EXAM PAPERS PRACTICE

Conversion

Model Answers

Question 1

Write the recurring decimal $0.2\dot{5}$ as a fraction.
[$0.2\dot{5}$ means 0.2555...] [2]

Multiply the number by 10 to "shift it" by one repeating cycle.

$$10 \times 0.2\dot{5} = 2.5\dot{5}$$

Subtract the number with recurring decimal from both sides.

$$9 \times 0.2\dot{5} = 2.5\dot{5} - 0.2\dot{5}$$

$$9 \times 0.2\dot{5} = 2.3$$

Divide both sides of the equation by 9.

$$0.2\dot{5} = \frac{2.3}{9}$$

Multiply the denominator and the numerator of the fraction by 10

$$0.2\dot{5} = \mathbf{\frac{23}{90}}$$

At the beginning of July, Kim had a mass of 63 kg.
At the end of July, his mass was 61 kg.

Calculate the percentage loss in Kim's mass. [3]

Loss of 2kg

$$\frac{2}{63} \times 100$$

$$= \mathbf{3.17}$$

Work out 72 cents as a percentage of 83 cents. [1]

The percentage can be worked out as follows:

$$\frac{72}{83} \times 100\%$$

$$= 0.8674698 \ldots \times 100\%$$

$$= \mathbf{86.7\%}$$

Write

(a) 60 square metres in square centimetres, [1]

$$60\ m^2 = ??\ cm^2$$

We know 1m is 100cm, we have to square this to match

the units as follows:

$$1\ m^2 = 100^2\ cm^2 = 10000\ cm^2$$

Hence

$$\mathbf{60\ m^2 = 600000\ cm^2}$$

(b) 22 metres per second in kilometres per hour. [2]

Applying the same principle, but for metres to kilometres:

$$22\frac{m}{s} = ??\frac{km}{h}$$

$$Since\ 1000m\ is\ 1km, \qquad 22\frac{m}{s} = 0.022\frac{km}{s}$$

$$Since\ 3600s\ is\ 1\ hr,$$

$$0.022\frac{km}{s} = 0.022\frac{km}{s} \times 3600\frac{s}{hr}$$

$$= \mathbf{79.2\frac{km}{hr}}$$

Question 5

A cruise ship travels at 22 knots.

[1 knot is 1.852 kilometres per hour.]

Convert this speed into metres per second. [3]

1 knot = 1.852 km/h

22 knots = 22 x 1.852 km/h

22 knots = 40.744 km/h

1 km = 1000 m

1 hour = 3600 seconds

We will first convert the speed from km/h into m/h.

40.744 km/h x 1000 m/km = 40477 m/h

Now, we convert the speed from m/h into m/s.

To do this, we divide the speed by 3600s/h.

$$\frac{40477 \text{ m/h}}{3600 \text{ s/h}}$$

= 11.3 m/s

The maximum speed of a car is 252 km/h.

Change this speed into metres per second. [2]

. Multiply by 10^3 to get m/h

$$252\ 000\ mh^{-1}$$

Now divide by 60^2 to get per second

$$252000 \div 60^2$$

$$= \mathbf{70}$$

Question 7

Lin scored 18 marks in a test and Jon scored 12 marks.
Calculate Lin's mark as a percentage of Jon's mark. [2]

$$(18 \div 12) \times 100$$

$$= \mathbf{150}\%$$

Question 8

Calculate

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

$\frac{5^2}{2^5} = \frac{25}{32}$

(a) giving your answer as a fraction, [1]

The answer as a fraction is: $\frac{25}{32}$

(b) giving your answer as a decimal. [1]

The answer as a decimal is: **0.781**

Question 9

Write the recurring decimal $0.\dot{6}\dot{3}$ as a fraction in its lowest terms.
You must show all your working. [3]

$$100 \times 0.\dot{6}\dot{3} - 0.\dot{6}\dot{3} = 63$$

$$= (100 - 1)0.\dot{6}\dot{3} = 99 \times 0.\dot{6}\dot{3}$$

$$\rightarrow 99 \times 0.\dot{6}\dot{3} = 63$$

Now divide through by 99

$$\rightarrow 0.\dot{6}\dot{3} = \frac{63}{99}$$

Cancel out 9 top and bottom

$$= \mathbf{\frac{7}{11}}$$

Question 10

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Write the recurring decimal $0.\dot{1}7$ as a fraction.
Show all your working. [2]

To do this, we can do a trick:

$$x = 0.1\dot{7} = 0.1777777\ldots$$

$$10x = 1.\dot{7} = 1.777777\ldots$$

We now can subtract one from the other, and get rid of the long string of numbers at the end:

$$10x - x = 9x = 1.77777\ldots - 0.1777777\ldots$$

$$9x = 1.6$$

$$x = \frac{1.6}{9}$$

$$\boldsymbol{x = \frac{8}{45}}$$

Question 11

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(a) Write \$0.70 as a fraction of \$5.60, giving your answer in its lowest terms. [1]

$$\frac{0.70}{5.60} \times \frac{10}{10} = \frac{7}{56} = \frac{7 \times 1}{7 \times 8}$$

$$= \mathbf{\frac{1}{8}}$$

(b) Write the recurring decimal $0.\dot{1}\dot{8}$ as a fraction in its lowest terms. [2]
[$0.\dot{1}\dot{8}$ means $0.181818\ldots$]

Give it a name: $f = 0.181818\ldots$

Multiply by 10 until the decimal parts are the same: $10f = 1.818181\ldots$

$100f = 18.181818\ldots$

Subtract to get rid of the decimal part: $100f - f = 18.181818\ldots - 0.181818\ldots$

And simplify: $99f = 18$

$$f = \frac{18}{99}$$

$$f = \frac{9 \times 2}{9 \times 11}$$

$$\boldsymbol{f = \frac{2}{11}}$$

Question 12

$$\frac{3}{5} < p < \frac{2}{3}$$

Which of the following could be a value of p? [2]

$$\frac{16}{27} \qquad 0.67 \qquad 60\% \qquad (0.8)^2 \qquad \sqrt{\frac{4}{9}}$$

The easiest way to find a suitable value of p is to convert numbers into decimals.

Out two limits are:

$$\frac{3}{5} = 0.6$$

$$\frac{2}{3} = 0.\dot{6}$$

And the potential candidates for p are:

$$\frac{16}{27} = 0.941\ldots$$

$$0.67$$

$$60\% = 0.6$$

$$(0.8)^2 = 0.64$$

$$\sqrt{\frac{4}{9}} = 0.\dot{6}$$

Two of these numbers are equal to our boundaries, however strict equality is not allowed for p, hence we can see that there is only one number between $\frac{3}{5} = 0.6$ and $\frac{2}{3} = 0.\dot{6}$ which is 0.64.

$$\boldsymbol{p = (0.8)^2}$$

Question 13

A tin of soup has the following information on the label.

200 grams of soup contains		
Protein	Carbohydrate	Fat
4 g	8.7 g	5.8 g

(a) What fraction of the soup is Protein? Give your answer in its simplest form. [1]

Protein fraction = $\frac{4\ g}{200\ g} = \frac{1}{50}$

(b) What percentage of the soup is Carbohydrate? [1]

The total amount of soup is 200g, amount which corresponds to a percentage of 100%.

The amount of carbohydrate is 8.7g. As a percentage we can write it as:

%carbohydrate = $\frac{8.7\ g\ x\ 100}{200\ g}$ = 4.35%

Question 14

Sima drinks 2.5 litres of water each day.
A full glass holds 125 millilitres of water.
How many full glasses of water does Sima drink each day? [2]

We need to convert millilitres to litres so we can have the

same unit for both amounts.

125 millilitres = 0.125 litres

$$\frac{2.5 \text{ litres}}{0.125 \text{ litres/glass}}$$

= **20 glasses**

Question 15

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The population of Europe is 580 000 000 people.
The land area of Europe is 5 900 000 square kilometres.

(a) Write 580 000 000 in standard form. [1]

A number in standard form takes up the form: $a \times 10^n$ where n is an integer and $0 < a < 10$.

$580\,000\,000 = 5.8 \times 10^8$

Where $n = 8$ and $a = 5.8$, $0 < 5.8 < 10$.

(b) Calculate the number of people per square kilometre, to the nearest whole number. [2]

$$\text{people/ square km} = \frac{580\,000\,000}{5\,900\,000}$$

people/ square km = 98.3

The nearest whole number is 98. (3 < 5)

(c) Calculate the number of square **metres** per person. [2]

We need to convert square km in square m.

$5\,900\,000\ km^2 = 5\,900\,000 \times 10^6\ m^2$

$$\text{square m/people} = \frac{5\,900\,000 \times 10^6}{580\,000\,000}$$

square m/people = **0.0102×10^6**

= 10200

Question 16

The top speed of a car is 54 metres per second.
Change this speed into kilometres per hour. [2]

54 m/s = 0.054 km/s

1 hours = 3 600 s

Speed = 0.054 km/s x 3 600 s/h

Speed = 194.4 km/h