Centre Number						Candidate Number				
Surname										
Other Names										
Candidate Signature										

For Examiner's Use	
Examiner's Initials	
Pages	Mark
3	
4 – 5	
6 – 7	
8 – 9	
10 – 11	
12 – 13	
14 – 15	
16	
TOTAL	

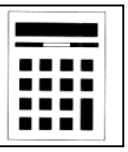
General Certificate of Secondary Education
Higher Tier

Methods in Mathematics (Linked Pair Pilot) 93652H

Unit 2 Geometry and Algebra

Practice Paper 1

H

For this paper you must have: • a calculator • mathematical instruments.	

Time allowed
- 1 hour 30 minutes

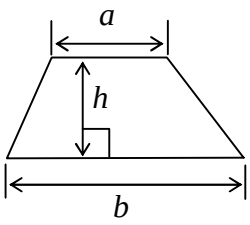
Instructions
- Use black ink or black ball-point pen. Draw diagrams in pencil.
- Fill in the boxes at the top of this page.
- Answer **all** questions.
- You must answer the questions in the space provided. Do not write outside the box around each page or on blank pages.
- Do all rough work in this book. Cross through any work that you do not want to be marked.
- If your calculator does not have a π button, take the value of π to be 3.14 unless another value is given in the question.

Information
- The marks for questions are shown in brackets.
- The maximum mark for this paper is 80.
- The quality of your written communication is specifically assessed in Questions 3, 6 and 15.
  These questions are indicated with an asterisk (✳)
- You may ask for more answer paper, graph paper and tracing paper
  These must be tagged securely to this answer booklet.
- You are expected to use a calculator where appropriate.

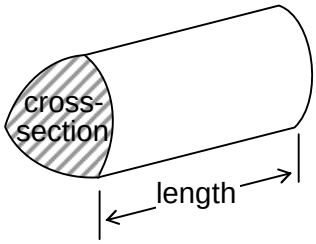
Advice
- In all calculations, show clearly how you work out your answer.

Formulae Sheet: Higher Tier

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

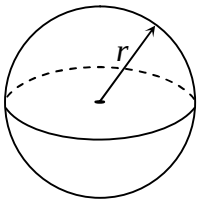


Volume of prism = area of cross-section × length



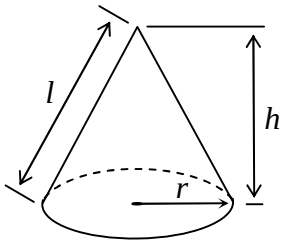
Volume of sphere = $\frac{4}{3}\pi r^3$

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



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

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

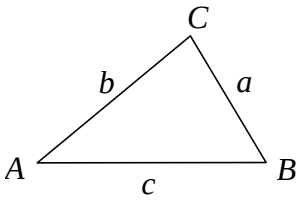


In any triangle ABC

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

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

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



The Quadratic Equation

The solutions of $ax^2 + bx + c = 0$, where $a \neq 0$, are given by

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

Answer **all** questions in the spaces provided.

1 (a) Solve $5y - 4 = 2y + 8$

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Answer $y =$ ..... *(3 marks)*

1 (b) Solve $\frac{5x - 7}{3} = x + 5$

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Answer $x =$ ..... *(3 marks)*

2 Calculate the circumference of a circle with diameter 12 cm.

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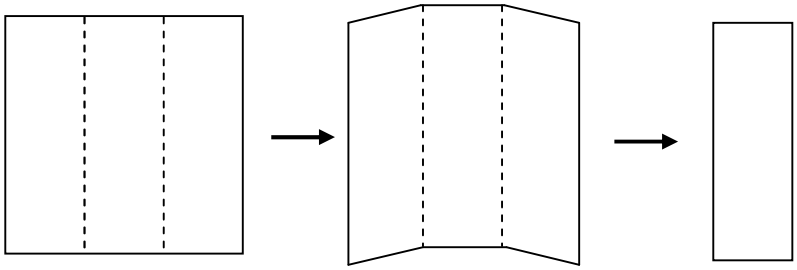
Answer ..... cm *(2 marks)*

Turn over for the next question

8

✶**3** A square piece of paper is folded in three.



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The final folded piece has a perimeter of 32 cm.

What is the area of the original square?

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Answer ..... cm^2 *(4 marks)*

4 Entry to a zoo costs £5.25 for adults and £4 for children.
A group of adults and children pay exactly £94 to get in.

There are more children than adults.

How many adults and children are in the group?

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Answer ..... adults ..... children *(3 marks)*

5 (a) Expand and simplify $5(x + 3) - 2(x - 1)$

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Answer ..... *(2 marks)*

5 (b) Expand and simplify $(x + 3)(x - 1)$

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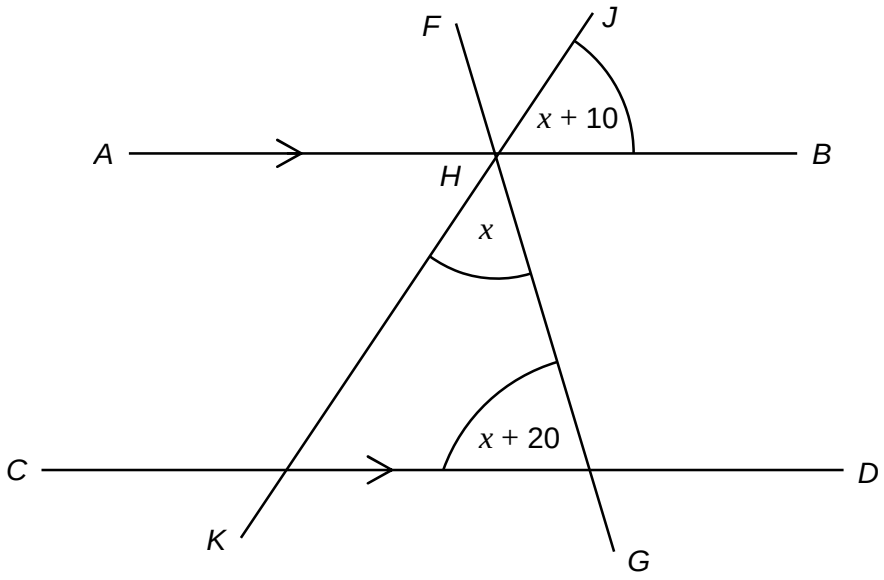
Answer ..... *(2 marks)*

✶**6** *AB* and *CD* are parallel lines.
FHG and *JHK* are straight lines.



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Calculate the value of x.

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Answer ..... *(4 marks)*

15

7 100 people are asked if they can sing and/or dance.

34 people cannot sing or dance.
46 people can sing.
50 can dance.

How many people can sing but not dance?

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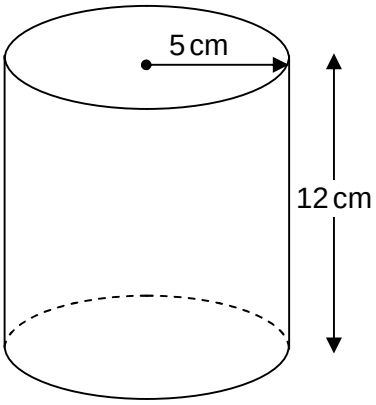
Answer ..... *(4 marks)*

8 A cylindrical can has a radius of 5 cm and a height of 12 cm.



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8 (a) Work out the volume of the can.

State the units of your answer.

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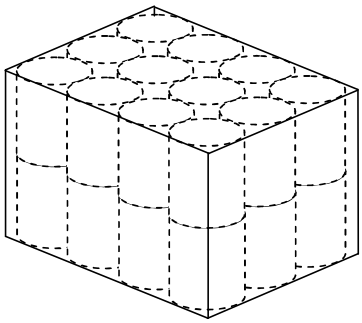
Answer ..... *(3 marks)*

8 (b) 24 of the cans are fitted into a box as shown.
The box is a cuboid and has six faces.



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Work out the **total** surface area of the box.

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Answer ..... cm^2 *(4 marks)*

11

9 (a) Calculate the length x in the triangle.

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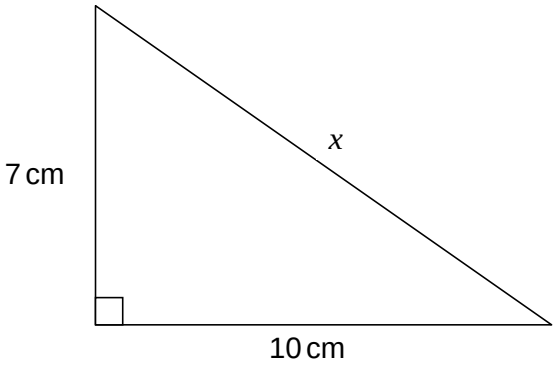

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Answer ..... cm *(3 marks)*

9 (b) Calculate the angle y in the triangle.

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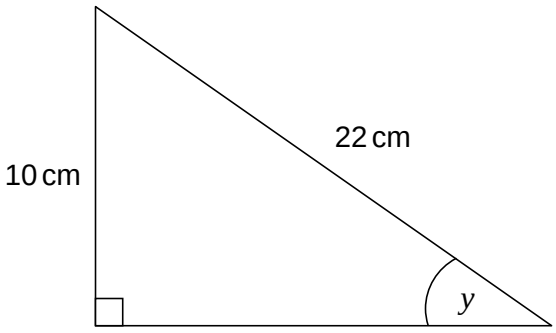

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Answer ..... degrees *(3 marks)*

10 (a) Use your calculator to work out

$$\sqrt{(7^2 + 9^2 - 2 \times 7 \times 9 \times \cos 42^\circ)}$$

Write down all the figures in your calculator display.

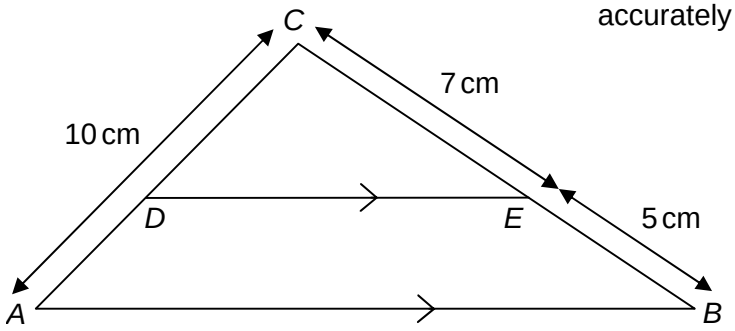
Answer ..... *(1 mark)*

10 (b) Give your answer to part (a) to an appropriate degree of accuracy.

Answer ..... *(1 mark)*

11 *ABC* is a triangle.
DE is parallel to *AB*.
AC = 10 cm, *CE* = 7 cm and *EB* = 5 cm.

Not drawn accurately



Work out the length *AD*.

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Answer ..... cm *(3 marks)*

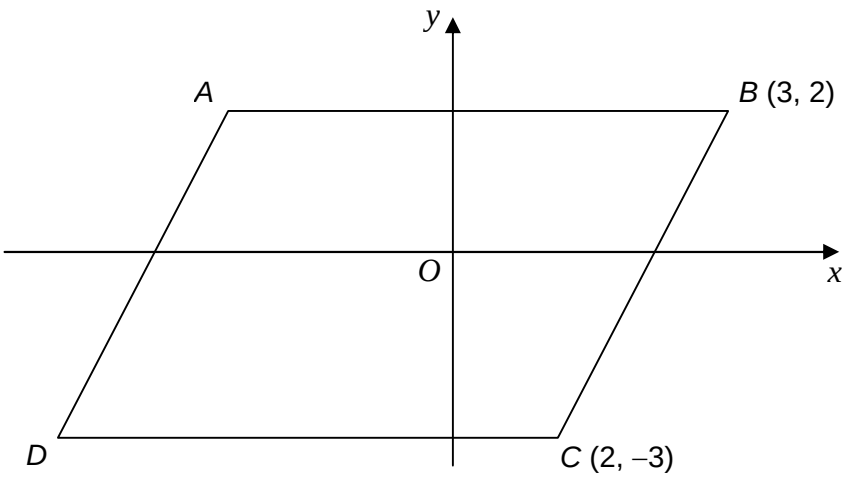
Turn over for the next question

12 The sketch shows a parallelogram *ABCD*.

B is the point (3, 2)

C is the point (2, –3)

The area inside the parallelogram on the right of the *y*-axis is one-third of the total area of the parallelogram.



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Work out the coordinates of the points *A* and *D*.

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Answer *A* (....., ...)

D (....., ...) *(5 marks)*

13 The number X has product of prime factors $2 \times 3^3 \times 5$
Another number Y has product of prime factors $2^2 \times 3 \times 5 \times 7$

13 (a) Work out the Highest Common Factor (HCF) of X and Y.

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Answer ..... *(2 marks)*

13 (b) Work out the Least Common Multiple (LCM) of X and Y.

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Answer ..... *(2 marks)*

14 (a) The nth term of a sequence is $n^2 - 2n$.

Work out the first three terms of the sequence.

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Answer ....., ..., ... *(2 marks)*

14 (b) Work out the nth term of the sequence 5, 6, 8, 11, 15, ...

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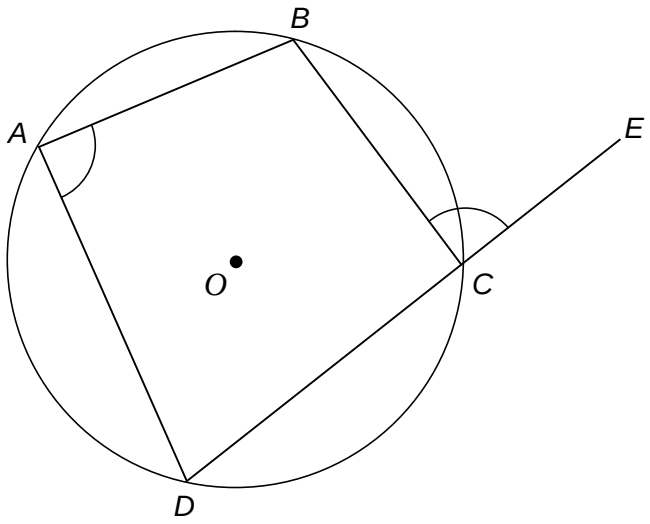
Answer ..... *(4 marks)*

15

✶**15 (a)** *ABCD* is a cyclic quadrilateral.

DC is extended to the point *E*.



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Show that angle *BAD* = angle *ECB*.

Give reasons for any statements you make.

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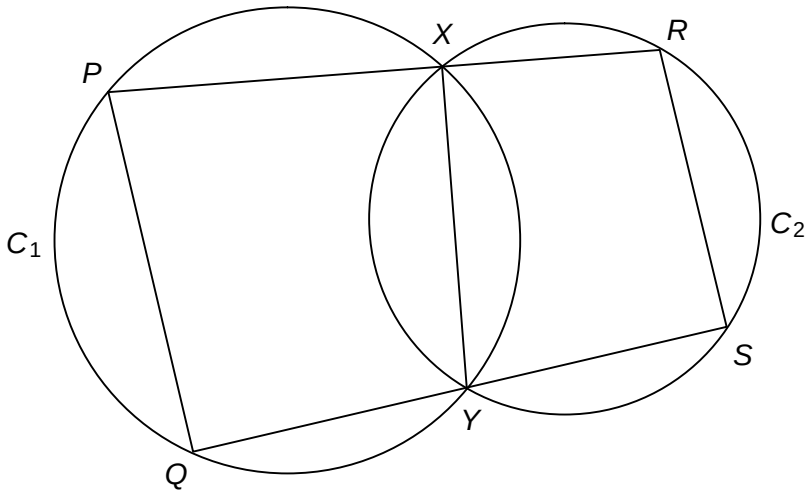
(2 marks)

15 (b) Two circles C_1 and C_2 intersect at X and Y.
P and Q are points on the circumference of C_1.
R and S are points on the circumference of C_2.
PXR and QYS are straight lines.



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Prove that PQ is parallel to RS.

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(4 marks)

6

16 (a) Solve the equation $3x^2 + 4x - 9 = 0$

Give your answer to 2 decimal places.

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Answer ..... *(3 marks)*

16 (b) Hassim is solving a quadratic equation using the quadratic formula.

He uses the formula correctly to get

$$x = \frac{3 \pm \sqrt{29}}{10}$$

Work out the equation that Hassim has solved.

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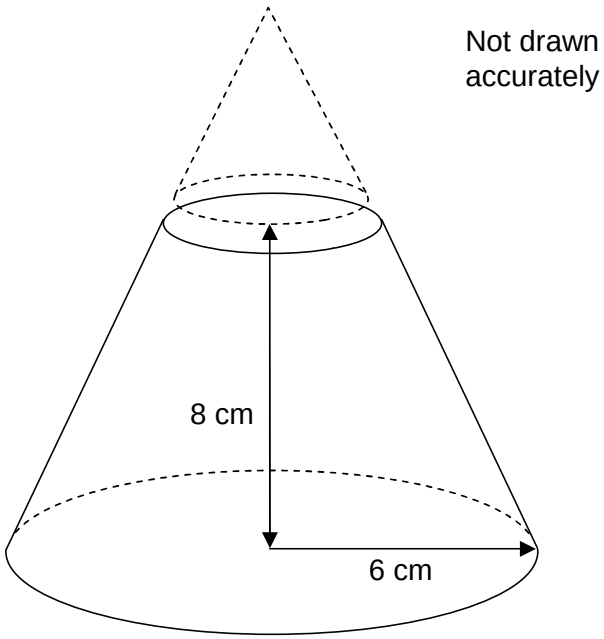
Answer ..... *(2 marks)*

17 The top third of a cone is cut away.
The resulting frustum has a base radius of 6 cm and a height of 8 cm.



Calculate the volume of the frustum.

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Answer ..... cm^3 *(4 marks)*

9

18 *ABCD* is a quadrilateral.

AB = 5 cm, *BC* = 12 cm, *CD* = 10 cm and *DA* = 9 cm.

Angle *ABC* = 90°

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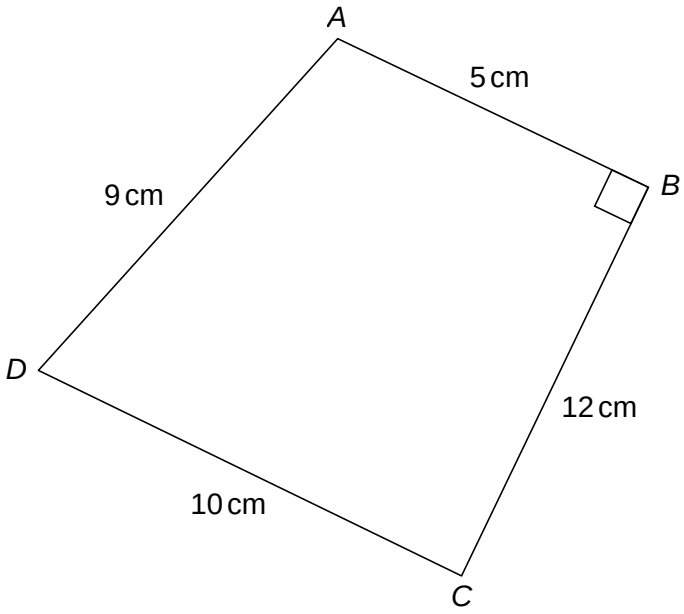

Calculate the area of *ABCD*.

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Answer ..... cm^2 *(5 marks)*

END OF QUESTIONS

5

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