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2

Answer **all** the questions.

1 Simplify $\frac{9q}{4r} - \frac{5(q-4r)}{6r}$.

Answer [2]

2 Factorise fully $8ax - 6ay - 4bx + 3by$.

Answer [2]

3

3

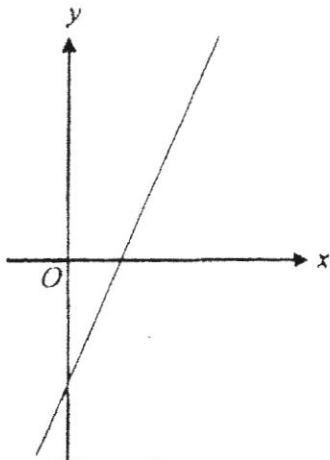


Figure 1

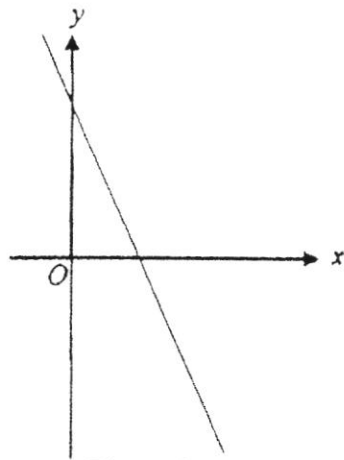


Figure 2

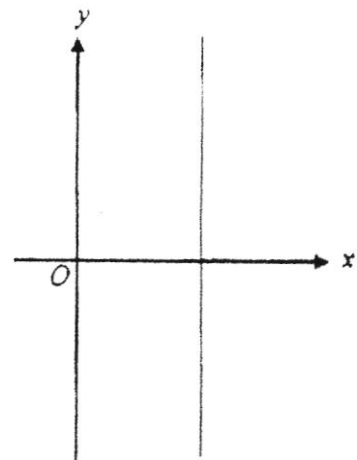


Figure 3

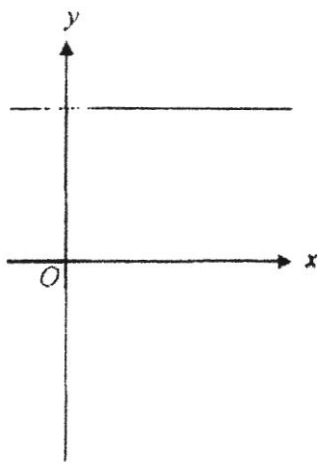


Figure 4

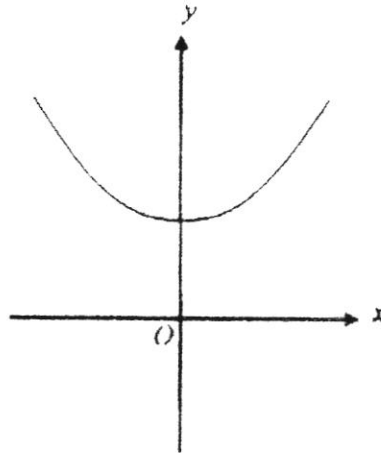


Figure 5

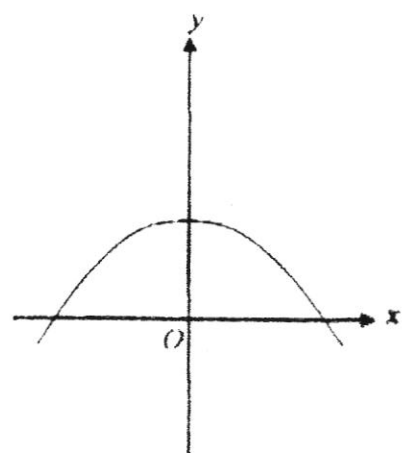


Figure 6

Which of the above figures represents the graph of

(a) $y + 2x = 2$,

Answer Figure [1]

(b) $y = 6 - x^2$,

Answer Figure [1]

(c) $x = 2$.

Answer Figure [1]

4

4 Expand and simplify each of the following expressions.

(a) $8c^2 - 3c(2 - 3c)$

Answer [1]

(b) $(3a + 2b)(2a + 3b)$

Answer [2]

5 Simplify

(a) $\frac{21mn}{6} \div \frac{15m^2}{2n}$,

Answer [1]

(b) $\frac{3p + 4q}{(8q + 6p)^2}$.

Answer [2]

- 6 The following chart was found on a board outside the Physics Laboratory.

To calculate the temperature, $T^{\circ}\text{C}$, of an object, apply the formula:

$$T = \frac{l - s}{m - s} \times 100, \text{ where}$$

l : length (in cm) of mercury thread when the temperature is $T^{\circ}\text{C}$

s : length (in cm) of mercury thread when the temperature is 0°C

m : length (in cm) of mercury thread when the temperature is 100°C

- (a) Make l the subject of the formula $T = \frac{l - s}{m - s} \times 100$.

Answer [2]

- (b) Given that $T = 85$, $s = 1.8$ and $m = 19.8$, find the length of the mercury thread at this instant.

Answer cm [1]

- 7 (i) Factorise $x^2 - 2xy + y^2$.

Answer [1]

- (ii) Hence, evaluate $17 \times 17 - 340 + 25$.
You must show your working clearly.

Answer [2]

6

- 8 It is given that y is directly proportional to $3x^2$ and $y = 18$ for a particular value of x . Find the value of y when x is doubled.

Answer $y = \dots\dots\dots$ [2]

- 9 Given that $x - y = 8$ and $x^2 - y^2 = 240$, find the value of $3x + 3y$.

Answer $\dots\dots\dots$ [3]

10 The area of a rectangle is $(8x^2 + 2x - 15) \text{ cm}^2$.

(i) If the length of the rectangle is $(2x + 3) \text{ cm}$, find its breadth.

Give your answer in the form $ax + b$.

Answer Breadth = cm [2]

(ii) Hence, find the perimeter of the rectangle.

Answer Perimeter = cm [2]

11 Express as a single fraction in its simplest form

(a) $\frac{6}{2x-3} + \frac{1}{3-2x}$,

Answer [2]

(b) $\frac{4}{x^2-1} - \frac{5}{x+1}$.

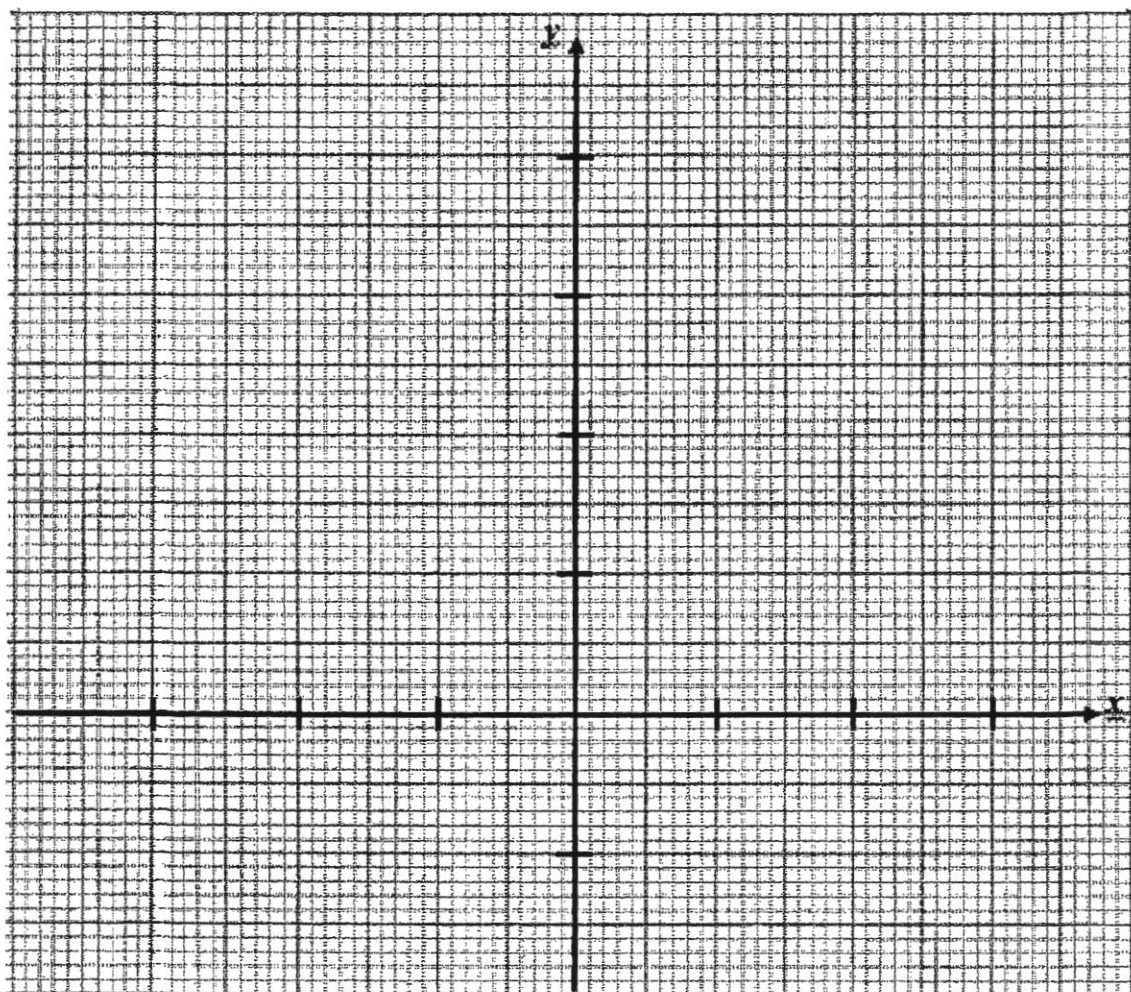
Answer [3]

- 12 (a) (i) Complete the table of values of x and y for the equation $y = 2x + 3$.

x	-3	0	3
y			

[1]

- (ii) Draw the graph of $y = 2x + 3$ on the grid given below for $-3 \leq x \leq 3$. [1]



- (iii) (a) On the same axes, draw the line $y = -2x - 1$ for $-3 \leq x \leq 1$. [2]

- (b) Hence, solve the simultaneous equations $y = 2x + 3$ and $y = -2x - 1$. [1]

12 (b) Write down a linear equation such that it has

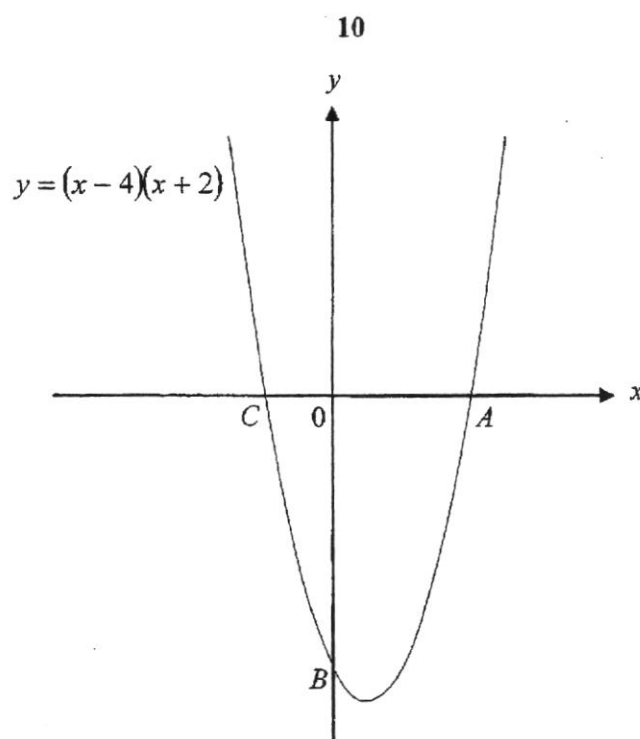
(i) an infinite number of solutions with $2y - x = 0$,

Answer [1]

(ii) no solution with $2y - x = 0$.

Answer [1]

13



The figure shows the curve $y = (x - 4)(x + 2)$. The curve cuts the x -axis at two points A and C , and the y -axis at the point B .

- (i) Write down the coordinates of A , B and C .

Answer Coordinates of A (.....,)

Coordinates of B (.....,)

Coordinates of C (.....,) [3]

- (ii) Find the equation of the line of symmetry of the curve.

Answer [1]

- (iii) Hence, find the coordinates of the minimum point.

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

- 14 A stone is thrown from the top of a cliff next to the sea.
The height, h metres, of the stone above sea level t seconds after it is released can be modelled by the equation $h = 100 + 21t - t^2$.

(a) Find the height of the cliff?

Answer m [1]

(b) (i) Solve the equation $0 = 100 + 21t - t^2$.

Answer $t =$ OR $t =$ [3]

(ii) Explain what the positive solution of this equation represents.

Answer

.....

..... [1]

~ End of Paper 1 ~

Answer all the questions.

Hand in Question 1 to Question 4 separately from Question 5 to Question 8.

- 1 Solve the simultaneous equations.

$$3x + 5y = 8$$

$$\frac{x}{2} - \frac{y}{3} = -1$$

[4]

- 2 Alice is t years old.
 Alice's brother is 7 years older than her.
 Alice's mother's age is twice the sum of Alice's and her brother's age.
 Their father is 4 years older than their mother.

- (a) Write down an expression, in terms of t , for

(i) their mother's age,

[1]

(ii) their father's age.

[1]

- (b) Given that the sum of all their ages is 79 years,

(i) form an equation in t ,

[1]

(ii) find Alice's father's age.

[2]

- 3 Solve the following equations.

(a) $(2x + 5)(2x - 5) = (4x + 3)(x - 1)$

[3]

(b) $\frac{2x}{x+3} = \frac{7}{2x+1}$

[3]

(c) $16(x-1)^2 - 9 = 0$

[4]

- 4 Express as a single fraction in its simplest form.

(a) $\frac{9x}{x-4} + \frac{36x}{(x-4)^2}$

[3]

(b) $\frac{1}{2x^2 - 5x - 3} + \frac{1}{x-3}$

[3]

Hand in Question 5 to Question 8 separately from Question 1 to Question 4.

5 A painter can paint a rectangular wall of dimensions 5 metres by 1.5 metres.

He takes 20 seconds to paint an area of 150 cm^2 .

- (a) Write down the area of the rectangular wall in cm^2 . [1]
- (b) Assuming that he paints at the same rate, find the time needed for the painter to paint the rectangular wall.
Give your **exact** answer in hours. [2]
-

6 5 men took 120 days to complete a building project.

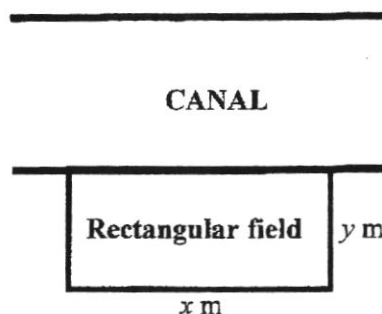
- (a) How long will it take 3 men to finish the project? [2]
- (b) (i) If the 5 men are paid \$225 a day in total, how much will each man get per day? [1]
(ii) Find the total pay each man will get at the end of the 120 days building project. [1]
- (c) After working for 120 days, one of the men decides to convert 40% of his pay to US dollars for savings.
How much US dollars will he get if the exchange rate is US\$1 = S\$1.67?
Give your answer to the nearest dollar. [3]
-

- 7 (a) Express as a single fraction $\frac{x^2 - 6x + 9}{3x - x^2}$. [2]
- (b) Given that $u = \frac{v^2 + 4}{5}$,
(i) find the value of u when $v = 3$, [1]
(ii) find the values of v when $u = 8$, [2]
(iii) express v in terms of u . [2]
-

8 Answer the whole of this question on a sheet of graph paper.

In the diagram, a rectangular field of area $A \text{ m}^2$ is formed using one side of a straight canal. The other three sides of the field is surrounded by a fence of 400 metres.

Let the length and width of the field be x metres and y metres respectively.



(a) Show that

(i) $y = \frac{1}{2}(400 - x),$ [1]

(ii) $A = 200x - \frac{1}{2}x^2.$ [1]

(b) The table shows some values of x and the corresponding values of A , where

$$A = 200x - \frac{1}{2}x^2.$$

x	0	50	100	150	200	250	300	350	400
A	0	8750	15000	18750	p	18750	15000	8750	0

Find the value of p . [1]

(c) Using a scale of 2 cm to represent 50 m, draw a horizontal x -axis for $0 \leq x \leq 400$.

Using a scale of 2 cm to represent 2000 m^2 , draw a vertical A -axis for $0 \leq A \leq 20000$.

On your axes, plot the points given in the table and join them with a smooth curve. [3]

(d) Use your graph to estimate

(i) the area of the field when $x = 315 \text{ m}$, [1]

(ii) the greatest possible area of the field. [1]

End of Paper 2
Have you checked your work?

2017 MYE Sec 2 Express Mathematic Paper 1

MARK SCHEME

- 1 $\frac{9q}{4r} - \frac{5(q-4r)}{6r}$
 $= \frac{27q - 10q + 40r}{12r}$ M1 for distributive property used correctly
 $= \frac{17q + 40r}{12r}$ o.e. A1
 _____ [2]
- 2 $8ax - 6ay - 4bx + 3by$
 $= 2a(4x - 3y) - b(4x - 3y)$ OR $2a(4x - 3y) + b(3y - 4x)$ M1
 $= (2a - b)(4x - 3y)$ A1
 _____ [2]
- 3(a) Figure 2 B1
 3(b) Figure 6 B1
 3(c) Figure 3 B1
 _____ [3]
- 4(a) $8c^2 - 3c(2 - 3c)$
 $= 8c^2 - 6c + 9c^2$
 $= 17c^2 - 6c$ B1
 4(b) $(3a + 2b)(2a + 3b)$
 $= 6a^2 + 9ab + 4ab + 6b^2$ B1 for $6a^2 \dots + 6b^2$ seen
 $= 6a^2 + 13ab + 6b^2$ B1 for $\dots + 13ab \dots$ seen
 _____ [3]

2017 MYE Sec 2 Express Mathematic Paper 1

MARK SCHEME

$$\begin{aligned}
 5(a) \quad & \frac{21mn}{6} \div \frac{15m^2}{2n} \\
 &= \frac{21mn}{6} \times \frac{2n}{15m^2} \\
 &= \frac{7n^2}{15m}
 \end{aligned}$$

B1

$$\begin{aligned}
 5(b) \quad & \frac{3p+4q}{(8q+6p)^2} \\
 &= \frac{3p+4q}{4(3p+4q)^2} \\
 &= \frac{1}{4(3p+4q)}
 \end{aligned}$$

M1 for $8q+6p=2(4q+3p)$ o.e. seenA1 ($\frac{1}{(12p+16q)}$ also accepted)

[3]

$$\begin{aligned}
 6(a) \quad & \frac{T(m-s)}{100} = l - s \\
 & \frac{T(m-s)}{100} + s = l
 \end{aligned}$$

M1

$$\text{OR } l = \frac{T(m-s)}{100} + s \quad \text{A1}$$

$$6(b) \quad 17.1$$

B1

[3]

$$7(i) \quad x^2 - 2xy + y^2 = (x-y)^2 \quad \text{B1}$$

$$7(ii) \quad 17 \times 17 - 340 + 25$$

$$= 17^2 - 2(17)(5) + 5^2 - 170 \quad \text{M1}$$

$$= (17-5)^2 - 170 \quad \left. \vphantom{\begin{array}{l} 17^2 - 2(17)(5) + 5^2 - 170 \\ (17-5)^2 - 170 \end{array}} \right\}$$

$$= -26$$

A1

, M0 A0 for no working shown
and -26 only seen

[3]

2017 MYE Sec 2 Express Mathematic Paper 1

MARK SCHEME

8 $y = k(3x^2)$, where k is a constant.

For a particular value of x , $18 = k(3x^2)$

When x is doubled, $y = 3k(2x)^2$

$$y = 4(3kx^2)$$

$$\therefore y = 4(18)$$

$$= 72 \quad \text{M1 A1}$$

[2]

9 $x + y = 30$

B1

$$3x + 3y = 3(x + y) \quad \text{soi} \quad \text{M1}$$

$$= 90 \quad \text{A1}$$

[3]

10(a) Let the breadth of the rectangle be $(ax + b)$ cm.

Area of the rectangle = $(2x + 3)(ax + b)$ cm,

$$= 2ax^2 + 2bx + 3ax + 3b$$

By comparison with original equation, $2a = 8$

$$2b + 3a = 2$$

$$3b = 15$$

Therefore $a = 4, b = -5$

Breadth of rectangle = $(4x - 5)$ cm M1 A1

10(b) Perimeter = $2[2x + 3 + 4x - 5]$ M1

$$= 12x - 4 \quad \text{A1}$$

[4]

2017 MYE Set 2 Express Mathematic Paper 1

MARK SCHEME

$$\begin{aligned}
 11(a) \quad & \frac{6}{2x-3} + \frac{1}{3-2x} \\
 &= \frac{6-1}{(2x-3)} \quad \text{M1} \\
 &= \frac{5}{(2x-3)} \quad \text{A1}
 \end{aligned}$$

$$\begin{aligned}
 11(b) \quad & \frac{4}{x^2-1} - \frac{5}{x+1} \\
 &= \frac{4-5(x-1)}{(x-1)(x+1)} \quad \text{M1} \quad \text{B1} \quad \text{for } x^2-1=(x-1)(x+1) \text{ s.o.i.} \\
 &= \frac{9-5x}{(x-1)(x+1)} \quad \text{o.e.} \quad \text{A1}
 \end{aligned}$$

[5]

2017 MYE Sec 2 Express Mathematic Paper 1

MARK SCHEME

12(a)(i)

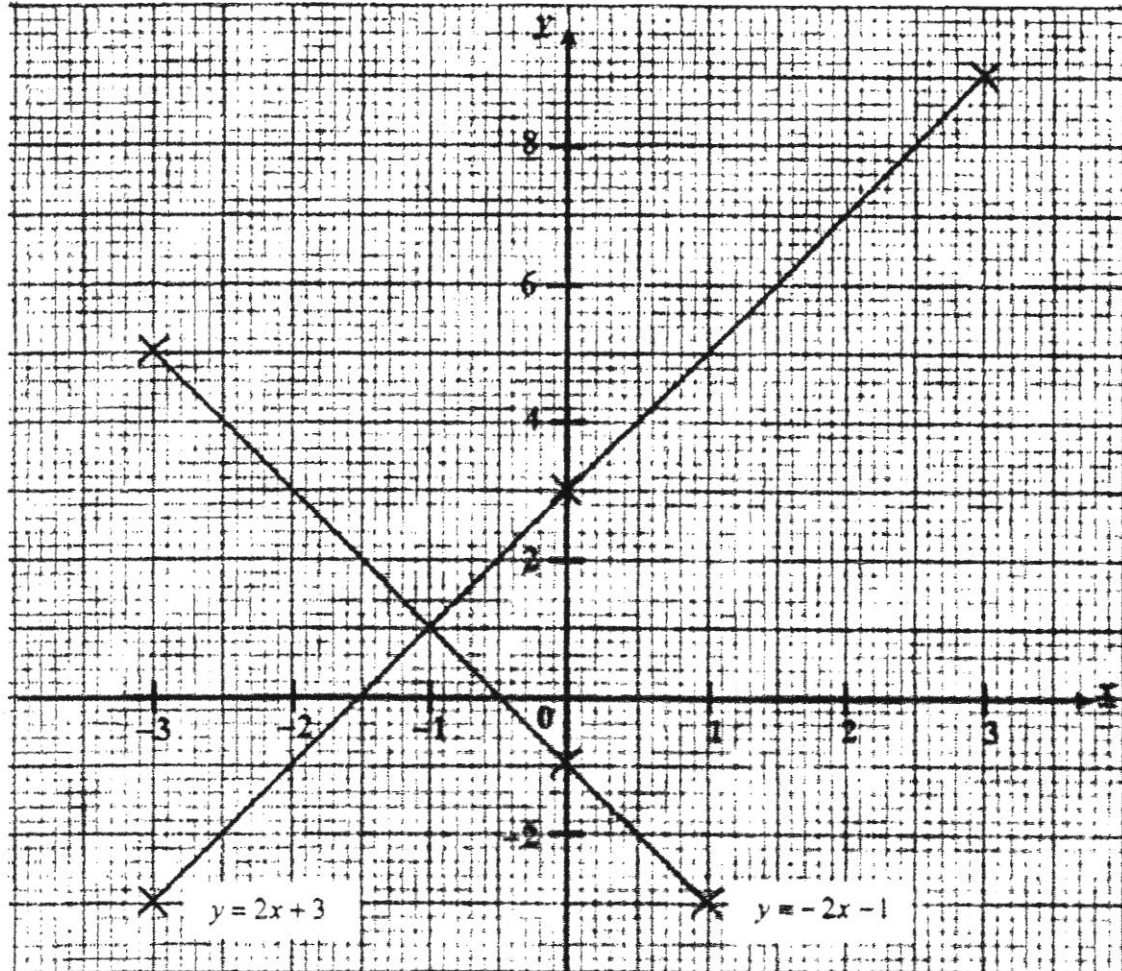
y	-3	3	9
-----	----	---	---

B1

12(a)(ii)

correct ruled straight line

P1

12(a)(iii)(a) Ruled straight line through $(-3, 5)$ and $(1, -3)$

P2

Or P1 for points plotted

12(a)(iii)(b) $x = -1$ and $y = 1$

B1

B0 if the coordinate of the point of intersections is not $(-1, 1)$ 12(b)(i) $2ny - rx = 0$, where n is a real number, and $n \neq 0$. B112(b)(ii) $2y - x = c$, where c is a real number, and $c \neq 0$. B1

[7]

2017 MYE Set 2 Express Mathematic Paper 1

MARK SCHEME

13(i) (4, 0) B1

(0, -8) B1

(-2, 0) B1

13(ii) $x = 1$ B1

13(iii) (1, -9) B1

[5]

14(a) Height of the cliff = 100m B1

14(b)(i) $(25 - t)(4 + t) = 0$ M1 $t = 25$ OR $t = -4$ A1 A1

14(b)(ii) The time taken for the stone to hit the water = 25s B1

[5]

Answer Key

1) $x = -\frac{2}{3}, y = 2$

- 2) a) (i) Mother's age = $4x + 14$
 (ii) Father's age = $4x + 18$
 b) (i) $x + (x + 7) + (4x + 14) + (4x + 18) = 79$
 (ii) Father is 34 years old.

- 3 a) $x = 22$
 b) $x = 3$ or $x = -\frac{7}{4}$
 c) $x = 1\frac{3}{4}$ or $x = \frac{1}{4}$

4 a) $\frac{9x^2}{(x-4)^2}$ b) $\frac{2x+2}{(x-3)(2x+1)}$

5 a) 75000 cm^2 b) $2\frac{7}{9} \text{ hrs}$

6 a) 200 days b)(i) \$45 (ii) \$5400 c) US\$1293

7 a) $\frac{3-x}{x}$

b) i) $u = \frac{13}{5}$ ii) $v = \pm 6$ iii) $v = \pm \sqrt{5u-4}$

8 a) i) $y = \frac{400-x}{2}$ ii) $A = 200x - \frac{1}{2}x^2$ b) $P = 20000$
 d) i) Area = 13387.5 (accept 13200 to 13600)
 ii) Greatest area = 20000 m^2