



St. Patrick's High School, Keady
Mathematics Department

GCSE Mathematics Practice Booklet

M3

Topic 7 – Algebra 2

Co-ordinate Geometry

Graphs and Gradients

Questions taken from CCEA Past Papers
Mark Scheme included at the end of this booklet



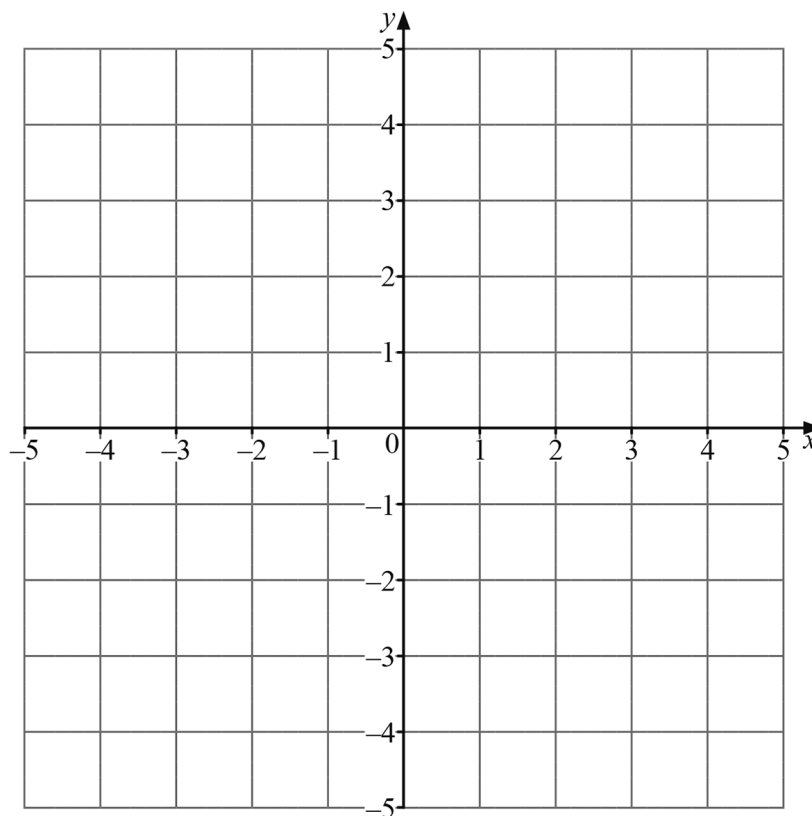
Q1

(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.



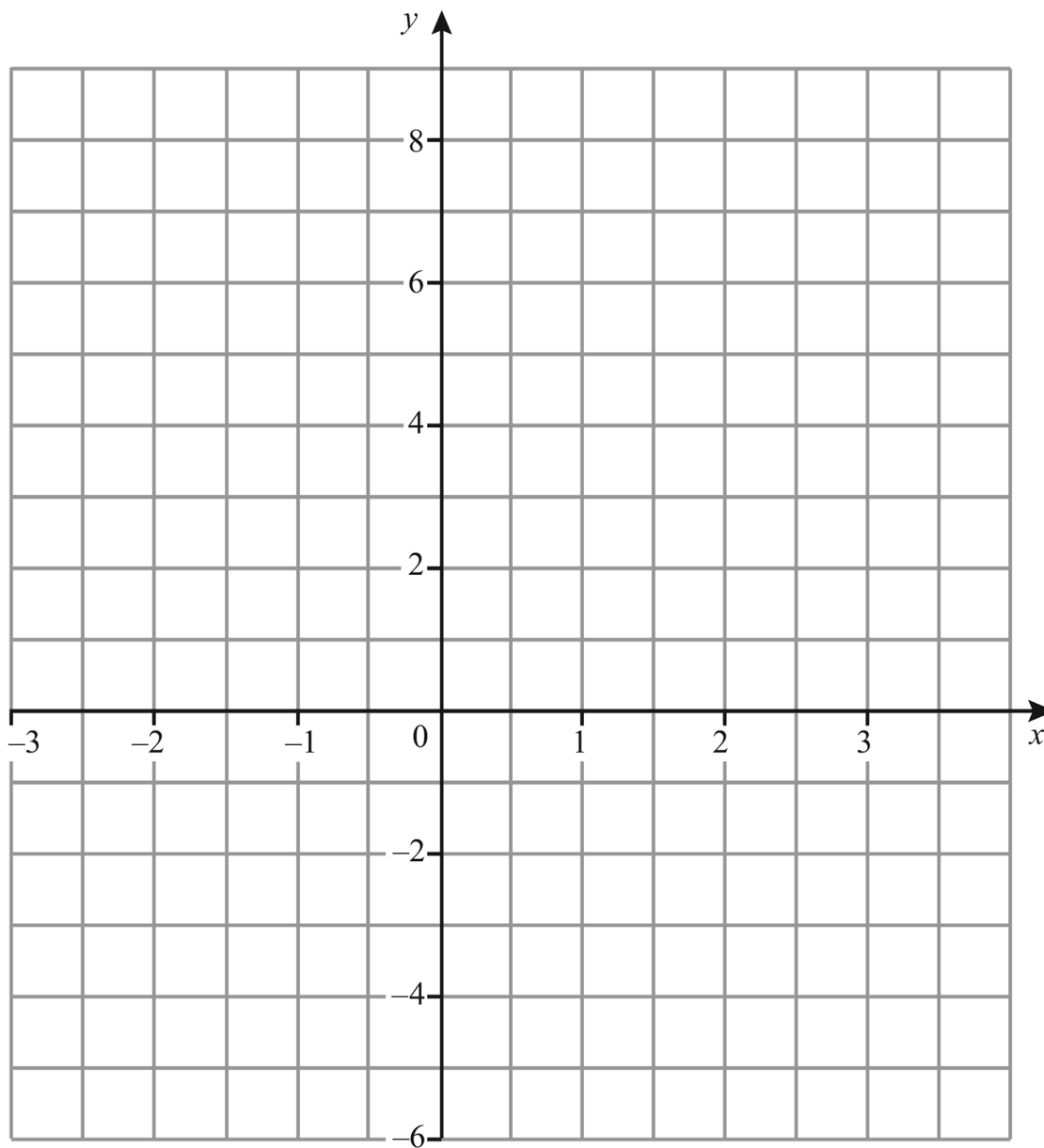
[2]

Q2 (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 $y = 5 - 3x$

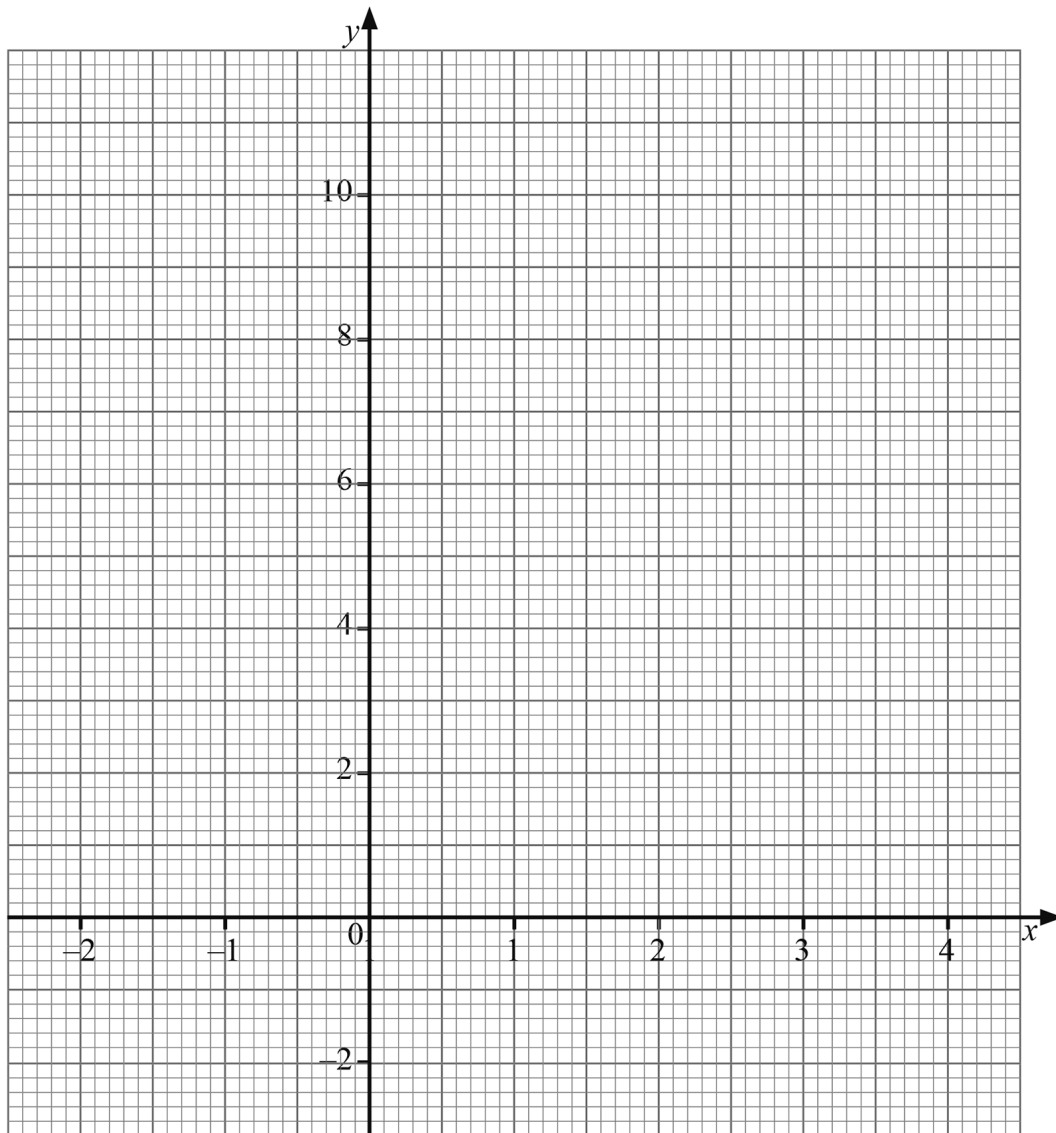


[1]

Q3

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

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



[3]

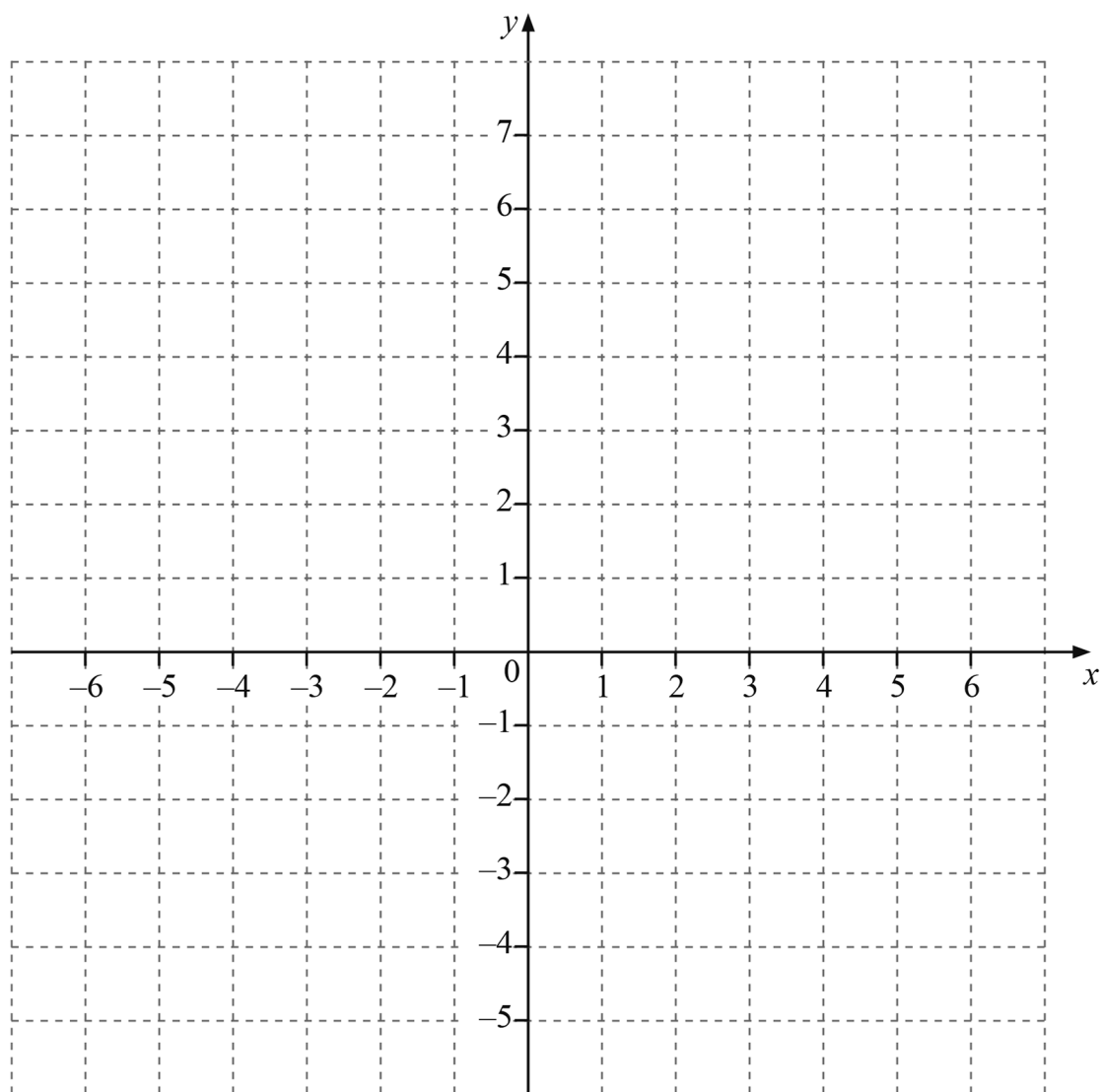
(b) The line $y = 7 - 3x$ crosses the line $y = 1$ at P.

Find the coordinates of the point P.

Answer P (_____, _____) [2]

Q4 L is the point $(-5, 6)$. N is the point $(3, -2)$.

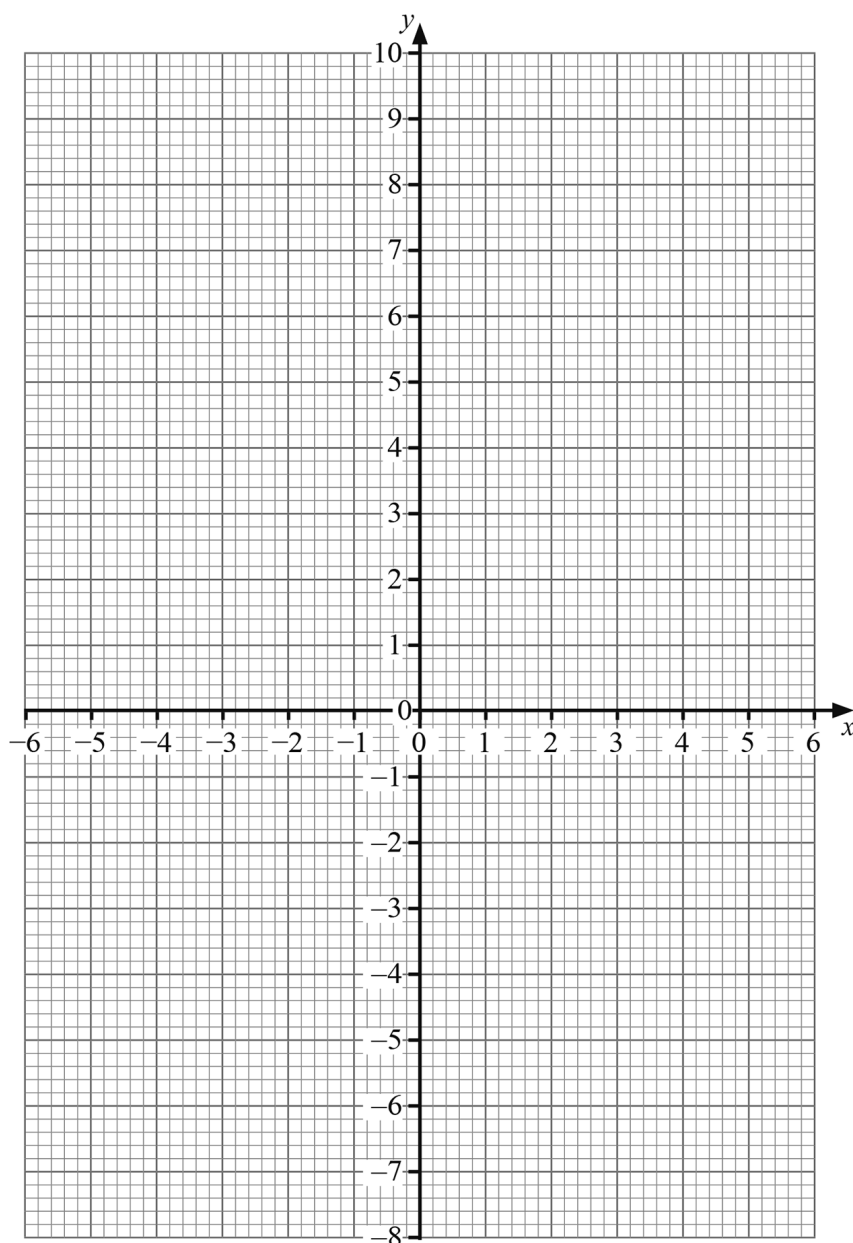
Write the co-ordinates of the midpoint of LN.



Answer (_____ , _____) [2]

Q5

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



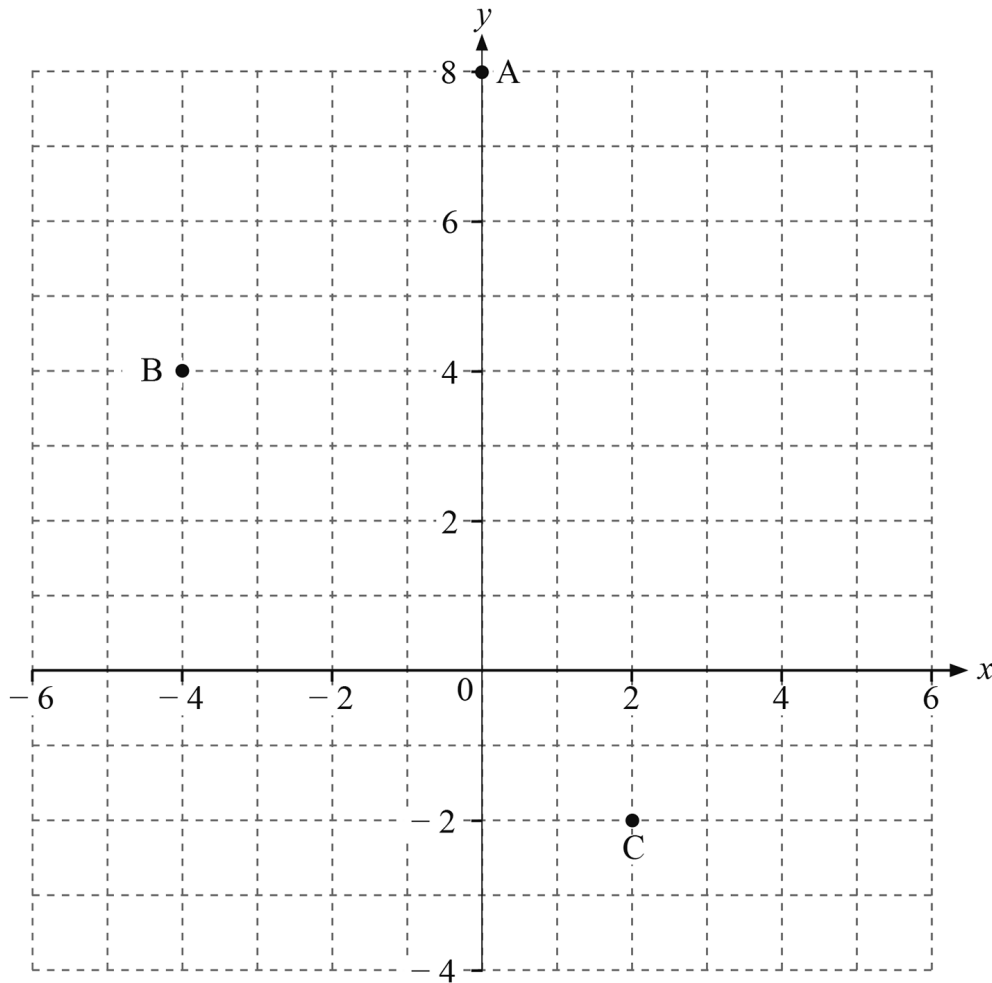
[3]

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

Write down the coordinates of P.

Answer (__ , __) [1]

Q6 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]

Q7 P is the point (2, 3) and Q is the point (-4, -1).

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

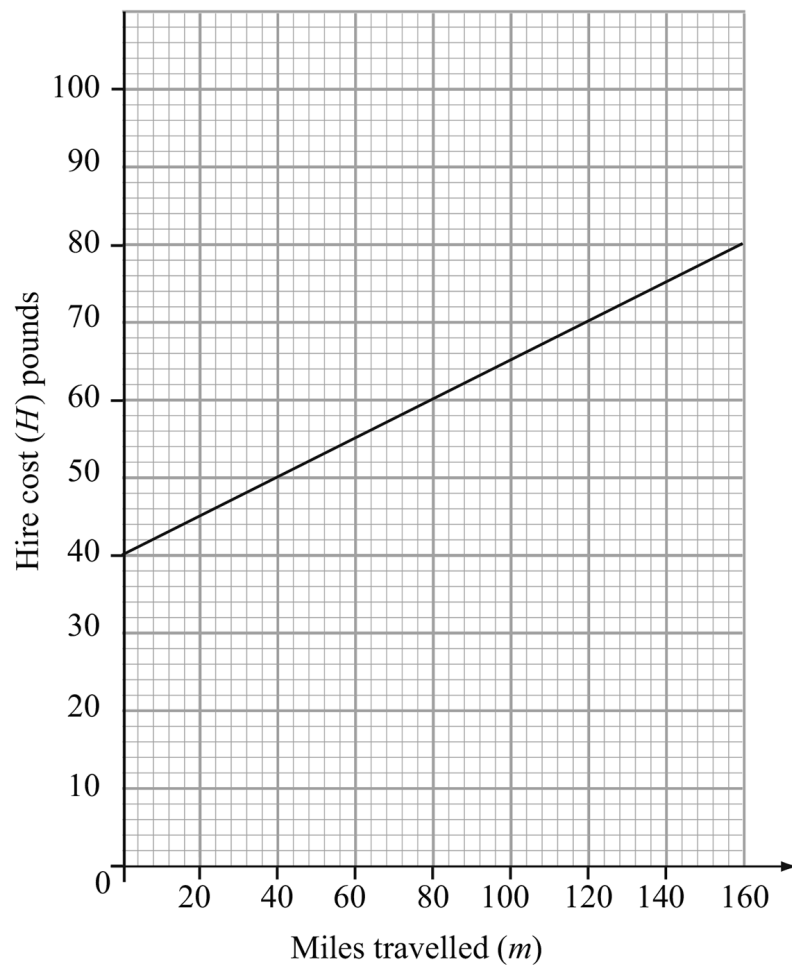
Answer (_____ , _____) [2]

Q8 Work out the midpoint of the line PQ joining P(4, -6) and Q(8, 2).

Answer (_____ , _____) [2]

Q9

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?

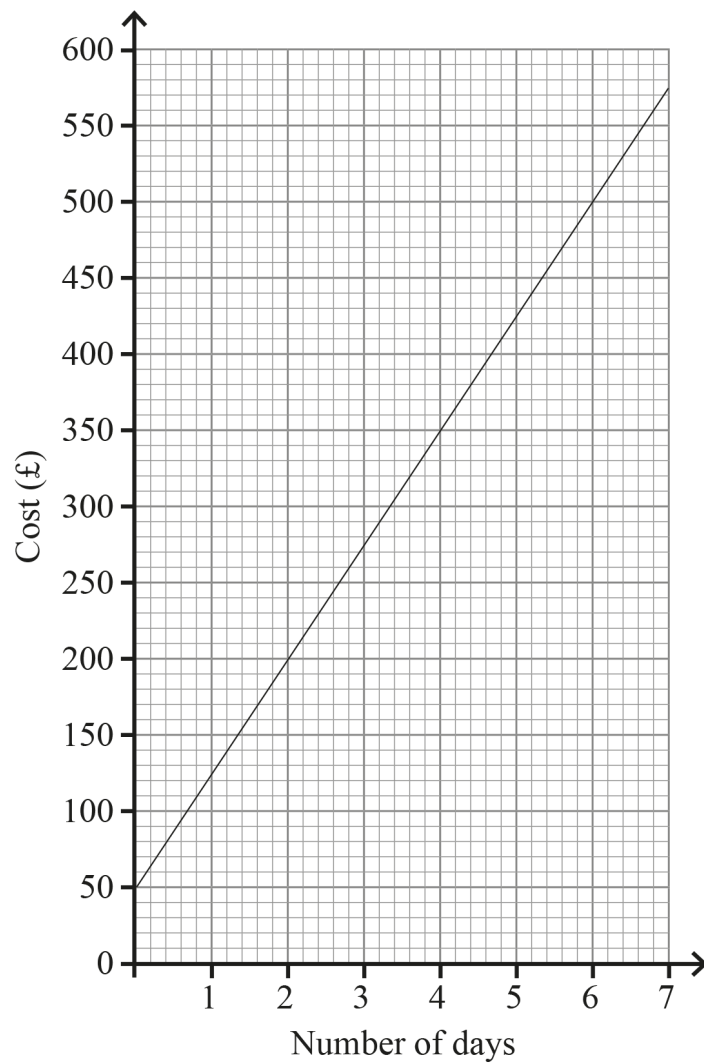
Answer _____ [2]

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

Answer _____ [2]

Q10

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]

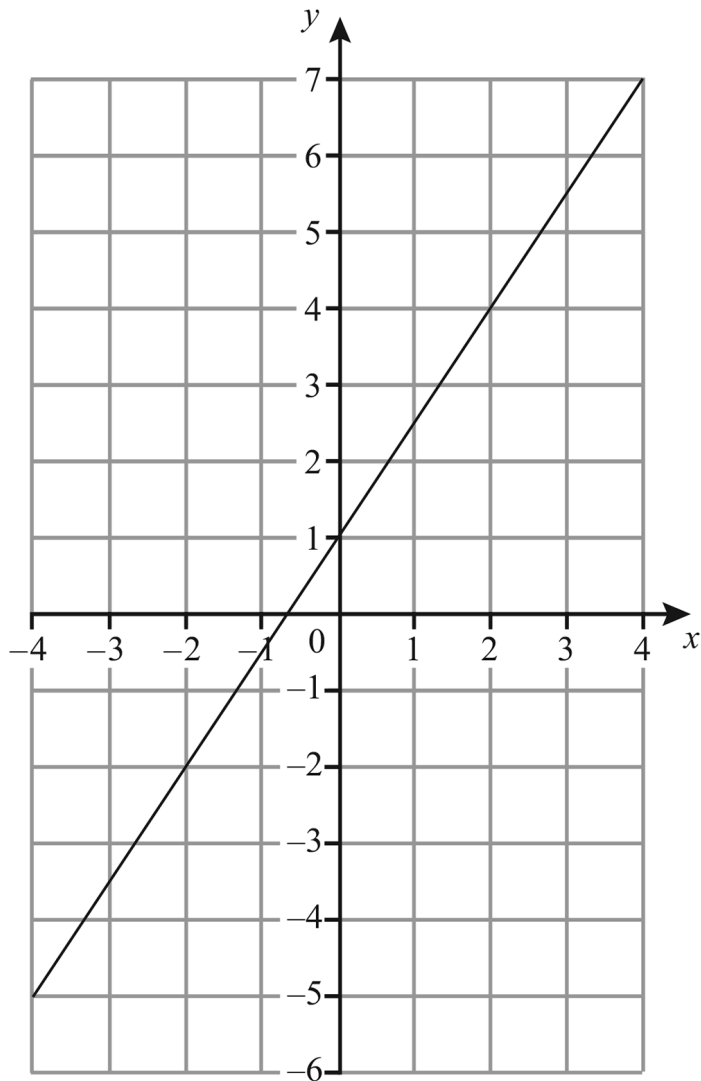
(ii) the gradient of the line.

Answer _____ [2]

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

Answer _____ [1]

Q11



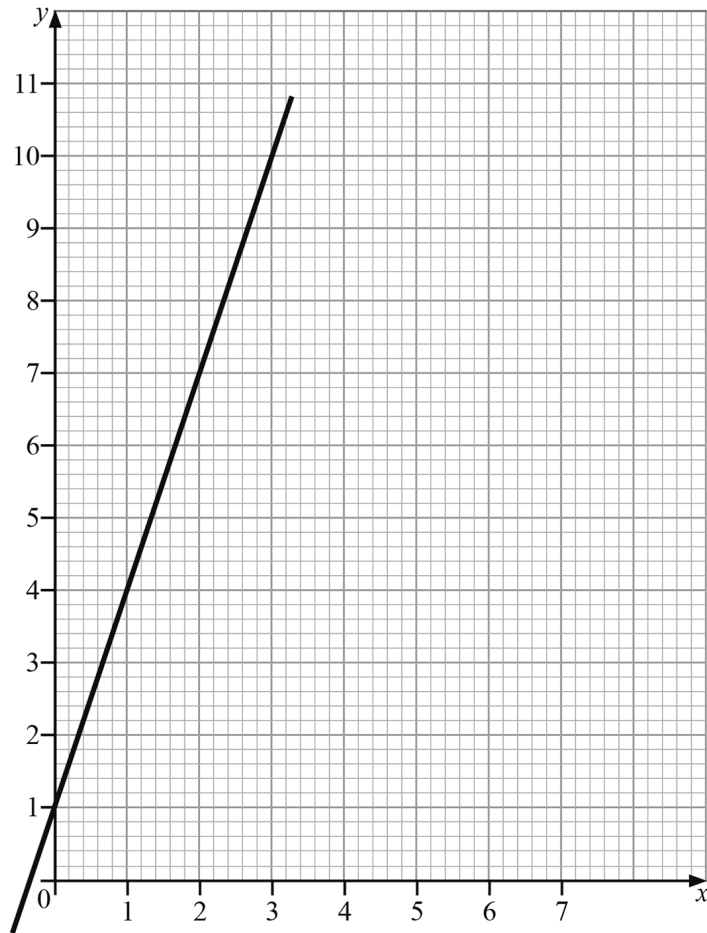
(a) Write down the gradient of the line drawn above.

Answer _____ [1]

(b) Hence write down the equation of this line.

Answer _____ [2]

Q12



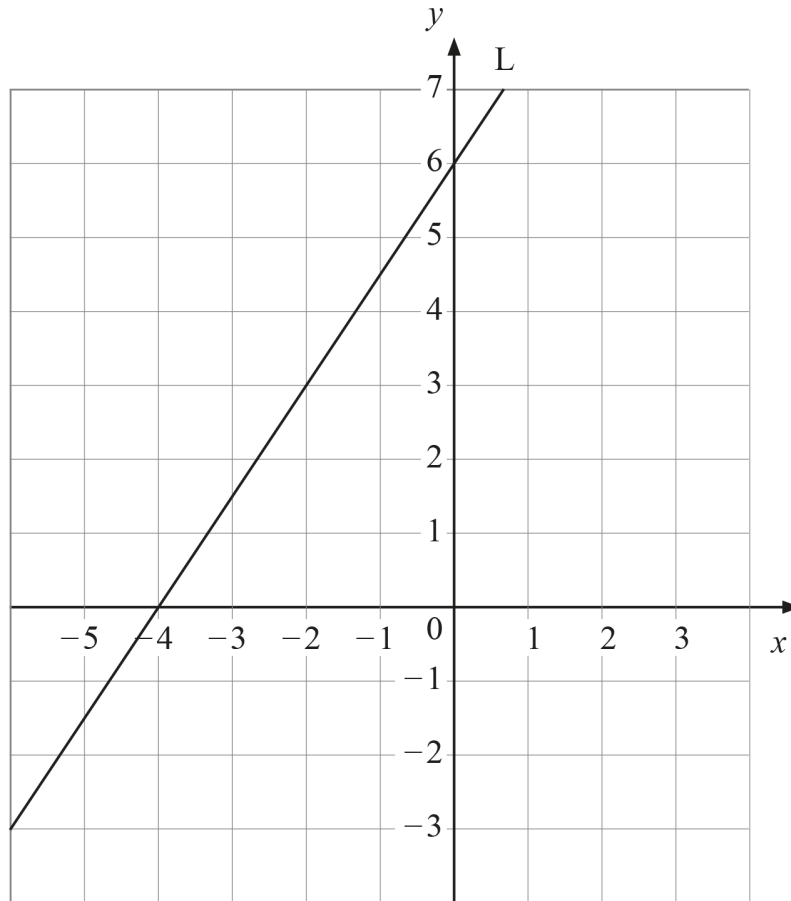
(a) Find the gradient of the line shown.

Answer _____ [1]

(b) Hence write down the equation of the line in the form $y = mx + c$

Answer _____ [1]

Q13



(a) Write down the equation of the line L shown.

Answer _____ [3]

(b) Write down the equation of any line parallel to line L.

Answer _____ [1]

Q14

Write down the equation of a line parallel to the line with equation $y = 3x + 5$

Answer _____ [2]

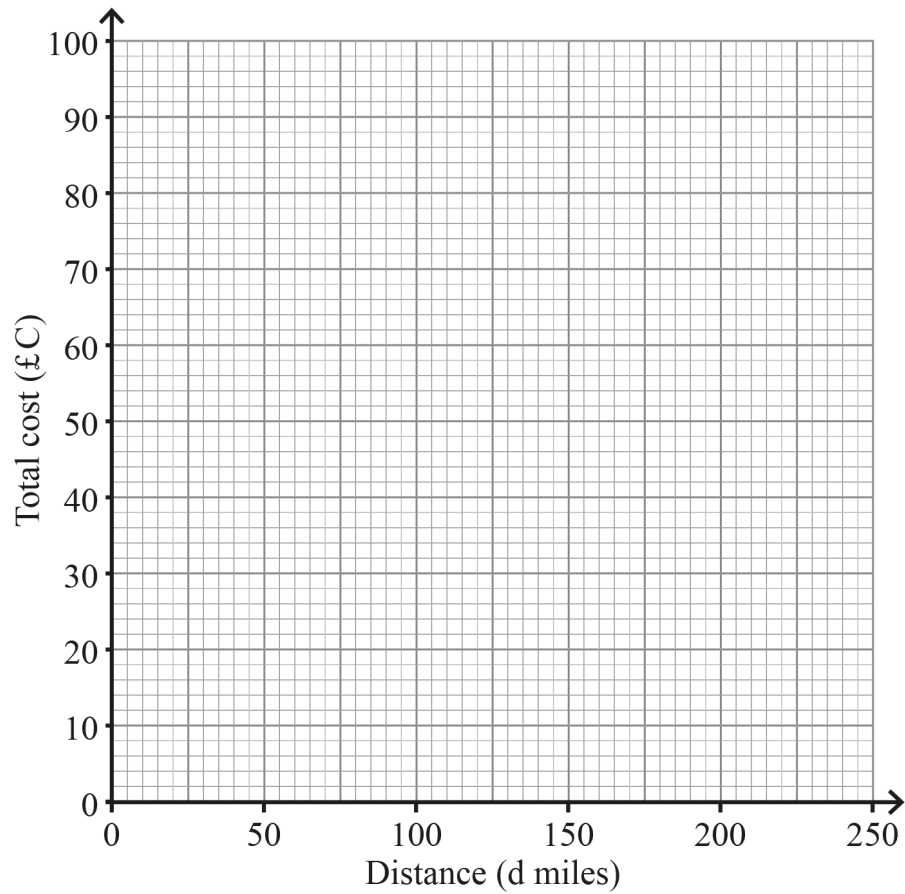
Q15

Martine wants to hire a van.

The table shows the costs for hiring the van.

Distance (d miles)	50	100	150	200	250
Total cost (£C)	50	60	70	80	90

(a) Draw a straight line graph to illustrate this information.



[2]

(b) Use the graph to find

(i) the initial fixed charge for hiring the van,

Answer £ _____ [1]

(ii) the cost per mile, in pence, for using the van.

Answer _____ p [1]

(c) Work out the total cost if the van travels 450 miles.

Answer £ _____ [2]

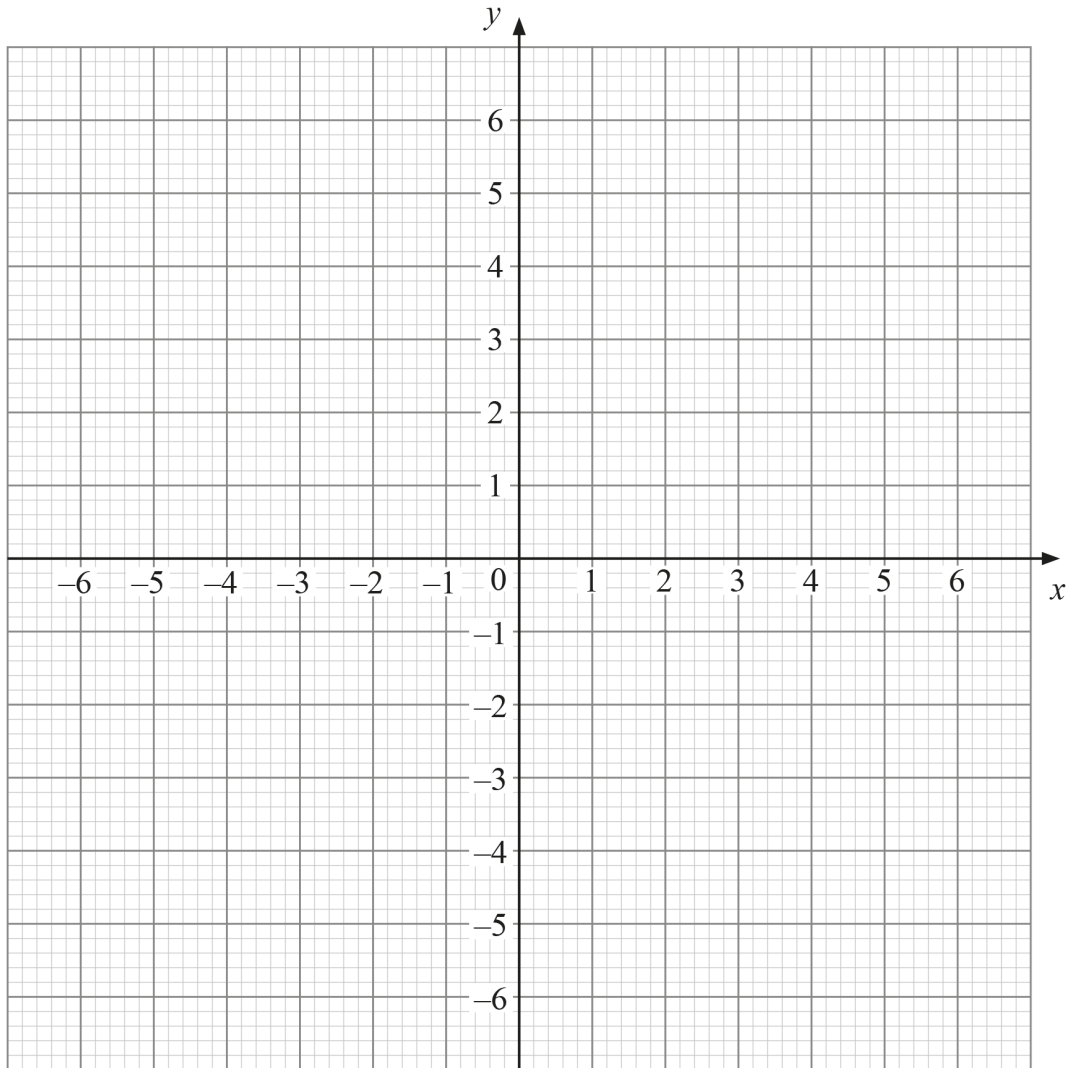
Q16

Find the equation of the line passing through the points (0, -2) and (6, 16)

Answer _____ [3]

Q17

(a) On the grid below draw the graph of $y = 3 - 2x$



[3]

(b) Write down the equation of any line parallel to $y = 3 - 2x$

Answer _____ [1]

Q18

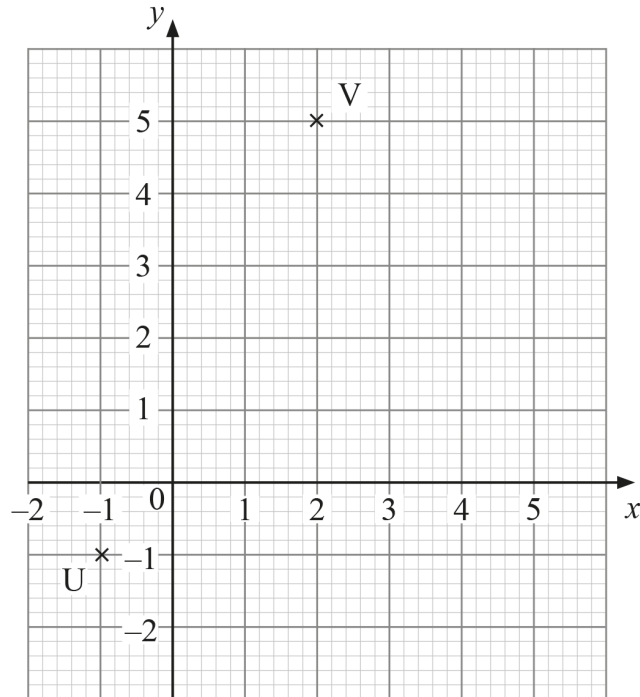
A line L passes through the points with coordinates $(0, 2)$ and $(2, 8)$.

Find the equation of any line parallel to line L .

Answer _____ [4]

Q19

U has coordinates $(-1, -1)$ and V has coordinates $(2, 5)$ as shown.



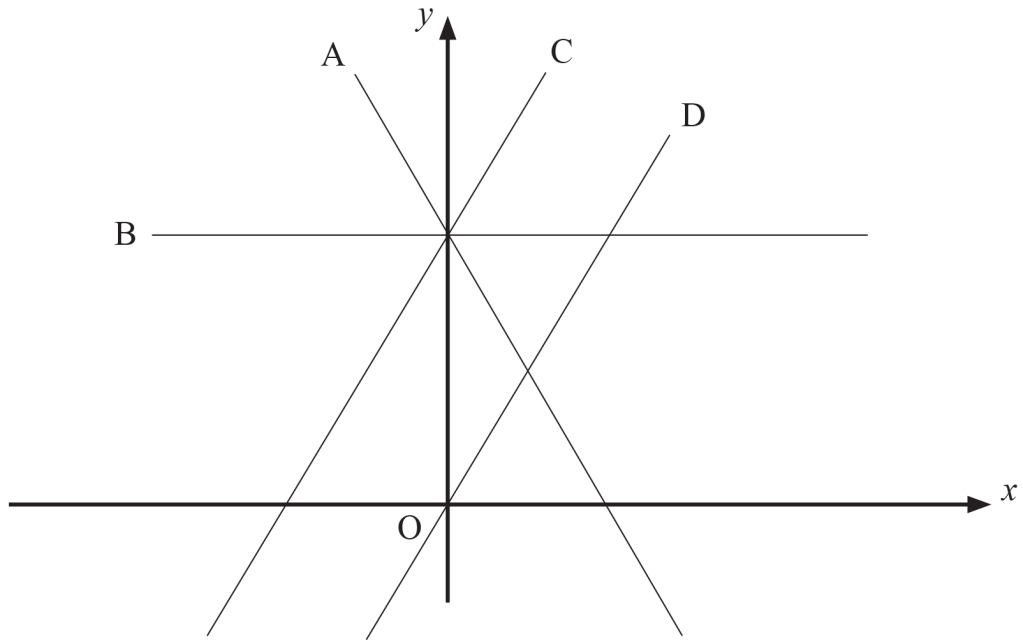
(a) Write down the coordinates of the midpoint of the line joining U and V.

Answer (_____ , _____) [2]

(b) Find the equation of the straight line joining U and V.

Answer _____ [3]

Q20



A, B, C and D are four straight lines.

C and D are parallel.

The equations of three of these lines are

$$y = 4x \quad y = 5 - 4x \quad y = 5$$

Use this information to find the equation of the fourth line.

Answer _____ [4]

1. (a) -1 and 5 A1
(b) Correct line drawn A2
(Award A1 for correct points or partial correct line)
-

2. (a) $5, -1$ A1 A1
(b) Correct line MA1
-

3. (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
-

4. $(-1, 2)$ A1 A1
-

5. (a) 1 point plotted correctly A1
2 points plotted correctly A1
Correct line A1
(b) (2, 5) A1
-

6. (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
-

7. (-1, 1) A1 A1
-

8. 26 (6, -2) A1 A1
-

9. (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
-

10. (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
-

11. (a) $\frac{3}{2}$ MA1
- (b) $y = \frac{3}{2}x + 1$ MA2
-

12. (a) Gradient = 3 A1
- (b) $y = 3x + 1$ A1
-

13. (a) $m = \frac{6}{4}$ or $\frac{3}{2}$ or 1.5 MA1
 $c = 6$ A1
 $y = 1.5x + 6$ MA1
- (b) Any line of the form $y = 1.5x + c, c \neq 6$ A1
-

14. $y = 3x + c$ ($c =$ any numerical value, $c \neq 5$) M1 A1
-

15. (a) all points correctly plotted MA1
straight line A1
- (b) (i) 40 A1
(ii) 20 A1
- (c) £40 + 450 × 20p M1
130 A1
-

16.

$$m = \frac{16 - -2}{6 - 0}$$

MA1

$$= 3$$

A1

$$y = 3x - 2$$

MA1

- 17.
- (a) first correct point plotted MA1
- second correct point plotted MA1
- straight line drawn A1
- (b) any equation of the form $y = c - 2x$ ($c \neq 3$) A1
-

18.

$$\text{gradient} = \frac{8 - 2}{2 - 0} = 3$$

M1A1

$$y = 3x + c \text{ (where } c \neq 2)$$

MA2

(award A1 if $y = 3x + 2$ written)

19.

(a) $\left(\frac{1}{2}, 2\right)$

A1 A1

(b) $\frac{5 - (-1)}{2 - (-1)} = \frac{6}{3}$ or 2

MA1

$c = 1$

A1

$y = 2x + 1$

A1

20.

D: $y = 4x$

A: $y = 5 - 4x$

B: $y = 5$

MA2

allow MA1 for 2 correct

(C) $y = 4x + 5$

A1 A1
