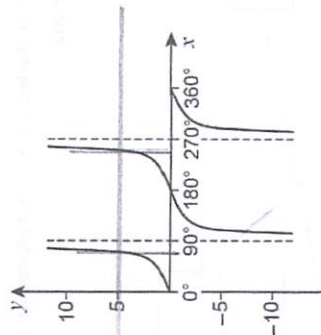


- 21 Here is a sketch of the graph of $y = \tan x$ where $0^\circ \leq x \leq 360^\circ$



You are given that $\tan 78.69^\circ = 5$

- 21 (a) Work out the other value of x where $\tan x = 5$ and $0^\circ \leq x \leq 360^\circ$

[1 mark]

$$x = 180^\circ + 78.69^\circ$$

Answer

$$258.69^\circ$$

- 21 (b) Work out the two values of x where $\tan x = -5$ and $0^\circ \leq x \leq 360^\circ$

[2 marks]

By inspection angles are

$$180^\circ - 78.69^\circ = 101.31^\circ \text{ and } 360^\circ - 78.69^\circ = 281.31^\circ$$

Answer

$$101.31^\circ \text{ and } 281.31^\circ$$

END OF QUESTIONS



23

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8



20

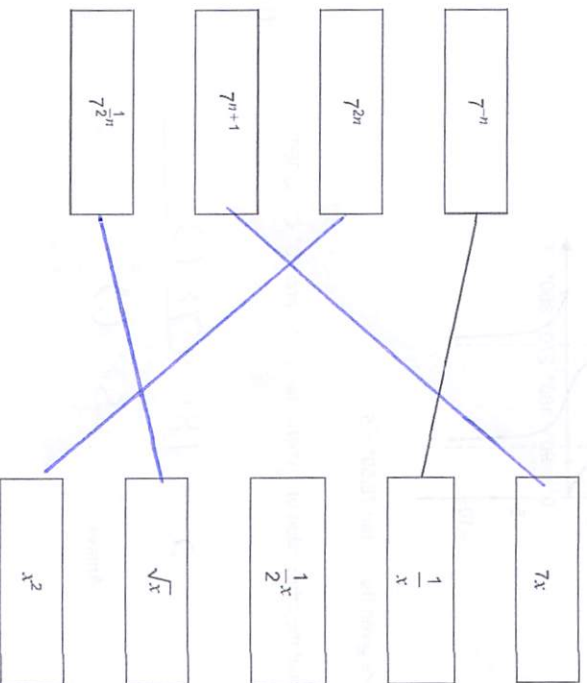
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22

$$7^n = x$$

Match each expression on the left to the correct expression on the right.
One has been done for you.

[3 marks]



Turn over for the next question

6

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23

The distance of a particle from a point is d metres after t seconds.

$$d = a \times b^t \quad \text{where } a \text{ and } b \text{ are constants}$$



Work out the values of a and b .

[3 marks]

$$\text{when } t=0 \quad d = a \times b^0$$

$$a = 3$$

$$\text{when } t=4$$

$$d = 3 \times b^4 = 48$$

$$b = \sqrt[4]{16} = 2$$

$$a =$$

$$3$$

$$b =$$

$$2$$

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2 1

Turn over ▶

IB/M/No/24/8300/1H



2 2

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- 22 The metal used to make a sphere costs £4320
The metal costs £3.60 per gram.
Each cubic centimetre of metal has a mass of 17.3 grams.
Work out the radius, r , of the sphere.

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

[4 marks]

$$4320 \text{ £} \times \frac{1 \text{ gram}}{£3.60} = \frac{1000}{17.3 \text{ grams}}$$

just follow the units

$$\frac{4320}{17.3 \times 3.60} \text{ cm}^3 = \frac{4}{3}\pi r^3$$

$$r = \sqrt[3]{\frac{4320}{17.3 \times 3.6} \times \frac{3}{4\pi}}$$

$$r = 2.55 \text{ cm}$$

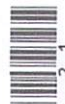
You can do this calculation in one
hit

Turn over for the next question

7

Turn over

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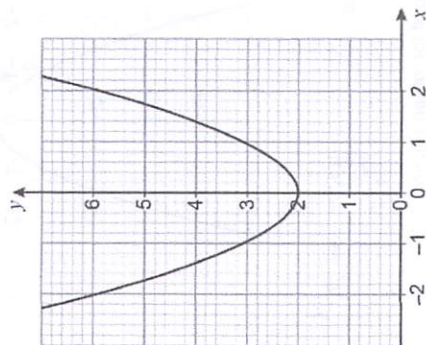
2 1

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- 23 In each part, the graph shown is a transformation of the graph $y = x^2$

- 23 (a) Write down the equation of the graph shown.

[1 mark]



Answer

$$y = x^2 + 2$$

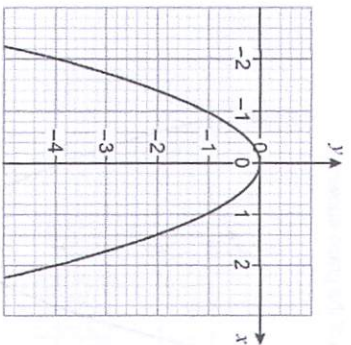


2 2

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23 (b) Write down the equation of the graph shown.

[1 mark]

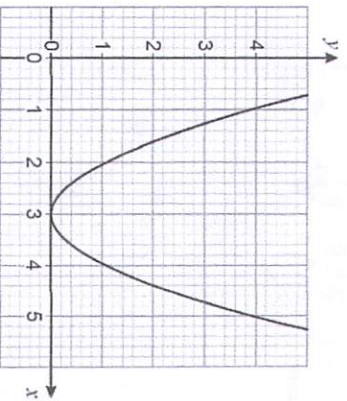


Answer

$$y = -x^2$$

23 (c) Write down the equation of the graph shown.

[1 mark]



Answer

$$y = (x-3)^2$$

END OF QUESTIONS

3

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21

A bag contains 25 discs.

11 are red, 9 are blue and 5 are yellow.

Ashley picks three of the discs at random without replacement.

Ashley's first disc is red.

Work out the probability that all three discs are different colours.

[3 marks]

Answer

$$P(\text{2nd disc blue}) = \frac{9}{24} \text{ AND}$$

$$P(\text{3rd disc yellow}) = \frac{5}{23}$$

$$\text{OR } P(\text{2nd disc yellow}) = \frac{5}{24} \text{ AND}$$

$$P(\text{3rd disc blue}) = \frac{9}{23}$$

$$\text{SO } \frac{9}{24} \times \frac{5}{23} + \frac{5}{24} \times \frac{9}{23}$$

$$= \frac{90}{24 \times 23}$$

$$= \frac{15}{92}$$

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2 3

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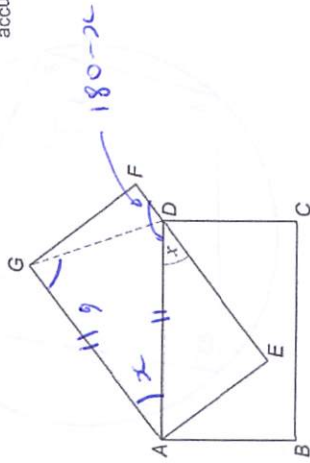
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24 In the diagram,

ABCD and AEEG are congruent rectangles

D lies on EF

angle ADE = x Not drawn
accurately

Prove that GD bisects angle ADF.

[4 marks]

$\angle ADF = 180 - x$
 Now AGD is isosceles triangle
 so $\angle AGD + \angle AOG = 180 - x$
 $\angle AOG = \frac{180 - x}{2}$

so clearly GD bisects ADF

END OF QUESTIONS

8



23

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20

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Paper 2

22 The n th term of a sequence is $n^2 - 30n + 236$

By completing the square,

show that all the terms of the sequence have two or more digits.

[3 marks]

$$\text{Try } (n-15)^2 = n^2 - 30n + 225$$

$$(n-15)^2 - 225 + 236 = (n-15)^2 + 11$$

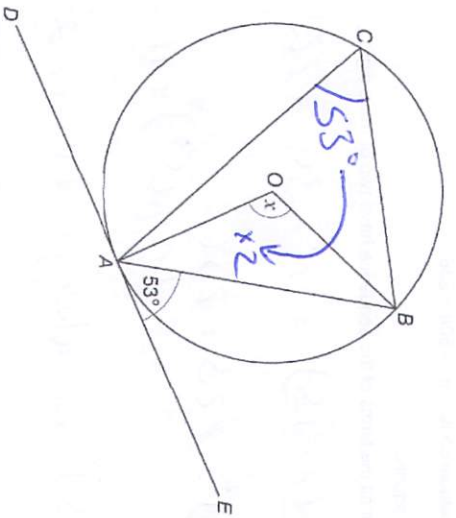
$(n-15)^2$ is always +ve or zero

+11 ensures all ~~digits~~ terms
two or more

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23 (a)

Not drawn accurately



Line DAE is a tangent at A to the circle with centre O.

Work out the size of angle x.

$$\angle ACB = 53^\circ \text{ (alternate segment)}$$

$$\angle BOA = 106^\circ \text{ (angles subtended from arc)}$$

$$x = 106^\circ$$

Turn over for the next question

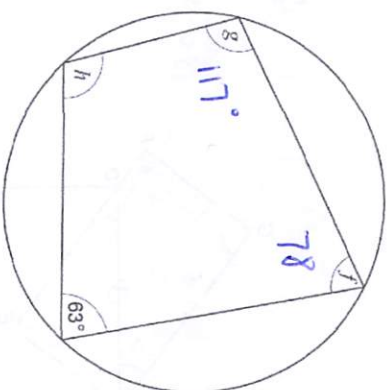
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23 (b)

Here is a cyclic quadrilateral.

Not drawn accurately



$$f : g = 2 : 3$$

Work out $f : h$

Give your answer in its simplest form.

[4 marks]

$$g = 180 - 63^\circ$$

$$= 117$$

$$\text{so } f = 117 \times \frac{2}{3}$$

$$= 78^\circ$$

$$h = 180 - 78$$

$$= 102^\circ$$

$$f : h \rightarrow 78 : 102 \text{ (6 is factor)}$$

$$13 : 17$$

$$\text{Answer } 13 : 17$$

as calculator paper enter 78/102
as a fraction and calculator
will simplify.

Turn over ►

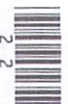
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2 1

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2 2

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