

2

Answer **all** the questions.

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

Answer ..... [2]

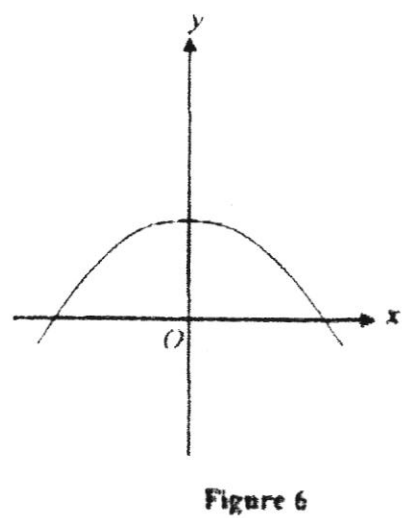
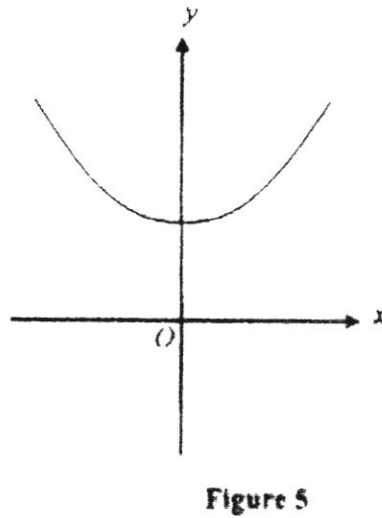
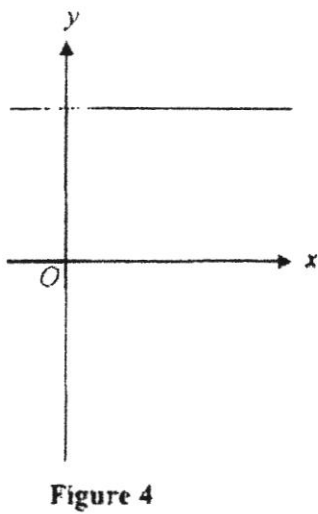
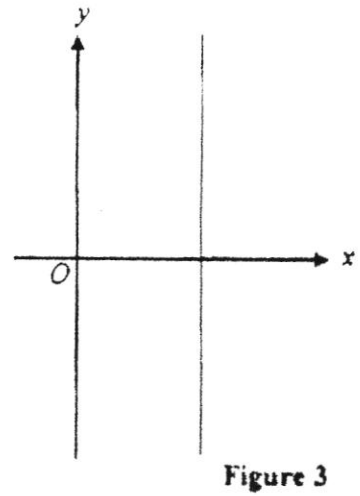
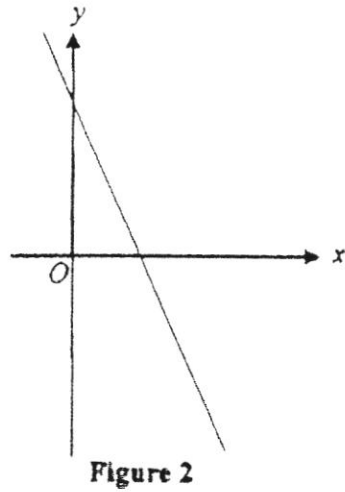
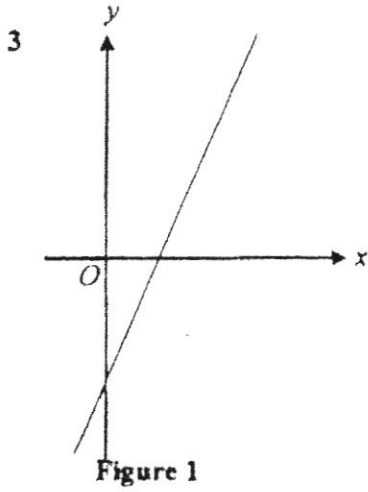
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2 Factorise fully  $8ax - 6ay - 4bx + 3by$ .

Answer ..... [2]

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3



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,  $T$  °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  $T$  °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]

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

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

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

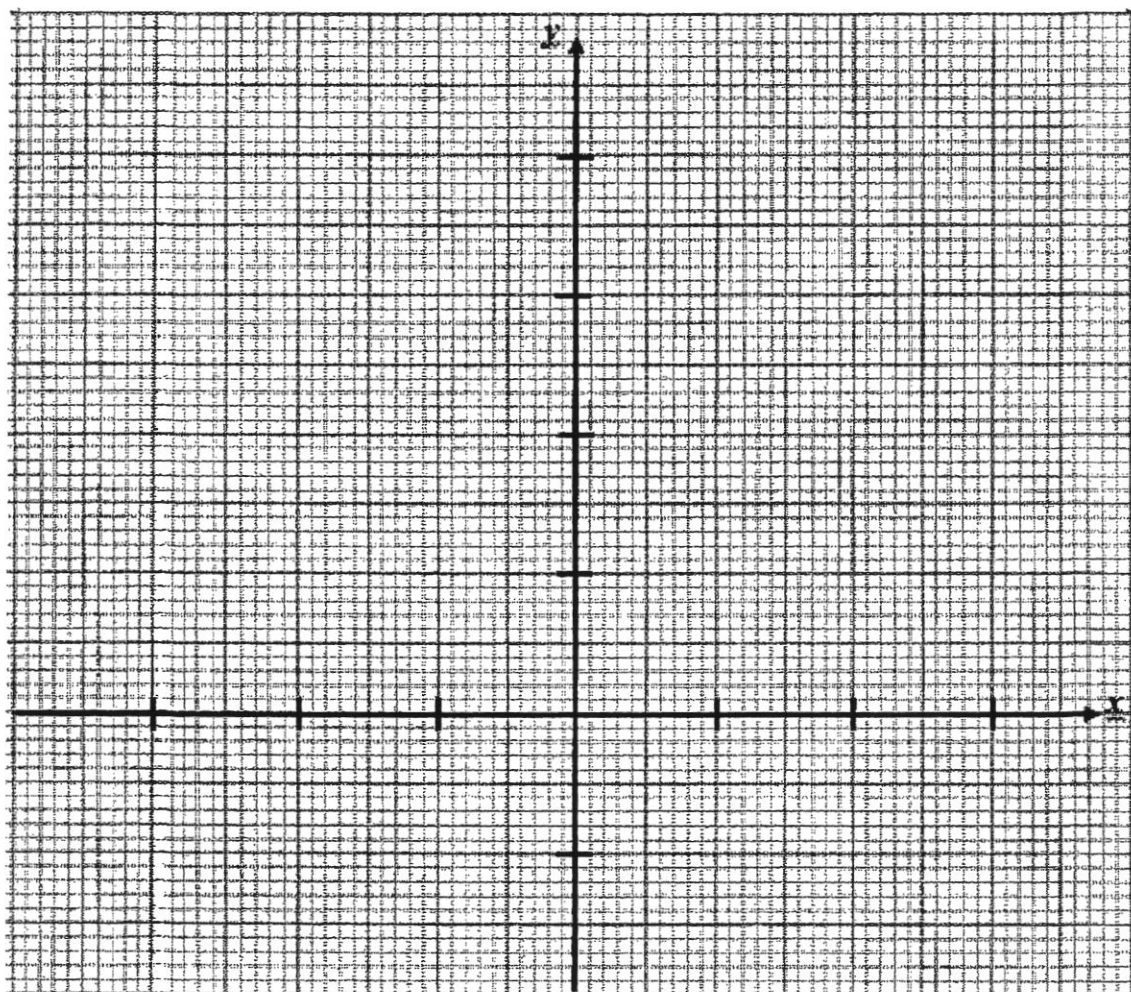
*Answer* ..... [3]

- 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]

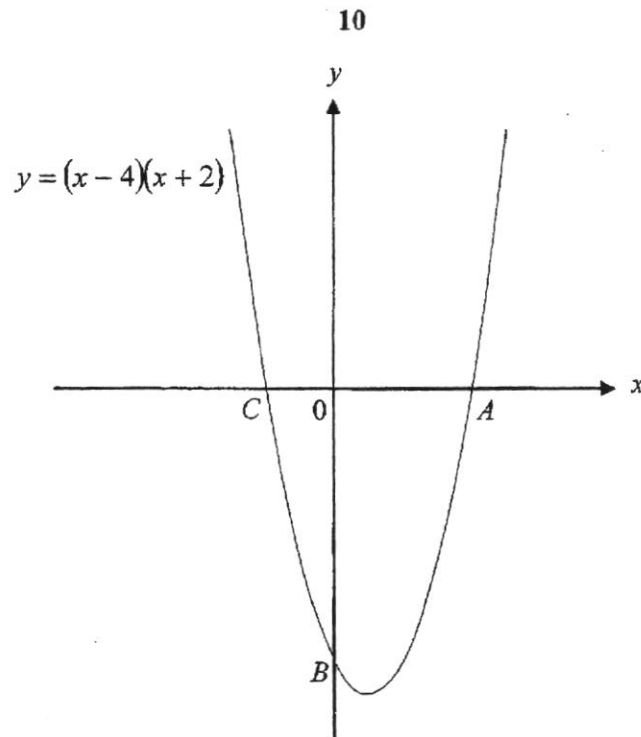
(ii) no solution with  $2y - x = 0$ .

*Answer* ..... [1]

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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  $150 \text{ cm}^2$ .

- (a) Write down the area of the rectangular wall in  $\text{cm}^2$ . [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]
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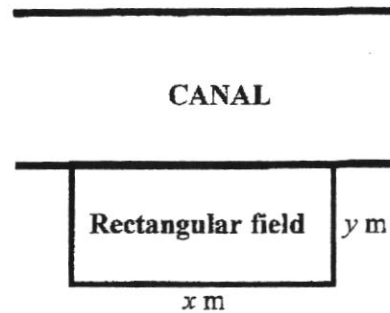
7 (a) Express as a single fraction  $\frac{x^2 - 6x + 9}{3x - x^2}$ . [2]

- (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

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

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

(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  $2000 \text{ m}^2$ , 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

$$\begin{aligned}
 1 \quad & \frac{9q}{4r} - \frac{5(q-4r)}{6r} \\
 & = \frac{27q - 10q + 40r}{12r} && \text{M1} \quad \text{for distributive property used correctly} \\
 & = \frac{17q + 40r}{12r} \quad \text{o.e.} && \text{A1}
 \end{aligned}$$


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$$\begin{aligned}
 2 \quad & 8ax - 6ay - 4bx + 3by \\
 & = 2a(4x - 3y) - b(4x - 3y) && \text{OR} \quad 2a(4x - 3y) + b(3y - 4x) && \text{M1} \\
 & = (2a - b)(4x - 3y) && \text{A1}
 \end{aligned}$$


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3(a) Figure 2 **B1**

3(b) Figure 6 **B1**

3(c) Figure 3 **B1**

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$$\begin{aligned}
 4(a) \quad & 8c^2 - 3c(2 - 3c) \\
 & = 8c^2 - 6c + 9c^2 \\
 & = 17c^2 - 6c && \text{B1}
 \end{aligned}$$

$$\begin{aligned}
 4(b) \quad & (3a + 2b)(2a + 3b) \\
 & = 6a^2 + 9ab + 4ab + 6b^2 && \text{B1} \quad \text{for } 6a^2 \dots + 6b^2 \text{ seen} \\
 & = 6a^2 + 13ab + 6b^2 && \text{B1} \quad \text{for } \dots + 13ab \dots \text{ seen}
 \end{aligned}$$


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## 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]

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

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

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

$$= (17-5)^2 - 170$$

$$= -26$$

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)

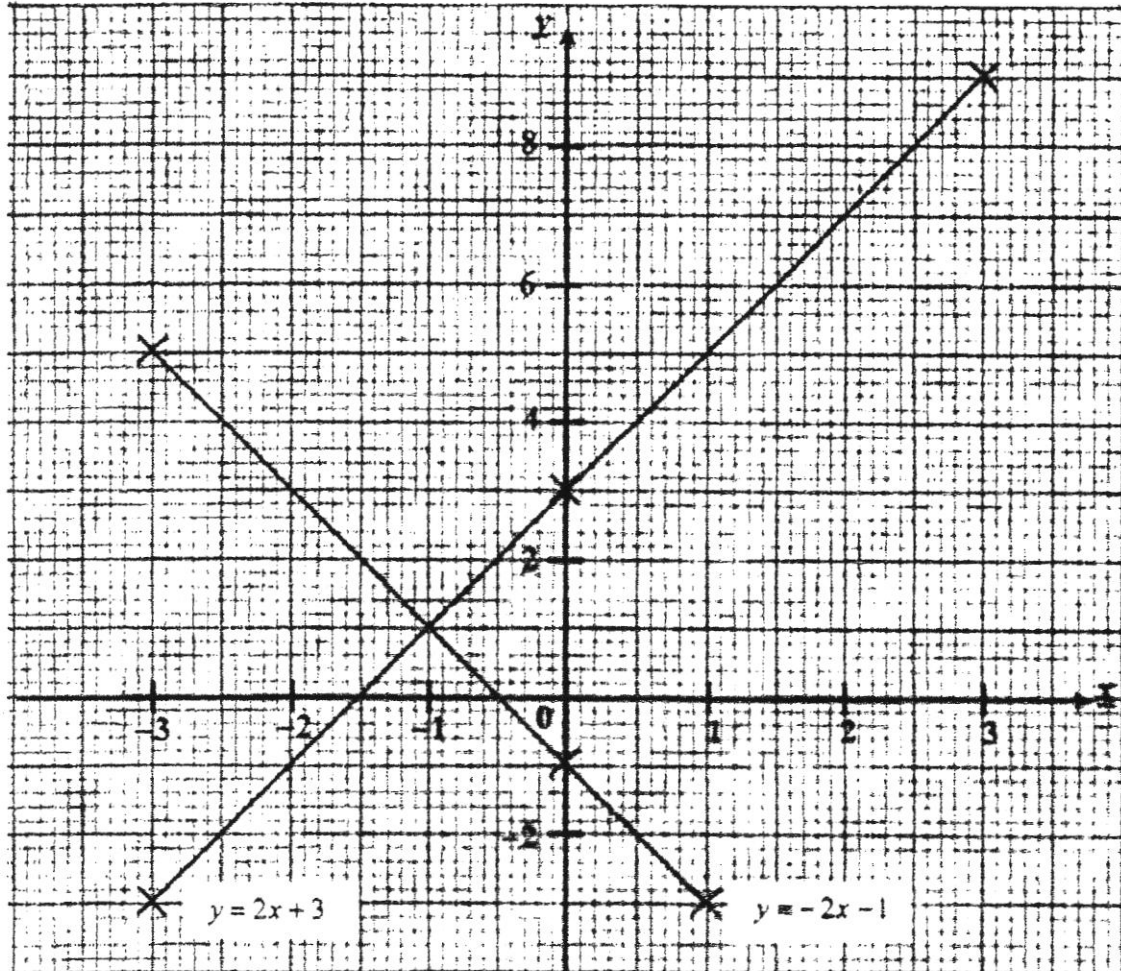
$y$	-3	3	9
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B1

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  $n \neq 0$ . B1

12(b)(ii)  $2y - x = c$ , where  $c$  is a real number, and  $c \neq 0$ . B1

## 2017 MYE Sec 2 Express Mathematic Paper 1

## MARK SCHEME

<b>13(i)</b>	(4, 0)	<b>B1</b>
	(0, -8)	<b>B1</b>
	(-2, 0)	<b>B1</b>
<b>13(ii)</b>	$x = 1$	<b>B1</b>
<b>13(iii)</b>	(1, -9)	<b>B1</b>

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**[5]**

<b>14(a)</b>	Height of the cliff = 100m	<b>B1</b>
<b>14(b)(i)</b>	$(25 - t)(4 + t) = 0$	<b>M1</b>
	$t = 25$ OR $t = -4$	<b>A1 A1</b>
<b>14(b)(ii)</b>	The time taken for the stone to hit the water = 25s	<b>B1</b>

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**[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)  $75000 \text{ cm}^2$  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 =  $20000 \text{ m}^2$