Cambridge Assessment International Education

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MATHEMATICS **0580/42**

Paper 4 (Extended) **October/November 2020**

2 hours 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 π, use either your calculator value or 3.142.

INFORMATION

- The total mark for this paper is 130.
- 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 Karel travelled from London to Johannesburg and then from Johannesburg to Windhoek.

View solution

(a) The flight from London to Johannesburg took 11 hours 10 minutes.
The average speed was 813 km/h.

Calculate the distance travelled from London to Johannesburg.
Give your answer correct to the nearest 10 km.

..... km [3]

View solution

(b) The total time for Karel's journey from London to Windhoek was 15 hours 42 minutes.
The total distance travelled from London to Windhoek was 10 260 km.

(i) Calculate the average speed for this journey.

..... km/h [2]

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(ii) The cost of Karel's journey from London to Windhoek was $470.

View solution

(a) Calculate the distance travelled per dollar.

..... km per dollar [1]

(b) Calculate the cost per 100 km of this journey.
Give your answer correct to the nearest cent.

$ ..... per 100 km [2]

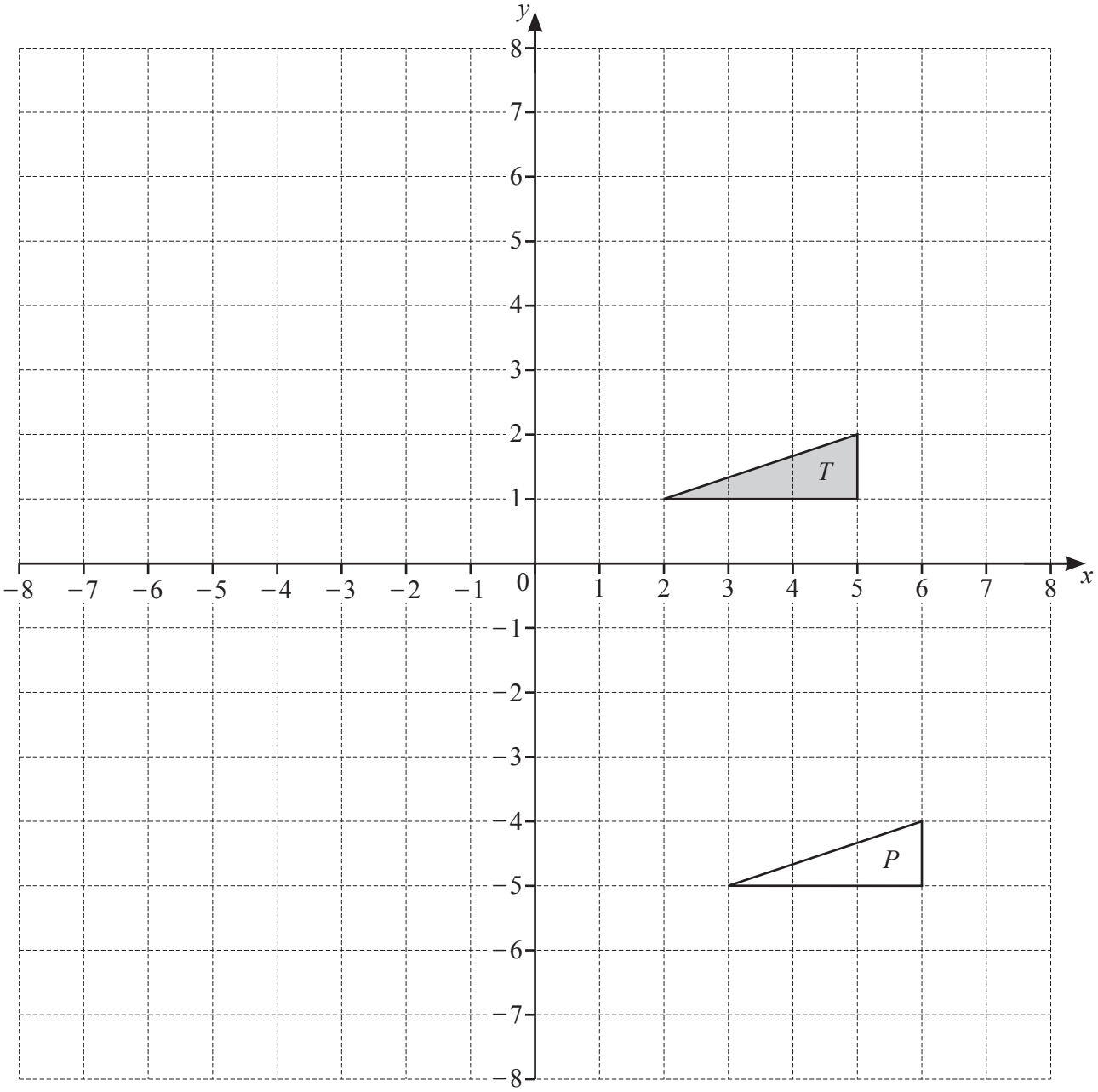
(c) Karel changed $300 into 3891 Namibian dollars.

View solution

Complete the statement.

$1 = ... Namibian dollars [1]

2



(a) Describe fully the **single** transformation that maps triangle T onto triangle P.

View solution

.....

..... [2]

(b) (i) Reflect triangle T in the line $x = 1$. [2]

(ii) Rotate triangle T through 90° anticlockwise about (6, 0). [2]

(iii) Enlarge triangle T by a scale factor of -2, centre (1, 0). [2]

View solution

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3 **(a)** Beth invests \$2000 at a rate of 2% per year compound interest.

View solution

(i) Calculate the value of this investment at the end of 5 years.

\$ ..... [2]

(ii) Calculate the overall percentage increase in the value of Beth's investment at the end of 5 years.

View solution

..... % [2]

(iii) Calculate the minimum number of complete years it takes for the value of Beth's investment to increase from \$2000 to more than \$2500.

View solution

..... [3]

(b) The population of a village decreases exponentially at a rate of 4% each year. The population is now 255.

View solution

Calculate the population 16 years ago.

..... [3]

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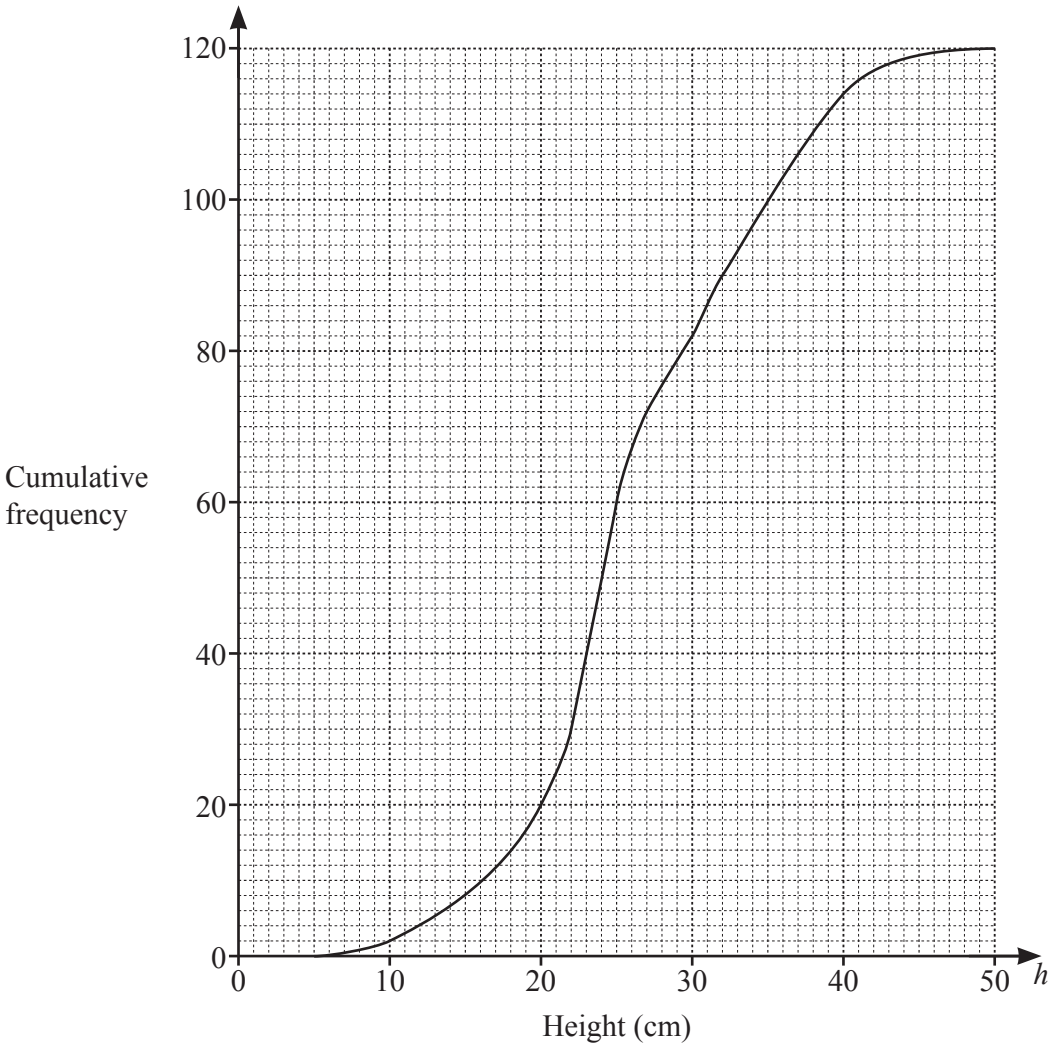
4 The height, h cm, of each of 120 plants is measured.
The cumulative frequency diagram shows this information.



(a) Use the cumulative frequency diagram to find an estimate of

(i) the median,

..... cm [1]

(ii) the interquartile range,

..... cm [2]

(iii) the 60th percentile,

..... cm [1]

(iv) the number of plants with a height greater than 40 cm.

..... [2]

(b) The information in the cumulative frequency diagram is shown in this frequency table.

View solution

Height, h cm	$0 < h \leqslant 10$	$10 < h \leqslant 20$	$20 < h \leqslant 30$	$30 < h \leqslant 50$
Frequency	2	18	62	38

(i) Calculate an estimate of the mean height.

..... cm [4]

(ii) A histogram is drawn to show the information in the frequency table.
The height of the bar representing the interval $10 < h \leqslant 20$ is 7.2 cm.

View solution

Calculate the height of the bar representing the interval $30 < h \leqslant 50$.

..... cm [2]

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5 Ahmed sells different types of cake in his shop.
The cost of each cake depends on its type and its size.

Every small cake costs $\$x$ and every large cake costs $\$(2x + 1)$.

(a) The total cost of 3 small lemon cakes and 2 large lemon cakes is \$12.36 .

View solution

Find the cost of a small lemon cake.

$ ..... [3]

(b) The cost of 18 small chocolate cakes is the same as the cost of 7 large chocolate cakes.

View solution

Find the cost of a small chocolate cake.

$ ..... [3]

(c) The number of small cherry cakes that can be bought for \$4 is the same as the number of large cherry cakes that can be bought for \$13.

View solution

Find the cost of a small cherry cake.

$ ..... [3]

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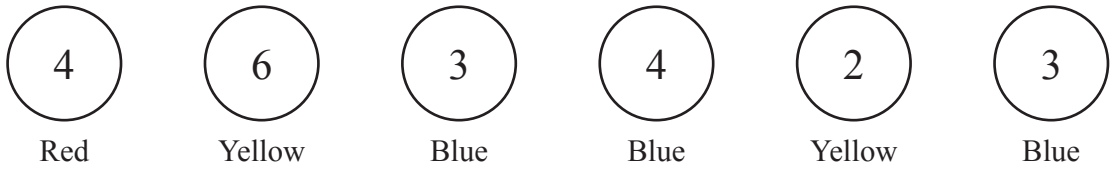
(d) Petra spends \$20 on small coffee cakes and \$10 on large coffee cakes.
The total number of cakes is 45.

View solution

Write an equation in terms of x.
Solve this equation to find the cost of a small coffee cake.
Show all your working.

\$ ..... [7]

6



The diagram shows six discs.
Each disc has a colour and a number.

(a) One disc is picked at random.

View solution

Write down the probability that

(i) the disc has the number 4,

..... [1]

(ii) the disc is red and has the number 3,

View solution

..... [1]

(iii) the disc is blue and has the number 4.

View solution

..... [1]

(b) Two of the six discs are picked at random **without** replacement.

View solution

Find the probability that

(i) both discs have the number 3,

..... [2]

(ii) both discs have the same colour.

View solution

..... [3]

(c) Two of the six discs are picked at random **with** replacement.

Find the probability that both discs have the same colour.

View solution

..... [3]

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7 $y = x^2 + \frac{1}{x},\ x \neq 0$

View solution

(a) Complete the table.

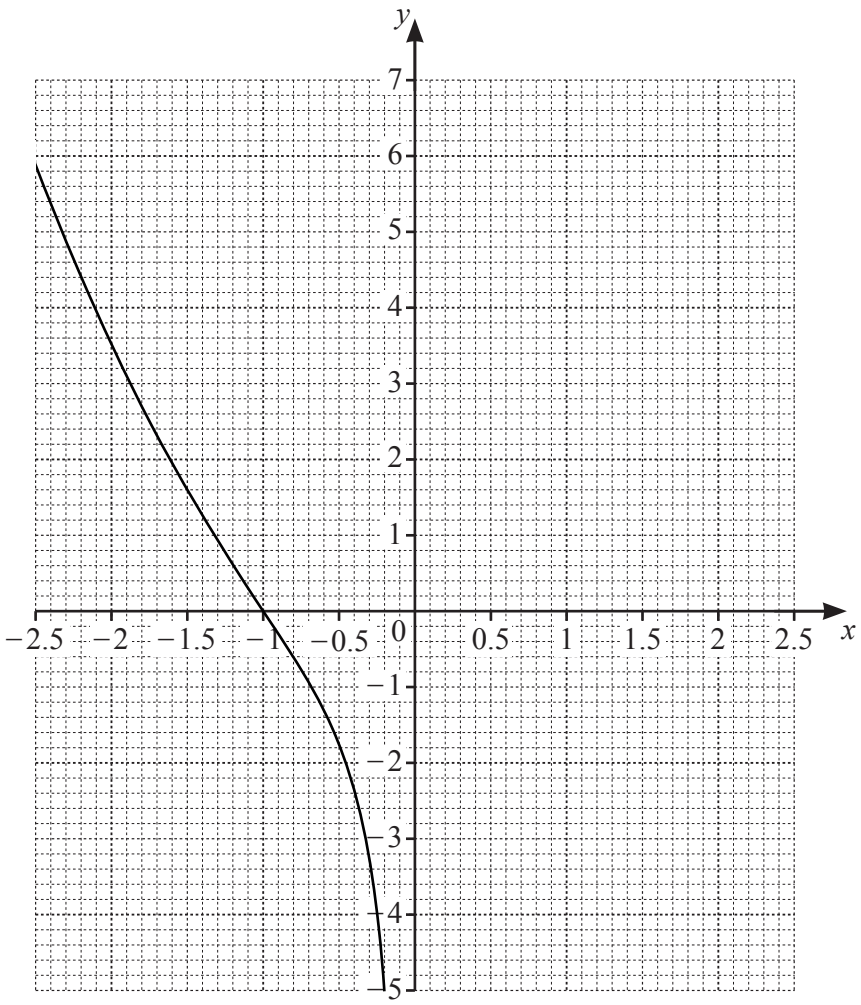
x	0.2	0.3	0.5	1	1.5	2	2.5
y	5.0	3.4	2.3		2.9		6.7

[2]

View solution

(b) On the grid, draw the graph of $y = x^2 + \frac{1}{x}$ for $0.2 \leqslant x \leqslant 2.5$.

The graph of $y = x^2 + \frac{1}{x}$ for $-2.5 \leqslant x \leqslant -0.2$ has been drawn for you.



[4]

(c) By drawing suitable straight lines on the grid, solve the following equations.

View solution

(i) $x^2 + \frac{1}{x} = -2$

$x =$ ..... [1]

View solution

(ii) $x^2 + \frac{1}{x} + x - 1 = 0$

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

View solution

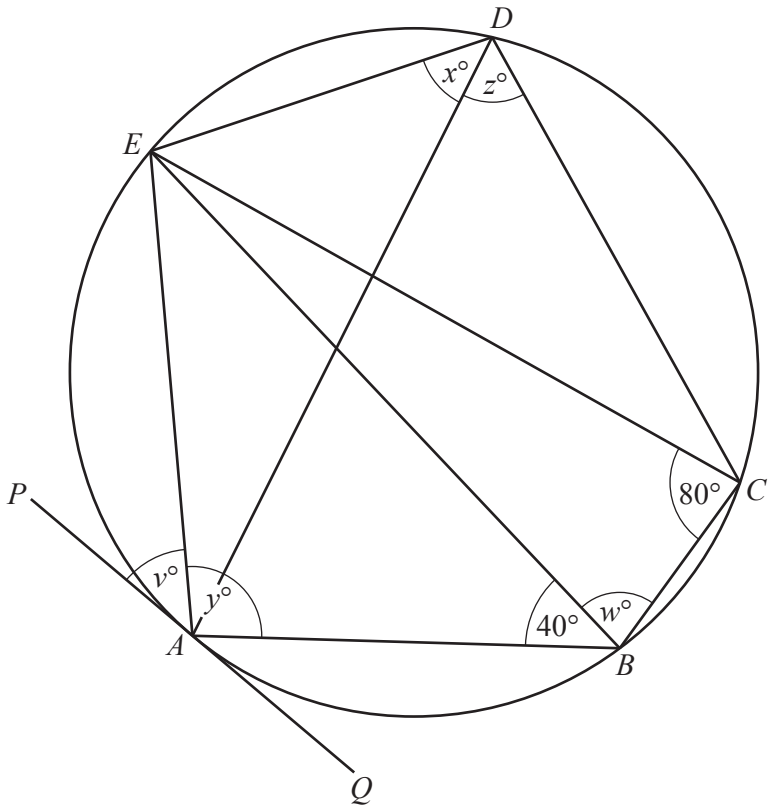
(d) k is an integer and the equation $x^2 + \frac{1}{x} = k$ has three solutions.

Write down a possible value of k.

$k =$ ..... [1]

8 (a)

View solution



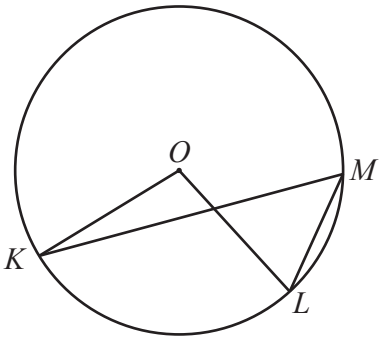
The points A, B, C, D and E lie on the circle.
PAQ is a tangent to the circle at A and $EC = EB$.
Angle $ECB = 80°$ and angle $ABE = 40°$.

Find the values of v, w, x, y and z.

$v =$ ..... $w =$ ..... $x =$ ..... $y =$ ..... $z =$ ..... [5]

(b)

View solution



NOT TO
SCALE

In the diagram, K, L and M lie on the circle, centre O.
Angle $KML = 2x°$ and reflex angle $KOL = 11x°$.

Find the value of x.

$x =$ ..... [3]

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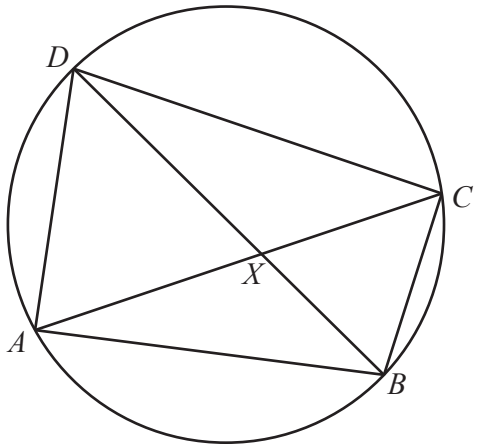
(c)

View solution



NOT TO SCALE

The diagonals of the cyclic quadrilateral $ABCD$ intersect at X.

(i) Explain why triangle ADX is similar to triangle BCX.
Give a reason for each statement you make.

.....

.....

.....

..... [3]

(ii) $AD = 10\,\text{cm}$, $BC = 8\,\text{cm}$, $BX = 5\,\text{cm}$ and $CX = 7\,\text{cm}$.

View solution

(a) Calculate DX.

$DX =$ ..... cm [2]

(b) Calculate angle BXC.

Angle $BXC =$ ..... [4]

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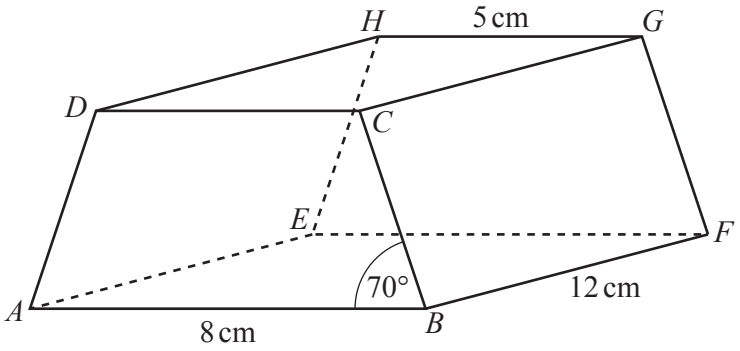
9



NOT TO SCALE

The diagram shows a prism with a rectangular base, *ABFE*.
The cross-section, *ABCD*, is a trapezium with $AD = BC$.
$AB = 8$ cm, $GH = 5$ cm, $BF = 12$ cm and angle $ABC = 70°$.

(a) Calculate the total surface area of the prism.

View solution

..... cm^2 [6]

(b) The perpendicular from G onto EF meets EF at X.

View solution

(i) Show that $EX = 6.5\,\text{cm}$.

[1]

View solution

(ii) Calculate AX.

$AX =$ ..... cm [2]

View solution

(iii) Calculate the angle between the diagonal AG and the base $ABFE$.

..... [2]

10 $f(x) = x^2 + 1$ $g(x) = 1 - 2x$ $h(x) = \frac{1}{x},\ x \neq 0$ $j(x) = 5^x$

View solution

(a) Find the value of

(i) f(3),

..... [1]

(ii) gf(3).

View solution

..... [1]

(b) Find $g^{-1}(x)$.

View solution

$g^{-1}(x) =$ ..... [2]

(c) Find x when $h(x) = 2$.

View solution

$x =$ ..... [1]

(d) Find $g(x)g(x) - gg(x)$, giving your answer in the form $ax^2 + bx + c$.

View solution

..... [4]

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(e) Find hh(x), giving your answer in its simplest form.

View solution

..... [1]

(f) Find j(5).

View solution

..... [1]

(g) Find x when $\mathrm{j}^{-1}(x) = 2$.

View solution

$x =$ ..... [1]

(h) $\mathrm{j}(x) = \mathrm{hg}(-12)$

View solution

Find the value of x.

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

Question 11 is printed on the next page.

11

Sequence	1st term	2nd term	3rd term	4th term	5th term		*n*th term
A	13	9	5	1			
B	0	7	26	63			
C	$\frac{7}{8}$	$\frac{8}{16}$	$\frac{9}{32}$	$\frac{10}{64}$			

(a) Complete the table for the three sequences.

View solution

[10]

(b) One term in Sequence C is $\frac{p}{q}$.

Write down the next term in Sequence C in terms of p and q.

View solution

..... [2]

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