

# Mixed Algebra 1

56 min  
46 marks

1. Mandy is  $x$  years old.  
Her brother is 5 years older than Mandy.  
The product of their ages is 84.

(a) Show that  $x^2 + 5x - 84 = 0$

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(1)

(b) Solve  $x^2 + 5x - 84 = 0$

Do **not** use a trial and improvement method.

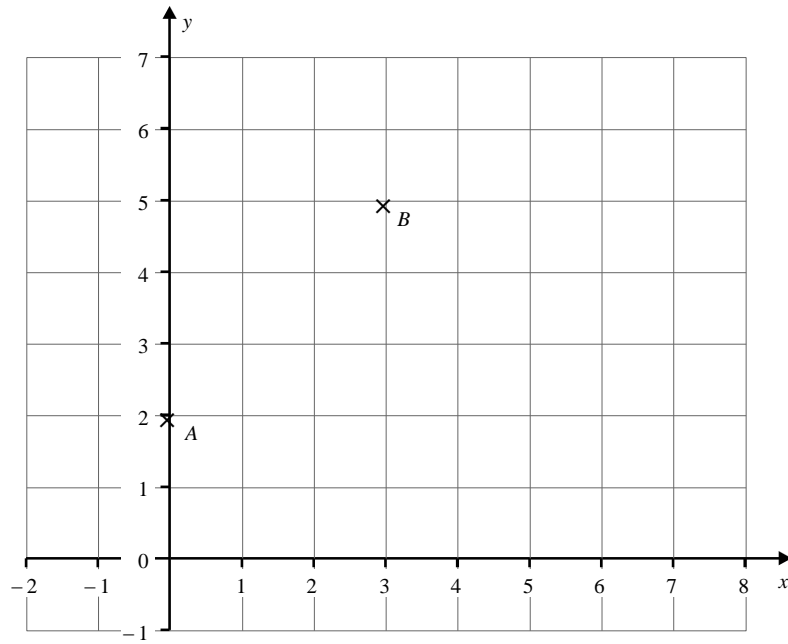
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Answer  $x =$  .....

(3)

(Total 4 marks)

2.



$A$  is the point  $(0,2)$  and  $B$  is the point  $(3,5)$ .

(a) Find the **exact** length of  $AB$ .

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Answer .....

(2)

(b) Find the equation of the line joining the points  $A$  and  $B$ .

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Answer .....

(3)  
(Total 5 marks)

3. The illumination,  $L$ , provided by a torch is inversely proportional to the square of the distance,  $d$ , from the torch.  
When  $L = 2$ ,  $d = 10$ .

(a) Find an equation expressing  $L$  in terms of  $d$ .

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Answer  $L =$  .....

(3)

(b) Find the value of  $L$  when  $d = 2$ .

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Answer .....

(1)

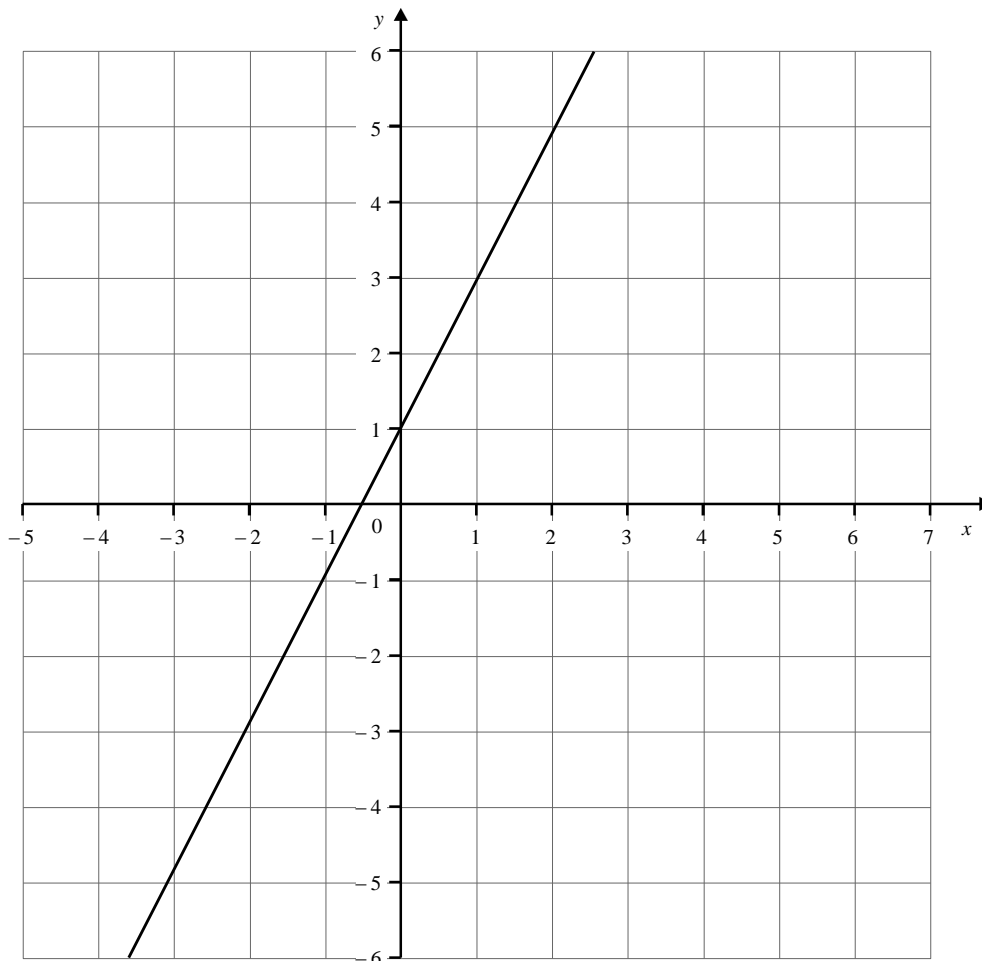
(c) Find the value of  $d$  when  $L = 8$ .

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Answer .....

(2)  
(Total 6 marks)

4. The diagram shows the graph of  $y = 2x + 1$ .



A line passes through the point  $(2, -3)$  and is perpendicular to  $y = 2x + 1$ .

The equation of this line can be written in the form  $ax + by = c$ .

What are the values of a, b and c?

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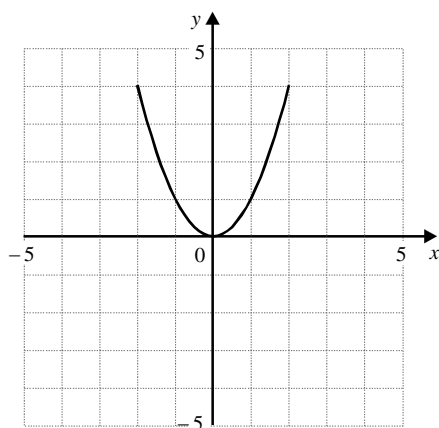
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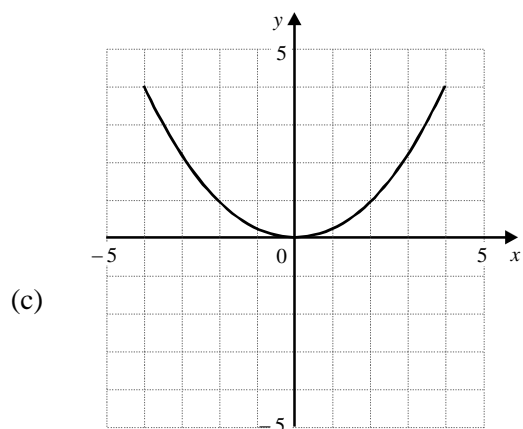
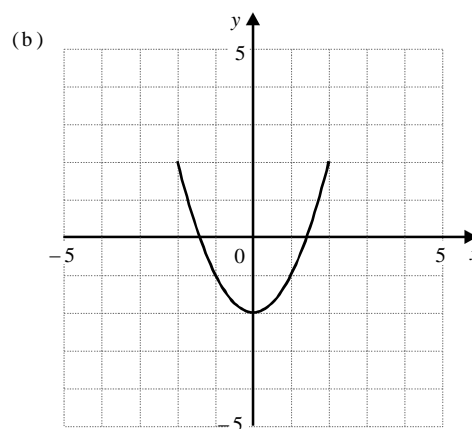
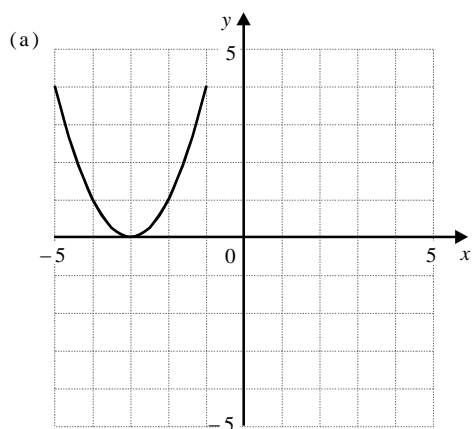
Answer .....

(Total 3 marks)

5. The diagram shows the graph of  $y = x^2$  for  $-2 \leq x \leq 2$ .



Each of the graphs below is a transformation of this graph.  
Write down the equation of each graph.



Answer (a)  $y = \dots\dots\dots$  (1)

Answer (b)  $y = \dots\dots\dots$  (1)

Answer (c)  $y = \dots\dots\dots$  (1)

**(Total 3 marks)**

6. (a) Simplify fully the expression

$$\frac{8x^2 + 24x}{2x^2 + 5x - 3}$$

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Answer .....

(3)

(b) You are given that  $(x + a)^2 + b = x^2 - 6x + 13$ .

Find the values of a and b.

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Answer .....

(3)

(Total 6 marks)

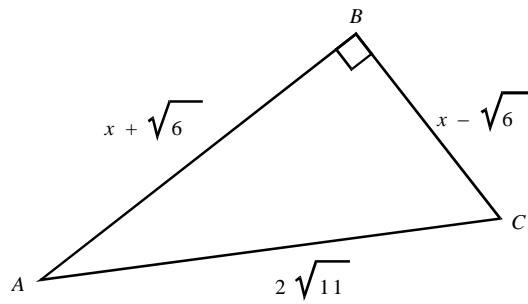
7. (a) Multiply out and simplify  $(x + \sqrt{6})^2$ .

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Answer .....

(2)

(b) Triangle  $ABC$  has a right angle at  $B$ .



Find the value of  $x$ .

You **must** explain clearly how you obtain your answer.

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Answer  $x =$  .....

(5)

(Total 7 marks)



8. (a) Expand and simplify  $(2x - 3)(3x + 5)$

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.....

Answer ..... (3)

(b) Simplify

(i)  $y^4 \times y^{-3}$

.....

Answer ..... (1)

(i)  $y^4 \div y^5$

.....

Answer ..... (1)

(Total 5 marks)

9. (a) List the integer values of  $x$  such that

$$-2 \leq x < 3$$

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.....

Answer ..... (2)

(b) Solve the inequality

$$x^2 > 64$$

.....  
 .....

Answer .....

(2)  
 (Total 4 marks)

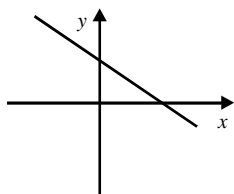
10. Below are three graphs.

Match each graph with one of the following equations.

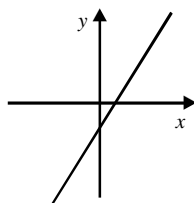
- Equation A:  $y = 3x - p$   
 Equation B:  $y = x^2 + p$   
 Equation C:  $3x + 4y = p$   
 Equation D:  $y = px^3$

In each case  $p$  is a **positive** number.

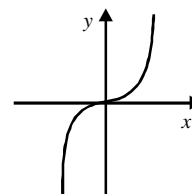
(i)



(ii)



(iii)



- |        |       |       |                |
|--------|-------|-------|----------------|
| Answer | Graph | (i)   | Equation ..... |
|        | Graph | (ii)  | Equation ..... |
|        | Graph | (iii) | Equation ..... |

(Total 3 marks)