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**0580/22**

## Paper 2 (Extended)

February/March 2024

**1 hour 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 70.
- The number of marks for each question or part question is shown in brackets [ ].

This document has **12** pages.

- 1 A night bus runs from 21 50 to 05 18 the next day.

Work out the number of hours and minutes that the night bus runs.

..... h ..... min [1]

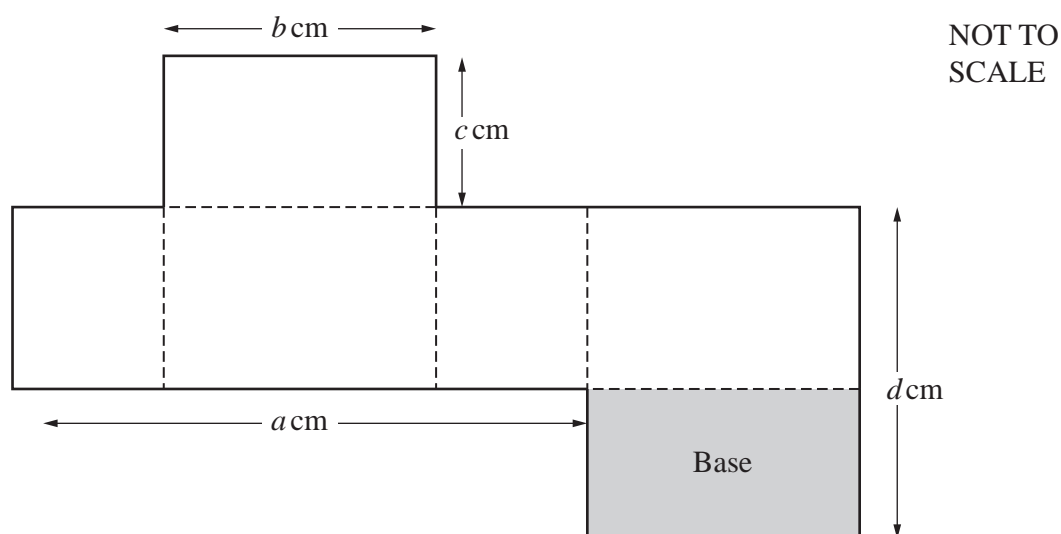
- 2 Calculate  $\sqrt{5.76} + 2.8^3$ .

..... [1]

- 3 Simplify  $4m + 7k - m + 3k$ .

..... [2]

4



The diagram shows the net of a cuboid with its base shaded.  
The length of the cuboid is 10 cm, its width is 4 cm and its height is 5 cm.

Write down the values of each of  $a$ ,  $b$ ,  $c$  and  $d$ .

$a =$  .....,  $b =$  .....,  $c =$  .....,  $d =$  ..... [4]

5 There are 20 cars in a car park and 3 of the cars are blue.

(a) James wants to draw a pie chart to show this information.

Find the angle of the sector for the blue cars in this pie chart.

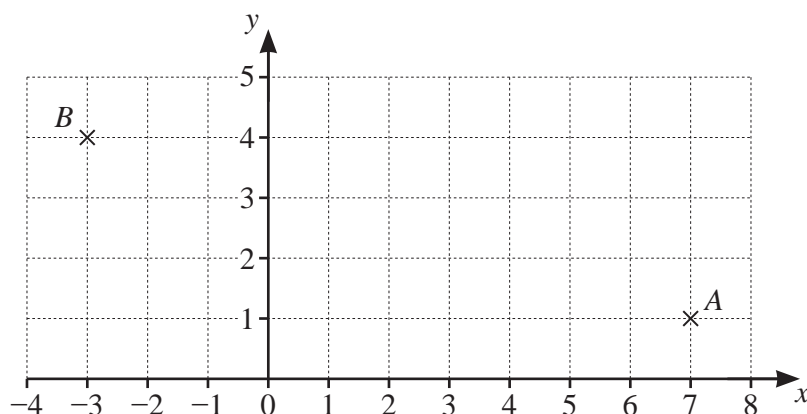
..... [2]

(b) One of the 20 cars is picked at random.

Find the probability that this car is **not** blue.

..... [1]

6



Write  $\overrightarrow{AB}$  as a column vector.

$$\overrightarrow{AB} = \begin{pmatrix} \phantom{0} \\ \phantom{0} \end{pmatrix} \quad [1]$$

7 As the temperature increases, the number of people who go swimming increases.

Write down the type of correlation that this statement describes.

..... [1]

- 8 (a) The  $n$ th term of a sequence is  $n^2 - 3$ .

Find the first three terms of this sequence.

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

- (b) These are the first five terms of a different sequence.

1      3      9      27      81

Find the  $n$ th term of this sequence.

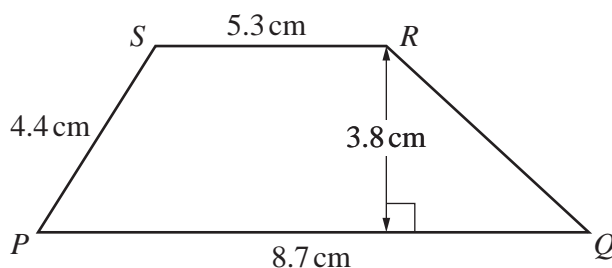
..... [2]

- 9 The line  $y = 2x - 5$  intersects the line  $y = 3$  at the point  $P$ .

Find the coordinates of the point  $P$ .

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

10



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The diagram shows a trapezium  $PQRS$ .

Calculate the area of the trapezium.

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

11 Without using a calculator, work out  $1\frac{1}{4} - \frac{5}{6}$ .

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

..... [3]

- 12** Farid spins a three-sided spinner with sides labelled  $A$ ,  $B$  and  $C$ .  
The probability that the spinner lands on  $C$  is  $0.35$ .  
Farid spins the spinner 40 times.

Calculate the number of times he expects the spinner to land on  $C$ .

..... [1]

- 13** The bearing of  $B$  from  $A$  is  $107^\circ$ .

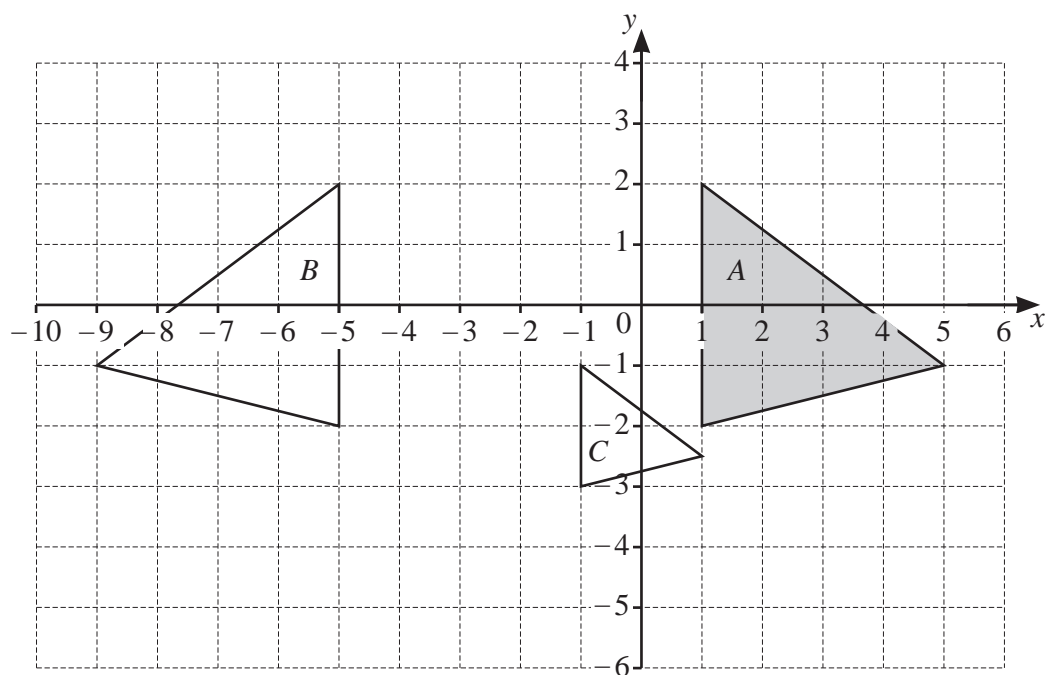
Calculate the bearing of  $A$  from  $B$ .

..... [2]

- 14** A train, 1750 metres long, is travelling at 55 km/h.

Calculate how long it will take for the whole train to completely cross a bridge that is 480 metres long.  
Give your answer in seconds, correct to the nearest second.

..... s [3]



(a) Describe fully the **single** transformation that maps

(i) triangle A onto triangle B

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

(ii) triangle A onto triangle C.

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

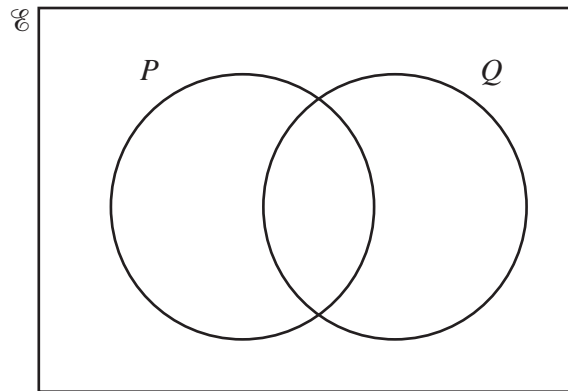
(b) Draw the image of triangle A after a rotation,  $90^\circ$  clockwise, about (1, 3). [2]

- 16  $x$  is an integer.

$$\mathcal{E} = \{x : 1 \leq x \leq 10\}$$

$$P = \{x : x \text{ is an even number}\}$$

$$Q = \{x : x \text{ is a multiple of } 5\}$$



Complete the Venn diagram.

[2]

- 17 The height of each of 200 people is measured.  
The table shows the results.

Height ( $h$ cm)	$100 < h \leq 120$	$120 < h \leq 130$	$130 < h \leq 150$	$150 < h \leq 190$
Frequency	32	55	64	49

Calculate an estimate of the mean height.

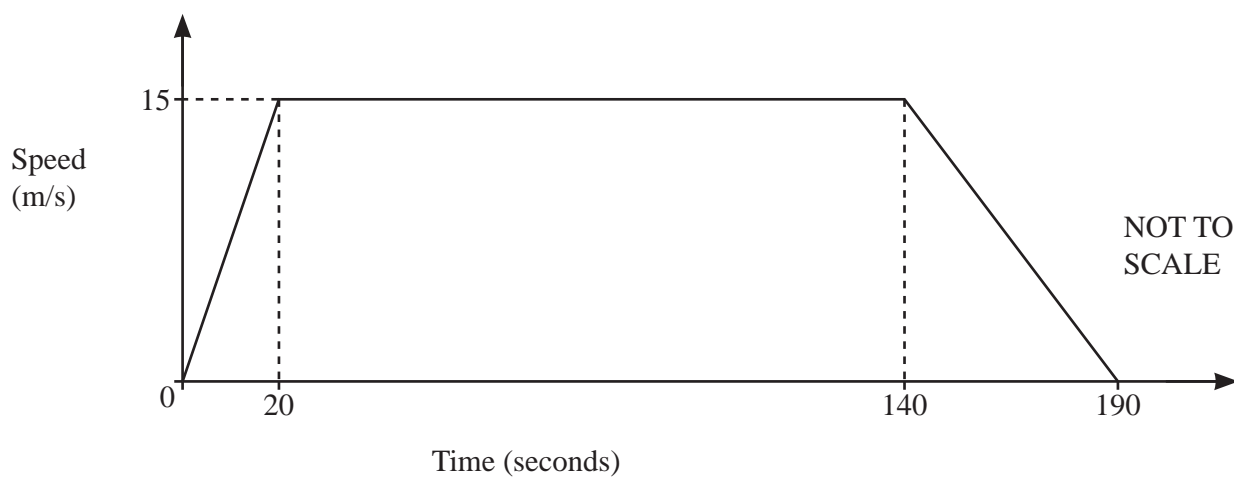
..... cm [4]

- 18 Find the highest common factor (HCF) of  $28x^5$  and  $98x^3$ .

..... [2]



19

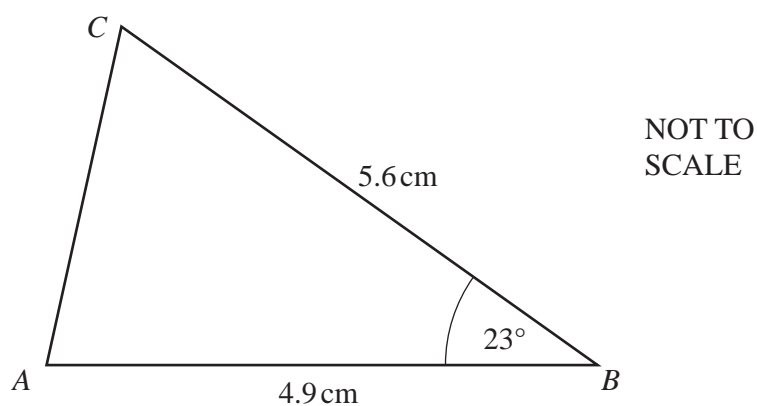


The speed–time graph shows information about a bus journey.

Calculate the total distance travelled by the bus.

..... m [3]

20



Calculate the area of triangle  $ABC$ .

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

21 (a)  $\sqrt[5]{3} = 3^h$

Write down the value of  $h$ .

$h = \dots\dots\dots$  [1]

(b) Simplify  $(4x^3)^3$ .

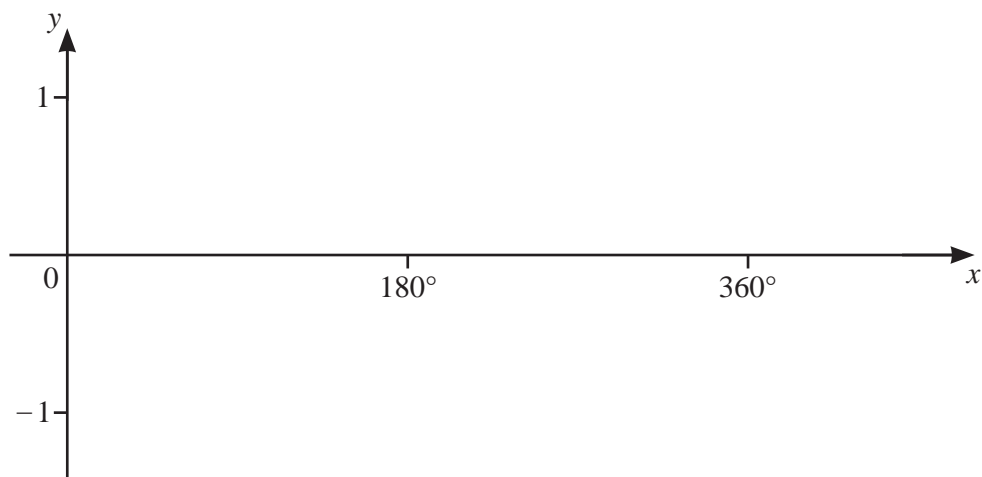
$\dots\dots\dots$  [2]

22  $y$  is inversely proportional to the square of  $(x + 3)$ .  
When  $x = 5$ ,  $y = 0.375$ .

Find  $y$  in terms of  $x$ .

$y = \dots\dots\dots$  [2]

- 23 (a) On the axes, sketch the graph of  $y = \cos x$ , for  $0^\circ \leq x \leq 360^\circ$ .



[2]

- (b) Solve the equation  $\cos x = 0.294$  for  $0^\circ \leq x \leq 360^\circ$ .

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

- 24  $x^2 - 16x + a$  can be written in the form  $(x + b)^2$ .

Find the value of  $a$  and the value of  $b$ .

$a = \dots\dots\dots$

$b = \dots\dots\dots$  [2]

Questions 25 and 26 are printed on the next page.

- 25 A bag contains 2 green buttons, 5 red buttons and 6 blue buttons.  
Two buttons are taken at random from the bag without replacement.

Calculate the probability that the two buttons are different colours.

..... [4]

- 26  $A$  is the point  $(6, 1)$  and  $B$  is the point  $(2, 7)$ .

Find the equation of the perpendicular bisector of  $AB$ .  
Give your answer in the form  $y = mx + c$ .

$y =$  ..... [5]

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