

Surname	Centre Number	Candidate Number
Other Names		0



GCSE LINKED PAIR PILOT

4363/02

**METHODS IN MATHEMATICS
UNIT 1: METHODS (NON-CALCULATOR)
HIGHER TIER**

A.M. WEDNESDAY, 11 January 2012

2 hours

**CALCULATORS ARE
NOT TO BE USED
FOR THIS PAPER**

INSTRUCTIONS TO CANDIDATES

- Use black ink or black ball-point pen.
- Write your name, centre number and candidate number in the spaces at the top of this page.
- Answer **all** the questions in the spaces provided.
- Take π as 3.14.

INFORMATION FOR CANDIDATES

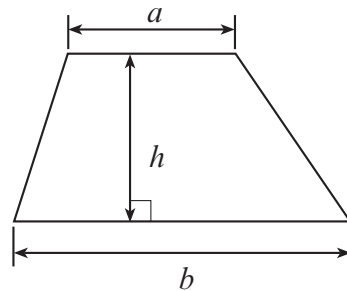
- You should give details of your method of solution when appropriate.
- Unless stated, diagrams are not drawn to scale.
- Scale drawing solutions will not be acceptable where you are asked to calculate.
- The number of marks is given in brackets at the end of each question or part-question.
- You are reminded that assessment will take into account the quality of written communication (including mathematical communication) used in your answer to question 8.

For Examiner's use only		
Question	Maximum Mark	Mark Awarded
1	5	
2	7	
3	5	
4	8	
5	8	
6	6	
7	4	
8	8	
9	13	
10	5	
11	3	
12	6	
13	4	
14	10	
15	8	
TOTAL MARK		

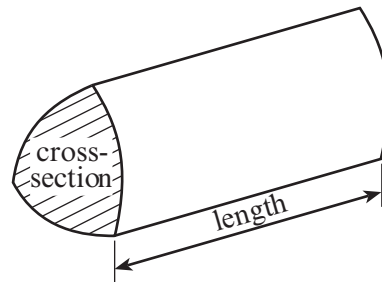
4363
020001

Formula List

Area of trapezium = $\frac{1}{2}(a + b)h$

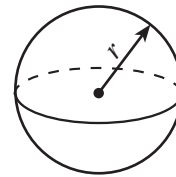


Volume of prism = area of cross-section \times length



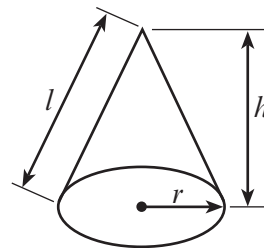
Volume of sphere = $\frac{4}{3}\pi r^3$

Surface area of sphere = $4\pi r^2$



Volume of cone = $\frac{1}{3}\pi r^2 h$

Curved surface area of cone = $\pi r l$

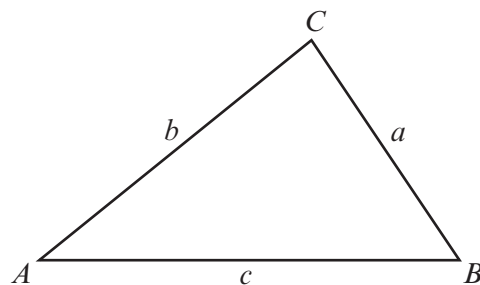


In any triangle ABC

Sine rule $\frac{a}{\sin A} = \frac{b}{\sin B} = \frac{c}{\sin C}$

Cosine rule $a^2 = b^2 + c^2 - 2bc \cos A$

Area of triangle = $\frac{1}{2}ab \sin C$



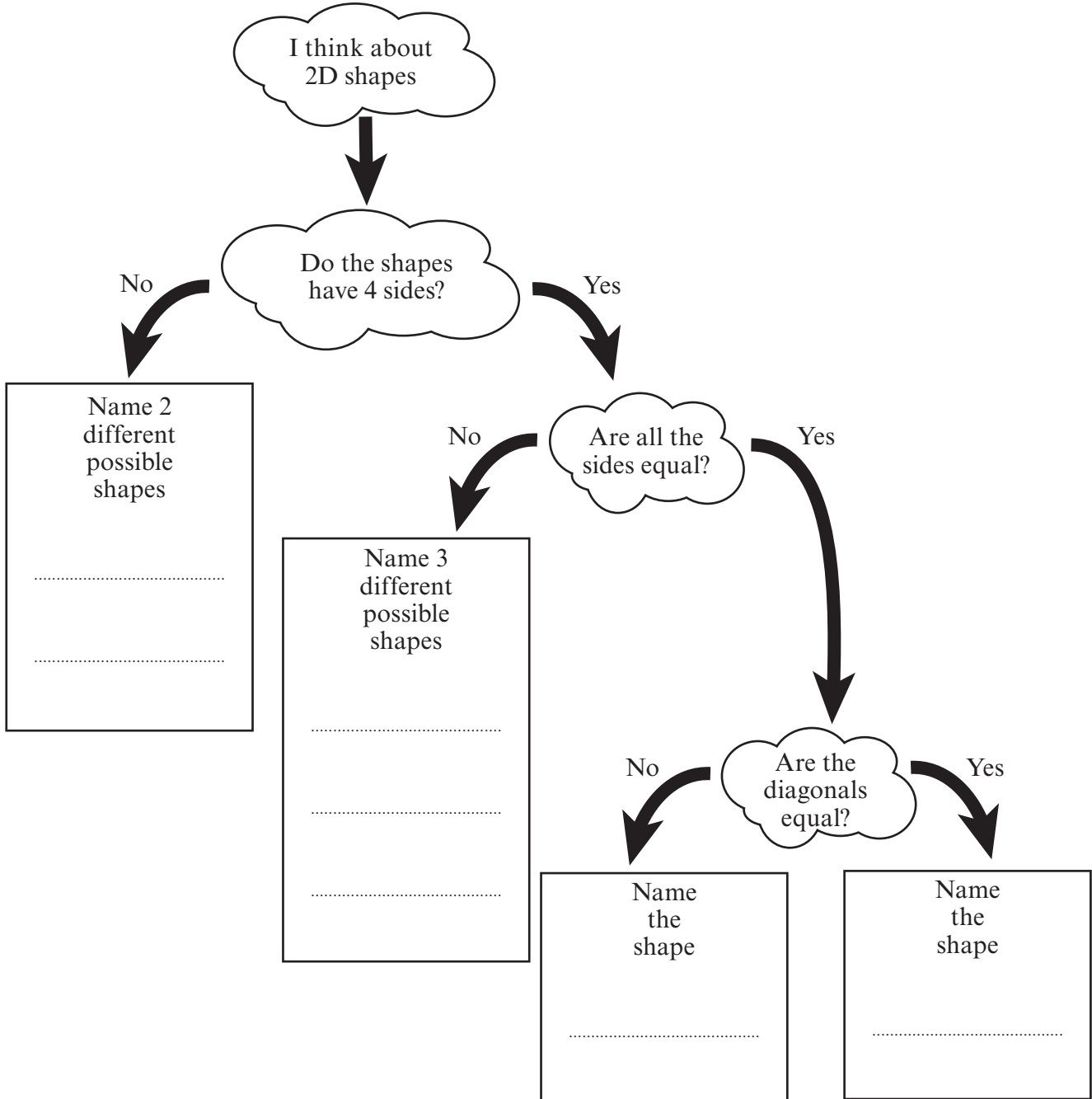
The Quadratic Equation

The solutions of $ax^2 + bx + c = 0$

where $a \neq 0$ are given by

$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

1. Fill in the answers in the shape sorter below.



4363 02/0003

[5]

2. (a) Express $\frac{3}{8}$ as a decimal.

.....
.....
.....

[2]

- (b) Express $\frac{0.12 \times 0.03}{36}$ as a fraction in its simplest form.

.....
.....
.....
.....
.....

[3]

- (c) A number is divided by 6 then 8 is added. This gives an answer of 78.
Find the number.

.....
.....
.....
.....
.....

[2]

3.

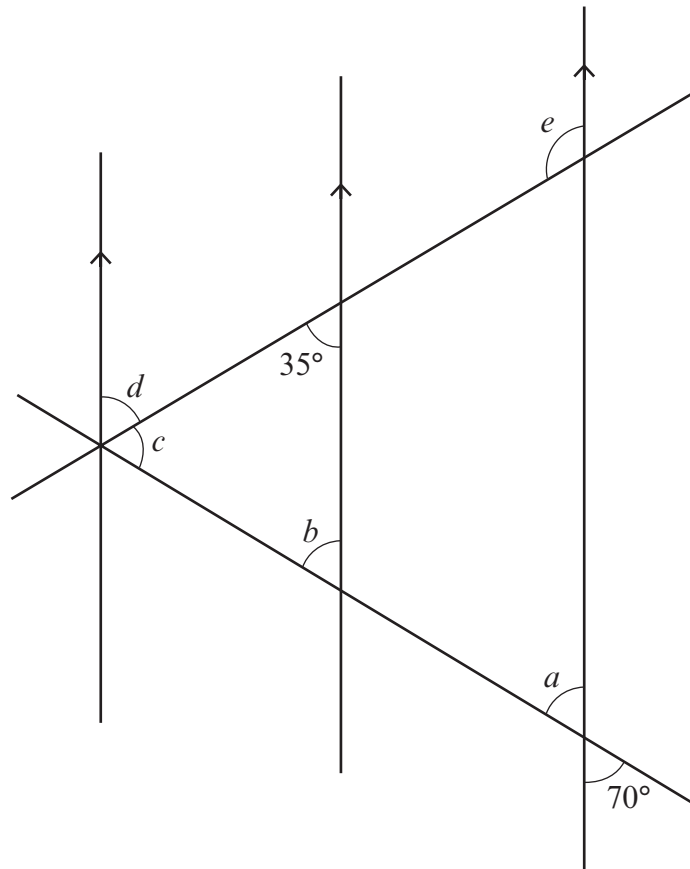


Diagram not drawn to scale

Find the size of the angles marked a , b , c , d and e .

.....

.....

.....

$$a = \text{.....}^\circ$$

$$b = \text{.....}^\circ$$

$$c = \text{.....}^\circ$$

$$d = \text{.....}^\circ$$

$$e = \text{.....}^\circ$$

[5]

4. (a) Given that $a = -2$, $b = -4$ and $c = 8$ find the value of $\frac{3c-4a}{b^2}$.

.....

.....

.....

.....

.....

[2]

- (b) Simplify $12x - 50y - 40x - 35y$.

.....

.....

.....

[2]

- (c) The n th term of a sequence is $3n^2 + 2n$.

- (i) Write down the first three terms of the sequence.

.....

.....

.....

.....

[2]

- (ii) Find the 10th term of the sequence.

.....

.....

.....

[1]

- (d) Simplify $\frac{(3a+2)^8}{3a+2}$.

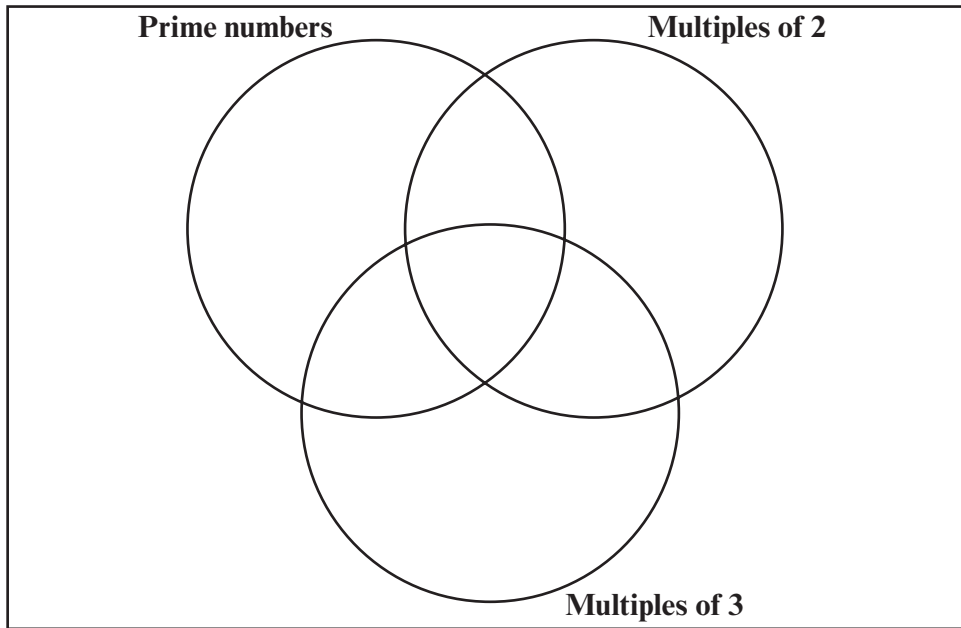
.....

.....

.....

[1]

5. (a) (i) Place each of the whole numbers 42, 43, 44, 45, 46, 47, 48, 49, 50 in the correct positions in the Venn diagram.



[3]

- (ii) A whole number is selected at random from the set {42, 43, 44, 45, 46, 47, 48, 49, 50}.

Find the probability that the number selected is

a prime number,

not a prime number,

a prime number that is also a multiple of 3.

[3]

- (b) A die has previously been used and shown to be fair. This fair die is thrown a further 60 times; a six is scored on the die on 15 of these throws. **Giving a reason for your answer,** write down the probability that a six is scored on the next throw.

.....

.....

.....

.....

[2]

6. (a) Find the highest common factor of 30 and 75.

.....

.....

.....

.....

.....

[1]

- (b) Find the lowest common multiple of 6 and 21.

.....

.....

.....

[2]

- (c) Simplify $\sqrt{(2^3 \times \sqrt{64})}$.

.....

.....

.....

[3]

7. Between Monday and Friday Sonia earns £8 per hour for working in a shop. At weekends the hourly rate of pay is doubled. She works x hours on Friday, $(x + 2)$ hours on Saturday and $(x + 3)$ hours on Sunday. Write down, in its simplest form, an expression for Sonia's total pay for working on Friday, Saturday and Sunday.

.....

.....

.....

.....

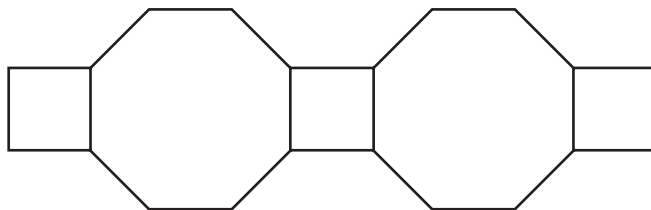
.....

.....

[4]

8. *You will be assessed on the quality of your written communication in this question.*

The pattern below is made using small square tiles and regular octagonal tiles.



Is it possible to use this pattern of tiles to tessellate and completely cover a rectangular area with only the need to cut tiles at the edges of the rectangle? You must show **all** your working and explain your answer.

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

[8]

4363
0200009

9. (a) Make x the subject of the formula $ax - g = bx + h$.

.....

.....

.....

.....

.....

.....

.....

[3]

- (b) Factorise $x^2 - 16$.

.....

.....

[1]

- (c) Factorise $x^2 - 8x + 15$.

.....

.....

.....

.....

[2]

- (d) Find the n th term of the sequence 4, 7, 12, 19, 28

.....

.....

.....

.....

.....

.....

.....

.....

.....

[2]

(e) Given that the product of $(x + 4)$ and $(2x + 3)$ is -3 find all the possible values of x .

.....
.....
.....
.....
.....
.....
.....
.....
.....
.....

[5]

10. (a) Express 2 380 000 in standard form correct to two significant figures.

.....
.....

[2]

(b) (i) Express 10^6 as a product of prime factors in index form.

.....
.....
.....
.....

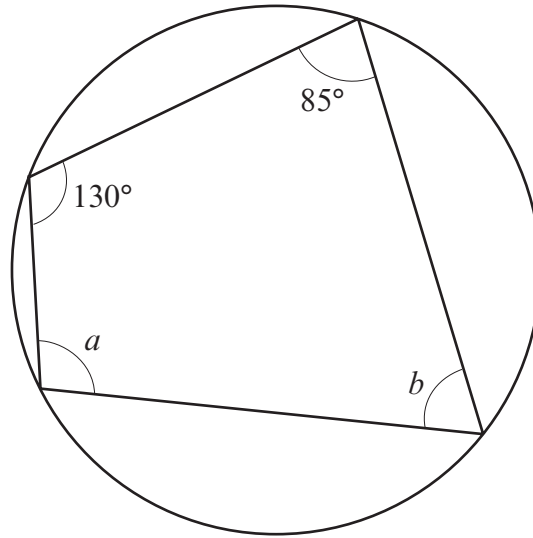
[2]

(ii) Explain how you know that one million is a square number.

.....
.....
.....
.....

[1]

11.

*Diagram not drawn to scale*

Giving a reason for your answers, calculate the size of the angles marked a and b in the diagram.

.....

.....

.....

$$a = \dots\dots\dots^\circ \quad b = \dots\dots\dots^\circ$$

[3]

12. At lunchtime, the probability that Kelly buys a bowl of soup is 0.7. The probability that Kelly buys a sandwich is independent of her buying a bowl of soup. The probability that Kelly buys a bowl of soup **and** a sandwich is 0.28.

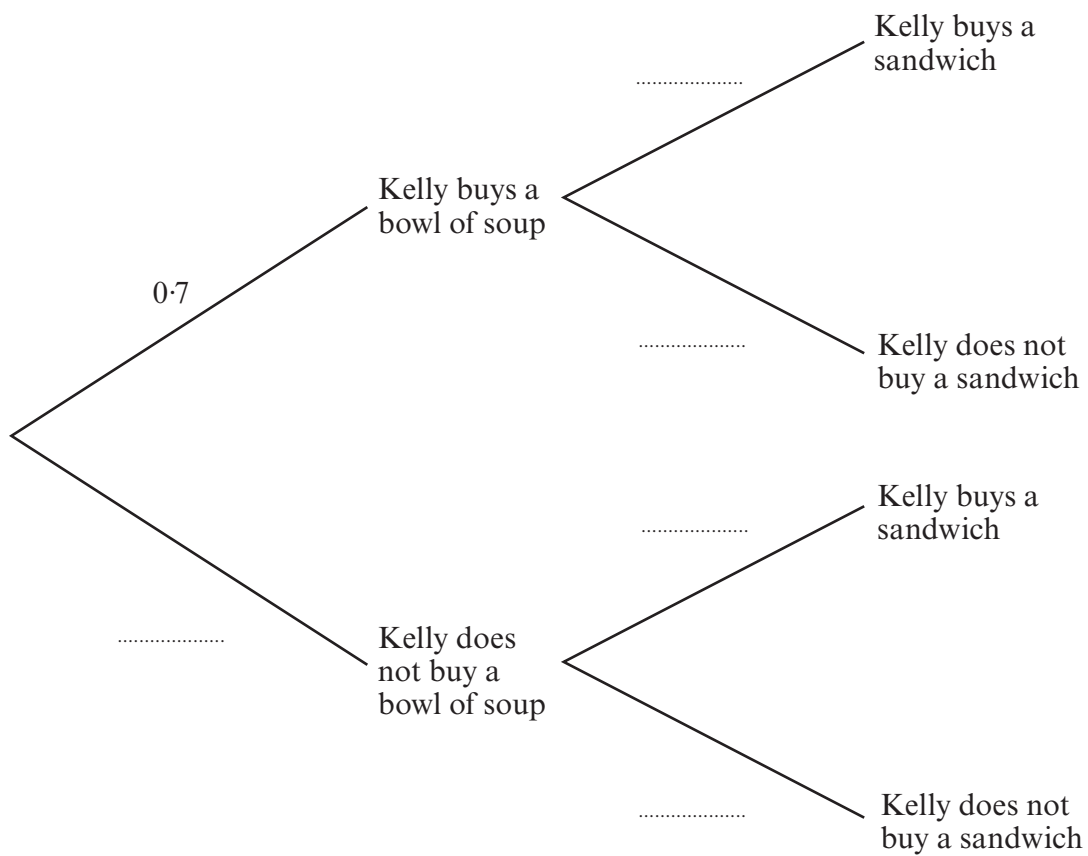
(a) Complete the tree diagram.

.....

.....

.....

.....



[4]

(b) Find the probability that Kelly does not buy soup and does not buy a sandwich.

.....

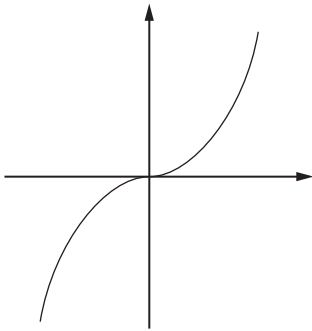
.....

.....

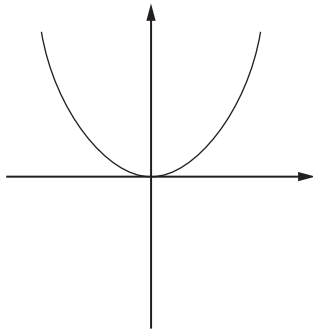
[2]

13.

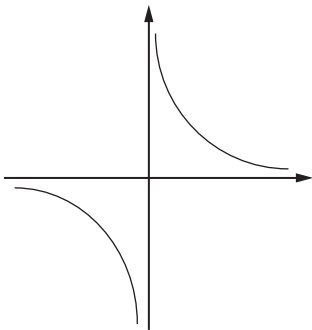
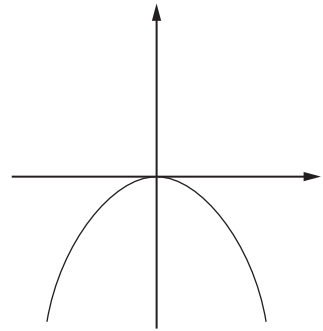
Sketch A



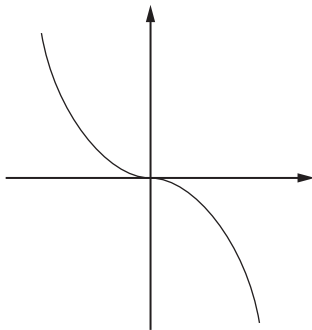
Sketch B



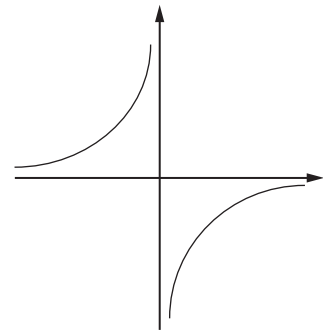
Sketch C



Sketch D



Sketch E



Sketch F

Match the sketches shown above with an equation in the table below.

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

[4]

14. (a) Express $1000^{\frac{2}{3}}$ as a decimal.

.....

.....

.....

.....

.....

.....

.....

[3]

(b) (i) Express $x^2 + 14x + 47$ in the form $(x + a)^2 + b$, where a and b are whole numbers to be found.

.....

.....

.....

.....

.....

.....

.....

[3]

(ii) Hence solve $x^2 + 14x + 47 = 0$ leaving your answer in surd form.

.....

.....

.....

.....

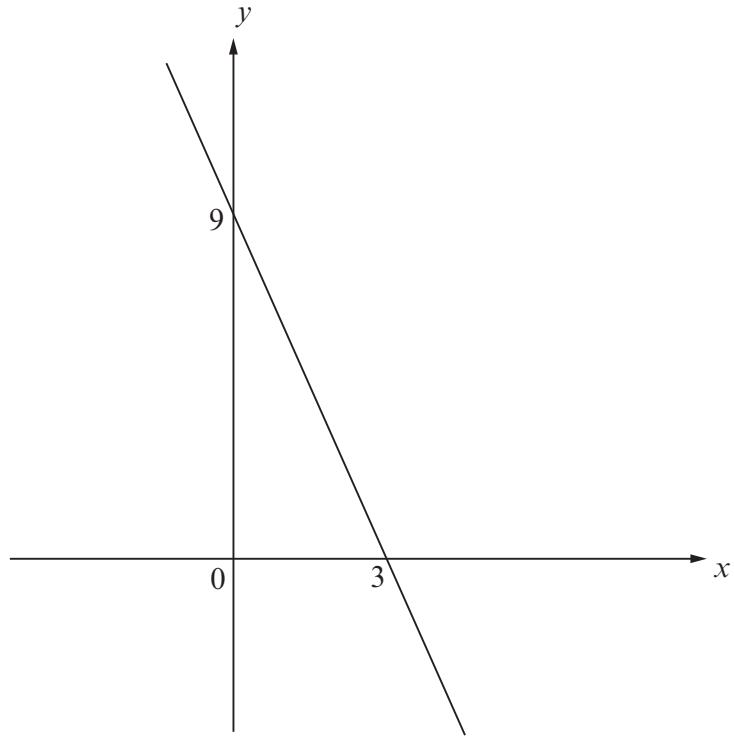
.....

.....

.....

[4]

15.



The straight line, shown in the sketch above, intersects with another straight line which is not shown.
 The other straight line is perpendicular to the straight line shown.
 The two straight lines intersect at the point where $x = 1$.
 Find the equation of this other straight line.

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

[8]