

Ratio, proportion and rate of change – GCSE Mathematics Paper 3

1. No.13

Milly has an equal number of 20p coins and 50p coins.

The value of her 20p coins is £2.80

Work out the **total** value of her 20p and 50p coins.

[3 marks]

Answer £ _____

2. No.23

a is two times b .

Circle the ratio $a : b$

[1 mark]

1 : 3

3 : 1

1 : 2

2 : 1

3. No.4

Circle the expression which means x divided by y

[1 mark]

$\frac{x}{y}$

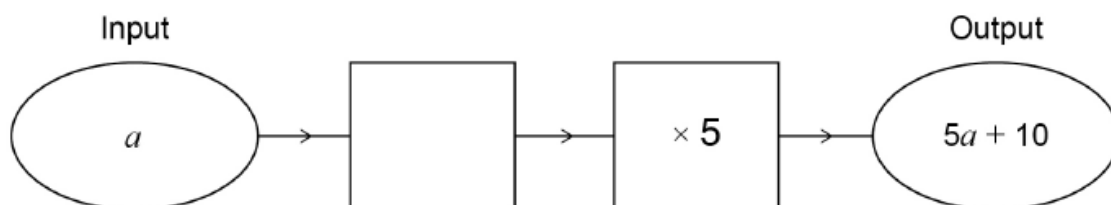
$\frac{y}{x}$

$\frac{1}{xy}$

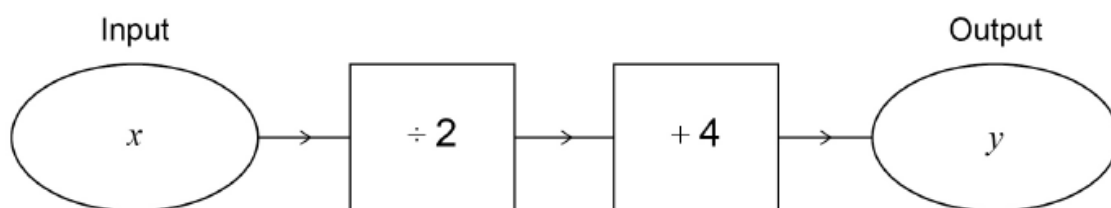
$\frac{1}{x+y}$

4. No.11

(a) Complete the number machine.



[1 mark]

(b) Write down the output y in terms of x .

[1 mark]

Answer _____

5. No.12

The first four triangular numbers are 1, 3, 6, 10

Circle the next triangular number.

[1 mark]

14

15

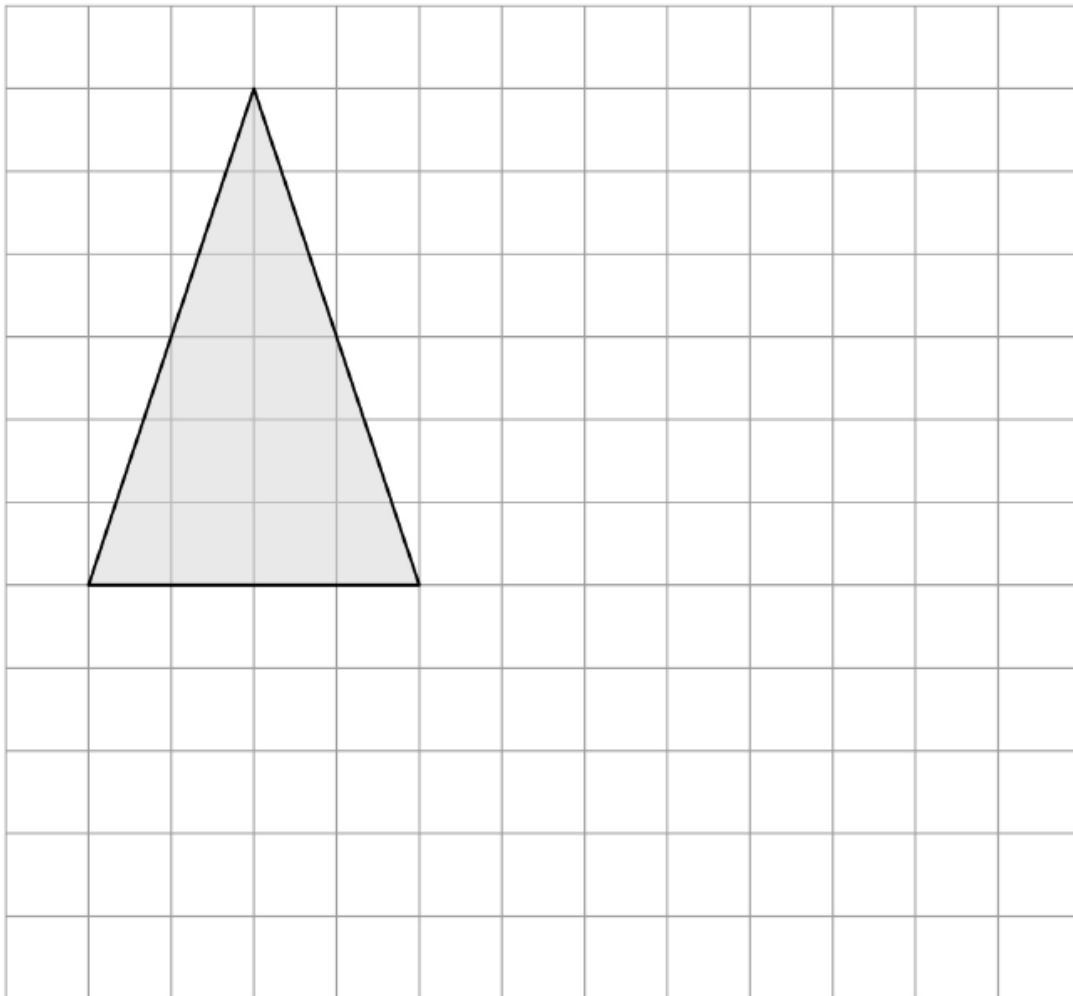
16

19

6. No.18

On the grid, draw an enlargement of the triangle with scale factor $\frac{1}{2}$

[2 marks]



7. No.20

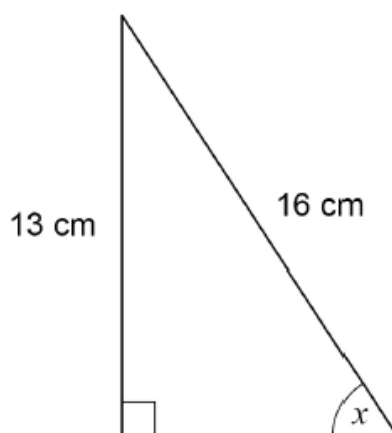
Solve $x^2 = 196$

[2 marks]

Answer _____

8. No.30

Here is a right-angled triangle.

Not drawn
accuratelyUse trigonometry to work out the size of angle x .

[2 marks]

Answer _____ degrees

9. No.7

Two solids, J and K, have the same density.

Complete the table.

Include units in your answers.

[3 marks]

	J	K
Mass	48 g	78 g
Volume	8 cm ³	
Density		

10. No.11

Here are two sets of numbers, A and B.

Set A

200	160
104	100

Set B

270	400	483
300	x	

mean of Set A : mean of Set B = 3 : 8

Work out the value of x .**[4 marks]**

Answer _____

11. No.14

For Class X, number of boys : number of girls = 7 : 8

For Class Y, number of boys : number of girls = 3 : 4

Which statement **must** be true?Tick **one** box.**[1 mark]**☐

Class X has more boys than class Y

☐

Class X has twice as many girls as class Y

☐

Class X has a greater proportion of boys than class Y

☐

Class X has the same proportion of boys as class Y

12. No.20

d is directly proportional to the square of v .

$d = 6$ when $v = 20$

(a) Work out an equation connecting d and v .

[3 marks]

Answer _____

(b) Work out the value of d when $v = 30$

[2 marks]

Answer _____

blue : yellow = 7 : 3

He buys yellow paint in 20-litre containers, each costing £80

make 40% profit on each tin.

[5 marks]

This image shows a blank sheet of white paper with horizontal ruling lines. The lines are evenly spaced and extend across the width of the page. There are no margins, text, or other markings on the paper.

Answer £

14. No.11

At a school there are six lessons in a day.

In total, the six lessons last for five hours.

(a) Assume that each lesson lasts the same amount of time.

How many minutes long is the final lesson?

[2 marks]

Answer _____ minutes

(b) In fact, the first lesson of the day lasts longer than the other lessons.

The other lessons last the same amount of time.

What does this tell you about the length of the final lesson?

Tick **one** box.

[1 mark]

☐

It is shorter than the answer to part (a)

☐

It is the same as the answer to part (a)

☐

It is longer than the answer to part (a)

15. No.20

$$a : b = 7 : 1$$

Circle the correct equation.

[1 mark]

$$a = 7b$$

$$b = 7a$$

$$a = 6b$$

$$b = 6a$$

16. No.23

(a) Tom is tiling a wall.

He needs to buy at least 100 tiles.

The tiles are sold in large packs and small packs.

Large pack 40 tiles £18

Small pack 28 tiles £14

Special offer

25% reduction when you buy 3 or more large packs

Work out the cheapest cost for Tom to buy the packs of tiles he needs.

[3 marks]

Answer £

17. No.26

$$\text{Density} = \frac{\text{mass}}{\text{volume}}$$

The mass is divided by 2 and the volume is multiplied by 4

What happens to the density?

Circle your answer.

[1 mark]

× 2

÷ 2

× 8

÷ 8

18. No.30

Work out

cube root of 512 : reciprocal of 0.4

Give your answer in the form $n : 1$

[3 marks]

Answer _____ : _____

19. No.10

$$\text{Density} = \frac{\text{mass}}{\text{volume}}$$

The mass is divided by 2 and the volume is multiplied by 4

What happens to the density?

Circle your answer.

[1 mark]

× 2

÷ 2

× 8

÷ 8

20. No.11

Work out

cube root of 512 : reciprocal of 0.4

Give your answer in the form $n : 1$

[3 marks]

Answer _____ : _____

21. No.21

Juice is sold in small bottles and large bottles.

The volume of the large bottle is 1125 ml.



$$\text{volume of small bottle} : \text{volume of large bottle} = 2 : 5$$

A café has small glasses and large glasses.

$$\text{volume of small glass} : \text{volume of large glass} = 4 : 7$$

A small bottle fills 6 small glasses with no juice left over.

How many large glasses can be filled by a large bottle?

You **must** show your working.

[4 marks]

Answer _____

22. No.23

$$x : y = \frac{1}{4} : \frac{2}{3}$$

What is x as a fraction of y ?

Circle your answer.

[1 mark]

$$\frac{8}{3}$$

$$\frac{1}{6}$$

$$\frac{3}{7}$$

$$\frac{3}{8}$$