Surname	Centre Number	Candidate Number
Other Names		0

GCSE LINKED PAIR PILOT

4364/02

METHODS IN MATHEMATICS

UNIT 2: Methods (Calculator)
HIGHER TIER

A.M. TUESDAY, 17 June 2014

2 hours

ADDITIONAL MATERIALS

A calculator will be required 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 or use the π button on your calculator.

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 **4**.

For Examiner's use only		
Question	**Maximum Mark**	**Mark Awarded**
1.	**3**	
2.	**10**	
3.	**14**	
4.	**9**	
5.	**4**	
6.	**3**	
7.	**2**	
8.	**6**	
9.	**8**	
10.	**6**	
11.	**5**	
12.	**3**	
13.	**6**	
14.	**6**	
15.	**2**	
16.	**5**	
17.	**8**	
Total	**100**	

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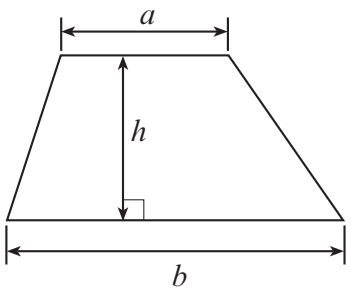
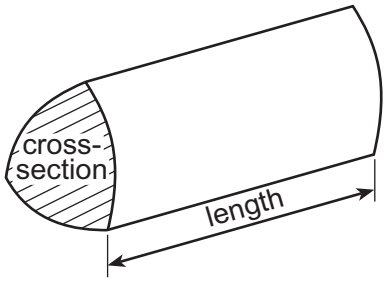
Formula List

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

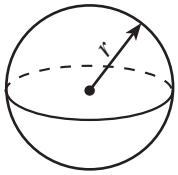


Volume of prism = area of cross-section × length



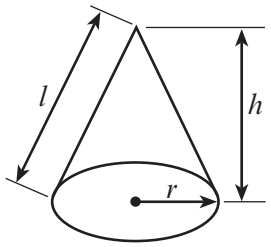
Volume of sphere = $\frac{4}{3}\pi r^3$

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



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

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

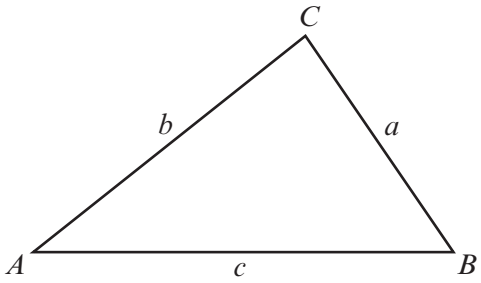


In any triangle ABC

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

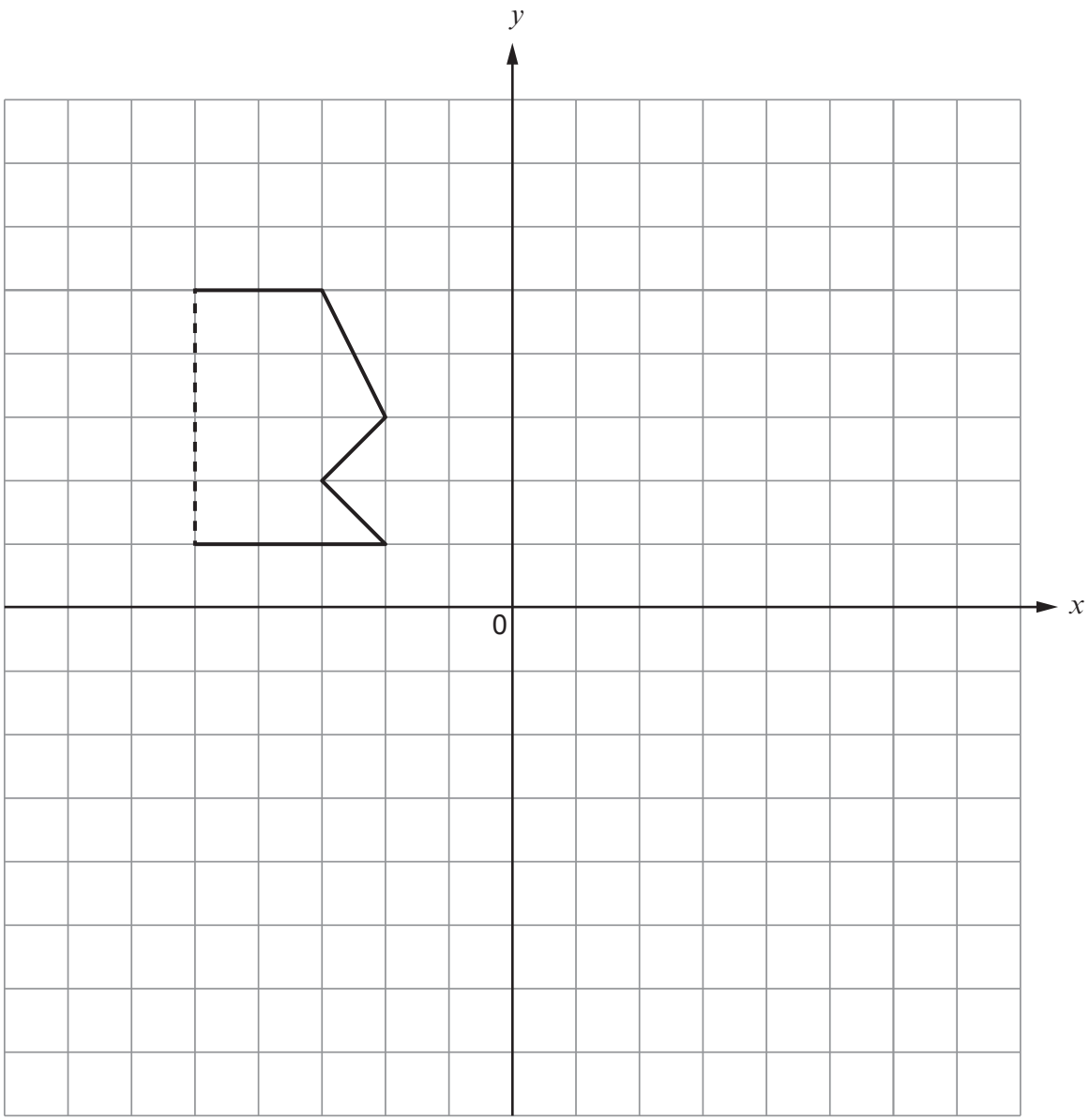
The solutions of $ax^2 + bx + c = 0$

where $a \neq 0$ are given by

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

Examiner only

1. Part of a shape is shown on the grid.
The dotted line is the line of symmetry of the shape.
Complete the drawing of the shape and then rotate your complete shape through 180° about the origin. [3]



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Examiner only

2. *(a)* Solve $\frac{5x}{8} = 10$. [2]

(b) Solve $\frac{28}{x} = 7$. [1]

(c) Solve $6(3x - 17) = 42$. [3]

(d) Solve the inequality $9x + 5 < 77$. [2]

(e) Write down the greatest whole number that satisfies the inequality $5x < 85$. [2]

Examiner only

3. *(a)* What percentage is 34 of 6800? [2]

(b) Increase 34 000 by $2\frac{1}{4}$%. [2]

(c) Evaluate each of the following three lengths **correct to two significant figures**, and then arrange them in ascending order.
You must show all your working. [5]

0·26 of 1345 metres

$\frac{3}{8}$ of 600 metres

4·5% of 3600 metres

Smallest Largest

(d) Calculate the difference between

- the smaller share when 450 is shared in the ratio 4:5

and

- $\frac{4}{5}$ of 450. [5]

Examiner only

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

The length of a cuboid is $4e$ cm.
The width of the cuboid is $3e$ cm.
The height of the cuboid is $2e$ cm.
The total surface area of the 6 faces of the cuboid is 468 cm^2.

- Write down an equation, in terms of e, for the total surface area of the cuboid.
- Solve the equation and use your answer to find the volume of the cuboid.

You must show all your working. [9]

Volume of the cuboid = ...

Examiner only

5. The temperature during Claudia's week on holiday changed every day.
The temperature was 26·5°C on Saturday.

The temperature was 12% lower on Sunday than on Saturday.
The temperature was 8% lower on Monday than on Sunday.

By Friday the temperature was 25·3°C.

What was the difference in temperature between Monday and Friday? [4]

Examiner only

6. It is known that a is proportional to b.
The table shows some values for a and b.

a	b
7·5	3
30	12
40	16

Use the information given in the table to complete the following equations. [3]

$$a = \ldots\ldots\ldots\ldots \times b$$

$$b = \ldots\ldots\ldots\ldots \times a$$

.....

.....

.....

.....

7. Express each of the following numbers in standard form.

(a) 0·000056 [1]

.....

(b) 2300000000 [1]

.....

Examiner only

8. The diagram below shows a parallelogram.

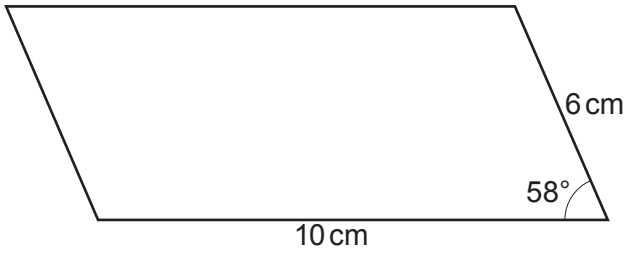
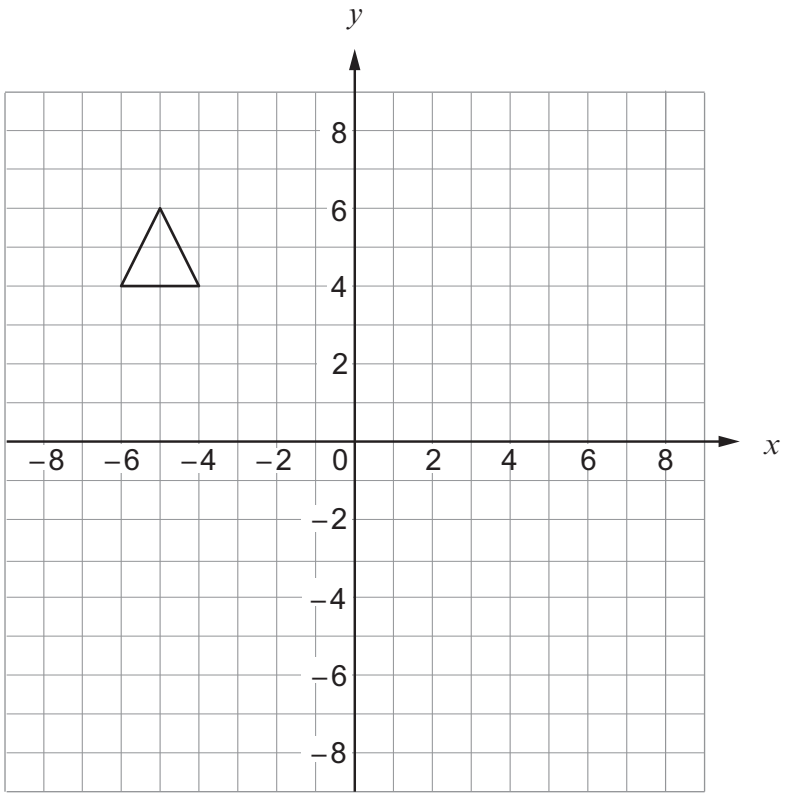


Diagram not drawn to scale

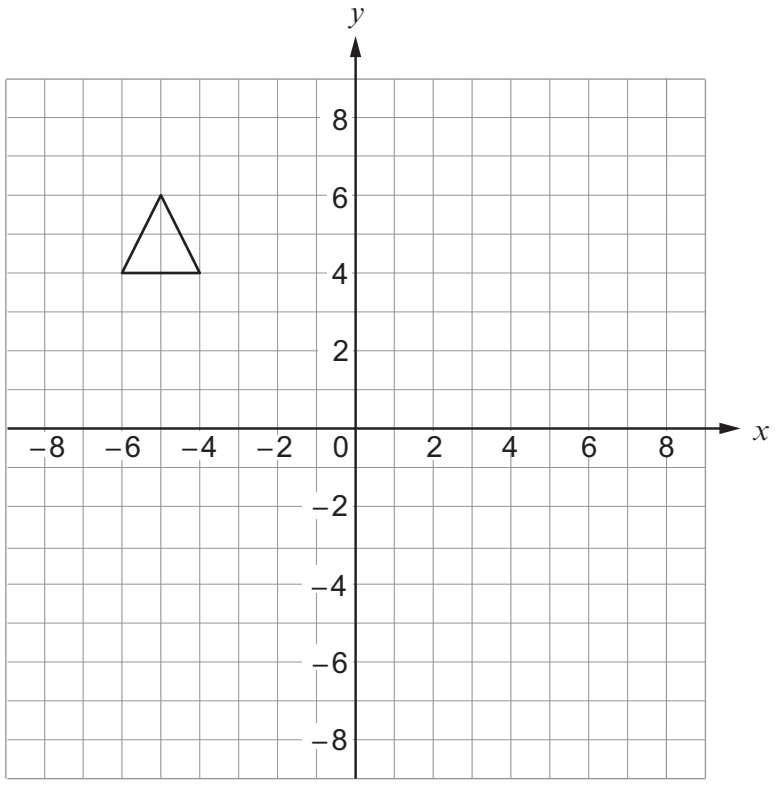
The area of the parallelogram is **not** 60 cm^2.
Calculate the correct area of the parallelogram.
Give your answer to an appropriate degree of accuracy. [6]

Examiner only

9. *(a)* Translate the triangle shown below by $\begin{pmatrix} 8 \\ -2 \end{pmatrix}$. [1]

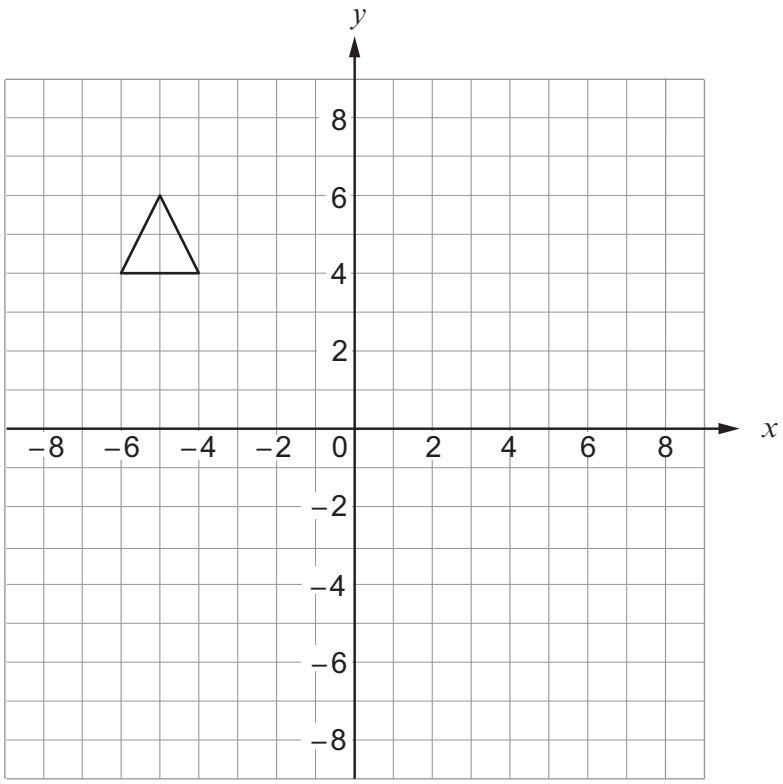


(b) Rotate the triangle through 90° anticlockwise using the point (–2, –1) as the centre of the rotation. [2]

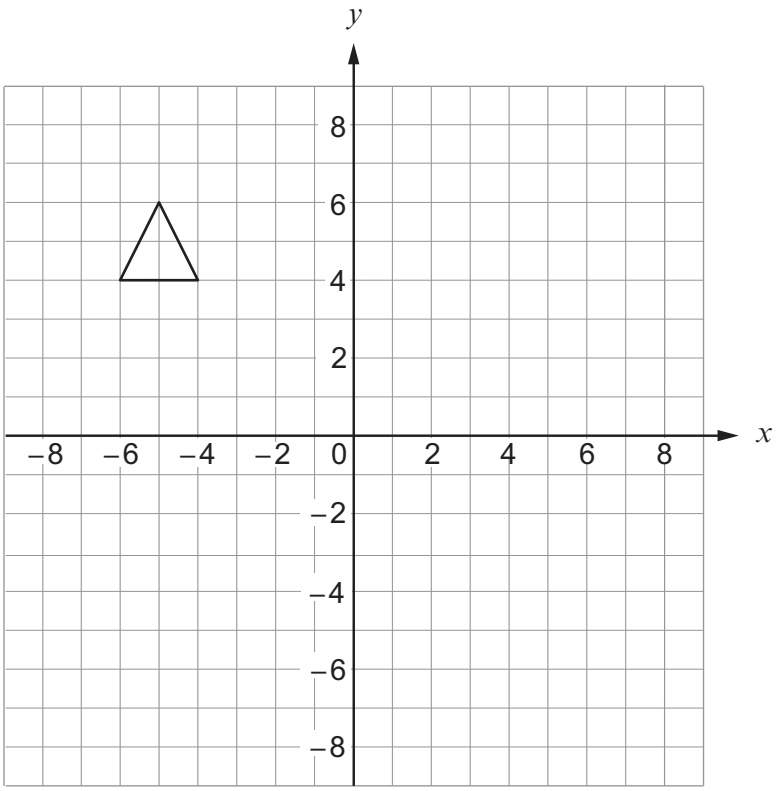


Examiner only

(c) Reflect the triangle shown in the line $y = x$. [2]



(d) Enlarge the triangle shown by a scale factor of $\frac{1}{2}$ using the origin as the centre of the enlargement. [3]



Turn over.

Examiner only

10. The diagram shows a circle with a diameter *PT* and a square with a diagonal *RP*.
RT is a straight line with *RP* = *PT*.

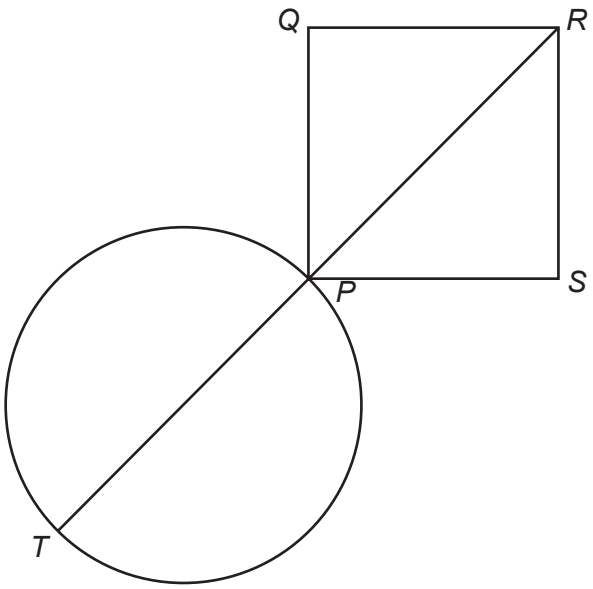


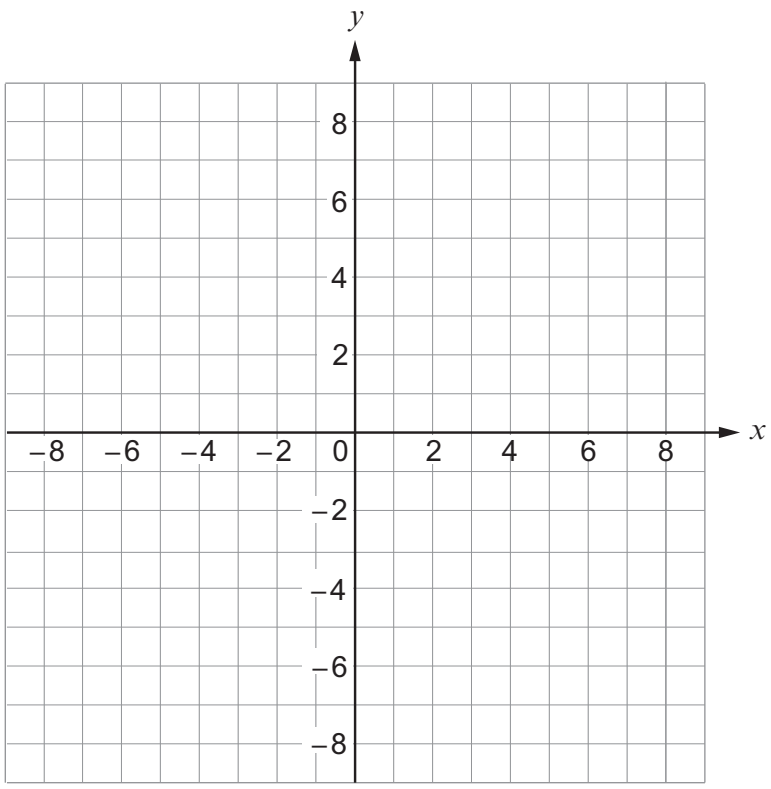
Diagram not drawn to scale

The circumference of the circle is 26·7 cm.
Calculate the perimeter of the square. [6]

Examiner only

11. *(a)* A point moves such that it is equidistant from the x-axis and the y-axis.

(i) On the grid below, plot the locus of the point. [2]



(ii) Write down the equations that represent the locus of the point. [2]

.....

..... and .....

(b) A point moves such that its distance from the origin is 3 units.
Write down the equation that represents the locus of the point. [1]

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Turn over.

Examiner only

12.

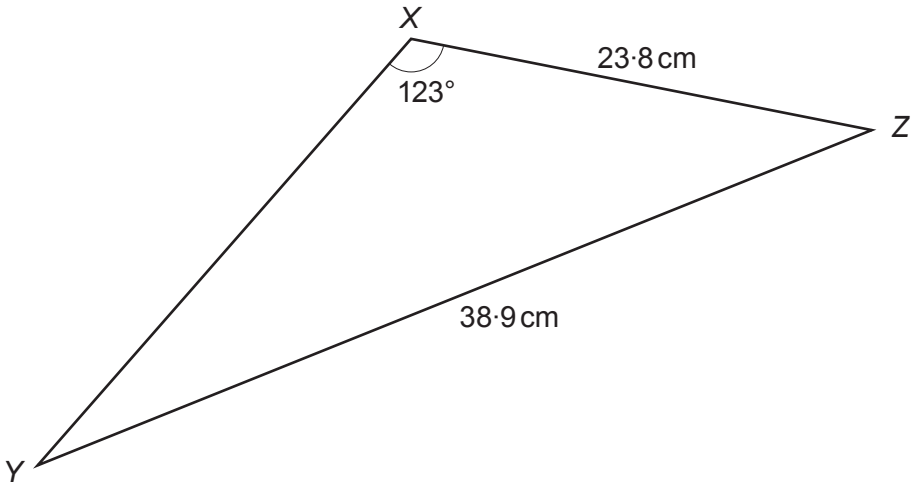


Diagram not drawn to scale

Calculate the size of $X\hat{Y}Z$. [3]

Examiner only

13. Solve the following simultaneous equations using an algebraic method. [6]

$$2x^2 + xy - 5 = 0$$
$$x + y = 4$$

Examiner only

14. *(a)*

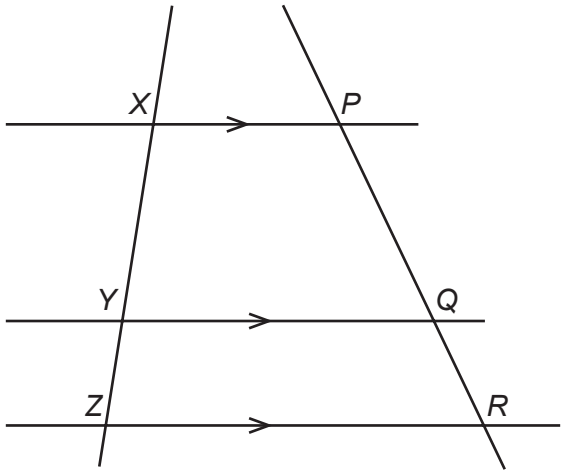


Diagram not drawn to scale

You are given that $XY = 6$ cm, $XZ = 8$ cm and $PQ = 7$ cm.
Calculate the length of QR. [3]

Examiner only

(b)

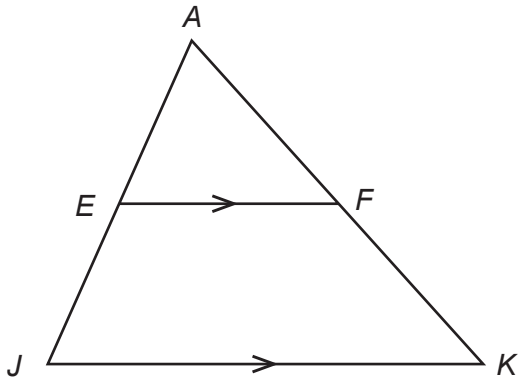
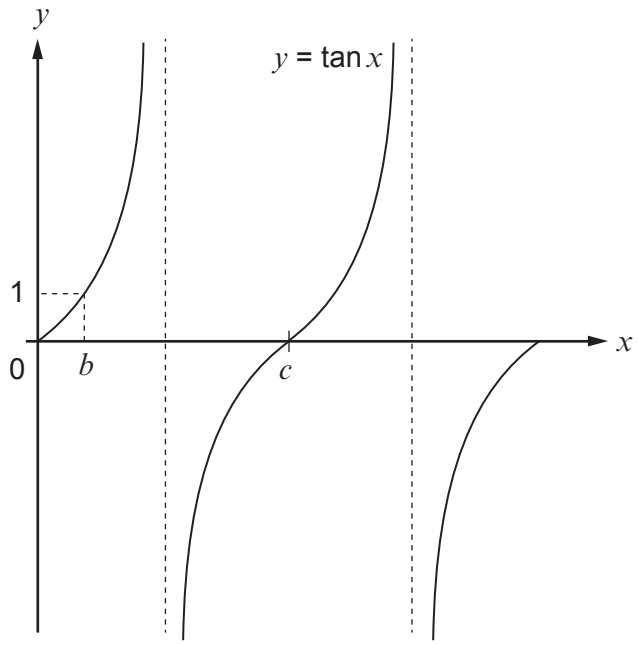


Diagram not drawn to scale

You are given that *AJ* = $8x$ cm, *AK* = $11y$ cm, *EF* = $2x + 3y$ cm and that *F* is the mid-point of *AK*.
Find the perimeter of triangle *AEF* in terms of x and y.
Give your answer in its simplest form. [3]

Examiner only

15.



A sketch of $y = \tan x$ is shown above.

Complete the following statements. [2]

b = ... ° c = ... °

Examiner only

16. You are given that **HL** = $5\mathbf{x} + 6\mathbf{y}$, **LK** = $3\mathbf{x} - 6\mathbf{y}$ and **KN** = $18\mathbf{x} - 36\mathbf{y}$.

(a) Express **HK** in terms of $\mathbf{x}$ and $\mathbf{y}$ in its simplest form. [2]

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(b) (i) Show that **LN** = k**LK** where the value of k is to be found. [2]

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(ii) What can you say about the points **L**, **K** and **N**? [1]

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Turn over for Question 17.

Examiner only

17. Here are some facts about two solids, a square-based pyramid and a cone.

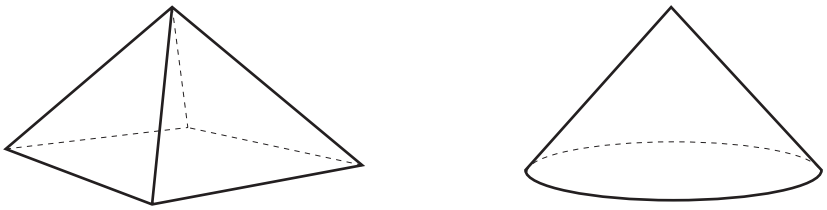

Diagram not drawn to scale

Square-based pyramid	Cone
It is a right pyramid. The total surface area of all 5 faces is $119{\cdot}8\,cm^2$. The area of **one** triangular face is $23{\cdot}6\,cm^2$. It has a volume of $76{\cdot}4\,cm^3$.	It is a right cone. It has a volume of $44{\cdot}4\,cm^3$.

The volume of each of these solids is calculated using:

$$\text{volume} = \frac{1}{3} \times \text{area of base} \times \text{perpendicular height.}$$

The square-based pyramid and the cone have equal perpendicular heights.
Calculate the radius of the cone.
Give your answer correct to an appropriate degree of accuracy. [8]

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END OF PAPER