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. A straight line, **L**, passes through the point with coordinates (4, 7) and is perpendicular to the line with equation $y = 2x + 3$.

Find an equation of the straight line **L**.

....

(Total 3 marks)

3.

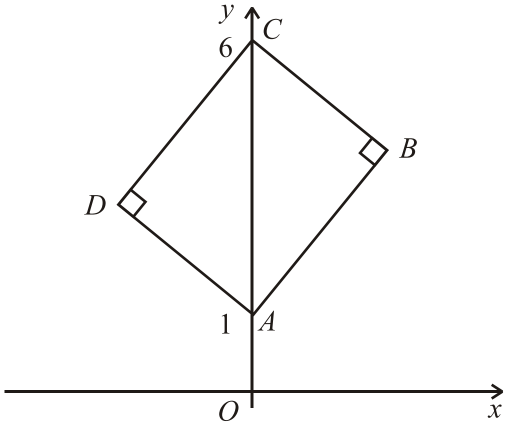


Diagram **NOT** accurately drawn

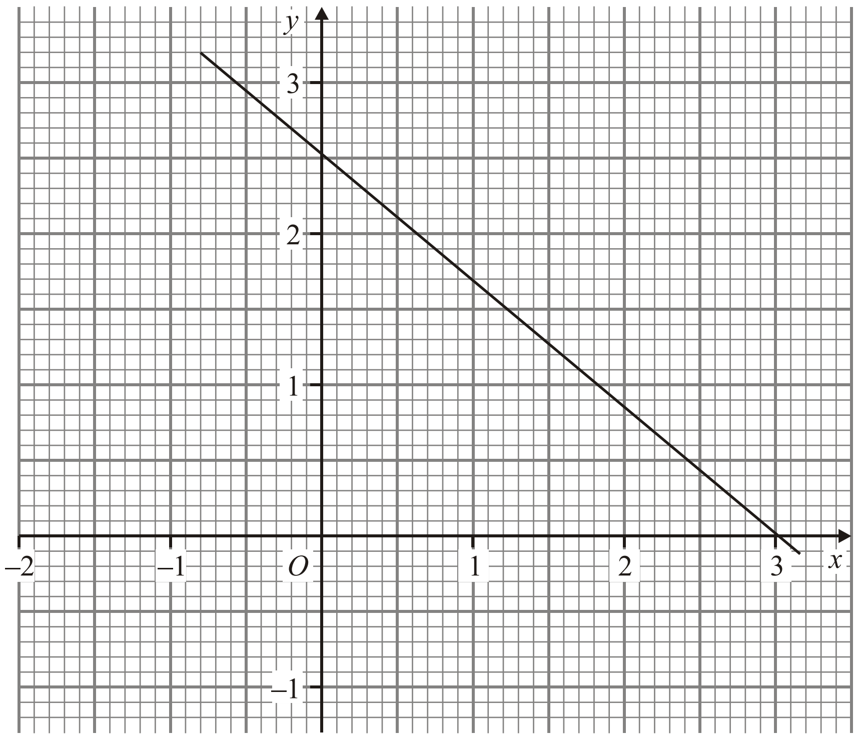
ABCD is a rectangle.
A is the point (0, 1).
C is the point (0, 6).

The equation of the straight line through *A* and *B* is $y = 2x + 1$

Find the equation of the straight line through *D* and *C*.

....
(Total 2 marks)

4.



The line with equation $6y + 5x = 15$ is drawn on the grid above.

(a) Rearrange the equation $6y + 5x = 15$ to make y the subject.

y = ...

(2)

(b) The point (–21, k) lies on the line.
Find the value of k.

k = ...

(2)

(c) (i) On the grid, shade the region of points whose coordinates satisfy the four inequalities

$y > 0$, $x > 0$, $2x < 3$, $6y + 5x < 15$

Label this region ***R.***

P is a point in the region ***R***. The coordinates of P are both integers.

(ii) Write down the coordinates of P.

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

(3)

(Total 7 marks)

5.

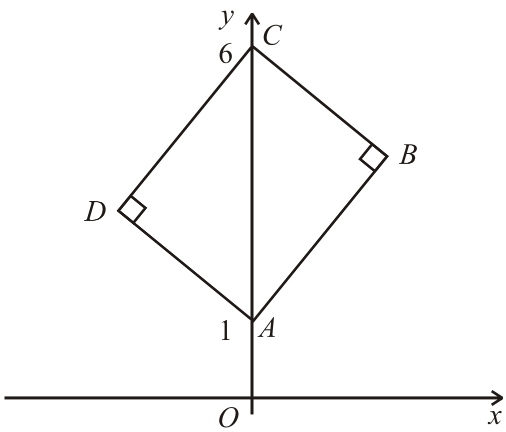


Diagram **NOT** accurately drawn

ABCD is a rectangle.
A is the point (0, 1).
C is the point (0, 6).

The equation of the straight line through *A* and *B* is $y = 2x + 1$

(a) Find the equation of the straight line through *D* and *C*.

....

(2)

(b) Find the equation of the straight line through *B* and *C*.

....

(2)

(c) It is always possible to draw a circle which passes through all four vertices of a rectangle. Explain why.

....

....

(1)
(Total 5 marks)

6. The straight line $\mathbf{L}_1$ has equation $y = 2x + 3$

The straight line $\mathbf{L}_2$ is parallel to the straight line $\mathbf{L}_1$.
The straight line $\mathbf{L}_2$ passes through the point (3, 2).

Find an equation of the straight line $\mathbf{L}_2$.

....

(Total 3 marks)

7.

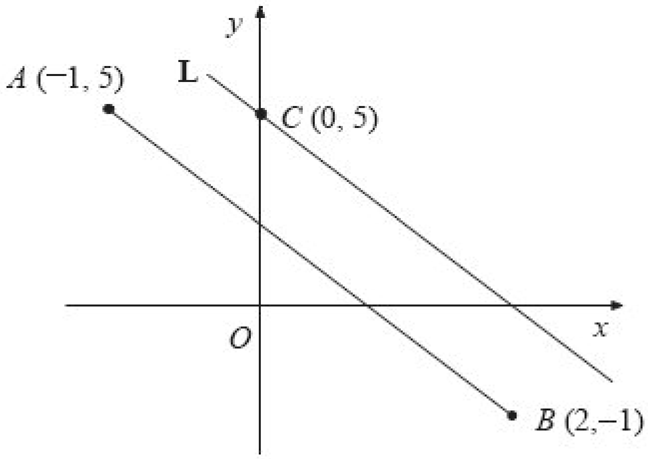


Diagram **NOT** accurately drawn

The diagram shows three points A (–1, 5), B (2, – 1) and C (0, 5).

A line **L** is parallel to AB and passes through C.

Find the equation of the line **L**.

…………………….

(Total 4 marks)

8. A straight line has equation $y = 2x - 3$
The point P lies on the straight line.
The y coordinate of P is –4

(a) Find the x coordinate of P.

....
(2)

A straight line **L** is parallel to $y = 2x - 3$ and passes through the point (3,4).

(b) Find the equation of line **L**.

....
(3)
(Total 5 marks)

9. A straight line has equation $y = 2x - 3$
The point P lies on the straight line.
The y coordinate of P is -4

(a) Find the x coordinate of P.

....
(2)

A straight line **L** is parallel to $y = 2x - 3$ and passes through the point (3,4).

(b) Find the equation of line **L**.

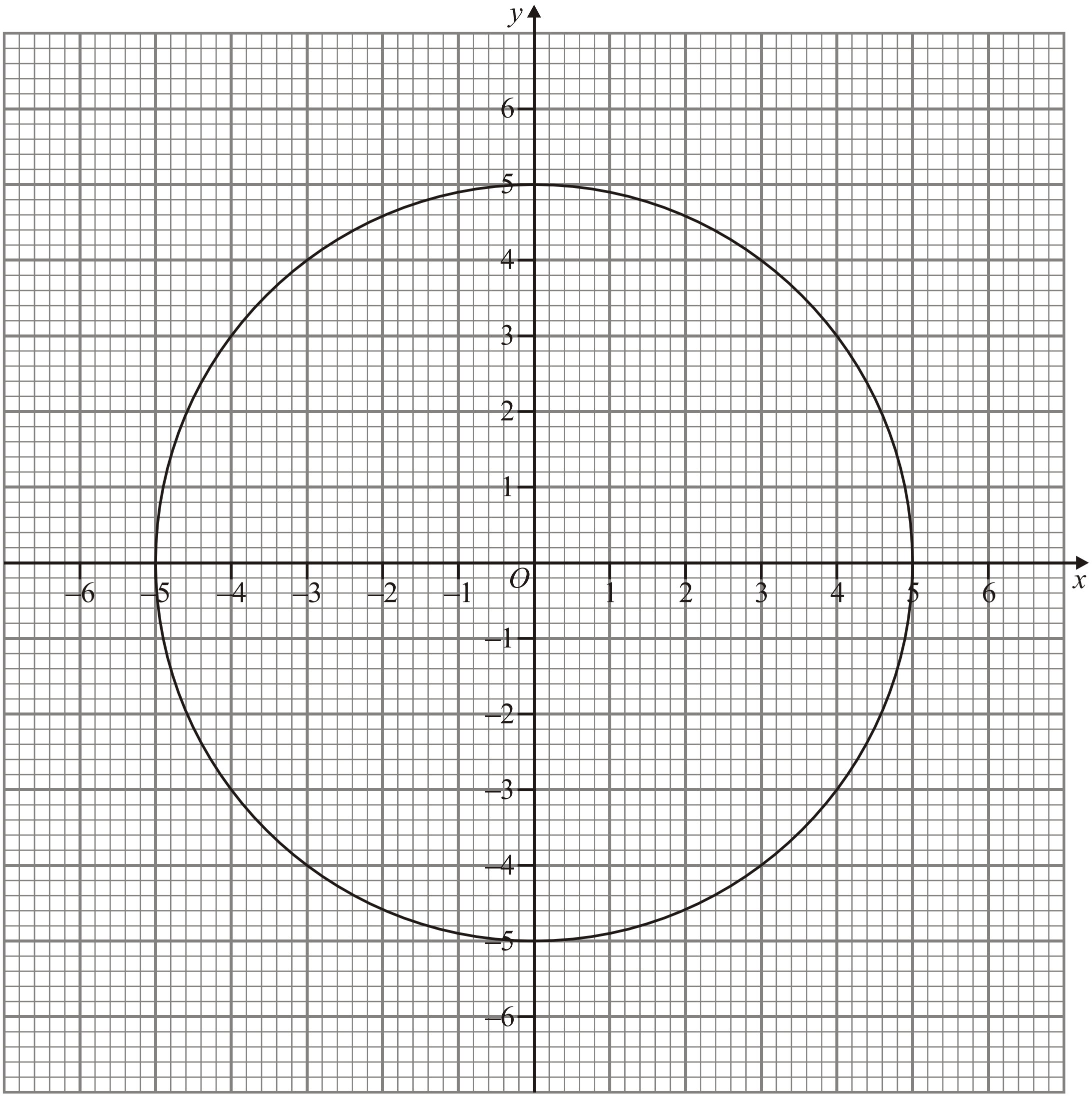
....
(3)

$y = 2x - 3$	$y = 3 - 2x$	$y = \frac{1}{2}x - 3$	$y = 3 - \frac{1}{2}x$	$y = 2x + 3$

(c) Put a tick (✓) underneath the equation which is the equation of a straight line that is perpendicular to the line with equation $y = 2x - 3$

(1)
(Total 6 marks)

10.



The diagram shows a circle of radius 5 cm, centre the origin.

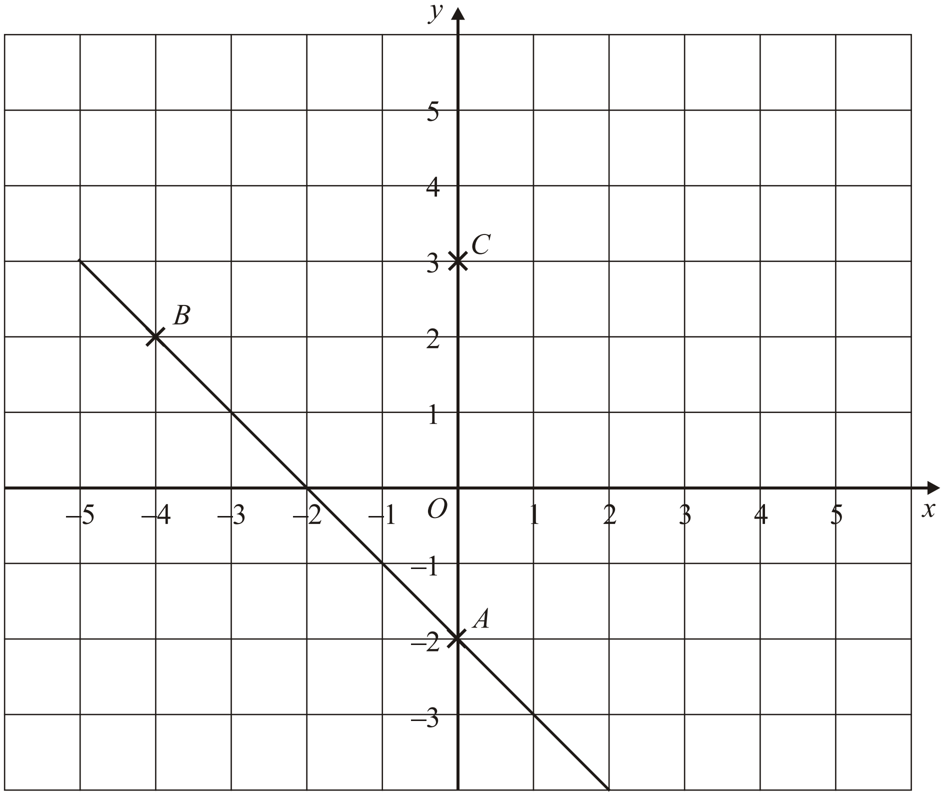
Draw a suitable straight line on the diagram to find estimates of the solutions to the pair of equations

$x^2 + y^2 = 25$
$y = 2x + 1$

x = ..., y = ...

x = ..., y = ...
(Total 3 marks)

11.

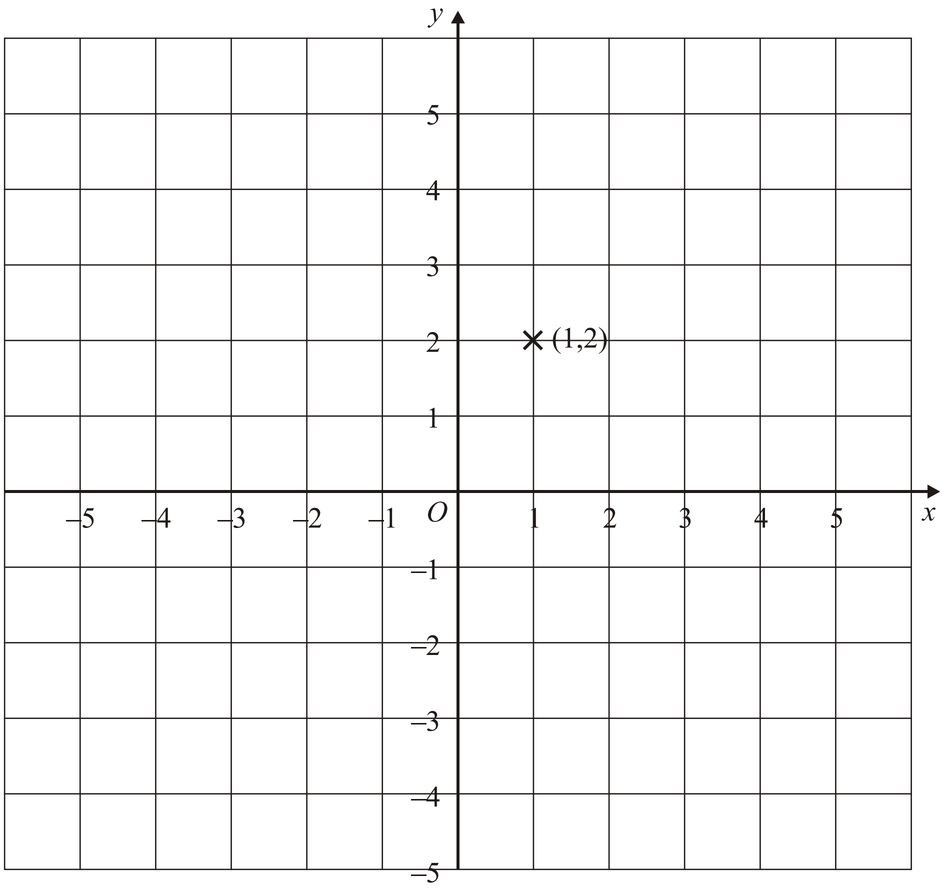


In the diagram *A* is the point (0, –2),
B is the point (–4, 2),
C is the point (0, 3).

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

....
(Total 4 marks)

12. Show that any straight line that passes through the point (1,2) must intersect the curve with equation $x^2 + y^2 = 16$ at two points.

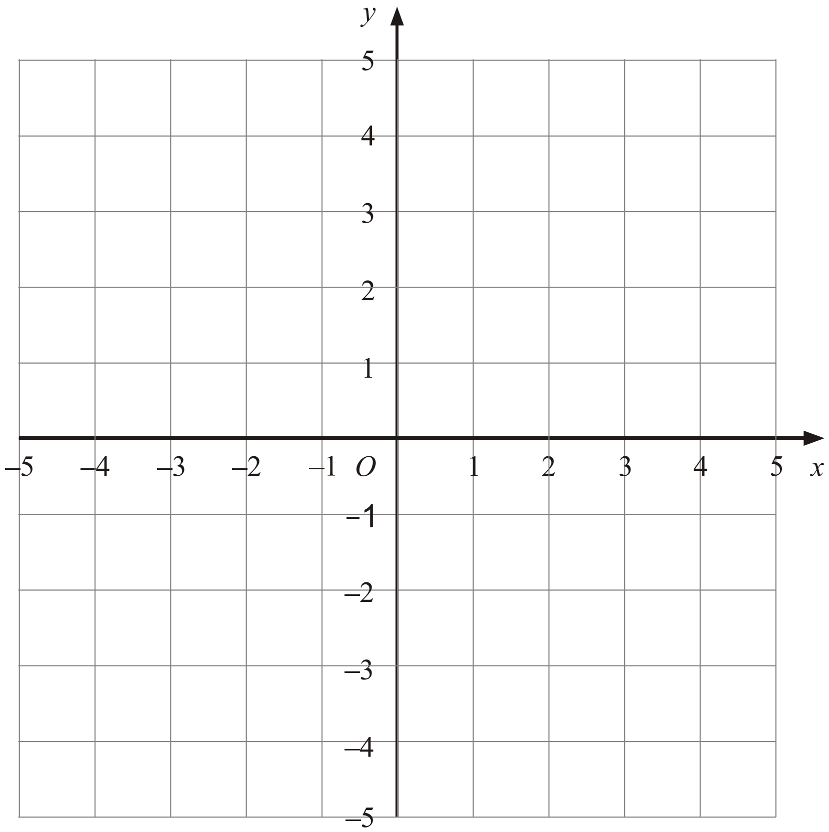


(Total 3 marks)

13. On the grid, show by shading, the region which satisfies all three of the inequalities.

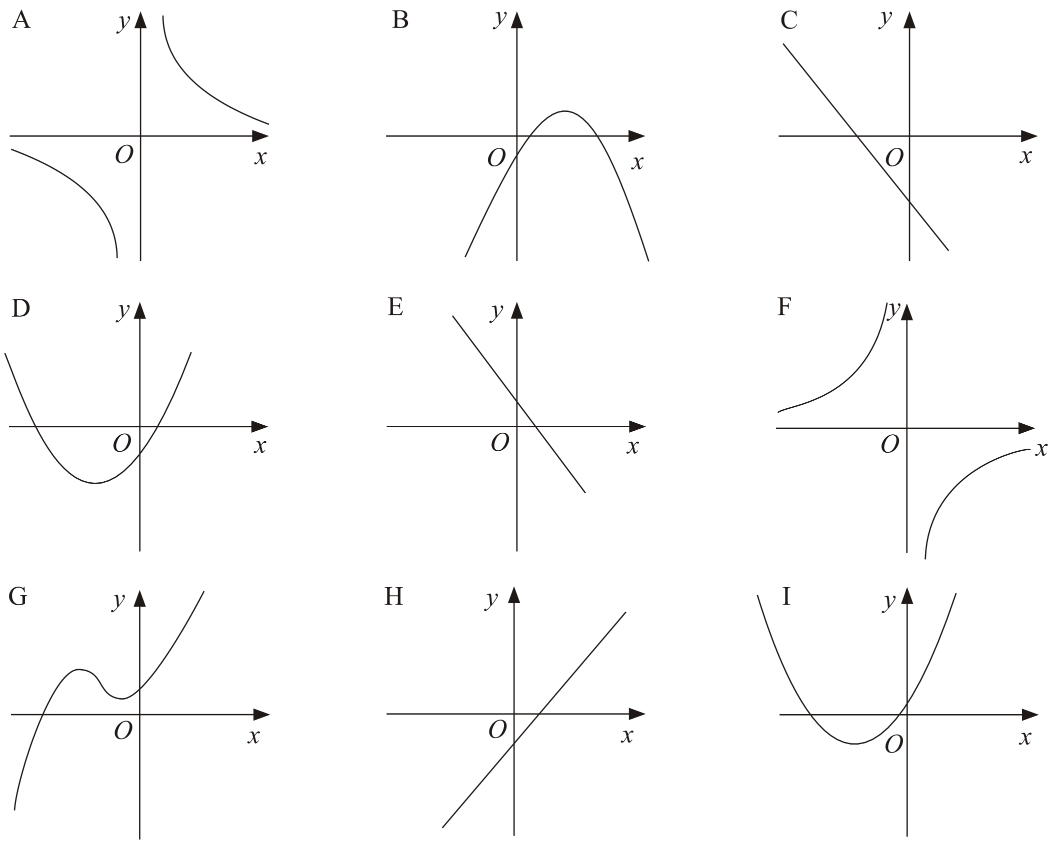
$x < 3$ $y > -2$ $y < x$

Label the region **R**.



(Total 4 marks)

14.



Write down the letter of the graph which could have the equation

(i) $y = 1 - 3x$

....

(ii) $y = \dfrac{1}{x}$

....

(iii) $y = 2x^2 + 7x + 3$

....

(Total 3 marks)

15.

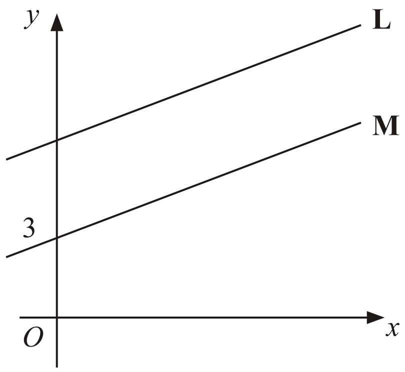


Diagram **NOT** accurately drawn

The straight line **L** has equation $y = \frac{1}{2}x + 7$

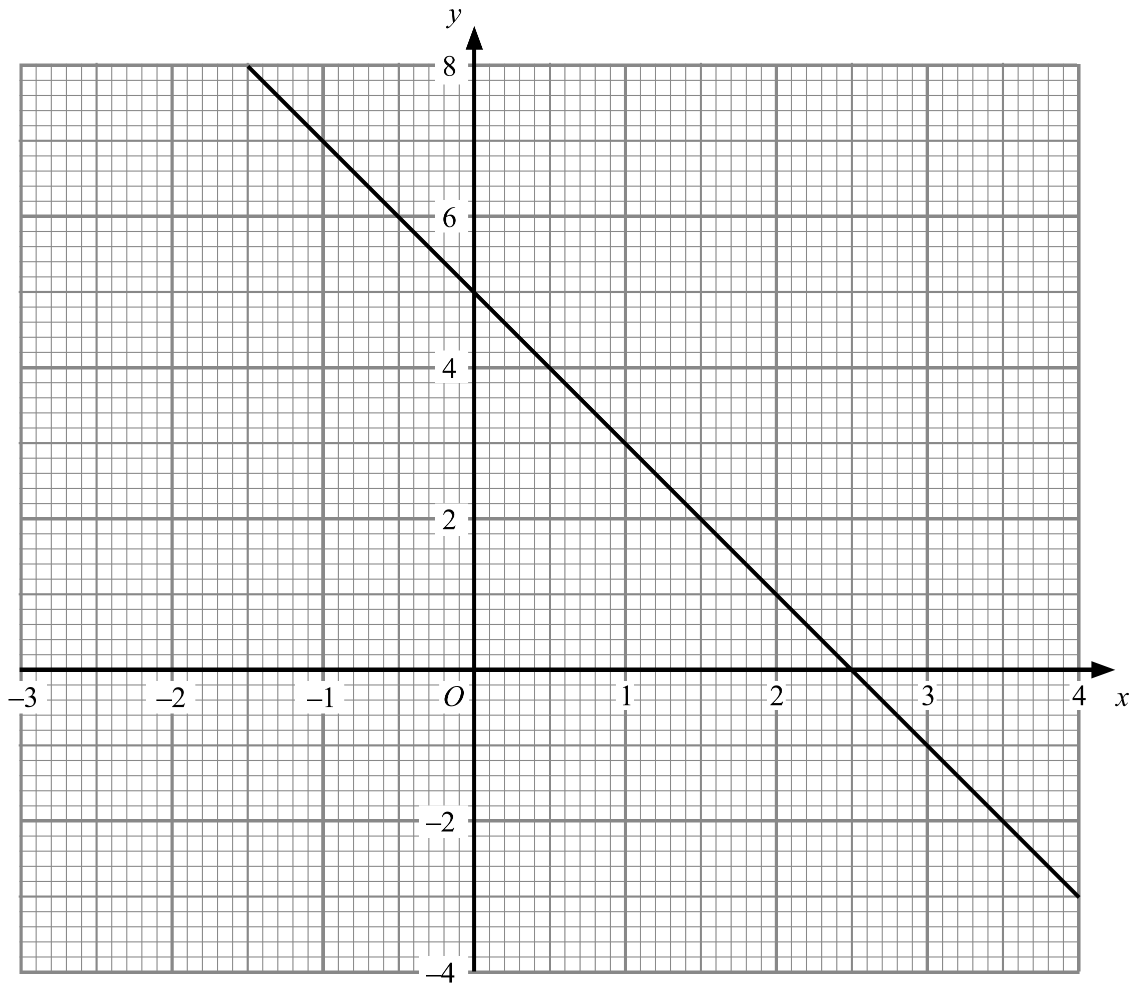
The straight line **M** is parallel to **L** and passes through the point (0, 3).

Write down an equation for the line **M**.

....

(Total 2 marks)

16. The straight line $y + 2x = 5$ has been drawn on the grid.



(a) Complete this table of values for $y = 2x – 1$

x	–1	0	1	2	3	4
y		–1		3	5	

(2)

(b) On the grid, draw the graph of $y = 2x - 1$

(2)

(c) Use your diagram to solve the simultaneous equations

$y + 2x = 5$

$y = 2x - 1$

$x =$ ....

$y =$ ....

(2)
(Total 6 marks)

17. Here are the equations of 5 straight lines.

P $y = 2x + 5$ **Q** $y = -2x + 5$

R $y = x + 5$ **S** $y = -\frac{1}{2}x + 6$

T $y = \frac{1}{2}x + 1$

(a) Write down the letter of the line that is parallel to $y = x + 6$

....

(1)

(b) Write down the letter of the line that is perpendicular to $y = 2x - 1$

....

(1)

(c) Find the coordinates of the point where the line $y = 2x + 5$ cuts the

(i) y axis,

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

(ii) x axis.

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

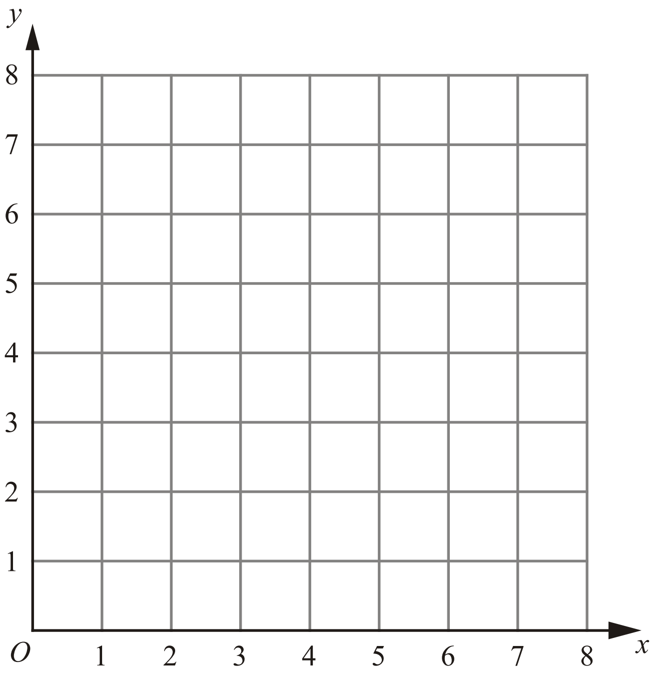
(2)

(Total 4 marks)

18. The region **R** satisfies the inequalities

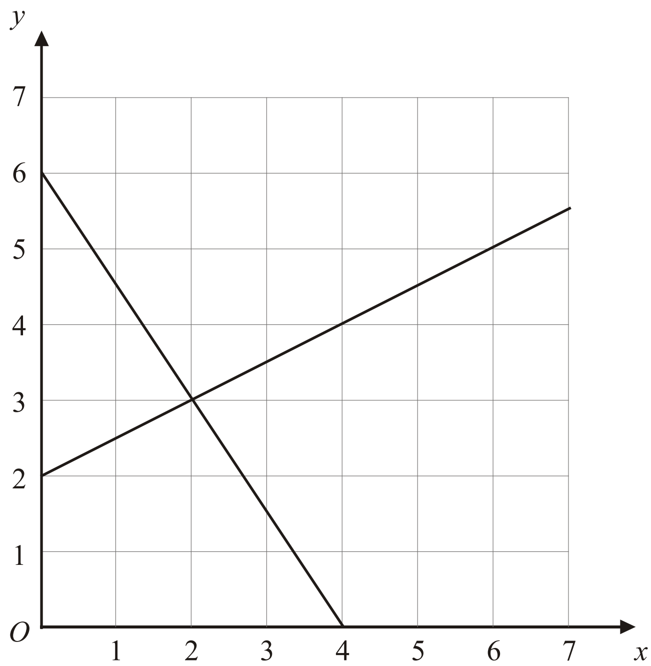
$x \geq 2, y \geq 1, x + y \leq 6$

On the grid below, draw straight lines and use shading to show the region **R**.



(Total 3 marks)

19.



The diagram shows graphs of $y = \frac{1}{2}x + 2$

and $2y + 3x = 12$

(a) Use the diagram to solve the simultaneous equations

$$y = \frac{1}{2}x + 2$$

$$2y + 3x = 12$$

$x =$ .... $y =$ ....

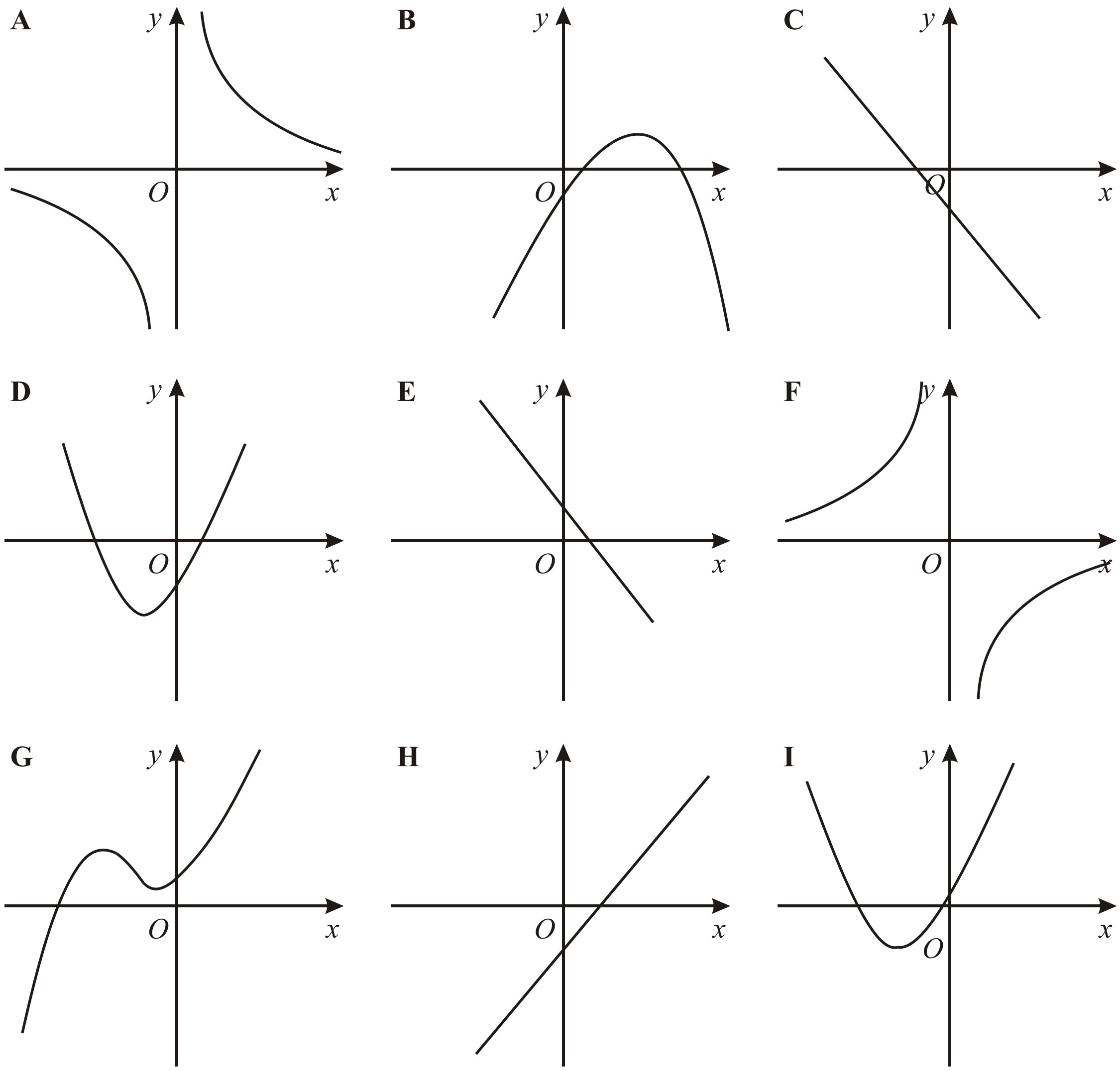
(1)

(b) Find an equation of the straight line which is parallel to the line $y = \frac{1}{2}x + 2$ and passes through the point (0, 4).

....

(2)
(Total 3 marks)

20.



Write down the letter of the graph which could have the equation

(i) $y = 3x - 2$ ……………

(ii) $y = 2x^2 + 5x - 3$ ……………

(iii) $y = \dfrac{3}{x}$ ……………

(Total 3 marks)

21. 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)

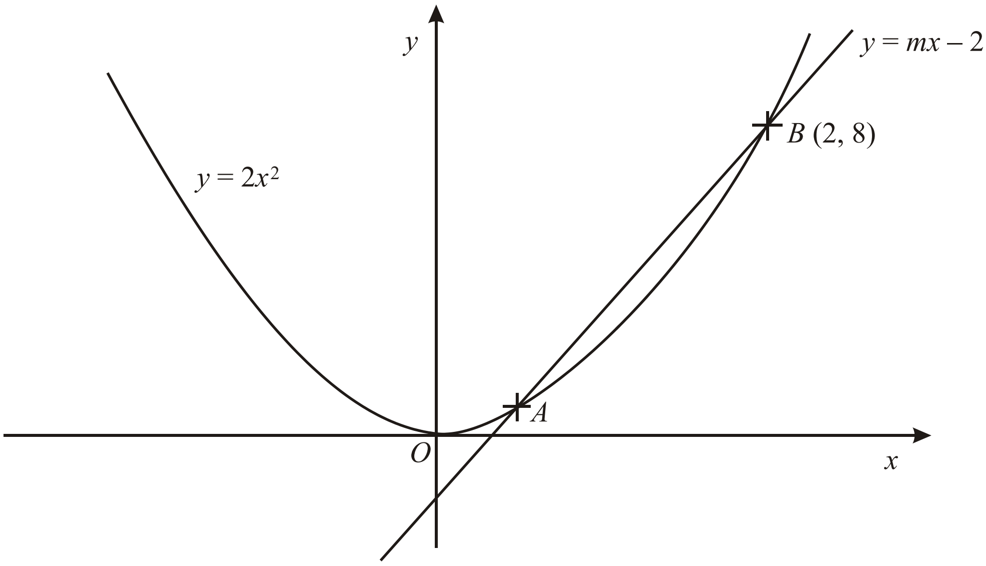
(c) Rearrange $y = ax + c$ to make x the subject.

$x =$ ....
(2)
(Total 5 marks)

22. (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)

23. A straight line has equation $2y - 6x = 5$

(a) Find the gradient of the line.

………………………..

(2)

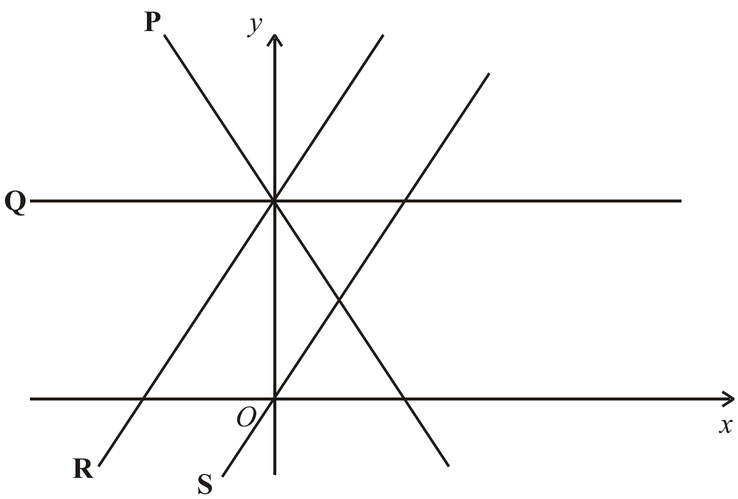
The point (k, 6) lies on the line.

(b) Find the value of k.

k = ……………..

(2)
(Total 4 marks)

24.



The diagram shows 4 straight lines, labelled **P**, **Q**, **R** and **S.**

The equations of the straight lines are

A: $y = 2x$
B: $y = 3 - 2x$
C: $y = 2x + 3$
D: $y = 3$

Match each straight line, **P**, **Q**, **R** and **S** to its equation.
Complete the table.

Equation	**A**	**B**	**C**	**D**
Straight line				

(Total 2 marks)

25. 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)

26. A straight line has equation $y = 2(3 - 4x)$

Find the gradient of the straight line.

....
(Total 2 marks)

27.

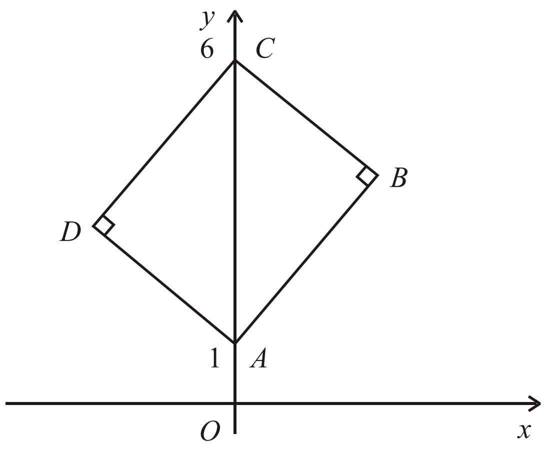


Diagram **NOT** accurately drawn

ABCD is a rectangle.
A is the point (0, 1).
C is the point (0, 6).

The equation of the straight line through *A* and *B* is $y = 2x + 1$

(a) Find the equation of the straight line through *D* and *C*.

....
(2)

(b) Find the equation of the straight line through *B* and *C*.

....
(2)
(Total 4 marks)

28. A straight line passes through the points (0, 5) and (3, 17).

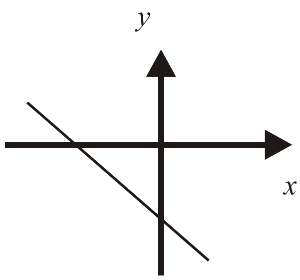
Find the equation of the straight line.

....

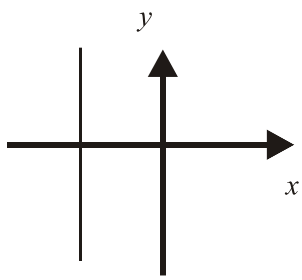
(Total 3 marks)

29. Here are five graphs labelled **A**, **B**, **C**, **D** and **E**.

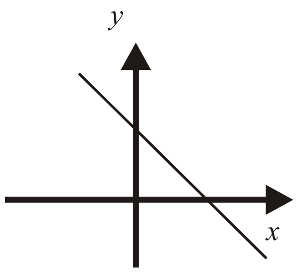
A



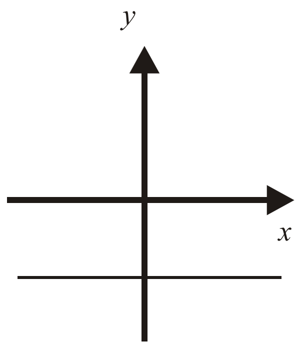
B



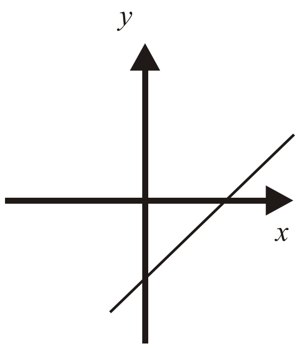
C



D



E



Each of the equations in the table represents one of the graphs **A** to **E**.

Write the letter of each graph in the correct place in the table.

Equation	**Graph**
$x + y = 5$	
$y = x - 5$	
$y = -5 - x$	
$y = -5$	
$x = -5$	

(Total 3 marks)

30. A straight line has equation $4y - 5x = 2$
Work out the gradient of this line.

....
(Total 2 marks)

31.

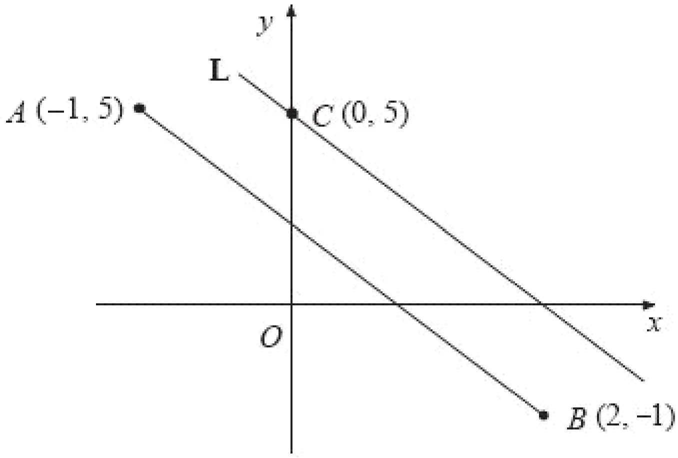


Diagram **NOT** accurately drawn

The diagram shows three points *A* (–1, 5), *B* (2, –1) and *C* (0, 5).
The line **L** is parallel to *AB* and passes through *C*.

(a) Find the equation of the line **L**.

……………………………..

(4)

The line M is perpendicular to *AB* and passes through (0, 0).

(b) Find the equation of the line **M**.

……………………………

(2)
(Total 6 marks)

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

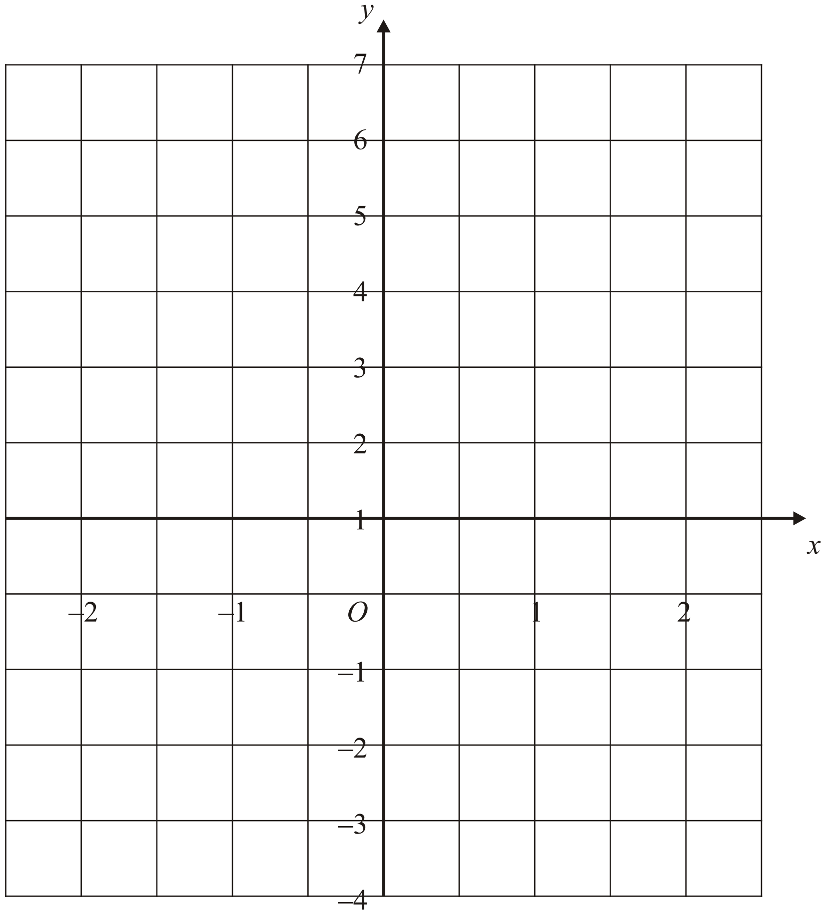
(i) Write down the gradient of this straight line.

…………………….

(ii) Write down the coordinates of the point where this straight line crosses the y axis.

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

33. On the grid, draw the graph of $y = 2x + 1$
Use values of x from –2 to +2



(Total 3 marks)

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. $y = -\frac{1}{2}x + 9$ 3

$-\frac{1}{2}$ or $2m = -1$ oe

$y = -\frac{1}{2}x + c$

B1 for $-\frac{1}{2}$ *or* $2m = \quad 1$ *oe*

M1 for $y = -\frac{1}{2}x + c$, $c \neq 0$

A1 for $y = -\frac{1}{2}x + 9$ *oe*

(SC: if $\frac{0}{3}$ *then B1 for either* $y = 2x - 1$ *oe or* $y = -2x + 15$ *oe)*

[3]

3. $y = 2x + 6$ 2

B2 for $y = 2x + 6$
(B1 for $y = 2x + k$, $k \neq 1$ *or for* $y = mx + 6$, $m \neq 0$
or for $2x + 6$*)*

[2]

4. (a) $y = \dfrac{15 - 5x}{6}$ 2

$6y = 15 - 5x$

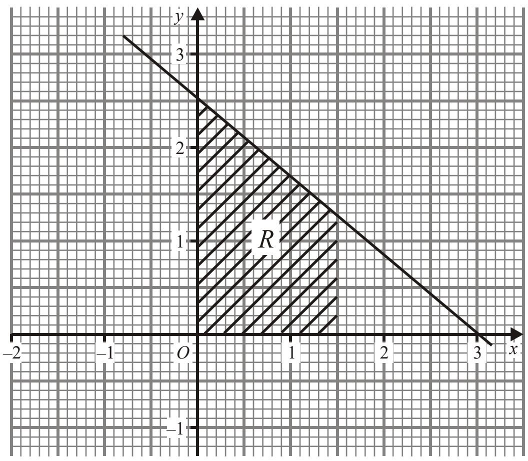
M1 for either $6y = 15 - 5x$ or for $\dfrac{5x}{6} + y = \dfrac{15}{6}$
or $-6y = 5x - 15$ or a correct ft on sign error to y =
A1 for $y = \dfrac{15 - 5x}{6}$ oe

(b) 20 2

$6k + 5(-21) = 15$

M1 for subst. of $x = -21$ (or $x = 21$) into given eq^n or answer to (a)
A1 for $k = 20$

(c) (i) Region R indicated 3



B2 correct region shaded (accept unshaded if R clear)
(B1 shaded (R) region satisfies 3 of the 4 given inequalities with same boundaries)

(ii) (1,1)
B1 for (1,1)

[7]

5. (a) $y = 2x + 6$ 2

B2 for y = 2x + 6
(B1 for y = 2x + k, k ≠ 1 or for y = mx + 6, m ≠ 0
or for 2x + 6)

(b) $y = -\frac{1}{2}x + 6$ 2

Grad of AB = 2; Grad of $BC = \frac{-1}{"2"}$

M1 for Grad of BC = $\frac{-1}{"2"}, -\frac{1}{2}$
or grad of BC = $-\frac{1}{\text{grad of } AB}$
A1 ft for $y = -\frac{1}{2}x + 6$ *oe ft on wrong coeff. of x in (a)*

(c) Eg A rectangle is always a cyclic quadrilateral because the opposite angles of a rectangle always add up to 180° (90 + 90) 1

B1 for valid explanation. (eg lines from the pt of int. of diagonals of rect to all 4 vertices are equal(radii))

[5]

6. $y = 2x - 4$ 3

$\mathbf{L_2}$ $y = 2x + c$
C = 2 – 2 × 3 = – 4

M1 for y = 2x + c, c ≠ 3 (any line parallel to y = 2x + 3) or statement "gradient is 2"
M1 for 2 = 2 × 3 + c, any clear attempt to substitute into any equation of the form y = 2x + c, c ≠ 3
A1 cao

[3]

7. $y = -2x + 5$ 4

$\frac{5--1}{-1-2} = -2$

M1 for clear attempt to find gradient eg fraction with – 1, 5 in numerator, 2, – 1 in denominator
A1 for – 2 cao

B2 ft for y = "–2"x + 5oe (eg $y = \frac{-6}{3}x + 5$*)*
(B1 for y = mx + 5 or , – 2x + 5 or y = "–2"x + c)

[4]

8. (a) $-4 = 2a - 3$

$= -\frac{1}{2}$ 2

M1 for –4 = 2a – 3 or x shown as $\frac{1}{2}$

A1 $-\frac{1}{2}$ *or* $(-\frac{1}{2}, -4)$

(b) $y = 2x + c$
$4 = 2 \times 3 + c$, c = –2
$y = 2x - 2$ 3

M1 for y = 2x + c (c ≠ –3) or gradient = 2
M1 (indep) attempt to subs x = 3, y = 4 into any linear equation
A1 for y = 2x – 2
SC B2 for 2x – 2

[5]

9. (a) $-4 = 2a - 3$ where a is the required x coordinate

$-\frac{1}{2}$ 2

M1 for –4 = 2a – 3 or x shown as $\frac{1}{2}$

A1 $-\frac{1}{2}$ *or* $(-\frac{1}{2}, -4)$

(b) $y = 2x + c$
$4 = 2 \times 3 + c, c = -2$
$y = 2x - 2$ 3

M1 for y = 2x + c (c ≠ –3) or gradient = 2
M1 (indep) attempt to subs x=3, y=4 into any linear equation
A1 for y = 2x – 2
SC B2 for 2x–2

(c) $y = 3 - \frac{1}{2}x$ 1

B1 cao

[6]

10. Straight line through (0,1) and (1,3)
$x = 1.8$
$y = 4.7$;
$x = -2.6$
$y = -4.2$ 3

M1 draw y = 2x + 1 or any st line with positive gradient thro' (0, 1) or any line with gradient 2. Must cut circle at least once.
A1 first solution (± 1 square, ft but dep on a single straight line)
A1 cao second solution (± 1 square)

[3]

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

12. Draw circle centre (0,0) radius 4
Draw a line through (1,2)
Show two intersections
Fully correct explanation 3

M1 circle or semi-circle centre (0, 0) drawn or plotted with at least 8 points or stated
A1 correct circle drawn or stated
A1 straight line drawn through (1, 2) and cutting the (possibly freehand) circle at 2 distinct points or for stating that any straight line through (1, 2) will cut the circle in 2 places as (1, 2) is inside the circle

[3]

13. Region $x < 3$ 4
Region $y > -2$
Region $y < x$

R shaded

*B4(dep on well defined border) correct region labelled **R**.*
If not labelled, dep on all inequalities being clearly shaded
(B3 corrected region with incorrectly marked boundaries)
(B2 2 out of 3 correct regions, consistently shaded or all 3 lines drawn to form a triangle)
(B1 any one region correctly shaded either side or any two correct lines drawn)

[4]

14. (i) E 3

B1 for E cao

(ii) A

B1 for A cao

(iii) I

B1 for I cao

[3]

15. $y = \frac{1}{2}x + 3$ 2

B2 for y = ½x + 3 oe
(B1 for y = ½x + c, c ≠7 or y = mx + 3 oe or ½x + 3 or M = ½x + 3)

[2]

16. (a) –3,..., 1,...., ..., 7 2

–3, 1, 7

B2 for all values correct

(B1 for 2 values correct)

(b) 2

B2 for correct line between $x = -1$ and $x = 4$

B1 ft for 4 points plotted ± one 2mm sq or for a line with gradient 2 or for a line through (0, –1)

(c) $x = 1.5$ 2

$y = 2$

B1 ft for x value = 1.5 ± one 2mm sq

B1 ft for y value = 2 ± one 2mm sq

(SC B1 for y = 1.5 and x = 2)

[6]

17. (a) R 1

B1 for R or $y = x + 5$

(b) S 1

B1 for S or $y = -1/2x + 6$

(c) (i) (0, 5) 2

B1 cao

(ii) (–2.5, 0)

B1 for (–2.5, 0) oe

[4]

18. Region indicated 3

M1 Both x = 2 drawn from at least (2, 1) to (2, 4) and y = 1 drawn from at least (2, 1) to (5, 1)

M1 for x + y = 6 drawn from at least (2, 4) to (5, 1)

A1 Correct region indicated by shading or clearly labelled. Boundaries of the region may be solid or dashed.

[3]

19. (a) $x = 2, y = 3$ 1

B1 cao

(b) $y = \frac{1}{2}x + 4$ 2

M1 for $y = mx + 4$ *or* $y = \frac{1}{2}x + c$, $c \neq 2$, *or* $\frac{1}{2}x + 4$

A1 for $y = \frac{1}{2}x + 4$ *oe*

[3]

20. H
D
A 3

B1 cao
B1 cao
B1 cao

[3]

21. (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 $y = \frac{1}{2}x + c$, *where c is not equal to 1*

(c) $x = \frac{y - c}{a}$ 2

$ax = y - c$ or $\frac{y}{a} = x + \frac{c}{a}$

M1 for correctly dividing both sides by a OR for correctly isolating ax

A1 for $\frac{y - c}{a}$ *oe*

(SC: B1 for $x = \frac{c - y}{a}$ *with no working)*

[5]

22. (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 $2x^2 =$ "5" $\times x - 2$ OR $y = 2 \times \left(\frac{y+2}{"5"}\right)^2$
A1 for $x = 0.5$
A1 for $y = 0.5$

[6]

23. (a) 3 — 2

$y = \frac{6}{2}x + \frac{5}{2}$

M1 for $y = \frac{6}{2}x$ + constant
A1 for 3
[SC: B1 ft from $y = ax + b$ for $m = a$]

(b) $\frac{7}{6}$ oe — 2

$12 - 6k = 5$

M1 for substitution of $y = 6$ into given equation or their rearrangement of it.
A1 cao

[4]

24. S, P, R, Q — 2

B2 all correct
(B1 for 2 or 3 correct)

[2]

25. (a) –3 1

B1 cao

(b) 0, 5 1

B1 cao

[2]

26. – 8 2

6 – 8x

M1 for 6 – 8x
A1 cao
[SC M1 A0 for – 4 or 8]

[2]

27. (a) $y = 2x + 6$ 2

B2 for y = 2x + 6
(B1 for y = 2x + k, k ≠ 1 or for y = mx + 6, m ≠ 0 or for 2x + 6)

(b) $y = -\frac{1}{2}x + 6$

grad of AB = 2; grad of $BC = -\frac{1}{2}$ 2

M1 for grad of BC $= -\frac{1}{2}$ *or grad of BC* $= \frac{-1}{\text{grad of } AB}$

A1 ft for $y = -\frac{1}{2}x + 6$ *oe ft on wrong coefficient of x in (a)*

[4]

28. $y = 4x + 5$ 3

Gradient = (17 – 5)/(3 – 0) = 4

M1 for (y =) mx + 5

M1 (indep) gradient $= \frac{17-5}{3-0}$ *oe or (y =)4x + c*

A1 for y = 4x + 5 oe

[3]

29. C, E, A, D, B, 3

B3
(B2 for 3 correct)
(B1 for 2 correct)

[3]

30. $\frac{5}{4}$ oe

$y = \frac{5}{4}x + \frac{2}{4}$ 2

B1 for $(y =)\ \frac{5x+2}{4}$ *or* $y - \frac{5}{4}x$ *= constant*

or $y = \frac{5}{4}x$ *+constant*

B1 for $\frac{5}{4}$ *oe or ft*

[2]

31. (a) $y = -2x + 5$ 4

$\frac{5 - -1}{-1 - 2} = -2$

M1 for clear attempt to find gradient eg fraction with – 1, 5 in numerator, 2, – 1 in denominator
A1 for –2
B2 ft for y = "–2x" + 5 oe (eg $y = \frac{-6}{3}x + 5$*)*
(B1 for y = mx + 5 or, – 2x+ 5 or y = "–2"x + c)

(b) $y = \frac{1}{2}x$ 2

gradient = $\frac{1}{2}$

M1 for "–2" × gradient = –1

A1 ft for $y = \frac{-1}{\text{"}-2\text{"}}x$

[6]

32. (i) 5 2

B1 cao

(ii) (0, –3)

B1 cao

[2]

33. Points (–2, –3) (–1, –1) (0, 1) (1, 3) (2, 5) 3

Straight line of grad 2 through (0, 1)

B3 for correct straight line from (–2, –3) to (2, 5)
(B2 for 5 points plotted correctly ***or*** *correct line from (–1, –1) to (1, 3))*
(B1 for 3 or 4 points plotted correctly ***or*** *any line of gradient 2* ***or*** *any line through (0,1))* ***or*** *for 3 points correctly calculated*

[3]

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. Most candidates did not seem to know that the product of the gradients had to be –1 for two lines to be perpendicular. Based on the evidence of the candidates' solutions to this question, this is a topic of the specification that is not understood.

3. Mathematics A Paper 3

More than 60% of candidates gained no marks in this question. Some just wrote down $y = 2x + 1$, the equation of the line *AB*, and $y = –2x +1$ was another common incorrect answer. Many of those who recognised that the equation would be of the form $y = 2x + k$ did not give the correct value of k.

Mathematics B Paper 16

Only 13% gained full marks in this question but many more earned one mark for correctly identifying either the gradient or the y-intercept.
Answers of $y = 2x – 1$, $y = – 2x + 6$ were common errors.

4. Mathematics A

Paper 3

The success rate for this question as a whole was very low and many weaker candidates did not attempt it. Most marks were gained in part (a) with the method mark being awarded to those candidates who showed a correct first step to get $6y = 15 – 5x$. In part (b) most candidates seemed to have no idea that –21 was an x value and did not connect this part of the question to part (a). Correct answers were rare. Very few candidates gained both marks in part (c) for shading the correct region. Some gained one mark for a region satisfying three of the four given inequalities but the line $x = 1.5$ was rarely drawn correctly for the fourth inequality. Candidates sometimes gave the correct coordinates in (ii) even though no other marks had been gained the term "integer" was not well understood by many weaker candidates.

Paper 5

In part (a) many candidates rearranged the equation correctly to find y. In part (b) those who substituted $x = – 21$ gained the method mark but sign errors were common in the simplification process. Another approach was to multiply 2.5 by 7 but the vast majority who attempted this method forgot to add the 2.5 and gave the wrong value for k as 17.5. Those candidates who attempted part (c) frequently gave the correct coordinates of P but correct answers to (i) were uncommon. Many candidates failed to recognise the boundary x=1.5.

Mathematics B Paper 16

Many candidates at this level found the demands of this question too great. Algebraic manipulation often presents problems although there were some very good attempts to transform the formula in part (a). The usual mistakes of $y = (5x – 15)/6$ and $15/6 – 5x$ were often seen. Many candidates having got $6y = 15 – 5x$ then tried to subtract $5x$ from 15 to give $10x$.
In part (b) very few were able to equate –21 to x, and thus any substitution was rarely started. When it was, errors with the signs were commonplace.
Only a very small minority were able to draw a correct fourth boundary in part (c), and more often than not when a mark was gained it was for shading the given triangle.
The point (1, 1) was given by the more able candidate only. ($1x$, $1y$) was seen on enough occasions to be worthy of mention.

5. Many candidates at grade B and above were able to find the equation of the parallel line in part (a) but the equation of the perpendicular in part (b) was rarely correct even amongst the grade A candidates. The wrong answer "y –2 + 6" was frequently seen. In part (c) some candidates stated that it was not possible to draw a circle through the four vertices of a rectangle. In general explanations were inadequate with many making no connection between the circle and the rectangle as illustrated by the common answers "Rectangles have four right angles" or just "Angles in a rectangle add up to 360°, the same as a circle." Better candidates made reference to the opposite angles of rectangles and cyclic quadrilaterals adding up to 180° or linking the right angles of rectangles with angles in a semicircle.

6. **Paper 4**

This question was anticipated as the hardest on the paper, graded at the top of grade B. Over 90% of candidates failed to gain a mark. The majority failed to attempt it. However, the more able at this level did at least realise that an equation with a gradient of 2 was needed, and recognition of this was rewarded. $y = 3x + 2$ was the most common incorrect answer.

Paper 6

Many candidates realised that the equation of $\mathbf{L_2}$ had to be in the form $y = 2x + c$.
A lot fewer were able to go on to find the value of c. there were two ways that successful candidates used: Firstly, there was the method that exploited directly that when $x = 3$ that $y = 2$. Unfortunately, a common error here was to confuse the values of x and y. An alternative was to consider a sketch of the two parallel lines and find the value of$y$ on $\mathbf{L_1}$ by substituting into $y = 2x + 3$, the value of $x = 3$. This gives $y = 9$, so 7 has to be subtracted to get $y = 2$. Consequently the equation of the required line is $y = 2x + 3 – 7$

7. **Specification A**

Higher Tier

This question was not done well. Only the best candidates were able to use the coordinates to find the gradient of the line. A common mistake was to use the 5 from (0.5) and the 2 from (2, –1) to arrive at a gradient of $\frac{5}{2}$.
Many of those candidates using the diagram to find a vertical displacement of 6, and a horizontal displacement of 3, did not include a minus sign in their final equation for the line. On the other hand, the majority of candidates knew that the value of c in $y = mx + c$ should be 5. There were some candidates that lost a mark for writing the equation as $L = –2x + 5$.

Intermediate Tier

This was a question beyond most candidates. It was at least encouraging to see many attempts to give a linear equation, but usually the values used were incorrect, a coefficient of x of 5 being a common occurrence. There was little evidence of any understanding of gradient.

Specification B

This question was very poorly done by candidates at this level. Occasionally the y-intercept was recognised and a mark awarded for an answer of $y = mx + 5$ There were very few attempts to find a gradient from the information given. Attempts, using sketches on the diagram, to determine a gradient usually failed. The better attempts often resulted in a gradient of +2 or +2.5, rarely –2. Some of the better candidates lost marks by omitting "y =" or giving their answer as "L = ….."

8. Few candidates gained any marks in this question. In part (a) some candidates correctly substituted into the equation $y = 2x – 3$. It was disappointing to find that some of those who did get as far as simplifying their equations to $2x = –1$ then gave their answer as $x = –2$.
In part (b) there was some reward for candidates who realised that their equation has to have a gradient of 2 (parallel with the given line), but fully correct answers were rare.

9. Most candidates substituted $y = 4$ into the equation and many went on to find the correct value of $x = -0.5$. For some odd reason a substantial number of candidates obtained the –0.5 and then changed the –0.5 to 0.5 on the answer line. A few candidates solved the equation incorrectly and got –3.5 or +3.5. There was substantial confusion in the answering of part(c), although many correct answers were seen. Most candidates scored at least one mark by recognising that the gradient remained unchanged. Few candidates started off with $y = 2 + c$ and so when trying to find the intercept, generally made errors. A few candidates drew a sketch in the answer space, but were not generally successful. Part (c) was not well answered.

10. There were some good answers to this question. Candidates saw that the solution of the equation corresponded to finding the x and y coordinates of the points of intersection of the line $y = 2x +1$ with the circle. Generally the line was drawn correctly but many candidates did not see the link and also drew the line $x + y = 5$ from the equation of the circle. Others saw that 3 and 4 satisfied the top equation so drew a line through the point (3, 4)

11. **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 $y = ...$

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.

12. Specification A

Success on this question depended largely on whether the candidate recognised the equation as being one which described a circle centre *O* and radius 4. Some candidates successfully rearranged the equation and used it to calculate the value of y for selected values of x. Often in this case the candidate did not realise that there were equal magnitude positive and negative values of y.

Specification B

Those candidates that recognised that the equation $x^2 + y^2 = 16$ defined a circle were generally able to score full marks in this question. This did, however, account for only 25% of candidates. The vast majority were unable to recognise the given equation as that of a circle and were therefore unable to gain any marks. The most common error was to assume that the given equation represented a parabola.

13. Many candidates had been well trained to find the required region. They were the people who drew sufficiently long straight lines and were consistent in shading the correct side of the line. Poorer candidates lacked this consistency, or drew their lines of limited length. A few solutions were spoilt by candidates not drawing the line $y = x$ correctly. In addition, weaker candidates believed $x < 3$ to mean $x = 2$ and $y > -2$ to be $y = -1$.

14. Paper 5524

This was a badly answered question. The majority of answers given by candidates were clearly guesses, and failed to show any relationship between the equations and the diagrams.

Paper 5526

This proved to be a challenging enough question with half of the candidate managing in each part to select the correct curve.
Candidates could usually pick out a straight line for the linear equation, but often picked the wrong diagram.

15. The vast majority of candidates had a clear understanding of the components of the line $y = mx + c$ and there were many fully correct answers. Some frequently seen incorrect answers were $y = \frac{1}{2}x + 4, y = \frac{1}{2}x + 7$ and $y = \frac{1}{2}x + 10$. A number of candidates failed to include the y in their equation for the line, or gave their final answer as $M = \frac{1}{2}x + 3$

A very small number of candidates thought that they were being asked to find the equation of the normal to the line.

16. Higher Tier

Parts (a) and (b) of this question were generally done well. In part (a), most candidates were able to complete the table accurately and, in part (b), draw a graph of the line. Common errors for the table were (−3, 0) and/or (1, 0). Some candidates, not using the values in the table to draw the line, drew a line through (0, −1) but with an incorrect gradient (common), or drew a line with gradient 2 but with incorrect intercept. Part (c) was done well by the majority of candidates but there were a significant number who did not appreciate that the point of intersection of the lines represents the solution of the simultaneous equations. Many candidates tried to solve the simultaneous equations algebraically or by trial and improvement, but few of these attempts were successful. For those reading from a correct graph, a common incorrect answer was (3, 2).

Intermediate Tier

Part (a) was well attempted by most candidates and a large number of fully correct tables were seen. The most common error was in the calculation of the y value for x = –1. Surprisingly, in part (b), many candidates did not associate the table from (a) with what they were being asked to do. Many of those with a correct table did not plot anything at all and some drew lines that bore no resemblance to the table. As incorrect lines passing through (0, 1) were quite common it could be that these candidates were using y = mx + c. Part (c) was poorly answered. A large number of correctly drawn graphs gave rise to no answers or to incorrect answers. Even though the question asked candidates to “use your diagram” many attempted to work out the values algebraically or, more commonly, by trial and error. These attempts rarely succeeded.

17. Part (a), this question was done well by the majority of candidates.

Part (b), this question was not answered well. Many candidates recognised the need to take the reciprocal of 2 for the gradient of the perpendicular line, but many forgot that this should also be negative. T was a common error.

Part (c) was done quite well, (i) more successfully than (ii). A common error was to write down the coordinates the wrong way round, e.g. (5, 0) and (0, −2.5), or to interchange the answers for (i) and (ii).

18. Many candidates knew that they had to draw lines but were unable to interpret the inequality signs as meaning just 1 line, so rectangles as the required region were common. There was some confusion between the line $x = 2$ and the line $y = 2$, but sadly the line $x + y = 6$ was often drawn as the two lines $x = 6$ and $y = 6$. Candidates who drew the correct lines often had no difficulty in identifying the correct region.

19. Part (a) was answered correctly by almost 60% of the candidates.

Many candidates attempted to solve the simultaneous equations using an algebraic method instead of using the graphs. Most of these attempts were unsuccessful. Part (b) was answered correctly by less than half of the candidates. Many who did not give a fully correct equation were awarded one mark for an equation with either a correct gradient or a correct intercept.

20. Many correctly identified the graph of the first equation. Part (iii) was also known but part (ii) was frequently given incorrectly as B or I.

21. Part (a) was generally not well done. Substituting $x = 5$ was the usual mistake giving an answer of 3.5. When the correct substitution into the equation was made an answer of 9 was often seen, in failing to double the 1 as well as the 5. A correct equation was often given in part (b) although there is doubt whether this was always linked with complete understanding of the criteria for parallel lines. $y = \frac{2}{4}x + 2$ and $2y = x + 1$ were typical acceptable answers which raised doubts.
The ability to transform a formula was seen only by the most able candidates. Usually working was not shown and this often led to both marks being lost. The mark scheme attempted to reward one accurate algebraic step, if shown. Flow diagrams rarely resulted in the correct answer.

22. 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.

23. This question was poorly answered with many candidates giving an incorrect answer of –6. A number of candidates realised that they had to rearrange the given equation but then frequently rearranged this incorrectly or chose the value of the *y* intercept rather than that of the gradient. Part (b) was poorly done. A common error was to substitute 6 for *x* rather than for *y*. A number of students failed to simplify $\frac{3.5}{3}$ correctly or else failed to obtain the correct answer from $6x = 7$, giving their answer as $\frac{6}{7}$ rather than $\frac{7}{6}$.

24. The majority of candidates were able to score at least 1 mark on this question with *Q* being the graph that was identified correctly most often.

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

26. Candidates often correctly expanded the brackets to give $y = 6 - 8x$ but could go no further. A few correctly identified the gradient as –8 but 6, 8, 2, 4 and –4 were common errors.

27. Part (a) was generally well answered. Part (b) was not. Of those who realised the significance of the right-angles, the majority gave the gradient of *BC* as –2 rather than the correct answer of $-\frac{1}{2}$.

28. Over a third of the candidates were able to give a fully correct solution; many other candidates were able to gain some credit. There was some confusion evident between the gradient and *y* intercept. Marks were sometimes lost due to the absence of '$y =$' in the final answer; an equation was clearly requested. Two common incorrect answers were $y = 5x + 4$ and $x = 5y + 4$.

29. One third of candidates identified all the graphs correctly with a further 36% of candidates identified 3 or 4 of the graphs correctly.

30. Just over half of all candidates failed to gain any marks on this question while a quarter of candidates were able to gain full marks. A significant number of candidates either used the equation as it was given and gave the incorrect answer of –5 or rearranged the equation but failed to make y unitary and so gave an incorrect answer of 5.

31. In part (a) many candidates recognised the necessity of finding the gradient of the given line but few were able to do so correctly. Many candidates divided the increase in x by the increase in y; thus ½ or –½ was often obtained for the gradient. Of those that were able to write down a correct expression for the gradient, arithmetic errors were evident when evaluating their expression. Many candidates were able to score a mark for recognising that the equation of the straight line would take the form $y = mx + 5$. Only a very small minority of candidates were able to recall and use the fact that the product of the gradients of perpendicular lines is –1.

32. Very few candidates, at this level, were able to score full marks here. $5x$ in part (i) and (5, –3) or (–3, 0) in part (ii) being the closest efforts.

33. This was a well understood question with about 60% of candidates scoring full marks. Only 20% of candidates scored no marks in this question. There was obviously a split of methods between the plots and the intercept gradient method; however those who chose the latter usually concentrated on getting one or other of the conditions right and not both!