St. Patrick's High School, Keady

Mathematics Department

GCSE Mathematics Practice Booklet

M2

Topic 7 – Algebra 2

Co-ordinate Geometry

Graphs and Gradients

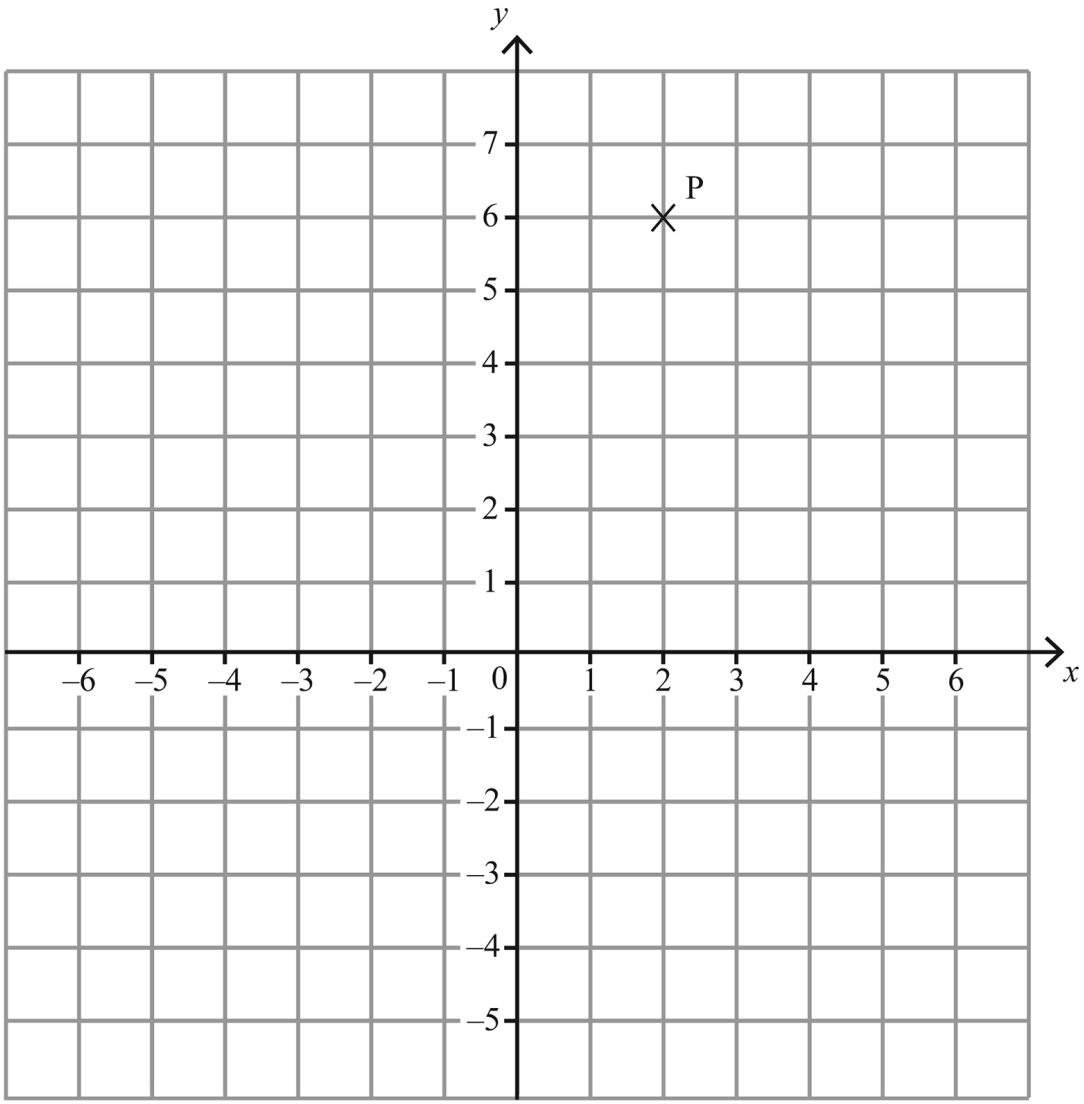
Working with Graphs

Questions taken from CCEA Past Papers

Mark Scheme included at the end of this booklet

Keady Maths

Q1



(a) Write down the coordinates of the point P.

Answer (_____ , _____) [1]

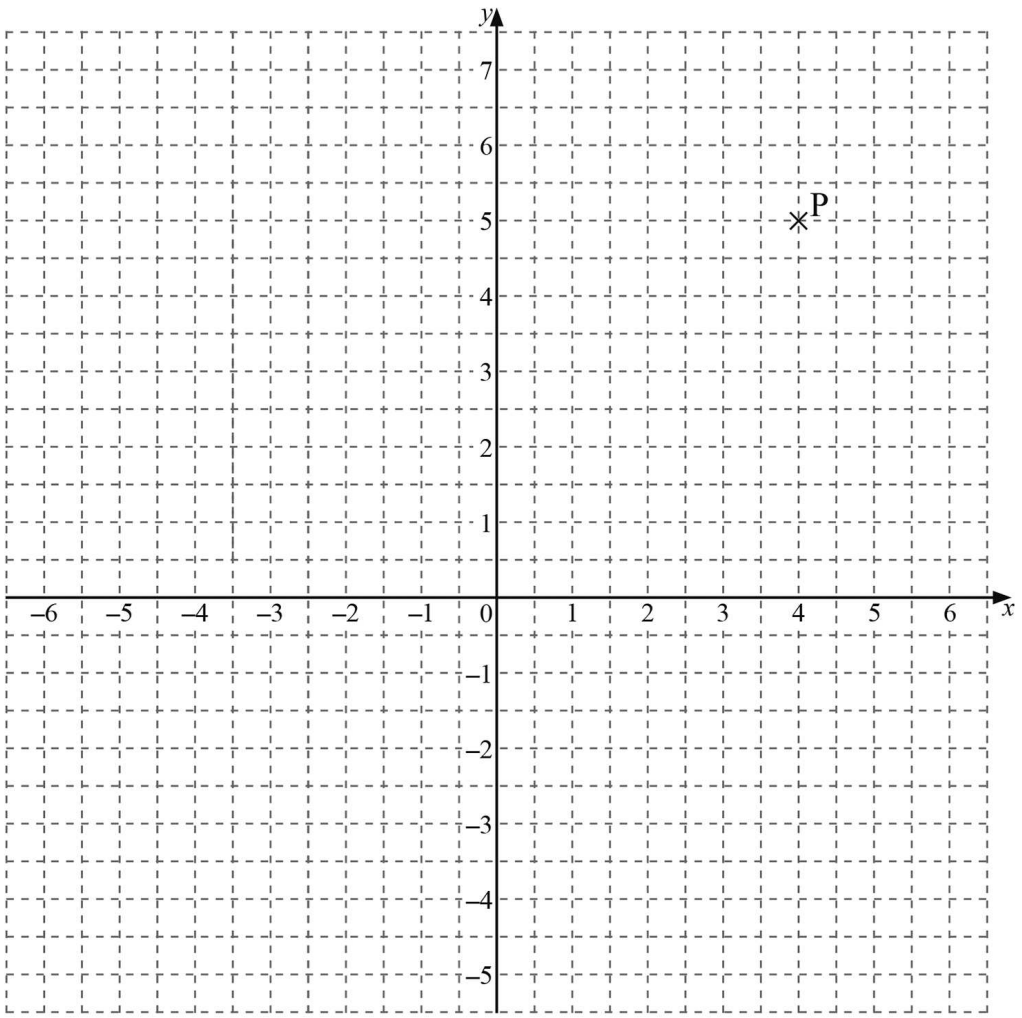
(b) Plot and label the points Q (–1, –3) and R (2, –3). [2]

(c) Join up P, Q and R to form a triangle.

What type of triangle is PQR?

Answer _____ [1]

Q2



(a) Write down the co-ordinates of the point P.

Answer (_____ , _____) [1]

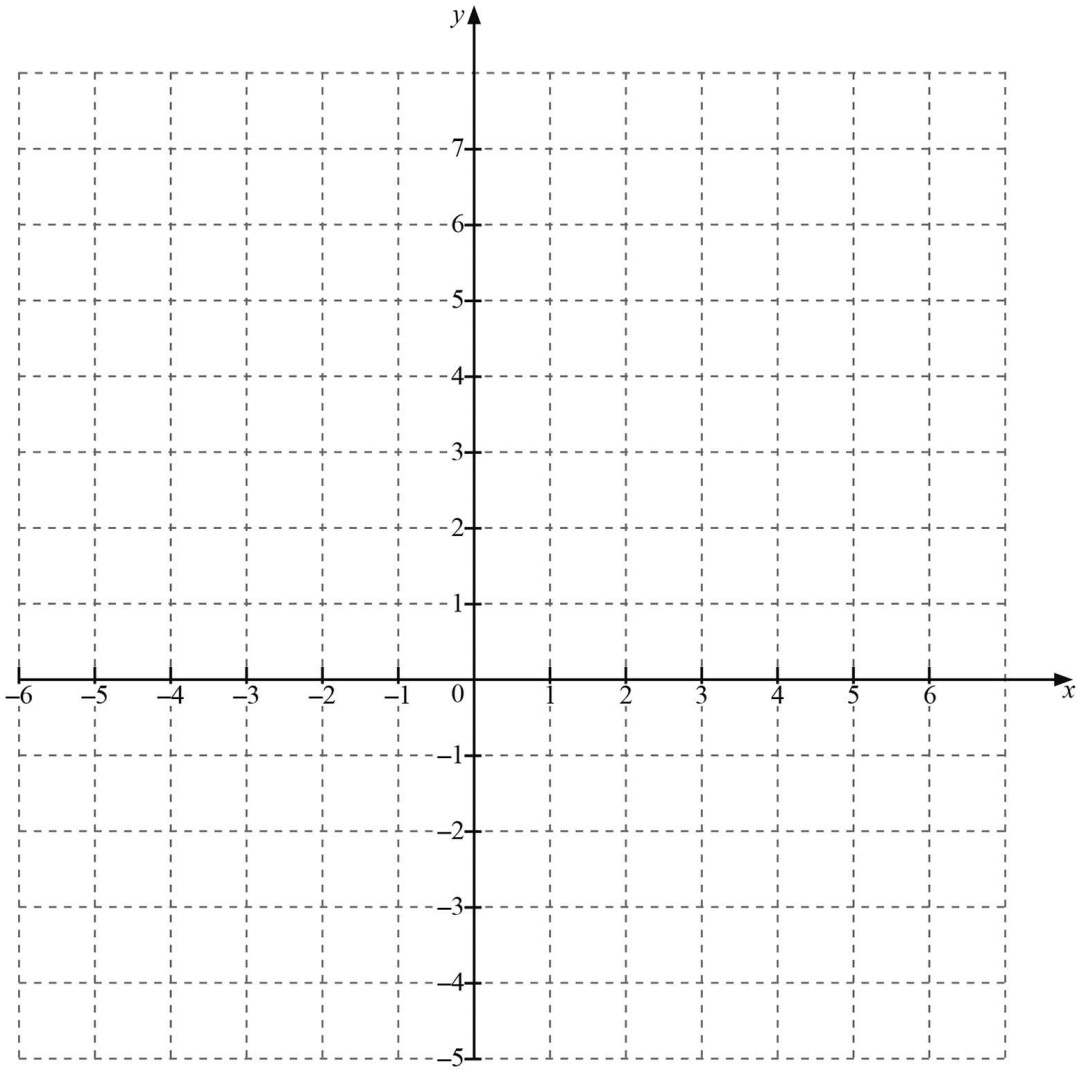
(b) Plot and label the points Q (–1, –5) and R (–6, 5) [2]

(c) Join up P, Q and R to form a triangle.

What type of triangle is PQR?

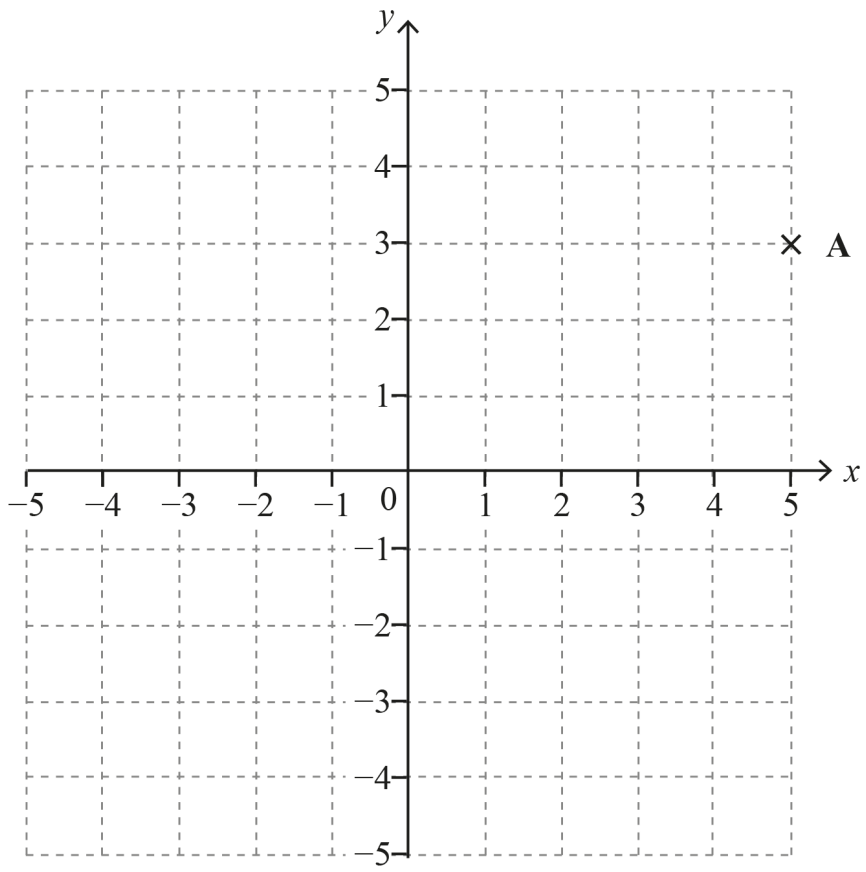
Answer _____ [1]

Q3



Plot and label the points A (3, –4) and B (–4, –1). [2]

Q4 The point A (5, 3) is plotted on this coordinate grid.



(a) Plot the points B (−2, 3) and C (2, −1) on the grid. [2]

(b) Write down the coordinates of a point D that could be plotted on the grid to make ABCD a trapezium.

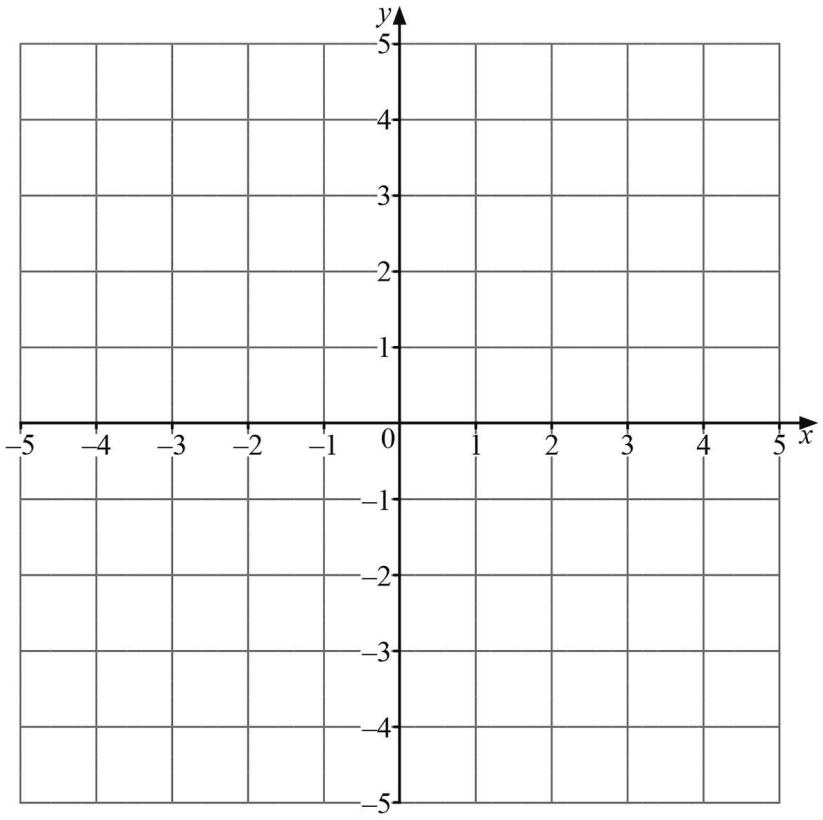
Answer (_____ , _____) [1]

Q5 **(a)** Complete the table below for $y = 2x + 1$

x	–2	–1	0	1	2
y	–3		1	3	

[1]

(b) Draw the line $y = 2x + 1$ on the grid provided.



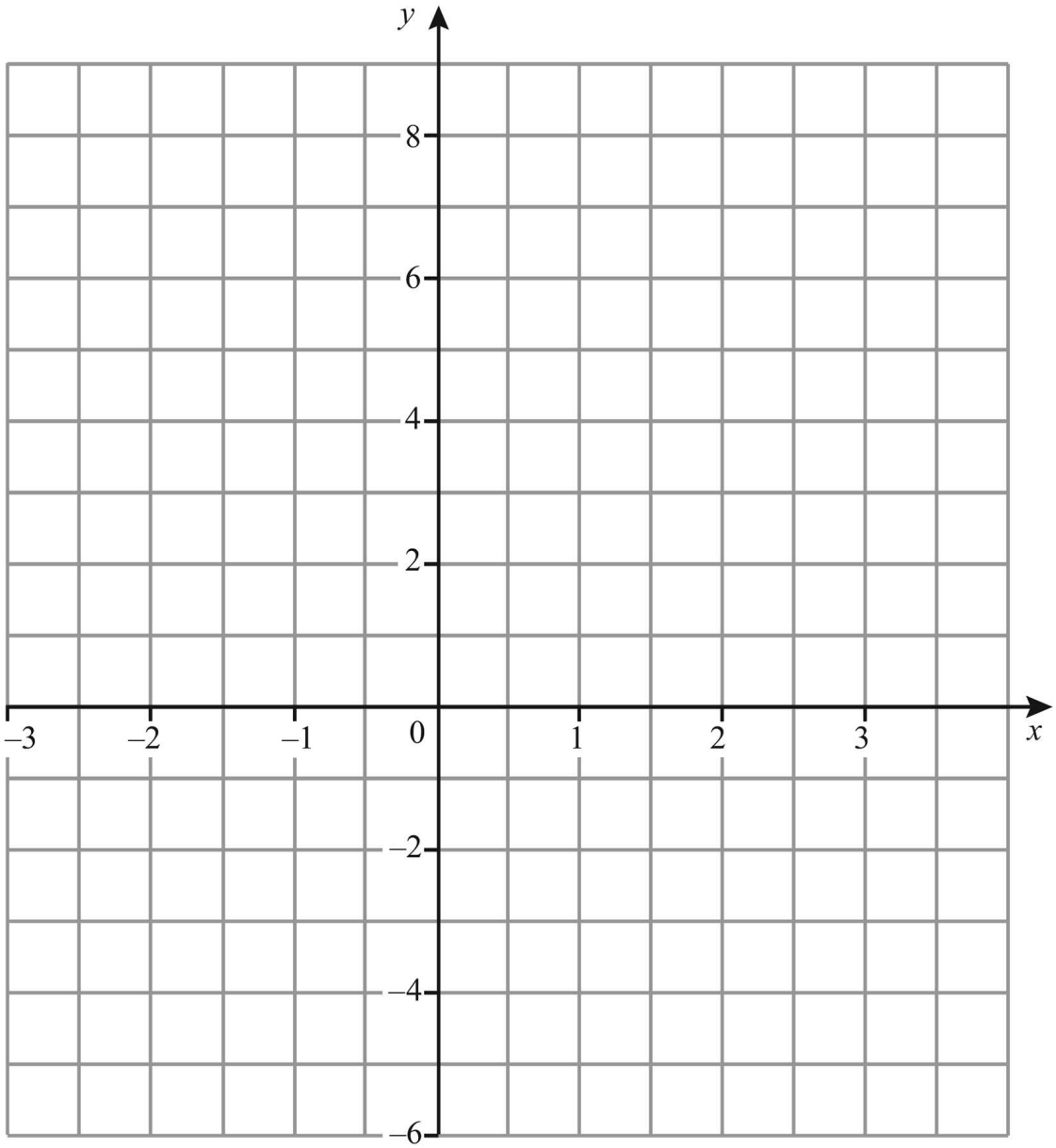
[2]

Q6 **(a)** Complete the table for $y = 5 - 3x$

x	–1	0	1	2	3
$y = 5 - 3x$	8		2		–4

[2]

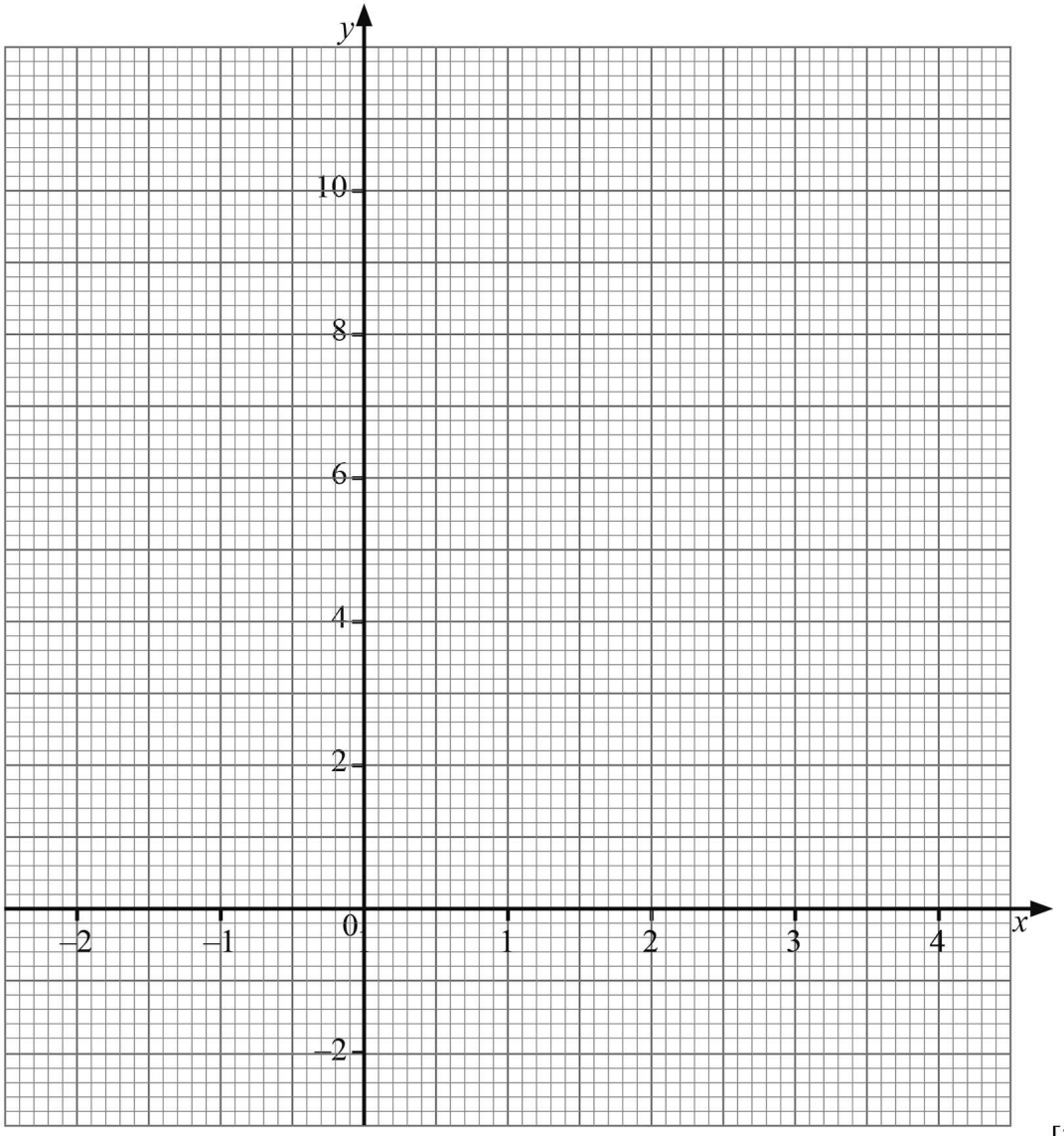
(b) Using values from the table, draw the graph of $y = 5 - 3x$



[1]

Q7 **(a)** Complete the following table and then draw the graph of $y = 7 - 3x$

x	-1	1	3
$y = 7 - 3x$	10		



[3]

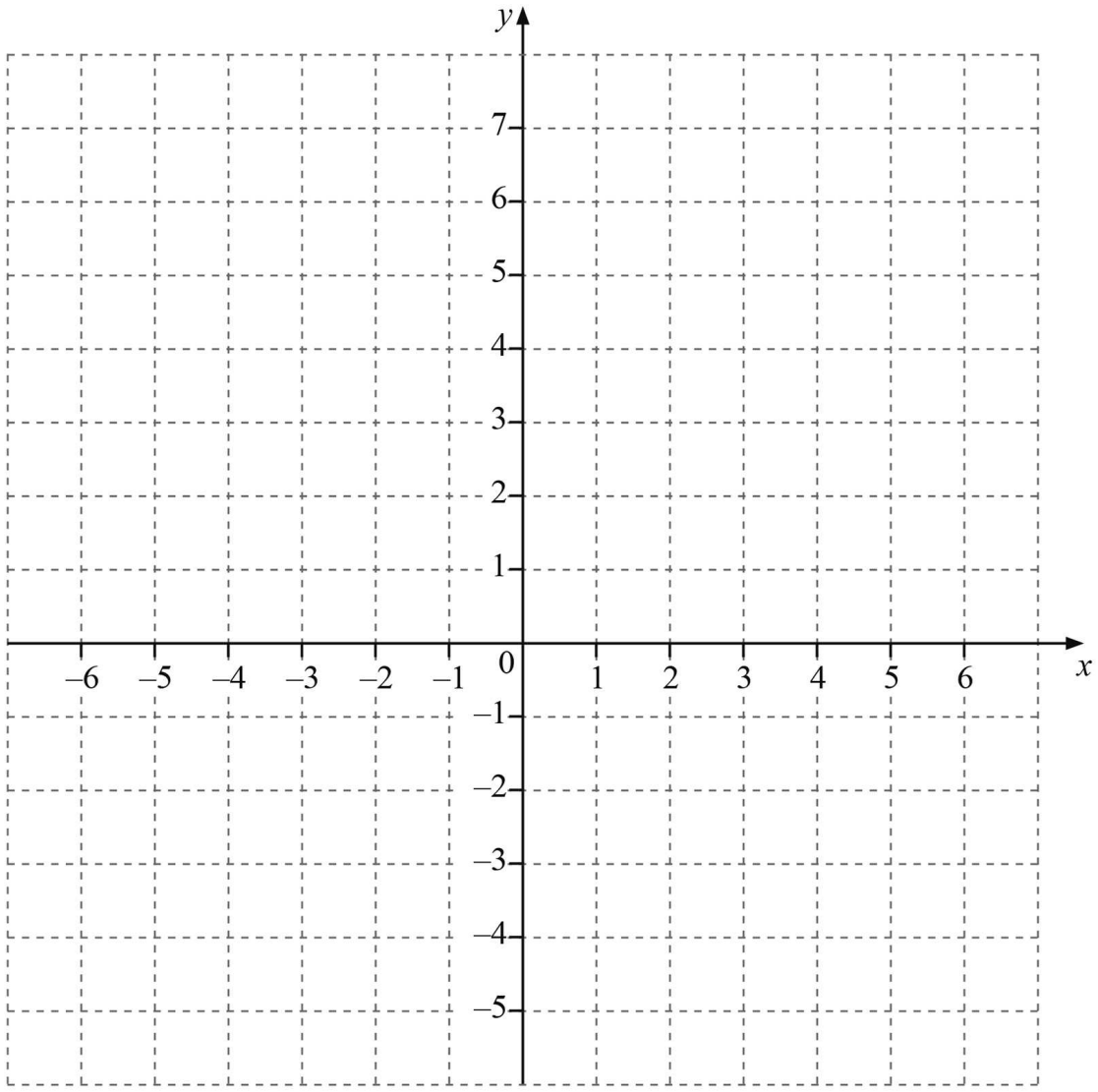
(b) The line $y = 7 - 3x$ crosses the line $y = 1$ at P.

Find the coordinates of the point P.

Answer P (_____, _____) [2]

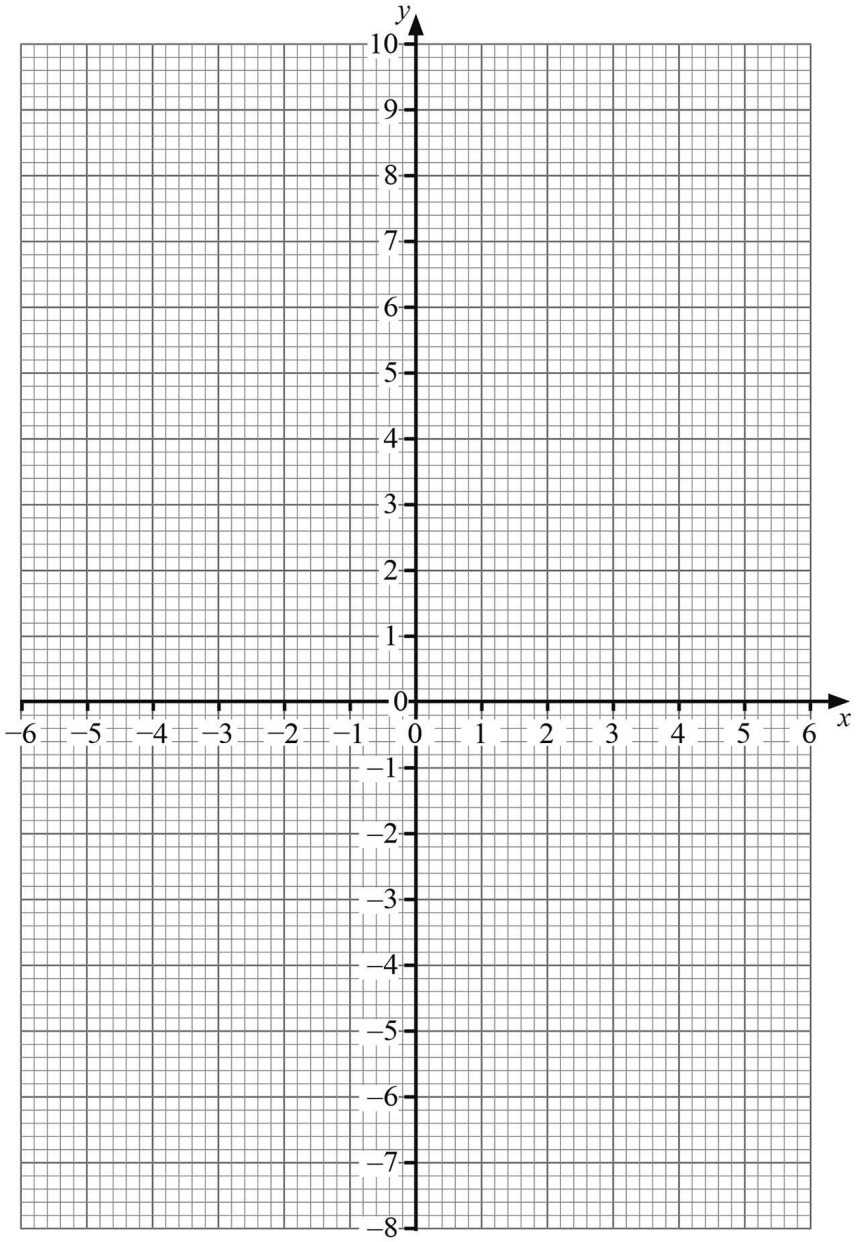
Q8 L is the point (−5, 6). N is the point (3, −2).

Write the co-ordinates of the midpoint of LN.



Answer (_____ , _____) [2]

Q9 **(a)** Draw the graph of $y = 4x - 3$ on the grid below.



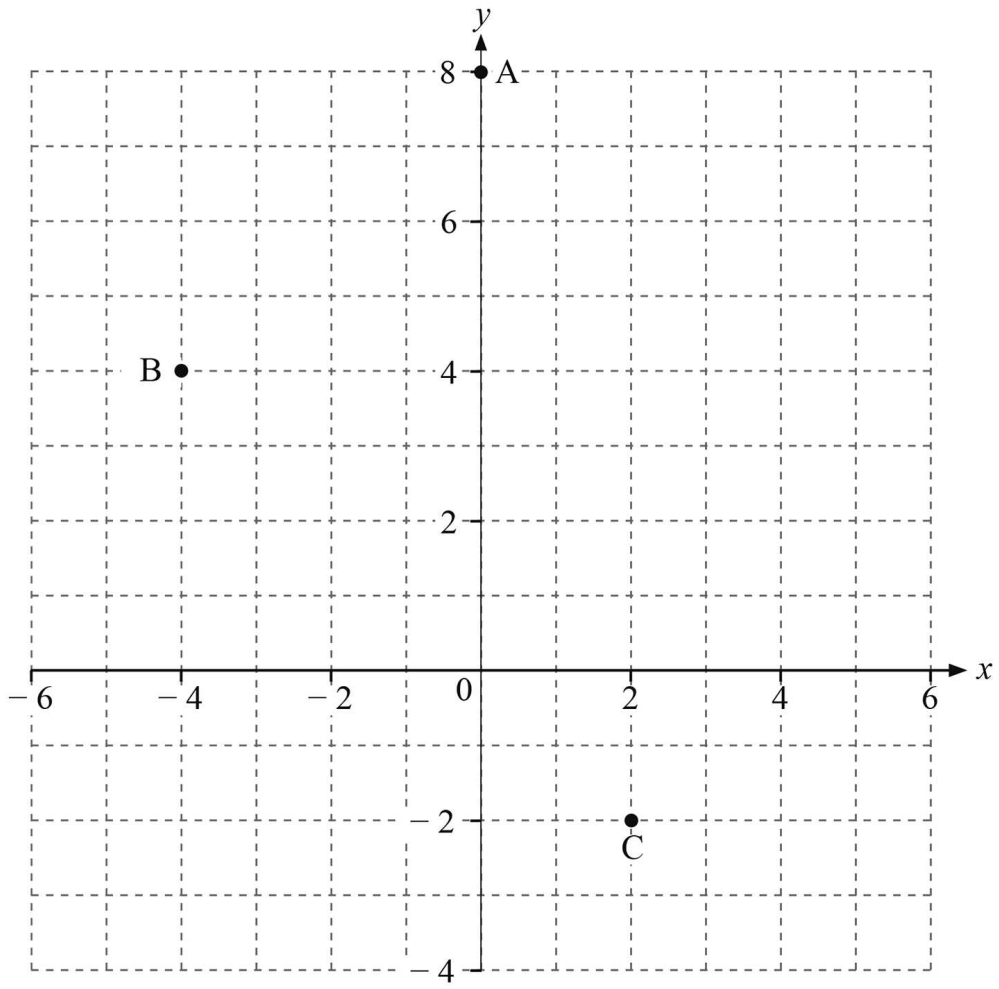
[3]

(b) The graph of $y = 4x - 3$ crosses the line $y = 5$ at the point P.

Write down the coordinates of P.

Answer (___ , ___) [1]

Q10 The vertices A(0, 8) B(−4, 4) and C(2, −2) of a right-angled triangle are shown.



(a) Write down the coordinates of the midpoint of the line joining A and C.

Answer (_____, _____) [2]

(b) A fourth point D is plotted so that ABCD forms a rectangle. Explain why the coordinates of D must be (6, 2).

[2]

Q11 P is the point (2, 3) and Q is the point (–4, –1).

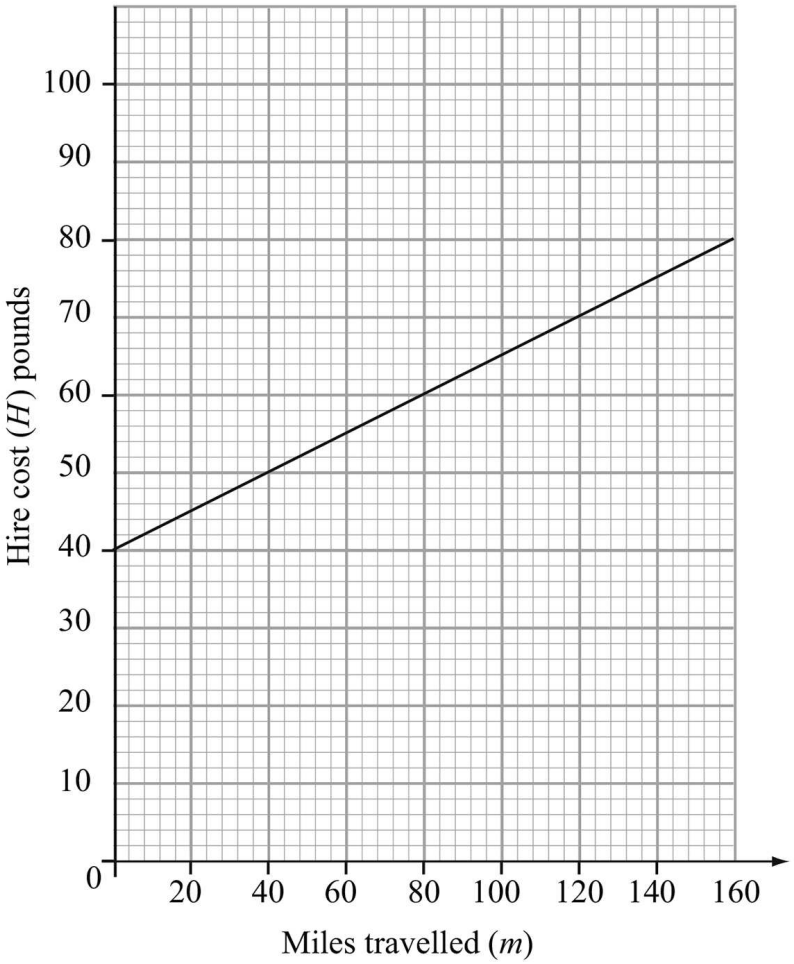
Work out the coordinates of the midpoint of the line PQ.

Answer (_____ , _____) [2]

Q12 Work out the midpoint of the line PQ joining P(4, −6) and Q(8, 2).

Answer (_____ , _____) [2]

Q13 Airport Autos is a car hire company.
The graph shows how the hire cost is calculated.



(a) Martha hired a car. The hire cost on return was £52
Use the graph to find how many miles Martha travelled.

Answer _____ miles [1]

The hire cost (H) is made up of a fixed charge plus a charge for the number of miles travelled (m).

(b) (i) How much is the fixed charge?

Answer £_____ [1]

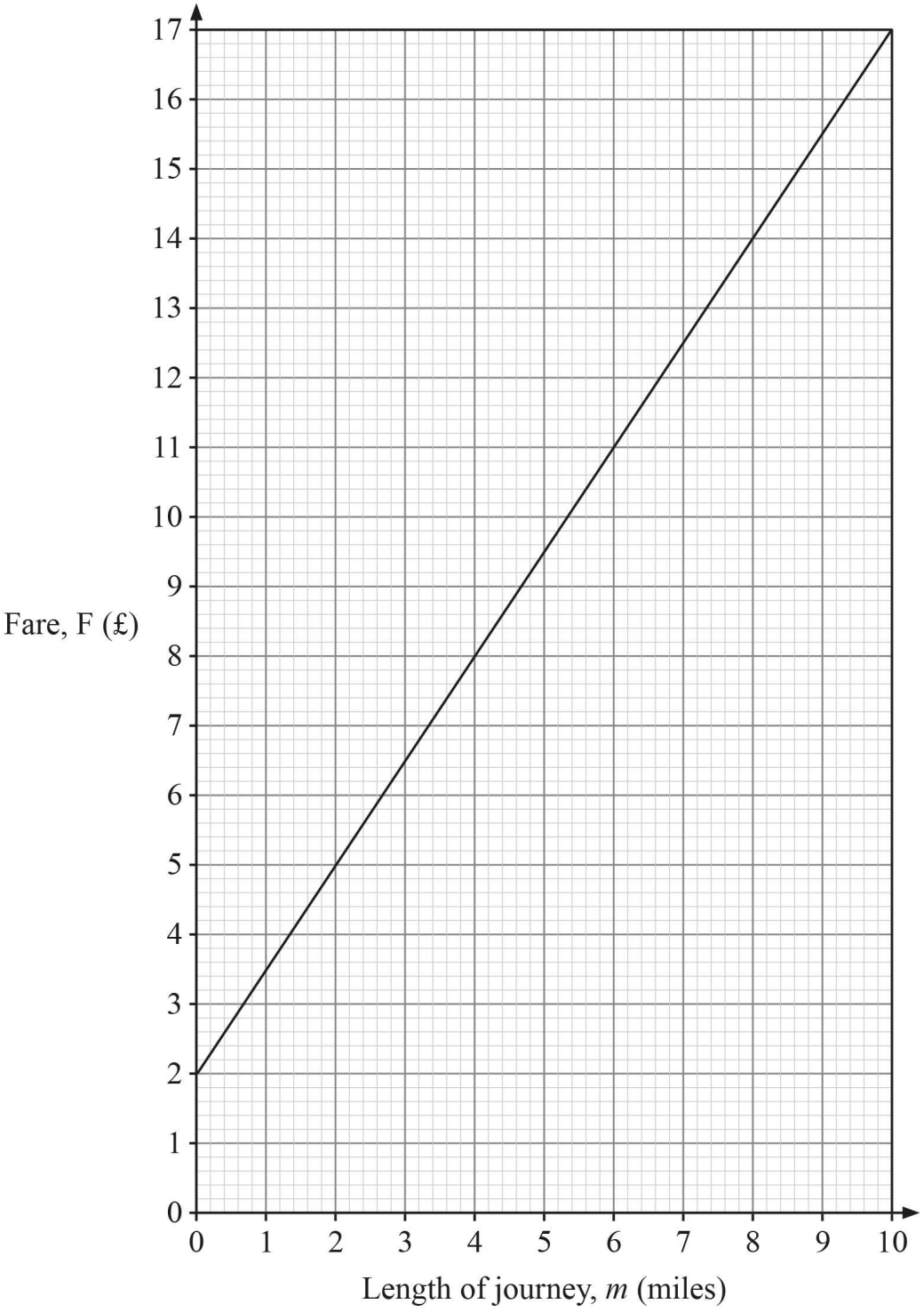
(ii) How much is the charge per mile?

Answer _____ [2]

(iii) Hence write down a formula for the hire cost H in terms of the number of miles travelled m.

Answer _____ [2]

Q14 The graph shows the fare, F (£), for a taxi journey of *m* miles with Trusty Taxis.



(a) Calculate the gradient of the straight line.

Answer _____ [2]

(b) Give a real life meaning to the value you found in part **(a)**.

Answer _____ [1]

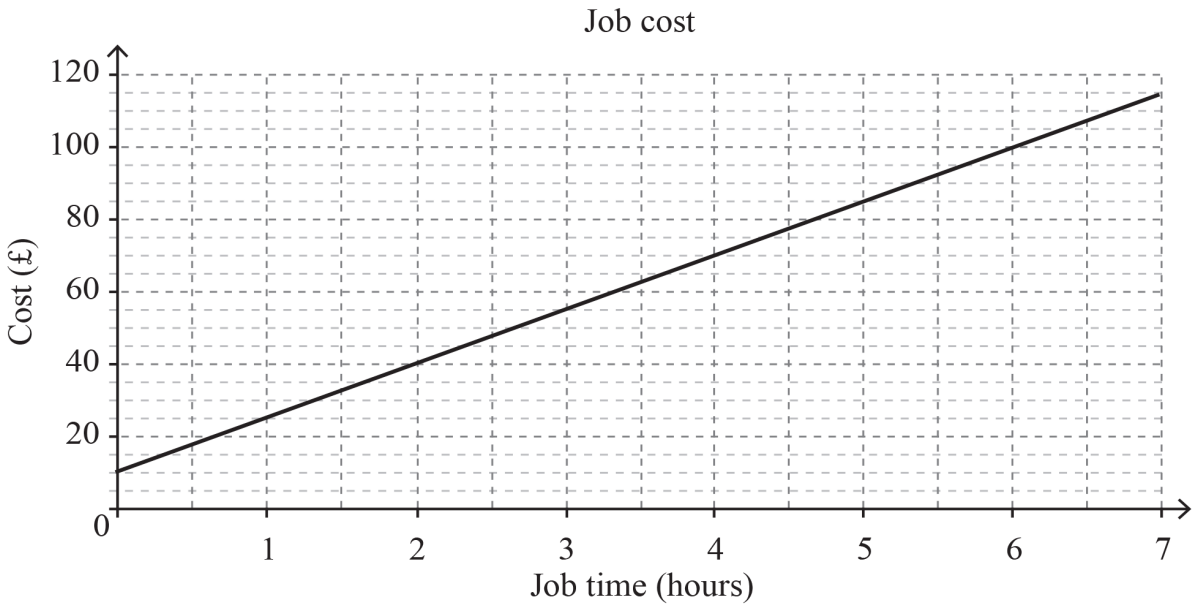
(c) Classy Cabs charge a minimum fare of £4 plus £1 for each mile travelled.

Draw a graph for the cost of a taxi journey with Classy Cabs on the same grid as Trusty Taxis. [1]

(d) Use your graphs to work out the length of the journey that will cost the same with both companies.

Answer _____ miles [1]

Q15 Harry uses the graph below to price jobs.



(a) How much does a 5-hour job cost?

Answer £ _____ [1]

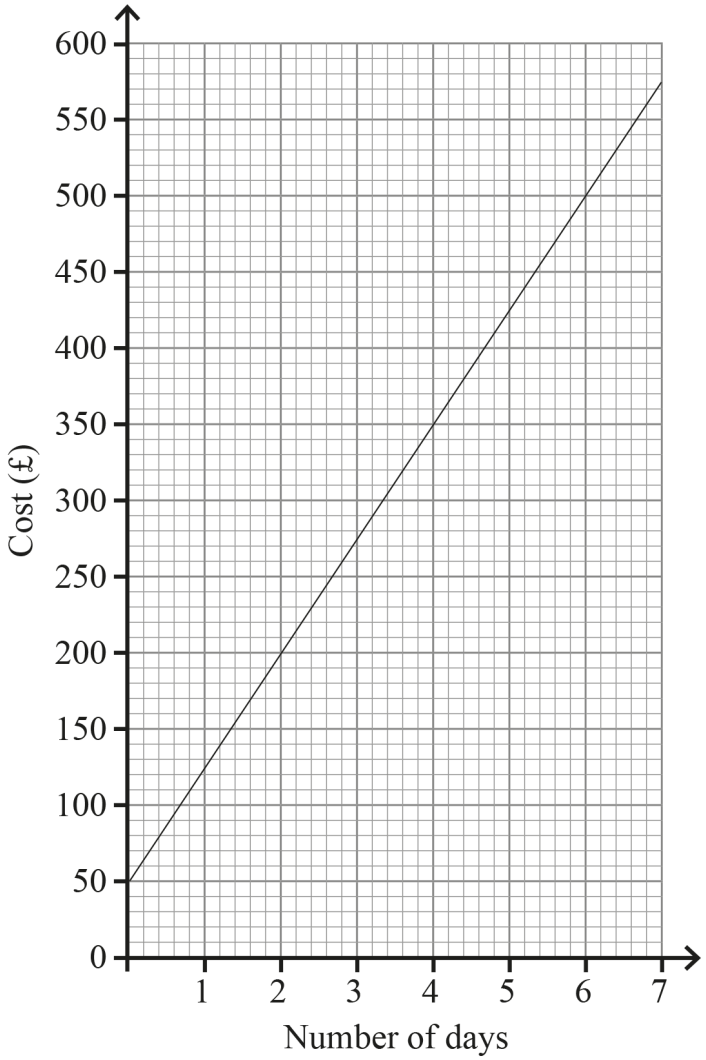
Harry completes two jobs on Friday.

One job lasts an hour longer than the other.

What is the difference in cost?

Answer £ _____ [2]

Q16 The graph shows the costs of hiring a mini digger for up to seven days, including the delivery charge.



(a) Use the graph to find

(i) the delivery charge,

Answer £_____ [1]

(ii) the gradient of the line.

Answer _____ [2]

(b) What does the gradient represent when hiring the mini digger?

Answer _____ [1]

1. **(a)** (2, 6) A1

(b) Correct points A2

(c) Right-angled A1

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2. **(a)** (4, 5) A1

(b) Q, R plotted A1 A1

(c) isosceles A1

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3. Points plotted A1 A1

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4. **(a)** (–2, 3) plotted A1

(2, –1) plotted A1

(b) $(x, -1)$ where $2 < x \leqslant 5$ A1

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5. **(a)** –1 and 5 A1

(b) Correct line drawn A2
(Award A1 for correct points or partial correct line)

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6. **(a)** 5, –1 A1 A1

(b) Correct line MA1

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7. **(a)**

x	–1	1	3
$y = 7 - 3x$	10	**4**	**–2**

A1

Points plotted correctly A1
Points joined with a straight line A1

(b) Point P (2, 1) A2
Award A1 if line $y = 1$ drawn or point P marked on grid
or attempting to solve $1 = 7 - 3x$ or y-coordinate is 1

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8. (–1, 2) A1 A1

9.

(a) 1 point plotted correctly A1

2 points plotted correctly A1

Correct line A1

(b) (2, 5) A1

10.

(a) (1, 3) A1 A1

(b) M must also be midpoint of BD M1

So (1, 3) = $\left(\frac{-4+6}{2}, \frac{4+2}{2}\right)$ A1

Alternative solution

proof using translations
e.g. BA = translation 4 across and 4 up so CD must have translation 4 across and 4 up
(hence 2 + 4 = 6 and –2 + 4 = 2) M1 A1

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11. (–1, 1) A1 A1

12.

26 (6, –2) A1 A1

13.

(a) 48 A1

(b) **(i)** £40 A1

(ii) £5/20 miles M1
= 25p per mile or £0.25 A1 (answer must have appropriate units)

(iii) $H = 40 + 0.25m$ A2

14.

(a) $\frac{14-5}{8-2}$ or equivalent correct division MA1

1.5 A1

(b) Each mile costs £1.50 A1

(c) correct line drawn A1

(d) 4 A1

(c) The median is higher (in 2015) (or equivalent) A1

The range is smaller (in 2015) (or equivalent) A1

15.

(a) 85 A1

(b) e.g. 40 – 25 = 15 or 25 -10 = 15 etc. M1A1

16.

(a) **(i)** 50 A1

(ii) gradient $= \frac{150}{2}$ (or equivalent) $= 75$ M1 A1

(b) The mini digger costs £75 a day to hire A1