Name: ANSWERS.

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. $x = -2$

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

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

(3 marks)

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

x intercept, $y = 0$

$2x = 9$

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

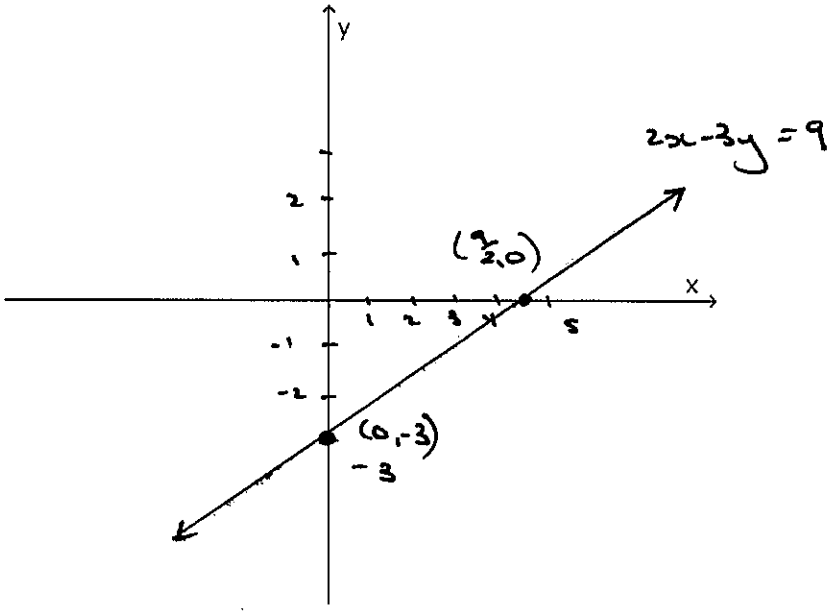
$(\frac{9}{2}, 0)$

y intercept, $x = 0$

$-3y = 9$

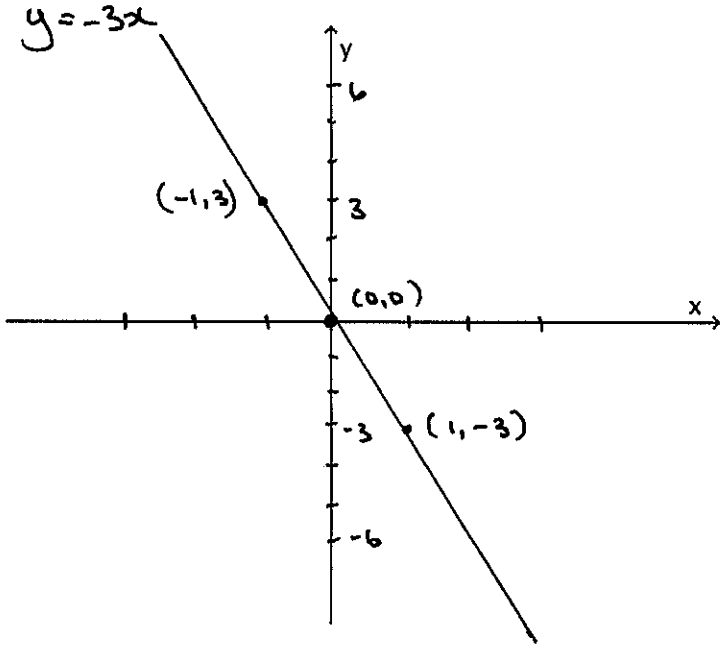
$y = -3$

$(0, -3)$



(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*.

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

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

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

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

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

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

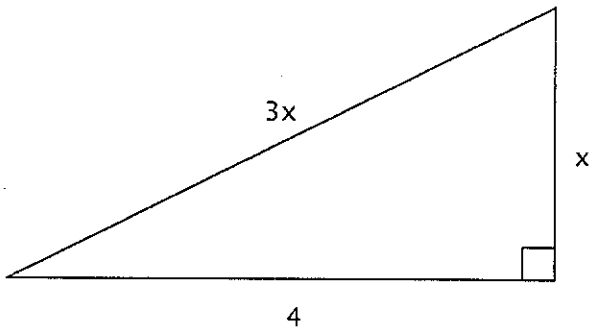
$$5x + 2y = 10.$$

(3 marks)

End of Section A

Section B: Multplie Choice **Calculator Allowed**
Circle the correct answer

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



A 2
B $\sqrt{2}$
C 4
D $\sqrt{\frac{8}{5}}$
E $\frac{1}{2}$

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

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

$8x^2 = 16$

$x^2 = 2$

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

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

A $\sqrt{5}$
B 17
C 3
D $\sqrt{145}$
E 13

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

$= \sqrt{25 + 144}$

$= \sqrt{169}$

$= 13$

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

A $m = 0$
B $m = \frac{3}{4}$
C $m < 0$
D m is undefined
E $m > \frac{3}{4}$

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

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

undefined.

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
B –1.2
C 2.5
D –2.5
E –0.3

$m = \tan 130^\circ$

$m = -1.19175$

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.

$m_1 = \frac{5-y}{0--1}$ $\quad$ $m_2 = \frac{5--1}{0-3}$

$m_1 = 5-y$ $\quad$ $m_2 = -2$

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

$5 - y = -2$

$y = 7.$

(3 marks)

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.

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

1. $3p + 2c = 17.90$
2. $5p + 3c = 29.10$

(2 marks)

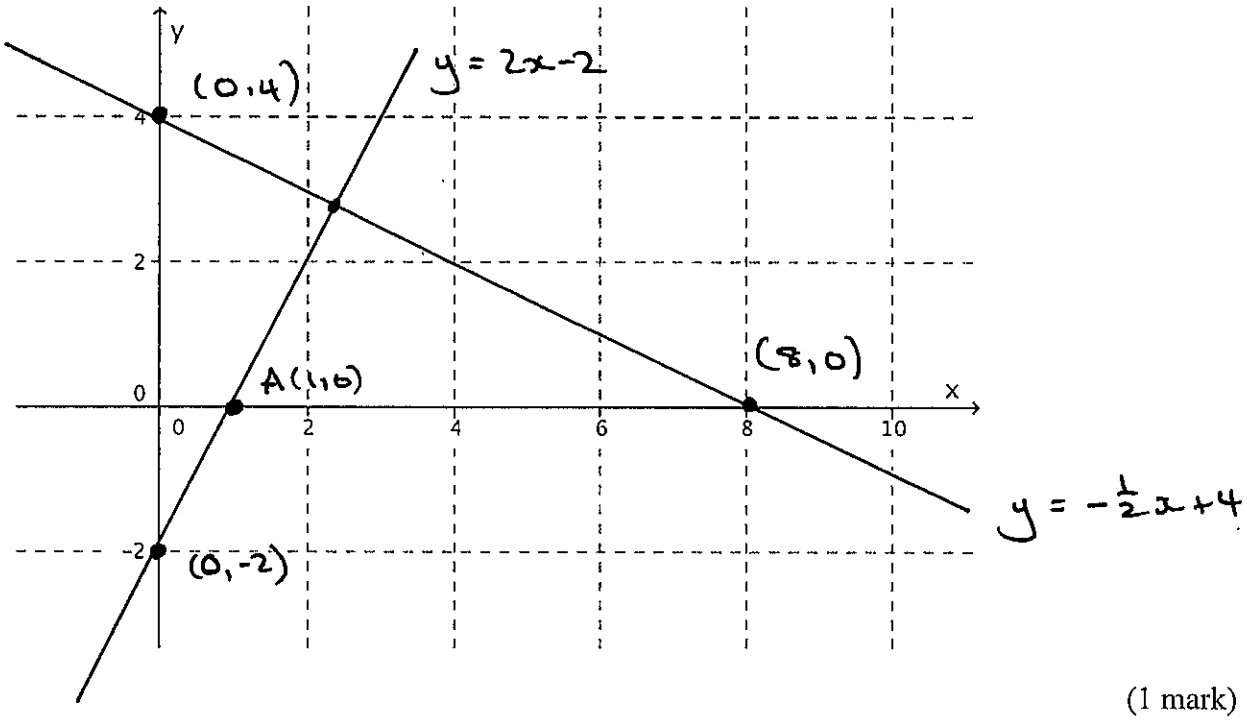
b) Hence, solve these equations to find the cost of a pie and a cola drink.

pie is \$4.50

cola is \$2.20

(1 mark)

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



(1 mark)

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

$m = 2$

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

$y = 2x - 2$

(2 marks)

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

(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.

Point of intersection is the closest to A.

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

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

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

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

$= 3.1$ 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 $m_1 \neq m_2$

$x + ay = 4$

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

Let $m_1 = -\frac{1}{a}$

$3ax - y = 2$

$y = 3ax - 2$

Let $m_2 = 3a$

If $m_1 \neq m_2$

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

$3a^2 \neq -1$

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

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

$x + ay = 4$

sub $(0, -2)$

$-2a = 4$

$a = -2$

(2 marks)

End of Section C