



# Cambridge IGCSE™

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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  $\pi$ , 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.



1 Karel travelled from London to Johannesburg and then from Johannesburg to Windhoek.

- (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]

- (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]

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

(a) Calculate the distance travelled per dollar.

..... km per dollar [1]

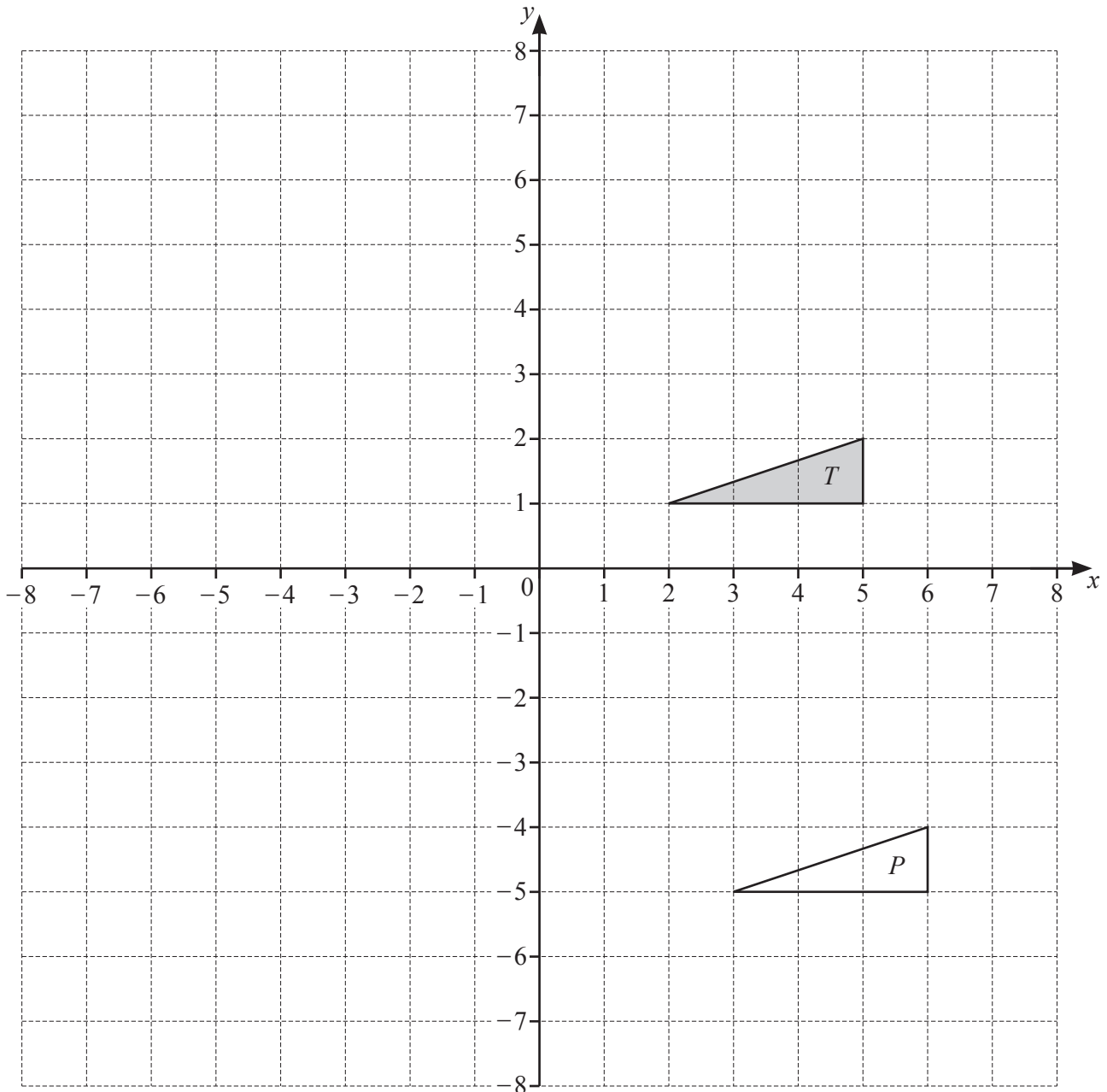
(b) Calculate the cost per 100 km of this journey.  
Give your answer correct to the nearest cent.

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

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

Complete the statement.

\$1 = ..... Namibian dollars [1]



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

.....  
 .....

[2]

- (b) (i) Reflect triangle  $T$  in the line  $x = 1$ .

[2]

- (ii) Rotate triangle  $T$  through  $90^\circ$  anticlockwise about  $(6, 0)$ .

[2]

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

[2]

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

(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.

..... % [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.

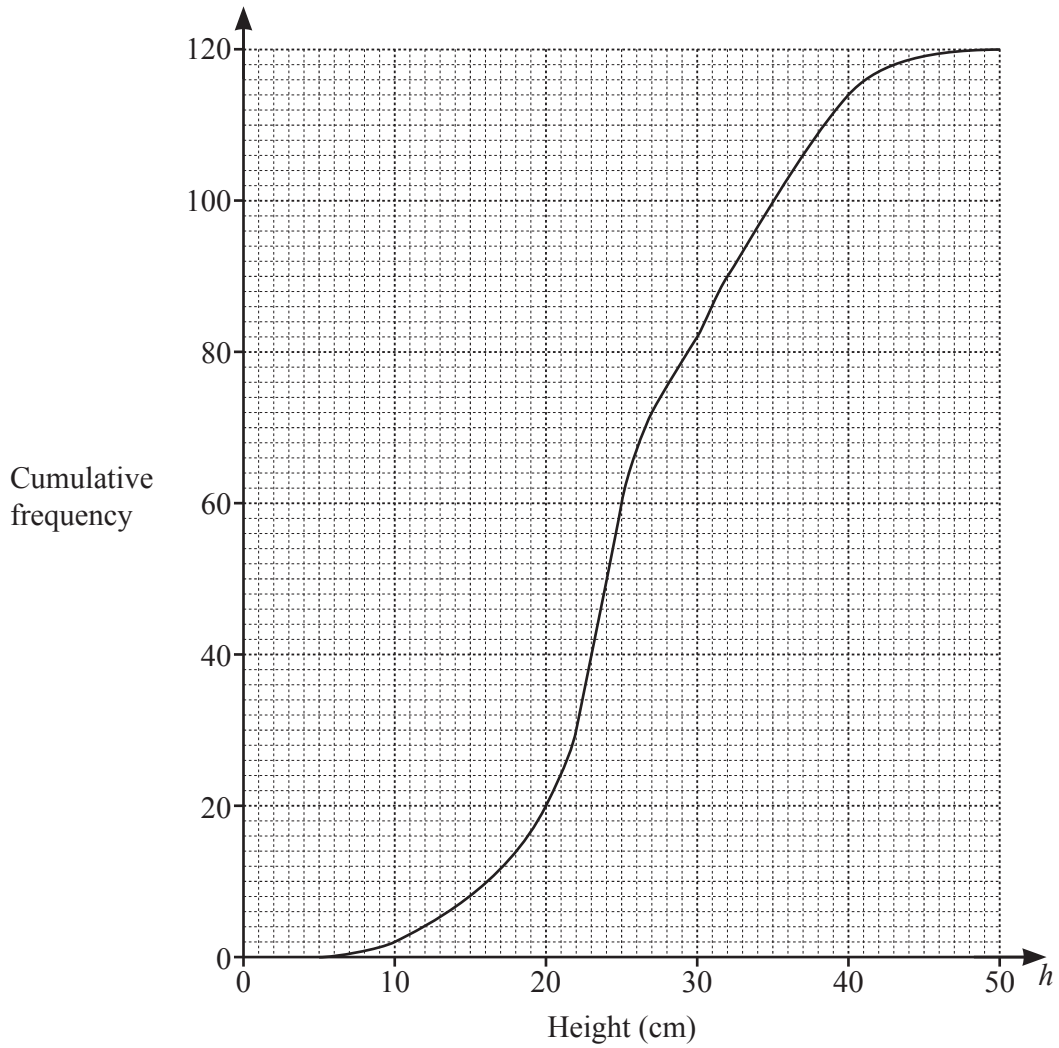
..... [3]

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

Calculate the population 16 years ago.

..... [3]

- 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.

Height, $h$ cm	$0 < h \leq 10$	$10 < h \leq 20$	$20 < h \leq 30$	$30 < h \leq 50$
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  $10 < h \leq 20$  is 7.2 cm.

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

..... cm [2]

- 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  $\$12.36$ .

Find the cost of a small lemon cake.

$\$ \dots\dots\dots$  [3]

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

Find the cost of a small chocolate cake.

$\$ \dots\dots\dots$  [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  $\$13$ .

Find the cost of a small cherry cake.

$\$ \dots\dots\dots$  [3]



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

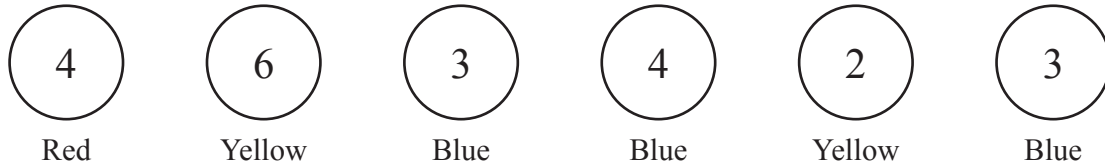
Write an equation in terms of  $x$ .

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.

Write down the probability that

(i) the disc has the number 4,

..... [1]

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

..... [1]

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

..... [1]

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

Find the probability that

(i) both discs have the number 3,

..... [2]

(ii) both discs have the same colour.

..... [3]

11

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

Find the probability that both discs have the same colour.

..... [3]

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

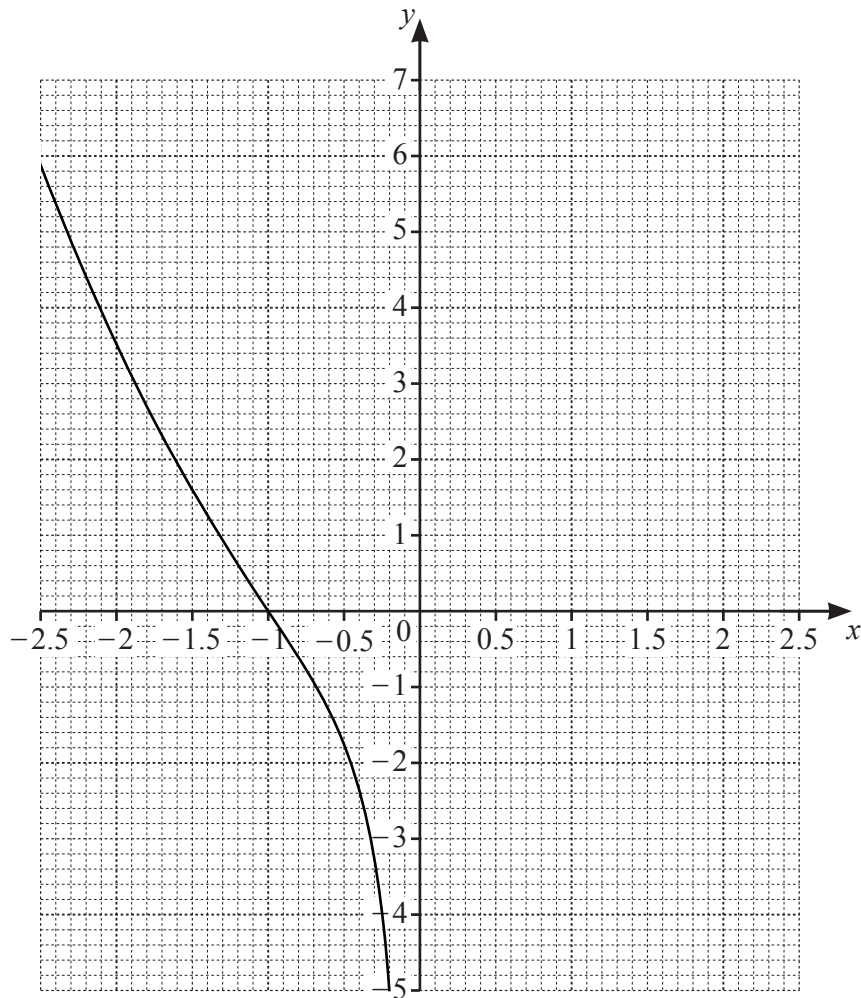
(a) Complete the table.

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

[2]

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

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



[4]

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

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

$x = \dots\dots\dots$  [1]

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

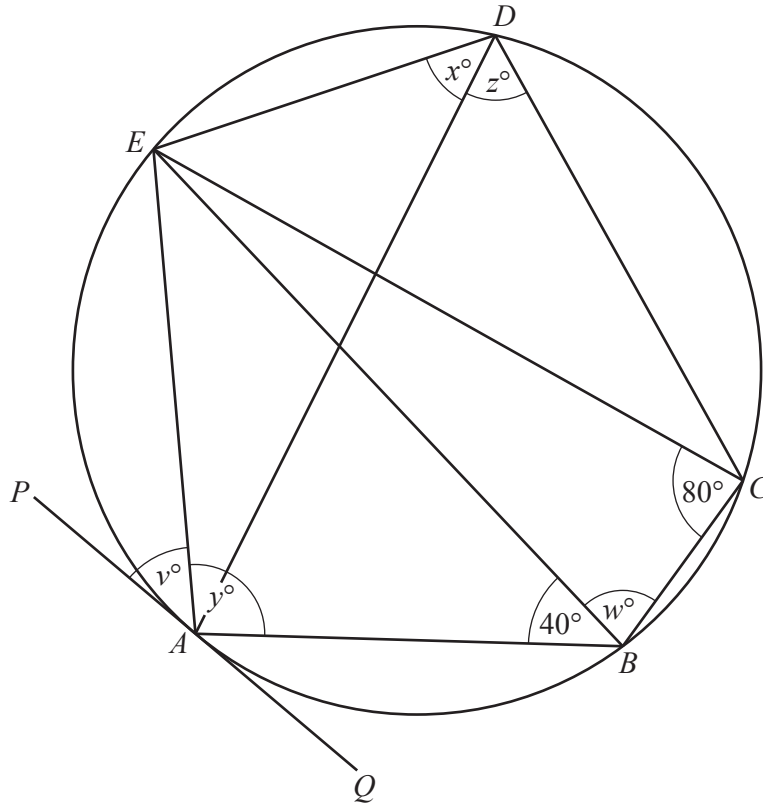
$x = \dots\dots\dots$  [2]

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

Write down a possible value of  $k$ .

$k = \dots\dots\dots$  [1]

8 (a)



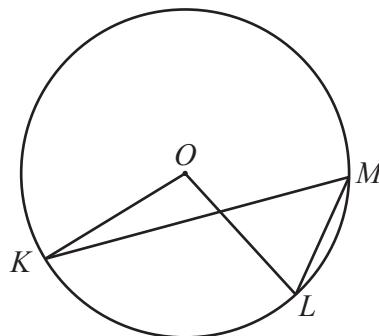
NOT TO SCALE

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  $ECB = 80^\circ$  and angle  $ABE = 40^\circ$ .

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

$v = \dots\dots\dots$      $w = \dots\dots\dots$      $x = \dots\dots\dots$      $y = \dots\dots\dots$      $z = \dots\dots\dots$  [5]

(b)



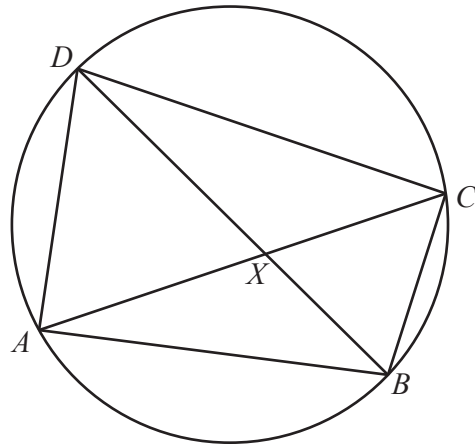
NOT TO SCALE

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

Find the value of  $x$ .

$x = \dots\dots\dots$  [3]

(c)



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]

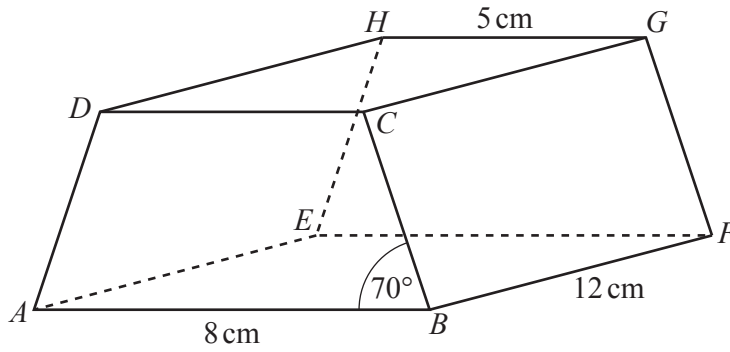
- (ii)  $AD = 10$  cm,  $BC = 8$  cm,  $BX = 5$  cm and  $CX = 7$  cm.

- (a) Calculate  $DX$ .

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

- (b) Calculate angle  $BXC$ .

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



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  $ABC = 70^\circ$ .

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

.....  $\text{cm}^2$  [6]



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

(i) Show that  $EX = 6.5$  cm.

[1]

(ii) Calculate  $AX$ .

$AX = \dots\dots\dots$  cm [2]

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

$\dots\dots\dots$  [2]

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

(a) Find the value of

(i)  $f(3)$ ,

..... [1]

(ii)  $gf(3)$ .

..... [1]

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

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

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

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

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

..... [4]

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

..... [1]

(f) Find  $j(5)$ .

..... [1]

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

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

(h)  $j(x) = hg(-12)$

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.

[10]

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

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

..... [2]

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