Cambridge O Level

Cambridge International Examinations
Cambridge Ordinary Level

CANDIDATE NAME	

CENTRE NUMBER							CANDIDATE NUMBER				

MATHEMATICS (SYLLABUS D)   **4024/01**

Paper 1   **For Examination from 2018**

SPECIMEN PAPER

      2 hours

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 in the spaces at the top of this page.
Write in dark blue or black pen.
You may use an HB pencil for any diagrams or graphs.
Do not use staples, paper clips, 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.
Essential working must be shown for full marks to be awarded.

ELECTRONIC CALCULATORS MUST NOT BE USED IN THIS PAPER.

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 number of marks for this paper is 80.

This document consists of **20** printed pages and **2** blank pages.

ELECTRONIC CALCULATORS MUST NOT BE USED IN THIS PAPER.

1   Express as a single fraction

(a) $\frac{5}{7} - \frac{2}{5}$,

Answer .... [1]

(b) $1\frac{1}{5} \div 2\frac{1}{3}$.

Answer .... [1]

2   The temperature in a freezer is $-18\,°C$.
    The outside temperature is $24\,°C$.

(a) Find the difference between the outside temperature and the freezer temperature.

Answer .... °C [1]

(b) The temperature in a fridge is $22\,°C$ warmer than the freezer temperature.

Find the temperature in the fridge.

Answer .... °C [1]

3 **(a)** Work out $12 + 8 \div (9 - 5)$.

Answer .... [1]

(b) Work out $0.018 \div 0.06$.

Answer .... [1]

4 The table shows information about the annual coffee production of some countries in a recent year.

Country	Number of bags per year
Brazil	
Vietnam	1.85×10^7
Colombia	9.2×10^6
Indonesia	8.5×10^6

(a) In the same year, Brazil produced 48 million bags of coffee.

Complete the table with the coffee production for Brazil, using standard form. [1]

(b) How many more bags of coffee were produced in Vietnam than in Colombia?

Answer .... [2]

(c) The mass of a bag of coffee is 60 kg.

Work out the number of kilograms of coffee produced in Indonesia.
Give your answer in standard form.

Answer .... kg [1]

 [Turn over

5 Factorise completely

(a) $16p + 4p^2$,

Answer .... [1]

(b) $xy + 2ay + 3ax + 6a^2$,

Answer .... [2]

(c) $2x^2 + 3x - 20$.

Answer .... [2]

6 **(a)** The ratio of boys to girls in a class is $4 : 5$.

What fraction of the class are boys?

Answer .... [1]

(b) The ratio of boys to girls in a school is $3 : 4$.
There are 120 more girls than boys.

How many students are in the school?

Answer .... [1]

7
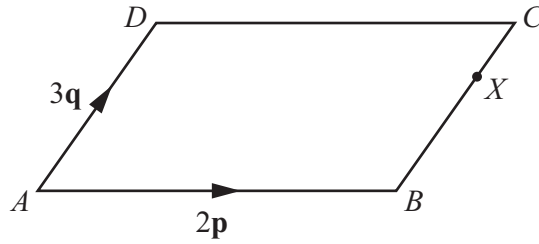
ABCD is a parallelogram.
X is the point on *BC* such that *BX* : *XC* = 2 : 1.

$\overrightarrow{AB}$ = 2**p** and $\overrightarrow{AD}$ = 3**q**.

Find, in terms of **p** and **q**,

(a) $\overrightarrow{AC}$,

Answer $\overrightarrow{AC}$ = ... [1]

(b) $\overrightarrow{AX}$,

Answer $\overrightarrow{AX}$ = ... [1]

(c) $\overrightarrow{XD}$.

Answer $\overrightarrow{XD}$ = ... [1]

8 A group of 80 students took a physics test.
This table shows the distribution of their marks.

Mark (*m*)	$0 < m \leqslant 10$	$10 < m \leqslant 20$	$20 < m \leqslant 30$	$30 < m \leqslant 40$	$40 < m \leqslant 50$	$50 < m \leqslant 60$
Frequency	4	12	14	22	18	10

(a) Complete the cumulative frequency table.

Mark (*m*)	$m \leqslant 10$	$m \leqslant 20$	$m \leqslant 30$	$m \leqslant 40$	$m \leqslant 50$	$m \leqslant 60$
Cumulative frequency						

[1]

(b) Draw a cumulative frequency curve for this information.

Mark (*m*)
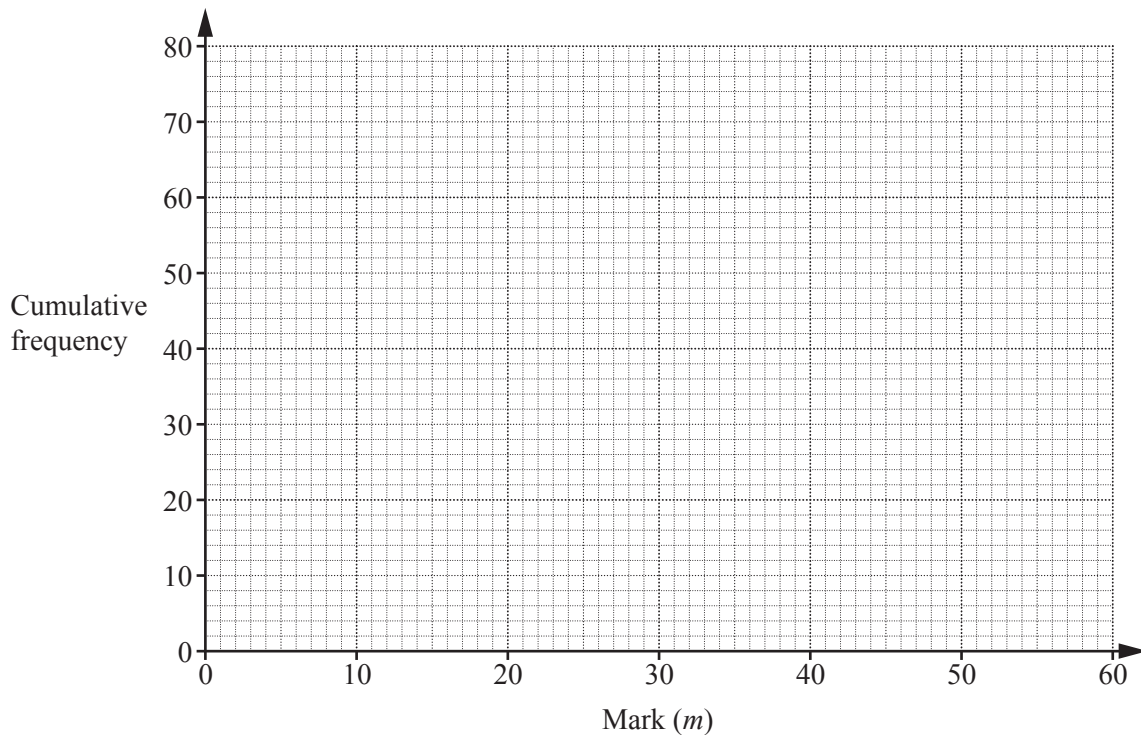
[2]

(c) The pass mark for the test is 45.
Use your cumulative frequency curve to estimate the number of students who passed.

Answer .... [2]

9

| 0.2 | 2 | $\sqrt{2}$ | $\frac{1}{3}$ | 0.83 | 8 | 81 |

From the numbers listed above, write down

(a) a square number,

Answer .... [1]

(b) a cube number,

Answer .... [1]

(c) an irrational number.

Answer .... [1]

10 $\mathbf{A} = \begin{pmatrix} 4 & -2 \\ -1 & 1 \end{pmatrix}$ $\mathbf{B} = \begin{pmatrix} -3 & 2 \\ -1 & 4 \end{pmatrix}$

(a) Find $2\mathbf{A} - \mathbf{B}$.

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

(b) Find $\mathbf{A}^{-1}$.

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

11 Write these numbers in order, starting with the smallest.

$$\frac{3}{4} \qquad 0 \qquad -1 \qquad -\frac{17}{20} \qquad -\frac{4}{5}$$

Answer ...., ..., ..., ..., ... [2]
           smallest

12 The diagram shows the regions *A* to *I*.
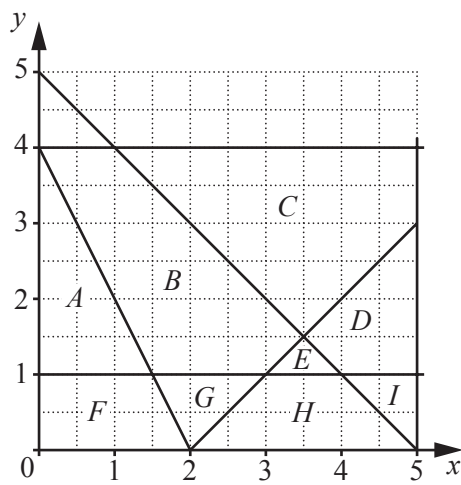
Give the letter of the region defined by each set of inequalities.
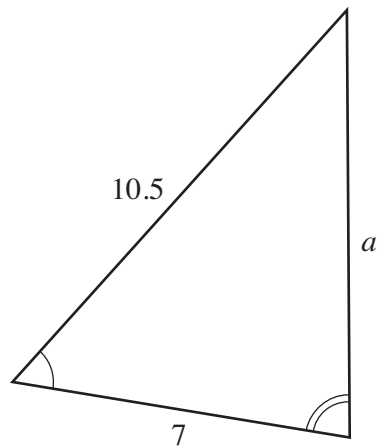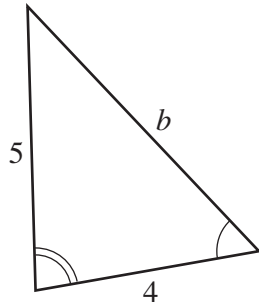
(a) $x > 0, y > 0, y < 1$ and $y < 4 - 2x$

Answer .... [1]

(b) $y > 1, y < x - 2$ and $y < 5 - x$

Answer .... [1]

13 The two triangles below are similar.
The lengths are in centimetres.

Calculate *a* and *b*.

Answer a = ...

b = ... [3]

14 $f(x) = \dfrac{7 - 3x}{2x}$

(a) Find f(4) .

Answer .... [1]

(b) Find f⁻¹(*x*) .

Answer f⁻¹(*x*) = ... [2]

15 R is directly proportional to the **cube** of p.
When $p = 2$, $R = 24$.

(a) Find the formula for R in terms of p.

Answer $R =$ .... [1]

(b) Find the value of p when $R = 192$.

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

(c) Which of the diagrams below represents the graph of R against p?

Diagram 1   Diagram 2   Diagram 3   Diagram 4   Diagram 5
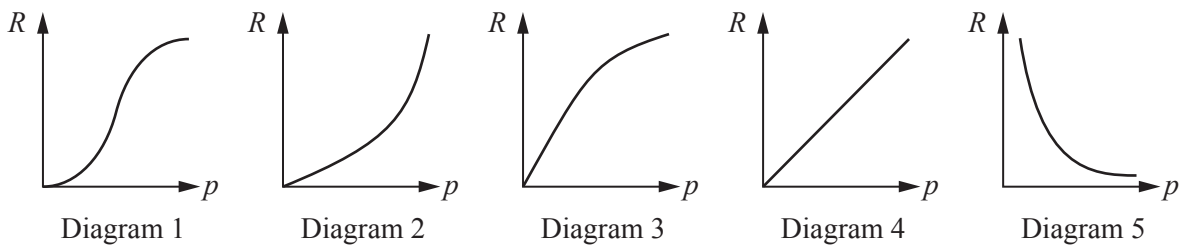
Answer Diagram .... [1]

16 The times of buses from Aytown to Deetown are shown.

Aytown	07 04	08 04	08 56	09 00	09 32	10 56
Beetown	–	–	09 05	–	09 41	11 05
Ceetown	07 18	08 18	09 14	–	–	11 14
Deetown	07 35	08 35	09 31	09 28	10 05	11 31

(a) Maryam lives in Ceetown and has to be in Deetown by 09 30.

What time is the latest bus from Ceetown that she can catch?

Answer .... [1]

(b) Aadil catches the 09 32 from Aytown to Deetown.

How long does his journey take?

Answer .... minutes [1]

17 The first four terms u_1, u_2, u_3 and u_4, in a sequence of numbers are given by

$$u_1 = \mathbf{1} \times 2 + 3^2 = 11$$
$$u_2 = \mathbf{2} \times 3 + 4^2 = 22$$
$$u_3 = \mathbf{3} \times 4 + 5^2 = 37$$
$$u_4 = \mathbf{4} \times 5 + 6^2 = 56.$$

(a) Evaluate u_5.

Answer .... [1]

(b) The nth term of the sequence is u_n.
Write down an expression for u_n in terms of n.

Answer .... [1]

(c) Given that $u_n = An^2 + Bn + C$, find the values of A, B and C.

Answer $A =$ ....

$B =$ ....

$C =$ .... [2]

18 (a) Evaluate $\left(\frac{5}{3}\right)^{-2}$.

Answer .... [1]

(b) Simplify $\left(\frac{9}{t^6}\right)^{\frac{1}{2}}$.

Answer .... [1]

(c) Simplify $\frac{2x^3 y}{6xy^2}$.

Answer .... [1]

19 (a) In the diagram, two small triangles are shaded.

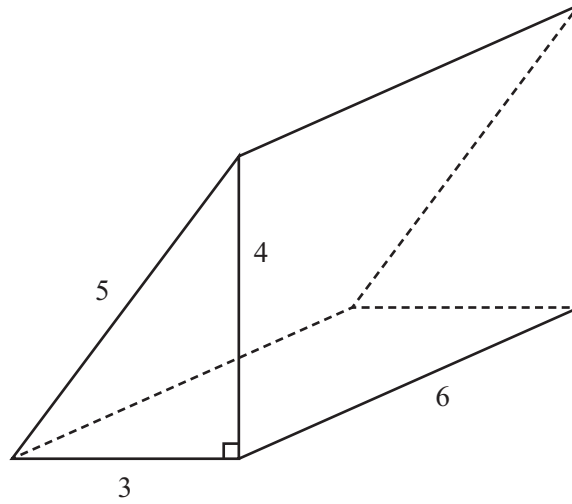Shade **one** more small triangle, so that the diagram will then have one line of symmetry.
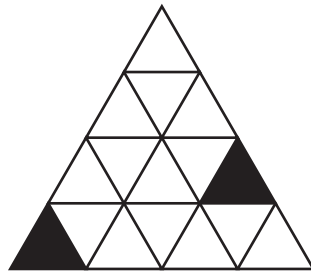
[1]

(b) In the diagram, two small squares are shaded.

Shade **two** more small squares, so that the diagram will then have rotational symmetry of order 2.
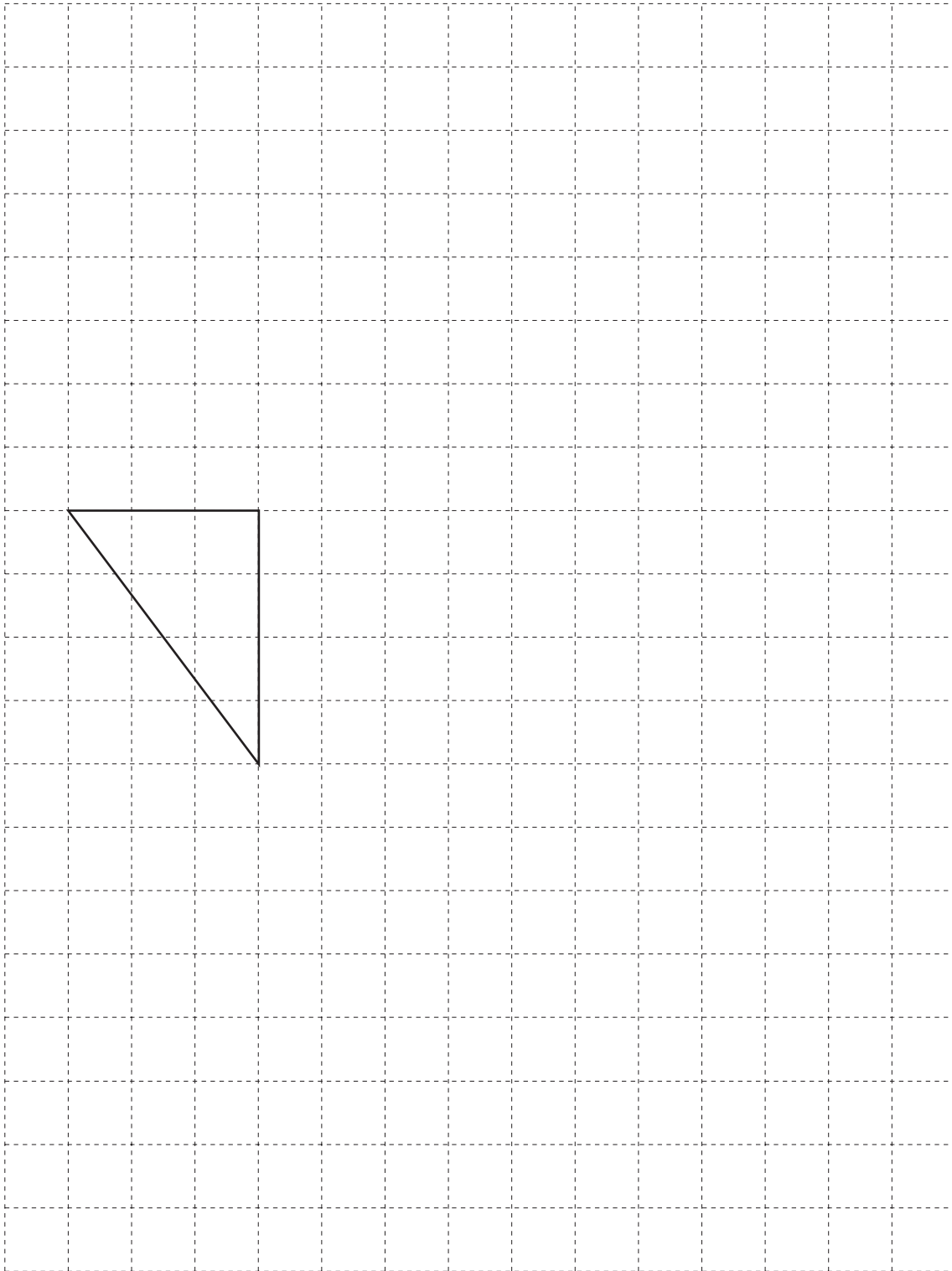

[1]

20
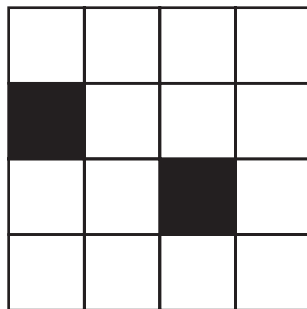
Amil is drawing an accurate net for the triangular prism shown.
All the lengths are in centimetres.

On the grid opposite, complete the accurate drawing of the net for this prism.

One face has been drawn for you.

[3]

21 A machine puts beads of different colours and sizes into packets.
The beads are selected at random from a large container and the selection of each bead for a packet is independent of all others.
The table shows information on the contents of six packets.

Packet	1	2	3	4	5	6	Total
Total number of beads	15	14	19	18	16	18	100
Number of blue beads	6	5	8	6	8	7	

(a) Calculate the relative frequency of the machine selecting a blue bead.

Answer .... [1]

(b) Calculate how many blue beads you would expect in a packet of 30 beads.

Answer .... [1]

(c) The probability that the machine selects a red bead is 0.17.

Calculate the probability that the machine does **not** select a red bead.

Answer .... [1]

22 The diagram at the bottom of the page shows the lines *AB* and *BC*.

   (a) By measuring an angle, find reflex angle *ABC*.

   Answer A$\hat{B}$C = ... [1]

   (b) The point *D* is on the opposite side of *AC* to *B*.
   CD = *CB* and *AD* = 10 cm.
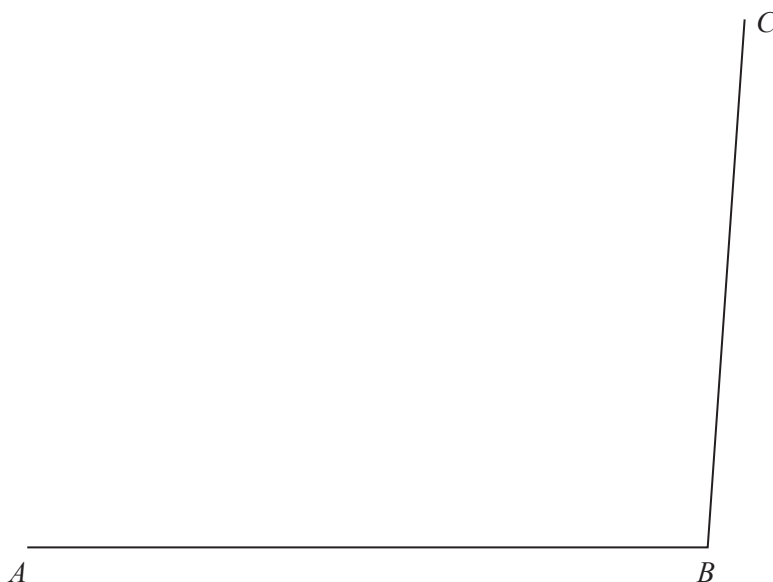
   On the diagram, construct quadrilateral *ABCD*. [1]

   (c) On the diagram, construct the locus of points, **inside** the quadrilateral *ABCD*, that are

   (i) equidistant from *A* and *B*. [1]

   (ii) equidistant from *BC* and *BA*. [1]

   (d) On the diagram, shade the region **inside** the quadrilateral *ABCD* containing the points that are

   - nearer to *A* than to *B*
   - **and** nearer to *BC* than to *BA*.

C

A   *B*

[1]

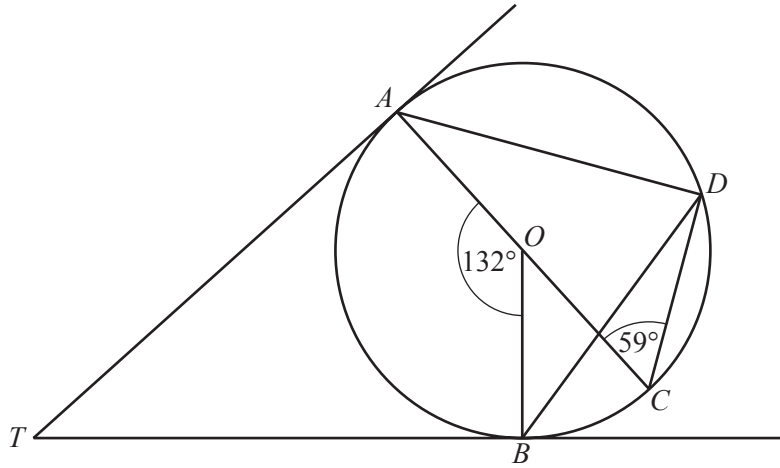**23** Find **one** value of x that satisfies **both** $x > 4$ **and** $17 - 4x > 2 - x$.

Answer .... [2]

24 (a) Find the Highest Common Factor (HCF) of 36 and 54.

Answer .... [1]

(b) Estimate, correct to the nearest whole number, the value of $\sqrt{97} - \sqrt{35}$.
Show clearly the approximate values you use.

Answer .... [1]

25

In the diagram, the points *A*, *B*, *C* and *D* lie on the circle, centre *O*.
TA and *TB* are tangents touching the circle at *A* and *B* respectively.

$A\hat{O}B$ = 132°, $A\hat{C}D$ = 59° and *AOC* is a straight line.

(a) Find $A\hat{T}B$.

Answer $A\hat{T}B$ = ... [1]

(b) Find $B\hat{D}A$.

Answer $B\hat{D}A$ = ... [1]

(c) Find $B\hat{D}C$.

Answer $B\hat{D}C$ = ... [1]

(d) Find $O\hat{B}D$.

Answer $O\hat{B}D$ = ... [1]

26 The diagram is the speed–time graph of part of a train's journey.
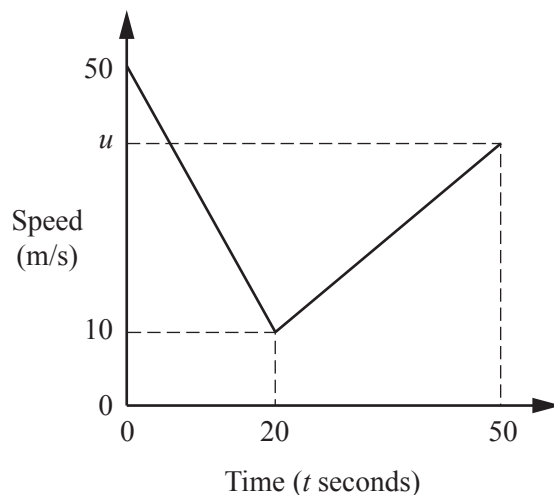
The train slows down uniformly from a speed of 50 m/s to a speed of 10 m/s in a time of 20 seconds.

During the next 30 seconds, it accelerates uniformly to a speed of u m/s.

(a) Calculate the deceleration from $t = 0$ to $t = 20$.

Answer .... m/s^2 [1]

(b) Calculate the speed of the train when $t = 15$.

Answer .... m/s [1]

(c) Calculate the distance travelled by the train from $t = 0$ to $t = 20$.

Answer .... m [1]

(d) The size of the acceleration is half the size of the deceleration.
Find the value of u.

Answer $u =$ .... [1]

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