Cambridge Assessment International Education

Cambridge IGCSE™

CANDIDATE NAME									
CENTRE NUMBER						CANDIDATE NUMBER				

MATHEMATICS **0580/31**

Paper 3 (Core) **May/June 2020**

2 hours

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 π, use either your calculator value or 3.142.

INFORMATION

- The total mark for this paper is 104.
- The number of marks for each question or part question is shown in brackets [ ].

This document has **20** pages. Blank pages are indicated.

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1 Gabriela designs the seating layout for a new theatre.
There are three sections of seats, A, B and C.

View solution

(a) Section A has 152 seats.
Section B has 12.5% more seats than Section A.
Section C has $\frac{3}{8}$ of the number of seats in Section A.

(i) Show that the number of seats in Section B is 171.

[1]

View solution

(ii) Show that the total number of seats is 380.

[2]

View solution

(b) Write down and simplify the ratio of the number of seats in each section A : B : C.

A : B : C = ... : ..... : ..... [2]

View solution

(c) In Section A:

- There are 12 seats in the front row.
- Each row has 2 more seats than the row in front of it.

Work out the number of rows for the 152 seats in Section A.

..... rows [2]

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(d) For a concert in the theatre, the ticket prices are in the ratio

View solution

$$A : B : C = 9 : 7 : 4.$$

A ticket for Section C costs \$6.

(i) Show that a ticket for Section B costs \$10.50 .

[1]

(ii) Find the cost of a ticket for Section A.

View solution

\$ ..... [1]

(iii) The table shows the number of tickets sold in each section.

View solution

Section	Number of tickets sold
A	120
B	136
C	30

Calculate the total amount received from the ticket sales.

\$ ..... [3]

(iv) The concert costs \$4500 to organise.

View solution

Calculate the amount received from the ticket sales as a percentage of the \$4500.

..... % [1]

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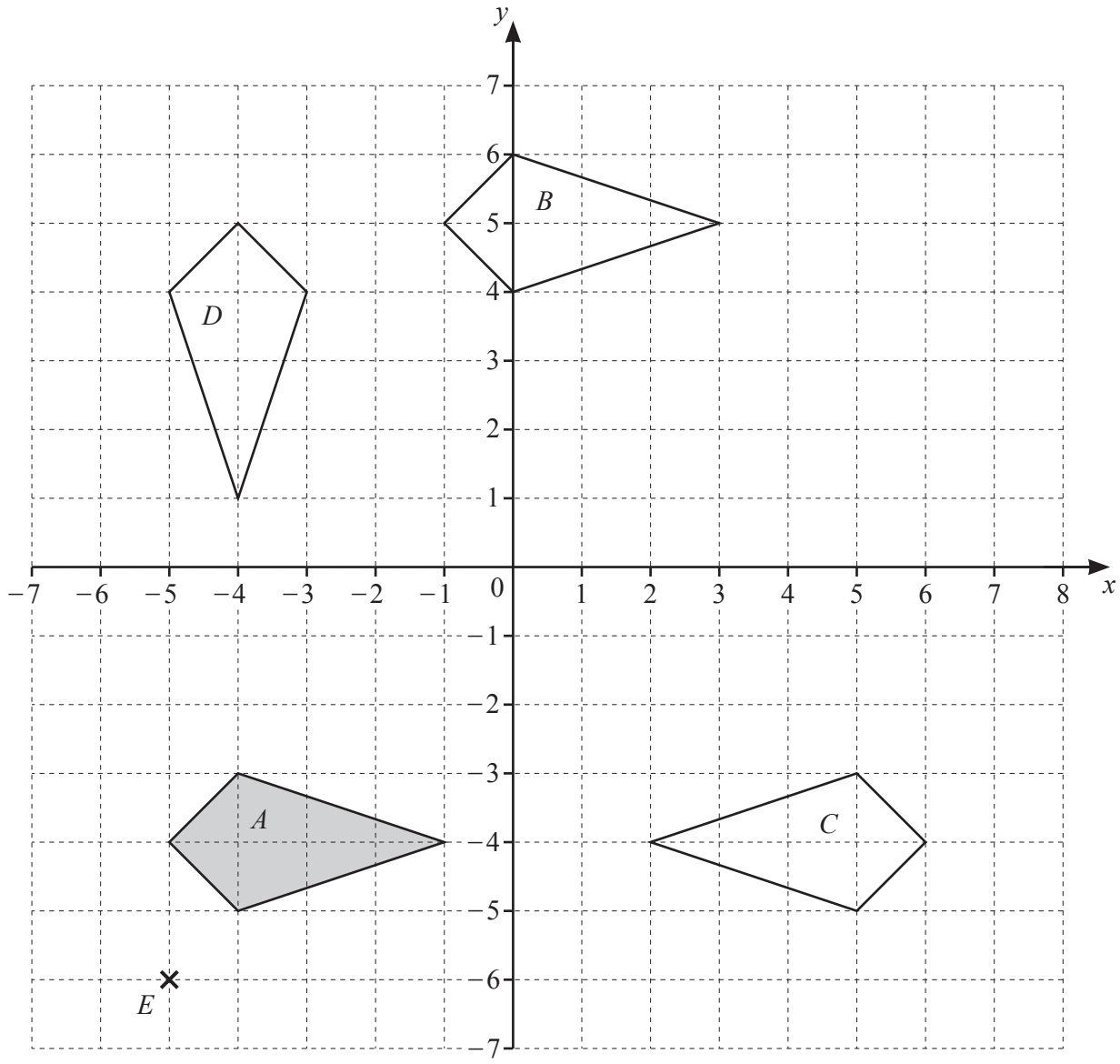
2 The grid shows a point E and four quadrilaterals, A, B, C and D.



(a) Write down the mathematical name of shape A.

View solution

..... [1]

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

View solution

(i) shape *A* onto shape *B*,

.....

..... [2]

(ii) shape *A* onto shape *C*,

View solution

.....

..... [2]

(iii) shape *A* onto shape *D*.

View solution

.....

..... [3]

(c) (i) Write down the coordinates of the point *E*.

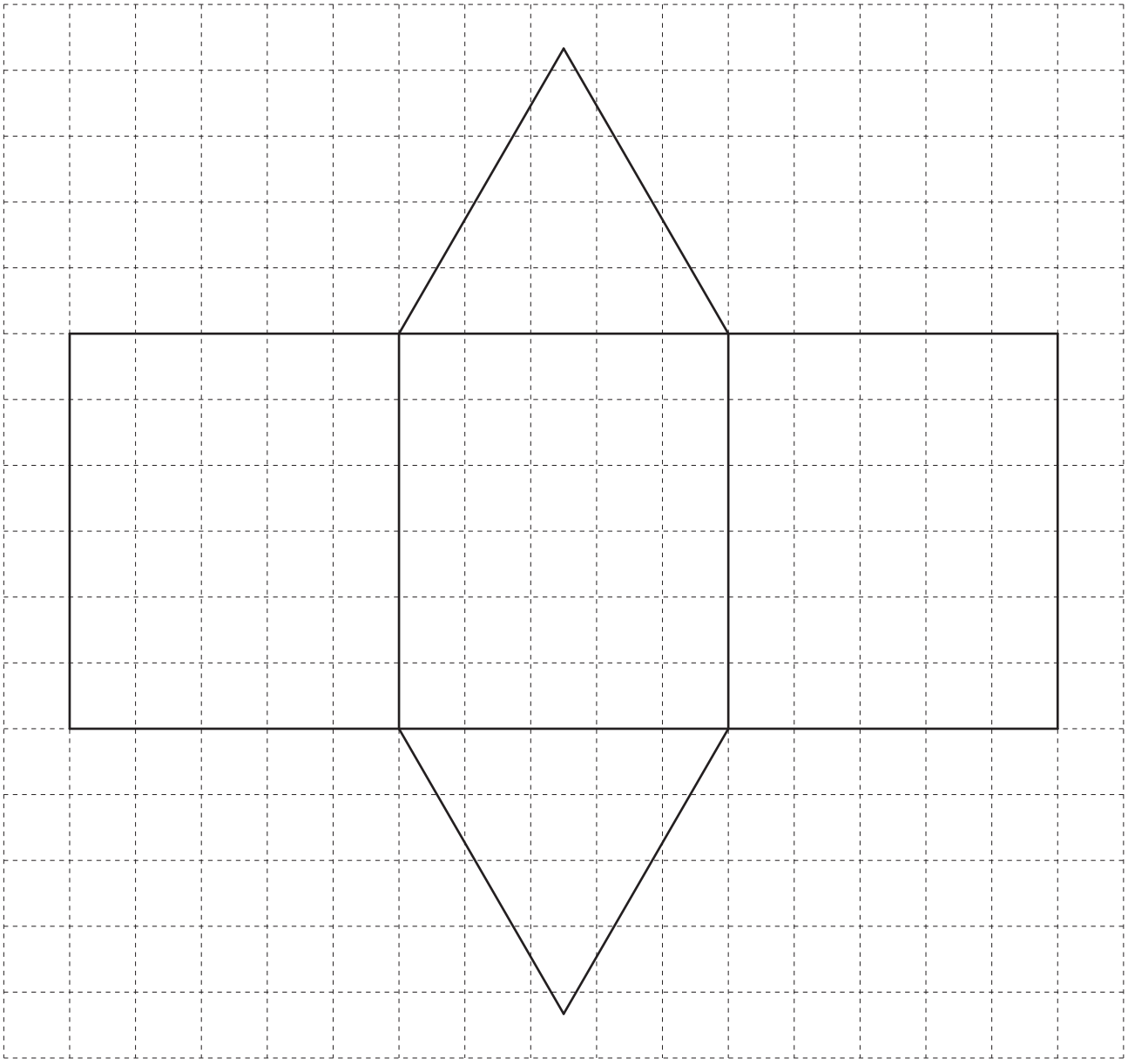
View solution

(..... , ...) [1]

(ii) On the grid, draw the image of shape *A* after an enlargement by scale factor 3, centre *E*. [2]

View solution

3 The diagram shows the net of a triangular prism on a 1 cm^2 grid.



(a) Write down the mathematical name for the type of triangle shown on the grid.

View solution

..... [1]

(b) (i) Measure the perpendicular height of the triangle.

View solution

..... cm [1]

(ii) Calculate the area of the triangle.

View solution

..... cm^2 [2]

(iii) Calculate the volume of the triangular prism.

View solution

..... cm^3 [2]

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4 **(a)** Complete the table of values for $y = 7 + 2x - x^2$.

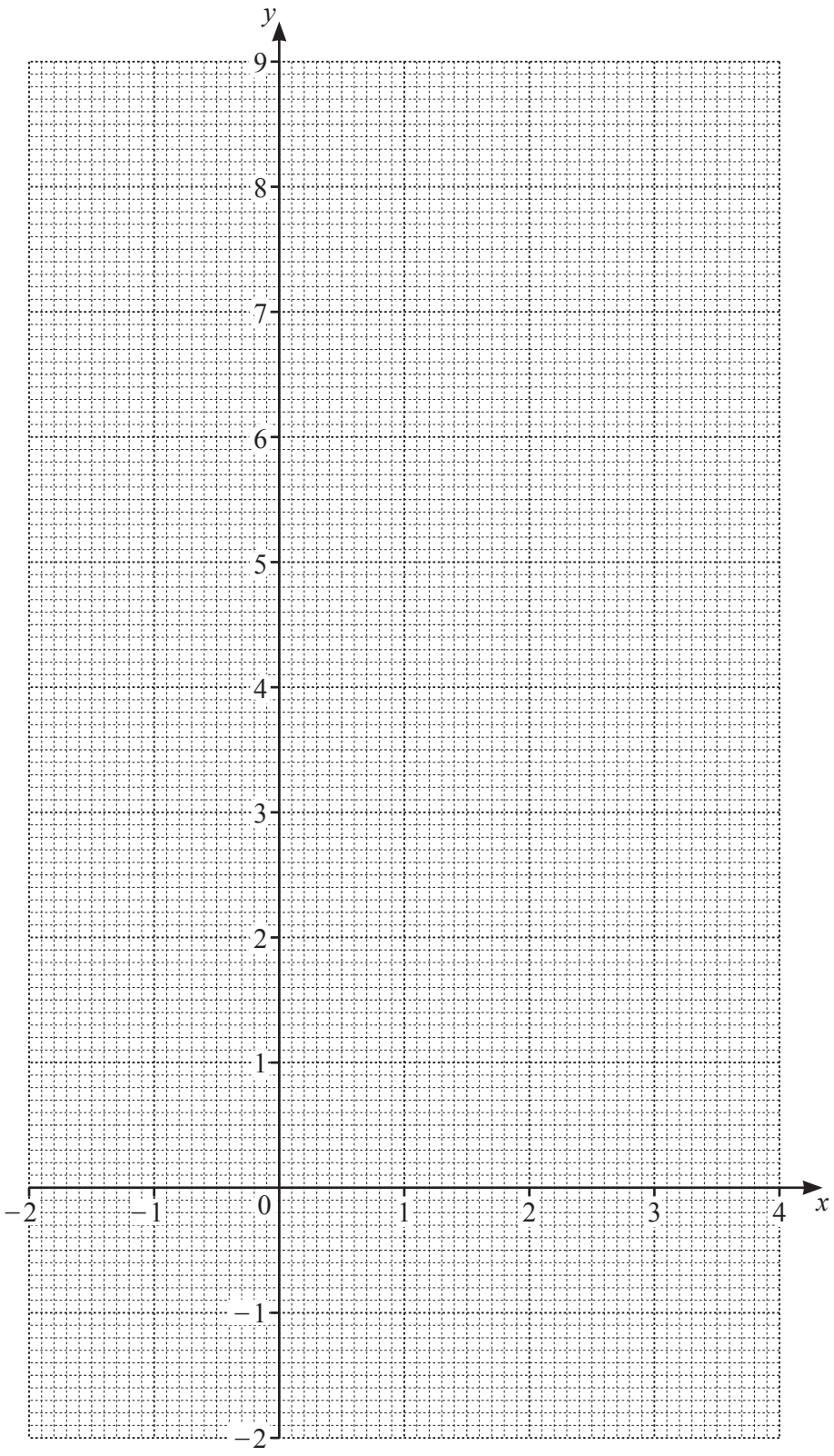
View solution

x	-2	-1	0	1	2	3	4
y	-1			8	7		-1

[2]

(b) On the grid, draw the graph of $y = 7 + 2x - x^2$ for $-2 \leqslant x \leqslant 4$.

View solution



[4]

(c) Write down the equation of the line of symmetry of the graph.

View solution

..... [1]

(d) Use your graph to solve the equation $7 + 2x - x^2 = 0$.

View solution

$x =$ ..... or $x =$ ..... [2]

5 **(a)** Using the integers from 60 to 75 only, find

View solution

(i) a multiple of 17,

..... [1]

View solution

(ii) the prime numbers.

..... [2]

View solution

(b) Find

(i) the square root of 4489,

..... [1]

View solution

(ii) 4^3,

..... [1]

View solution

(iii) $\sqrt[3]{274\,625}$,

..... [1]

View solution

(iv) $2^{-3} \times 24^2$.

..... [1]

(c) Write down the reciprocal of 7.

View solution

..... [1]

(d) Write 3.72194 correct to 3 decimal places.

View solution

..... [1]

(e) Find the lowest common multiple (LCM) of 8 and 14.

View solution

..... [2]

(f) The average temperature at the North Pole is −23 °C in January and −11 °C in March.

View solution

(i) Find the difference between these temperatures.

..... °C [1]

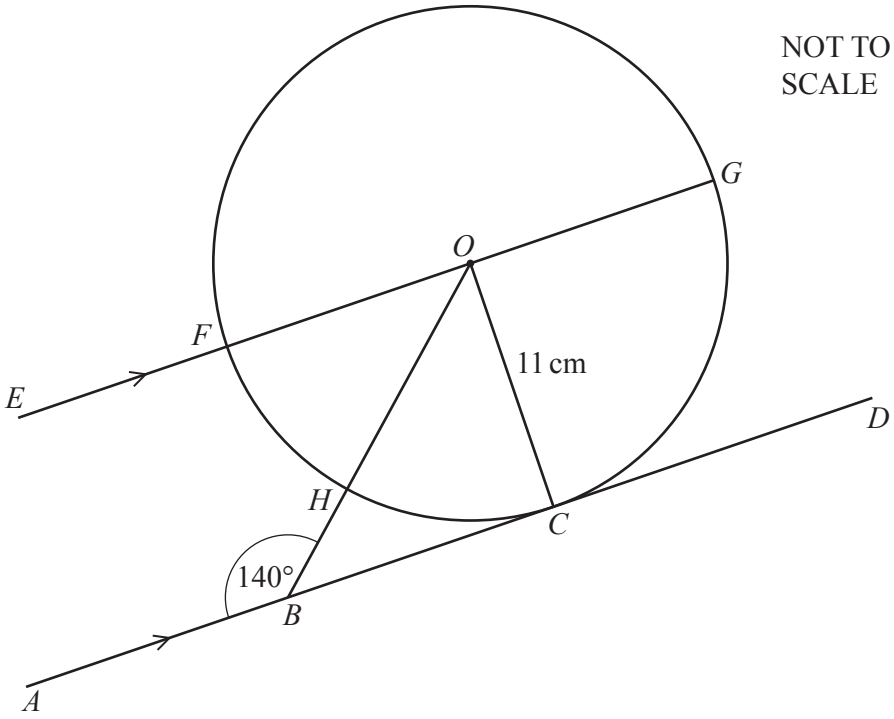
(ii) The average temperature in July is 28 °C higher than the average temperature in March.

View solution

Find the average temperature in July.

..... °C [1]

6



The diagram shows a circle, centre O, radius 11 cm.
C, F, G and H are points on the circumference of the circle.
The line AD touches the circle at C and is parallel to the line EG.
B is a point on AD and angle $ABO = 140°$.

(a) Write down the mathematical name of the straight line AD.

View solution

..... [1]

(b) (i) Find, in terms of π, the circumference of the circle.

View solution

..... cm [2]

(ii) Work out angle FOH.

View solution

Angle $FOH =$ ..... [2]

(iii) Calculate the length of the minor arc FH.

View solution

..... cm [2]

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(c) (i) Give a reason why angle BCO is 90°.

..... [1]

(ii) Show that $BC = 13.11$ cm, correct to 2 decimal places.

View solution

[3]

(iii) Calculate BH.

$BH =$ ..... cm [3]

7 **(a)** 20 students from College A each run 5 km.
The times, correct to the nearest minute, are recorded.

View solution

32	51	25	40	47	21	37	32	48	36
46	39	30	29	44	39	53	35	40	31

(i) Complete the stem-and-leaf diagram.

2	
3	
4	
5	

Key: 3 | 4 represents 34 minutes [2]

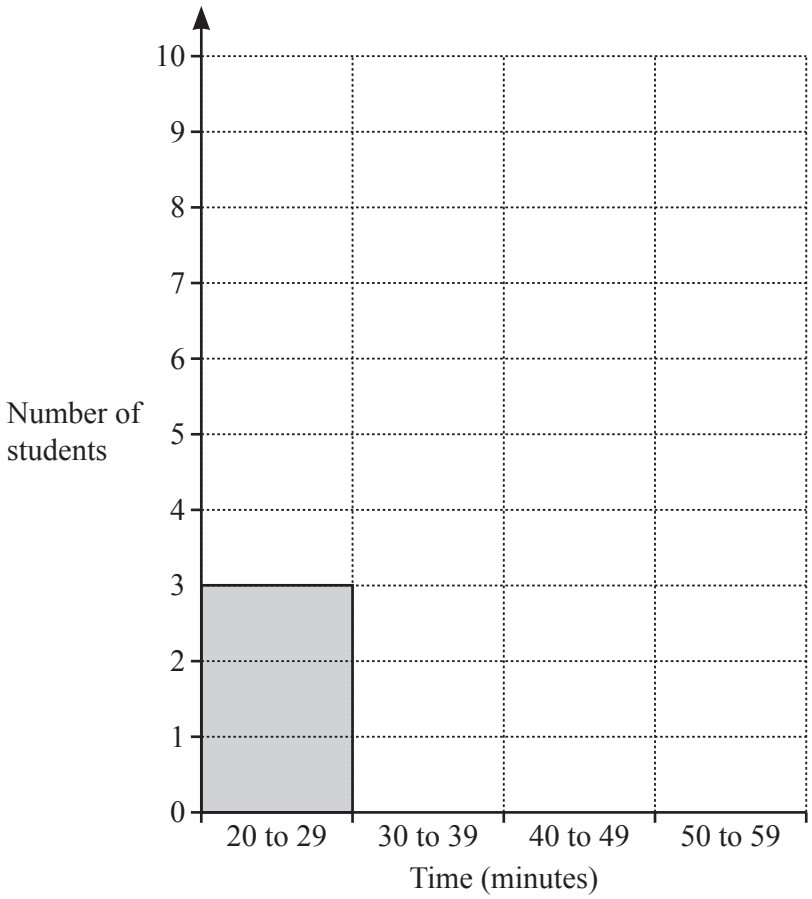
(ii) Find the range of the times.

..... min [1]

(iii) Find the median of the times.

..... min [1]

(iv) Complete the bar chart for the times of the students.



[2]

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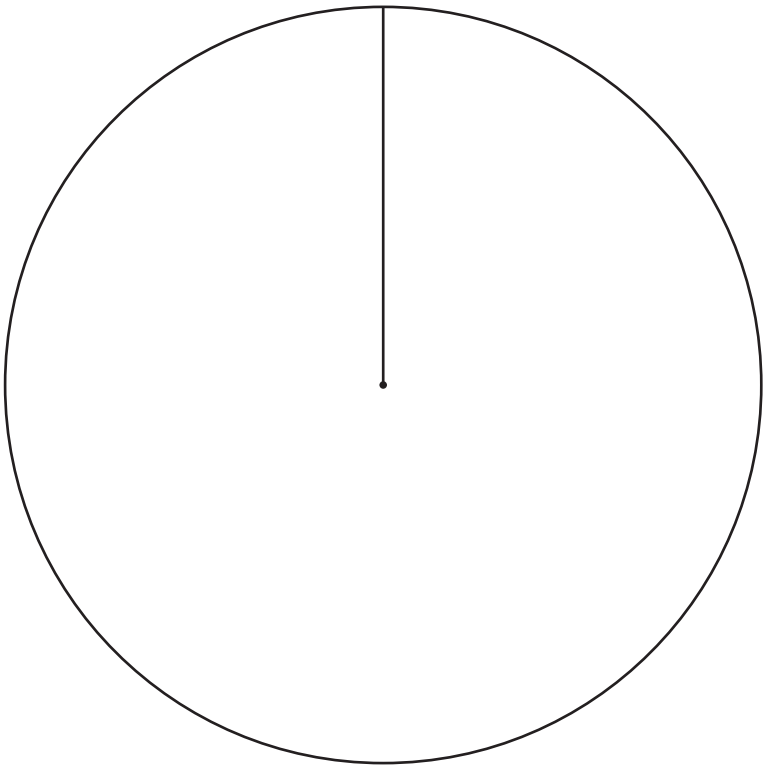
(b) 20 students from College B each run 5 km.
Their times, correct to the nearest minute, are recorded and the results are shown in the table.

View solution

Time (minutes)	Number of students	Pie chart sector angle
30 to 39	5	90°
40 to 49	8	
50 to 59	7	

(i) Complete the table. [2]



(ii) Complete the pie chart. [2]

(c) Write down two comments comparing the times of students from College A with the times of students from College B.

View solution

1 .....

.....

2 .....

..... [2]

8 **(a)** Simplify $3c-5d-c+2d$.

View solution

..... [2]

(b) Solve the equation $12x-7=23$.

View solution

$x =$ ..... [2]

(c) Multiply out.

$9(3-x)$

View solution

..... [1]

(d) $A=\dfrac{(a+b)h}{2}$

View solution

Work out the value of h when $A=38.64$, $a=5.5$ and $b=3.7$.

$h =$ ..... [3]

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(e) Alphonse is x years old and Beatrice is y years old.
Three times Alphonse's age is equal to 5 times Beatrice's age.
Twice Beatrice's age is 4 years more than Alphonse's age.

View solution

(i) Use this information to write down two equations in x and y.

.....

..... [2]

(ii) Find the age of Alphonse and the age of Beatrice.

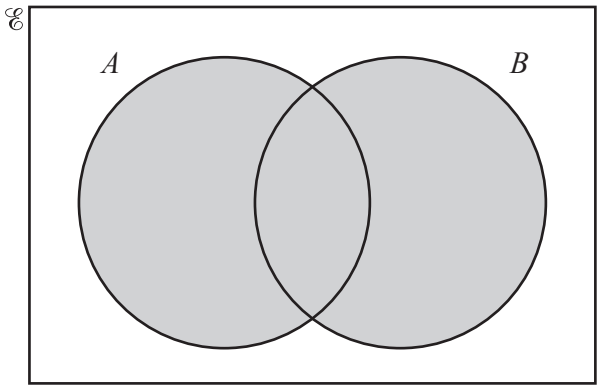
View solution

Alphonse ..... years old

Beatrice ..... years old [3]

9 **(a)** Use set notation to describe the shaded region in each Venn diagram.

View solution



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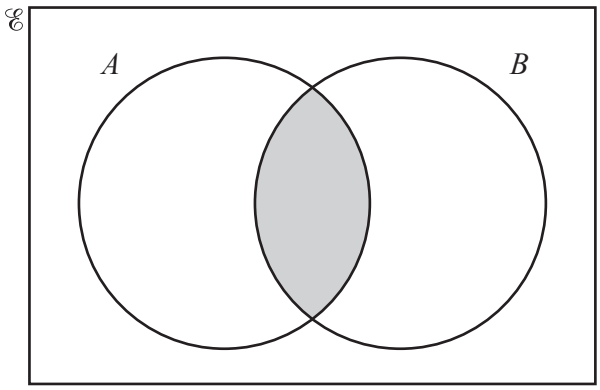


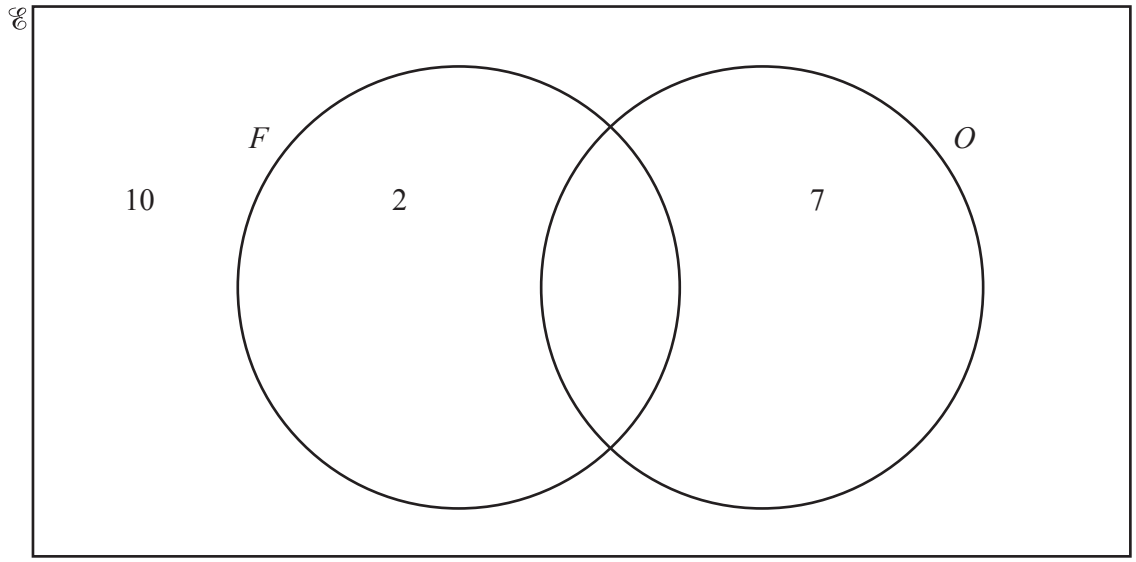
.....

[2]

(b) $\mathscr{E} = \{x : x \text{ is a natural number} \leqslant 15\}$
$F = \{x : x \text{ is a factor of } 12\}$
$O = \{x : x \text{ is an odd number}\}$

View solution

(i) Complete the Venn diagram to show the elements of these sets.



[2]

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(ii) Write down one number that is in set O, but not in set F.

View solution

..... [1]

(iii) Find $n(F \cup O)$.

View solution

..... [1]

(iv) A number is chosen at random from $\mathscr{E}$.

Work out the probability that this number is in set O.

View solution

..... [1]

Question 10 is printed on the next page.

10 Point B is 36 km from point A on a bearing of 140°.

(a) Using a scale of 1 centimetre to represent 4 kilometres, mark the position of B.

View solution



Scale: 1 cm to 4 km

[2]

(b) (i) Point C is 28 km from A and 20 km from B.
The bearing of C from A is less than 140°.

View solution

Using a ruler and compasses only, construct triangle ABC.
Show all your construction arcs. [3]

(ii) Measure angle ACB.

Angle ACB = ... [1]

View solution

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