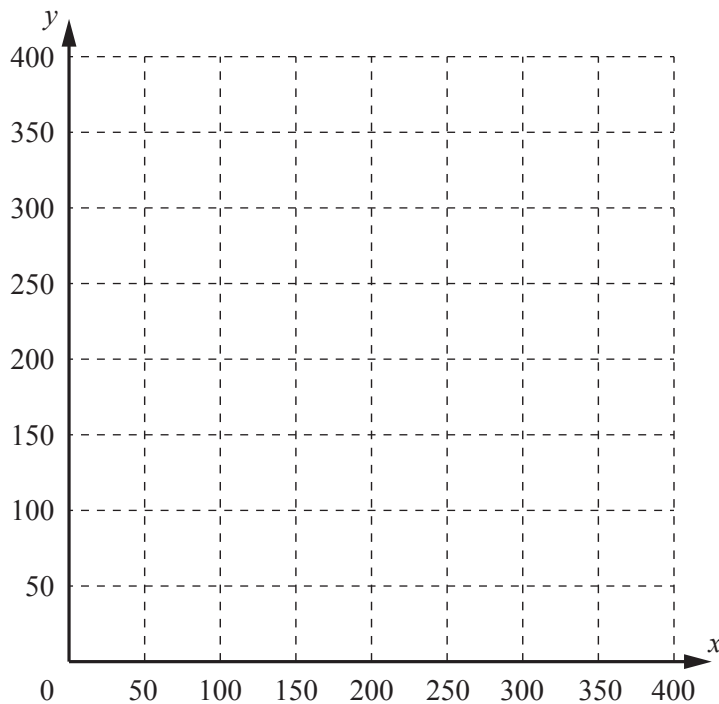
(b) He wants to buy at least 50 tables.
The number of chairs should be more than the number of tables.

Write down two inequalities to represent the above information.

Answer (b) .... and .... [2]

(c) Show the region satisfied by the three inequalities by shading the **unwanted** region.

[4]

(d) If he buys 200 chairs, find the maximum number of tables that he can buy.

Answer (d) .... [1]

 [Turn over

8 Thami asked 200 primary school pupils how much pocket money they carried to school on a particular day. The table shows his results.

Amount of money (Ex)	Number of pupils
$100 < x \leqslant 1.50$	6
$1.50 < x \leqslant 3.00$	14
$3.00 < x \leqslant 4.50$	20
$4.50 < x \leqslant 6.00$	28
$6.00 < x \leqslant 7.50$	48
$7.50 < x \leqslant 9.00$	60
$9.00 < x \leqslant 10.50$	18
$10.50 < x \leqslant 12.00$	6

(a) Write down the modal interval.

Answer (a) .... [1]

(b) Calculate an estimate of the mean.

Answer (b) .... [3]

(c) Complete the cumulative frequency table for this data.

Amount of money (Ex)	Number of pupils
$x \leqslant 1.50$	6
$x \leqslant 3.00$	20
$x \leqslant 4.50$	40
$x \leqslant 6.00$	68
$x \leqslant 7.50$	
$x \leqslant 9.00$	
$x \leqslant 10.50$	194
$x \leqslant 12.00$	200

[2]

(d) On the grid below draw a cumulative frequency diagram for the data.

Cumulative frequency (y-axis, labelled from 10 to 200 in steps of 10)

Amount of money (x-axis, labelled 0 to 12)

[3]
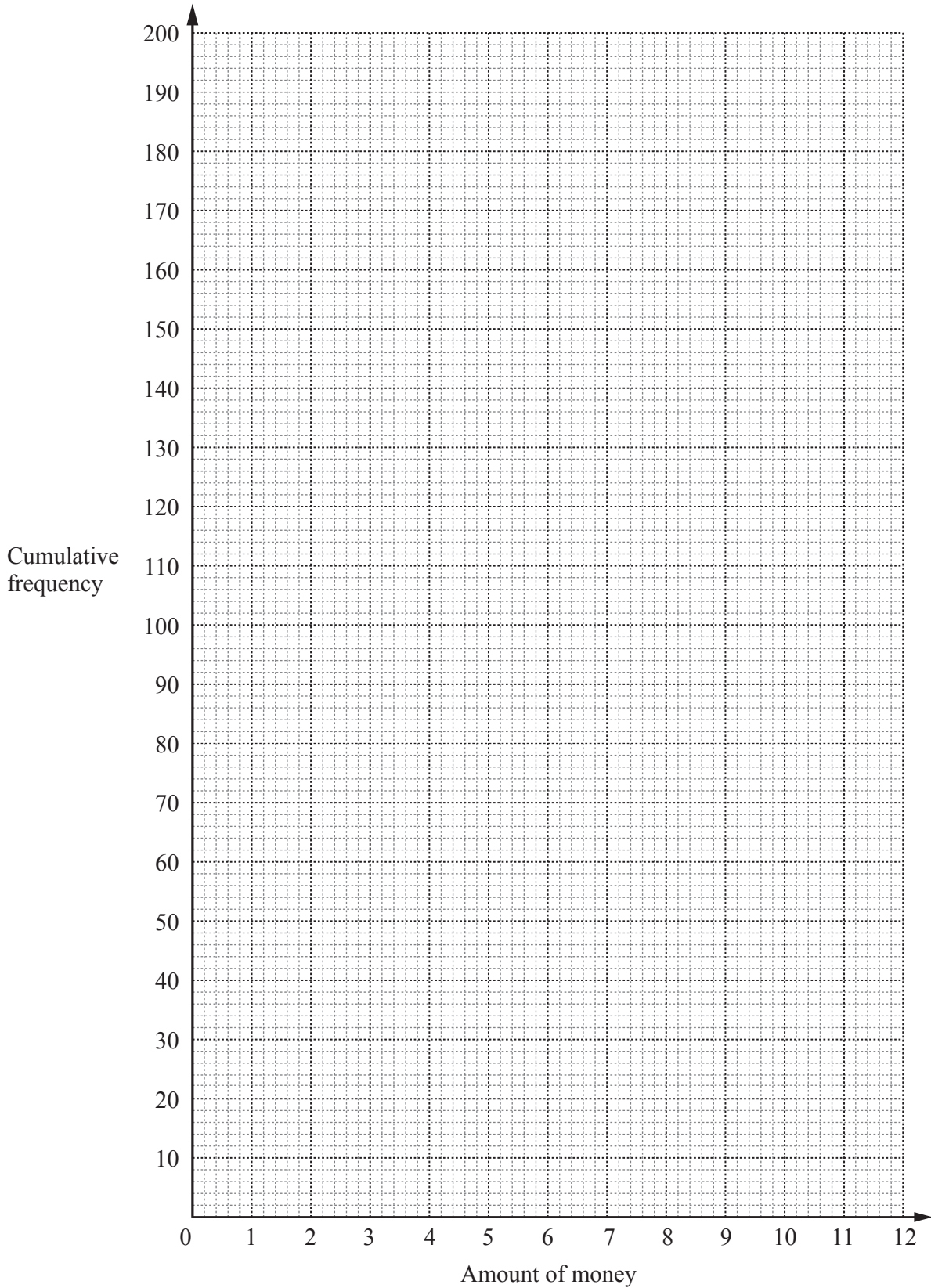
(e) Use your graph to find:

(i) the 20th percentile,

Answer (e)(i) .... [2]

(ii) the interquartile range.

Answer (e)(ii) .... [2]

9 Triangle *E* has vertices (1, 1) , (3, 1) and (1, 2).
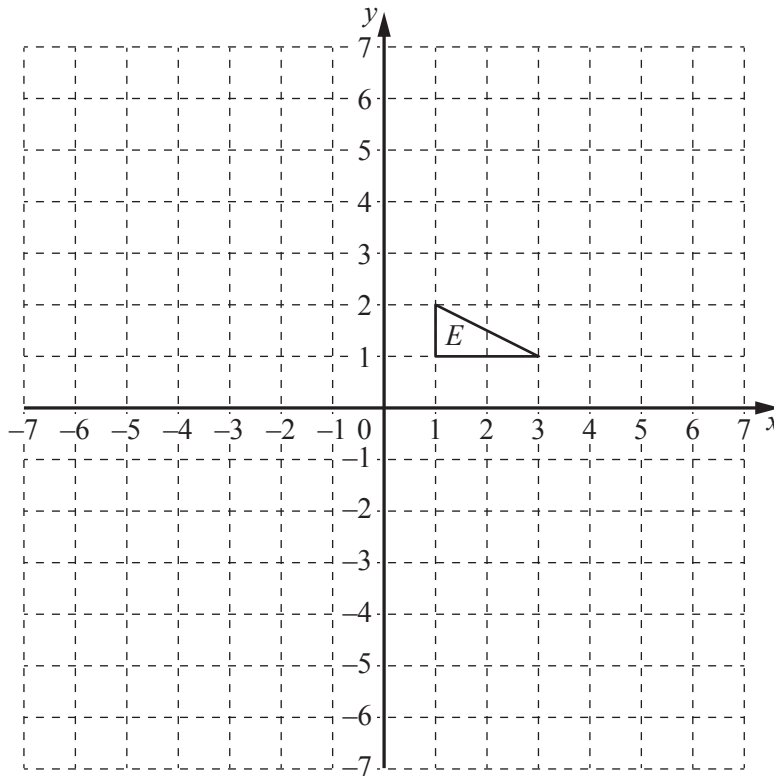
(a) A transformation *P* maps triangle *E* onto triangle *F*.

The matrix of a transformation *P* is $\begin{pmatrix} b & 0 \\ 0 & b \end{pmatrix}$.

The vertices of *F* are $(-2, -2)$, $(-6, -2)$, and $(-2, -4)$.

(i) Draw and label triangle *F*. [1]

(ii) Describe fully the single transformation *P*.

Answer (a)(ii) ....

.... [3]

(iii) Write down the value of *b*.

Answer (a)(iii) b = ... [1]

(b) Draw triangle *G*, the image of triangle *E* under a reflection in the line *y* = *x*. [2]

(c) Triangle *H* is the image of triangle *E* under a transformation represented by the matrix.

$$Q = \begin{pmatrix} 1 & 2 \\ 0 & 1 \end{pmatrix}$$
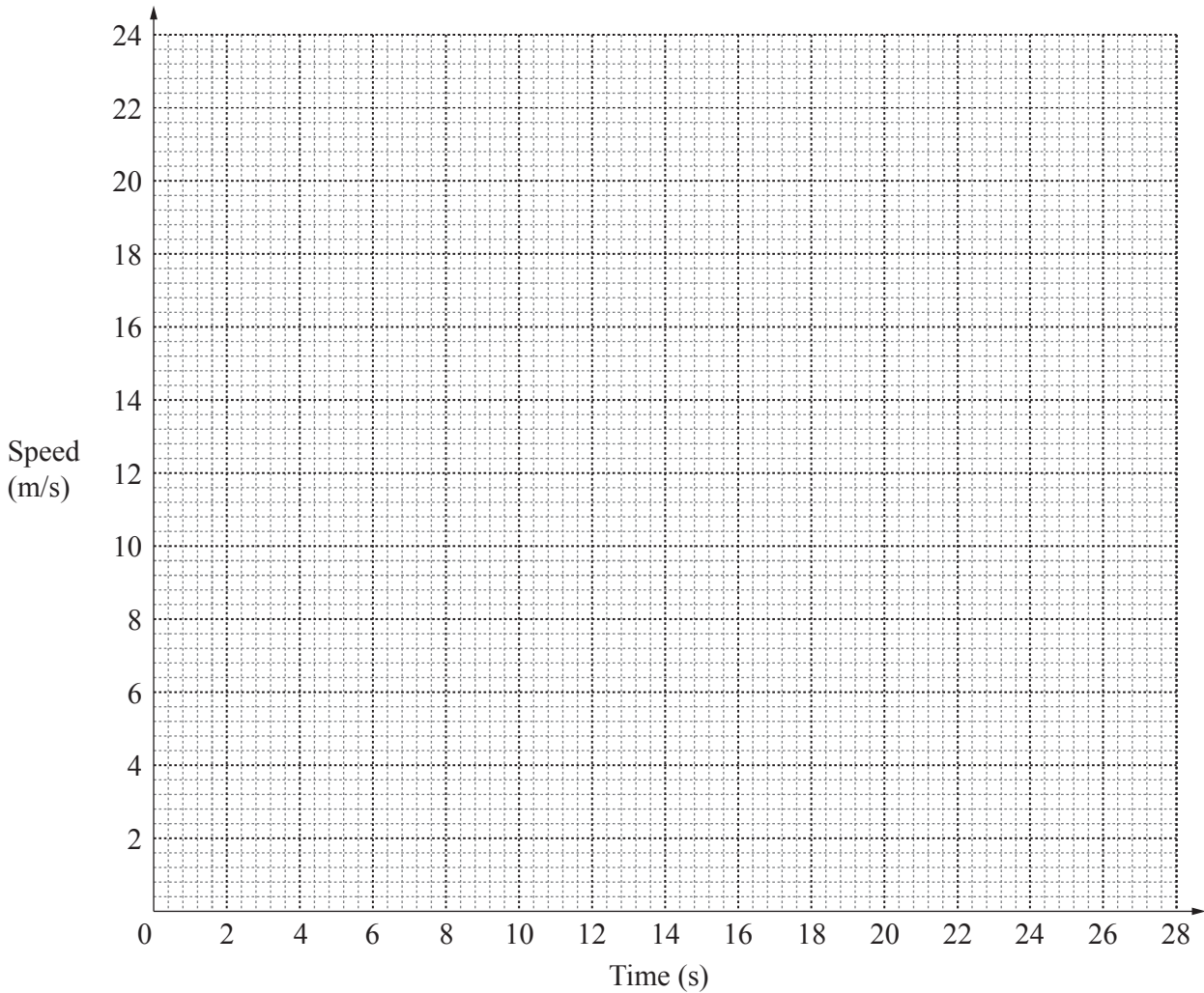
(i) Draw and label triangle *H*.

(ii) Describe fully the transformation represented by matrix *Q*.

Answer (c)(ii) ....

.... [3]

10 A particle accelerates constantly from rest to a speed of 20 m/s in 10 seconds.
It maintains that speed for another 10 seconds.
It comes to rest after a further 5 seconds with a constant acceleration.

(a) On the grid below show the particle's journey.

[2]

(b) Find the speed of the particle at 3 seconds.

Answer (b) .... m/s [1]

(c) Calculate the distance covered by the particle in the whole journey.

Answer (c) .... m [2]

(d) Calculate the acceleration of the particle in the last 5 seconds.

Answer (d) .... m/s² [2]

11 **(a)** Make p the subject in the following equation.

$$\sqrt{p^2 + r} = 3p$$

Answer (a) .... [4]

(b) Solve for x and y in the following matrix equation.

$$\begin{pmatrix} 3 & 2 \\ 4 & -1 \end{pmatrix} \begin{pmatrix} x \\ y \end{pmatrix} = \begin{pmatrix} 13 \\ 10 \end{pmatrix}$$

Answer (b) x = ... , *y =* .... [4]

(c) p varies directly as the cube of r.

$p = 448$ when $r = 4$.

(i) Express p in terms of r.

Answer (c)(i) .... [2]

(ii) Find r when $p = 875$.

Answer (c)(ii) .... [2]

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