AQA - H - Nov 8th '23 2

P1

Do not write outside the box

Answer **all** questions in the spaces provided.

1 Work out the lowest common multiple (LCM) of 20 and 25

[1 mark]

20 40 60 80 100

25 50 75 100

Answer 100

2 Work out the size of an **exterior** angle of a regular hexagon. = 6

[1 mark]

360 ÷ 6

Answer 60 °

3 *A* is (2, 0) and *B* is (0, –4)

Work out the midpoint of *AB*.

[1 mark]

Answer (1 , -2)

Do not write outside the box

4 Simplify $a + 3a \div a$

[1 mark]

Answer $a + 3$

5 Work out the value of $(8^2 \times 8) \div (8^9 \div 8^5)$

Give your answer as a decimal.

[3 marks]

$= (8^{2+1}) \div (8^{9-4})$

$= 8^3 \div 8^4$

$= 8^{-1}$

$= \frac{1}{8}$

0.125
$8\overline{)1.0^{2}0^{4}0}$

Answer 0.125

Turn over for the next question

7

Do not write outside the box

6 A music company releases 10 albums.

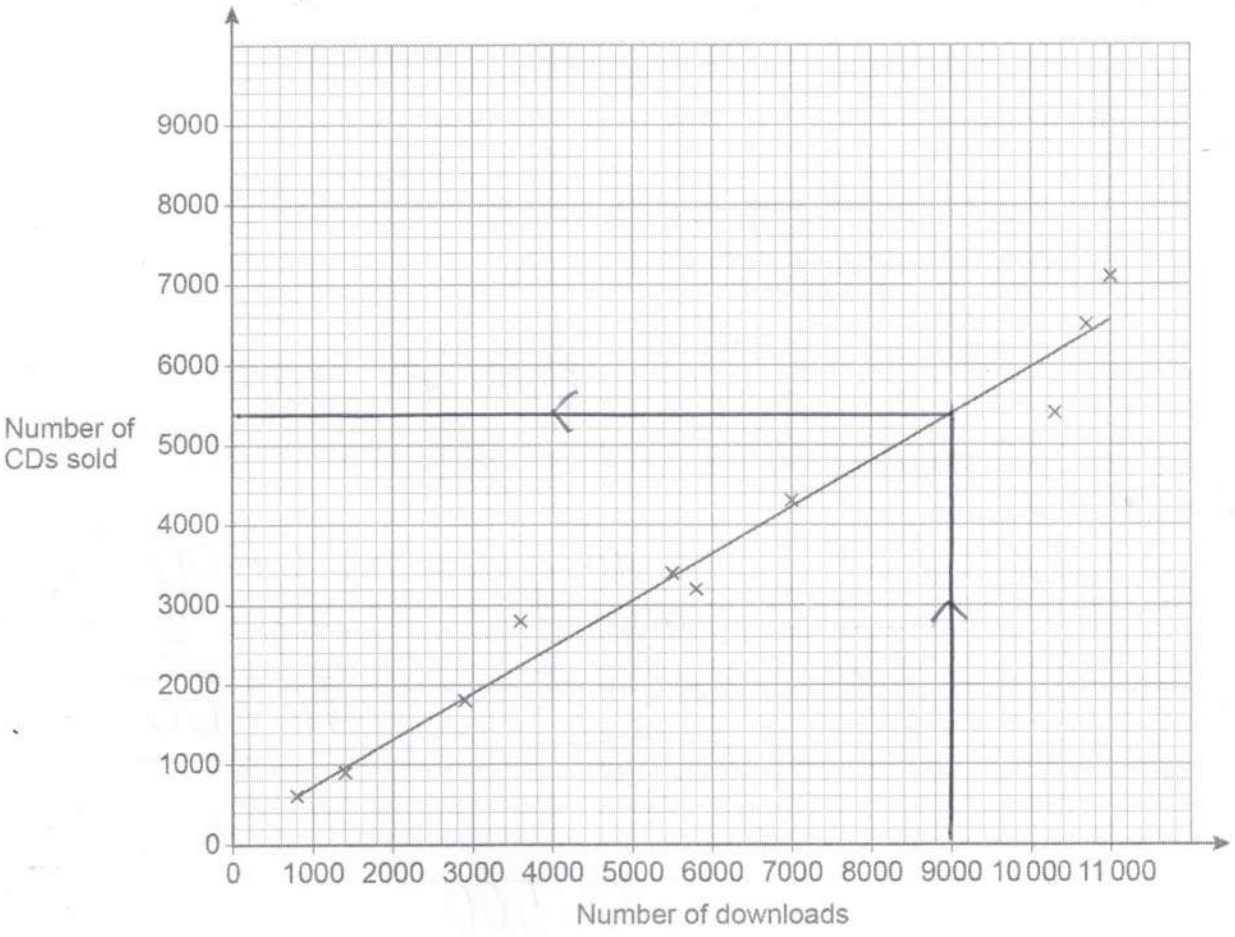
The scatter graph shows, for each album,

the number of downloads on the first day

and

the number of CDs sold on the first day.

A line of best fit has been drawn on the scatter graph.



Do not write outside the box

6 (a) The scatter graph shows positive correlation.

Describe the relationship between number of downloads and number of CDs sold.

[1 mark]

As downloads increase, so do CD sales

6 (b) The company earns

£2.50 for each download

and

£3 for each CD sold.

The company releases another album.

On the first day it has 9000 downloads. = 5400 CD sales

Estimate the **total** amount the company earns from downloads and CDs of the album that day.

[3 marks]

9000 x 2·5 = 9000
9000 +
4500 +
£22500

5400
1 x 3
16200

+ 22500
+ 16200
38700

Answer £ 38,700

[ms 38400 → 3900]0

4

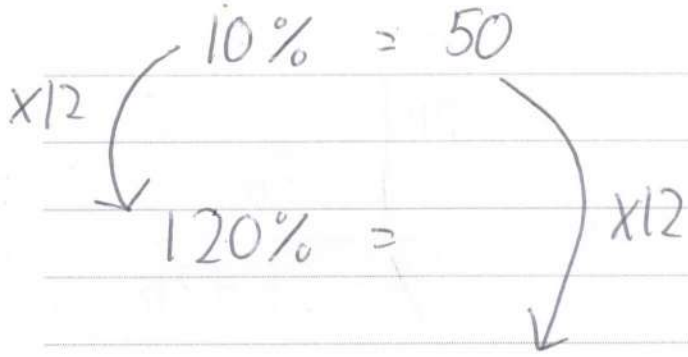
Turn over ▶

Do not write outside the box

7 70% of a number is 350

Work out 120% of the number.

[3 marks]



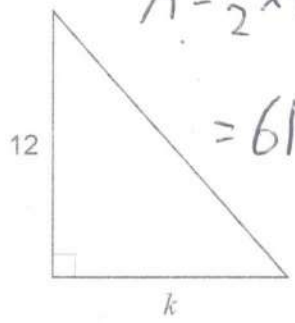
Answer 600

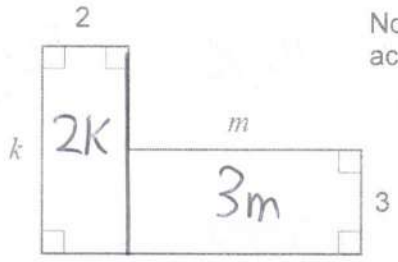
Do not write outside the box

8 In the diagrams, all lengths are in centimetres.

$A = \frac{1}{2} \times k \times 12$

$= 6k$





Not drawn accurately

$A = 2k + 3m$

The two shapes have equal areas.

Work out $k : m$

[3 marks]

so $6k = 2k + 3m$

$4k = 3m$

$k = \frac{3}{4}m$

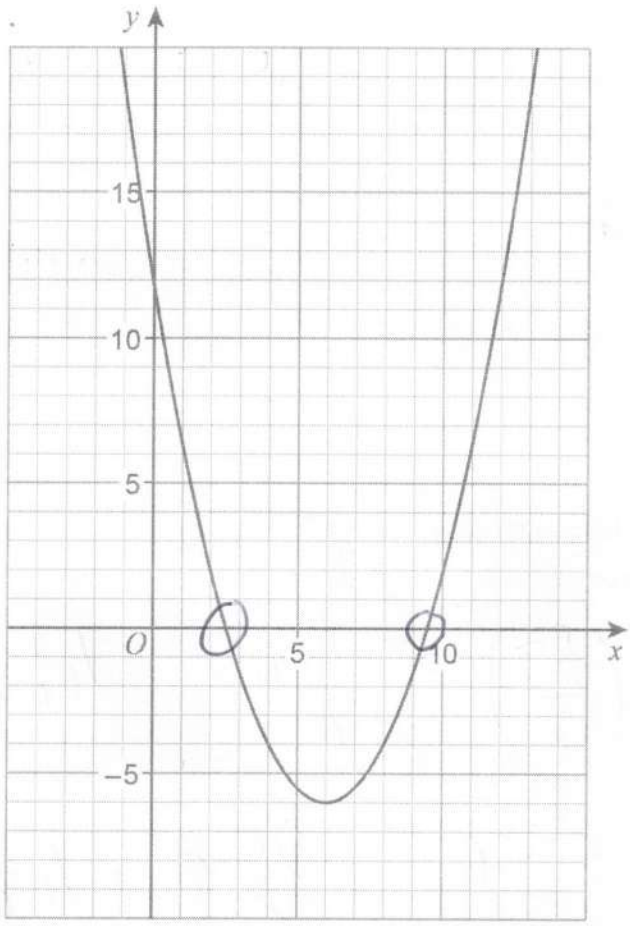
Answer 3 : 4

Turn over for the next question

6

Do not write outside the box

9 Here is the graph of $y = 0.5x^2 - 6x + 12$



Use the graph to estimate the solutions of $0.5x^2 - 6x + 12 = 0$

[2 marks]

Answer $x = 2.5$, $x = 9.5$

[ms ±0.25]

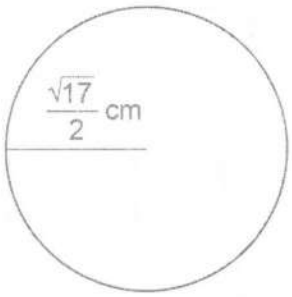
Do not write outside the box

10 Shape A is a circle with radius $\frac{\sqrt{17}}{2}$ cm

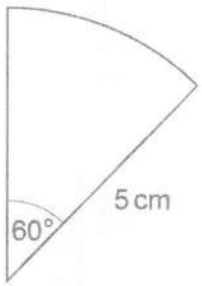
Shape B is a sector of a circle with radius 5 cm

Not drawn accurately

Shape A



Shape B



Which shape has the greater area, A or B?

You **must** show your working.

[5 marks]

(A) $\pi \times \left(\frac{\sqrt{17}}{2}\right)^2 = \frac{17}{4}\pi = 4\frac{1}{4}\pi$

(B) $\pi \times 5^2 \div 6 = \frac{25}{6}\pi = 4\frac{1}{6}\pi$

A $4\frac{1}{4} > 4\frac{1}{6}$ B

Answer A

7

Do not write outside the box

11 Factorise $x^2 + 2x - 24$ X

[2 marks]

Answer (x+6)(x-4)

12 (a) Write 2×10^3 as an ordinary number.

[1 mark]

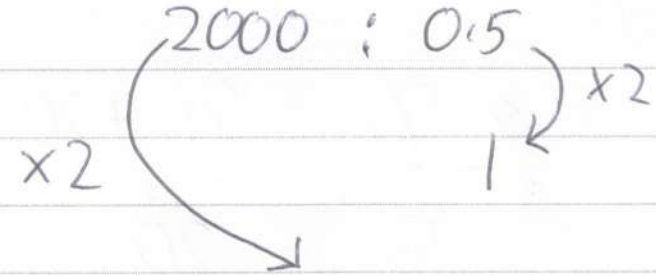
2x10 x10 x10

Answer 2000

12 (b) Simplify $(2 \times 10^3) : (5 \times 10^{-1})$

Give your answer in the form $n : 1$

[2 marks]



Answer 4000 : 1

Do not write outside the box

13 Here is an identity in x.

$$5(2x + d) \equiv cx + 30$$

Work out the values of c and d.

[3 marks]

$10x + 5d = cx + 30$

$5d = 30$

$c =$ 10 $d =$ 6

14 Cora is revising for two subjects, History and French.

The time she spends revising is in the ratio

History : French = 7 : 2

The time she spends revising for History is 20 hours **more** than for French.

Work out the **total** time she spends revising.

[3 marks]

H : F

$7x : 2x$ so $7x = 2x + 20$

$5x = 20$

$x = 4$

Total $= 9x$

$= 9 \times 4$

$= 36$

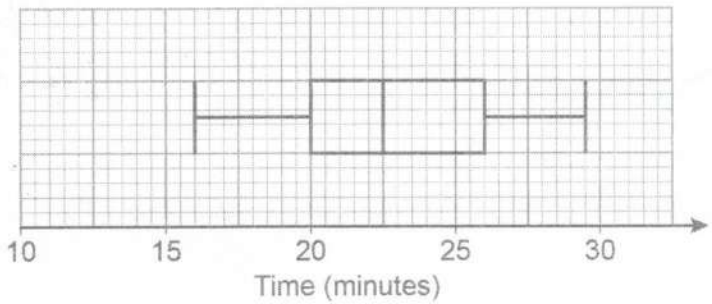
Answer 36 hours

11

Do not write outside the box

15 A race was run in 2019 and in 2020

The box plot shows information about the finishing times in 2019



15 (a) In 2019, what was the fastest time?

[1 mark]

Answer 16 minutes

Do not write outside the box

15 (b) The table shows information about the finishing times in 2020

2020

Lower quartile	21 minutes
Median	24 minutes
Upper quartile	27 minutes

IQR = 6

2019
20
22.5
26
IQR = 6

Use the data to comment on each of the following statements.

[4 marks]

On average, times were faster in 2019 than in 2020

This is correct. The 2019 median is 1·5 mins lower

Times were equally consistent in 2019 and 2020

This is correct, both years have an IQR of 6

5

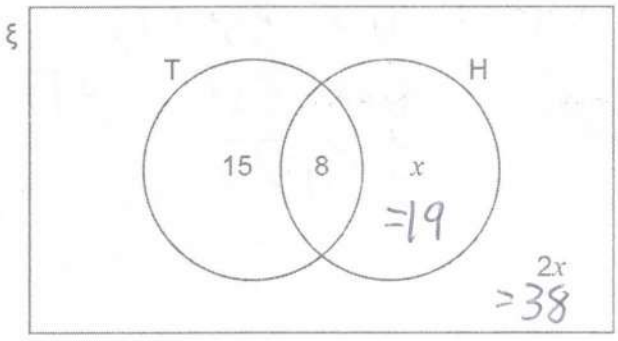
Do not write outside the box

16 The Venn diagram shows information about 80 people who visited an online shop.

ξ = 80 people

T = people who bought trainers

H = people who bought a hoodie



16 (a) One person is chosen at random.

Work out the probability that they bought a hoodie.

[3 marks]

$3x + 23 = 80$

$3x = 57$

$x = 19$

$8 + 19 = 27$

Answer $\frac{27}{80}$

16 (b) One person who bought trainers is chosen at random.

Work out the probability that they bought a hoodie.

[1 mark]

Answer $\frac{8}{23}$

Do not write outside the box

17 x and y are integers.

$8 \leqslant 4x \leqslant 20$ and $y - 3x < 12$

Work out the **largest** possible value of y.

[3 marks]

$2 \leqslant x \leqslant 5$

$y < 3x + 12$

$y < 3 \times 5 + 12$

$y < 27$

Answer 26

Turn over for the next question

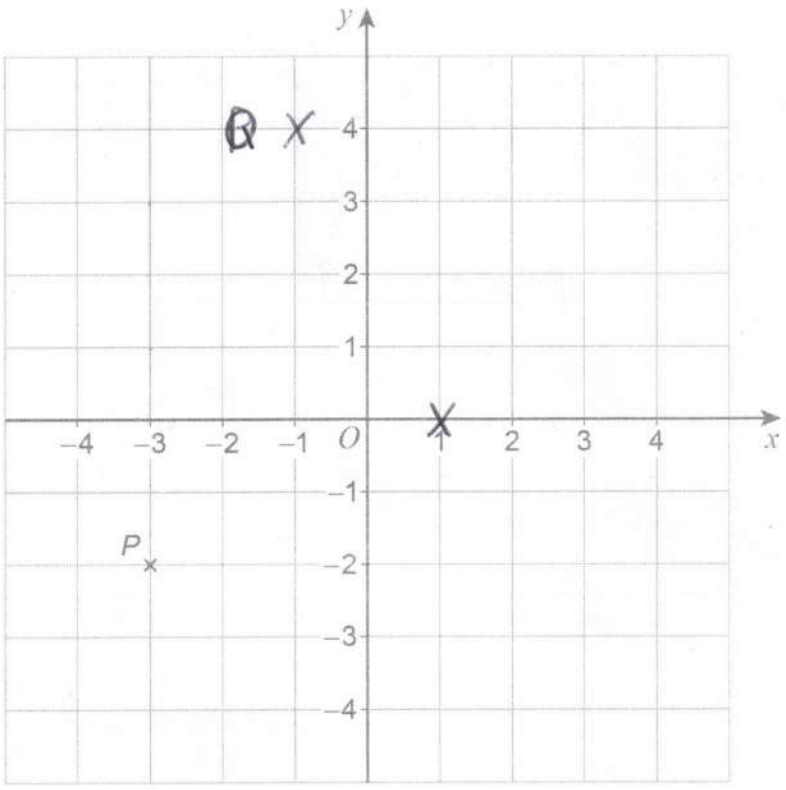
7

Do not write outside the box

18 (a) *P* and *Q* are points.

P (–3, –2) is mapped to *Q* by a rotation about (1, 0) through 90° clockwise.

Q is mapped back to *P* by a **single** transformation.



Complete these two **single** transformations that each map *Q* back to *P*.

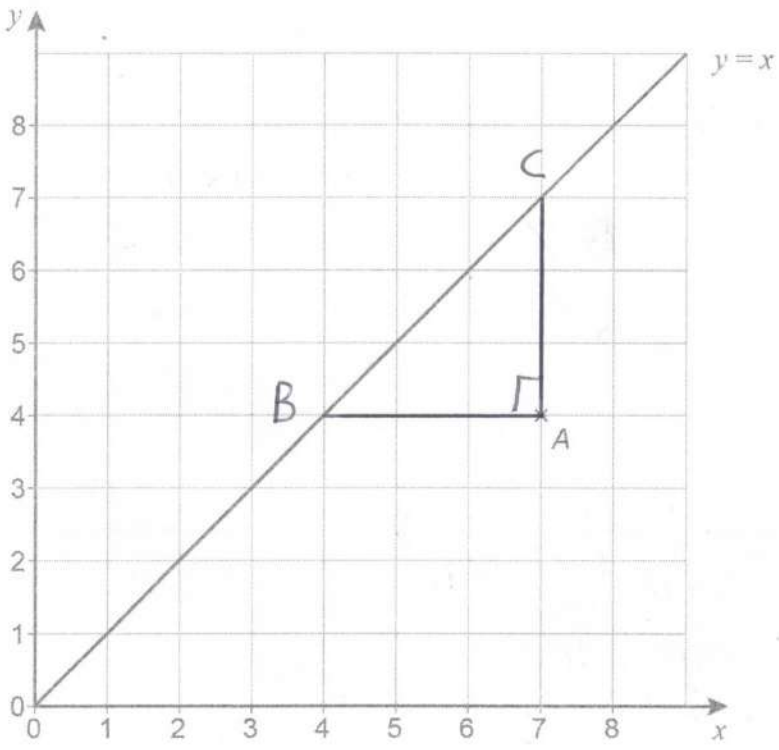
[2 marks]

Rotation about (1, 0) 90° anti clockwise

Translation with vector $\begin{bmatrix} -2 \\ -6 \end{bmatrix}$

Do not write outside the box

18 (b) Point A (7, 4) and the line $y = x$ are shown on the grid.



B and C are points on the grid, each having positive **integer** coordinates.

BAC is a right-angled triangle.

When BAC is reflected in the line $y = x$ side BC is invariant.

Work out **one** possible set of coordinates for B and C.

[1 mark]

B (4 , 4) C (7 , 7)

or (1,1) and (6,6)

3

Do not write outside the box

19 When converted to a fraction $0.\dot{7} = \frac{7}{9}$

Work out $0.\dot{4} + 0.0\dot{7}$

Give your answer as a fraction.

[3 marks]

$0.\dot{4} = \frac{4}{9}$

$0.0\dot{7} = 0.\dot{7} \div 10$

$= \frac{7}{90}$

$\frac{4}{9} + \frac{7}{90}$

$= \frac{40}{90} + \frac{7}{90}$

Answer $\frac{47}{90}$

Do not write outside the box

20 x and y are acute angles.

$\sin x = \frac{\sqrt{3}}{2}$ $\tan y = 1$

$w = 3x - 2y$

Work out the value of $\cos w$

You **must** show your working.

[3 marks]

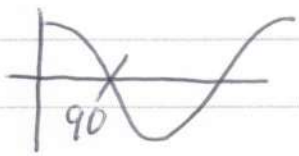
$y = 45°$

$x = 60°$

$w = (3 \times 60) - (2 \times 45)$

$= 180 - 90$

$= 90$



$\cos 90 = 0$

Answer 0

Turn over for the next question

6

Do not write outside the box

21 $f(x) = \frac{x-9}{8}$ $g(x) = 2x^2 + 9$ $h(x) = 4x$

Solve $f^{-1}(x) = gh(x)$ **[5 marks]**

$y = \frac{x-9}{8}$

$8y + 9 = x$

$f^{-1}(x) = 8x + 9$

$gh(x)$

$= g(4x)$

$= 2(4x)^2 + 9$

$= 32x^2 + 9$

so $8x + 9 = 32x^2 + 9$

$0 = 32x^2 - 8x$

$0 = 4x^2 - x$

$0 = x(4x - 1)$

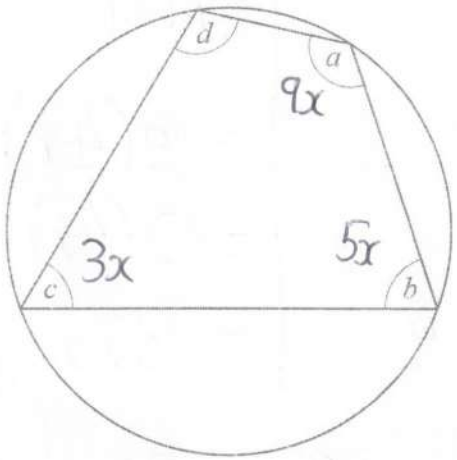
Answer $x = 0, \ x = \frac{1}{4}$

Do not write outside the box

22 Here is a cyclic quadrilateral.

$a : b : c = 9 : 5 : 3$

Not drawn accurately



Work out the size of angle d.

[3 marks]

$a + c = 180$

$12x = 180$

$x = 15$

$5x + d = 180$

$75 + d = 180$

$d = 180 - 75$

$d =$ 105 °

8

Do not write outside the box

23 Work out $\frac{7}{\sqrt{2}} \times \frac{\sqrt{3}}{\sqrt{10}}$

Give your answer in the form $\frac{x\sqrt{15}}{y}$ where x and y are integers.

[3 marks]

$= \frac{7\sqrt{3}}{\sqrt{20}} \times \frac{\sqrt{5}}{\sqrt{5}}$

$= \frac{7\sqrt{15}}{\sqrt{100}}$

Answer $\frac{7\sqrt{15}}{10}$ (OE)

Do not write outside the box

24 Line A is perpendicular to line B.

The gradient of line A is –2

Work out the gradient of line B.

[1 mark]

Answer $\frac{1}{2}$

25 The nth term of a geometric progression is r^n where $r > 0$

The second term is $\frac{8}{9}$

Work out the third term.

Give your answer in the form $\frac{c\sqrt{2}}{d}$ where c and d are integers.

[2 marks]

$r^2 = \frac{8}{9}$

$r = \sqrt{\frac{8}{9}}$

$r = \frac{2\sqrt{2}}{3}$

$r^3 = \frac{8}{9} \times \frac{2\sqrt{2}}{3}$

Answer $\frac{16\sqrt{2}}{27}$

6

Do not write outside the box

26 (a) Work out the value of $\left(5\frac{1}{16}\right)^{\frac{1}{4}}$

[2 marks]

$= \left(\frac{81}{16}\right)^{\frac{1}{4}} = \frac{\sqrt[4]{81}}{\sqrt[4]{16}}$

Answer $\frac{3}{2}$

26 (b) Write $\left(49^m\right)^{2.5}$ as a power of 7 in terms of m.

[2 marks]

$(7^{2m})^{2.5}$

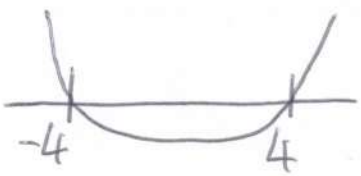
$= 7^{2m \times 2.5}$

Answer 7^{5m}

27 Write down the solution of $x^2 < 16$

[1 mark]

Answer $-4 < x < 4$



Do not write outside the box

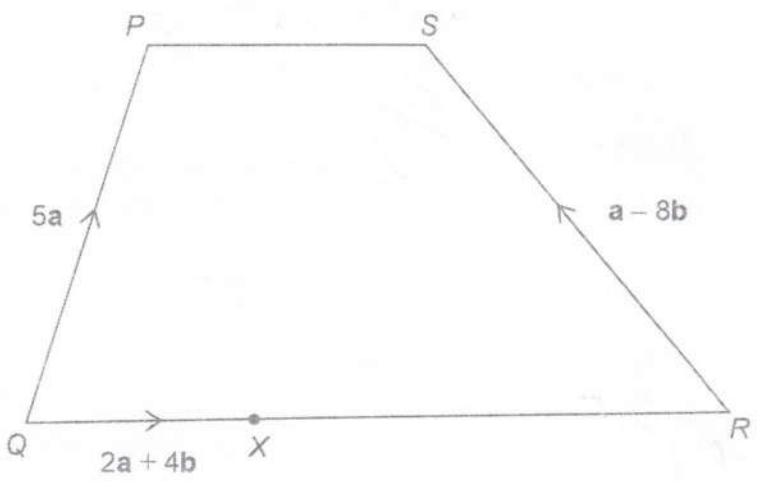
28 *PQRS* is a quadrilateral.

PQ is not parallel to *SR*.

X is a point on *QR*.

$QX : XR = 2 : 3$

$\overrightarrow{QX} = 2\mathbf{a} + 4\mathbf{b}$



Not drawn accurately

Prove that *PQRS* is a trapezium.

[3 marks]

$\overrightarrow{XR} = 3a + 6b$

$\overrightarrow{QR} = 5a + 10b$

$\overrightarrow{PS} = \overrightarrow{PQ} + \overrightarrow{QR} + \overrightarrow{RS}$

$= -5a + 5a + 10b + a - 8b$

$= a + 2b = \frac{1}{5}(5a + 10b) = \frac{1}{5}\overrightarrow{QR}$

$\overrightarrow{PS}$ and $\overrightarrow{QR}$ are parallel, hence trapezium

8

Do not write outside the box

29 Here are the equations of three graphs.

$y = \sin x$ $y = \cos x$ $y = \tan x$

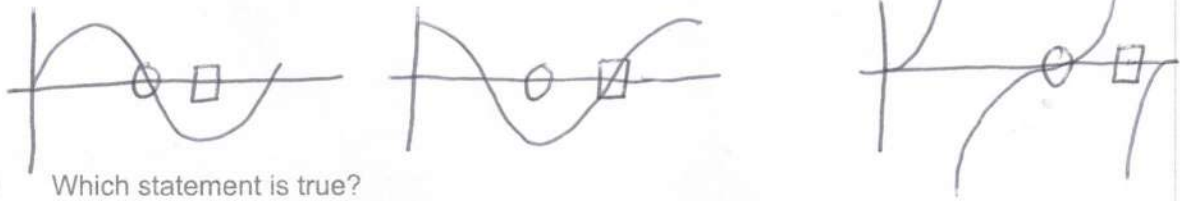
29 (a) Which statement is true?

Tick **one** box.

[1 mark]

- ☐ $y = \sin x$ passes through (180°, –1)
- ☑ $y = \cos x$ passes through (180°, –1)
- ☐ $y = \tan x$ passes through (180°, –1)
- ☐ None of the graphs pass through (180°, –1)

O=180
□=270



29 (b) Which statement is true?

Tick **one** box.

[1 mark]

- ☐ $y = \sin x$ passes through (270°, 1)
- ☐ $y = \cos x$ passes through (270°, 1)
- ☐ $y = \tan x$ passes through (270°, 1)
- ☑ None of the graphs pass through (270°, 1)

END OF QUESTIONS

2