

MM12 Assignment 1 – Coordinate Geometry
Section A: Short Answer

No Calculator Allowed

Exact answers are required unless instructed otherwise within the question

Skills = / 15

Analysis = / 19

1. Given $M(3, y)$ is the midpoint of the points $A(-x, 2x)$ and $B(4, 3)$ find the values of x and y .

Midpoint $\left(\frac{-x+4}{2}, \frac{2x+3}{2} \right)$

$$\frac{-x+4}{2} = 3$$

$$-x+4 = 6$$

$$-x = 2$$

$$x = -2$$

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

sub. $x = -2$

$$\frac{-4+3}{2} = y$$

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

2. On the axes provided sketch the graph of $2x - 3y = 9$. Find and label the coordinates of any axes intercepts. (3 marks)

x intercept, $y = 0$

$$2x = 9$$

$$x = \frac{9}{2}$$

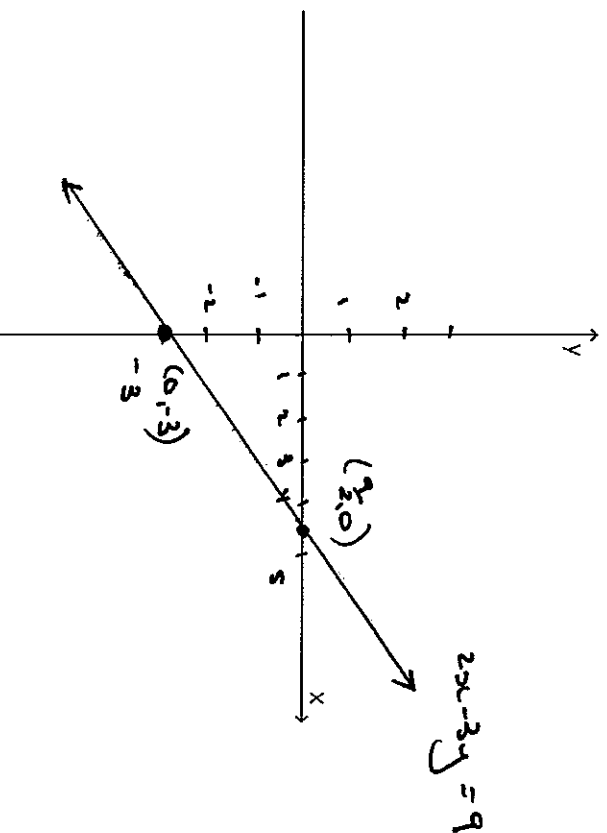
$$\left(\frac{9}{2}, 0 \right)$$

y intercept, $x = 0$

$$-3y = 9$$

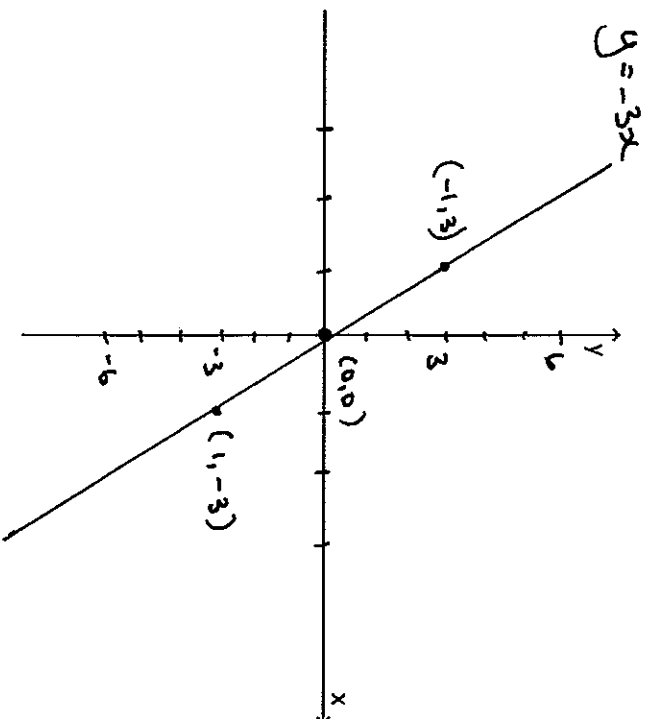
$$y = -3$$

$$(0, -3)$$



(3 marks)

3. On the axes provided, sketch the graph of $y = -3x$. Find and label the **coordinates** of any axes intercepts.



(2 marks)

4. Find the equation of the line passing through $(-2, 10)$ and $(4, -5)$. Write your answer in the form $ax + by = c$, where a , b and c are integers.

$$m = \frac{10 - -5}{-2 - 4}$$

$$= -\frac{15}{6}$$

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

$$y - y_1 = m(x - x_1)$$

$$y - 10 = -\frac{5}{2}(x + 2)$$

$$2y - 20 = -5x - 10$$

$$5x + 2y = 10.$$

(3 marks)

End of Section A

Section B: Multiple Choice
Circle the correct answer

Calculator Allowed

1. In the diagram on the right, the value of x is:

A ☐
 B ☒
 C ☐

2 $\sqrt{2}$
4

$$x^2 + 4^2 = (3x)^2$$

$$x^2 + 16 = 9x^2$$

D ☐

$\sqrt{\frac{8}{5}}$

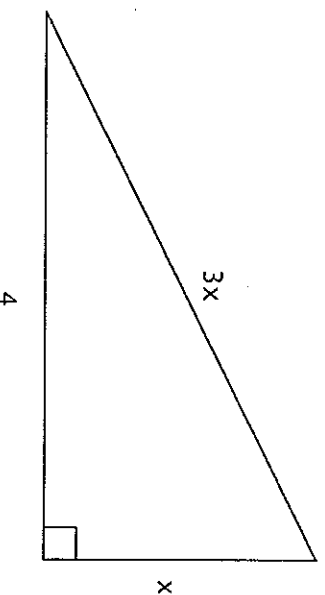
$$8x^2 = 16$$

E ☐

$\frac{1}{2}$

$$x^2 = 2$$

$$x = \sqrt{2} \quad \text{since } x > 0.$$



2. The length of the line joining $A(-2, 5)$ and $B(3, -7)$ is:

A ☐

$\sqrt{5}$

$$L = \sqrt{(-2-3)^2 + (5-(-7))^2}$$

B ☐

17

$$= \sqrt{25 + 144}$$

C ☐

3

$$= \sqrt{169}$$

D ☐

$\sqrt{145}$

$$= 13$$

E ☒

13

3. If m is the gradient of the line joining $A(4, -1)$ and $B(4, 7)$ then:

A ☐

$m = 0$

$$m = \frac{-1-7}{4-4}$$

B ☐

$m = \frac{3}{4}$

$$= \frac{-8}{0}$$

C ☐

$m < 0$

D ☒

m is undefined

undefined.

E ☐

$m > \frac{3}{4}$

4. The anticlockwise angle turned from the positive direction of the x -axis to the line $y = mx + 3$ is 130° . The value of m is closest to:

A ☐

1.2

$$m = \tan 130^\circ$$

B ☒

-1.2

$$m = -1.19175$$

C ☐

2.5

D ☐

-2.5

E ☐

-0.3

End of Section B

Section C: Analysis

Calculator Allowed

Exact answers are required unless instructed otherwise within the question

1. Given $(3, -1)$ lies on the line passing through $(0, 5)$ and $(-1, y)$, find the value of y .

$$m_1 = \frac{5 - y}{0 - -1}$$

$$m_2 = \frac{5 - -1}{0 - 3}$$

$$m_1 = 5 - y$$

$$m_2 = -2$$

Since all points are on the same line, $m_1 = m_2$

$$5 - y = -2$$

$$y = 7.$$

2. At the football, three pies and two cans of cola cost \$17.90, whereas five pies and three cans of cola cost \$29.10. Let \$ p be the cost of the pie and \$ c be the cost of a cola drink. (3 marks)

- a) Write two equations in terms of p and c , to represent the above information.

$$1. \quad 3p + 2c = 17.90$$

$$2. \quad 5p + 3c = 29.10$$

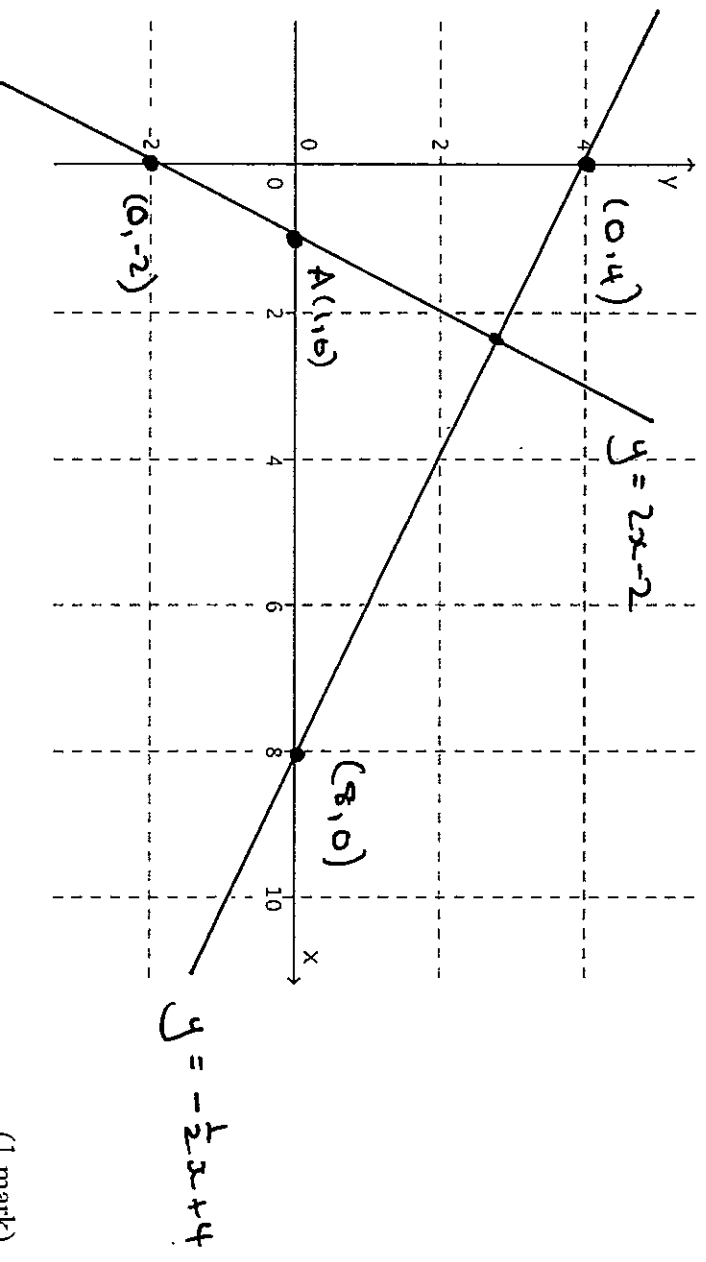
- b) Hence, solve these equations to find the cost of a pie and a cola drink. (2 marks)

$$\text{pie is } \$4.50$$

$$\text{cola is } \$2.20$$

(1 mark)

3. a) On the axes provided below draw the line $y = -\frac{1}{2}x + 4$.



- b) On the same axes plot the point $A(1, 0)$. (1 mark)

- c) Find the equation of the line that passes through $(1, 0)$ and is perpendicular to the line $y = -\frac{1}{2}x + 4$. (1 mark)

$$m = 2$$

$$y - 0 = 2(x - 1)$$

$$y = 2x - 2$$

- d) Draw the line passing through $(1, 0)$ and perpendicular to $y = -\frac{1}{2}x + 4$. (2 marks)

(1 mark)

- e) Find the shortest distance from the point $(1, 0)$ to the line $y = -\frac{1}{2}x + 4$. Give your answer correct to 1 decimal place.

$$dx =$$

Point of intersection is the closest to A.

$$2x - 2 = -\frac{1}{2}x + 4$$

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

$$x = \frac{12}{5} \quad y = \frac{14}{5}$$

$$d = \sqrt{\left(\frac{12}{5} - 1\right)^2 + \left(\frac{14}{5}\right)^2}$$

$$= 3.1 \text{ units}$$

(3 marks)

4. Given $a \neq 0$, consider the system of equations below.

$$x + ay = 4$$

$$3ax - y = 2$$

- a) Show that this system will always have one unique solution for x and y .

unique solution if $u_1 \neq u_2$

$$x + ay = 4$$

$$y = -\frac{x}{a} + \frac{4}{a}$$

$$\text{Let } u_1 = -\frac{1}{a}$$

$$3ax - y = 2$$

$$y = 3ax - 2$$

$$\text{Let } u_2 = 3a$$

if $u_1 \neq u_2$

$$-\frac{1}{a} \neq 3a$$

$$3a^2 \neq -1$$

$$a^2 \neq -\frac{1}{3}$$

This is true for all values of a since a square cannot be negative

(3 marks)

- b) Find the value of a if the solution to the system is $(x, y) = (0, -2)$

$$x + ay = 4$$

$$\text{sub } (0, -2)$$

$$-2a = 4$$

$$a = -2$$

(2 marks)

End of Section C