1.   There are 30 children in a nursery school.
      At least 1 adult is needed for every 8 children in the nursery.

      (a) Work out the least number of adults needed in the nursery.

$$\frac{30}{8} = 3.75$$

$$3.75 \rightarrow 4$$

....4.......................................
      (2)

      2 more children join the nursery.
      32 children
      (b) Does this mean that more adults are needed in the nursery? $\frac{32}{8} = 4$
            You must give a reason for your answer.

.......No, because 32÷8 is also 4...

12   7   19

18   8   26

30   15   45

8 short haired females $\frac{8}{45}$
45 in total

2 : 6 : 3
H : R : K

45 × 3 = 135

2 + 5 + 3 = 10

$\frac{450}{10}$ = 45

135

2. Here is a list of ingredients for making 16 flapjacks.

Ingredients for 16 flapjacks

120 g butter
140 g brown sugar
250 g oats
2 tablespoons syrup

Jenny wants to make 24 flapjacks.

Work out how much of each of the ingredients she needs.

16 $\xrightarrow[\times 1.5]{}$ 24

120 × 1.5 = 180
140 × 1.5 = 210
250 × 1.5 = 375
2 × 1.5 = 3

butter ....180............ g

brown sugar ......210............ g

oats ....375........... g

syrup ....3....... tablespoons

(Total for Question   is 3 marks)

3.   The diagram shows a logo made from three circles.
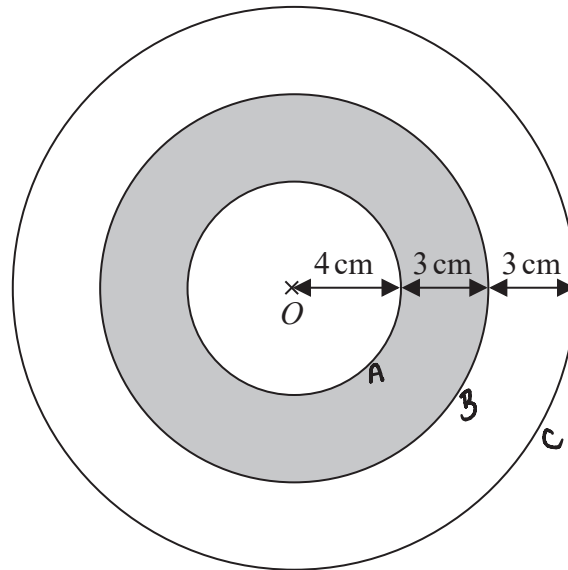
Each circle has centre *O*.

Daisy says that exactly $\frac{1}{3}$ of the logo is shaded.

Is Daisy correct?
You must show all your working.

Area of circle $= \pi r^2$

A $\pi \times 4^2$
     $= 16\pi$

B $\pi \times 7^2$
     $= 49\pi$

C $\pi \times 10^2$
     100π

B − A

Shaded Area
     $= 49\pi - 16\pi$
     $= 33\pi$

$\dfrac{33\pi}{100\pi}$

$= \dfrac{33}{100}$

Daisy is not correct because $\dfrac{33}{100} \neq \dfrac{1}{3}$

(Total for Question   is 4 marks)

4. Gavin, Harry and Isabel each earn the same monthly salary.

Each month,

Gavin **saves** 28% of his salary and spends the rest of his salary

Harry spends $\dfrac{3}{4}$ of his salary and **saves** the rest of his salary

the amount of salary Isabel saves : the amount of salary she spends = 3 : 7

Work out who saves the most of their salary each month.
You must show how you get your answer.

e.g. fractions /·/· /ratios

We need to convert each value into the same form.
I chose to change them all into percentages so that I could
easily work with each value (also 28% is already a percentage
so speeds up the process).

Percentage Saved

$$G = 28\%$$

$$H = 1 - \frac{3}{4} = \frac{1}{4} = 25\%$$

$$I = 3:7 \qquad \frac{3}{3+7} = \frac{3}{10} \xrightarrow{\times 10} \frac{30}{100} = 30\%$$

$$S_a : S_p$$

Isabel saves the most (greatest proportion of the salary).

$$30\% > 28\% > 25\%$$

(Total for Question   is 4 marks)

5. Here is the list of ingredients for making 30 biscuits.

> Ingredients for 30 biscuits
>
> 225 g butter
> 110 g caster sugar
> 275 g plain flour
> 75 g chocolate chips

Lucas has the following ingredients.   *How many batches can be made (looking at one ingredient at a time).*

900 g butter $900 \div 225 = 4$

1000 g caster sugar $1000 \div 110 = 9.09...$ ①

1000 g plain flour $1000 \div 275 = 3.6...$

225 g chocolate chips $225 \div 75 = 3$ ← *3 = smallest number of batches*

What is the greatest number of biscuits Lucas can make?   *Chocolate chips are the limiting ingredient here*
You must show your working.   *so a maximum of 3 batches can be made*

①

$3 \times 30 = 90$

↑ *batch maximum*   ↑ *biscuits in a batch*

90   ①

(Total for Question   **is 3 marks)**

6.   Raya buys a van for £8500 plus VAT at 20%

Raya pays a deposit for the van.
She then pays the rest of the cost in 12 equal payments of £531.25 each month.

Find the ratio of the deposit Raya pays to the total of the 12 equal payments.
Give your answer in its simplest form.

A) Total Cost of Van :

= 120% of £8500

1.2 × 8500 = £10 200 ①

B) Total Cost of payments:

12 × £531.25 = £6375 ①

c) Deposit : $\overset{A}{\text{Van cost}} - \overset{B}{\text{Payment cost}}$

= 10200 − 6375

= £3825 ①

$\overset{C}{\text{Deposit}}$: $\overset{B}{\text{Total of 12 payments}}$

3825 : 6375 ①

Simplify Ratio

÷3825 $\left(\begin{array}{ccc} 3825 & : & 6375 \\ 1 & : & \frac{5}{3} \end{array}\right)$ ÷3825

×3 $\left(\begin{array}{ccc} 3 & : & 5 \end{array}\right)$ ×3

↖ Whole number ratio

3 : 5 ①

(Total for Question is 5 marks)

7.   Alan, Bispah and Chan share a sum of money.

Alan gets $\frac{1}{8}$ of the money.

Bispah gets $\frac{1}{2}$ of the money.

Chan gets the rest of the money.

Alan gets £2.50

(a) Work out how much money Bispah gets.

↙ Alan gets $\frac{1}{8}$ of the total. Alan gets £2.50

$\times 8 \left(\begin{array}{c} \frac{1}{8}t = £2.50 \\ t = 2.50 \times 8 ① \\ t = £20 \end{array} \right) \times 8$ t = total money

↙ Bispah gets $\frac{1}{2}$ of the total (t)

$B = \frac{1}{2}t = \frac{1}{2} \times 20$
$= £10$

£ 10 ①

(2)

(b) Find the ratio

amount of money Alan gets : amount of money Chan gets

Give your answer in the form $a:b$ where a and b are whole numbers.

$A = £2.50$ $t = £20$
$B = £10$

Chan's Share:
$C = 20 - 10 - 2.50 = 7.50$ ①

Alan : Chan
$\div 2.50 \left(\begin{array}{c} £2.50 : £7.50 \\ 1 : 3 \end{array} \right) \div 2.50$ ①   ← we need a ratio with whole numbers

$1 : 3$ ①

(3)

(Total for Question   is 5 marks)

8. There are some counters in a bag.
The counters are red or white or blue or yellow.

Bob is going to take at random a counter from the bag.

The table shows each of the probabilities that the counter will be blue or will be yellow.

Colour	red	white	blue	yellow
Probability	$2x$	x	0.45	0.25

There are 18 blue counters in the bag.

The probability that the counter Bob takes will be red is twice the probability that the counter will be white.

(a) Work out the number of red counters in the bag.

Probabilities sum to 1:

$2x + x + 0.45 + 0.25 = 1$

$3x = 0.3$ ①

$x = 0.1$

$2x = P(\text{Red}) = 0.2$ ①

$P(\text{Blue}) = 0.45$

   ↳ total counters

$0.45t = 18$ ← number of blue counters

$t = \dfrac{18}{0.45} = 40 \text{ counters}$ ①

Number of red counters:

$40 \times 0.2 = 8$

       8   ①

(4)

A marble is going to be taken at random from a box of marbles.
The probability that the marble will be silver is 0.5

$\dfrac{1}{2} t$ must be a whole number

There must be an even number of marbles in the box.

(b) Explain why.

0.5 multiplied by an odd number will never be a whole number and we can not have half a marble. For half of a number to be an integer, the number must be even.

(1)

(Total for Question   is 5 marks)

9.   Shahid is going to use these instructions to make a fizzy drink.

> Mix 5 parts of orange juice
> with 2 parts of lemonade

Shahid thinks that he has 300 m*l* of orange juice and 200 m*l* of lemonade.

(a) If Shahid is correct, what is the greatest amount of fizzy drink he can make?

$$\frac{300}{5} = 60ml \text{ per part of orange juice} \checkmark$$

$$\frac{200}{2} = 100ml \text{ per part of lemonade}$$

1 part = 60ml

5 parts = 60 × 5   2 parts = 60 × 2
        = 300ml   = 120ml ✓

                  300 + 120 = 420ml

.... 420 ✓ .... m*l*

                                                        (3)

Shahid has 300 m*l* of orange juice but he only has 160 m*l* of lemonade.

(b) Does this affect the greatest amount of fizzy drink he can make?
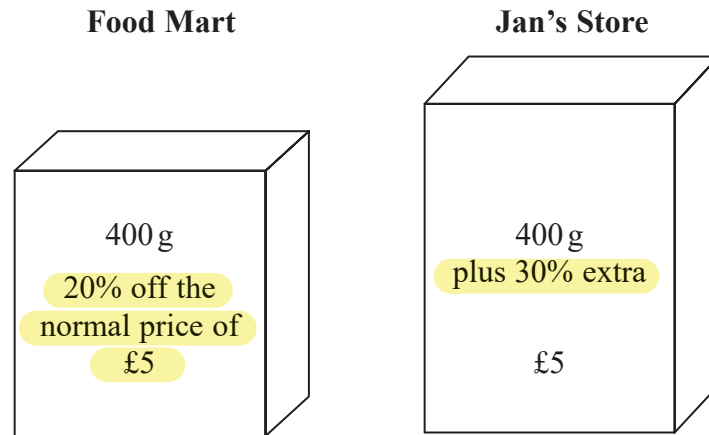   Give a reason for your answer.

No, because only 120ml of lemonade is required to
make 420ml of the fizzy drink ✓

                                                        (1)

                            (Total for Question   is 4 marks)

10. Food Mart and Jan's Store sell boxes of the same type of breakfast cereal.

Each shop has a special offer.

Food Mart   **Jan's Store**

400 g

20% off the normal price of £5

400 g

plus 30% extra

£5

Which box of cereal is the better value for money?
You must show your working.

£5 ⟶ 100%.

↓÷5   ↓÷5

£1 ⟶ 20%.

5 - 1 = £4 ✓

Food Mart
400g costs £4
(÷4)   (÷4)
100g costs £1

400g ⟶ 100%.

↓÷10   ↓÷10

40g ⟶ 10%.

↓×3   ↓×3

120g ⟶ 30%.

400 + 120 = 520g ✓

Jan's Store
520g costs £5
(÷5)   (÷5)
104g costs £1 ✓

Jan's store because 104g costs £1 ✓

(Total for Question   is 4 marks)

11. A bonus of £2100 is shared by 10 people who work for a company.
40% of the bonus is shared equally between 3 managers.
The rest of the bonus is shared equally between 7 salesmen.

One of the salesmen says,

  "If the bonus is shared equally between all 10 people I will get 25% more money."

Is the salesman correct?
You must show how you get your answer.

$$100\% - 40\% = 60\%$$
$$50\% + 10\% = 60\% \checkmark$$
$$1050 + 210 = 1260 \checkmark$$
$$1260 \div 7 = 180 \checkmark$$

$$\begin{array}{r} 0\ 1\ 8\ 0 \\ 7\overline{)1\ {}^12\ {}^56\ 0} \end{array}$$

Amount per salesman is £180
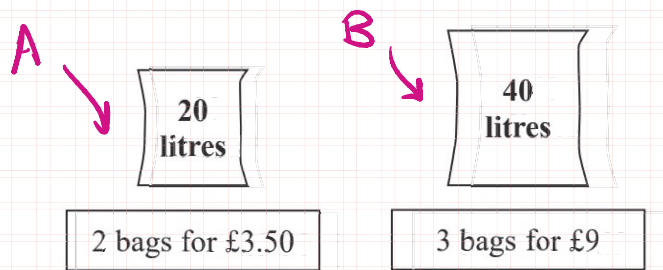
$$2100 \div 10 = 210 \checkmark$$

$$125\% = 100\% + 25\%$$

$$= 180 + 45$$
$$= £225$$

No, because when split evenly, each salesman gets
£210, but 25% extra from £180 is £225 $\checkmark$

(Total for Question   is 5 marks)

12. A shop sells compost in 20 litre bags and in 40 litre bags.
One day the shop had two special offers for the compost.

A ↘

```
20
litres
```

B ↘

```
40
litres
```

| 2 bags for £3.50 |

| 3 bags for £9 |

Which offer is the better value for money?
You must show how you get your answer.

Work out how much 1 litre is worth in each deal

A ↘   20 l each ↙

B ↘   40 l each ↙

2 **bags** = £3.50   3 **bags** = £9   ②

$(2 \times 20l) = £3.50$ $(3 \times 40l) = £9$

$40l = £3.50$ $120l = £9$

÷40 ⎰ $1l = £0.0875$ ⎱ ÷40   ÷120 ⎰ $1l = £0.075$ ⎱ ÷120

$0.075 < 0.0875$ so 3 40l bags for £9 is
better value for money   ①

13. Here are the ingredients needed to make 16 biscuits.

Biscuits

Ingredients to make **16** biscuits

175 g of butter
75 g of sugar
250 g of flour

For 1 biscuit
$\frac{175}{16}$ g butter
$\frac{75}{16}$ g sugar
$\frac{250}{16}$ g flour

Anna has
500 g of butter
300 g of sugar
625 g of flour

Work out the greatest number of biscuits Anna can make.

Butter : $500 \div \left[\frac{175}{16}\right] = 45.714 = 45$ whole biscuits

Sugar : $300 \div \left[\frac{75}{16}\right] = 64$ whole biscuits ②

Flour : $625 \div \left[\frac{250}{16}\right] = 40$ whole biscuits

We're limited by ingredient that can make the least biscuits so Anna can make 40 biscuits ①

14.   Here are the costs of the same type of batteries in two shops.

Shop **A**
Pack of 4 batteries £1.60

Shop **B**
Pack of 6 batteries £2.70

Harry needs to buy at least 30 batteries.
He assumes that he has to buy batteries in whole packs.
Harry wants to buy the batteries as cheaply as possible from the same shop.

(a) Which shop should he buy the batteries from, shop **A** or shop **B**?
     You must show all your working.

SHOP A | SHOP B

7 packs = 4 × 7 = 28 batteries
↳ Not enough.
8 packs = 4 × 8 = 32 batteries
↳ Enough.
①
∴ minimum 8 packs needed from shop A.
①

×8 (1 pack = £1·60) ×8
       8 packs = £12·80

SHOP B

5 packs = 6 × 5 = 30 batteries
↳ Perfect amount.

∴ 5 packs needed from shop B.

×5 (1 pack = £2·70) ×5
       5 packs = £13·50

①

①

£12·80 < £13·50 ∴ he should buy the batteries from Shop A.

(4)

Harry's assumption is wrong.
He can buy single batteries for 40p each in shop **A** and for 45p each in shop **B**.

(b) Does this affect which of these two shops Harry should buy the batteries from?
     Give a reason for your answer.

30 batteries from A = £0·40 × 30 = £12.
30 batteries from B = £0·45 × 30 = £13·50   ①
Shop A is still cheaper than shop B ∴ there is no effect.

(1)

(Total for Question   is 5 marks)