

Topic test 7

Coordinate geometry

- Time allowed: 45 minutes
- Part A: 20 multiple-choice questions (40 marks)
- Part B: 16 free-response questions (60 marks)

Name: _____

Part A

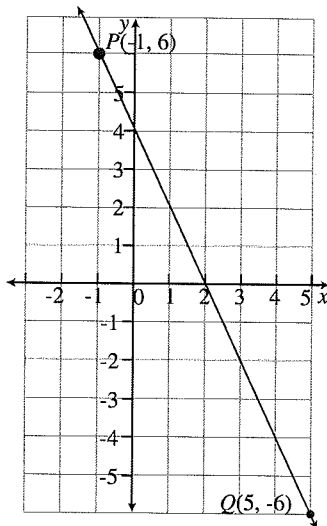
20 multiple-choice questions

2 marks each: 40 marks

Circle the correct answer.

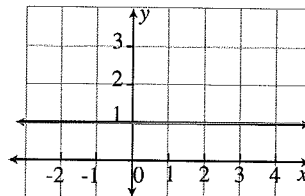
- 1 Which one of these points lies on the line $y = 3x - 4$?
- A (5, 4) B (-1, 12)
 C (2, 2) D (4, 3)

Questions 2 to 5 refer to the graph below.



- 2 The length of interval PQ is closest to:
- A 10.4 units B 13.4 units
 C 6.0 units D 12.6 units
- 3 The gradient of interval PQ is:
- A $\frac{1}{2}$ B $-\frac{1}{2}$
 C 2 D -2
- 4 The midpoint of interval PQ is
- A (2, 6) B (3, -2)
 C (2, 0) D (3, 0)
- 5 The line through PQ has equation:
- A $y = 2x + 2$ B $y = -2x + 4$
 C $y = -\frac{1}{2}x + 2$ D $y = \frac{1}{2}x + 4$

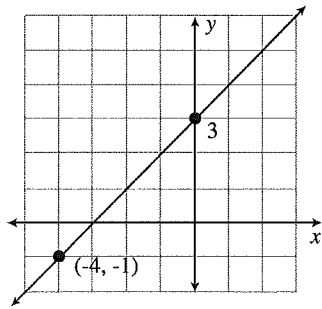
- 6 What is the equation of this line?



- A $y = x + 1$ B $x = 0$
 C $x = 1$ D $y = 1$
- 7 The gradient of $y = -3x - 6$ is:
- A -6 B -3
 C 2 D 3
- 8 The y-intercept of $y = -3x - 6$ is:
- A -6 B -3
 C 2 D 3
- 9 The x-coordinate of the midpoint of the interval joining points (x_1, y_1) and (x_2, y_2) is:
- A $\frac{x_1 + y_1}{2}$ B $\frac{x_1 + x_2}{2}$
 C $\frac{x_2 - x_1}{2}$ D $\frac{y_2 - y_1}{x_2 - x_1}$
- 10 The gradient of $y = \frac{3x}{4} + \frac{1}{2}$ is:
- A $-\frac{1}{2}$ B $\frac{1}{2}$
 C $-\frac{3}{4}$ D $\frac{3}{4}$
- 11 The graph of $x = 0$:
- A has zero gradient B is the x-axis
 C is the y-axis D has no y-intercept
- 12 The gradient of $y = \frac{x}{2} + 5$ is:
- A $\frac{1}{2}$ B 2
 C 5 D 10
- 13 Which one of these lines has a gradient of -1?
- A $y = -1$ B $y = x - 1$
 C $y = -x + 1$ D $y = x + 1$

Topic test 7: Coordinate geometry *continued*

14 What is the equation of this line?



- A $y = x - 4$ B $y = x + 3$
 C $y = -x + 3$ D $y = 2x + 7$

15 Which line is parallel to $y = 2 + 3x$?

- A $y = 1 - 3x$ B $y = \frac{x}{3} + 2$
 C $y = 3$ D $y = 3x + 6$

16 Which line is parallel to $y = 4$?

- A $y = 4x$ B $y = -1$
 C $x = 4$ D $y = x - 4$

17 Which one of these points lies on the line $2x + 3y = 9$?

- A (2, 2) B (6, -1)
 C (-2, 4) D (0, -4)

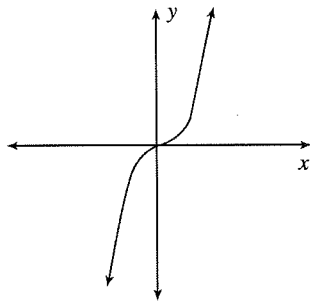
18 $3x + 4y + 12 = 0$ can be rewritten as:

- A $y = \frac{3}{4}x + 4$ B $y = -\frac{3}{4}x + 3$
 C $y = \frac{3}{4}x - 4$ D $y = -\frac{3}{4}x - 3$

19 Which one of these lines is not parallel to the other three?

- A $y = 4 - x$ B $y = 6 - 4x$
 C $-4x = y$ D $y = -4x + 10$

20 What is the equation of this curve?



- A $x + y = 1$ B $y = x^2$
 C $y = 2^x$ D $y = x^3$

Part B

16 free-response questions

60 marks

Show working where appropriate.

21 (2 marks) Write the equation of a straight line that has a y-intercept of 4.

22 (2 marks) Draw the graph of $x = -3$ on a number plane.

23 (6 marks) The interval AB on a number plane has endpoints $A(-3, 1)$ and $B(7, 5)$.

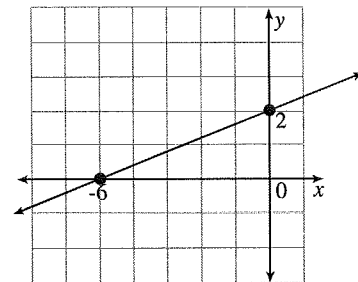
Find:

a the gradient of AB

b the length of AB as a surd

c the midpoint of AB

24 (2 marks) Find the equation of this line.

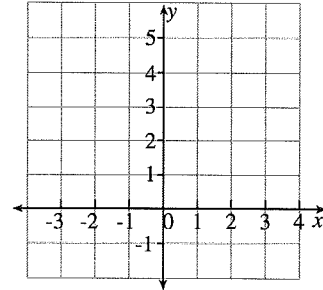


Topic test 7: Coordinate geometry *continued*

25 (6 marks) A triangle has vertices at $P(-2, -5)$, $Q(1, 4)$ and $R(10, 1)$. Prove that it is isosceles.

28 (4 marks)

a Graph $y = 2 - \frac{1}{2}x$ on the number plane below.

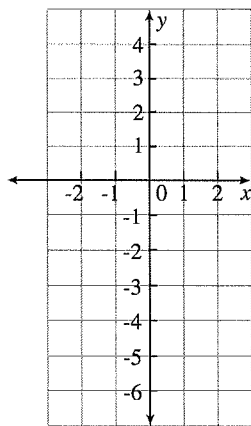


b What is the x -intercept of the line?

26 (4 marks)

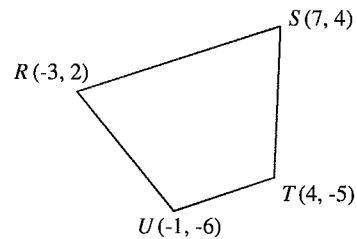
a Graph this table of values on the number plane below.

x	-1	0	1	2
y	-6	-3	0	3



b Find the equation of the line.

29 (4 marks) The vertices of a quadrilateral are $R(-3, 2)$, $S(7, 4)$, $T(4, -1)$ and $U(-1, -6)$. Prove that $RSTU$ is a trapezium.



30 (2 marks) Rewrite the equation $5x + 2y + 14 = 0$ in gradient-intercept form ($y = mx + b$).

31 (4 marks) Rewrite each equation in general form ($ax + by + c = 0$).

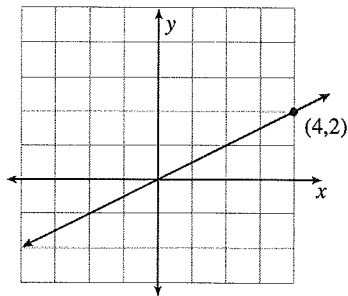
a $y = -3x + 10$

b $y = \frac{2x}{5} - 1$

27 (2 marks) Write the equation of a line that has a gradient of 7 and a y -intercept of -3.

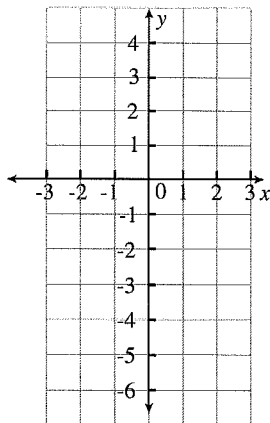
Topic test 7: Coordinate geometry *continued*

32 (2 marks) Find the equation of this line.



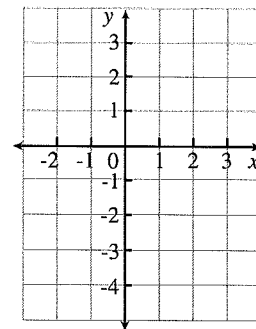
35 (4 marks) Find the gradient and y-intercept of the line with equation $6x - 4y + 6 = 0$.

33 (6 marks) Graph $y = -2x + 1$ and $y = 3x - 4$ on the number plane below and write the coordinates of the point of intersection.



36 (4 marks) Complete the table for $y = x^2 - 4$ and graph the equation on the number plane.

x	-2	-1	0	1	2	3
y						



END OF TEST.

Use this column for extra working space.

34 (6 marks) The vertices of a quadrilateral are $H(0, 6)$, $I(5, 8)$, $J(9, -2)$ and $K(4, -4)$.

a Find the lengths of diagonals HJ and IK . (Is the point of intersection of the diagonals also the midpoint of each diagonal?)

b Hence what type of quadrilateral is $HIJK$? Give a reason for your answer.

Topic test 7 : Coordinate geometry continued

24 (6 marks) Show that the points $S(-6, 2)$, $T(-2, 9)$, $W(4, 6)$ and $X(0, -1)$ are the vertices of a parallelogram.

$$m_{ST} = \frac{2-9}{-6-2} = 1.75$$

$$m_{TW} = \frac{6-9}{4-2} = -1.5$$

$$m_{WX} = \frac{-1-6}{0-4} = 1.75$$

$$m_{XS} = \frac{-1-2}{0-(-6)} = -0.5$$

2 pairs opposite sides parallel \therefore it's a parallelogram.

25 (6 marks) Find the x - and y -intercepts of the line $x + 2y - 4 = 0$ and hence graph the line on the number plane.

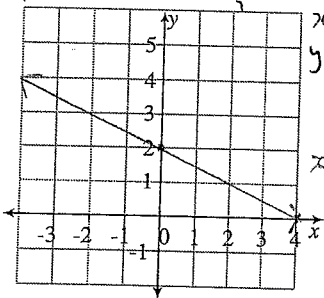
$$2y = -x + 4$$

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

$$0 = -\frac{x}{2} + 2$$

$$-2 = -\frac{x}{2} \rightarrow -4 = -x$$

x intercept is 4
 y intercept is 2



27 (4 marks) Find in general form the equation of the line that passes through the points $(-5, 7)$ and $(3, 0)$.

$$m = \frac{0-7}{3-(-5)} = -\frac{7}{8}$$

$$y = -\frac{7}{8}x + b$$

$$0 = (-7 \times 3) + b$$

$$b = 21$$

$$y = -\frac{7}{8}x + 21 \rightarrow 8y = -7x + 21$$

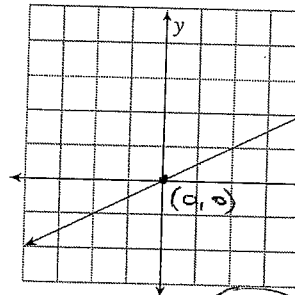
$$7x + 8y - 21 = 0$$

28 (2 marks) Write the equation $5x + 2y + 14 = 0$ in gradient-intercept form $y = mx + b$.

$$2y = -5x - 14$$

$$y = -\frac{5}{2}x - 7$$

29 (2 marks) Find the equation of this line.



$$m = \frac{2-2}{4-0} = 0$$

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

$$2 = \frac{4}{2} + b$$

$$b = 0$$

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

26 (9 marks) The points $R(-1, 0)$, $S(9, 5)$ and $T(14, -5)$ are the vertices of a triangle.

a Prove that $\triangle RST$ is right-angled at S .

$$RT = \sqrt{(-1-14)^2 + (0-(-5))^2} = \sqrt{250}$$

$$RS = \sqrt{(-1-9)^2 + (0-5)^2} = \sqrt{125}$$

$$ST = \sqrt{(9-14)^2 + (5-(-5))^2} = \sqrt{125}$$

$\sqrt{250}^2 = \sqrt{125}^2 + \sqrt{125}^2$
 $\therefore \triangle RST$ is right-angled at S .

b Prove that $\triangle RST$ is isosceles.

$$RS = \sqrt{125}$$

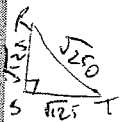
$$ST = \sqrt{125}$$

2 sides equal $\therefore \triangle RST$ is isosceles

c Find the area of $\triangle RST$.

$$\text{area} = \frac{\sqrt{125} \times \sqrt{125}}{2}$$

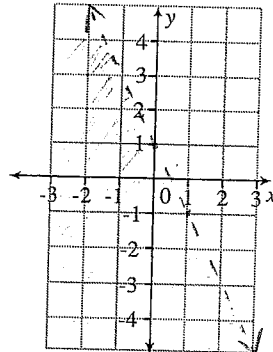
$$= 62.5 \text{ units}^2$$



30 (6 marks) Graph $2x + y < 1$ on the number plane below.

$$y < -2x + 1$$

$$0 < (-2 \times 0) + 1$$



35

Topic test 7 : Coordinate geometry continued

31 (2 marks) Write $y = \frac{2x}{5} - 1$ in general form.

$$5y = 2x - 5$$

$$2x - 5y - 5 = 0$$

34 (4 marks) Complete the table for $y = x^2 - 4$ and graph the equation on the number plane.

x	-2	-1	0	1	2	3
y	0	-3	-4	-3	0	5

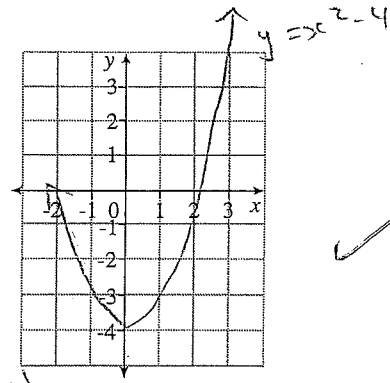
32 (6 marks)

a Find the gradient and y-intercept of the line with equation $6x - 4y - 4 = 0$.

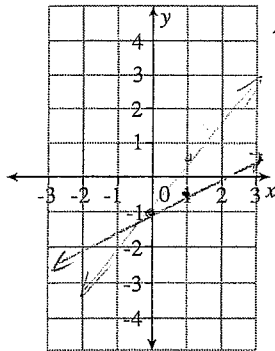
$$4y = 6x - 4$$

$$y = \frac{6x}{4} - 1$$

$$m = 1.5 \text{ and } b = -1$$



b Hence, graph $6x - 4y - 4 = 0$ on the number plane.



the gradient's 1.5, not 0.5, idiot!

17

33 (6 marks) The vertices of a quadrilateral are $H(0, 6)$, $I(5, 8)$, $J(9, -2)$ and $K(4, -4)$.

a Find the lengths of diagonals HJ and IK .

$$HJ = \sqrt{(0-9)^2 + (6-(-2))^2}$$

$$= \sqrt{145} \text{ units}$$

$$IK = \sqrt{(5-4)^2 + (8-(-4))^2}$$

$$= \sqrt{145} \text{ units}$$

b By finding the midpoints of the diagonals, show that the diagonals bisect each other.

$$\text{mid } HJ = \frac{0+9}{2}, \frac{6+(-2)}{2}$$

$$= (4.5, 2)$$

$$\text{mid } IK = \frac{5+4}{2}, \frac{8+(-4)}{2}$$

$$= (4.5, 2) \Rightarrow \text{same midpoint}$$

c Hence, what type of quadrilateral is HJK ? Give reasons for your answer.

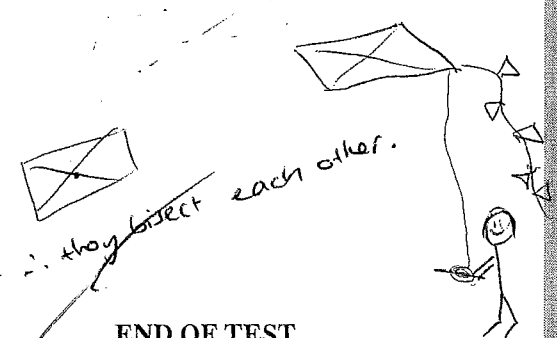
$$m_{HI} = \frac{8-6}{5-0} = 0.4$$

$$m_{JK} = \frac{-4-2}{4-9} = 0.4$$

$$m_{IJ} = \frac{-2-8}{9-5} = -2.5$$

$$m_{KH} = \frac{-4-6}{4-0} = -2.5$$

HJK is a rectangle because 2 pairs opp. sides parallel, diagonals are equal and bisect each other + opposite sides are equal



END OF TEST.

Use the rest of this page for extra working space.

$$HI = \sqrt{(0-5)^2 + (6-8)^2} = \sqrt{29}$$

$$IJ = \sqrt{(5-9)^2 + (8-(-2))^2} = \sqrt{116}$$

$$JK = \sqrt{(9-4)^2 + (-2-(-4))^2} = \sqrt{29}$$

$$KH = \sqrt{(0-4)^2 + (6-(-4))^2} = \sqrt{116}$$

Topic test 7 : Coordinate geometry continued

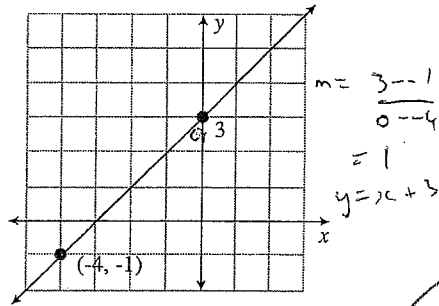
12 Which line is parallel to $y = 2 + 3x$? $y = 3x + 2$

- A $y = 3x + 6$ B $y = \frac{x}{3} + 2$
 C $y = 3$ D $y = 1 - 3x$

13 Which line has a gradient of -1?

- A $y = -1$ B $y = x - 1$
 C $y = -x + 1$ D $y = x + 1$

14 What is the equation of this line?



- A $y = x - 4$ B $y = x + 3$
 C $y = -x + 3$ D $y = 2x + 7$

15 Find the equation of the line that is parallel to $8x - 2y + 5 = 0$ and passes through the point $(7, -5)$. $2y = 8x + 5$
 $y = 4x + 2.5$

- A $y = \frac{1}{4}x + \frac{13}{4}$ B $y = 4x + 27$
 C $y = -4x + 23$ D $y = 4x - 33$

16 Which line is parallel to $y = 4$?

- A $y = 4x$ B $y = -1$
 C $x = 4$ D $y = x - 4$

17 Which one of these points lies on the line $2x + 3y = 9$?

- A $(2, 2)$ B $(6, -1)$
 C $(-2, 4)$ D $(0, -4)$

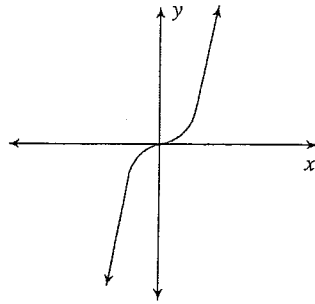
18 $3x + 4y + 12 = 0$ can be rewritten as:

- A $y = \frac{3}{4}x + 4$ B $y = -\frac{3}{4}x + 3$
 C $y = \frac{3}{4}x - 4$ D $y = -\frac{3}{4}x + 3$

19 Which one of these lines is not parallel to the other three?

- A $y = 4 - x$ B $y = 6 - 4x$
 C $-4x = y$ D $y = -4x + 10$

20 What is the equation of this curve?



- A $x + y = 1$ B $y = x^2$
 C $y = 2^x$ D $y = x^3$

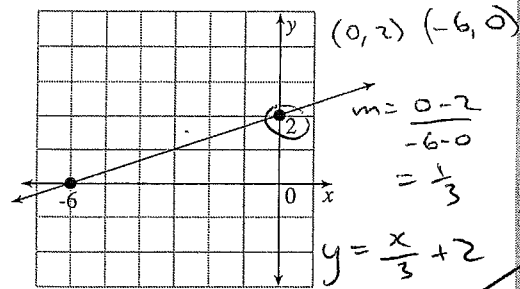
Part B

14 free-response questions

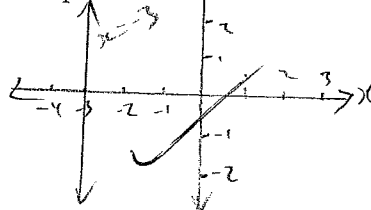
60 marks

Show working where appropriate.

21 (2 marks) Find the equation of this line.



22 (2 marks) Draw the graph of $x = -3$ on a number plane.



23 (3 marks) Find the equation of the line perpendicular to the line $y = 4 - x$ and passing through the point $(8, 1)$.

$y = -x + 4$
 m should be 1
 $1 = (1 - 8) + b$
 $\therefore b = -7$
 $y = x - 7$