



# Cambridge IGCSE™

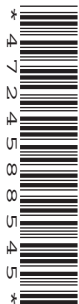
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**MATHEMATICS**

**0580/43**

Paper 4 (Extended)

**October/November 2021**

**2 hours 30 minutes**

You must answer on the question paper.

You will need: Geometrical instruments

## INSTRUCTIONS

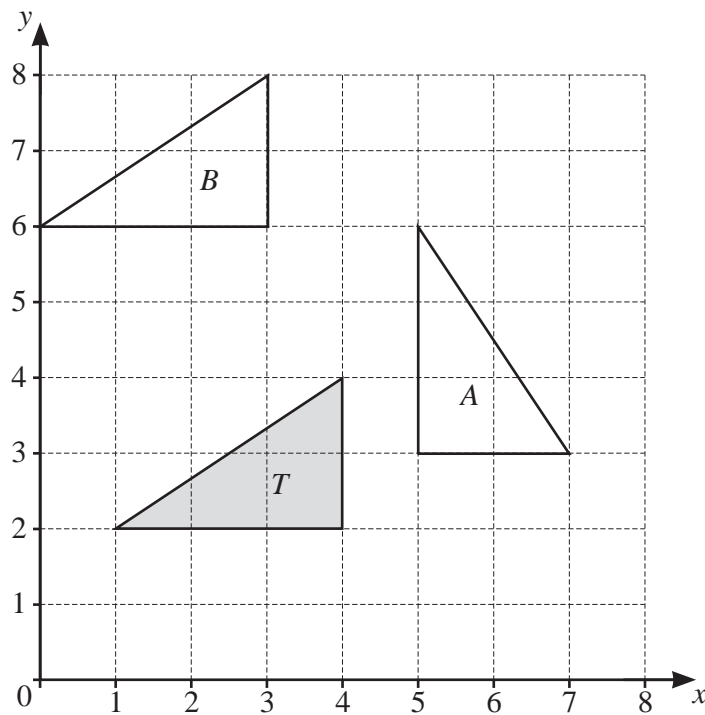
- Answer **all** questions.
- Use a black or dark blue pen. You may use an HB pencil for any diagrams or graphs.
- Write your name, centre number and candidate number in the boxes at the top of the page.
- Write your answer to each question in the space provided.
- Do **not** use an erasable pen or correction fluid.
- Do **not** write on any bar codes.
- You should use a calculator where appropriate.
- You may use tracing paper.
- You must show all necessary working clearly.
- Give non-exact numerical answers correct to 3 significant figures, or 1 decimal place for angles in degrees, unless a different level of accuracy is specified in the question.
- For  $\pi$ , use either your calculator value or 3.142.

## INFORMATION

- The total mark for this paper is 130.
- The number of marks for each question or part question is shown in brackets [ ].

This document has **20** pages. Any blank pages are indicated.

1 The diagram shows three triangles,  $T$ ,  $A$ , and  $B$ , drawn on a  $1 \text{ cm}^2$  grid.



(a) Describe fully the **single** transformation that maps triangle  $T$  onto triangle  $A$ .

.....  
 ..... [3]

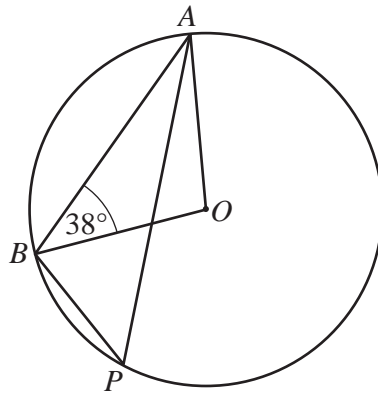
(b) (i) Describe fully the **single** transformation that maps triangle  $T$  onto triangle  $B$ .

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

(ii) Calculate the distance that each point of triangle  $T$  moves when it is mapped onto triangle  $B$ .

..... cm [2]

2 (a)



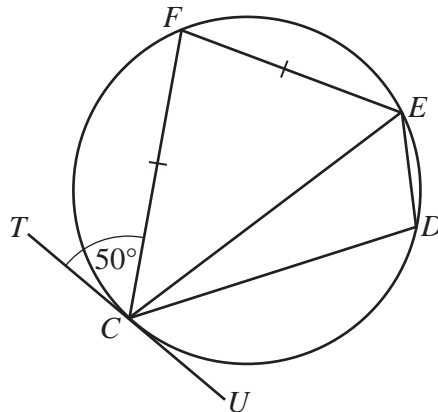
NOT TO SCALE

$A, B$  and  $P$  are points on a circle, centre  $O$  and angle  $OBA = 38^\circ$ .

Find angle  $APB$ .

Angle  $APB = \dots\dots\dots$  [3]

(b)



NOT TO SCALE

$CDEF$  is a cyclic quadrilateral and  $FC = FE$ .  
 $TU$  is a tangent to the circle at  $C$  and angle  $TCF = 50^\circ$ .

Find

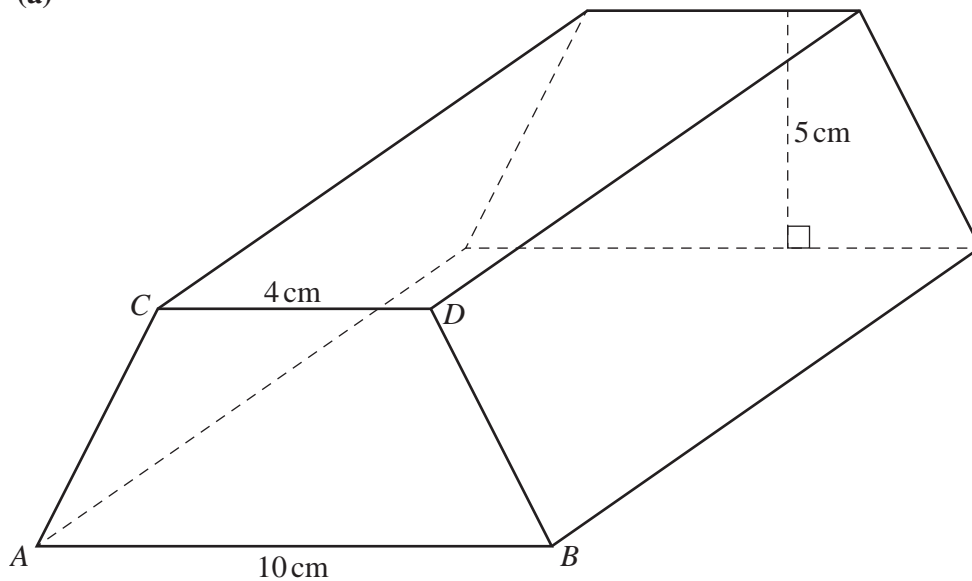
(i) angle  $EFC$ ,

Angle  $EFC = \dots\dots\dots$  [2]

(ii) angle  $CDE$ .

Angle  $CDE = \dots\dots\dots$  [1]

3 (a)



NOT TO SCALE

The diagram shows a prism.

The cross-section of the prism is a trapezium with  $CD$  parallel to  $AB$  and  $AC = BD$ .

$AB = 10\text{ cm}$ ,  $CD = 4\text{ cm}$  and the height of the trapezium is  $5\text{ cm}$ .

The volume of the prism is  $525\text{ cm}^3$ .

- (i) The prism is made of iron.  
 $1\text{ cm}^3$  of iron has a mass of  $7.8\text{ g}$ .

Calculate the mass of the prism.  
 Give your answer in kilograms.

..... kg [2]

- (ii) Calculate the length of the prism.

..... cm [3]

(iii) Calculate the total surface area of the prism.

.....  $\text{cm}^2$  [6]

(iv) In a mathematically similar prism, the height of the trapezium is 10 cm.

Calculate the volume of this prism.

.....  $\text{cm}^3$  [3]

(b) A cuboid measures 10 cm by 4 cm by 6 cm.  
Each side is measured correct to the nearest centimetre.

Complete the inequality for the volume,  $V$ , of this cuboid.

.....  $\text{cm}^3 \leq V <$  .....  $\text{cm}^3$  [3]

- 4 (a) Solve the simultaneous equations.  
You must show all your working.

$$2p - q = 7$$

$$3p + 2q = 7$$

$$p = \dots\dots\dots$$

$$q = \dots\dots\dots [3]$$

- (b) Solve the equation.

$$\frac{x}{4} + \frac{2x}{3} = 1$$

$$x = \dots\dots\dots [2]$$

- (c)  $-8 < 3x - 2 \leq 7$

- (i) Solve the inequality.

$$\dots\dots\dots [3]$$

- (ii) Find the integer values of  $x$  that satisfy the inequality.

$$\dots\dots\dots [1]$$

(d) Factorise completely.

$$16a - 4a^2$$

..... [2]

(e) Write each of the following as a single fraction, in its simplest form.

(i)  $\frac{1}{2a} \div \frac{3}{4b}$

..... [2]

(ii)  $2 - \frac{x}{x-1}$

..... [2]

- 5 (a) \$500 is invested at a rate of 3% per year.

Calculate the total interest earned at the end of 7 years when

- (i) simple interest is paid,

\$ ..... [2]

- (ii) compound interest is paid.

\$ ..... [3]

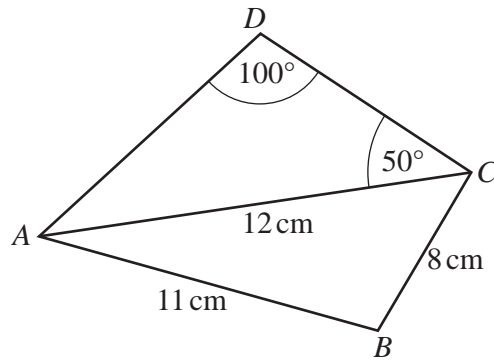
- (b) The value of a car decreases exponentially by 10% each year.  
The value now is \$6269.40 .

Calculate the value of the car 3 years ago.

\$ ..... [3]



6



NOT TO SCALE

(a) Calculate  $AD$ .

$AD = \dots\dots\dots$  cm [3]

(b) Calculate angle  $BAC$  and show that it rounds to  $40.42^\circ$ , correct to 2 decimal places.

[4]

(c) Calculate the area of the quadrilateral  $ABCD$ .

$\dots\dots\dots$   $\text{cm}^2$  [3]

(d) Calculate the shortest distance from  $B$  to  $AC$ .

$\dots\dots\dots$  cm [3]

- 7 (a) Amir buys 3 cakes that cost  $c$  cents each and 2 loaves of bread that cost  $(2c - 11)$  cents each. He spends a total of \$5.87.

Find the value of  $c$ .

$$c = \dots\dots\dots [3]$$

- (b) A bottle of water costs \$ $w$ .  
A bottle of juice costs \$ $(w + 1)$ .

Alex spends \$22 on bottles of water and \$42 on bottles of juice.  
The number of bottles of water is equal to the number of bottles of juice.

Find the value of  $w$ .

$$w = \dots\dots\dots [3]$$

## 11

- (c) Alicia walks a distance of 9 km at a speed of  $x$  km/h.  
She then runs a distance of 5 km at a speed of  $(2x + 1)$  km/h.

The total time Alicia takes is 2.5 hours.

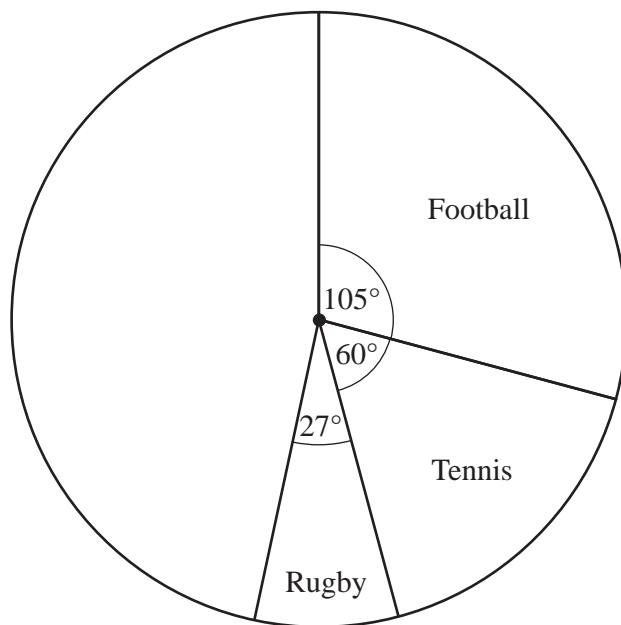
- (i) Show that  $10x^2 - 41x - 18 = 0$ .

[4]

- (ii) Work out Alicia's running speed.  
You must show all your working.

..... km/h [4]

- 8 (a) Jean asks 600 people to choose their favourite sport. The pie chart shows some of this information.



- (i) Show that 100 people choose tennis.

[1]

- (ii) Work out how many people choose rugby.

..... [2]

- (iii) 125 people choose cricket and the rest choose swimming.

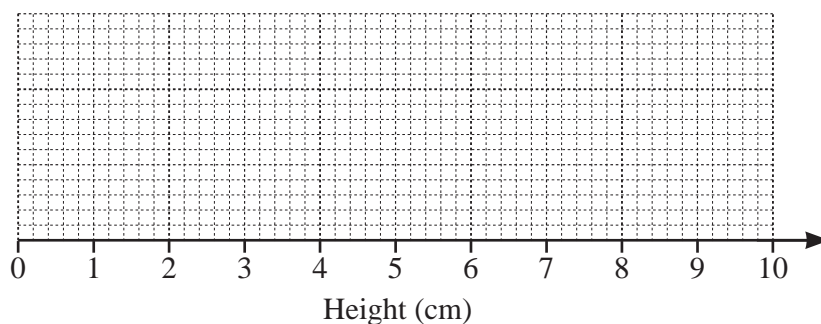
Complete the pie chart to show this information.

[2]

- (b) The heights of some plants are measured:

- smallest height = 0.6 cm
- range = 8.1 cm
- median = 5.2 cm
- lower quartile = 3.4 cm
- interquartile range = 4.1 cm.

On the grid, draw a box-and-whisker plot to show this information.



[3]

- (c) A dice is rolled 100 times.  
The frequency table shows the results.

Score	1	2	3	4	5	6
Frequency	16	25	17	19	8	15

Find

- (i) the range,

..... [1]

- (ii) the mode,

..... [1]

- (iii) the median.

..... [1]

- (d) 50 students answer a mathematics question.  
The table shows the time,  $t$  seconds, taken by each student to answer the question.

Time ( $t$ seconds)	$10 < t \leq 20$	$20 < t \leq 25$	$25 < t \leq 30$	$30 < t \leq 50$	$50 < t \leq 80$
Frequency	2	8	12	16	12

Calculate an estimate of the mean.

..... s [4]

9  $f(x) = x(x-1)(x-2)$

(a) Find the coordinates of the points where the graph of  $y = f(x)$  crosses the  $x$ -axis.

( ..... , ..... )

( ..... , ..... )

( ..... , ..... ) [2]

(b) Show that  $f(x) = x^3 - 3x^2 + 2x$ .

[2]

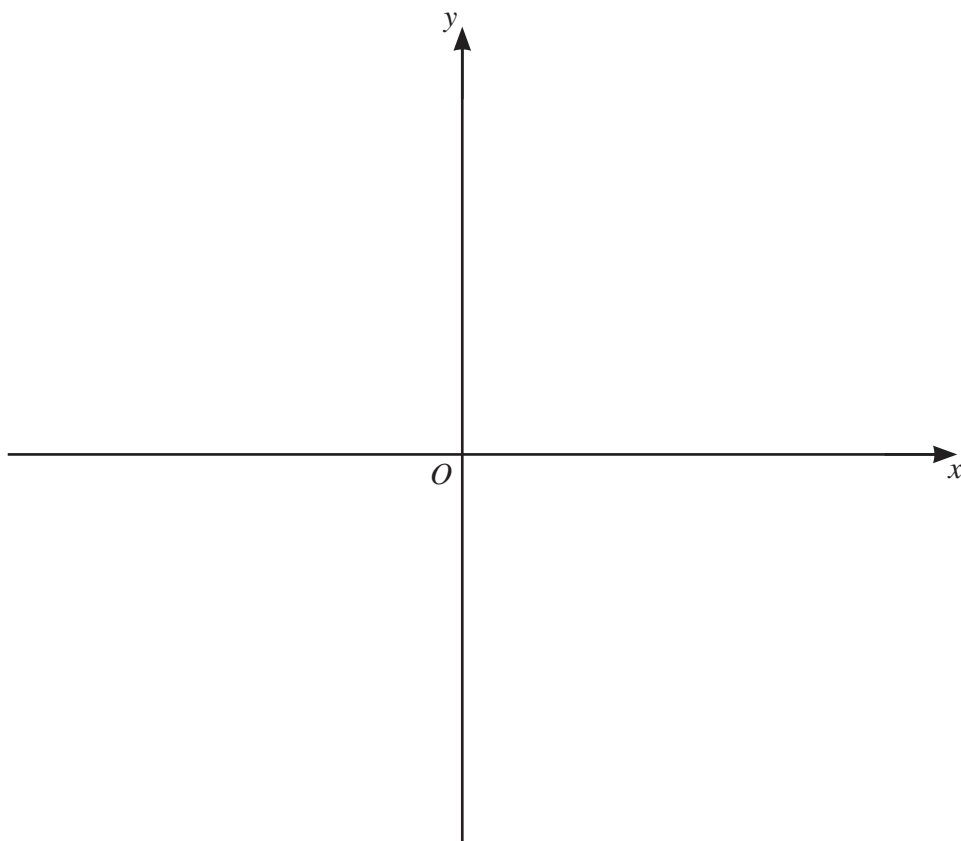
(c) Find the coordinates of the turning points of the graph of  $y = f(x)$ .  
Show all your working and give your answers correct to 1 decimal place.

( ..... , ..... )

( ..... , ..... ) [8]

15

(d) Sketch the graph of  $y = f(x)$ .



[2]

10 (a) Sarah spins a fair four-sided spinner numbered 0, 1, 1 and 3.

(i) What number is the spinner most likely to land on?

..... [1]

(ii) Sarah spins the spinner twice.

Find the probability that it lands on the number 1 both times.

..... [2]

(iii) Sarah spins the spinner until it lands on the number 3.

The probability that this happens on the  $n$ th spin is  $\frac{729}{16384}$ .

Find the value of  $n$ .

$n =$  ..... [2]



(b) Scott takes an examination.

The examination is in two parts, a theory test and a practical test.

Both parts must be passed to pass the examination.

The probability that Scott passes the theory test is 0.9 .

The probability that Scott passes the practical test is 0.8 .

Find the probability that

(i) Scott passes the examination,

..... [2]

(ii) Scott passes the theory test or the practical test but not both.

..... [3]

**11**       $f(x) = 2x - 1$        $g(x) = x^2 + 2x$        $h(x) = 4^x$        $j(x) = 2^x$

(a) Find the value of

(i)  $h(3)$ ,

..... [1]

(ii)  $fh(3)$ .

..... [1]

(b) Solve the equation  $gf(x) = 0$ .

$x = \dots\dots\dots$  or  $x = \dots\dots\dots$  [4]

(c)       $p^{-1}(x) = f(x)$

Find  $p(x)$ .

..... [2]

(d)  $h(x)j(x) = \frac{1}{\sqrt{2}}$

Find the value of  $x$ .

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

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