Location Entry Codes

As part of CIE's continual commitment to maintaining best practice in assessment, CIE uses different variants of some question papers for our most popular assessments with large and widespread candidature. The question papers are closely related and the relationships between them have been thoroughly established using our assessment expertise. All versions of the paper give assessment of equal standard.

The content assessed by the examination papers and the type of questions is unchanged.

This change means that for this component there are now two variant Question Papers, Mark Schemes and Principal Examiner's Reports where previously there was only one. For any individual country, it is intended that only one variant is used. This document contains both variants which will give all Centres access to even more past examination material than is usually the case.

The diagram shows the relationship between the Question Papers, Mark Schemes and Principal Examiners' Reports that are available.

Question Paper	**Mark Scheme**	**Principal Examiner's Report**
Introduction	Introduction	Introduction
First variant Question Paper	First variant Mark Scheme	First variant Principal Examiner's Report
Second variant Question Paper	Second variant Mark Scheme	Second variant Principal Examiner's Report

Who can I contact for further information on these changes?
Please direct any questions about this to CIE's Customer Services team at:
international@cie.org.uk

The titles for the variant items should correspond with the table above, so that at the top of the first page of the relevant part of the document and on the header, it has the words:

- First variant Question Paper / Mark Scheme / Principal Examiner's Report

or

- Second variant Question Paper / Mark Scheme / Principal Examiner's Report

as appropriate.

UNIVERSITY OF CAMBRIDGE INTERNATIONAL EXAMINATIONS
International General Certificate of Secondary Education

CANDIDATE NAME

CENTRE NUMBER

CANDIDATE NUMBER

MATHEMATICS

Paper 2 (Extended)

0580/21, 0581/21

May/June 2009

1 hour 30 minutes

Candidates answer on the Question Paper.

Additional Materials: Electronic calculator   Geometrical instruments
                             Mathematical tables (optional)   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 a pencil for any diagrams or graphs.
Do not use staples, paper clips, highlighters, 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 π, use either your calculator value or 3.142.

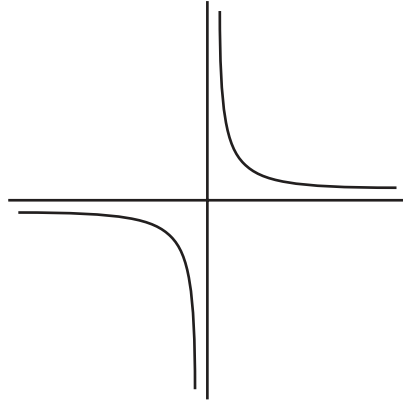At the end of the examination, fasten all your work securely together.
The number of marks is given in brackets [ ] at the end of each question or part question.
The total of the marks for this paper is 70.

This document consists of **12** printed pages.

IB09 06_0580_02/4RP
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International Examinations

[Turn over

1

(a) Write down the order of rotational symmetry of the diagram.

Answer(a) .... [1]

(b) Draw all the lines of symmetry on the diagram. [1]

2 Write the following in order of size, smallest first.

$$\sqrt{\frac{9}{17}} \qquad\qquad \frac{5}{7} \qquad\qquad 72\% \qquad\qquad \left(\frac{4}{3}\right)^{-1}$$

Answer .... $<$ .... $<$ .... $<$ .... [2]

3 At 05 06 Mr Ho bought 850 fish at a fish market for \$2.62 each.
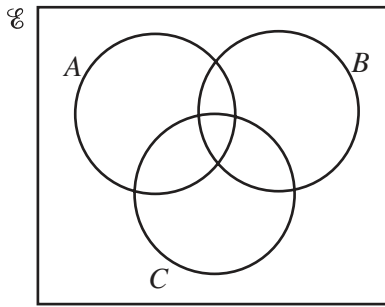95 minutes later he sold them all to a supermarket for \$2.86 each.

(a) What was the time when he sold the fish?
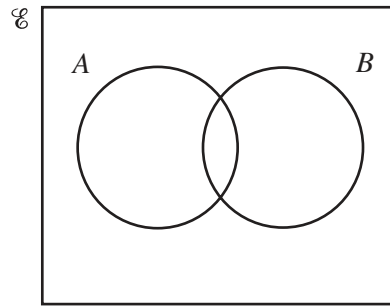
Answer(a) .... [1]

(b) Calculate his total profit.

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

4 Shade the region required in each Venn Diagram.

$A \cap B \cap C$ $A \cup B'$ [2]

5
$$\mathbf{A} = \begin{pmatrix} -2 & 3 \\ -4 & 5 \end{pmatrix}$$

Find $\mathbf{A}^{-1}$, the inverse of the matrix $\mathbf{A}$.

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

---

6 In 2005 there were 9 million bicycles in Beijing, correct to the nearest million.
The average distance travelled by each bicycle in one day was 6.5 km correct to one decimal place.
Work out the upper bound for the **total** distance travelled by all the bicycles in one day.

Answer .... km [2]

---

7 Find the co-ordinates of the mid-point of the line joining the points $A(2, -5)$ and $B(6, 9)$.

Answer (............ , ...)   [2]
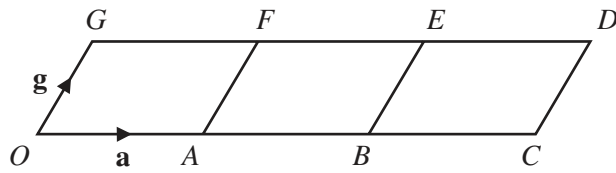
                  [Turn over

8

The diagram is made from three identical parallelograms.

O is the origin. $\overrightarrow{OA}$ = **a** and $\overrightarrow{OG}$ = **g**.

Write down in terms of **a** and **g**

(a) $\overrightarrow{GB}$,

Answer(a) .... [1]

(b) the position vector of the centre of the parallelogram *BCDE*.

Answer(b) .... [1]

9 Rearrange the formula to make *y* the subject.

$$x + \frac{\sqrt{y}}{9} = 1$$

Answer y = ... [3]

10 Write $\dfrac{1}{c}$ + $\dfrac{1}{d}$ − $\dfrac{c-d}{cd}$ as a single fraction in its simplest form.

Answer .... [3]

0580/21/M/J/09

11 In January Sunanda changed £25 000 into dollars when the exchange rate was $1.96 = £1.
    In June she changed the dollars back into pounds when the exchange rate was $1.75 = £1.
    Calculate the profit she made, giving your answer in pounds (£).

Answer £ .... [3]

12 Solve the simultaneous equations

$$2y + 3x = 6,$$
$$x = 4y + 16.$$

Answer x = ...

y = ... [3]

13 A spray can is used to paint a wall.
    The thickness of the paint on the wall is t. The distance of the spray can from the wall is d.
    t is inversely proportional to the square of d.

    $t = 0.2$ when $d = 8$.
    Find t when $d = 10$.
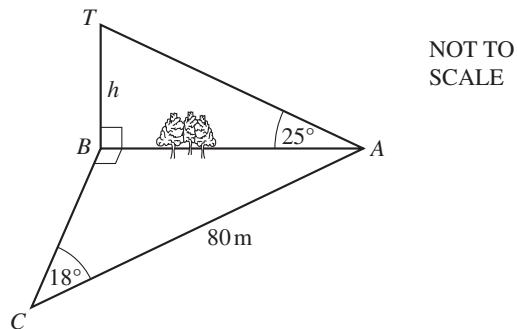
Answer t = ... [3]

14 (a) There are 10^9 nanoseconds in 1 second.
Find the number of nanoseconds in 5 minutes, giving your answer in standard form.

Answer(a) .... [2]

(b) Solve the equation $5(x + 3 \times 10^6) = 4 \times 10^7$.

Answer(b) x = ... [2]

15

NOT TO
SCALE

Mahmoud is working out the height, h metres, of a tower BT which stands on level ground.
He measures the angle TAB as $25°$.
He cannot measure the distance AB and so he walks 80 m from A to C, where angle $ACB = 18°$ and
angle $ABC = 90°$.
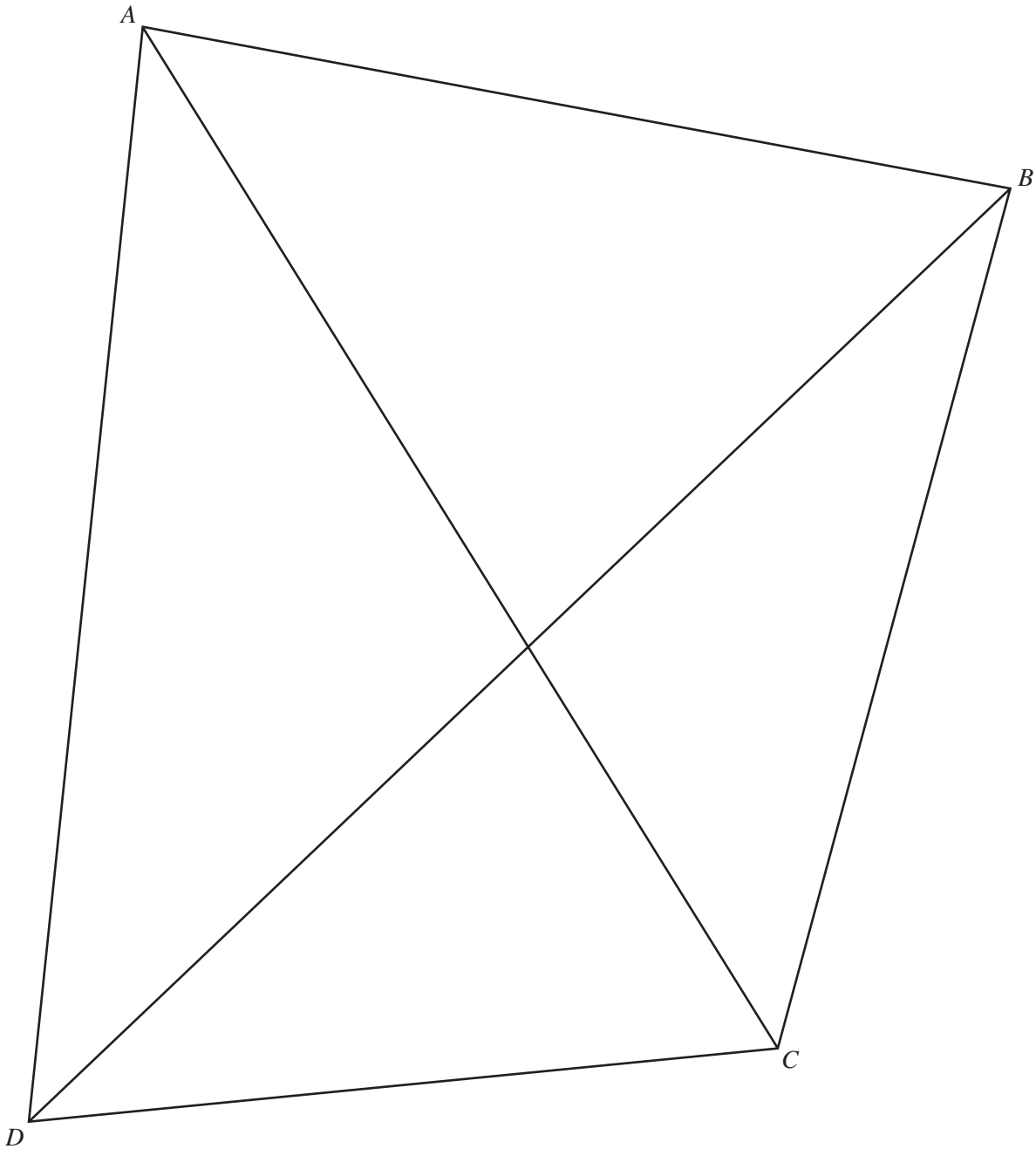
Calculate

(a) the distance AB,

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

(b) the height of the tower, BT.

Answer(b) .... m [2]

16 **Using a straight edge and compasses only,** draw the locus of all points inside the quadrilateral *ABCD* which are equidistant from the lines *AC* and *BD*.
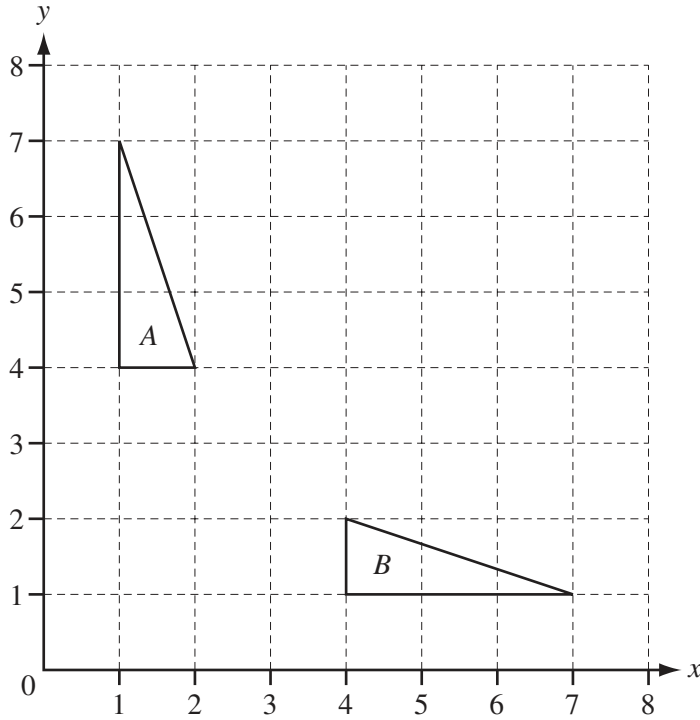
Show clearly all your construction arcs.

[4]

17

(a) Describe fully the **single** transformation which maps triangle *A* onto triangle *B*.

Answer(a) .... [2]

(b) On the grid, draw the image of triangle *A* after rotation by 90° clockwise about the point (4, 4).

[2]

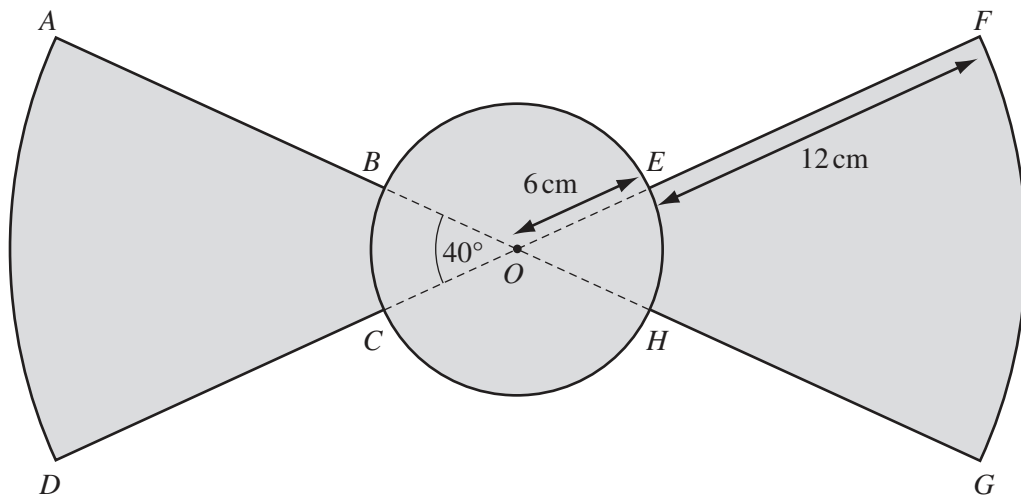**18** Two similar vases have heights which are in the ratio 3 : 2.

(a) The volume of the larger vase is $1080 \, \text{cm}^3$.
Calculate the volume of the smaller vase.

Answer(a) .... cm^3 [2]

(b) The surface area of the smaller vase is $252 \, \text{cm}^2$.
Calculate the surface area of the larger vase.

Answer(b) .... cm^2 [2]
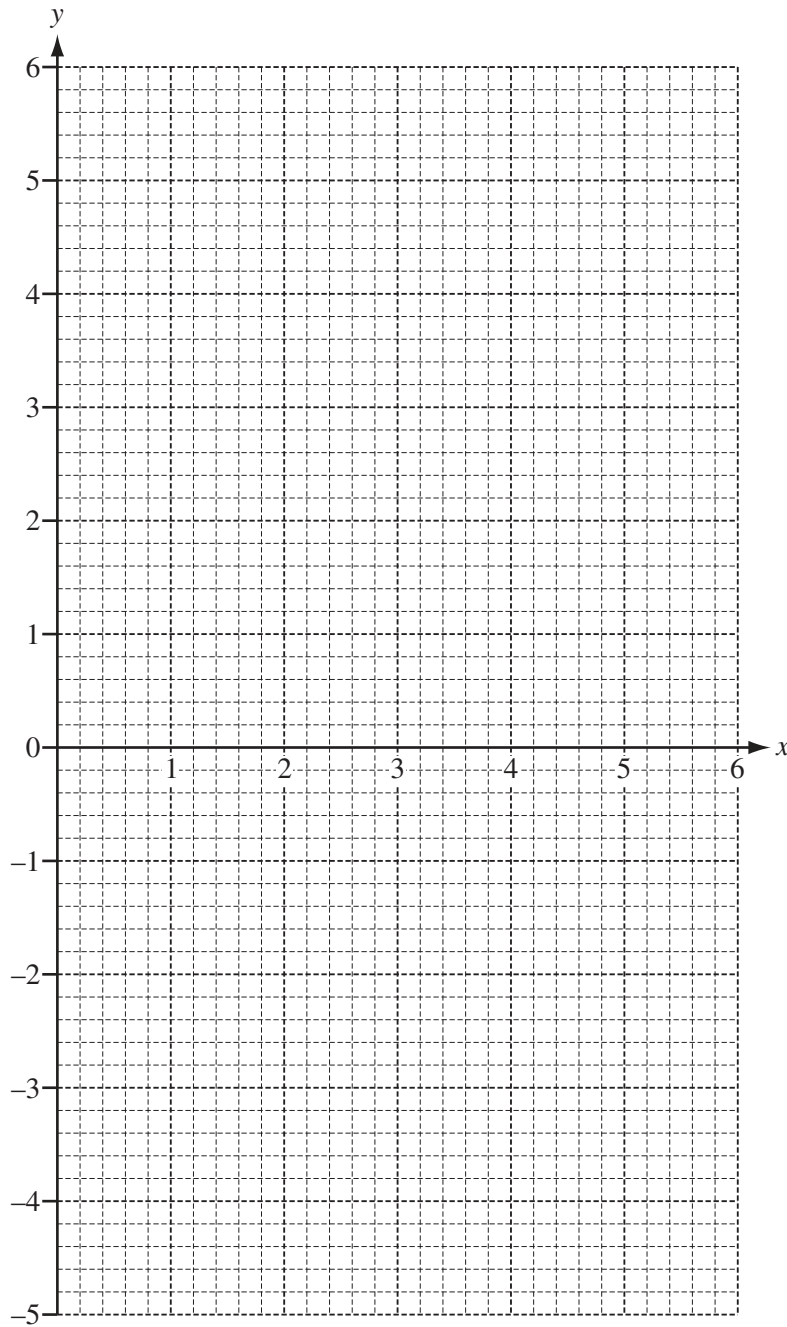

19

NOT TO SCALE

The diagram shows part of a fan.
OFG and *OAD* are sectors, centre *O*, with radius 18 cm and sector angle 40°.
B, *C*, *H* and *E* lie on a circle, centre *O* and radius 6 cm.
Calculate the shaded area.

Answer .... cm² [4]

 [Turn over

20

(a) Draw the three lines $y = 4$, $2x - y = 4$ and $x + y = 6$ on the grid above. [4]

(b) Write the letter R in the region defined by the three inequalities below.

$y \leqslant 4$ $\qquad\qquad$ $2x - y \geqslant 4$ $\qquad\qquad$ $x + y \geqslant 6$ [1]

0580/21/M/J/09

21

$$\mathbf{A} = \begin{pmatrix} x & 6 \\ 4 & 3 \end{pmatrix} \qquad \mathbf{B} = \begin{pmatrix} 2 & 3 \\ 2 & 1 \end{pmatrix}$$
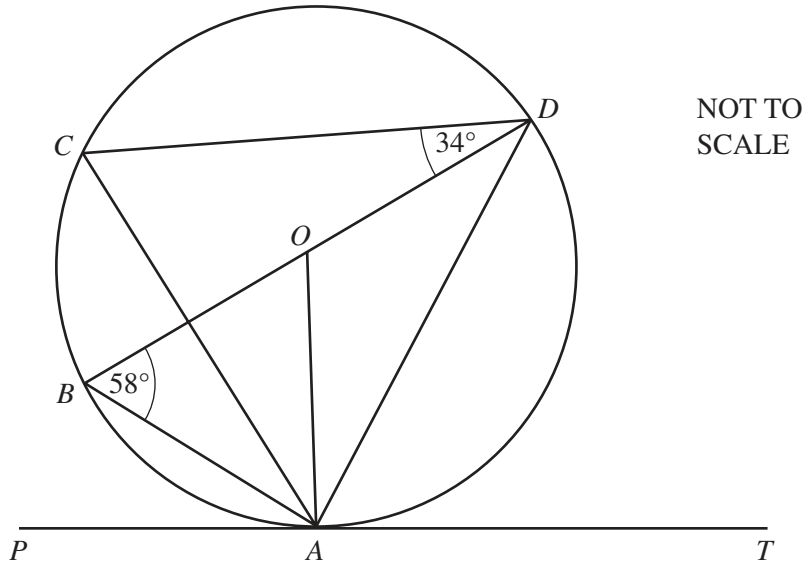
(a) Find **AB**.

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

(b) When **AB** = **BA,** find the value of x.

Answer(b) $x =$ .... [3]

Question 22 is on the next page

22

NOT TO
SCALE

34°

58°

C

D

O

B

P   *A*   *T*

A, B, C and *D* lie on the circle, centre *O*.
BD is a diameter and *PAT* is the tangent at *A*.
Angle *ABD* = 58° and angle *CDB* = 34°.

Find

(a) angle *ACD*,

Answer(a)   Angle *ACD* = ... [1]

(b) angle *ADB*,

Answer(b)   Angle *ADB* = ... [1]

(c) angle *DAT*,

Answer(c)   Angle *DAT* = ... [1]

(d) angle *CAO*.

Answer(d)   Angle *CAO* = ... [2]

UNIVERSITY OF CAMBRIDGE INTERNATIONAL EXAMINATIONS
International General Certificate of Secondary Education

CANDIDATE
NAME

CENTRE
NUMBER

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MATHEMATICS

Paper 2 (Extended)

0580/22, 0581/22

May/June 2009

1 hour 30 minutes

Candidates answer on the Question Paper.

Additional Materials: Electronic calculator   Geometrical instruments
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[Turn over

1

(a) Write down the order of rotational symmetry of the diagram.

Answer(a) .... [1]

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2 Write the following in order of size, smallest first.

$$74\% \qquad \sqrt{\frac{8}{15}} \qquad \frac{18}{25} \qquad \left(\frac{27}{20}\right)^{-1}$$

Answer .... $<$ .... $<$ .... $<$ .... [2]

3 At 05 18 Mr Ho bought 950 fish at a fish market for \$3.08 each.
85 minutes later he sold them all to a supermarket for \$3.34 each.

(a) What was the time when he sold the fish?

Answer(a) .... [1]

(b) Calculate his total profit.

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

4 Shade the region required in each Venn Diagram.

$\mathscr{E}$ A   B

C

$A \cap B \cap C$

$\mathscr{E}$ A   B
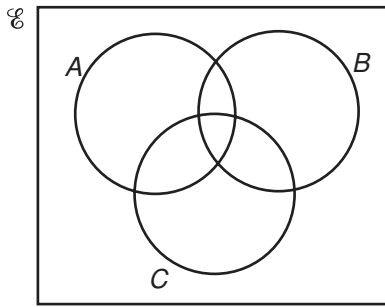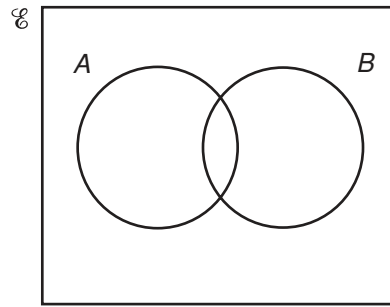
$A \cup B'$ [2]

5 $\mathbf{A} = \begin{pmatrix} -6 & 7 \\ -4 & 3 \end{pmatrix}$

Find $\mathbf{A}^{-1}$, the inverse of the matrix $\mathbf{A}$.

Answer $\begin{pmatrix} & \\ & \end{pmatrix}$

[2]

6 In 2005 there were 9 million bicycles in Beijing, correct to the nearest million.
The average distance travelled by each bicycle in one day was 6.5 km correct to one decimal place.
Work out the upper bound for the **total** distance travelled by all the bicycles in one day.

Answer .... km [2]

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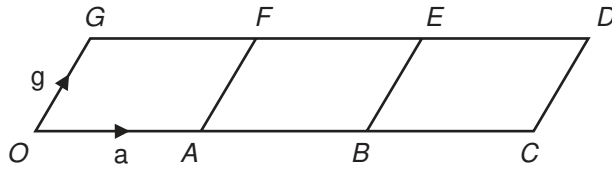
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Calculate the profit she made, giving your answer in pounds (£).

Answer £ .... [3]

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Answer x = ...

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$t = 0.4$ when $d = 5$.
Find t when $d = 4$.

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Mahmoud is working out the height, *h* metres, of a tower *BT* which stands on level ground.
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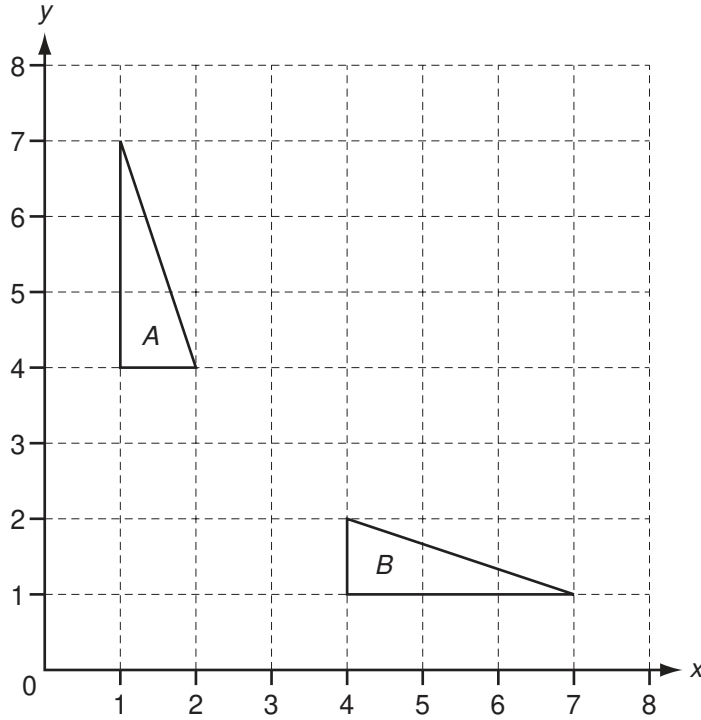
Show clearly all your construction arcs.

A

B

D

C

[4]

 [Turn over

17

(a) Describe fully the **single** transformation which maps triangle *A* onto triangle *B*.

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Calculate the volume of the smaller vase.

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Calculate the surface area of the larger vase.

Answer(b) .... cm² [2]

19

NOT TO
SCALE

A

F

B

6 cm
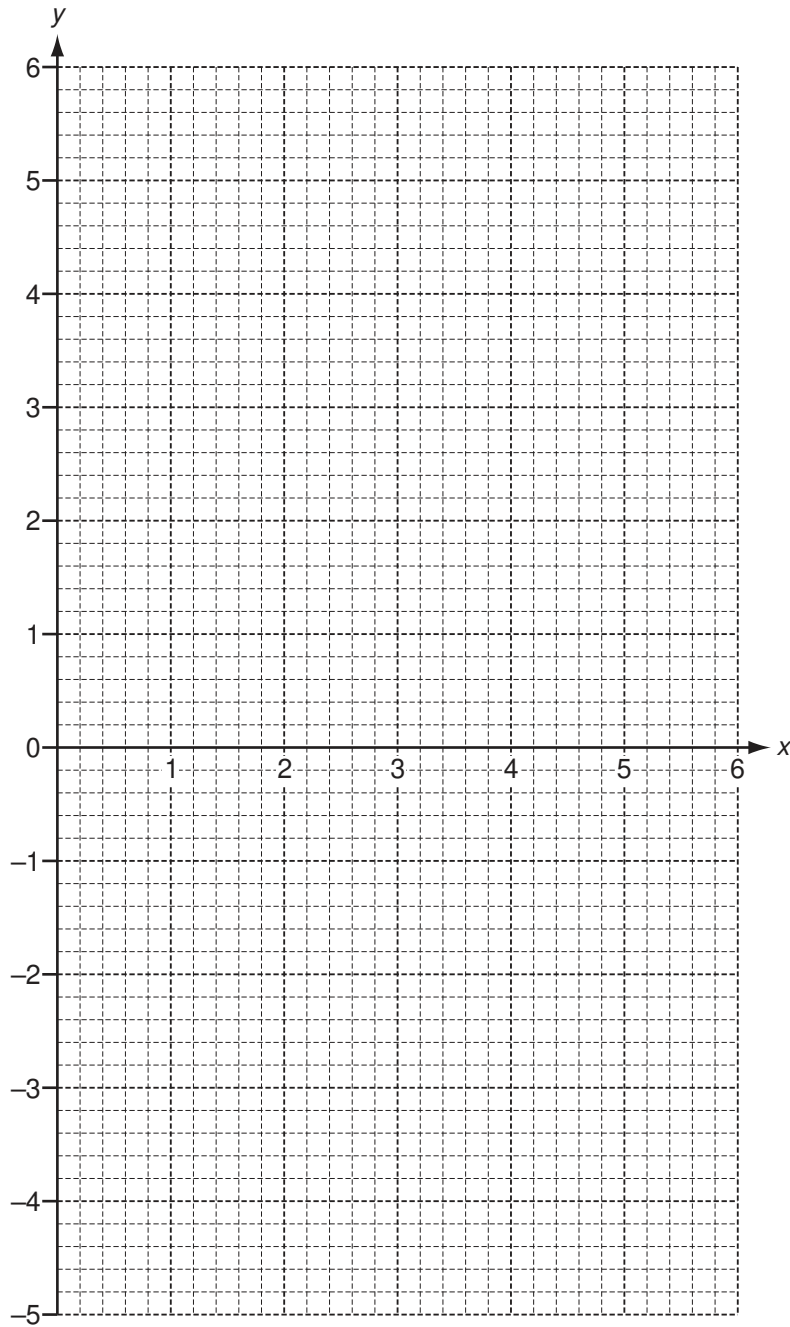
E

12 cm

40°

O

C

H

D

G

The diagram shows part of a fan.
OFG and *OAD* are sectors, centre *O*, with radius 18 cm and sector angle 40°.
B, *C*, *H* and *E* lie on a circle, centre *O* and radius 6 cm.
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0580/22/M/J/09

21

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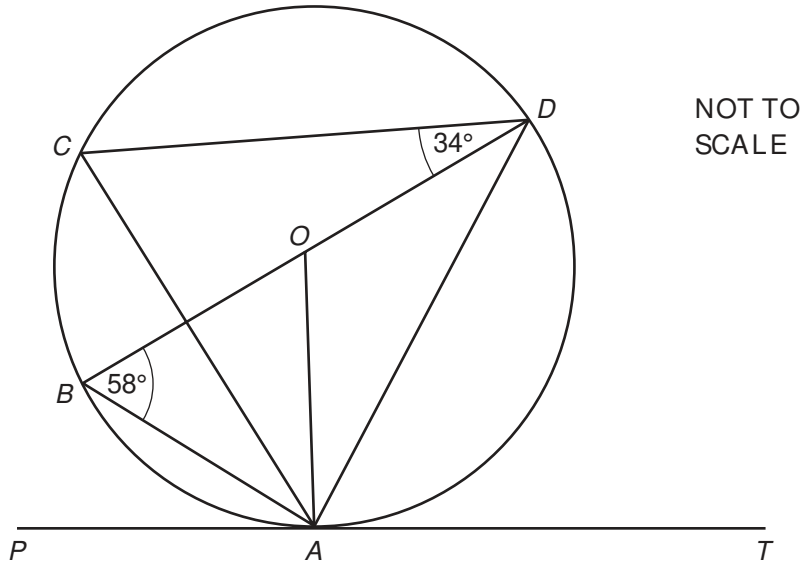
(a) Find **AB**.

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

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NOT TO SCALE

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Find

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Answer(a) Angle *ACD* = ... [1]

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Answer(b) Angle *ADB* = ... [1]

(c) angle *DAT*,

Answer(c) Angle *DAT* = ... [1]

(d) angle *CAO*.

Answer(d) Angle *CAO* = ... [2]