Chapter 3

Coordinate geometry

01. 0580_m24_qp_22 Q: 9

The line $y = 2x - 5$ intersects the line $y = 3$ at the point P.

Find the coordinates of the point P.

(....., ...) [2]

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02. 0580_m24_qp_22 Q: 26

A is the point (6, 1) and B is the point (2, 7).

Find the equation of the perpendicular bisector of AB.
Give your answer in the form $y = mx + c$.

$y =$ ..... [5]

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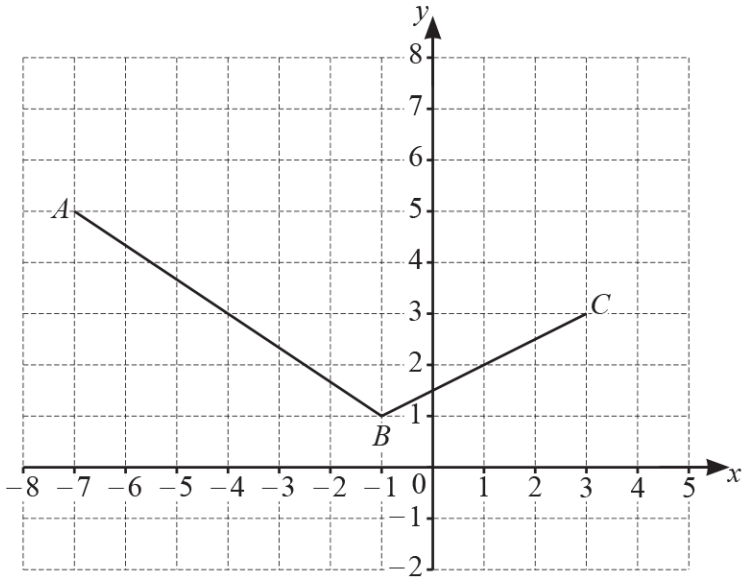
03. 0580_s24_qp_21 Q: 1

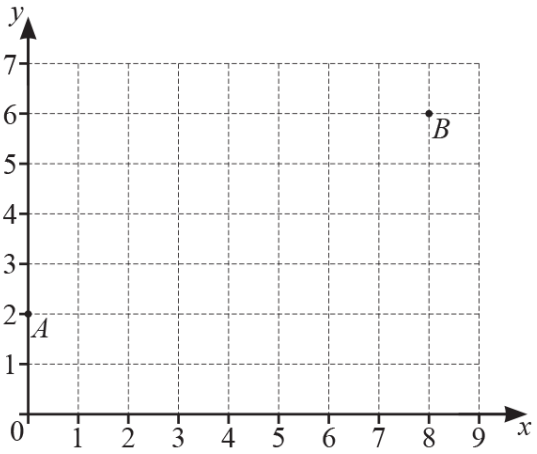


The diagram shows two sides of a parallelogram $ABCD$.

Find the coordinates of point D.

(..... , ...) [2]

04. 0580_s24_qp_22 Q: 14



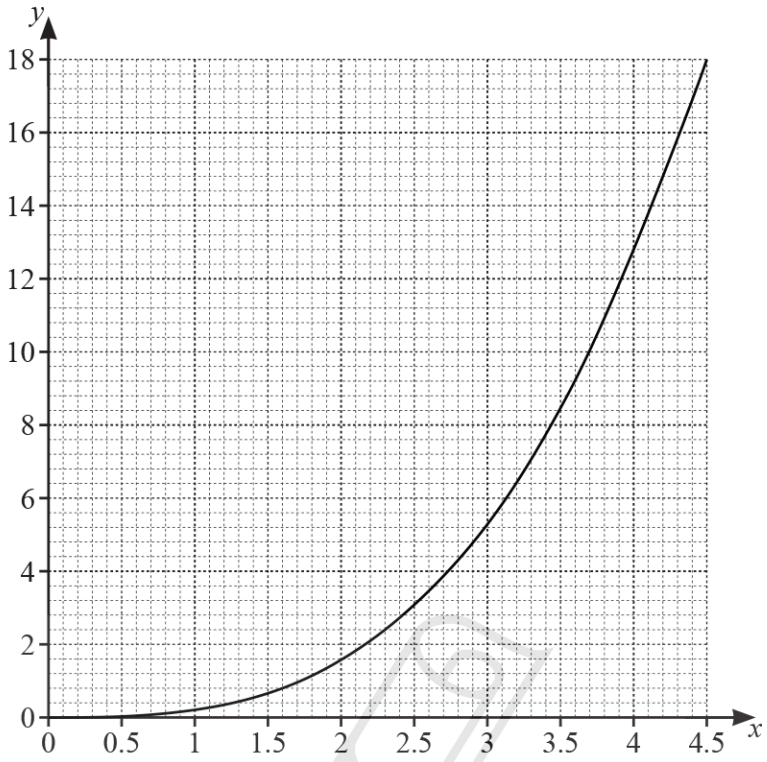
A is the point (0, 2) and B is the point (8, 6).

Find the equation of line AB.

Give your answer in the form $y = mx + c$.

$y =$ ..... [2]

05. 0580_s24_qp_22 Q: 18



The graph of $y = f(x)$ is drawn on the grid.

(a) Draw the tangent to the graph at the point $x = 3$. [1]

(b) Use your tangent to find an estimate for the gradient of the curve at the point $x = 3$.

..... [2]

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06. 0580_s24_qp_23 Q: 10

Find the gradient of the line joining the points $(-2, 7)$ and $(3, 1)$.

..... [2]

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07. 0580_s23_qp_22 Q: 15

C is the point $(5, -1)$ and D is the point $(13, 15)$.

(a) Find the midpoint of CD.

(..... , ...) [2]

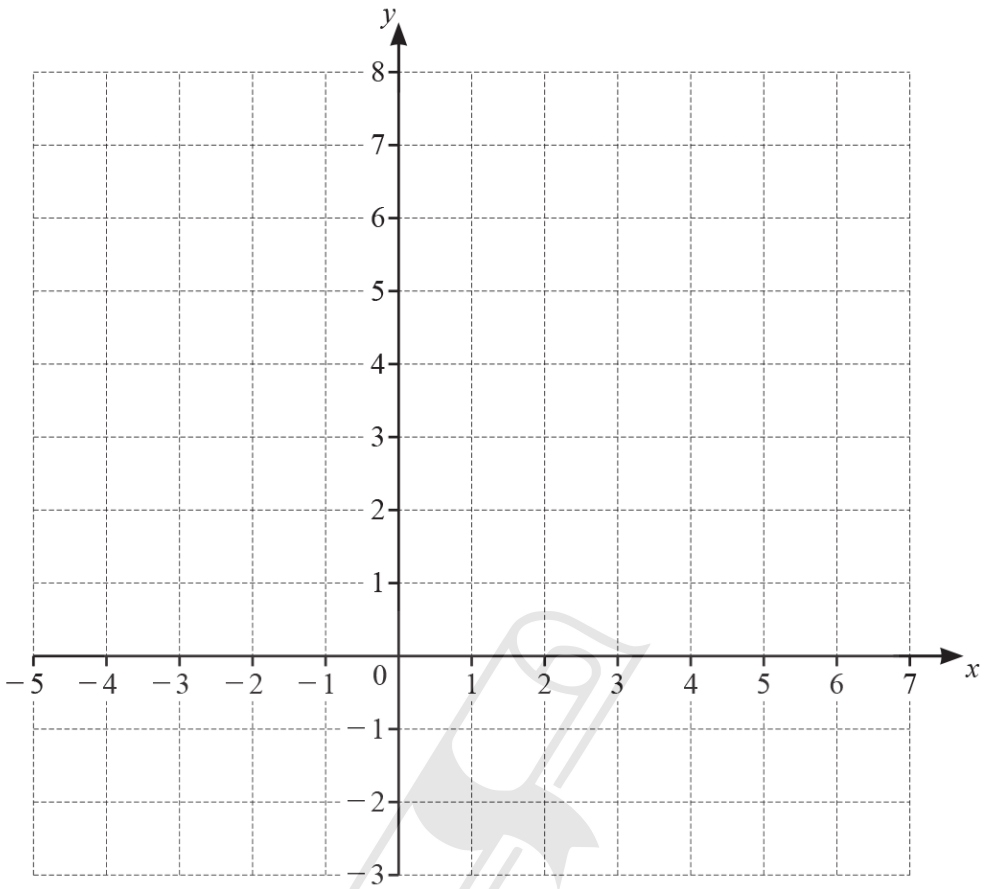
(b) Find the gradient of CD.

..... [2]

(c) Find the equation of the perpendicular bisector of CD.
Give your answer in the form $y = mx + c$.

$y =$ ..... [3]

08. 0580_w23_qp_21 Q: 15



By shading the **unwanted** regions of the grid, draw and label the region R which satisfies these inequalities.

$y > 1$ $x \leqslant 2$ $y \geqslant x+2$

[5]

09. 0580_w23_qp_22 Q: 21

The line $y = x + 1$ intersects the curve $y = x^2 + x - 3$ at two points.

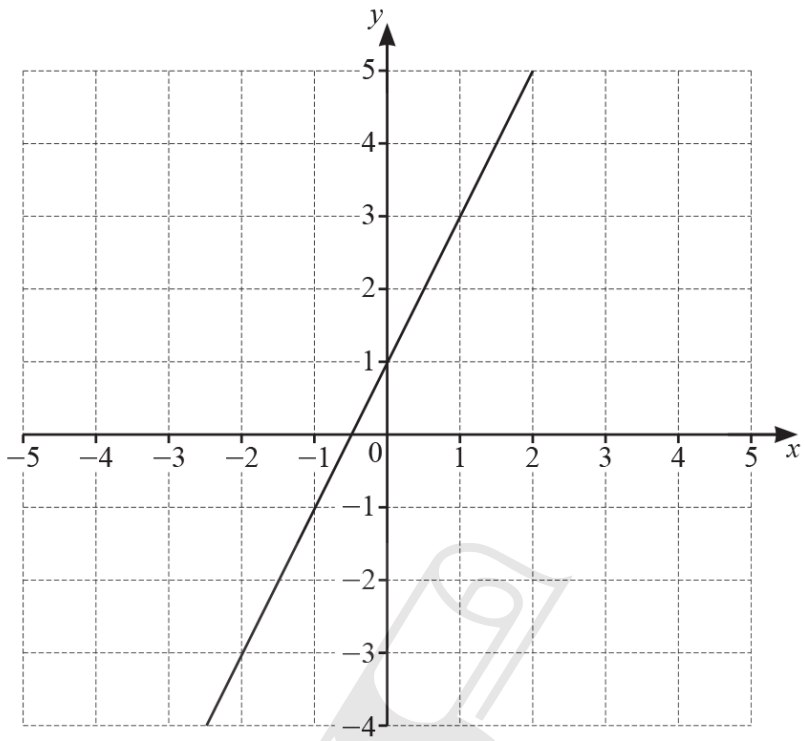
Find the coordinates of the two points.

(..... , ...)

(..... , ...) [4]

10. 0580_w23_qp_23 Q: 13

The graph of $y = 2x + 1$ is drawn on the grid.



By shading the **unwanted** regions of the grid, find and label the region R which satisfies these inequalities.

$y \geqslant 2x + 1$ $y \geqslant 1$ $4x + 3y < 12$ [4]

11. 0580_w23_qp_23 Q: 22

Find the coordinates of the point where the line $4x+y=9$ intersects the curve $y+x^2=5$.
You must show all your working.

(..... , ...) [5]

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12. 0580_m22_qp_22 Q: 5

(a) Write down the gradient of the line $y=5x+7$.

..... [1]

(b) Find the coordinates of the point where the line $y=5x+7$ crosses the y-axis.

(....., ...) [1]

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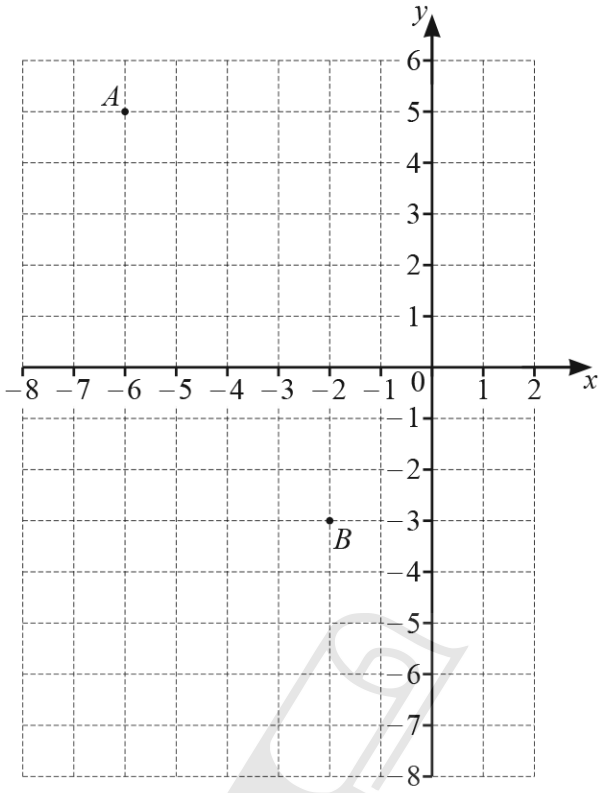
13. 0580_m22_qp_22 Q: 16



A is the point $(-6, 5)$ and B is the point $(-2, -3)$.

(a) Find the equation of the straight line, l, that passes through point A and point B.
Give your answer in the form $y = mx + c$.

$y =$ ..... [2]

(b) Find the equation of the line that is perpendicular to l and passes through the origin.

..... [2]

14. 0580_w22_qp_23 Q: 8

A is the point $(-3, 5)$ and B is the point $(5, 2)$.

Find the coordinates of the midpoint of the line AB.

(..... , ...) [2]

---

15. 0580_w22_qp_23 Q: 16

A kite is drawn on a coordinate grid.
The diagonals of the kite intersect at the point $(-2, -5)$.

One diagonal has equation $y = 4x + 3$.

Find the equation of the other diagonal of the kite.
Give your answer in the form $y = mx + c$.

$y =$ ..... [3]

---

16. 0580_s21_qp_21 Q: 9

A is the point $(5, -5)$ and B is the point $(9, 3)$.

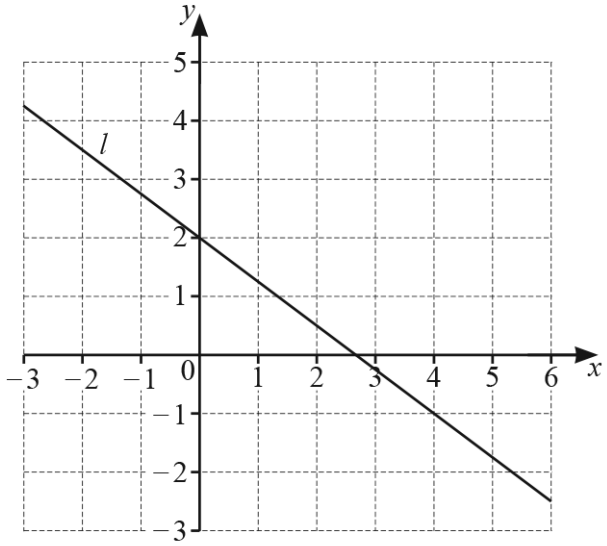
(a) Find the coordinates of the midpoint of AB.

(....., ...) [2]

(b) Find the length of AB.

..... [3]

17. 0580_s21_qp_21 Q: 16



(a) Find the gradient of line l.

..... [2]

(b) Find the equation of line l in the form $y = mx + c$.

$y =$ ..... [2]

(c) Find the equation of the line that is perpendicular to line l and passes through the point $(12, -7)$.
Give your answer in the form $y = mx + c$.

$y =$ ..... [3]

18. 0580_s21_qp_22 Q: 16

A is the point (5, 7) and B is the point (9, −1).

(a) Find the length AB.

..... [3]

(b) Find the equation of the line AB.

..... [3]

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19. 0580_s21_qp_22 Q: 17

Find the gradient of the line that is perpendicular to the line $3y = 4x - 5$.

..... [2]

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20. 0580_w21_qp_21 Q: 11

Line L has equation $y = 4 - 5x$.

Find the equation of a line that is perpendicular to line L and passes through the point (0, 6).

..... [3]

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21. 0580_w21_qp_22 Q: 15

(a) A is the point (3, 16) and B is the point (8, 31).

Find the equation of the line that passes through A and B.
Give your answer in the form $y = mx + c$.

$y =$ ..... [3]

(b) The line CD has equation $y = 0.5x - 11$.

Find the gradient of a line that is perpendicular to the line CD.

..... [1]

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22. 0580_w21_qp_23 Q: 18

Find the equation of the straight line that passes through the points (2, −2) and (3, 10).

Give your answer in the form $y = mx + c$.

$y =$ ..... [3]

---

23. 0580_m20_QP_22 Q: 17

A is the point (3, 5) and B is the point $(1, -7)$.

Find the equation of the line perpendicular to AB that passes through the point A.
Give your answer in the form $y = mx + c$.

$y =$ ..... [4]

---

24. 0580_s20_QP_21 Q: 20

The curve $y = x^2 - 2x + 1$ is drawn on a grid.
A line is drawn on the same grid.
The points of intersection of the line and the curve are used to solve the equation $x^2 - 7x + 5 = 0$.

Find the equation of the line in the form $y = mx + c$.

$y =$ ..... [1]

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25. 0580_w20_qp_21 Q: 14

Find the gradient of a line that is perpendicular to $8y + 4x = 5$.

..... [2]

---

26. 0580_w20_qp_22 Q: 24

A line from the point (2, 3) is perpendicular to the line $y = \frac{1}{3}x + 1$.
The two lines meet at the point P.

Find the coordinates of P.

(..... , ...) [5]

27. 0580_w20_qp_23 Q: 12

A straight line, l, has equation $y = 5x + 12$.

(a) Write down the gradient of line l.

..... [1]

(b) Find the coordinates of the point where line l crosses the x-axis.

(..... , ...) [2]

(c) A line perpendicular to line l has gradient k.

Find the value of k.

$k =$ ..... [1]

28. 0580_m19_QP_22 Q: 23

A is the point (2, 3) and B is the point (7, −5).

(a) Find the co-ordinates of the midpoint of AB.

(....., ...) [2]

(b) Find the equation of the line through A that is perpendicular to AB.
Give your answer in the form $y = mx + c$.

$y =$ ..... [4]

29. 0580_s19_QP_21 Q: 26

Line L passes through the points $(0, -3)$ and $(6, 9)$.

(a) Find the equation of line L.

..... [3]

(b) Find the equation of the line that is perpendicular to line L and passes through the point $(0, 2)$.

..... [2]

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30. 0580_s19_QP_23 Q: 5

(a) Find the co-ordinates of the point where the line $y = 3x - 8$ crosses the y-axis.

(..... , ...) [1]

(b) Write down the gradient of the line $y = 3x - 8$.

..... [1]

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31. 0580_s19_QP_23 Q: 15

A is the point $(7, 12)$ and B is the point $(2, -1)$.

Find the length of AB.

..... [3]

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32. 0580_w19_QP_22 Q: 14

Show that the line $4y = 5x - 10$ is perpendicular to the line $5y + 4x = 35$.

[3]

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33. 0580_w19_QP_23 Q: 7

Find the gradient of the line that is perpendicular to the line $2y = 3 + 5x$.

..... [2]

---

34. 0580_w19_QP_23 Q: 12

A is the point (2, 1) and B is the point (9, 4).

Find the length of AB.

..... [3]

---

35. 0580_w19_QP_23 Q: 13

A straight line joins the points $(3k, 6)$ and $(k, -5)$.
The line has a gradient of 2.

Find the value of k.

$k =$ ..... [3]

---

36. 0580_s18_QP_21 Q: 24

(a) Point A has co-ordinates (1, 0) and point B has co-ordinates (2, 5).

Calculate the angle between the line AB and the x-axis.

..... [3]

(b) The line PQ has equation $y = 3x - 8$ and point P has co-ordinates (6, 10).

Find the equation of the line that passes through P and is perpendicular to PQ.
Give your answer in the form $y = mx + c$.

$y =$ ..... [3]

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37. 0580_s18_QP_22 Q: 25

P is the point (16, 9) and Q is the point (22, 24).

(a) Find the equation of the line perpendicular to PQ that passes through the point (5, 1).
Give your answer in the form $y = mx + c$.

$y =$ ..... [4]

(b) N is the point on PQ such that $PN = 2NQ$.

Find the co-ordinates of N.

(..... , ...) [2]

---

38. 0580_w18_QP_22 Q: 10

Find the mid-point of AB where $A = (w, r)$ and $B = (3w, t)$.
Give your answer in its simplest form in terms of w, r and t.

(..... , ...) [2]

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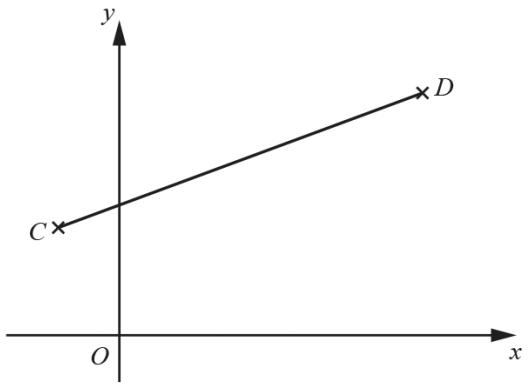
39. 0580_w18_QP_22 Q: 17



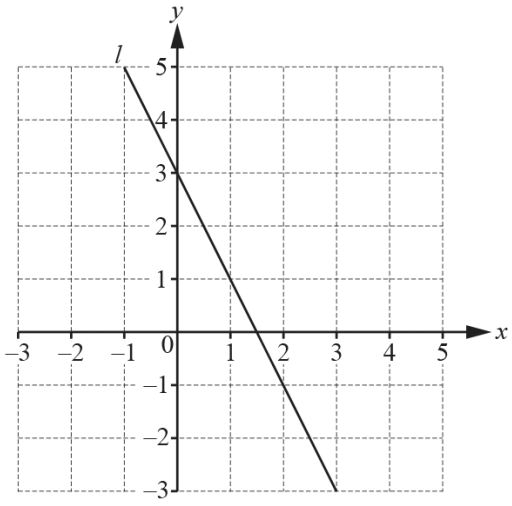
NOT TO SCALE

The diagram shows the points $C(-1, 2)$ and $D(9, 7)$.

Find the equation of the line perpendicular to CD that passes through the point $(1, 3)$.
Give your answer in the form $y = mx + c$.

$y =$ ..... [4]

40. 0580_m17_QP_22 Q: 20



(a) Find the equation of the line l.
Give your answer in the form $y = mx + c$.

$y =$ ..... [3]

(b) A line perpendicular to the line l passes through the point $(3, -1)$.

Find the equation of this line.

..... [3]

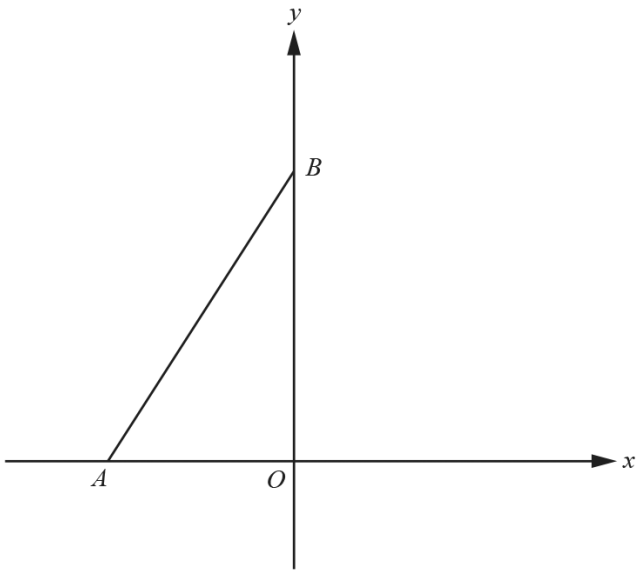
41. 0580_s17_QP_21 Q: 12

A line has gradient 5.
M and N are two points on this line.
M is the point $(x, 8)$ and N is the point $(k, 23)$.

Find an expression for x in terms of k.

$x =$ ..... [3]

42. 0580_s17_QP_22 Q: 27



NOT TO SCALE

A is the point $(-2, 0)$ and B is the point $(0, 4)$.

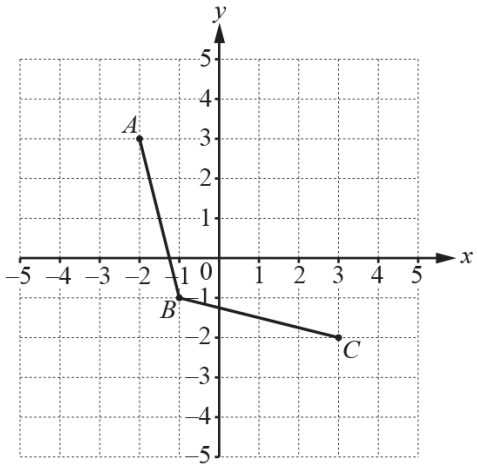
(a) Find the equation of the straight line joining A and B.

..... [3]

(b) Find the equation of the perpendicular bisector of AB.

..... [4]

43. 0580_w17_QP_21 Q: 6



The diagram shows two sides of a rhombus *ABCD*.

(a) Write down the co-ordinates of *A*.

(..... , ...) [1]

(b) Complete the rhombus *ABCD* on the grid. [1]

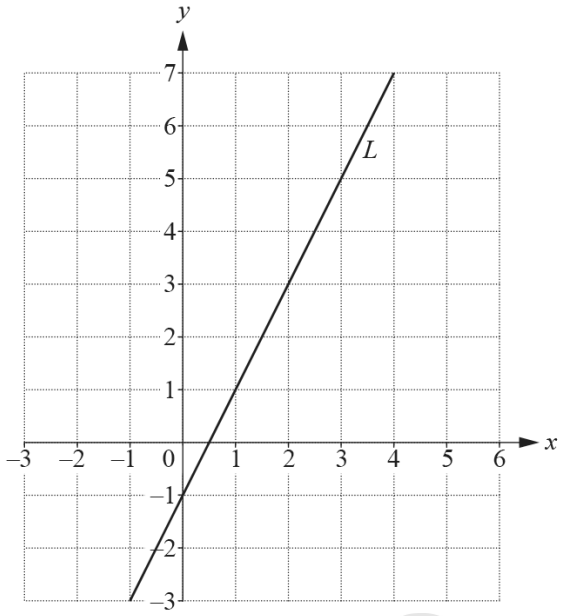
44. 0580_s16_QP_21 Q: 25

A is the point (4, 1) and B is the point (10, 15).

Find the equation of the perpendicular bisector of the line AB.

..... [6]

45. 0580_s16_QP_23 Q: 18



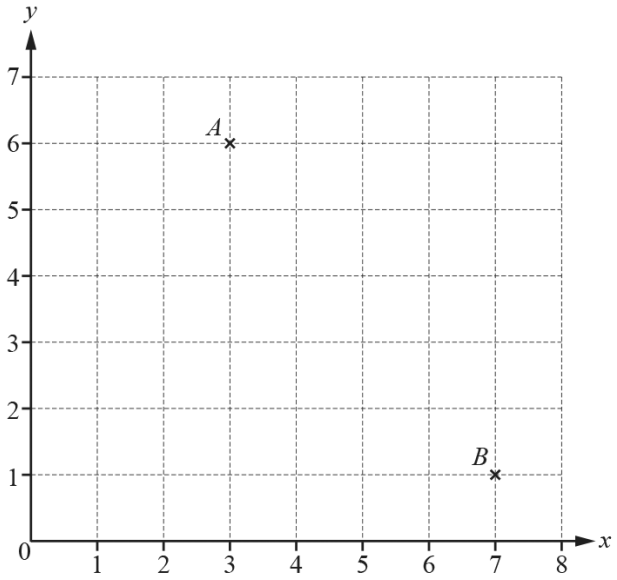
(a) Work out the gradient of the line L.

..... [2]

(b) Write down the equation of the line parallel to the line L that passes through the point (0, 6).

..... [2]

46. 0580_w16_QP_22 Q: 20



Point A has co-ordinates (3, 6).

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

(..... , ...) [1]

(b) Find the gradient of the line AB.

..... [2]

(c) Find the equation of the line that

- is perpendicular to the line AB

and

- passes through the point (0, 2).

..... [3]

47. 0580_w16_QP_23 Q: 17

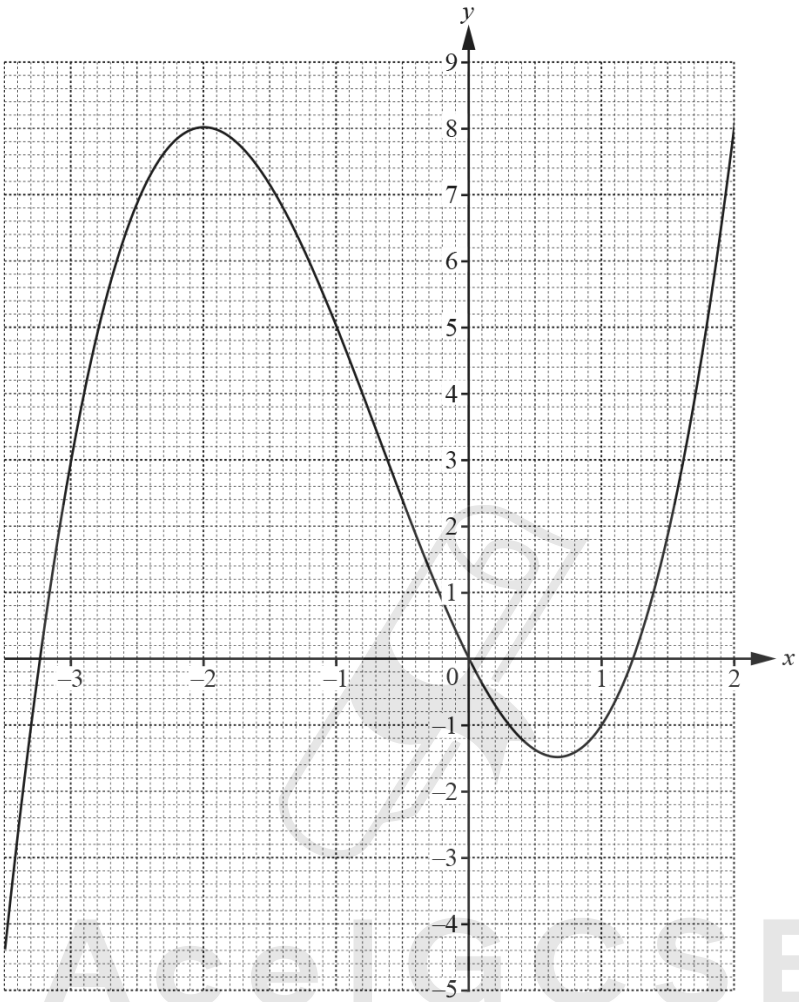
A is the point (8, 3) and B is the point (12, 1).

Find the equation of the line, perpendicular to the line AB, which passes through the point (0, 0).

..... [3]

48. 0580_w16_QP_23 Q: 19

The curve $y = x^3 + 2x^2 - 4x$ is shown on the grid.



(a) By drawing a suitable tangent, find an estimate of the gradient of the curve when $x = 1$.

..... [3]

(b) A point D lies on the curve.
The x co-ordinate of D is negative.
The gradient of the tangent at D is 0.

Write down the co-ordinates of D.

(..... , ...) [1]

49. 0580_m15_QP_22 Q: 14

Find the equation of the line that

- is perpendicular to the line $y = 3x - 1$

and

- passes through the point (7, 4).

Answer ..... [3]

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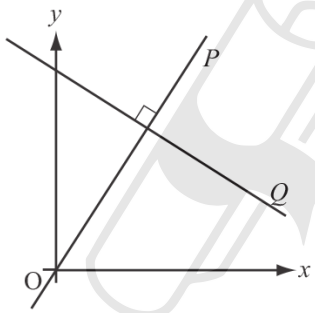
50. 0580_P15_QP_20 Q: 8

This is a sketch of two lines P and Q.



The two lines P and Q are perpendicular.
The equation of line P is $y = 2x$.
Line Q passes through the point (0, 10).

Work out the equation of line Q.

Answer ..... [3]

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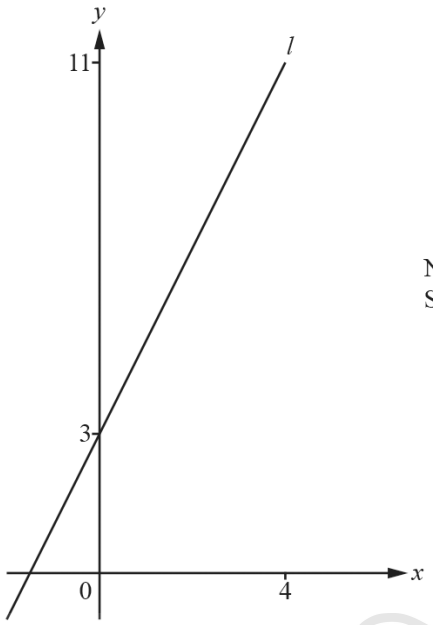
51. 0580_s15_QP_21 Q: 8

The point A has co-ordinates $(-4, 6)$ and the point B has co-ordinates $(7, -2)$.

Calculate the length of the line AB.

Answer AB = ... units [3]

52. 0580_s15_QP_22 Q: 17



NOT TO SCALE

The diagram shows the straight line, l, which passes through the points (0, 3) and (4, 11).

(a) Find the equation of line l in the form $y = mx + c$.

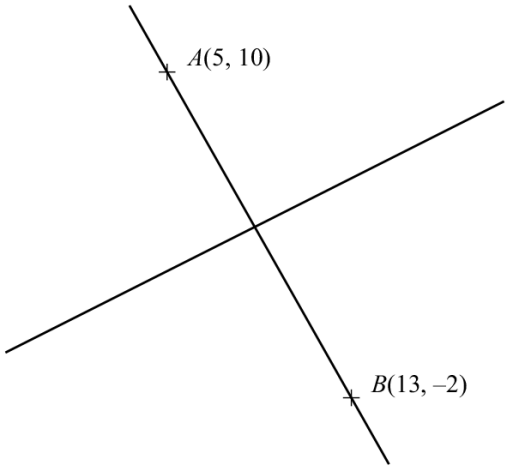
Answer(a) $y =$ ..... [3]

(b) Line p is perpendicular to line l.

Write down the gradient of line p.

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

53. 0580_s14_QP_21 Q: 14



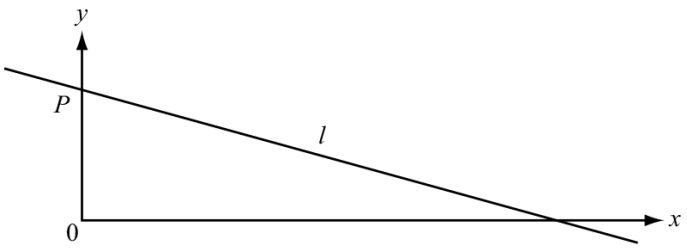
NOT TO SCALE

$A(5, 10)$ and $B(13, -2)$ are two points on the line AB.
The perpendicular bisector of the line AB has gradient $\frac{2}{3}$.

Find the equation of the perpendicular bisector of AB.

Answer ..... [4]

54. 0580_s14_QP_22 Q: 5



NOT TO SCALE

The equation of the line l in the diagram is $y = 5 - x$.

(a) The line cuts the y-axis at P.

Write down the co-ordinates of P.

Answer(a) (..... , ...) [1]

(b) Write down the gradient of the line l.

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

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55. 0580_s14_QP_23 Q: 13

Find the equation of the line passing through the points with co-ordinates (5, 9) and (–3, 13).

Answer ..... [3]

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56. 0580_s13_QP_21 Q: 17

Find the equation of the line passing through the points (0, –1) and (3, 5).

Answer ..... [3]

57. 0580_w13_QP_22 Q: 18

A (5, 23) and B (–2, 2) are two points.

(a) Find the co-ordinates of the midpoint of the line AB.

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

(b) Find the equation of the line AB.

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

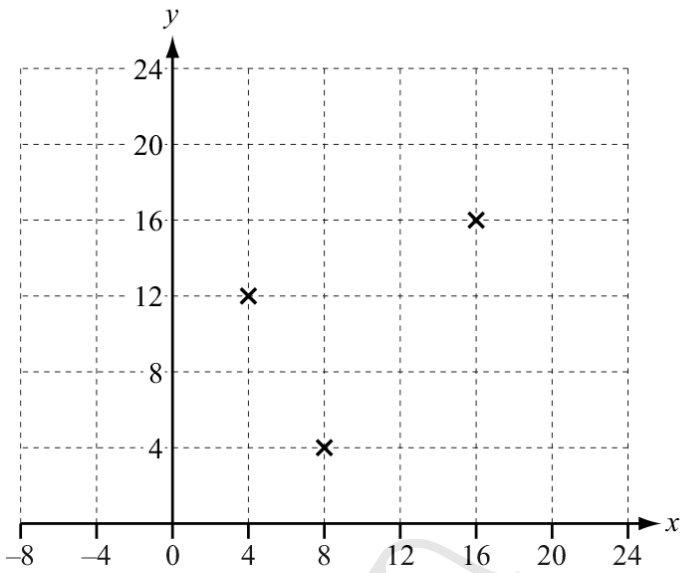
(c) Show that the point (3, 17) lies on the line AB.

Answer(c)

[1]

58. 0580_w13_QP_23 Q: 2

Three of the vertices of a parallelogram are at (4, 12), (8, 4) and (16, 16).



Write down the co-ordinates of two possible positions of the fourth vertex.

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

59. 0580_s12_QP_22 Q: 17

(a) Find the co-ordinates of the midpoint of the line joining $A(-8, 3)$ and $B(-2, -3)$.

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

(b) The line $y = 4x + c$ passes through (2, 6).

Find the value of c.

Answer(b) $c =$ ..... [1]

(c) The lines $5x = 4y + 10$ and $2y = kx - 4$ are parallel.

Find the value of k.

Answer(c) $k =$ ..... [2]

60. 0580_w12_QP_22 Q: 20

(a) The two lines $y = 2x + 8$ and $y = 2x - 12$ intersect the x-axis at P and Q.

Work out the distance PQ.

Answer(a) $PQ =$ ..... [2]

(b) Write down the equation of the line with gradient -4 passing through $(0, 5)$.

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

(c) Find the equation of the line parallel to the line in **part (b)** passing through $(5, 4)$.

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