



**Cambridge International Examinations**  
Cambridge International General Certificate of Secondary Education

CANDIDATE  
NAME

CENTRE  
NUMBER

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CANDIDATE  
NUMBER

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**MATHEMATICS**

**0580/27**

Paper 2 (Extended)

**May/June 2014**

**1 hour 30 minutes**

Candidates answer on the Question Paper.

Additional Materials:      Electronic calculator  
   Tracing paper (optional)

Geometrical instruments

**READ THESE INSTRUCTIONS FIRST**

Write your Centre number, candidate number and name on all the work you hand in.

Write in dark blue or black pen.

You may use an HB pencil for any diagrams or graphs.

Do not use staples, paper clips, glue or correction fluid.

**DO NOT WRITE IN ANY BARCODES.**

Answer **all** questions.

If working is needed for any question it must be shown below that question.

Electronic calculators should be used.

If the degree of accuracy is not specified in the question, and if the answer is not exact, give the answer to three significant figures. Give answers in degrees to one decimal place.

For  $\pi$ , use either your calculator value or 3.142.

At the end of the examination, fasten all your work securely together.

The number of marks is given in brackets [ ] at the end of each question or part question.

The total of the marks for this paper is 70.

The syllabus is approved for use in England, Wales and Northern Ireland as a Cambridge International Level 1/Level 2 Certificate.

This document consists of **11** printed pages and **1** blank page.



- 1 In a desert the noon temperature was  $28^{\circ}\text{C}$ .  
At midnight the temperature was  $33^{\circ}\text{C}$  lower than the noon temperature.

Find the temperature at midnight.

Answer .....  $^{\circ}\text{C}$  [1]

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- 2 A L G E B R A

- (a) A letter is chosen at random from the list.

Find the probability that the letter chosen is A.

Answer(a) ..... [1]

- (b) A letter is chosen at random from the list and then replaced.  
This is done 63 times.

Work out the number of times the letter A is expected to be chosen.

Answer(b) ..... [1]

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- 3 During a football match a player ran 7.8 km, correct to 1 decimal place.

Complete the statement about the distance,  $d$  km, the player ran during the football match.

Answer .....  $\leq d <$  ..... [2]

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- 4 Sara invests \$600 at a rate of 4% per year compound interest.

Calculate the total amount Sara has after 2 years.

Answer \$ ..... [2]

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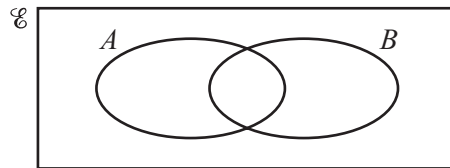
5 (a) Calculate  $\left(\frac{115 + \sqrt[4]{233}}{0.58^3}\right)$ .

Answer(a) ..... [1]

(b) Write your answer to **part (a)** in standard form.

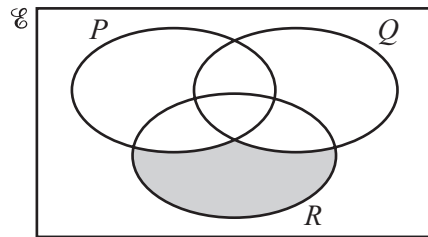
Answer(b) ..... [1]

6 (a)



On the Venn diagram, shade the region  $A \cup B'$ . [1]

(b)



Use set notation to describe the region shaded on the Venn diagram.

Answer(b) ..... [1]

7  $w$  varies directly as  $\sqrt{v}$ .  
When  $v = 9$ ,  $w = 24$ .

Find  $w$  in terms of  $v$ .

Answer  $w =$  ..... [2]

8 Solve the simultaneous equations.

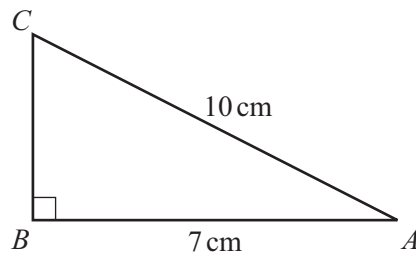
$$3x - y = 10$$

$$x + 2y = 1$$

Answer  $x =$  .....

$y =$  ..... [3]

9



NOT TO  
SCALE

Calculate the length of  $BC$ .

Answer  $BC =$  ..... cm [3]

10 Work out  $\left(\frac{1}{8} + \frac{2}{3}\right) \div \frac{5}{4}$ , giving your answer as a fraction.

Do not use a calculator and show all the steps of your working.

Answer ..... [3]

11  $x = p^2 - q^2$

(a) Find the value of  $x$  when  $p = 7$  and  $q = 9$ .

Answer(a)  $x = \dots\dots\dots$  [1]

(b) Make  $q$  the subject of the formula.

Answer(b)  $q = \dots\dots\dots$  [2]

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12 A cone has a volume of  $21 \text{ cm}^3$  and a height of  $4 \text{ cm}$ .

Calculate the radius of the cone.

[The volume,  $V$ , of a cone with radius  $r$  and height  $h$  is  $V = \frac{1}{3}\pi r^2 h$ .]

Answer  $\dots\dots\dots \text{ cm}$  [3]

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13 (a) Simplify  $(3p^3)^4$ .

Answer(a)  $\dots\dots\dots$  [2]

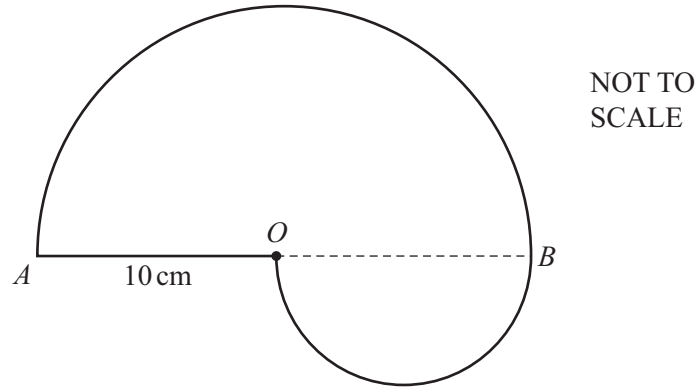
(b)  $(p^2)^n = \frac{1}{p^6}$

Find the value of  $n$ .

Answer(b)  $n = \dots\dots\dots$  [1]

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14



The diagram shows a shape made with two semicircles.  
 $AO = OB = 10$  cm.

Calculate the perimeter of the shape.

Answer ..... cm [3]

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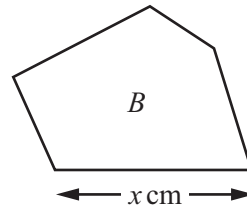
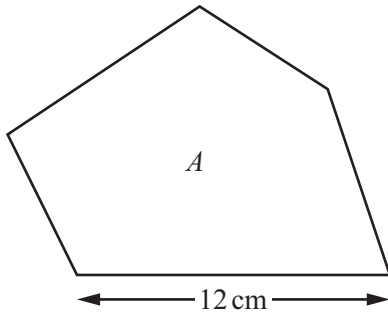
15 Solve the equation.

$$\frac{2x - 3}{x + 1} = \frac{1}{2}$$

Answer  $x =$  ..... [3]

---

16

NOT TO  
SCALE

$A$  and  $B$  are two similar pentagons.  
The area of  $A$  is  $126 \text{ cm}^2$  and the area of  $B$  is  $56 \text{ cm}^2$ .

Calculate the value of  $x$ .

Answer  $x = \dots\dots\dots$  [3]

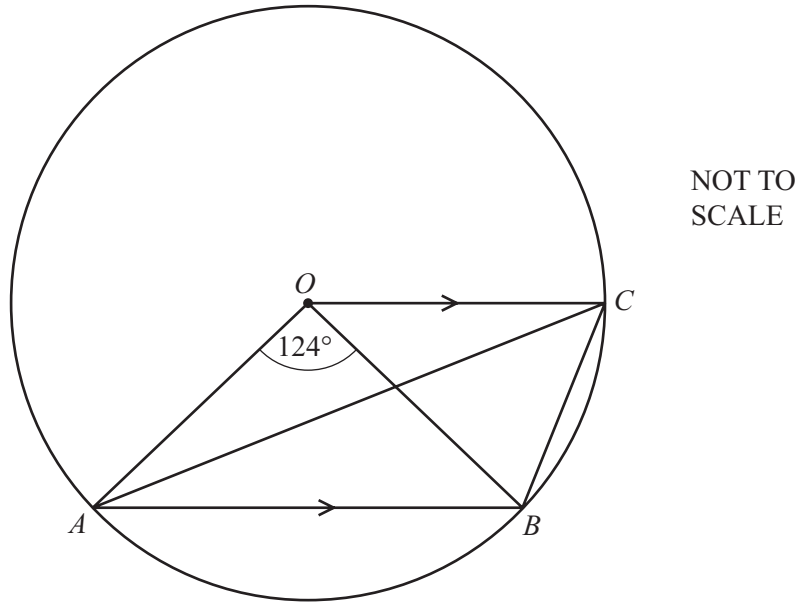
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- 17 The scale of a map is 1:20 000.  
On the map the area of a lake is  $60 \text{ cm}^2$ .

Calculate the actual area of the lake, giving your answer in **square kilometres**.

Answer  $\dots\dots\dots \text{ km}^2$  [3]

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In the diagram,  $O$  is the centre of the circle which passes through  $A$ ,  $B$  and  $C$ .  
 $OC$  is parallel to  $AB$ .  
 Angle  $AOB = 124^\circ$ .

Find

(a) angle  $BOC$ ,

Answer(a) Angle  $BOC = \dots\dots\dots$  [2]

(b) angle  $OBC$ ,

Answer(b) Angle  $OBC = \dots\dots\dots$  [1]

(c) angle  $CAB$ .

Answer(c) Angle  $CAB = \dots\dots\dots$  [1]



19 (a) Factorise completely.

(i)  $a^2 - b^2$

Answer(a)(i) ..... [1]

(ii)  $2a + 2b + 3ay + 3by$

Answer(a)(ii) ..... [2]

(b) Simplify  $\frac{2a + 2b + 3ay + 3by}{a^2 - b^2}$ .

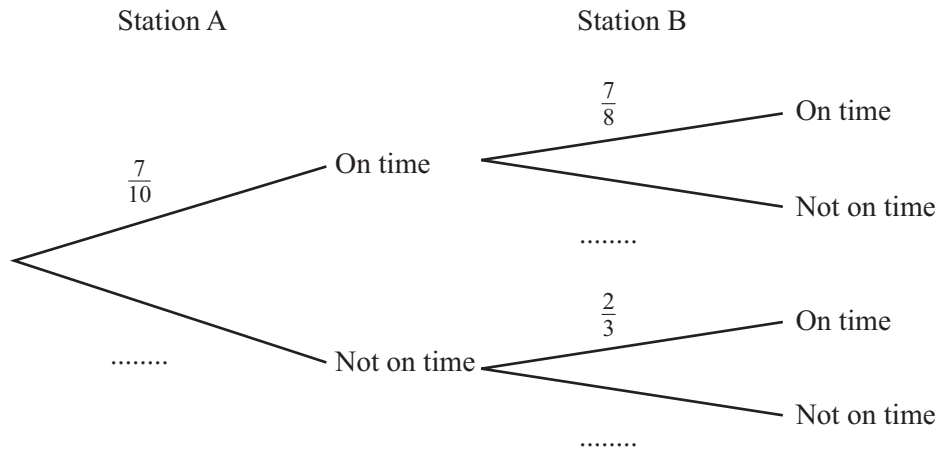
Answer(b) ..... [1]

20 The probability that a train arrives at station A on time is  $\frac{7}{10}$ .

If it is on time the probability that it arrives at station B on time is  $\frac{7}{8}$ .

If it is not on time the probability that it arrives at station B on time is  $\frac{2}{3}$ .

(a) Complete the tree diagram.



[1]

(b) Calculate the probability that the train arrives at station B on time.

Answer(b) ..... [3]

21  $M = \begin{pmatrix} 2 & 1 \\ 3 & 4 \end{pmatrix}$

(a) Find  $M^2$ .

*Answer(a)*  $\begin{pmatrix} & \\ & \end{pmatrix}$  [2]

(b) Find  $M^{-1}$ .

*Answer(b)*  $\begin{pmatrix} & \\ & \end{pmatrix}$  [2]

22  $f(x) = 4 - 3x$        $g(x) = x^2 + 5$

(a) Find  $fg(2)$ .

*Answer(a)* ..... [2]

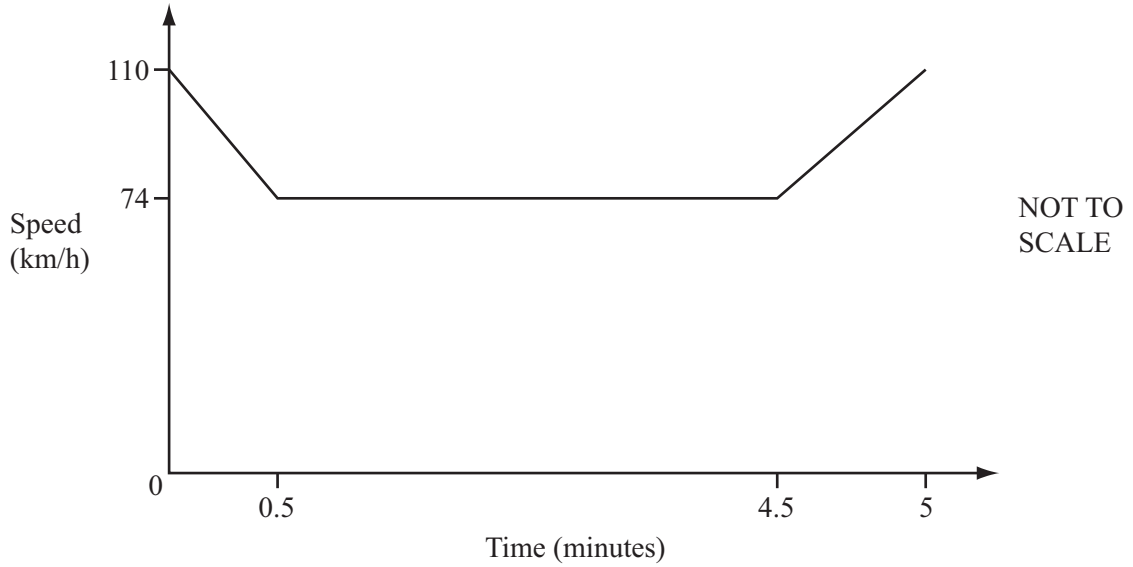
(b) Find  $gf(x)$ .  
Give your answer in its simplest form.

*Answer(b)*  $gf(x) = \dots\dots\dots$  [2]

(c) Find  $x$  when  $f^{-1}(x) = \frac{2}{3}$ .

*Answer(c)*  $x = \dots\dots\dots$  [1]

23



The diagram shows the speed-time graph of a car which slows down to pass through road works. The car slows down from a speed of 110 km/h to a speed of 74 km/h in 0.5 **minutes**. It then travels at a speed of 74 km/h for 4 minutes. The car then accelerates for 0.5 minutes to return to its speed of 110 km/h.

- (a) Calculate the acceleration of the car between 4.5 and 5 minutes.  
Give your answer in  $\text{m/s}^2$ .

Answer(a) .....  $\text{m/s}^2$  [2]

- (b) Calculate the total distance travelled by the car during the journey shown in the diagram.  
Give your answer in kilometres.

Answer(b) ..... km [4]

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