

Q1



To find the price of the adult ticket, we need to reduce £24 by $\frac{1}{3}$

Find $\frac{1}{3}$ of £24, and then subtract this from £24

$$\frac{1}{3} \text{ of } £24 = £8$$

$$£24 - £8 = £16$$

[]

The adult ticket costs £16 when using the Family Railcard

To find the price of a child ticket, we need to reduce £12 by 60%

This is the same as finding 40% of the price, as $100\% - 60\% = 40\%$

We can use a multiplier of 0.4 to find 40%

$$£12 \times 0.4 = £4.80$$

[]

Children's tickets cost £4.80 with the Family Railcard

Find the total cost for 1 adult and 2 children

$$£16 + £4.80 + £4.80$$

[]

£25.60 []

Q2



Write out each number in a longer form, to make comparing them easier

$$0.2\dot{4}6 = 0.246464646\dots$$

$$0.24\dot{6} = 0.246666666\dots$$

$$0.\dot{2}46 = 0.246246246\dots$$

$$0.246 = 0.246000000\dots$$

Correct use of recurring symbol[]

The numbers are the same up to the 3rd decimal place, but are different from the 4th decimal place onwards

$$0.2\dot{4}6 = 0.246 \mathbf{464646} \dots$$

$$0.24\dot{6} = 0.246 \mathbf{666666} \dots$$

$$0.\dot{2}46 = 0.246 \mathbf{246246} \dots$$

$$0.246 = 0.246 \mathbf{000000} \dots$$

Putting the numbers in order, with the smallest first

$$0.24600000\dots$$

$$0.246246246\dots$$

$$0.246464646\dots$$

$$0.246666666\dots$$

0.246, 0.246̄, 0.246̇, 0.246̈ []

Q3

3

Let x be the recurring decimal

$$x = 0.36363636\dots$$

Multiply both sides by 10

$$10x = 3.6363636\dots$$

Multiply both sides by 10 again

$$100x = 36.363636\dots$$

[]

The two equations for $100x$ and x both contain the trail of $.363636\dots$, so we can find $100x - x$ to eliminate the recurring part

$$100x - x = 36.36363636\dots - 0.36363636\dots$$

[]

Simplifying

$$99x = 36$$

Divide both sides by 99

$$x = \frac{36}{99}$$

Simplify the fraction by dividing the top and bottom by 9

$$x = \frac{4}{11} \quad []$$

Q4

4

Let x be the recurring decimal

$$x = 0.396396396396396\dots$$

Multiply both sides by 10

$$10x = 3.963963963963\dots$$

Multiply both sides by 10 again

$$100x = 39.639639639\dots$$

There is still no pair of equations with a matching decimal part, so multiply by 10 again

$$1000x = 396.396396396396\dots$$

The two equations for $1000x$ and x both contain the trail of $.396396396\dots$, so we can find $1000x - x$ to eliminate the recurring part

$$1000x - x = 396.396396396\dots - 0.396396396\dots$$

[]

Simplifying

$$999x = 396$$

Divide both sides by 999

$$x = \frac{396}{999}$$

Simplify the fraction by dividing the top and bottom by 9

$$x = \frac{44}{111} \quad []$$

Q5

5

Let x be the recurring decimal

$$x = 0.417417417417\dots$$

Multiply both sides by 10

$$10x = 4.174174174174\dots$$

Multiply both sides by 10 again

$$100x = 41.741741741741\dots$$

There is still no pair of equations with a matching decimal part, so multiply by 10 again

$$1000x = 417.417417417417\dots$$

The two equations for $1000x$ and x both contain the trail of $.417417417\dots$, so we can find $1000x - x$ to eliminate the recurring part

$$1000x - x = 417.417417417\dots - 0.417417417\dots$$

[]

Simplifying

$$999x = 417$$

Divide both sides by 999

$$x = \frac{417}{999}$$

Simplify the fraction by dividing the top and bottom by 3

$$x = \frac{139}{333} \quad []$$

Q6

6

The ratio of team A to team B is 3:4, this means that

$$\frac{3}{7} \text{ are in team A}$$

$$\frac{4}{7} \text{ are in team B}$$

 $\frac{4}{5}$ of team A work full time, so we need to find $\frac{4}{5}$ of $\frac{3}{7}$

$$\frac{4}{5} \times \frac{3}{7} = \frac{4 \times 3}{5 \times 7} = \frac{12}{35}$$

24% of team B work full time, so we need to find 24% of $\frac{4}{7}$ 24% is equal to $\frac{24}{100}$ which simplifies to $\frac{6}{25}$

$$\frac{6}{25} \times \frac{4}{7} = \frac{6 \times 4}{25 \times 7} = \frac{24}{175}$$

Finding either $\frac{12}{35}$ or $\frac{24}{175}$ []

We can now find the total fraction of the company work full time by adding these together

$$\frac{12}{35} + \frac{24}{175} = \frac{12 \times 5}{35 \times 5} + \frac{24}{175} = \frac{60}{175} + \frac{24}{175} = \frac{84}{175}$$

[]

Simplify by dividing the top and bottom by 7

$$\frac{12}{25} \quad []$$

Q7

We need to find out how many cakes of each type were sold
 First, divide the 80 cakes in the ratio 3:2:5
 This means there are 10 parts in total

$$\frac{3}{10} \times 80 = 24 \text{ chocolate cakes}$$

$$\frac{2}{10} \times 80 = 16 \text{ lemon cakes}$$

$$\frac{5}{10} \times 80 = 40 \text{ fruit cakes}$$

[3]

Alex sells all of the chocolate cakes

24 chocolate cakes sold

$\frac{3}{4}$ of the lemon cakes

$$\frac{3}{4} \times 16 = 12 \text{ lemon cakes sold}$$

$\frac{7}{8}$ of the fruit cakes

$$\frac{7}{8} \times 40 = 35 \text{ fruit cakes sold}$$

[1]

We can now multiply the numbers of each cake sold, by the profit Alex makes on each type of cake using the table provided in the question

We can now multiply the numbers of each cake sold, by the profit Alex makes on each type of cake using the table provided in the question

$$\begin{aligned} \text{Chocolate cake profit: } & 24 \times \text{£}2.00 = \text{£}48.00 \\ \text{Lemon cake profit: } & 12 \times \text{£}1.70 = \text{£}20.40 \\ \text{Fruit cake profit: } & 35 \times \text{£}2.40 = \text{£}84.00 \\ \text{Total profit} & = \text{£}48.00 + \text{£}20.40 + \text{£}84.00 = \text{£}152.40 \end{aligned}$$

£152.40 [1]

Q8

8

Let x be the recurring decimal

$$x = 0.254545454\dots$$

Multiply both sides by 10

$$10x = 2.54545454\dots$$

Multiply both sides by 10 again

$$100x = 25.45454545\dots$$

Multiply both sides by 10 again

$$1000x = 254.54545454\dots$$

The two equations for $1000x$ and $10x$ both contain the trail of $.545454\dots$, so we can find $1000x - 10x$ to eliminate the recurring part

$$1000x - 10x = 254.545454\dots - 2.545454\dots$$

[1]

Simplifying

$$990x = 252$$

Divide both sides by 990

$$x = \frac{252}{990}$$

Simplify the fraction by dividing the top and bottom by 18

$$x = \frac{14}{55} \quad [1]$$

Q9

9

120 books are bought for £4 each

$$120 \times £4 = £480 \text{ spent}$$

[1]

 $\frac{1}{2}$ of the books are sold for £5 each

$$\frac{1}{2} \times 120 = 60 \text{ books}$$

$$60 \times £5 = £300 \text{ income}$$

Income for at least one of the selling prices [1]

40% are sold for £7 each

$$0.4 \times 120 = 48 \text{ books}$$

$$48 \times £7 = £336 \text{ income}$$

The rest are sold for £8 each

$\frac{1}{2}$ (50%) were sold at £5, and 40% were sold at £7, which adds up to 90%. So 10% remain

$$0.1 \times 120 = 12 \text{ books}$$

$$12 \times £8 = £96 \text{ income}$$

Find the total income

$$£300 + £336 + £96 = £732$$

Method to find total income [1]

Find the total income

$$£300 + £336 + £96 = £732$$

*Method to find total income [1]*Find the percentage profit using $\frac{\text{Income} - \text{Amount Spent}}{\text{Amount Spent}} \times 100$

$$\frac{732 - 480}{480} \times 100 = 52.5\%$$

*Method to find percentage profit [1]***52.5% [1]**

Q10

As Ahmed has 20% more money than Behnaz, we can use a multiplier of 1.2 to show this
i.e. Ahmed has 120% of the money that Behnaz has

$$\textcircled{1} \quad 1.2 \times B = A$$

Carmen has $\frac{7}{8}$ of the amount that Behnaz has, so we can write

$$\textcircled{2} \quad C = \frac{7}{8} \times B$$

Finally, we are told that Carmen has 31.50 euros, so we can write

$$C = 31.50$$

We can then substitute this into equation $\textcircled{2}$

$$31.50 = \frac{7}{8} \times B$$

Multiply both sides by 8, and then divide both sides by 7, to find B

$$\begin{aligned} 252 &= 7B \\ 36 &= B \end{aligned}$$

[1]

We can then substitute this into equation $\textcircled{1}$

$$1.2 \times 36 = A$$

[1]

$$43.2 = A$$

Ahmed has 43.20 euros [1]

Q11

11

The total of James' marks is the sum of the numerators for Paper 1 and Paper 2, plus x if we let x be his Paper 3 mark.

$$\text{James' total mark} = 43 + 38 + x = 81 + x$$

The total marks available in all three papers is the sum of the denominators for Papers 1 and 2, plus 95.

$$\text{Total marks available} = 80 + 65 + 95 = 240$$

[1]

The percentage of the three papers is James' total mark ($81 + x$) over the the total marks available (240). Make an equation equating this to 60% (60% is 0.6).

$$\frac{81 + x}{240} = 0.6$$

Solve. Start by multiplying both sides by 240 to clear the fraction.

$$\begin{aligned} 81 + x &= 240 \times 0.6 \\ 81 + x &= 144 \end{aligned}$$

[1]

Subtract 81 from both sides.

$$x = 144 - 81$$

[1]

Answer = 63 marks [1]

Q12

12a

Let x be the recurring decimal

$$x = 0.19191919\dots$$

Multiply both sides by 10

$$10x = 1.91919191\dots$$

Multiply both sides by 10 again

$$100x = 19.191919\dots$$

[1]

The two equations for $100x$ and x both contain the trail of $.191919\dots$, so we can find $100x - x$ to eliminate the recurring part

$$100x - x = 19.191919\dots - 0.19191919\dots$$

[1]

Simplifying

$$99x = 19$$

Divide both sides by 99

$$x = \frac{19}{99} \quad [1]$$

12b

$\frac{19}{990}$ is $\frac{19}{99}$ divided by 10. So it is also $0.\dot{1}9$ divided by 10.

$$\frac{19}{990} = 0.\dot{1}9 \div 10$$

this line or an equivalent statement must be seen to score any marks [1]

Answer = $0.0\dot{1}9$ [1]

No marks are scored in this question unless the method is shown!