

Please check the examination details below before entering your candidate information

Candidate surname

Other names

**Pearson Edexcel
International GCSE**

Centre Number

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Candidate Number

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Monday 7 January 2019

Morning (Time: 2 hours)

Paper Reference **4MA1/1HR**

Mathematics A

Level 1/2

Paper 1HR

Higher Tier



You must have:

Ruler graduated in centimetres and millimetres, protractor, compasses, pen, HB pencil, eraser, calculator. Tracing paper may be used.

Total Marks

Instructions

- Use **black** ink or ball-point pen.
- **Fill in the boxes** at the top of this page with your name, centre number and candidate number.
- Answer **all** questions.
- Without sufficient working, correct answers may be awarded no marks.
- Answer the questions in the spaces provided
– *there may be more space than you need.*
- **Calculators may be used.**
- You must **NOT** write anything on the formulae page.
Anything you write on the formulae page will gain NO credit.

Information

- The total mark for this paper is 100.
- The marks for **each** question are shown in brackets
– *use this as a guide as to how much time to spend on each question.*

Advice

- Read each question carefully before you start to answer it.
- Check your answers if you have time at the end.

Turn over ►

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Pearson

International GCSE Mathematics

Formulae sheet – Higher Tier

Arithmetic series

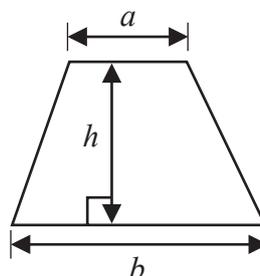
Sum to n terms, $S_n = \frac{n}{2} [2a + (n - 1)d]$

Area of trapezium = $\frac{1}{2}(a + b)h$

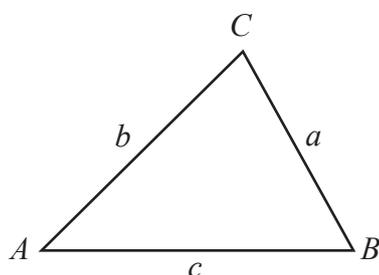
The quadratic equation

The solutions of $ax^2 + bx + c = 0$ where $a \neq 0$ are given by:

$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$



Trigonometry



In any triangle ABC

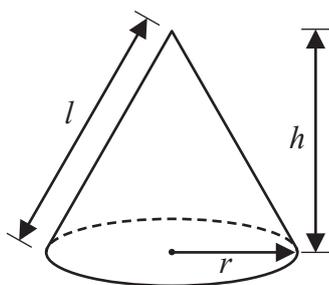
Sine Rule $\frac{a}{\sin A} = \frac{b}{\sin B} = \frac{c}{\sin C}$

Cosine Rule $a^2 = b^2 + c^2 - 2bc \cos A$

Area of triangle = $\frac{1}{2}ab \sin C$

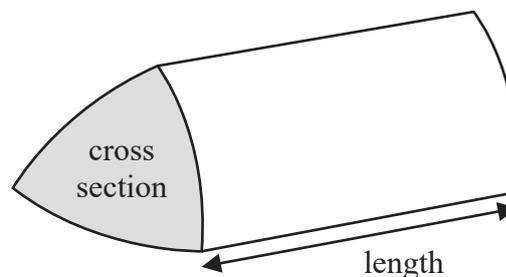
Volume of cone = $\frac{1}{3}\pi r^2 h$

Curved surface area of cone = $\pi r l$



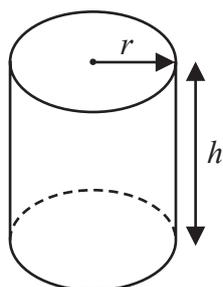
Volume of prism

= area of cross section \times length



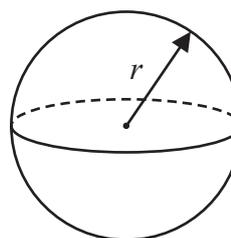
Volume of cylinder = $\pi r^2 h$

Curved surface area of cylinder = $2\pi r h$



Volume of sphere = $\frac{4}{3}\pi r^3$

Surface area of sphere = $4\pi r^2$



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Answer ALL TWENTY THREE questions.

Write your answers in the spaces provided.

You must write down all the stages in your working.

1 Show that $1\frac{2}{3} + 2\frac{3}{4} = 4\frac{5}{12}$

(Total for Question 1 is 3 marks)

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2 There are 60 children in a club.

In the club, the ratio of the number of girls to the number of boys is 3 : 1

$\frac{3}{5}$ of the girls play a musical instrument.

$\frac{4}{5}$ of the boys play a musical instrument.

What fraction of the 60 children play a musical instrument?

(Total for Question 2 is 4 marks)

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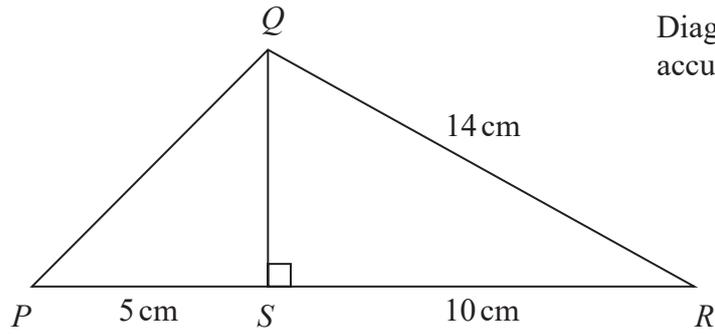
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3

Diagram **NOT**
accurately drawn



In triangle PQR ,

S is the point on PR such that $\angle RSQ = 90^\circ$

$RQ = 14$ cm

$RS = 10$ cm

$SP = 5$ cm

Work out the length of PQ .

cm

(Total for Question 3 is 4 marks)



4 a , a , b and 40 are four numbers.

a is the least number.

40 is the greatest number.

The range of the four numbers is 14

The median of the four numbers is 30

Work out the value of a and the value of b .

$a =$

$b =$

(Total for Question 4 is 3 marks)

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5 The Shanghai Maglev Train takes 8 minutes to travel a distance of 30.5 kilometres.

Work out the average speed of the train.
Give your answer in kilometres per hour.

kilometres per hour

(Total for Question 5 is 3 marks)



6 The diagram shows the triangle PQR .

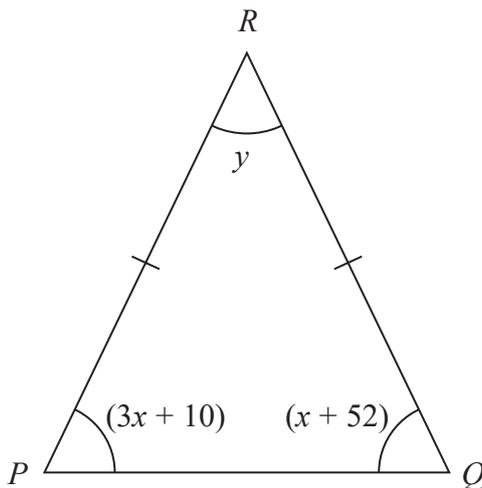


Diagram **NOT** accurately drawn

In the diagram, all the angles are in degrees.

$$RP = RQ$$

Find the value of y .

Show clear algebraic working.

$$y =$$

(Total for Question 6 is 4 marks)

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7 The diagram shows two water towers in Kuwait.

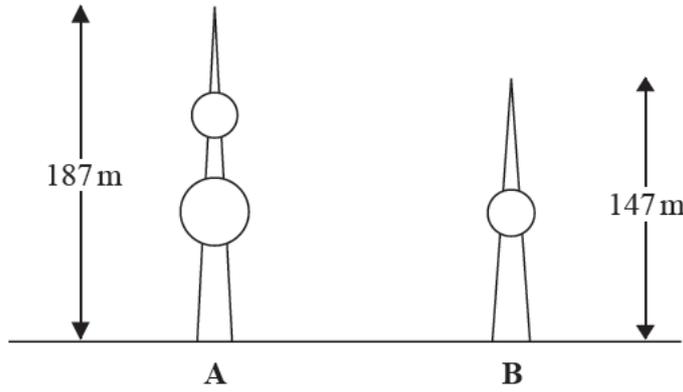


Diagram **NOT** accurately drawn

The real height of tower **A** is 187 m.
The real height of tower **B** is 147 m.

Ahmed makes a scale model of both towers.

The height of tower **A** on the scale model is 90 cm.

Work out the height of tower **B** on the scale model.
Give your answer correct to the nearest centimetre.

cm

(Total for Question 7 is 3 marks)



8 Solve the simultaneous equations

$$4x + 2y = 9$$

$$x - 4y = 9$$

Show clear algebraic working.

$$x =$$

$$y =$$

(Total for Question 8 is 3 marks)

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9 $N = 480 \times 10^9$

(a) Write N as a number in standard form.

(1)

(b) Write N as a product of powers of its prime factors.
Show your working clearly.

(3)

(c) Find the largest factor of N that is an odd number.

(1)

(Total for Question 9 is 5 marks)



10 The shape, shown shaded in the diagram, is the region between two semicircles.

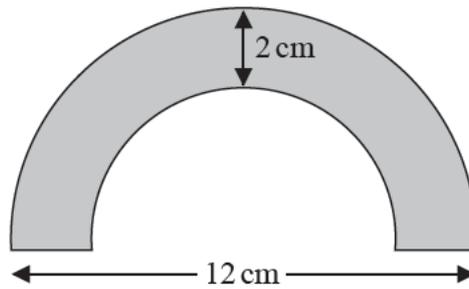


Diagram **NOT**
accurately drawn

The diameter of the outer semicircle is 12 cm.
The shape has constant thickness 2 cm.

Calculate the area of the shape.
Give your answer as a multiple of π .

cm²

(Total for Question 10 is 3 marks)



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11 There are 12 boys and 8 girls in a class.
The boys and the girls have some coins.

The mean number of coins that the boys have is 5.5
The girls have a total of 18 coins.

Work out the mean number of coins the 20 children have.

(Total for Question 11 is 3 marks)



12 Here are the first four terms of a sequence of fractions.

$$\frac{1}{1} \quad \frac{2}{3} \quad \frac{3}{5} \quad \frac{4}{7}$$

The numerators of the fractions form the sequence of whole numbers 1 2 3 4 ...

The denominators of the fractions form the sequence of odd numbers 1 3 5 7 ...

(a) Write down an expression, in terms of n , for the n th term of this sequence of fractions.

(2)

(b) Using algebra, prove that when the square of any odd number is divided by 4 the remainder is 1

(3)

(Total for Question 12 is 5 marks)



13 A curve C has equation $y = x^3 - x^2 - 8x + 12$

(a) Find $\frac{dy}{dx}$

$$\frac{dy}{dx} = \quad (2)$$

The curve C has two turning points.

(b) Work out the x coordinates of the two turning points.
Show your working clearly.

(3)

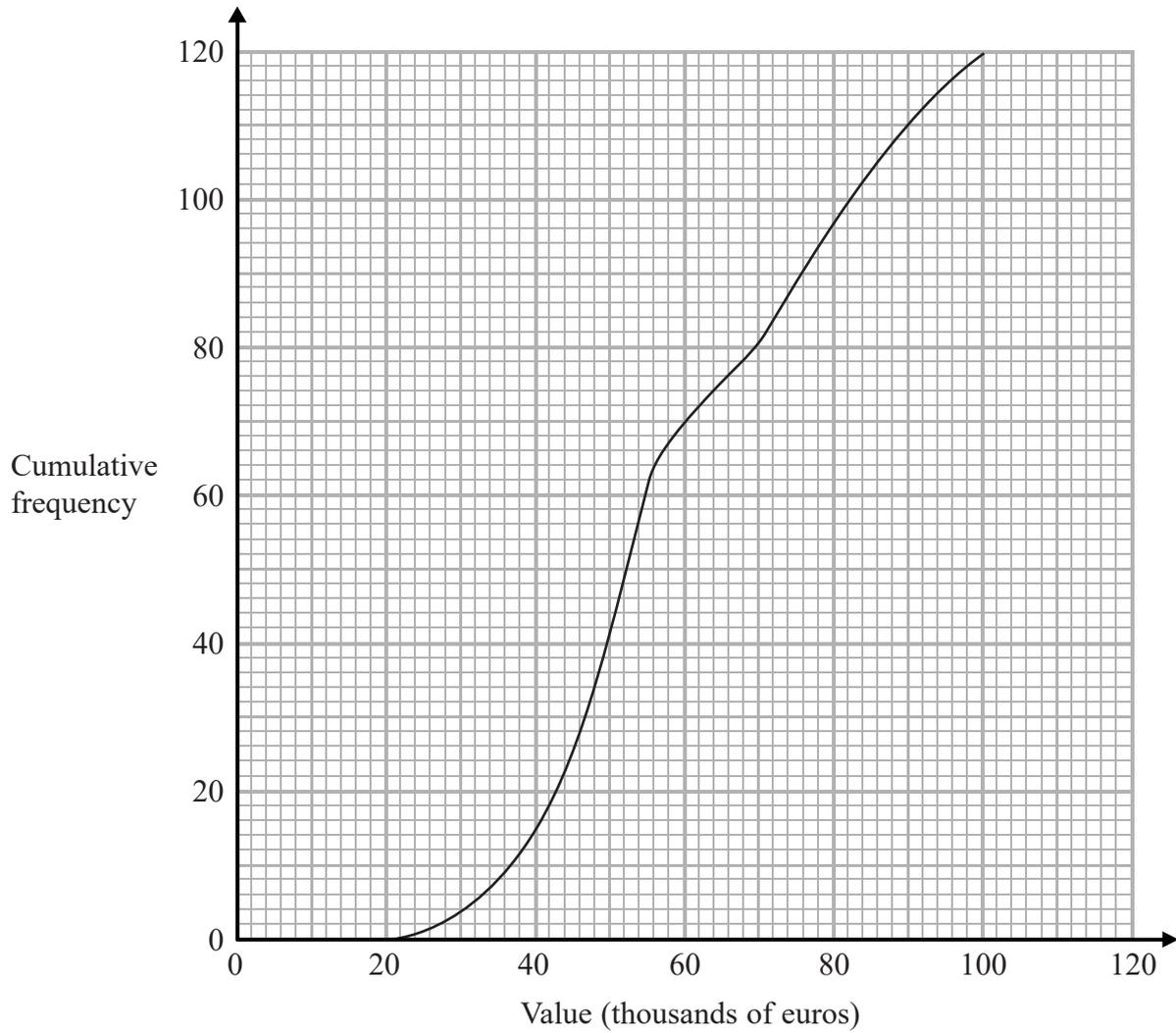
(c) Show that the x -axis is a tangent to the curve C.

(2)

(Total for Question 13 is 7 marks)



14 The cumulative frequency diagram gives information about the values, in thousands of euros, of 120 apartments in 2015



(a) Find an estimate for the number of these apartments with a value of 80 thousand euros or less in 2015

(1)

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The table gives information about the values, in thousands of euros, of the same 120 apartments in 2018

Value in thousands of euros (v)	Cumulative frequency
$0 < v \leq 20$	0
$0 < v \leq 40$	15
$0 < v \leq 60$	44
$0 < v \leq 80$	85
$0 < v \leq 100$	102
$0 < v \leq 120$	120

- (b) On the grid opposite, draw a cumulative frequency diagram for this information. (2)
- (c) Find an estimate for the increase in the median value for these apartments from 2015 to 2018

thousand euros
(2)

(Total for Question 14 is 5 marks)

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15 (a) Simplify $(3x^2y^5)^4$

(2)

(b) Expand and simplify $4n(n - 3)(n + 5)$

(2)

(c) Factorise $4c^2 - 9d^2$

(1)

(d) Simplify fully $\frac{x^2 - 7x + 12}{4x - x^2}$

(3)

(Total for Question 15 is 8 marks)



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16 There are 12 beads in a bag.

- 7 of the beads are red.
- 3 of the beads are green.
- 2 of the beads are yellow.

Lucy takes at random a bead from the bag and keeps it.
Then Julian takes at random a bead from the bag.

(a) Work out the probability that they each take a yellow bead.

(2)

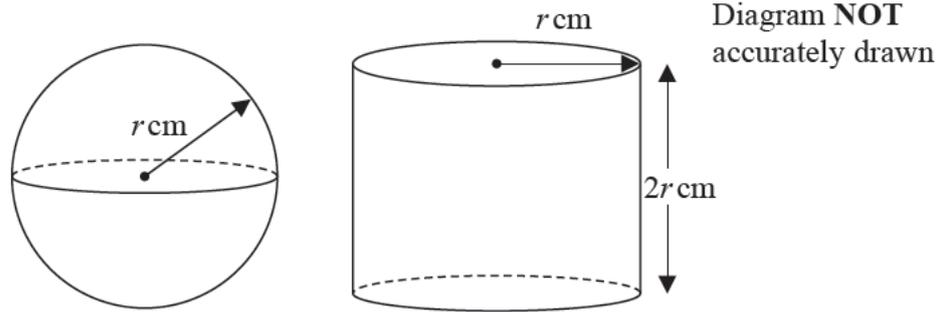
(b) Work out the probability that the beads they take are **not** the same colour.

(3)

(Total for Question 16 is 5 marks)



17 Here are a solid sphere and a solid cylinder.



The radius of the sphere is $r \text{ cm}$.

The radius of the cylinder is $r \text{ cm}$.

The height of the cylinder is $2r \text{ cm}$.

The total surface area of the cylinder is $k\pi \text{ cm}^2$

(a) Find an expression for k in terms of r .

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(2)



(b) Show that the ratio

total surface area of the cylinder : total surface area of the sphere

is the same as the ratio

volume of the cylinder : volume of the sphere

(3)

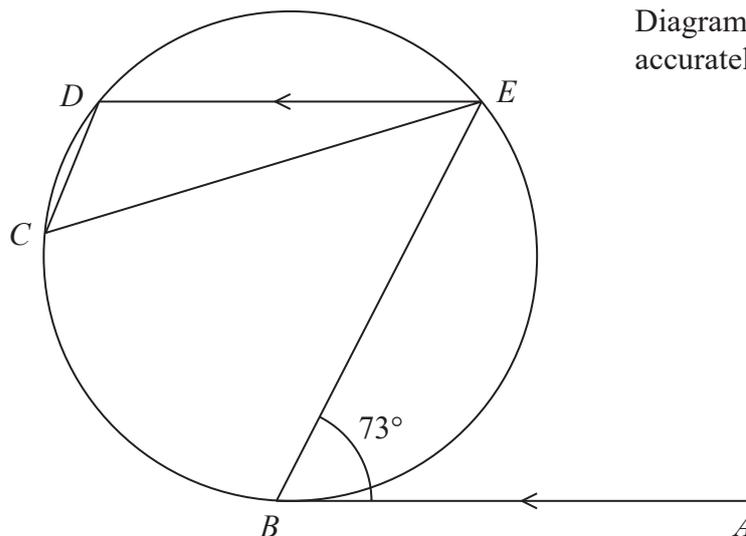
(Total for Question 17 is 5 marks)

- 18 Show that $\frac{\sqrt{8}}{\sqrt{8}-2}$ can be written in the form $n + \sqrt{n}$, where n is an integer.
Show your working clearly.

(Total for Question 18 is 3 marks)



Diagram **NOT**
accurately drawn



B , C , D and E are points on a circle.

AB is the tangent at B to the circle.

AB is parallel to ED .

Angle $ABE = 73^\circ$

Work out the size of angle DCE .

Give a reason for each stage of your working.

(Total for Question 19 is 5 marks)



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20 Here is a cube $ABCDEFGH$.

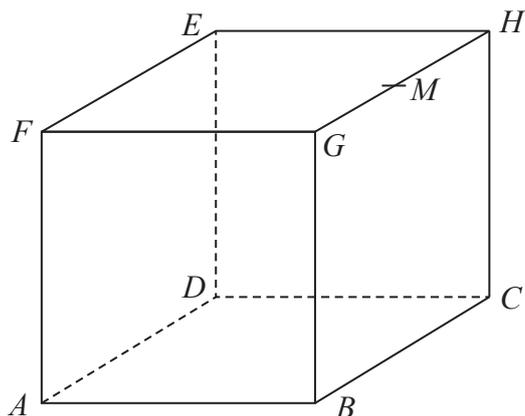


Diagram **NOT** accurately drawn

M is the midpoint of the edge GH .

Find the size of the angle between the line MA and the plane $ABCD$.
Give your answer correct to 1 decimal place.

(Total for Question 20 is 4 marks)



21 Here is a triangle XYZ .

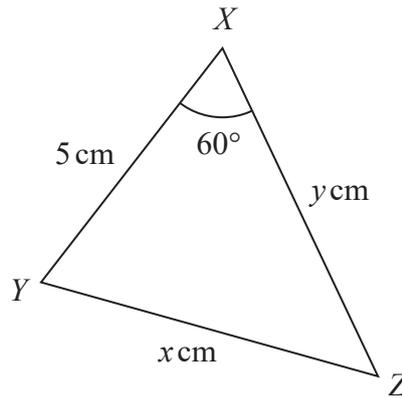


Diagram **NOT**
accurately drawn

The perimeter of the triangle is $k\text{ cm}$.

Given that $x = y - 1$

find the value of k .

Show your working clearly.

$k =$

(Total for Question 21 is 5 marks)

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22 $ABCDEF$ is a regular hexagon.

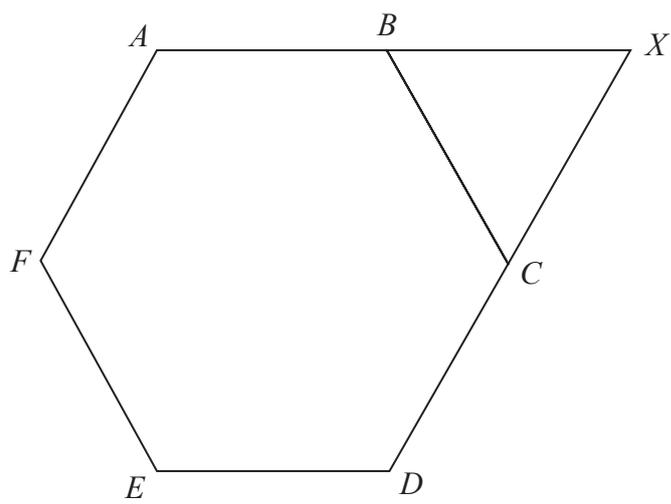


Diagram **NOT** accurately drawn

ABX and DCX are straight lines.

$$\vec{AB} = \mathbf{a} \quad \vec{BC} = \mathbf{b}$$

Find \vec{EX} in terms of \mathbf{a} and \mathbf{b} .

Give your answer in its simplest form.

(Total for Question 22 is 4 marks)



P 5 9 0 2 2 A 0 2 5 2 8

23 The function f is defined as $f(x) = \frac{\sqrt{x^2 + k^2}}{x}$ for $x > 0$ and where k is a positive number.

(a) Find the value of p for which $f^{-1}(p) = k$

$$p = \quad (3)$$

The function g is defined as $g(x) = x^2$ for $x > 0$

(b) Given that $gf(a) = k$ for $k > 1$
find an expression for a in terms of k .

$$a = \quad (3)$$

(Total for Question 23 is 6 marks)

TOTAL FOR PAPER IS 100 MARKS

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