

CANDIDATE  
NAME

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CENTRE  
NUMBER

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CANDIDATE  
NUMBER

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**MATHEMATICS**

Paper 2 (Extended)

**0626/02**

**May/June 2018**

**1 hour**

Candidates answer on the Question Paper.

Additional Materials:      Geometrical instruments  
   Tracing paper (optional)

**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 and graphs.

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

**DO NOT WRITE IN ANY BARCODES.**

Answer **all** questions.

**Electronic calculators should be used.**

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

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 60.

This syllabus is regulated for use in England as a Cambridge International Level 1/Level 2 (9–1) Certificate.

This document consists of **16** printed pages.

- 1 Hilda is carrying out a health survey.  
She stands outside a health food store and surveys 12 people as they leave the store.

Give **one** reason why her results may not be reliable.

.....  
 ..... [1]

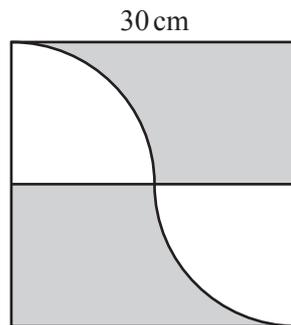
- 2 A suitcase has a mass of 21 kg, correct to the nearest kilogram.

Write down the lower bound and the upper bound of the mass of this suitcase.

lower bound ..... kg

upper bound ..... kg [2]

- 3 The diagram shows a pattern made from a square of side 30 cm and two identical quarter circles.

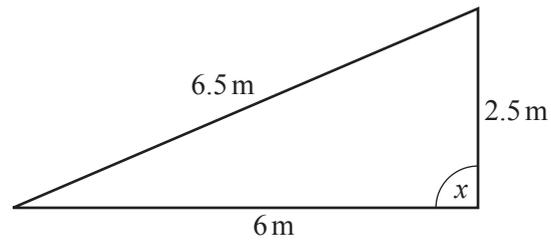


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Calculate the shaded area.

..... cm<sup>2</sup> [3]

- 4 The diagram shows a flower bed that David has made.



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David says:

Angle  $x$  is a right angle.

Show that David is correct.

[2]

- 5 Factorise fully  $3a^2 - 21ab$ .

..... [2]

- 6 The members of Dolphin Swim Club and Shark Swim Club each complete as many lengths of the same pool as they can.

The stem and leaf diagrams show the results.

Dolphin Swim Club	Shark Swim Club
2   6 8 9 9	2   5 7 7 8
3   0 2 2 3	3   1 1 4 9 9
4   2 3	4   0 3 3 5
5	
6   9	

**Key:** 6 | 9 represents 69 lengths

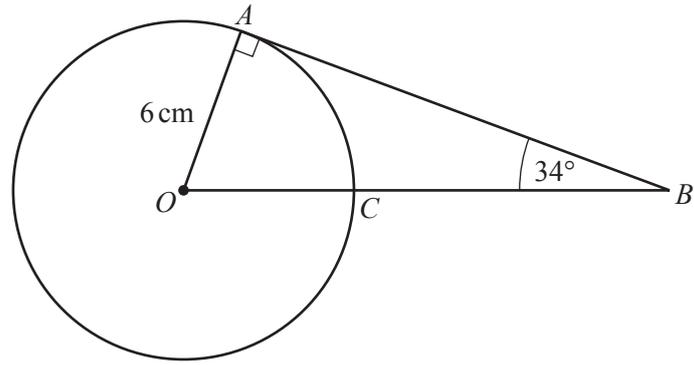
- (a) Explain why the mean number of lengths should not be used to compare the swim clubs.

.....  
 ..... [1]

- (b) The median number of lengths completed by Shark Swim Club is 34.

Compare the average number of lengths completed by the two clubs.

.....  
 ..... [2]



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The diagram shows a circle centre  $O$  and radius 6 cm.  
 The line  $AB$  is a tangent to the circle at  $A$ .  
 The point  $C$  is where the line  $OB$  crosses the circumference of the circle.  
 Angle  $ABO = 34^\circ$ .

- (a) Explain why the radius  $OA$  is the shortest distance from  $O$  to the tangent  $AB$ .

..... [1]

- (b) (i) Calculate the length of  $OB$ .

$OB =$  ..... cm [3]

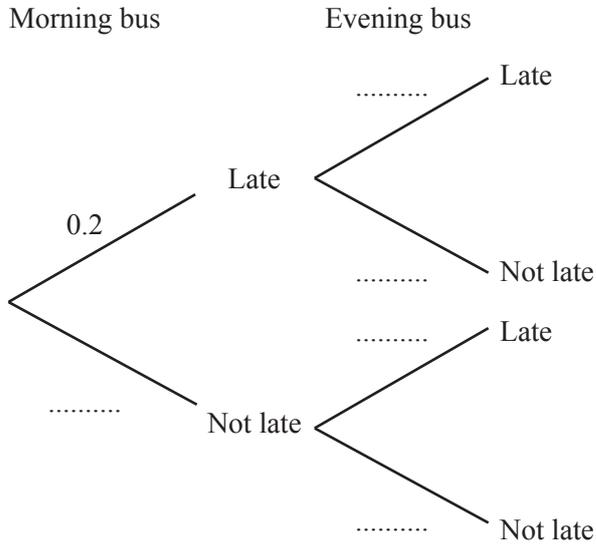
- (ii) Work out the length of  $BC$ .

$BC =$  ..... cm [1]

- 8 Renata goes to work by bus in the morning and goes home by bus in the evening. The probability that the morning bus is late is 0.2 .

When the morning bus is late, the probability that the evening bus is late is 0.6 .  
 When the morning bus is not late, the probability that the evening bus is late is 0.1 .

- (a) Complete the tree diagram.



[2]

- (b) Find the probability that both buses are late.

..... [2]

9 Make  $t$  the subject of this formula.

$$s = \frac{t+r}{p}$$

..... [2]

10 Calculate  $\sqrt[3]{\frac{512}{81^{0.75}}}$ .

..... [1]

- 11 The population,  $P$ , of a species of insect,  $t$  years after 1st January 2000, is given by the formula

$$P = 43200 \times 0.85^t.$$

- (a) Jan says:

The multiplier is 0.85, so the population is decreasing by 85% each year.

Is Jan correct?

Explain how you know.

..... because .....

..... [1]

- (b) Find the population on 1st January 2018.

..... [2]

- (c) Find the number of whole years it takes for the population to fall below 20 000.

..... [2]

12  $\mathcal{E} = \{\text{two-digit positive integers}\}$

$A = \{\text{factors of } 64\}$

$B = \{x: 10 \leq x \leq 50\}$

$C = \{\text{square numbers}\}$

(a) Write  $50 \in B$  in words.

..... [1]

(b) Find  $A \cap B \cap C$ .

{ ..... } [1]

(c) Find  $n(B \cup C)$ .

..... [2]

- 13 There are 1067 students in Lena's school.  
The table shows information about the number of students in each year.

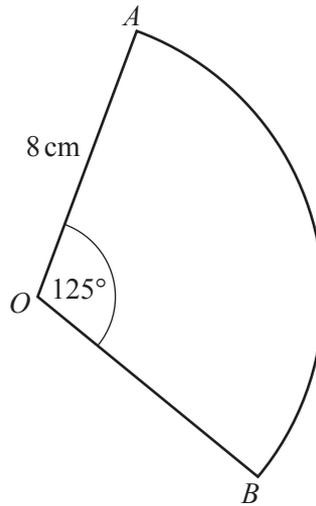
	Girls	Boys
Year 7	80	120
Year 8	95	102
Year 9	112	90
Year 10	113	115
Year 11	105	135

Lena carries out a survey and takes a sample of 100 of these students, stratified by gender and by school year.

Work out the number of Year 9 boys that Lena samples in her survey.

..... [2]

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$AOB$  is a sector of a circle with centre  $O$  and radius  $8\text{ cm}$ .  
Angle  $AOB = 125^\circ$ .

Find the perimeter of the sector  $AOB$ .

..... cm [3]

- 15** Solve the simultaneous equations.  
Show all your working and give your answers in exact form.

$$\begin{aligned}(\sqrt{2})x + y &= 2\sqrt{2} \\ x - (\sqrt{2})y &= 14\end{aligned}$$

$$x = \dots\dots\dots$$

$$y = \dots\dots\dots [4]$$

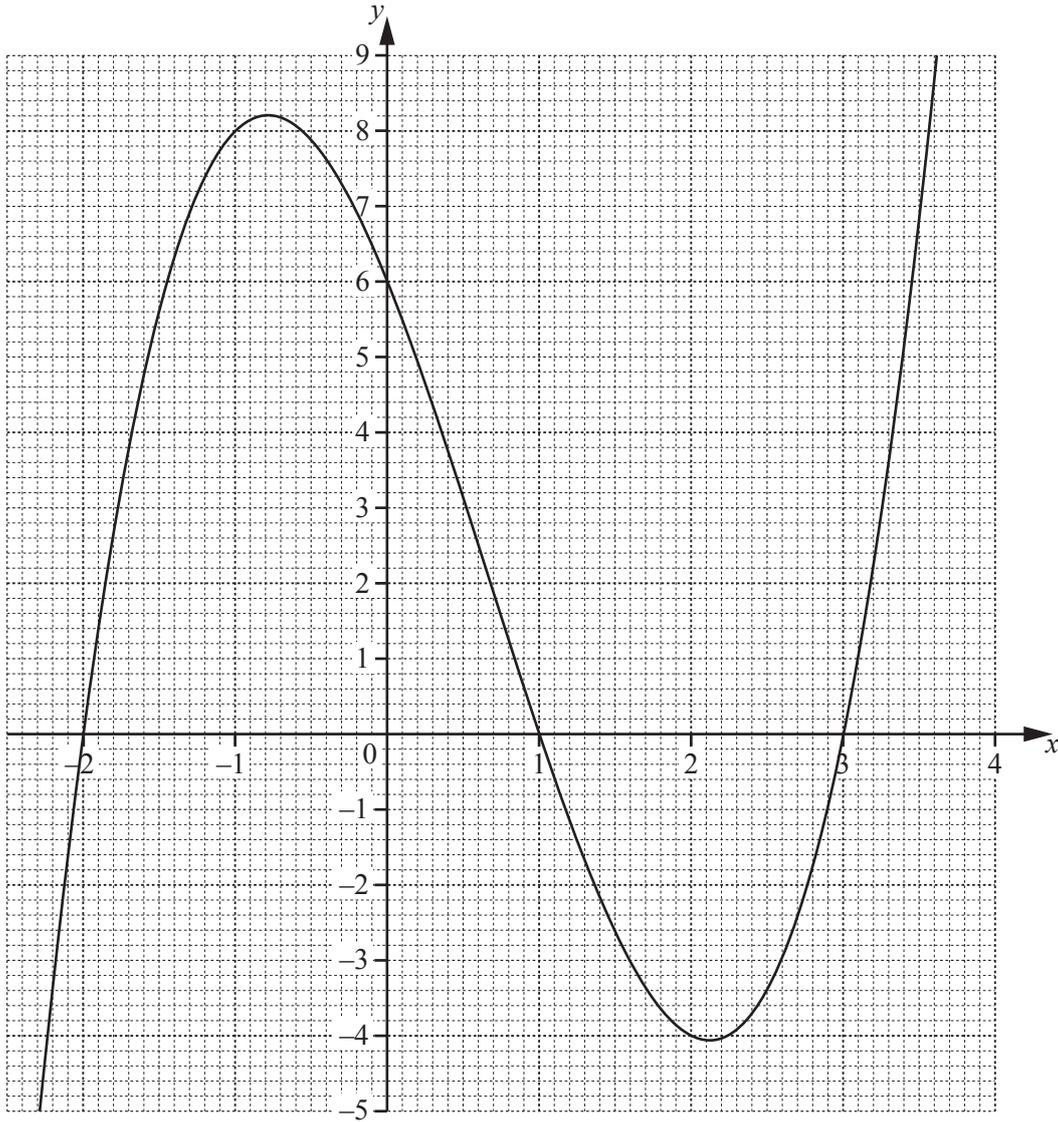
- 16** The equation  $3x^2 + ax - 10 = 0$  can be written as  $(x - b)(cx + 2) = 0$ .

- (a)** Find the value of each of the constants  $a$ ,  $b$  and  $c$ .

$$a = \dots\dots\dots \quad b = \dots\dots\dots \quad c = \dots\dots\dots [3]$$

- (b)** Hence solve the equation.

$$x = \dots\dots\dots \quad \text{or} \quad x = \dots\dots\dots [1]$$

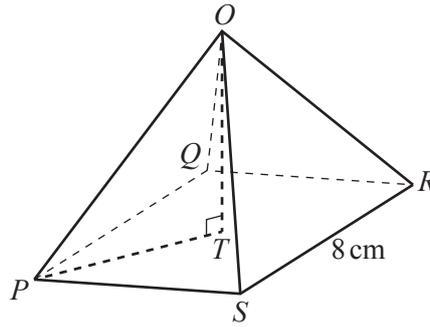


The diagram shows the graph of  $y = x^3 - 2x^2 - 5x + 6$ .

Use the graph to solve the equation  $x^3 - 2x^2 - 6x + 3 = 0$ .

..... [3]

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$OPQRS$  is a square-based pyramid with base of side 8 cm.  
 $T$  is the centre of the base, with angle  $OTP = 90^\circ$ , and the height of the pyramid,  $OT$ , is 12 cm.

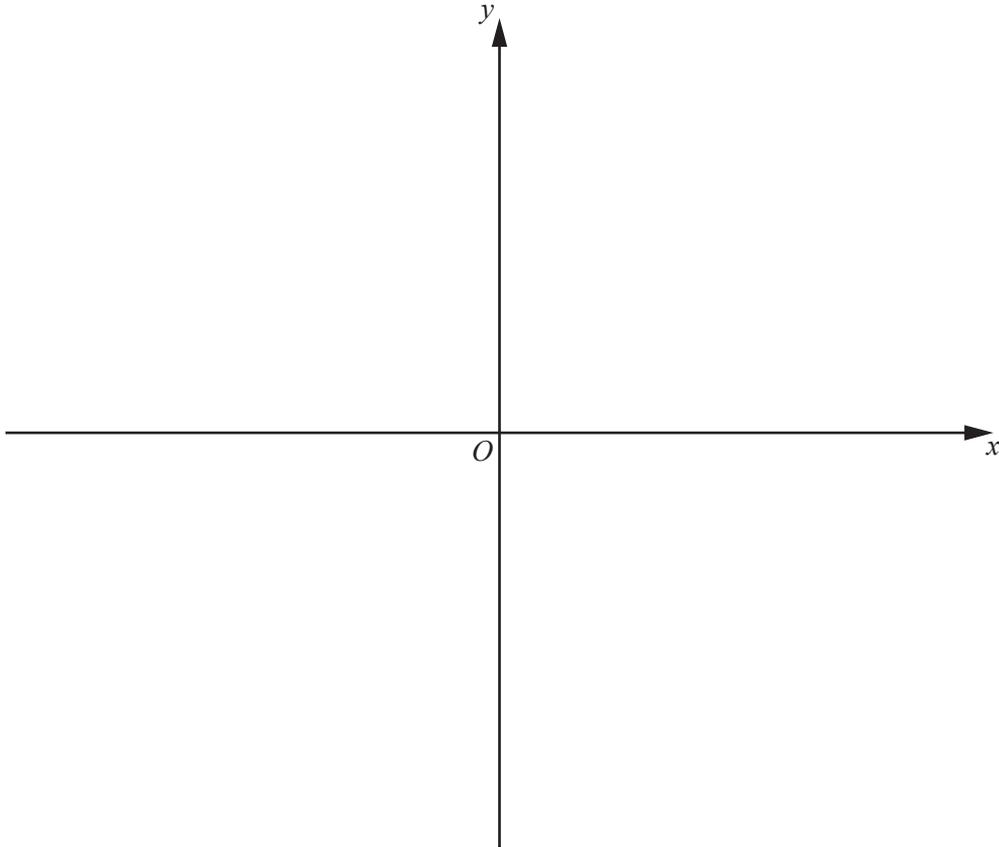
Calculate angle  $OPT$ .

Angle  $OPT = \dots\dots\dots$  [4]

19  $f(x) = 5^x$

On the axes below, sketch the graph of  $y = f(x)$ .

Label the co-ordinates of any point where your curve cuts the axes and state the equation of the asymptote.



Equation of asymptote ..... [3]

**Question 20 is printed on the next page.**

20  $p(x) = x^3 + 7x - 5$

The iterative formula

$$x_{n+1} = \frac{5}{x_n^2 + 7}$$

with  $x_1 = 0.6$  may be used to find a solution of  $p(x) = 0$ .

- (a) Find the values of  $x_2, x_3, x_4$  and  $x_5$ .  
Give each value correct to 6 decimal places.

$x_2 =$  .....

$x_3 =$  .....

$x_4 =$  .....

$x_5 =$  ..... [2]

- (b) Marco says:

I can be certain that this solution is 0.67 correct to 2 decimal places.

Is Marco correct?  
Explain how you decide.

..... because .....

..... [1]

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