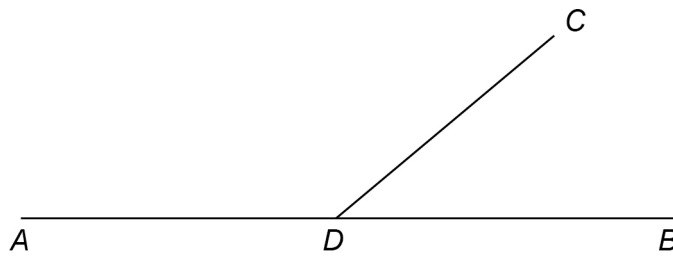


- 1 ADB and CD are straight lines.



Not drawn
accurately

angle $ADC = 5 \times$ angle CDB

Work out the size of angle ADC .

[3 marks]

$$ADC : CDB = 5 : 1 \quad (1)$$

$$180^\circ \div 6 = 30^\circ \quad (1)$$

$$ADC : 5 \times 30^\circ = 150^\circ \quad (1)$$

Answer 150 degrees

2 (a) In a field

number of sheep : number of cows = 10 : 3

Zak says,

"There are 10 sheep in the field."

Give a reason why Zak **could** be wrong.

[1 mark]

The number of sheeps could be any multiple of 10 .

①

2 (b) In a different field

number of goats : number of pigs = 13 : 4

Priya says,

"There are more than three times as many goats as pigs."

Is she correct?

Tick **one** box.

☒

Yes

☐

No

☐

Cannot tell

①

Show working to support your answer.

[1 mark]

$$13 \div 4 = 3.25 > 3$$

3

In a **right-angled** triangle

smallest angle : largest angle = 2 : 5



Work out the three angles of the triangle.

[4 marks]

$$180^\circ - 90^\circ = 90^\circ$$

$$90^\circ \div 5 = 18^\circ \text{ (1)}$$

$$2 \times 18^\circ = 36^\circ \text{ (1)}$$

$$90^\circ - 36^\circ = 54^\circ$$

(1)

90

degrees

54

(1)

degrees

36

degrees

4

Three teams, A, B and C, play in a competition.

games won by A : games won by B = 2 : 1

games won by B : games won by C = 3 : 1

Team B has won 6 games.

In total, how many games have the three teams won?

[3 marks]

$$A : B : C$$

$$2 \times 3 : 1 \times 3$$

$$3 : 1$$

$$6 : 3 : 1$$

$$A : \frac{6}{3} (6) = 12$$

$$C : \frac{1}{3} (6) = 2$$

$$\text{Total} : 12 + 6 + 2 = 20$$

Answer 20

5

$$a : b = 7 : 1$$

Circle the correct equation.

[1 mark]

$$a = 7b$$

$$b = 7a$$

$$a = 6b$$

$$b = 6a$$

6

Work out

cube root of 512 : reciprocal of 0.4

Give your answer in the form $n : 1$

[3 marks]

$$\sqrt[3]{512} = 8 \quad (1) \quad , \quad \frac{1}{0.4} = \frac{10}{4} = 2.5 \quad (1)$$

$$8 : 2.5$$

$$8 \div 2.5 = 3.2$$

Answer $3.2 \quad (1)$: 1

7

A password has 30 characters.

It is made up of 5 numbers, 15 letters and some symbols.

Work out the ratio numbers : letters : symbols

Give your answer in its simplest form.

[2 marks]

$$30 - 5 - 15 = 10$$

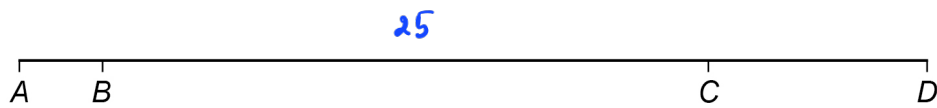
$$\begin{aligned} \text{ratio} &= 5 : 15 : 10 \\ &= 1 : 3 : 2 \end{aligned} \quad \left. \begin{array}{l} \div 5 \end{array} \right\}$$

Answer 1 : 3 : 2 2

8

A , B , C and D are junctions on a motorway.

Not drawn
accurately



distance $CD = 3 \times$ distance AB

distance $BC = 25$ miles

Salma drives from A to C .

She drives for 30 minutes at an average speed of 62 miles per hour.

Work out the distance AD .

[4 marks]

$$62 = \frac{25 + AB}{30 \div 60}$$

$$(0.5) \quad 62 = 25 + AB$$

①

①

$$31 = 25 + AB$$

$$AB = 6 \text{ miles}$$

$$CD = 3 \times 6 \quad \text{①}$$

$$= 18$$

$$AD = 6 + 25 + 18 = 49 \quad \text{①}$$

Answer 49 miles

9

Some buttons are red or blue in the ratio red : blue = 3 : 5

What fraction of the buttons are red?

$$\text{total : } 3 + 5 = 8$$

Circle your answer.

[1 mark]

$$\frac{2}{5}$$

$$\frac{3}{5}$$

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

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

$$\frac{5}{8}$$

10

Harry and his sister Jess have some money in the ratio Harry : Jess = 1 : 4

Harry has £7.35

They pay £16.99 for a present for a friend.

Harry uses $\frac{1}{3}$ of his money.

Jess pays the rest.

How much money does Jess have left?

[4 marks]

$$\text{Jess} : £7.35 \times 4 = £29.40 \quad (1)$$

$$\frac{1}{3} \times 7.35 = 2.45 \quad (1)$$

$$16.99 - 2.45 = 14.54$$

$$29.40 - 14.54 = 14.86 \quad (1)$$

Answer £ 14.86

11 Jeff and Kaz share £270 in the ratio Jeff : Kaz = 2.6 : 1

How much **more** than Kaz does Jeff get?

[3 marks]

$$\text{Total ratio : } 2.6 + 1 = 3.6$$

$$270 \div 3.6 = 75 \quad (1)$$

$$\text{Difference in ratio : } 2.6 - 1 = 1.6$$

$$75 \times 1.6 = 120$$

(1)

Answer £

120

(1)

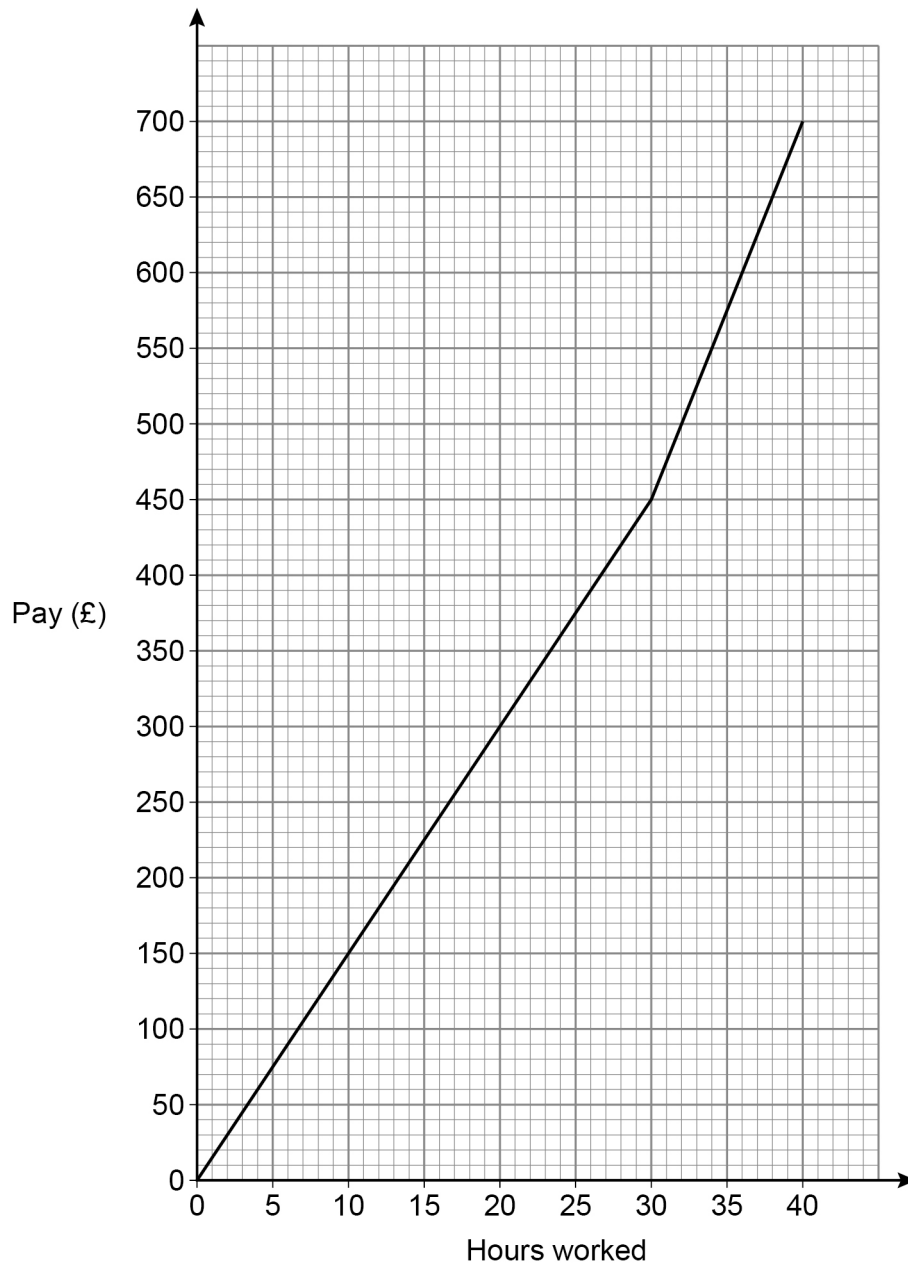
12

In a week, Samir is paid

a basic hourly rate for the first 30 hours worked

an overtime hourly rate for any extra hours worked.

The graph shows his pay for working up to 40 hours in a week.



Work out the ratio basic hourly rate : overtime hourly rate

Give your answer in its simplest form.

[3 marks]

$$\text{Basic hourly rate} = \frac{450}{30} = 15 \quad (1)$$

$$\text{Overtime hourly rate} = \frac{(700 - 450)}{40 - 30} = \frac{250}{10} = 25 \quad (1)$$

$$\begin{aligned} \text{ratio} &= 15 : 25 \\ &= 3 : 5 \quad \downarrow \div 5 \end{aligned}$$

$$\text{Answer } \underline{3} : \underline{5} \quad (1)$$

13

 $x : y$ is $9 : 5$ Circle the value of $\frac{2x}{y}$

$$\frac{x}{y} = \frac{9}{5}$$

$$2\left(\frac{9}{5}\right) = \frac{18}{5}$$

[1 mark]

$$\frac{5}{18}$$

$$\frac{18}{5}$$

$$1$$

$$\frac{9}{10}$$

$$\frac{10}{9}$$

- 14 (a) The people at a party are either adults or children.

adults : children = 9 : 11

What percentage are adults?

[2 marks]

$$9 + 11 = 20$$

$$\text{Adults} : \frac{9}{20} \times 100\%$$

$$= 45\%$$

Answer 45 %

- 14 (b) The people at a different party are from Spain, France or Germany.

68% are from Spain

number from France = number from Germany

Work out number from Spain : number from France

Give your answer in the form $n : 1$

[3 marks]

$$100\% - 68\% = 32\%$$

$$\text{France} = \text{Germany} = \frac{32\%}{2} = 16\%$$

$$\begin{aligned} \text{Spain} : \text{France} &= 68 : 16 \\ &= 4.25 : 1 \end{aligned}$$

Answer 4.25 : 1

15 In a bag,
number of green discs : number of blue discs = 20 : 11

Tick **one** box for each statement about the discs in the bag.

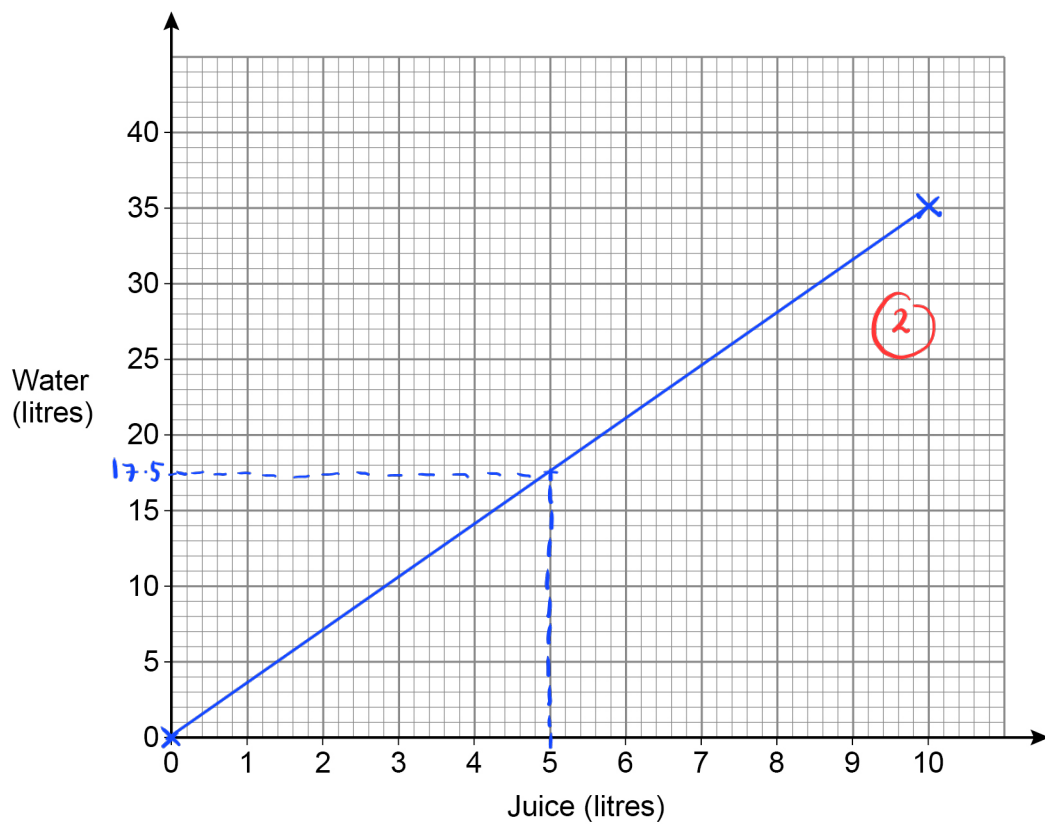
[2 marks]

	True	False	Cannot tell
There are more green discs than blue discs.	☒	☐	☐
In total there are 31 discs.	☐	☐	☒

16 Juice and water are mixed together in the ratio 2 : 7

16 (a) Draw a straight line graph that shows the amounts of juice and water to mix together.
Your graph **must** show up to 10 litres of juice.

[2 marks]



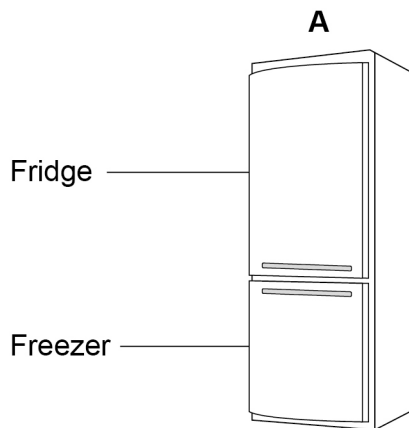
16 (b) How much water needs to be mixed with 5 litres of juice?

[1 mark]

Answer 17.5 1 litres

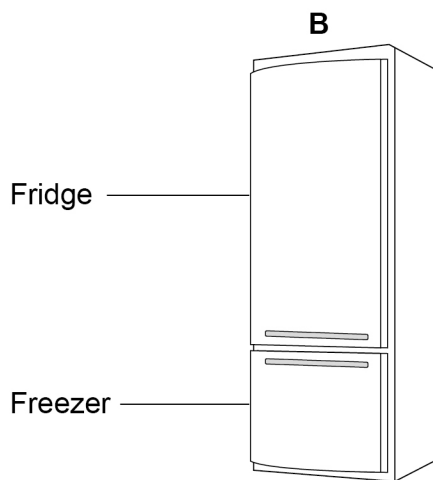
17

Information about two fridge-freezers, A and B, is shown.



Total capacity is 330 litres

fridge capacity : freezer capacity = 3 : 2



Fridge capacity is 294 litres

fridge capacity : freezer capacity = 7 : 3

Grace buys one of these fridge-freezers.

She buys the one with the greater **freezer** capacity.

Which one does she buy?

You **must** show your working.

[4 marks]

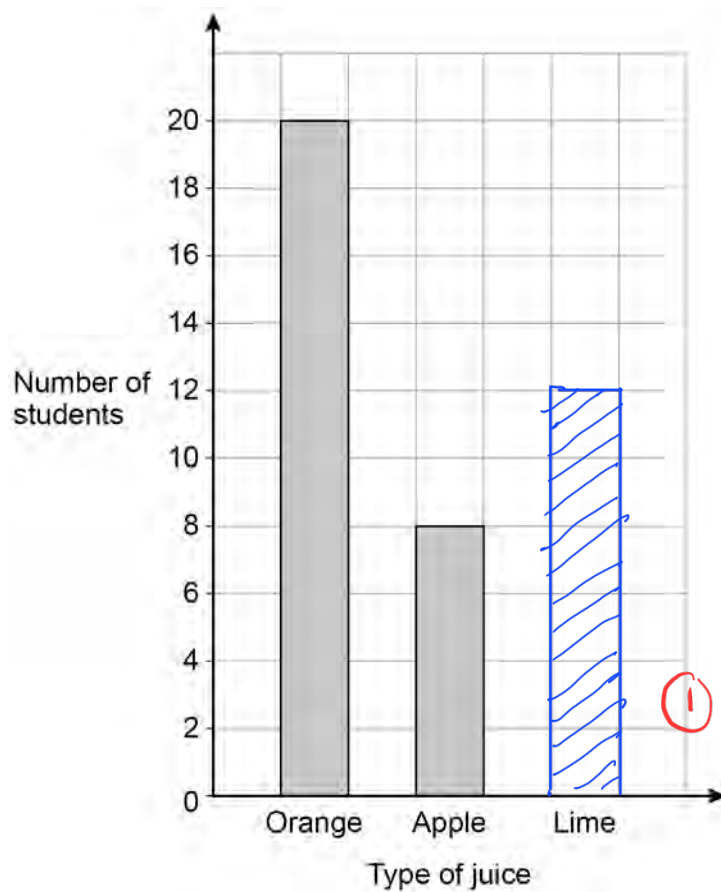
$$A : \frac{2}{3+2} \times 330 = \frac{2}{5} \times 330 = 132 \quad (1)$$

$$B : \frac{294}{7} \times 3 = 126 \quad (1)$$

Grace buys A. (1)

Answer A

- 18 Students choose juice with their school meal in the ratio
orange : apple : lime = 5 : 2 : 3



Complete the bar chart.

[3 marks]

$$\frac{3}{5} \times 20 = 12$$

19 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]

$$\text{Andrew : } \frac{96}{6} \times 5 = 80 \quad (1)$$

$$\text{Andrew gives : } \frac{1}{4} \times 80 = 20 \quad (1)$$

$$\text{Bruce gives : } \frac{2}{3} \times 96 = 64 \quad (1)$$

$$\text{Carl : } 20 + 64 = 84 \quad (1)$$

Answer £ 84

20 (a) There are green pens and red pens in the box.

The ratio of green : red is 4 : 3

What fraction of the pens are green?

[1 mark]

$$\text{Total ratio} = 4 + 3 = 7$$

$$\frac{4}{7}$$

①

Answer $\frac{4}{7}$

21

Kai says that $3 : 2$ is an equivalent ratio to $9 : 6$

Jo says that $1.5 : 1$ is an equivalent ratio to $9 : 6$

Who is correct?

Tick **one** box.

☒

Both of them

1

☐

Kai only

☐

Jo only

☐

Neither of them

Give reasons for your answer.

[2 marks]

Kai : $3 : 2 \xrightarrow{\times 3} 9 : 6$

Jo : $1.5 : 1 \xrightarrow{\times 6} 9 : 6$

1

22

Jess saves 2p, 5p and 10p coins.

She has

- 45 10p coins
- 8 times as many 2p coins as **10p coins**
- £17.70 in total.

Work out total **value** of 2p coins : total **value** of 5p coins

Give your answer in its simplest form.

[4 marks]

$$2p : 45 \times 8 = 360 \text{ coins} \quad (1)$$

$$5p : 17.70 - (45 \times 0.10) - (360 \times 0.20)$$

$$: 17.70 - 4.50 - 7.20 \quad (1)$$

$$: 6.00 \quad (1)$$

$$2p : 7.20$$

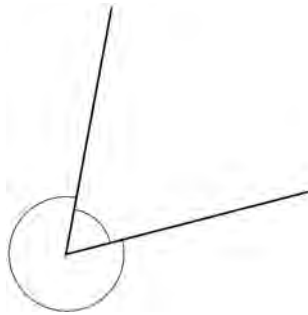
$$2p : 5p = 7.20 : 6.00 \quad \downarrow \div 12$$

$$= 6 : 5 \quad (1)$$

Answer 6 : 5

23

Two angles around a point are shown.

Not drawn
accurately

The angles are in the ratio 2 : 7

Show that the larger angle is 280°

[2 marks]

$$2 + 7 = 9$$

(2)

$$\frac{7}{9} \times 360^\circ = 280^\circ$$

24

Jing has £2450

She saves some and gives the rest to her four brothers.

money saved : money given to brothers = 2 : 5

She gives each of her **four** brothers the **same** amount.

Does each brother receive more than £430 ?

You **must** show your working.

[4 marks]

Total ratio : $2 + 5 = 7$ money she gives : $\frac{5}{7} \times 2450 = 1750$ (1) (1)Each brother receive : $\frac{1750}{4} = 437.50$ (1)

Yes. Each receive £437.50.

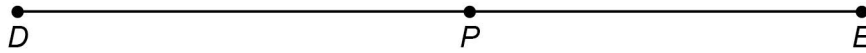
(1)

- 25 (a) A straight path between D and E passes through P .

$$DE = 200 \text{ metres}$$

P is 60 metres **closer** to E than to D .

Not drawn
accurately



Work out the ratio $DP : PE$

Give your answer in its simplest form.

[3 marks]

$$PE = \frac{200 - 60}{2} = 70 \quad (1)$$

$$DP = 200 - 70 = 130$$

(1)

$$DP : PE = 130 : 70$$

$$= 13 : 7 \quad (1)$$

Answer 13 : 7

26

Divide 62 in the ratio 3 : 7

[3 marks]

$$\text{Total ratio} = 3 + 7 = 10 \quad (1)$$

$$62 \div 10 = 6.2$$

$$6.2 \times 3 = 18.6 \quad , \quad 6.2 \times 7 = 43.4$$

(1)

Answer 18.6 and 43.4 (1)

27 Write $(3^6 \times 3^5) : 3^7$ in the form $n : 1$ where n is an integer.

[3 marks]

$$3^{6+5} : 3^7$$

$$= 3^{11} : 3^7$$

$$3^4 : 1$$

$$= 81 : 1$$

Answer 81 : 1

28 a is 10% more than b .

Circle the ratio $a : b$

[1 mark]

10 : 11

10 : 1

11 : 10

1 : 10

- 29 On a train, there are between 60 and 70 people.
The ratio of adults to children is 5 : 4
Work out the **total** number of people on the train. [2 marks]

$$\text{Total ratio} = 5 + 4 = 9 \quad (1)$$

Total number should be divisible by 9.

$$= 63 \div 9 = 7$$

Answer 63 (1)

30

Joe, Kim and Lisa each have an amount of money.

Joe has £72

Joe's amount : Kim's amount = 6 : 5

Lisa's amount is $1\frac{1}{2}$ times Joe's amount.

Show that, in total, they have **less** than £250

[3 marks]

$$\text{Kim's amount : } \frac{£72}{6} \times 5 = £60 \quad (1)$$

$$\text{Lisa's amount : } 1.5 \times £72 = £108 \quad (1)$$

$$\text{Total amount : } £72 + £60 + £108$$

$$= £240 \quad (1)$$

31

Here are the results after 250 spins of a coin.

Heads	128
Tails	122

The coin is spun an extra 50 times.

After all 300 spins, the relative frequency of Heads is 0.49

For the **extra 50 spins**, work out number of Heads : number of Tails**[3 marks]**

After 300 spins :

$$(\text{Heads}) \quad 0.49 \times 300 = 147 \quad (1)$$

$$(\text{Tails}) \quad 0.51 \times 300 = 153$$

$$\text{For extra 50 spins: } (\text{Heads}) : 147 - 128 = 19 \quad (1)$$

$$(\text{Tails}) : 153 - 122 = 31$$

Answer 19 : 31 (1)

- 32 (a) Two friends share £240 in the ratio 1 : 3

Work out the larger share.

[2 marks]

$$\text{Total ratio} = 1 + 3 = 4$$

$$\text{Larger ratio} = \frac{3}{4}$$

$$\begin{aligned}\text{Larger share} &= \frac{3}{4} \times \pounds 240 \quad \checkmark \textcircled{1} \\ &= \pounds 180\end{aligned}$$

Answer £ 180 $\checkmark \textcircled{1}$

- 32 (b) A tennis player wins or loses matches in the ratio win : lose = 5 : 9

What fraction of the matches do they win? $\text{Total fraction} = 5 + 9 = 14$

[1 mark]

$$\text{Fraction of matches won} = \frac{5}{14} \quad \checkmark \textcircled{1}$$

Answer $\frac{5}{14}$

33

- A pack of pegs costs 40p
- A bar of soap costs £2.20
- A basket costs £7

Dan buys **two** packs of pegs, **one** bar of soap and **one** basket.

What fraction of the total cost is the cost of the basket?

[3 marks]

$$\begin{aligned}\text{Total cost} &: 2(\text{£}0.40) + \text{£}2.20 + \text{£}7 \quad \checkmark \textcircled{1} \\ &= \text{£}0.80 + \text{£}2.20 + \text{£}7 \quad \checkmark \textcircled{1} \\ &= \text{£}10\end{aligned}$$

Fraction of basket's price to total price :

$$\frac{7}{10}$$

Answer $\frac{7}{10}$ $\checkmark \textcircled{1}$

- 34 (a) There are 30 students in a class.
12 of the students have school lunch.

Work out the ratio

students having school lunch : students not having school lunch

Give your answer in its simplest form.

[2 marks]

$$\text{students not having lunch : } 30 - 12 = 18$$

$$\text{ratio of lunch : no lunch} = 12 : 18 \quad \checkmark \textcircled{1}$$

$$= 2 : 3$$

Answer $\underline{2} : \underline{3} \quad \checkmark \textcircled{1}$

- 34 (b) In a different class

students wearing glasses : students not wearing glasses = 3 : 8

What fraction of students in this class wear glasses?

[1 mark]

$$\text{Total ratio : } 3 + 8 = 11$$

Answer $\underline{\frac{3}{11}} \quad \checkmark \textcircled{1}$

- 34 (c) The ratio 4 : 9 is written in the form 1 : n

Work out the value of n .

[1 mark]

$$\begin{array}{c} 4 : 9 \\ \div 4 \quad \downarrow \quad \div 4 \\ 1 : \frac{9}{4} \end{array}$$

$n = \underline{\frac{9}{4}} \quad \checkmark \textcircled{1}$