1. A straight line has equation $y = \frac{1}{2}x + 1$

The point P lies on the straight line.
P has a y-coordinate of 5.

(a) Find the x-coordinate of P.

....

(2)

(b) Write down the equation of a different straight line that is parallel to $y = \frac{1}{2}x + 1$.

....

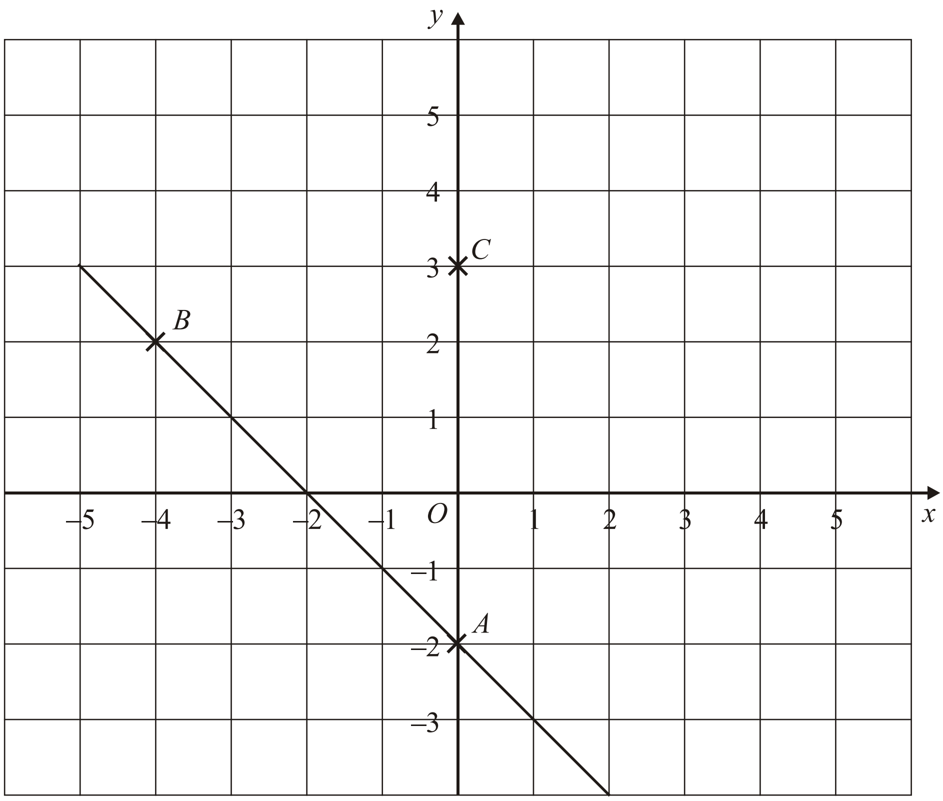
(1)

(c) Rearrange $y = \frac{1}{2}x + 1$ to make x the subject.

....

(2)
(Total 5 marks)

2.



In the diagram A is the point (0, –2),
B is the point (–4, 2),
C is the point (0, 3).

Find an equation of the line that passes through C and is parallel to AB.

....

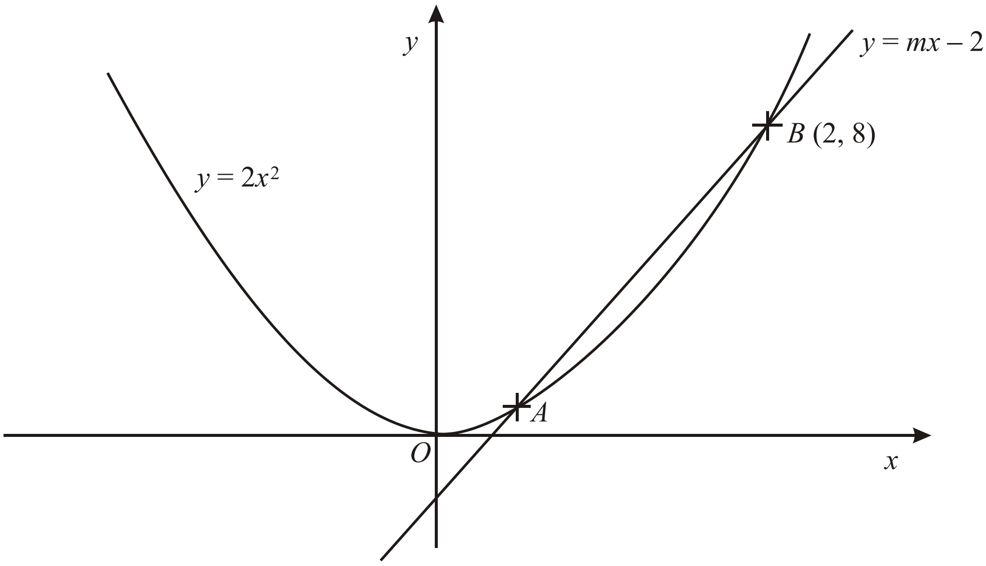
(Total 4 marks)

3. (a) Find the equation of the straight line which passes through the point (0, 3) and is perpendicular to the straight line with equation $y = 2x$.

....

(2)

The graphs of $y = 2x^2$ and $y = mx - 2$ intersect at the points A and B. The point B has coordinates (2, 8).



(b) Find the coordinates of the point A.

(........, ...)

(Total 4 marks)

4. A straight line has equation $y = 5 - 3x$

(a) Write down the gradient of the line.

………………………..

(1)

(b) Write down the coordinates of the point where the line crosses the y axis.

(…… , ……)
(1)
(Total 2 marks)

5.

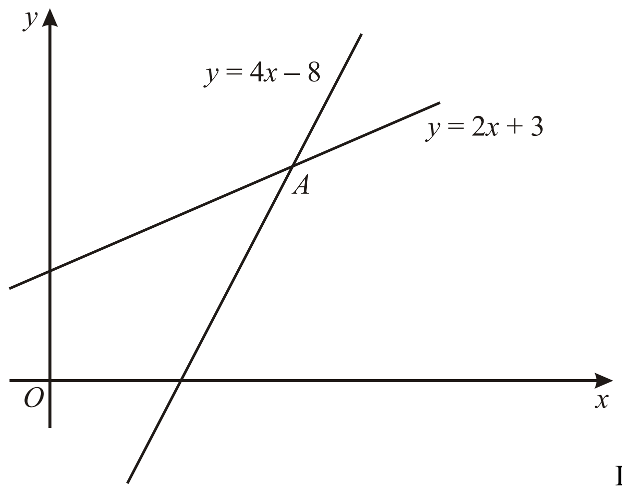


Diagram **NOT** accurately drawn

The diagram shows two straight lines intersecting at point A.
The equations of the lines are

$y = 4x - 8$
$y = 2x + 3$

Work out the coordinates of A.

(................., ...)
(Total 3 marks)

6. A is the point with coordinates (2, 5)
B is the point with coordinates (8, 13)

Calculate the length AB.

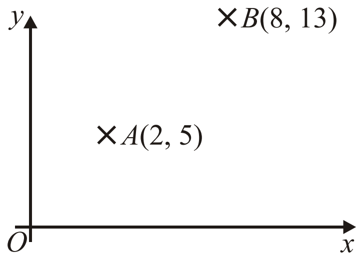


Diagram **NOT** accurately drawn

....
(Total 3 marks)

7.

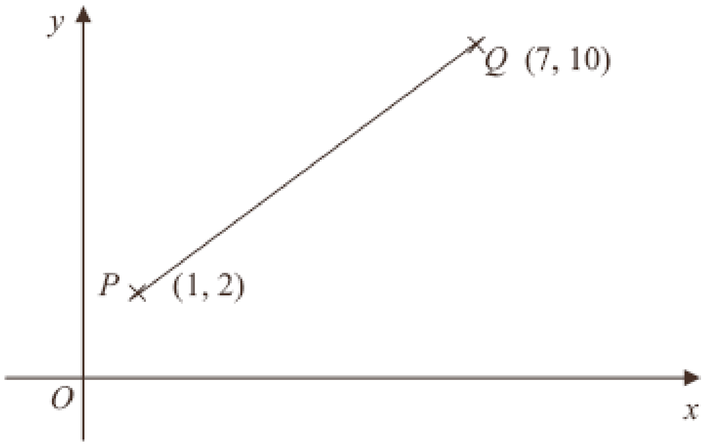


Diagram **NOT** accurately drawn

P has coordinates (1, 2)
Q has coordinates (7, 10)

Find the coordinates of the mid-point of the line *PQ*.

(........... , ...)
(Total 2 marks)

8.

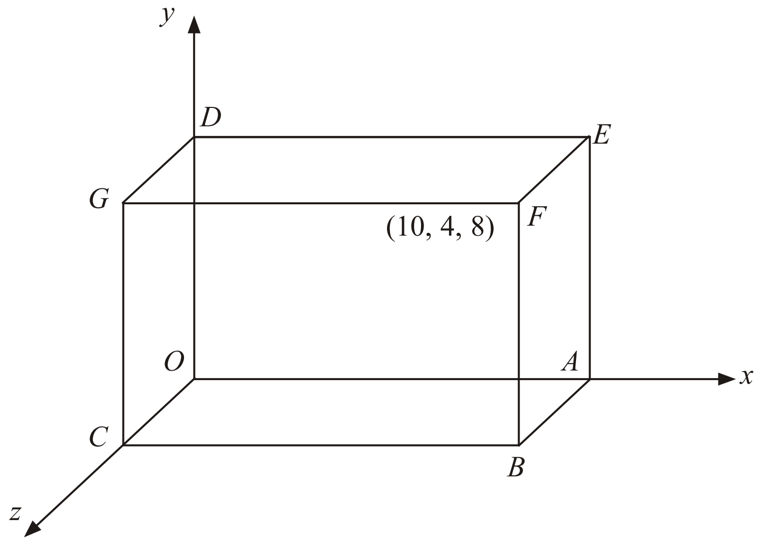


Diagram **NOT** accurately drawn

The diagram shows a cuboid.
The coordinates of the vertex F are (10, 4, 8).

(a) Write down the coordinates of the vertex E.

(.......... , ... , ...)

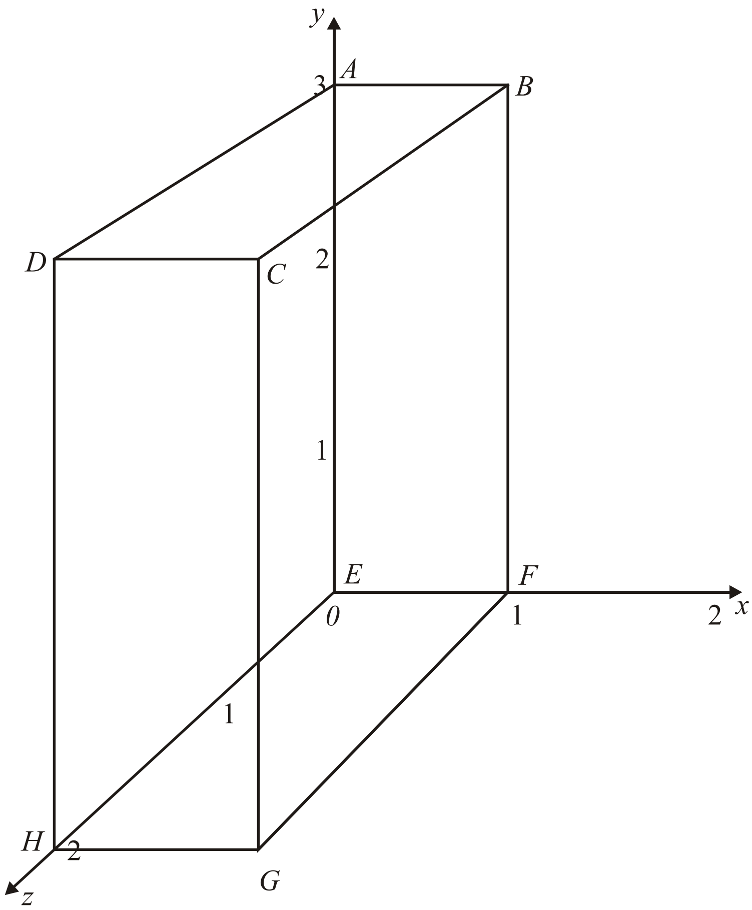
(1)

(b) Find the coordinates of the midpoint of OE.

(.......... , ... , ...)

(2)
(Total 3 marks)

9.



Work out the coordinates of the midpoint of the line *HB*.

(1, 1, 1)	(1, 2, 1)	(1, 2, ½)	(½, 1½ ½)	(½, 1½, 1)
A	**B**	**C**	**D**	**E**

(Total 1 mark)

10. *F* and *G* are two points on a 3-D coordinate grid.
Point *F* is (2, 3, 3).
Point *G* is (6, –1, –4).

Which are the coordinates of the midpoint of the line segment *FG*?

A	B	C	D	E
(4, 2, 3½)	(2, 1, ½)	(4, 1, –½)	(4, 2, ½)	(4, 1, ½)

(Total 1 mark)

11. The diagram shows a cuboid on a 3-D grid.

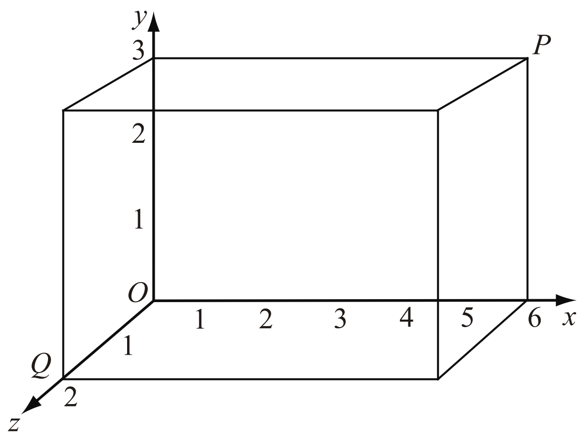


Diagram **NOT** accurately drawn

P and *Q* are two vertices of the cuboid.

Which are the coordinates of the midpoint of the line segment *PQ*?

A	B	C	D	E
(6,3,2)	(6,1½,1)	(3,3,2)	(3,3,1)	(3,1½,1)

(Total 1 mark)

12.

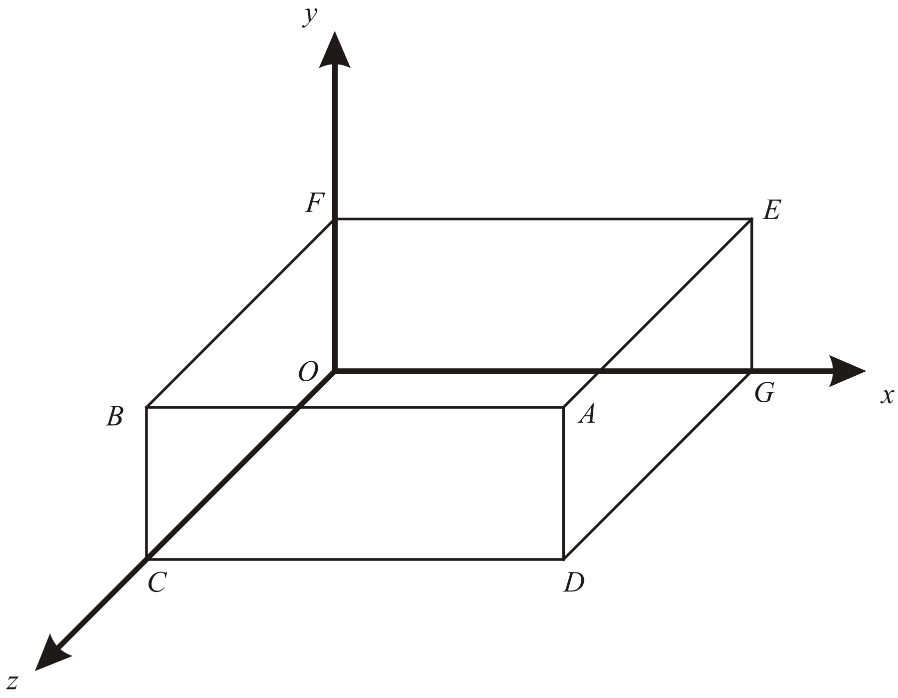


Diagram **NOT** accurately drawn

The diagram shows a cuboid drawn on a 3-D grid.

Vertex A has coordinates (5, 2, 3).

(a) Write down the coordinates of vertex E.

(........... , ... , ...)

(1)

B and *D* are vertices of the cuboid.

(b) Work out the coordinates of the midpoint of *BD*.

(........... , ... , ...)

(3)

(Total 4 marks)

13. A cuboid is shown on a 3-D grid.

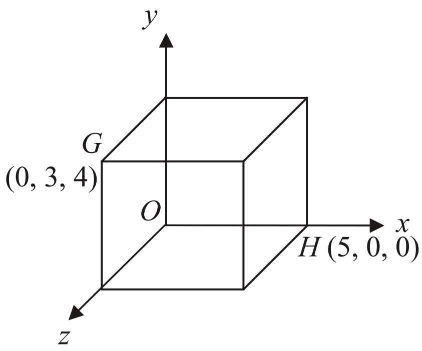


Diagram **NOT** accurately drawn

The point *G* has coordinates (0, 3, 4)
The point *H* has coordinates (5, 0, 0)

Which are the coordinates of the midpoint of the line segment *GH*?

(5, 3, 4)	$(2\frac{1}{2}, 3, 4)$	$(2\frac{1}{2}, 1\frac{1}{2}, 2)$	(10, 6, 8)	$(5, 1\frac{1}{2}, 2)$
A	**B**	**C**	**D**	**E**

(Total 1 mark)

14.

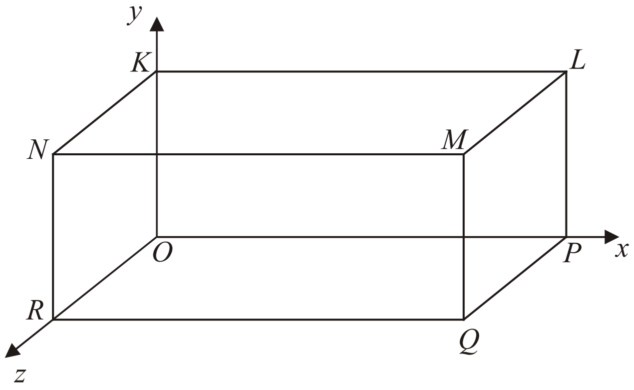


Diagram **NOT** accurately drawn

The diagram shows a cuboid on a 3-D grid.
The coordinates of the vertex *M* are (6, 2, 3).

What are the coordinates of the midpoint of *LN*?

$(3, 1, 1\frac{1}{2})$	$(3, 2, 1\frac{1}{2})$	(3, 2, 3)	(3, 1, 3)	$(6, 1, 1\frac{1}{2})$
A	**B**	**C**	**D**	**E**

(Total 1 mark)

15. What are the coordinates of the midpoint of the line joining *P* (–3, 2, 4) to *Q* (5, 1, 8)?

(1, 1.5, 6)	(2, –1, 4)	(8, –1, 4)	(1, –0.5, 2)	(2, 3, 12)
A	**B**	**C**	**D**	**E**

(Total 1 mark)

16. The diagram shows a cuboid drawn on a 3-D grid.

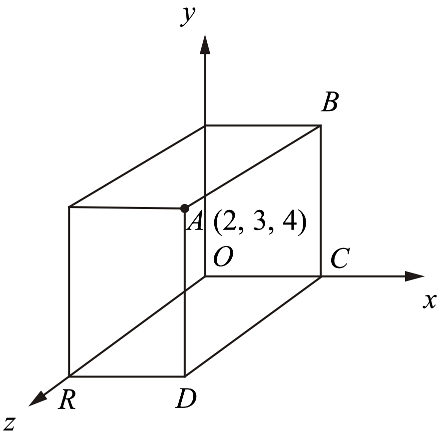


Diagram **NOT** accurately drawn

The base of the cuboid is *OCDR*.
The point *C* is on the *x*-axis.
The point *R* is on the *z*-axis.

A = (2, 3, 4).

What is the area of the face *ABCD* ?

9	6	8	24	12
A	**B**	**C**	**D**	**E**

(Total 1 mark)

1. (a) 8 — 2

$5 = 0.5x + 1$

M1 for 5 = 0.5x + 1
A1 cao

(b) $y = \frac{1}{2}x + c$ — 1

B1 for $y = \frac{1}{2}x + c$, $c \neq 1$, *oe*

(c) $x = 2y - 2$ OR
$x = 2(y - 1)$ 2

M1 for correctly multiplying both sides by 2 or correctly isolating $\frac{x}{2}$

A1 for $x = 2(y - 1)$, $x = \frac{y-1}{0.5}$; $x = \frac{y-1}{\frac{1}{2}}$ *oe*

SC: B1 for $x = 2y - 1$

[5]

2. $m = \frac{-4}{4} = -1$
$c = 3$
$y = -x + 3$ 4

M1 for clear attempt to find gradient of AB
A1 for $m = -1$
B1 for $c = 3$ *in* $y = mx + c$ *m does not have to be numerical*
A1 for $y = -x + 3$ *oe*
SC B2 for $y = x + 3$ *seen*
B3 for $-x + 3$ *on its own*
B1 for $x + 3$ *on its own*

[4]

3. (a) $y = -0.5x + 3$ oe 2

B2 for $y = -0.5x + 3$ *oe*
(B1 for $y = nx + 3$ *oe* ***or*** $y = -0.5x + a$ *oe)*

(b) (0.5, 0.5) 4

$8 = 2m - 2$ ($m = 5$)
$2x^2 = 5x - 2$
$2x^2 - 5x + 2 = 0$
$(2x - 1)(x - 2) = 0$
$x = 2, 0.5$
$y = 5 \times 0.5 - 2$

M1 for $8 = 2m - 2$ *OR* $2x^2 = mx - 2$
M1 for $2x^2 = \text{“}5\text{”} \times x - 2$ *OR* $y = 2 \times \left(\frac{y+2}{\text{"}5\text{"}}\right)^2$
A1 for $x = 0.5$
A1 for $y = 0.5$

[6]

4. (a) -3 1

B1 cao

(b) 0, 5 1

B1 cao

[2]

5. (5.5, 14) 3

$4x - 8 = 2x + 3$
$2x = 11$
$x = 5.5$

$y = 2 \times 5.5 + 3$

M1 for $4x - 8 = 2x + 3$ or correct method to eliminate x or y
A1 for $x = 5.5$ oe
A1 for $y = 14$
(SC: If no marks awarded B1 for either $x = 5.5$or $y = 14$)

[3]

6. $\sqrt{(8-2)^2 + (13-5)^2}$

$\sqrt{6^2 + 8^2} = \sqrt{100}$

10 3

M1 for $8 - 2$ (= 6) or $13 - 5$ (= 8)
M1 (dep on previous M1) for "6"^{2} + "8"^{2}
A1 cao

[3]

7. (4, 6) 2

B2 for (4, 6)

(B1 for (4, y) or (x, 6))

[2]

8. (a) (10, 4, 0) 1

B1 cao

(b) (10 ÷ 2, 4 ÷ 2, 0) 2
(5, 2, 0)

*M1 for **two** correct coordinates or for **two** of "10" ÷ 2, "4" ÷ 2, "0" ÷ 2, ft from (a)*
A1 ft from (a)

***If the answer to (a) is correct, ie (10, 4, 0),** then in part (b);*
(5, 2, 0) gets 2 marks.

*(**5**, **2**, 4), (**5**, 4, **0**), (10, **2**, **0**) all get 1 mark for **two** correct coordinates.*

(5, 4, 4), (10, 2, 8), (10, 4, 0) all get 0 marks.

***If the answer to (a) is incorrect, for example (4, 10, 8)**, then in part (b)*
(2, 5, 4) gets 2 marks, following through; ie dividing each of the coordinates by 2

(2, 5, 0), (4, 5, 4), (2, 6, 4) all get 1 mark for two "correct" coordinates.

(5, 4, 4), (2, 2, 8), (4, 5, 0) all get 0 marks.

[3]

9. E

[1]

10. C

[1]

11. E

[1]

12. (a) (5, 2, 0) 1

B1 for (5, 2, 0) cao

(b) $\left(\frac{0+5}{2}, \frac{2+0}{2}, \frac{3+3}{2}\right)$

$\left(\frac{5}{2}, 1, 3\right)$ 3

B1 for (0,2,3) or for (5,0,3) or for (0,0,3) seen or implied

M1 for $\left(\frac{x_1+x_2}{2}, \frac{y_1+y_2}{2}, \frac{z_1+z_2}{2}\right)$

A1 for $\left(\frac{5}{2}, 1, 3\right)$ *oe*

B1 SC for (x, y, 3)

Alternative mark scheme

B1 for each coordinate correct.

[4]

13. C

[1]

14. B

[1]

15. A

[1]

16. E

[1]

1. **Paper 4**

In part (a) many candidates correctly substituted $y = 5$ into the equation but were then unable to solve this correctly. Some substituted 5 for x instead of y. Part (b) was answered poorly. Many tried to rearrange the equation or simply wrote it in a different way, e. g. $y = 0.5x + 1$. Dealing with the $\frac{1}{2}$ proved difficult in part (c) and even successful candidates tended to write $\frac{y-1}{\frac{1}{2}}$ rather than $2(y - 1)$. Few candidates rearranged the equation correctly and often no working was shown so no mark could be awarded for a correct step. Some candidates simply interchanged x and y in the equation.

Paper 6

The presence of the half as the coefficient of x caused more problems than it should have. A common answer to part (a) was 9, which was obtained by multiplying 5 by 2 and then subtracting 1. A similar process was carried out in many cases for part (c), where the answer of $x = 2y - 1$ was very common.

There were many correct answers to part (b), although some candidates thought that they had to write the same equation in an alternative fashion, giving, for example, the response $2y = x+2$.

2. **Specification A**

This question was very successfully answered. Many candidates found the gradient of the given line by drawing a suitable triangle on the line. They then used $y = mx + c$ and found the value of c from the graph. An alternative approach was to recognise that the given line was parallel to $y = -x$ and obtain the gradient that way. A further successful approach was to draw the required line and to recognise the linear relationship satisfied by the coordinates of points lying on the required line. Common errors were to give the equation as $y = x + 2$ or to omit the letter y from $y = \ldots$

Specification B

This question was not well answered. Few candidates showed a complete method. Only 40% of all candidates were able to gain full marks. The incorrect answer of $y = x + 3$ was seen fairly frequently.

3. The most frequently seen answer for part (a) was $y = -2x + 3$. The majority of candidates recognised that a y intercept of +3 would give the constant term of +3 but few candidates were able to give the correct gradient. Few candidates were able to start part (b). A minority of candidates were able to get as far as $m = 5$ and then write $2x^2 = 5x - 2$ but were then unable to progress further.

4. This question was answered correctly by about half of the candidates.

5. This question was very poorly done with 75% of candidates failing to gain any credit. Few candidates recognised that the question could be answered by equating the two expressions given for y. There were some long and usually incorrect attempts to solve them as simultaneous equations by eliminating the x term. The most popular method of solution was trial and improvement but this was rarely completely successful.

6. The majority of candidates were able to gain some credit by subtracting the x and y values of the given coordinates. There was plenty of evidence of arithmetic errors with 8 – 2 frequently given as 4 or 5 and numbers squared incorrectly by some of those candidates who realised that they had to go on to use Pythagoras's theorem. Fully correct solutions were seen from approximately 50% of candidates. The calculation 8 + 6 = 14 was frequently seen.

7. Finding the mid-point of a line joining two given points provided a straightforward introductory question to the paper. The realisation that the x values were added together and divided by two, and similarly with the y values, was the common correct approach. Some subtracted rather than add which produced the incorrect value of '(3, 4)'. On the whole a question which could be dealt with correctly and efficiently with 1.38 being the mean mark for the question.

8. Part (a) of this question was not answered well, many giving the coordinates of F as their answer for E. The wrong answer (10, 0, 8) was also popular. In part (b), many candidates realised that the midpoint of OE could be found by simply halving their coordinates of E, gaining full marks. However the answers to parts (a) and (b) were often completely unrelated.

9. No Report available for this question.

10. No Report available for this question.

11. No Report available for this question.

12. Candidates realised what was required in this question but could not often carry out the execution of the task. In part (a) it was common to see a repetition of the coordinates of A whilst in (b) some candidates gained credit for realising that the z coordinate was in the same plane as *ABCD* and so gained a mark for using 3.

13. No Report available for this question.

14. No Report available for this question.

15. No Report available for this question.

16. No Report available for this question.