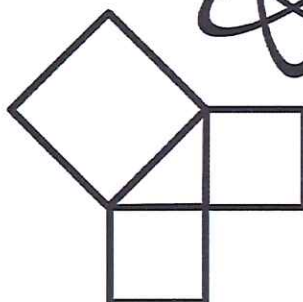
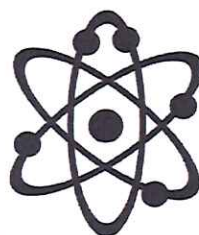
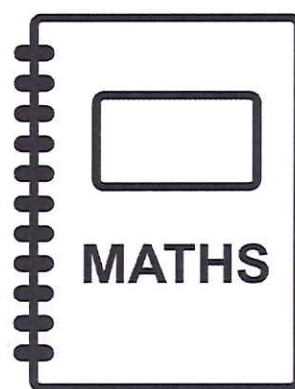
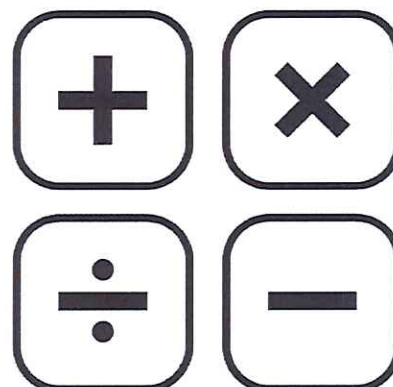
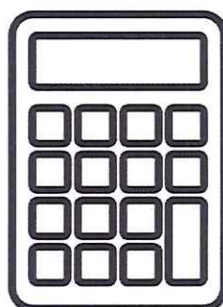
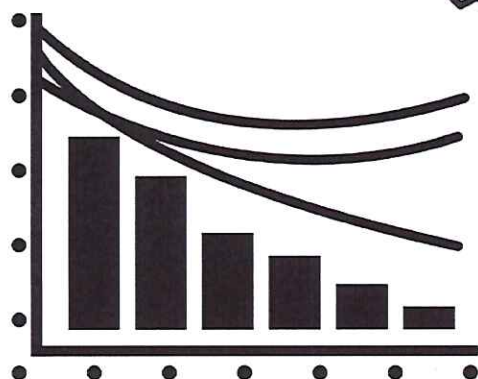
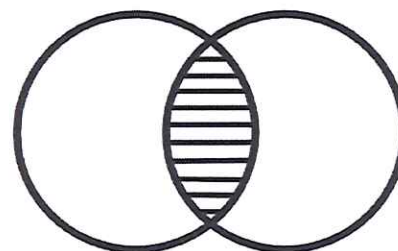
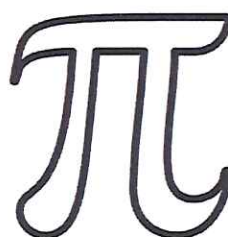
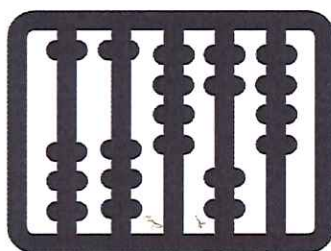
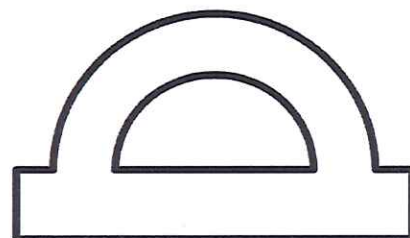


SOLUTIONS

GCSE TOPIC BOOKLET FRACTIONS



$$a^2 = b^2 + c^2$$



1.

In a competition a player gains 1 point for a win, $\frac{1}{2}$ a point for a draw and no points for a loss. Each player plays 10 games.

Calculate the total number of points gained by a player who loses 2 games, draws 5 games and wins all the rest → wins 3

$$(5 \times \frac{1}{2}) + (3 \times 1) = 2\frac{1}{2} + 3 = 5\frac{1}{2}$$

[3]

2.

a) Karim painted a fence.

On Monday, he painted $\frac{7}{10}$ of the fence.

On Tuesday, he painted another $\frac{1}{5}$ of the fence.

On Wednesday, he finished painting the fence.

What fraction of the fence did Karim paint on Wednesday?

[3]

$$\frac{7}{10} + \frac{1}{5} = \frac{7}{10} + \frac{2}{10} = \frac{9}{10} \quad | - \frac{9}{10} = \frac{1}{10}$$

Wednesday painted $\frac{1}{10}$

b) Hanna earns £142 each week. She spends $\frac{2}{5}$ of this amount on food.

How much money does Hanna spend on food?

Find $\frac{1}{5}$ first 28.40
 $5 \overline{) 142.00}$

$$\frac{2}{5} \rightarrow 2 \times 28.40 = \underline{\underline{£56.80}}$$

[2]

3.

- (a) Write $\frac{3}{4}$, $\frac{9}{10}$, and $\frac{5}{8}$ in descending order.

← careful

Show all your working.

[3]

Need common denominator of 40

$$\begin{array}{r} \times 10 \\ 3 \overline{) 30} \\ 4 \overline{) 40} \\ \times 10 \end{array}$$

$$\begin{array}{r} \times 4 \\ 9 \overline{) 36} \\ 10 \overline{) 40} \\ \times 4 \end{array}$$

$$\begin{array}{r} \times 5 \\ 5 \overline{) 25} \\ 8 \overline{) 40} \\ \times 5 \end{array}$$

$$\frac{9}{10}, \frac{3}{4}, \frac{5}{8}$$

- (b) Write 40p as a fraction of £2 in its simplest form.

[2]

$$= \frac{40}{200} = \frac{4}{20} = \frac{2}{10} = \frac{1}{5}$$

4.

Idris comes from a very large family.

He has many relatives, all of whom live in Canada, Japan or Wales.

$\frac{1}{5}$ of his relatives live in Canada, $\frac{3}{8}$ of his relatives live in Japan.

All 34 of his other relatives live in Wales.

How many relatives does Idris have altogether?

[5]

$$\frac{1}{5} + \frac{3}{8} = \frac{8}{40} + \frac{15}{40} = \frac{23}{40}$$

$$\text{Fraction in Wales} = 1 - \frac{23}{40} = \frac{17}{40}$$

$$\therefore \frac{17}{40} \text{ th of his relatives} = 34$$

$$\frac{1}{40} \text{ th of his relatives} = 34 \div 17 = 2$$

$$\text{Idris has } 2 \times 40 = 80 \text{ relatives altogether}$$

5.

Showing all your working, write $\frac{1}{2}$, $\frac{3}{8}$ and $\frac{3}{4}$ in ascending order.

[3]

Common denominator of 8

$$\frac{1}{2} \xrightarrow{\times 4} \frac{4}{8}, \quad \frac{3}{8}, \quad \frac{3}{4} \xrightarrow{\times 2} \frac{6}{8}$$

$$\frac{3}{8}, \quad \frac{1}{2}, \quad \frac{3}{4}$$

6.

Maria sells ribbon.

She has a 400 cm length of ribbon.

Maria cuts off $\frac{3}{10}$ of this ribbon and sells this piece to a customer.

She uses $\frac{2}{5}$ of the remaining ribbon herself to decorate a card.

Then, Maria cuts the ribbon that is left over into three equal lengths.

What is the length of each of these three remaining pieces of ribbon?

[5]

$$\frac{1}{10} \text{ of } 400 = 10 \overline{)400} \quad 40 \text{ cm}$$

$$\frac{3}{10} \text{ of } 400 = 40 \times 3 = 120 \text{ cm sold}$$

$$400 - 120 = 280 \text{ cm left}$$

$$\frac{1}{5} \text{ of } 280 = 5 \overline{)280} \quad 56 \text{ cm}$$

$$\frac{2}{5} \Rightarrow 56 \times 2 = 112 \text{ cm}$$

$$\begin{array}{r} 280 \\ - 112 \\ \hline 168 \end{array}$$

168 cm left

$$\begin{array}{r} 56 \text{ cm} \\ 3 \overline{)168} \end{array}$$

The length of each remaining piece of ribbon is 56 cm

7.

A company registers the number of complaints it receives about its products. They have done this each year for a period of 3 years.

They received 400 complaints in the first year.

get $\frac{9}{10}$

Each year, the number of complaints reduced by $\frac{1}{10}$ of the number received the previous year.

How many complaints did the company receive in the third year?

Second year $\frac{9}{10}$ of 400 = $\frac{9}{10} \times 400 = \frac{3600}{10}$
= 360 complaints

Third year $\frac{9}{10}$ of 360 = $\frac{9}{10} \times 360 = \frac{3240}{10}$
= 324 complaints

[3]

8.

- (a) Use equivalent fractions, with a common denominator, to write $\frac{3}{4}$, $\frac{7}{12}$, $\frac{5}{6}$ and $\frac{2}{3}$ in order with the **smallest** first.
You must show all your working.

Choose common denominator of 12

$\frac{3}{4} \xrightarrow{\times 3} \frac{9}{12}$, $\frac{7}{12}$, $\frac{5}{6} \xrightarrow{\times 2} \frac{10}{12}$, $\frac{2}{3} \xrightarrow{\times 4} \frac{8}{12}$

$\frac{7}{12}$, $\frac{2}{3}$, $\frac{3}{4}$, $\frac{5}{6}$

[3]

- (b) In a school $\frac{3}{5}$ of the pupils are girls.

There are 390 girls in the school.

Calculate the total number of pupils in the school.

$390 = \frac{3}{5}$ th of pupils

$\frac{1}{5} = 3 \overline{) 130}$

Total pupils = $\frac{5}{5} = \frac{130 \times 5}{5}$
650

[3]

650 pupils

9.

(a)

Railcard for 16 to 25 year olds

£30 for a year

Get $\frac{1}{3}$ off all your rail travel

Nerys and Eleri are sisters.

Nerys is 22 years old and Eleri is 27 years old.

The two sisters live in Holyhead.

Their aunt lives in Milford Haven.

They travel by train to visit their aunt 3 times a year.

Nerys buys a 16-25 Railcard to use for these journeys.

They buy single rail tickets for each journey.

The cost of a single rail ticket from Holyhead to Milford Haven is £84.50.

The journey home from Milford Haven also costs £84.50 per ticket.

In a year, how much less does Nerys pay than Eleri for the journeys to Milford Haven and back?

You must show all your working.

[5]

$$\text{Eleri (no railcard)} = 6 \times £84.50 = £507$$

$$\text{Nerys pays } \frac{2}{3} \text{rd of } £84.50 = \frac{2}{3} \times 84.50 = £56.33$$

(nearest penny)

$$= £56.33 \times 6 + £30 \text{ (for railcard)}$$

$$= £367.98$$

$$\therefore £507 - £367.98 = £139.02$$

Nerys pays £139.02 less than Eleri

(examiner accepts answer in the range

$$£138.96 - £139.02)$$

(b) Cristiano is 22 years old.

He sometimes travels from Rhyl to Llandudno Junction by train.

The cost of a single rail ticket from Rhyl to Llandudno Junction is £7.80.

Nerys advises Cristiano to buy a Railcard.

Cristiano says,

It is not worth paying £30 for the Railcard.

How many times in a year would Cristiano have to travel to make it worthwhile for him to buy a Railcard?

[3]

If Cristiano buys the railcard he needs £30 to be less than the amount he would save

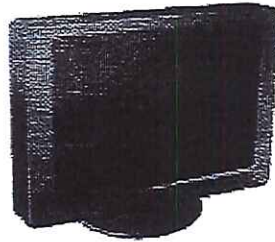
$$\text{On one journey he saves } \frac{1}{3} \text{rd of } £7.80 = £2.60$$

$$30 \div 2.60 = 11.538 \text{ journeys}$$

He needs to make 12 journeys (6 return trips)

10.

a)



In a sale, Ailsa saw a television which she wanted to buy. Its original cost was £450.

Then it was reduced by $\frac{2}{5}$ of this cost.

How much did Ailsa pay for the television in the sale?

[3]

$$\frac{1}{5} \text{ of } 450 = \frac{90}{5} \quad \begin{array}{r} 90 \\ 5 \overline{) 450} \end{array}$$

$$\frac{2}{5} = 90 \times 2 = \text{£180 comes off}$$

$$450 - 180 = \text{£270 paid}$$

b)

Each week Sally earns £325.

She saves $\frac{2}{5}$ of this amount.

How much does Sally save each week?

$$\frac{1}{5} \text{ of } 325 = \frac{65}{5} \quad \begin{array}{r} 65 \\ 5 \overline{) 325} \end{array}$$

$$\frac{2}{5} = 2 \times \text{£65} = \text{£130 saved each week}$$

[2]

c)

Chris has £600 to spend.

He spends $\frac{1}{4}$ of his £600 on a DVD player and $\frac{1}{3}$ of the £600 on a bicycle.

What fraction of his £600 has he got left?

$$\begin{array}{r} 150 \\ 4 \overline{) 600} \end{array}$$

$$\begin{array}{r} 200 \\ 3 \overline{) 600} \end{array}$$

$$\begin{array}{r} 150 \\ + 200 \\ \hline \text{£350 spent} \end{array}$$

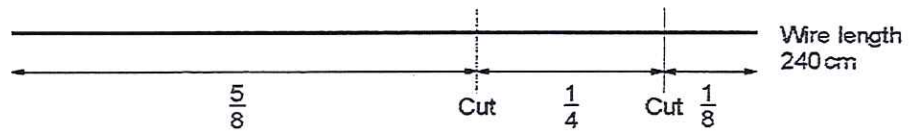
$$\begin{array}{r} 600 \\ - 350 \\ \hline \text{£250 left} \end{array}$$

$$\text{As a fraction} = \frac{250}{600} \quad \left(= \frac{5}{12} \right)$$

[4]

11.

- (a) A length of wire measuring 240 cm is to be cut into 3 pieces as shown in the diagram.



Calculate the length of each of the 3 pieces of wire.

[2]

$$\frac{1}{8} \text{ of } 240 = \frac{30}{1} = \underline{\underline{30 \text{ cm}}}$$

$$\frac{5}{8} \text{ of } 240 = 5 \times 30 = \underline{\underline{150 \text{ cm}}}$$

$$\frac{1}{4} \text{ of } 240 = \frac{60}{1} = \underline{\underline{60 \text{ cm}}}$$

(b)

Find $\frac{2}{7}$ of 63.

$$\frac{1}{7} \rightarrow \frac{9}{1}$$

$$\frac{2}{7} \rightarrow 9 \times 2 = \underline{\underline{18}}$$

(c)

Find $\frac{3}{7}$ of 28.

$$\frac{1}{7} \rightarrow \frac{4}{1}$$

$$\frac{3}{7} \rightarrow 4 \times 3 = \underline{\underline{12}}$$

[2]

[2]

12.

(a) Evaluate $\frac{5}{10} + \frac{8}{10} = \frac{13}{10}$

Write your answer as a mixed number.

$$= 1 \frac{3}{10}$$

[2]

- (b) Write 15 seconds as a fraction of 1 minute in its simplest form.

[2]

$$= \frac{15}{60} = \frac{1}{4}$$

60 seconds

13.

You will be assessed on the quality of your written communication in this question.

Each day, Sion uses $\frac{3}{5}$ of a 1 litre carton of long life milk.

He buys 1 litre cartons of long life milk on the Saturday of each week.

He always buys the least number of 1 litre cartons so that he has enough milk to last him for the next seven days.

On a particular Saturday Sion had no long life milk at all in the house.

Calculate the least number of 1 litre cartons he should buy

- (i) on the Saturday and (ii) on the following Saturday.

You must show all your working.

[8]

i) First Saturday $7 \times \frac{3}{5} = \frac{21}{5} = 4\frac{1}{5}$ litres
Sion must buy 5 1 litre cartons

ii) Second Saturday
Sion will have $\frac{4}{5}$ of a carton still in the fridge. So, although he needs $\frac{21}{5}$ he can buy $\frac{21}{5} - \frac{4}{5} = \frac{17}{5} = 3\frac{2}{5}$ litres.
Sion must buy 4 1 litre cartons

14.

On Monday, Gary went to the gym and worked out on four machines. The fraction of the time he spent on each machine is represented in the diagram below.

Weights	Rowing Machine	Treadmill	Bike
---------	----------------	-----------	------

(a) What fraction of the total time was Gary on the bike?

$$\frac{4}{10} \quad \left(\frac{2}{5}\right)$$

[2]

(b) Gary spent 24 minutes on the treadmill. How long did Gary spend in the gym on Monday?

$$\frac{3}{10} \text{ of time} = 24 \text{ minutes}$$

$$\frac{1}{10} \text{ of time} = 24 \div 3 = 8 \text{ minutes}$$

$$\text{Total time} = 10 \times 8 \text{ minutes} = \underline{\underline{80 \text{ minutes}}}$$

[4]

15.

David has £600. He spends some of the £600 on rent and food. His rent is $\frac{1}{4}$ of the £600 and his food is $\frac{1}{5}$ of the £600.

What fraction of the £600 remains? Your fraction must be given in its lowest terms.

$$\text{Rent} = 4 \overline{) 600}^{150} = \underline{\underline{£150}}$$

$$\text{Food} = 5 \overline{) 600}^{120} = \underline{\underline{£120}}$$

$$\text{Spends} = 150 + 120 = \underline{\underline{£270}}$$

$$\text{Remaining} = 600 - 270 = \underline{\underline{£330}}$$

$$\text{Fraction remaining} = \frac{330}{600} = \frac{33}{60} \xrightarrow{\div 3} \frac{11}{20}$$

[4]

16.

- (a) Showing all your working, write $\frac{1}{2}$, $\frac{5}{8}$, and $\frac{3}{4}$ in order, starting with the largest. [3]

Common denominator of 8

$$\frac{1}{2} \xrightarrow{\times 4} \frac{4}{8}, \quad \frac{5}{8}, \quad \frac{3}{4} \xrightarrow{\times 2} \frac{6}{8}$$

$$\frac{6}{8}, \quad \frac{5}{8}, \quad \frac{4}{8}$$

- (b) Write down 50p as a fraction of £4 in its simplest form. [2]

$$\frac{50}{400} \xrightarrow{\div 50} \frac{1}{8}$$

17.

Ivan, Dylan and Joe live in the same building.
The front of the building needs painting and the three men share the cost between them.

Ivan pays $\frac{1}{4}$ of the cost and Dylan pays $\frac{1}{8}$ of the cost.

Joe pays £100 which is the rest of the cost.

What is the total cost of painting the front of the building?

[4]

Between them Ivan & Dylan pay $\frac{1}{4} + \frac{1}{8}$

$$= \frac{2}{8} + \frac{1}{8} = \frac{3}{8}$$

This means the £100 that Joe pays is $\frac{5}{8}$ of the total cost.

$$\frac{5}{8} \rightarrow £100$$

$$\frac{1}{8} \rightarrow £100 \div 5 = £20$$

$$\text{Total cost} = \frac{8}{8} = 8 \times £20 = £160$$

18.

You will be assessed on the quality of your written communication in this question.

A shop sells oranges in packs of 8 at a price of £1.44.
A special offer is advertised as two packs for £2.40.

Emyr bought two packs using the special offer.

Emyr had to throw away $\frac{1}{4}$ of the oranges he bought because they became mouldy before he had time to eat them.

Calculate the price per orange

- (i) when buying a single pack,
- (ii) when buying two packs at the special offer,
- (iii) for the oranges that Emyr actually used.

Comment on whether Emyr was wise to use the special offer.
You must show all your working.

[7]

i) Price per orange of a single pack

$$= \begin{array}{r} 18 \\ 8 \overline{) 144} \end{array} = 18p$$

ii) Price per orange using special offer

$$= \begin{array}{r} 15 \\ 16 \overline{) 240} \end{array} = 15p$$

iii) $\frac{1}{4}$ of the oranges = $\frac{1}{4}$ of 16 = 4 oranges

$\therefore$ Only used 12 oranges $\therefore$ price per orange

$$= \begin{array}{r} 20 \\ 12 \overline{) 240} \end{array} = 20p$$

No. Emyr was not wise to use the special offer because he actually ended up spending more per orange than if he had just bought a single pack. ($20p - 18p =$ actually 2p extra per orange)