

Please write clearly in block capitals.

Centre number

--	--	--	--	--

Candidate number

--	--	--	--

Surname

\_\_\_\_\_

Forename(s)

\_\_\_\_\_

Candidate signature

\_\_\_\_\_

I declare this is my own work.

# GCSE MATHEMATICS

## Example-Problem Past Paper

# H

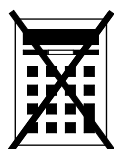
Higher Tier      Paper 1      Non-Calculator

June 2023

### Materials

For this paper you must have:

- mathematical instruments.



You must **not** use a calculator.

### Ingfif Wjcbg

- Engage with the fully-worked solutions in full before attempting the shadow questions.
- Explain the fully-worked solutions to yourself, anticipating the next steps in the worked solutions, making links between the problems and the mathematics used to solve them.
- Apply the methods learnt from the fully-worked solutions to the shadow questions, writing down all the workings in the spaces provided. Your thought process is important.
- Do all rough work in this book. Cross through any work you do not want to be marked.

### Information

- The marks for questions are shown in brackets.
- You may ask for more answer paper, graph paper and tracing paper.
- You should ask your teacher for help on a question if you do not fully understand a part of the fully-worked solution. Remember to be specific, understanding why the step was completed, rather than simply getting the correct answer.

### Advice

In all calculations, show clearly how you work out your answer.

Answer **all** questions in the spaces provided.1 (a) Work out  $0.7 \times 0.5$ 

[1 mark]

$$\frac{7}{10} \times \frac{5}{10} = \frac{35}{100}$$

Answer 0.351 (b) Work out  $\frac{5}{6} \div 3$ 

[1 mark]

$$\frac{5}{6} \times \frac{1}{3} = \frac{5}{18}$$

Answer  $\frac{5}{18}$ 1 (c) Work out  $27 \div 0.6$ 

[1 mark]

$$\frac{27}{0.6} = \frac{270}{6}$$

$$6 \overline{) 270} \begin{array}{r} 045 \\ 270 \\ \hline 0 \end{array}$$

Answer 45

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

Do not write  
outside the  
box

**1 (a)** Work out  $0.3 \times 0.2$

**[1 mark]**

---

---

Answer \_\_\_\_\_

**1 (b)** Work out  $\frac{4}{5} \div 7$

**[1 mark]**

---

---

Answer \_\_\_\_\_

**1 (c)** Work out  $16 \div 0.2$

**[1 mark]**

---

---

Answer \_\_\_\_\_

Turn over ►

2

Solve  $2x < 26$ 

[1 mark]

$$\begin{array}{r} 2x < 26 \\ \div 2 \quad \div 2 \end{array}$$

$$x < 13$$

Answer  $x < 13$

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

*Do not write  
outside the  
box*

**2**

Solve  $5x < 60$

**[1 mark]**

---

---

Answer \_\_\_\_\_

**Turn over ►**

3 Work out the value of  $\left(\frac{3}{2}\right)^2$

Give your answer as a mixed number.

[1 mark]

$$\left(\frac{3}{2}\right) \times \left(\frac{3}{2}\right) = \frac{9}{4}$$

Answer  $2\frac{1}{4}$

3 Work out the value of  $\left(\frac{5}{3}\right)^2$

Give your answer as a mixed number.

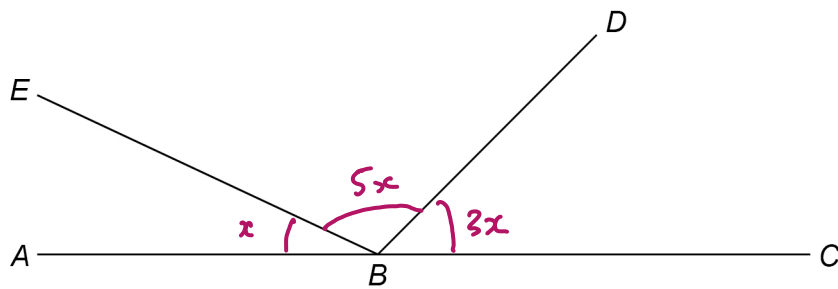
[1 mark]

---

---

Answer \_\_\_\_\_

4

 $ABC$ ,  $BD$  and  $BE$  are straight lines.Not drawn  
accuratelyangle  $EBD = 5 \times$  angle  $ABE$ angle  $DBC = 3 \times$  angle  $ABE$ Work out the size of angle  $EBD$ .**[3 marks]**

$$x + 5x + 3x = 9x$$

$$9x = 180^\circ$$

$$\div 9 \quad \div 9$$

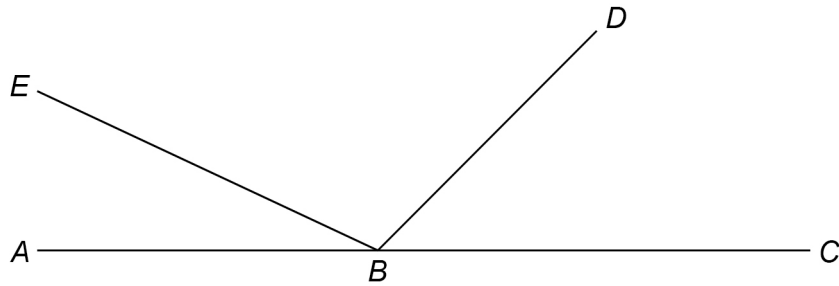
$$x = 20^\circ$$

$$5x = 5 \times 20 = 100$$

Answer 100 °



- 4  $ABC$ ,  $BD$  and  $BE$  are straight lines.



Not drawn  
accurately

$$\text{angle } EBD = 6 \times \text{angle } ABE$$

$$\text{angle } DBC = 3 \times \text{angle } ABE$$

Work out the size of angle  $DBC$ .

[3 marks]

---

---

---

---

---

---

---

Answer \_\_\_\_\_ °

5

Two prime numbers are multiplied together.

2, 3, 5, 7, 11, 13, 17, 19, 23, 29

The answer is an even number between 50 and 60

Complete the calculation.

[3 marks]

$$\boxed{2} \times \boxed{29} = \boxed{58}$$

6

Andrew and Bruce share some money in the ratio 5 : 6

Bruce gets £96

Andrew gives  $\frac{1}{4}$  of his share to Carl.Bruce gives  $\frac{2}{3}$  of his share to Carl.

How much money does Carl receive?

[4 marks]

A ○○○○○○

$$16 \times 5 = 80$$

$$A: £80$$

$$\frac{1}{4} \text{ of } £80 = £20$$

B ○○○○○○○○  
96

$$96 \div 6 = 16$$

$$B: £96$$

$$\frac{2}{3} \text{ of } £96 = £64$$

$$£20 + £64 = £84$$

Answer £ 84

- 5** Two prime numbers are multiplied together.  
The answer is an **even** number between 40 and 50  
Complete the calculation.

**[3 marks]**

$$\square \times \square = \square$$

---

---

---

---

- 6** Chloe and Mikey share some money in the ratio 3 : 4  
Mikey gets £72

Chloe gives  $\frac{1}{6}$  of her share to Pippa.

Mikey gives  $\frac{4}{9}$  of his share to Pippa.

How much money does Pippa receive?

**[4 marks]**


---

---

---

---

---

---

Answer £ \_\_\_\_\_

7

$$2^a \times 3 \times 5^2 = 600$$

Work out the value of  $a$ .

You **must** show your working.

[3 marks]

$$600 \div 60 \times 10$$

$$\div 6 \times 10 \times 10$$

$$\div 2 \times 3 \times 2 \times 5 \times 2 \times 5$$

$$\div 2 \times 2 \times 2 \times 3 \times 5 \times 5$$

$$\div 2^3 \times 3 \times 5^2$$

$$a = \underline{\quad 3 \quad}$$

8

Expand and simplify fully  $5(3x + 4) - 2(x - 1)$

[2 marks]

$$\begin{array}{r|l} 3x & +4 \\ \hline 5 & 15x + 20 \end{array}$$

$$\begin{array}{r|l} x & -1 \\ \hline -2 & -2x + 2 \end{array}$$

$$15x + 20 - 2x + 2$$

$$15x - 2x + 20 + 2$$

$$\text{Answer } \underline{\quad 13x + 22 \quad}$$

7

$$2^a \times 3^2 \times 5 = 360$$

Work out the value of  $a$ .

You **must** show your working.

**[3 marks]**

---

---

---

---

---

---

---

$$a = \underline{\hspace{4cm}}$$

8

Expand and simplify fully  $2(5x + 6) - 3(x - 2)$

**[2 marks]**

---

---

---

---

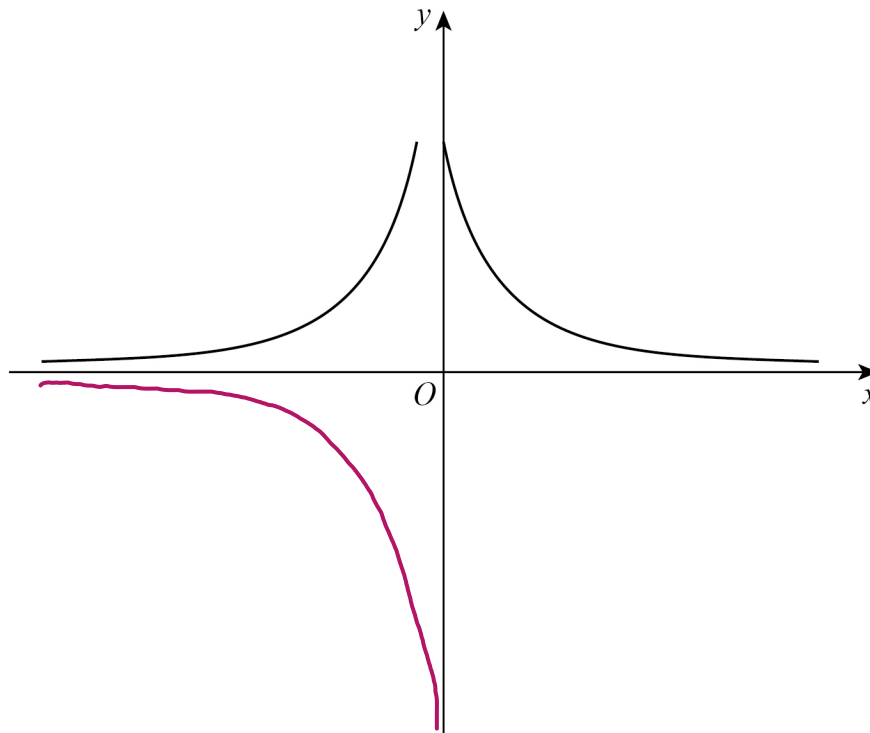
---

---

Answer  $\underline{\hspace{4cm}}$

9

Erika tries to sketch the graph  $y = \frac{1}{x}$  with  $x \neq 0$



Make **two** different criticisms of her sketch.

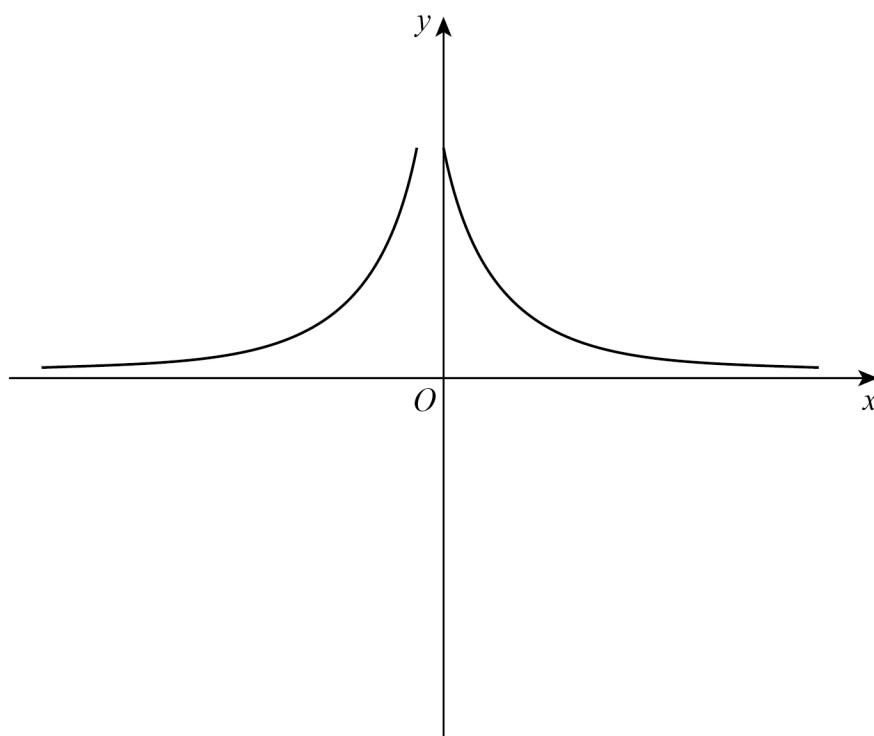
[2 marks]

Criticism 1 The decreasing part of the graph shouldn't meet the x-axis. The x-axis is an asymptote.

Criticism 2 The increasing part of the graph should be reflected in the x-axis.

9

Erika tries to sketch the graph  $y = \frac{1}{x}$  with  $x \neq 0$



Make **two** different criticisms of her sketch.

**[2 marks]**

Criticism 1 \_\_\_\_\_

\_\_\_\_\_

Criticism 2 \_\_\_\_\_

\_\_\_\_\_

Turn over ►

10

Sunita is  $x$  years old.

Beth is one year younger than Sunita.

Joel is double Sunita's age.

The mean of their ages is 5

How old is **Joel**?**[5 marks]**

$$S \quad x$$

$$B \quad x-1$$

$$J \quad 2x$$

$$\frac{x + x-1 + 2x}{3} = 5$$

$$\frac{4x-1}{3} = 5$$

$$\begin{array}{rcl} 4x-1 & = & 15 \\ +1 & & +1 \end{array}$$

$$\begin{array}{rcl} 4x & = & 16 \\ :4 & & :4 \end{array}$$

$$x = 4$$

$$2x = 2 \times 4 = 8$$

Answer

8

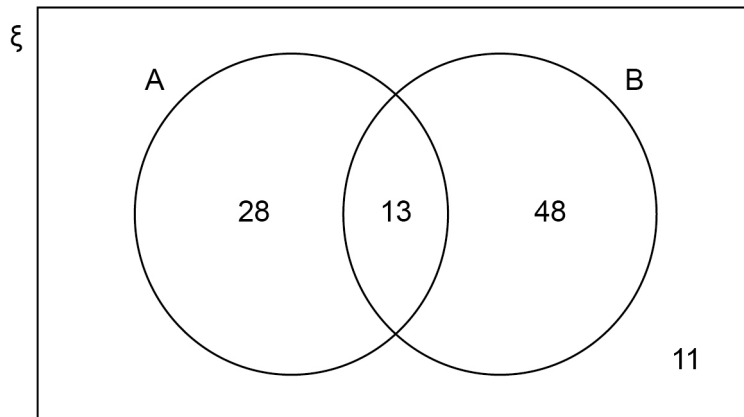


Answer \_\_\_\_\_

5

Copyright © 2024 AQA and its licensors. All rights reserved.

- 11 The Venn diagram represents 100 items.



- 11 (a) Write down  $P(A \cap B)$



[1 mark]

Answer

$$\frac{13}{100}$$

- 11 (b) Work out  $P(A')$



[1 mark]

$$13 + 48 + 11 = 72$$

Answer

$$\frac{72}{100} = \frac{18}{25}$$

- 11 (c) Work out  $P(A \cup B)$



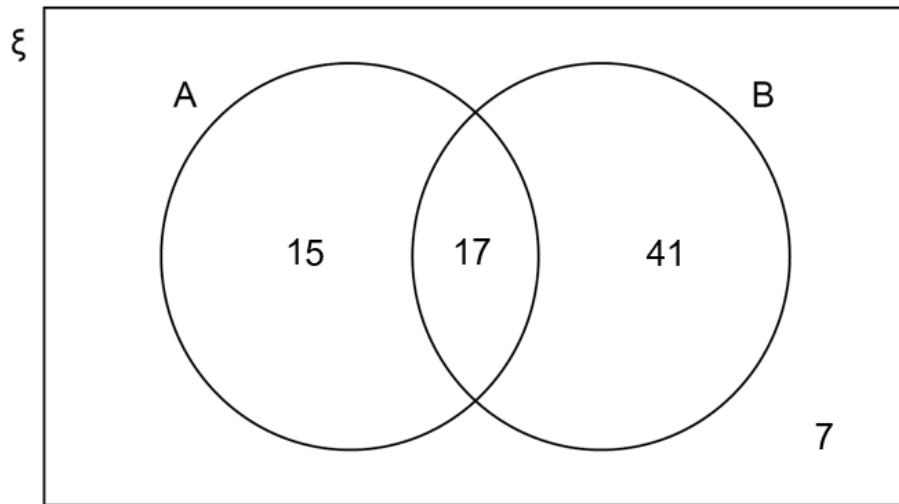
[1 mark]

$$28 + 13 + 48 = 89$$

Answer

$$\frac{89}{100}$$

- 11** The Venn diagram represents 80 items.



- 11 (a)** Write down  $P(B)$

[1 mark]

Answer \_\_\_\_\_

- 11 (b)** Work out  $P(A \cup B)$

[1 mark]

---



---

Answer \_\_\_\_\_

- 11 (c)** Work out  $P(A' \cap B)$

[1 mark]

---



---

Answer \_\_\_\_\_

- 12 (a)**  $a \times 10^n$  is a number in standard form.

Complete the inequality for the value of  $a$ .

[1 mark]

$$\underline{1} \leq a < \underline{10}$$

- 12 (b)**  $b \times 10^n$  is the number 7200 written in standard form.

Work out  $b \times 10^{-n}$

Write your answer as an ordinary number.

[2 marks]

$$7200 : 7.2 \times 10^3 \quad b: 7.2, n: 3$$

$$b \times 10^{-n} : 7.2 \times 10^{-3}$$

Answer 0.0072

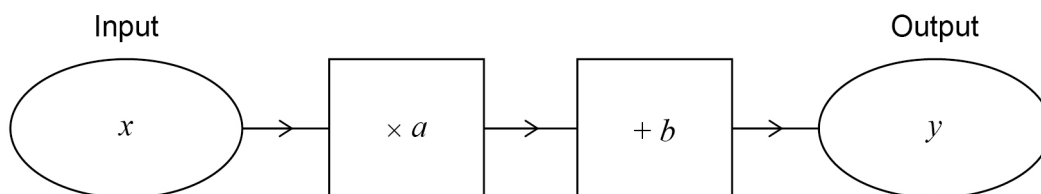
**[1 mark]**

$$\underline{\hspace{2cm}} \leq a < \underline{\hspace{2cm}}$$

**[2 marks]**

Answer \_\_\_\_\_

- 13 (a) Here is a number machine.



Show that when the input increases by 2 the output increases by  $2a$ .

[2 marks]

$$\begin{array}{ccc}
 x & ax & ax+b \\
 x+2 & a(x+2) & ax+2a+b \\
 & ax+2a & =
 \end{array}$$

An increase by  $2a$ .

- 13 (b)  $f(x) = kx^2$  where  $k$  is a constant.

Kai says that  $\frac{f(6)}{f(2)}$  is equal to  $f(3)$  because  $\frac{6}{2} = 3$

Is he correct?

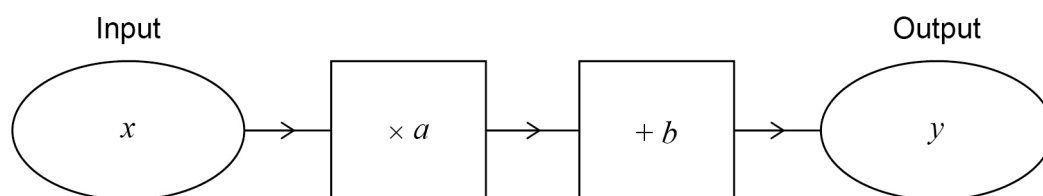
Show working to support your answer.

[2 marks]

$$\begin{array}{l}
 f(6) = k \times 6^2 = 36k \\
 f(2) = k \times 2^2 = 4k \\
 \frac{f(6)}{f(2)} = \frac{36k}{4k} = 9.
 \end{array}$$

No.

**13 (a)** Here is a number machine.



Show that when the input decreases by 3 the output decreases by  $3a$ .

**[2 marks]**

---

---

---

---

---

---

---

---

**13 (b)**  $f(x) = kx^3$  where  $k$  is a constant.

Josh says that  $f(2) \times f(1)$  is equal to  $f(2)$  because  $2 \times 1 = 2$

Is he correct?

Show working to support your answer.

**[2 marks]**

---

---

---

---

---

---

---

---

14

Here is a list of 11 whole numbers in numerical order.

The lower quartile, median, upper quartile and highest value are missing.

5	8	12	13	19	24	25	28	30	34	41
---	---	----	----	----	----	----	----	----	----	----

LQ

median

UQ

- median =  $2 \times$  lower quartile
- upper quartile =  $2.5 \times$  lower quartile
- range =  $2 \times$  interquartile range

Complete the list.

[2 marks]

$$UQ : 2.5 \times \underline{\quad}, \text{ between } 28 \text{ and } 34 \quad (30)$$

$$LQ \times 2.5 : 30 \quad 30 \div 2.5 : 12$$

$$M : 2 \times LQ : 24$$

$$IQR : 30 - 12 = 18$$

$$\text{Range} : 2 \times 18 : 36$$

$$5 + 36 = 41$$



**14**

Here is a list of 11 whole numbers in numerical order.

The lower quartile, median, upper quartile and highest value are missing.

1	3		9	13		23	32		44	
---	---	--	---	----	--	----	----	--	----	--

- median =  $3.5 \times$  lower quartile
- upper quartile =  $6 \times$  lower quartile
- range =  $1.5 \times$  interquartile range

Complete the list.

**[2 marks]**

---



---



---



---



---



---

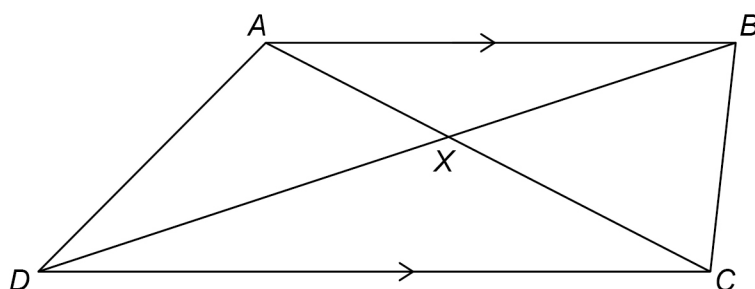


---

15

 $ABCD$  is a trapezium.

All four sides are different lengths.

 $AB$  is parallel to  $CD$ .The diagonals intersect at  $X$ .Not drawn  
accurately

For each statement, tick the correct box.

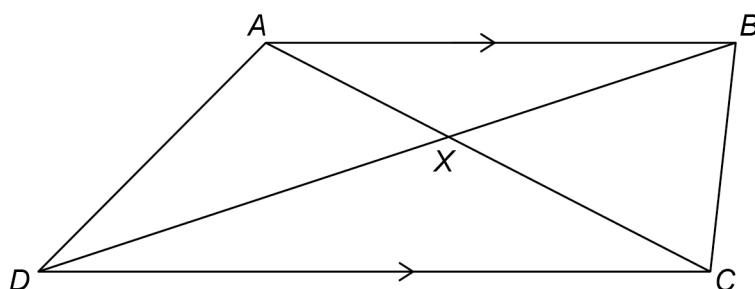
[4 marks]

	True	May be true	Not true
Triangles $AXB$ and $CXD$ are similar	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Triangles $AXD$ and $BXC$ are congruent	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Angle $ADB$ = angle $BDC$	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Area of triangle $ABC$ = area of triangle $ABD$	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

15

 $ABCD$  is a trapezium.

All four sides are different lengths.

 $AB$  is parallel to  $CD$ .The diagonals intersect at  $X$ .Not drawn  
accurately

For each statement, tick the correct box.

[4 marks]

	True	May be true	Not true
Triangles $AXD$ and $BCX$ are similar	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Triangles $ABX$ and $CDX$ are congruent	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Angle $BAC$ = angle $ACD$	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Area of triangle $BCD$ = area of triangle $ACD$	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Turn over ►

16

Solve the simultaneous equations

$$2x - 5y = 13 \quad \text{--- ①}$$

$$3x + 4y = 8 \quad \text{--- ②}$$

[4 marks]

$$\textcircled{1} \times 4 \quad 8x - 20y = 52 \quad \text{--- ③}$$

$$\textcircled{2} \times 5 \quad 15x + 20y = 40 \quad \text{--- ④}$$

$$\textcircled{3} + \textcircled{4} \quad 23x \quad \quad = 92$$

$$\div 23 \quad \quad \div 23$$

$$x = 4$$

$$\textcircled{2} \quad 3x + 4y = 8$$

$$3(4) + 4y = 8$$

$$12 + 4y = 8$$

$$-12 \quad -12$$

$$4y = -4$$

$$\div 4 \quad \div 4$$

$$y = -1$$

$$x = \underline{4} \quad y = \underline{-1}$$

Solve the simultaneous equations

$$5x + 3y = 9$$

$$2x - 4y = 14$$

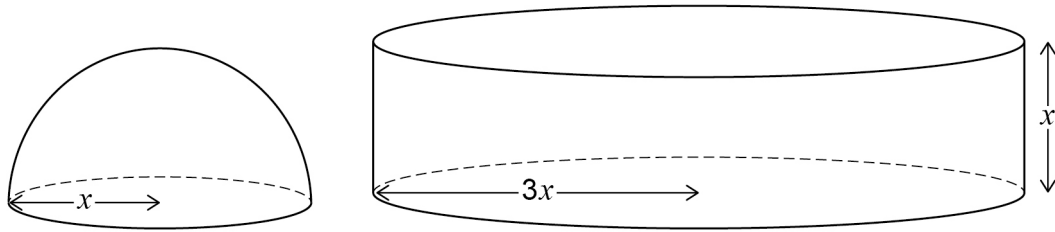
**[4 marks]**

$x =$  \_\_\_\_\_  $y =$  \_\_\_\_\_

4

**Turn over ►**

17

A solid hemisphere has radius  $x$ .A solid cylinder has radius  $3x$  and height  $x$ .

Surface area of a sphere =  $4\pi r^2$   
where  $r$  is the radius

Work out the ratio

total surface area of the hemisphere : total surface area of the cylinder

Give your answer in its simplest form.

You **must** show your working.

[3 marks]

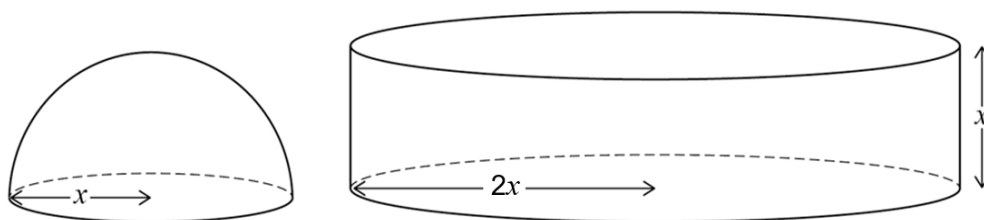
$$\begin{aligned}\text{Cylinder} &= \pi \times (3x)^2 + \pi \times 6x \times x + \pi \times (3x)^2 \\ &= 9x^2\pi + 6x^2\pi + 9x^2\pi \\ &= 24x^2\pi\end{aligned}$$

$$\begin{aligned}\text{Hemisphere} &= \frac{1}{2} \times 4 \times \pi \times x^2 + \pi \times x^2 \\ &= 2x^2\pi + x^2\pi \\ &= 3x^2\pi\end{aligned}$$

$$\begin{aligned}3x^2\pi : 24x^2\pi \\ = 3 : 24\end{aligned}$$

Answer 1 : 8

A solid cylinder has radius  $2x$  and height  $x$ .



where  $r$  is the radius

You **must** show your working.

**[3 marks]**

Answer :

18

$$6 < \sqrt[3]{x} < 7$$

Circle the possible value of  $x$ .

$$6^3 < (\sqrt[3]{x})^3 < 7^3$$

$$216 < x < 343$$

[1 mark]

1.9

20

45

290

19

Work out how many 5-digit **odd** numbers can be made using these digits **once** each.

2

4

6

7

9

Do **not** list them.

[2 marks]

Last digit must be odd (7 or 9) =                             2

4 choices for first digit after 7 or 9 : 4                      2

3 for second...  $4 \times 3 \times 2 \times 1 \times 2$

Answer       48



18

$$4 < \sqrt[3]{x} < 5$$

Circle the possible value of  $x$ .

[1 mark]

1.4

64

102

500

19

Work out how many 5-digit **even** numbers can be made using these digits **once** each.

2

4

6

7

9

Do **not** list them.

[2 marks]

---

---

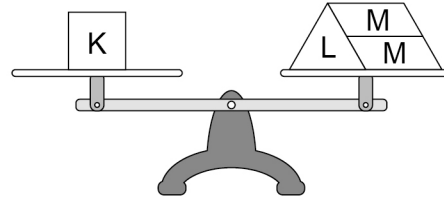
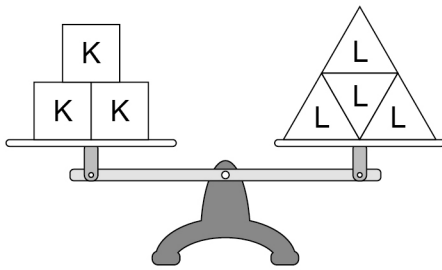
---

Answer \_\_\_\_\_

20

K, L and M are weights.

Both of the scales balance exactly.

How many M weights are needed to balance **one** L weight?

[3 marks]

$$3K = 4L$$

$$K = L + 2M$$

$$3K = 3L + 6M$$

$$4L = 3L + 6M$$

$$-3L \quad -3L$$

$$L = 6M$$

Answer

6

20

K, L and M are weights.

Both of the scales balance exactly.

How many M weights are needed to balance **one** L weight?**[3 marks]**


---

---

---

---

---

---

---

---

---

---

---

Answer \_\_\_\_\_

21

Express  $x^2 - 6x - 15$  in the form  $(x - a)^2 - b$  where  $a$  and  $b$  are integers.

[2 marks]



$$(x - 3)^2 = x^2 - 6x + 9$$

$$x^2 - 6x - 15 = (x - 3)^2 - 24$$

Answer

$$(x - 3)^2 - 24$$

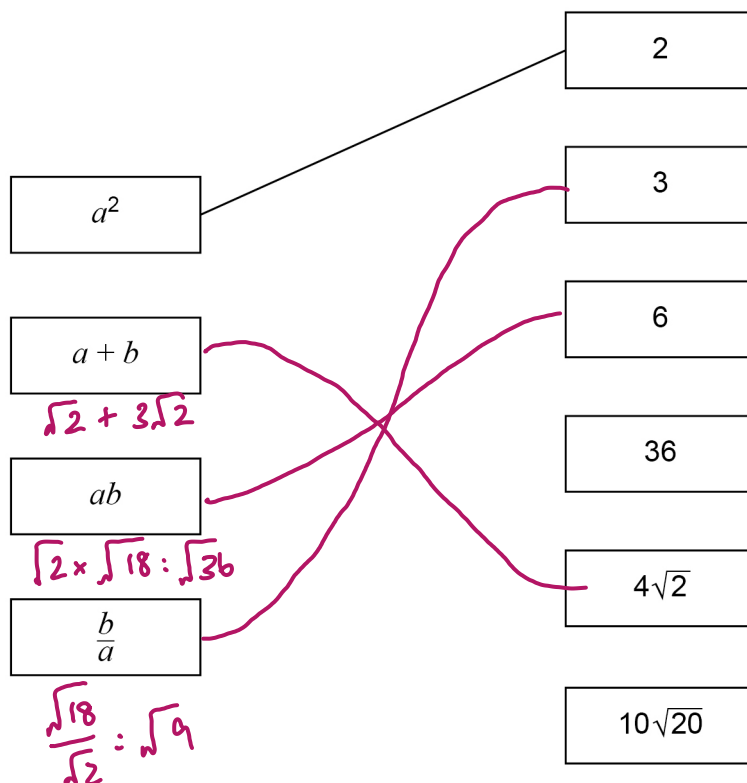
22

$$a = \sqrt{2} \quad \text{and} \quad b = \sqrt{18} : \sqrt{9} \times \sqrt{2} : 3\sqrt{2}$$

Match each expression to its value.

One has been done for you.

[3 marks]



- 21** Express  $x^2 - 8x + 9$  in the form  $(x - a)^2 - b$  where  $a$  and  $b$  are integers.

[2 marks]

---



---



---



---

Answer \_\_\_\_\_

- 22**  $a = \sqrt{3}$  and  $b = \sqrt{12}$

Match each expression to its value.

One has been done for you.

[3 marks]

$a^2$	3
$a + b$	2
$ab$	6
$\frac{b}{a}$	$3\sqrt{3}$
	36
	$10\sqrt{20}$

Turn over ►

23

Write  $0.\dot{1}\dot{3}$  as a fraction in its simplest form.

[3 marks]

$$x = 0.\dot{1}\dot{3}$$

$$x = 0.1333333 \dots$$

$$10x = 1.3333333 \dots$$

$$100x = 13.3333333 \dots$$

$$100x - 10x = 13.\dot{3} - 1.\dot{3}$$

$$90x = 12$$

$$\div 90 \quad \div 90$$

$$x = \frac{12}{90} = \frac{2}{15}$$

Answer  $\frac{2}{15}$

23

Write  $0.\dot{2}\dot{4}$  as a fraction in its simplest form.**[3 marks]**

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

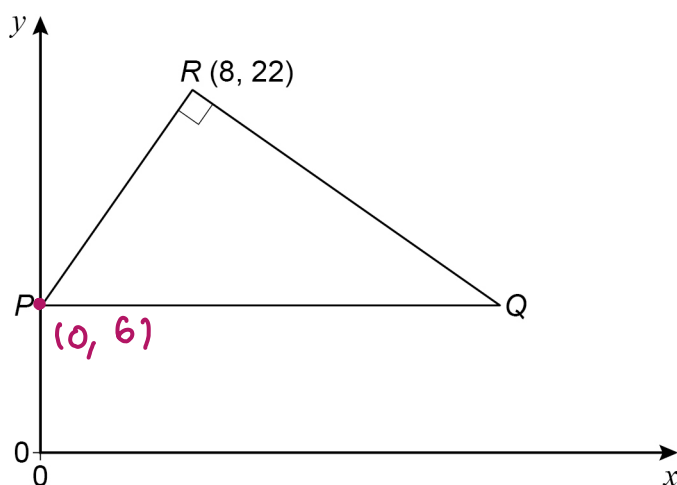
---

Answer \_\_\_\_\_

---

3**Turn over ►**

24

Points  $P$ ,  $Q$  and  $R(8, 22)$  form a triangle.Not drawn  
accurately $PQ$  is a horizontal line, with  $P$  on the  $y$ -axis.Angle  $PRQ$  is a right angle.The gradient of  $PR$  is 2Work out the coordinates of  $Q$ .

[5 marks]

$$\frac{\Delta y}{\Delta x} : 2 \quad \frac{\Delta y}{\Delta x} : 2 \quad \Delta y : 16 \quad 22 - 16 = 6$$

$$\text{Gradient}_{RQ} = \frac{-1}{\text{Gradient}_{PR}} = \frac{-1}{2} \quad y = \frac{-1}{2}x + c$$

$$22 = \frac{-1}{2}(8) + \underline{\quad}$$

$$22 = -4 + \underline{26} \quad y = \frac{-1}{2}x + 26$$

$$6 = \frac{-1}{2}x + 26$$

$$\begin{array}{r} -26 \\ -26 \end{array}$$

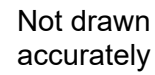
$$-20 = \frac{-1}{2}x$$

$$\begin{array}{r} \times -2 \quad \times -2 \\ 40 = x \end{array}$$

Answer ( 40 , 6 )



Points  $P$ ,  $Q$  and  $R$   $(6, 22)$  form a triangle.



Work out the coordinates of Q.

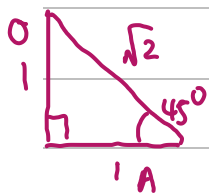
5

8300/1H

25

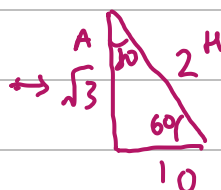
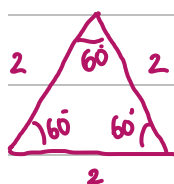
Show that  $\frac{4 \sin 30^\circ - \tan 45^\circ}{2 \cos 30^\circ}$  can be written as  $\tan x$ , where  $x$  is an acute angle.

[4 marks]



$$\tan \theta = \frac{O}{A}$$

$$\tan 45^\circ = \frac{1}{1}$$



$$\sin \theta = \frac{O}{H}$$

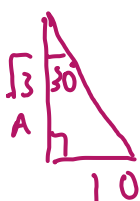
$$\sin 30^\circ = \frac{1}{2}$$

$$\cos \theta = \frac{A}{H}$$

$$\cos 30^\circ = \frac{\sqrt{3}}{2}$$

$$\frac{4 \sin 30^\circ - \tan 45^\circ}{2 \cos 30^\circ} = \frac{4\left(\frac{1}{2}\right) - (1)}{2\left(\frac{\sqrt{3}}{2}\right)} = \frac{2-1}{\sqrt{3}} = \frac{1}{\sqrt{3}}$$

$$\tan 30^\circ = \frac{1}{\sqrt{3}}$$



Turn over ►

Show that  $\frac{5\sin 60^\circ - \cos 30^\circ}{2\tan 60^\circ}$  can be written as  $\tan x$ , where  $x$  is an acute angle.

8300/1H

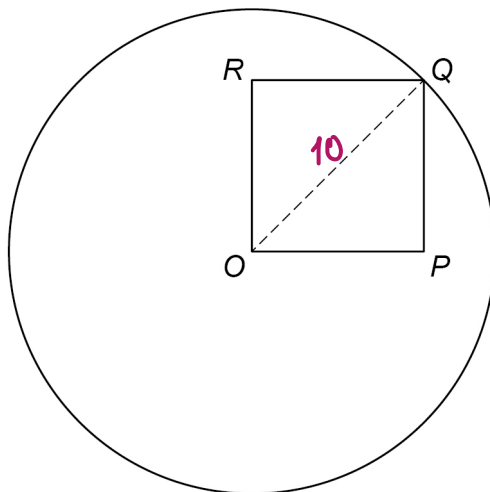
26

A circle, centre  $O$ , has circumference  $20\pi$  cm

$Q$  is a point on the circle.

$OPQR$  is a **square**.

Not drawn  
accurately



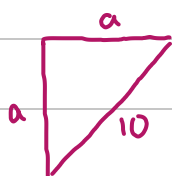
perimeter of the square : circumference of the circle =  $\sqrt{a} : \pi$  where  $a$  is an integer.

Work out the value of  $a$ .

You **must** show your working.

[4 marks]

$$C: 20\pi \quad d: 20 \quad r: 10$$



$$a^2 + a^2 = 10^2$$

$$2a^2 = 100$$

$$a^2 = 50$$

$$a = \sqrt{50} = \sqrt{25 \times 2} = 5\sqrt{2}$$

$$\text{Perimeter} : 4 \times 5\sqrt{2} = 20\sqrt{2}$$

$$20\sqrt{2} : 20\pi$$

$$= \sqrt{2} : \pi$$

$$a = \underline{\quad 2 \quad}$$

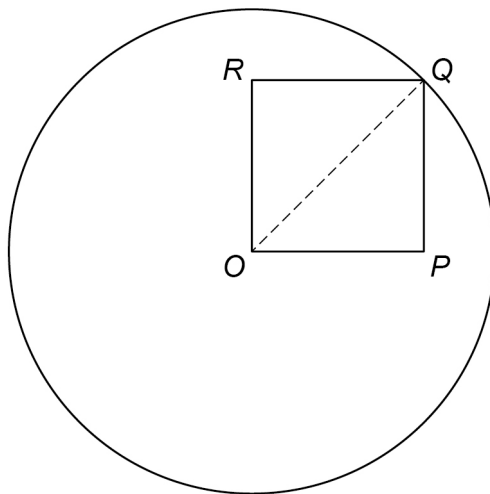
26

A circle, centre  $O$ , has an area of  $36\pi \text{ cm}^2$

$Q$  is a point on the circle.

$OPQR$  is a **square**.

Not drawn  
accurately



area of the square : area of the circle  $= \frac{1}{a} : \pi$  where  $a$  is an integer.

Work out the value of  $a$ .

You **must** show your working.

[4 marks]

---

---

---

---

---

---

---

---

---

---

$a =$  \_\_\_\_\_

4

Turn over ►

27

A journey has two stages.

	Distance (km)	Average speed (km/h)	Time (h)
Stage 1	30	$a$	$\frac{30}{a}$
Stage 2	30	$b$	$\frac{30}{b}$

Show that the average speed for the **whole** journey, in km/h, is  $\frac{2ab}{a+b}$

[3 marks]

$$\text{Speed} = \frac{\text{distance}}{\text{time}}$$

$$\text{Total distance} = 30 + 30 = 60$$

$$\text{Total time} = \frac{30}{a} + \frac{30}{b} = \frac{30b}{ab} + \frac{30a}{ab} = \frac{30a + 30b}{ab}$$

$$\text{Speed} = \frac{\text{distance}}{\text{time}} = \frac{60}{\frac{30a + 30b}{ab}} = 60 \times \frac{ab}{30a + 30b}$$

$$= \frac{2}{\cancel{60} \times 30(a+b)} \times \frac{ab}{1}$$

$$= \frac{2ab}{a+b}$$

END OF QUESTIONS

Liquid C is made by mixing liquid A and liquid B.

	Mass (g)	Density (g/cm <sup>3</sup> )	Volume (cm <sup>3</sup> )
Liquid A	200	$a$	$\frac{200}{a}$
Liquid B	300	$b$	$\frac{300}{b}$

**[3 marks]**

**END OF QUESTIONS**

For confidentiality purposes, all acknowledgements of third-party copyright material are published in a separate booklet. This booklet is published after each live examination series and is available for free download from [www.aqa.org.uk](http://www.aqa.org.uk).

Permission to reproduce all copyright material has been applied for. In some cases, efforts to contact copyright-holders may have been unsuccessful and AQA will be happy to rectify any omissions of acknowledgements. If you have any queries please contact the Copyright Team.

Copyright © 2023 AQA and its licensors. All rights reserved.