St Peter the Apostle High School

Maths Department

Higher Practice Questions

1. Straight Line

1 Find the gradient of the line joining each pair of points:

(a) T(3, 2) and R(4, 4)
(b) A(– 1, 3) and Q(4, 8)
(c) C(– 3, – 2) and S(7, 3)
(d) V(0, 3) and L(– 3, 9)
(e) B(1, 4) and H(– 1, – 2)
(f) G(– 3, 4) and W(– 1, 8)
(g) K(9, – 2) and N(5, – 12)
(h) X(– 7, – 4) and E(– 3, – 2)

2 Rearrange the equation of each line so that it is in the form $y = mx + c$ and write down its gradient and y – intercept.

(a) $3y - 5x = 3$
(b) $4x + 3y = 9$
(c) $2x - y = -12$
(d) $5y + 2x = 0$
(e) $2y - 6x + 15 = 0$
(f) $4x - 3y - 7 = 0$
(g) $5x + 2y + 6 = 0$
(h) $8y + 4x - 11 = 0$

3 Write down the equation, in the form $y = mx + c$, where possible, of each of the straight lines described below.

(a) A straight line passes through the point (0, 7), with a gradient of 6.

(b) A straight line passes through the point (0, 11), with a gradient of -2.

(c) A straight line has a gradient of $\frac{1}{2}$ and passes through the point $(-1, 4)$.

(d) A straight line parallel to the x – axis and passes through $(-2, 4)$.

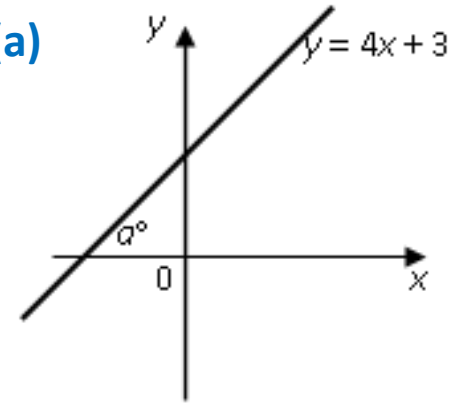
(e) A straight line parallel to the y – axis and passes through (5, 1).

(f) The A straight line passes through the point $(0, -4)$, with a gradient of $\frac{2}{3}$.

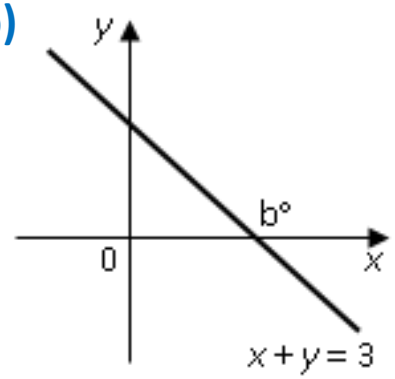
(g) A straight line has a gradient of $-\frac{1}{2}$ and passes through the point $(-1, 4)$.

4 Calculate the size of the angle marked in each diagram.

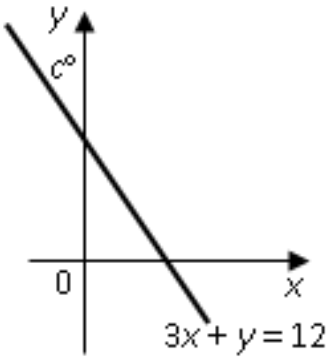
(a)



(b)

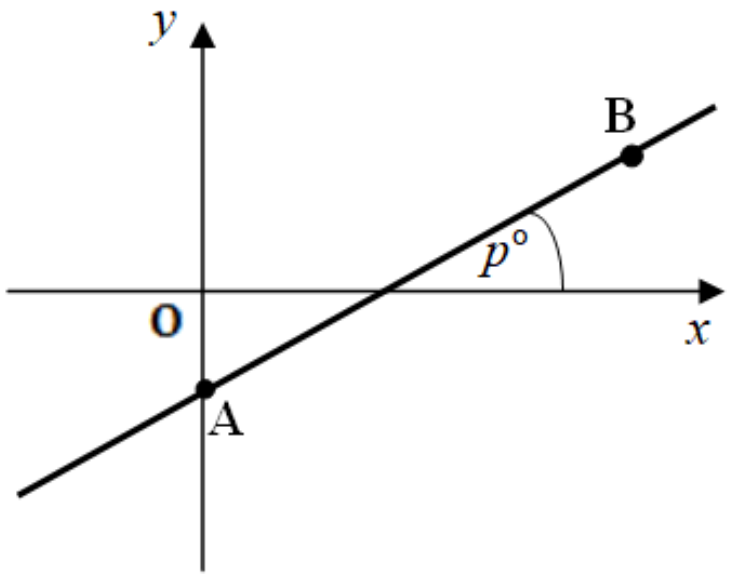


(c)



5

(a) Find the gradient of the line AB where $A(0, -2)$ and $B(4\sqrt{3}, 2)$



(b) Find the size of the angle $p°$, that the line AB makes with the positive direction of the x-axis

6 Find the point of intersection between each pair of lines

(a) $3x + 4y = -7$ and $2x + y = -3$
(b) $y = -x + 12$ and $y = x - 4$
(c) $2x - 5y = 1$ and $4x - 3y = 9$
(d) $2x + 4y = 7$ and $4x - 3y = 3$
(e) $2x + 5y = 16$ and $x - y = 1$

7 Prove that each of the following sets of points is collinear

(a) A(1, 1) , B(3, 9) and C(–2, –11)
(b) P(–2, –3), Q(0, 1) and R(5, 11)
(c) S(2, 1), T(5, –2) and U(3, 0)
(d) D(–2, 1), E(–1, 0) and F(7, –8)

8 The points (2, – 2), (3, p) and (– 1,7) are collinear. Find the value of p.

9 Use the distance formula to calculate the length of the straight line joining each pair of points. Leave your answer as a surd.

(a) A(1, 5) and B(3, 3)
(b) P(– 7, 1) and Q (3, 8)
(c) C(– 3, – 5) and D(7, 1)
(d) V(0, 3) and W (– 7, 9)
(e) G(7, 3) and H(– 1, – 2)
(f) R(– 2, 3) and S (– 1, 8)

10 **(a)** Find the midpoint of each pair of points.

(i) A(– 3, 1) and B(1, 3)
(ii) P(1, 4) and Q(9, 8)
(iii) C(3, – 3) and D(– 6, 1)
(iv) V(– 7, 1) and W(3, 9)
(v) G(2, 4) and H(– 2, – 2)
(vi) R(– 6, 2) and S(– 2, 8)

(b) The line CD has the midpoint (5, 3) and the point C has coordinates (– 3, 2). Find the coordinates of D.

(c) The line AB has the midpoint (– 2, 7) and the point A has coordinates (3, – 7) Find the coordinates of B.

11 Write down the gradient of the line perpendicular to the gradient given

(a) $m = 3$

(b) $m = -2$

(c) $m = 6$

(d) $m = \frac{1}{3}$

(e) $m = -\frac{1}{4}$

(f) $m = \frac{1}{5}$

(g) $m = -\frac{2}{3}$

(h) $m = \frac{5}{4}$

(i) $m = -\frac{3}{5}$

(j) $m = 0$

12 Write down the gradient of the line perpendicular to the given line.

(a) $y = 5x + 2$

(b) $y = \frac{2}{3}x - 7$

(c) $y = 2 - 3x$

(d) $y = 4 - \frac{1}{2}x$

(e) $y = 3x - 3$

(f) $y = x + 9$

(g) $y - 4x + 12 = 0$

(h) $3x - y - 8 = 0$

(i) $3x - 2y + 7 = 0$

(j) $8y + 4x - 2 = 0$

13 Find the equations of the straight lines through the following pairs of points:

(a) (3, 4), (1, 2)
(b) (0, 1), (– 5, – 2)
(c) (– 1, – 3), (4, 0)
(d) (0, 0), (2, – 3)
(e) (1, – 4), (3, – 6)
(f) (– 5, – 2), (– 8, – 1)

14 Find the equations of the straight lines through the following points, parallel to the given lines:

(a) (2, 3), $y = 6x - 4$
(b) (– 5, 2), $x + y = 5$
(c) (1, 0), $x - y = 0$
(d) (– 3, 2), $2x + 3y + 4 = 0$

15 Find the equations of the straight lines perpendicular to the given line, passing through the given points:

(a) $y = 2x - 3$, (6, – 1)
(b) $y - 4x = 1$, (9, 3)
(c) $2y - x - 5 = 0$, (3, 4)
(d) $2x + 3y + 1 = 0$, (5, 0)

16 P is (3, 5), Q is (– 3, 1) and R is (5, – 3). Find:

(a) the midpoint of QR
(b) the gradient of the median from P
(c) the equation of the median from P.

17 Find the equations of the medians of the triangle ABC, in which A is the point (6, 8), B is (– 4, 0) and C is (2, – 2).

18 P is (5, 2), Q is (– 3, 0) and R is (3, – 4). Find:

(a) the gradient of QR
(b) the gradient of the altitude from P
(c) the equation of the altitude from P.

19 Find the equations of the altitudes of the triangle with vertices A(4, 0), B(0, 4) and C(– 2, – 2).

20 Find the equations of the perpendicular bisectors of the straight lines joining the points:

(a) D(8, 4) and E(2, 6)

(b) F(– 1, 3) and G(1, – 3)

21 The vertices of a triangle are P(– 3, 1), Q(5, 5) and R(6, – 2).

(a) Find **(i)** the equations of the perpendicular bisectors of PQ and QR.

(ii) the intersection point, S, of these lines.

(b) Show that S lies on the perpendicular bisector of PR.