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## 0580/23

May/June 2018

**1 hour 30 minutes**

Additional Materials: Electronic calculator                      Geometrical instruments  
Tracing paper (optional)

**READ THESE INSTRUCTIONS FIRST**

DO **NOT** WRITE IN ANY BARCODES.

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

The total of the marks for this paper is 70.

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

- 1 One day in Chamonix the temperature at noon was  $6^{\circ}\text{C}$ .  
At midnight the temperature was  $11^{\circ}\text{C}$  lower.

Write down the temperature at midnight.

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

- 2 Factorise.

$$w + w^3$$

..... [1]

- 3 Liz takes 65 seconds to run 400 m.

Calculate her average speed.

..... m/s [1]

- 4 Complete the list of factors of 36.

1, 2, ....., 36 [2]

- 5 Increase \$22 by 15%.

\$..... [2]

- 6 (a) Write 209 802 correct to the nearest thousand.

..... [1]

(b) Write 4123 correct to 3 significant figures.

..... [1]

- 7 The probability that Kim wins a game is 0.72 .  
In one year Kim will play 225 games.

Work out an estimate of the number of games Kim will win.

..... [2]

- 8 (a) Write  $4.82 \times 10^{-3}$  as an ordinary number.

..... [1]

(b) Write 52 million in standard form.

..... [1]

- 9 Solve.

$$\frac{1-p}{3} = 4$$

$p =$  ..... [2]

- 10 Factorise completely.

$$2a + 4b - ax - 2bx$$

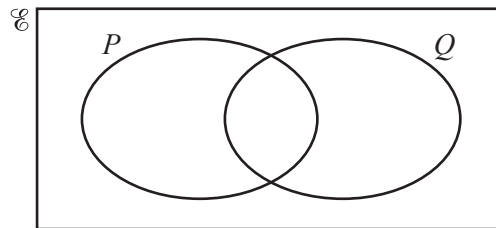
..... [2]

11  $A = (2\pi + y)x^2$

Rearrange the formula to make  $x$  the subject.

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

12



$n(E) = 20$ ,  $n(P) = 10$ ,  $n(Q) = 13$  and  $n(P \cup Q)' = 5$ .

Work out  $n(P \cap Q)$ .

You may use the Venn diagram to help you.

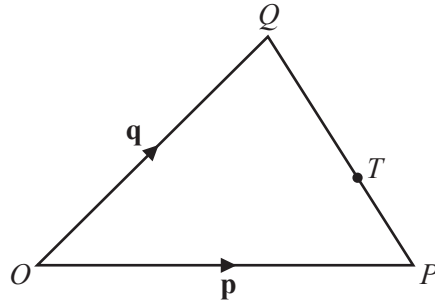
$n(P \cap Q) = \dots\dots\dots$  [2]

13 Simplify.

$$\frac{3+x}{9-x^2}$$

$\dots\dots\dots$  [2]

14

NOT TO  
SCALE

$O$  is the origin,  $\overrightarrow{OP} = \mathbf{p}$  and  $\overrightarrow{OQ} = \mathbf{q}$ .  
 $QT : TP = 2 : 1$

Find the position vector of  $T$ .  
 Give your answer in terms of  $\mathbf{p}$  and  $\mathbf{q}$ , in its simplest form.

..... [2]

15 Without using a calculator, work out  $\frac{2}{3} \div 1\frac{1}{5}$ .

You must show all your working and give your answer as a fraction in its simplest form.

..... [3]

16 (a) The length of the side of a square is 12 cm, correct to the nearest centimetre.

Calculate the upper bound for the perimeter of the square.

..... cm [2]

(b) Jo measures the length of a rope and records her measurement correct to the nearest ten centimetres.  
 The upper bound for her measurement is 12.35 m.

Write down the measurement she records.

..... m [1]

- 17 (a) Find the value of  $\left(\frac{1}{81}\right)^{-\frac{3}{4}}$ .

..... [1]

- (b) Simplify.  $\sqrt[3]{27t^{27}}$

..... [2]

- 18 Expand the brackets and simplify.

$$(2p+3)(3p-2)$$

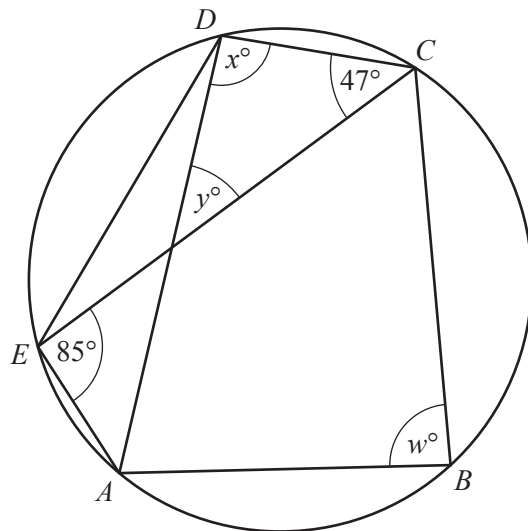
..... [3]

- 19  $y$  is directly proportional to  $(x-1)^2$ .  
When  $x = 3$ ,  $y = 24$ .

Find  $y$  when  $x = 6$ .

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

20

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The points  $A$ ,  $B$ ,  $C$ ,  $D$  and  $E$  lie on the circumference of the circle.  
Angle  $DCE = 47^\circ$  and angle  $CEA = 85^\circ$ .

Find the values of  $w$ ,  $x$  and  $y$ .

$w =$  .....

$x =$  .....

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

21 Write as a single fraction in its simplest form.

$$\frac{1}{y-1} - \frac{1}{y}$$

..... [3]

22 Find an expression for the  $n$ th term of each sequence.

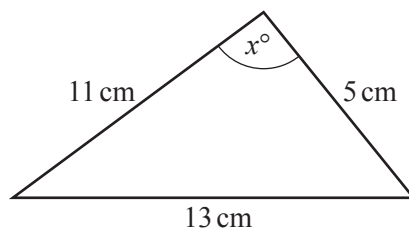
(a) 11, 7, 3, -1, ...

..... [2]

(b) 3, 6, 12, 24, ...

..... [2]

23



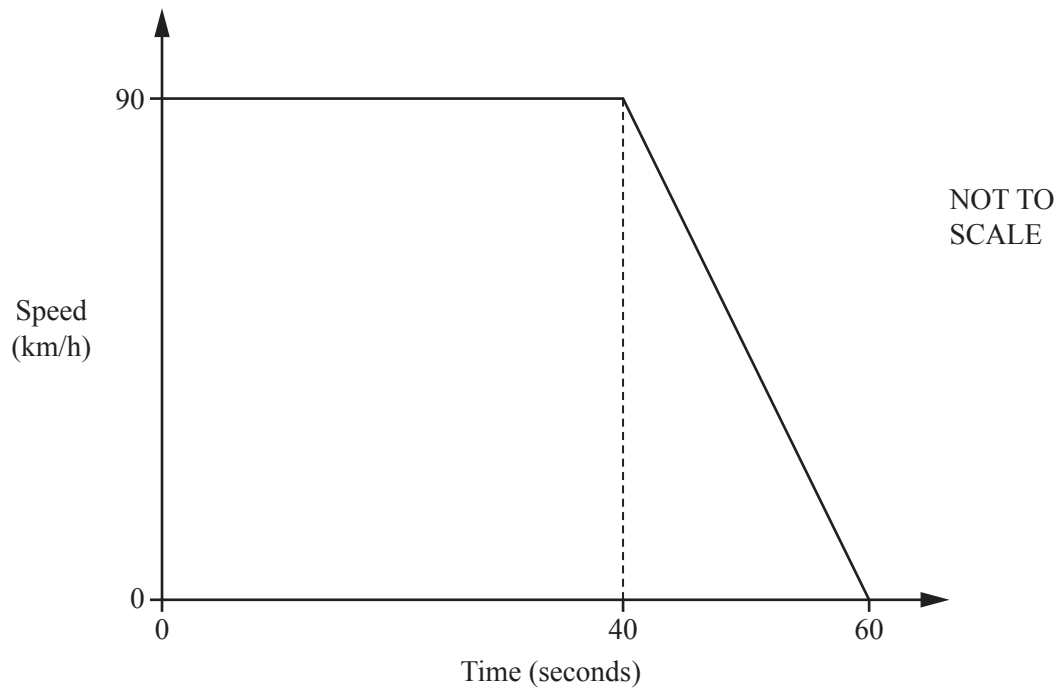
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Calculate the value of  $x$ .

$x =$  ..... [4]



24



The diagram shows the speed–time graph for 60 seconds of a car journey.

- (a) Change 90 km/h to m/s.

..... m/s [2]

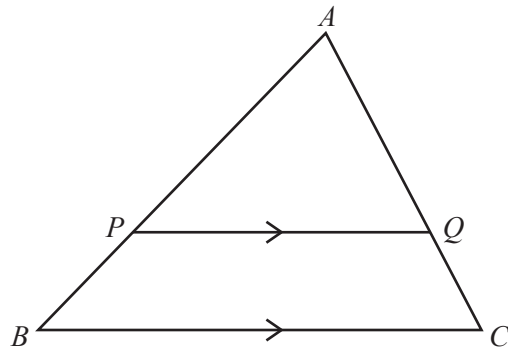
- (b) Find the deceleration of the car in  $\text{m/s}^2$ .

.....  $\text{m/s}^2$  [1]

- (c) Find the distance travelled, in metres, in the 60 seconds.

..... m [2]

25 (a)

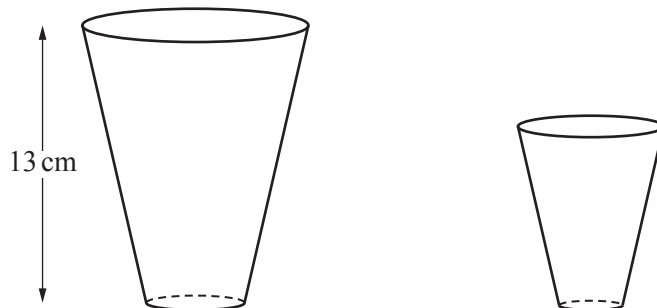
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In the diagram,  $PQ$  is parallel to  $BC$ .  
 $APB$  and  $AQC$  are straight lines.  
 $PQ = 8$  cm,  $BC = 10$  cm and  $AB = 9$  cm.

Calculate  $PB$ .

$PB = \dots\dots\dots$  cm [2]

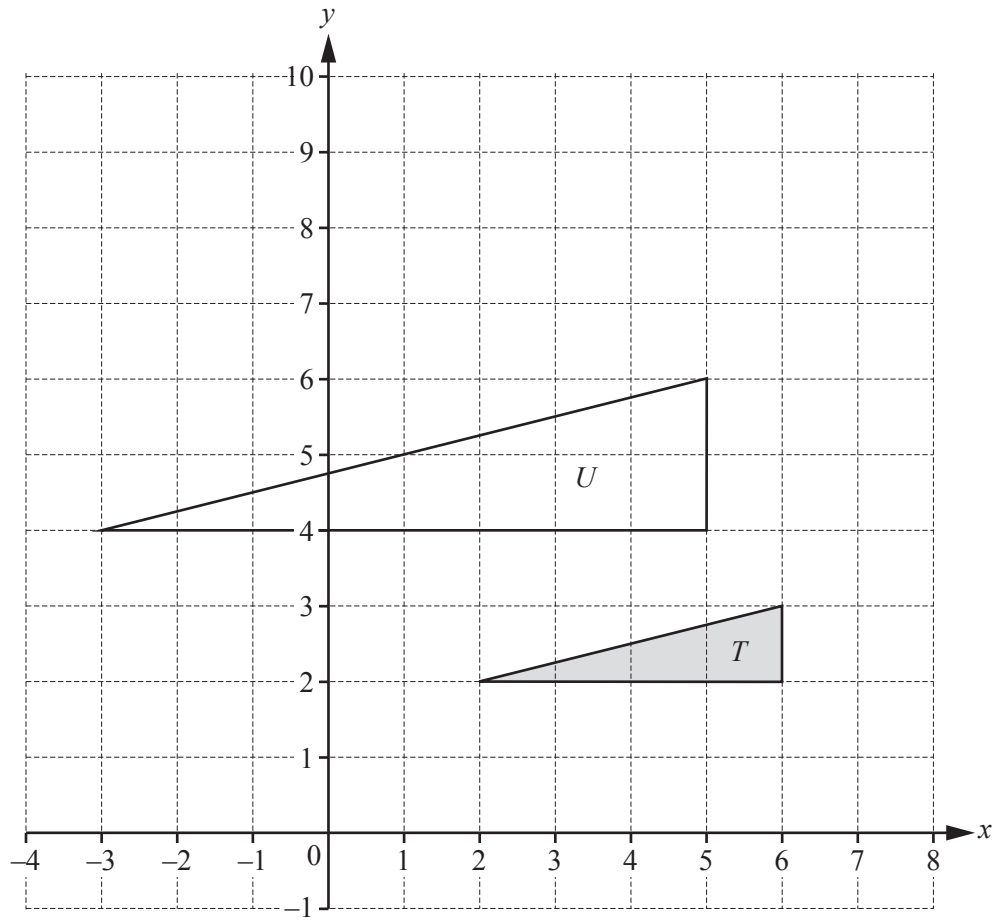
(b)

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The diagram shows two glasses which are mathematically similar.  
The larger glass has a capacity of 0.5 litres and the smaller glass has a capacity of 0.25 litres.  
The height of the larger glass is 13 cm.

Calculate the height of the smaller glass.

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



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

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

- (b) On the grid, draw the image of triangle  $T$  after a rotation through  $90^\circ$  clockwise about the point  $(7, 3)$ . [3]

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