ARITHMETIC (Q 1, PAPER 1)

2011

1. **(a)** Aoife and Brian share a prize fund in the ratio 4:3. Aoife gets €56.

(i) Find the total prize fund.

(ii) How much does Brian get?

(b) The cost of staying for three nights in a hotel in England is £231 sterling.

(i) Find that cost in euro, given that €1 = £0·88 sterling?

(ii) This cost is 5% more than the cost a year ago.
Find, in euro, the cost a year ago.

(c) The speedometer in a car is faulty. When the car is actually travelling at 57 km/h, the speedometer reads 60 km/h.

(i) Calculate the percentage error, correct to one decimal place.

(ii) If the percentage error is the same at all speeds, at what speed is the car actually travelling when the speedometer reads 110 km/h?
Give your answer correct to one decimal place.

(iii) The driver is not aware of the fault. He calculates that if he travels at an average speed of 80 km/h as shown on the speedometer, he will reach his destination in four hours.
How long, correct to the nearest minute, will it actually take him to reach his destination?

SOLUTION

1 (a) (i)

If one quantity is **DIRECTLY PROPORTIONAL** to another, then if you multiply or divide one quantity by a number you must do the same to the other quantity.

Prize fund is divided in ration 4:3.

Aoife gets $\frac{4}{7}$ of the fund which is €56 and Brian gets $\frac{3}{7}$ of the fund.

$\frac{4}{7}$ of prize = €56

$\frac{1}{7}$ of prize = $€\frac{56}{4} = €14$

$\frac{7}{7}$ of prize = $€14 \times 7 = €98$ [Total prize fund]

1 (a) (ii)

$\frac{1}{7}$ of prize = $€\frac{56}{4} = €14$

$\frac{3}{7}$ of prize = $€14 \times 3 = €42$ [Brian's share]

1 (b) (i)

€1 = £0.88

$€\frac{1}{0.88}$ = £1

$€\frac{1}{0.88}$ 231 = €262.50 = £231

1 (b) (ii)

105% = £231

1% = $£\frac{231}{105}$

100% = $£\frac{231}{105}$ 100 = £250

1 (c) (i)

STEPS

1. Find the absolute error: Absolute error $= |\text{True value} - \text{Estimate}|$
2. Find the fractional error: Fractional error $= \dfrac{\text{Absolute Error}}{\text{True Value}}$
3. Find the percentage error: % Error $= \dfrac{\text{Absolute Error}}{\text{True Value}} \times 100\%$

$$\%\,\text{Error} = \frac{\text{Absolute Error}}{\text{True Value}} \times 100\%$$

True value = 57 km/h
Estimate = 60 km/h
Absolute error = 3 km/h

Percentage error $= \dfrac{3}{57} \times 100\% = 5.3\%$

1 (c) (ii)

105.3% = 110 km/h

1% = $\dfrac{110}{105.3}$ km/h

100% = $\dfrac{110}{105.3} \times 100$ km/h = 104.5 km/h

1 (c) (iii) $\text{Speed } (v) = \dfrac{\text{Distance } (s)}{\text{Time } (t)}$ $\boxed{v = \dfrac{s}{t}}$

Speed = 80 km/h
Time = 4 hours
Distance = ?

$$80 \text{ km/h} = \frac{\text{Distance}}{4 \text{ hr}}$$

$$\therefore \text{Distance} = 80 \times 4 = 320 \text{ km}$$

$$105.3\% = 80 \text{ km/h}$$

$$1\% = \frac{80}{105.3} \text{ km/h}$$

$$100\% = \frac{80}{105.3} \times 100 \text{ km/h} = 76 \text{ km/h (True speed)}$$

Speed = 76 km/h
Time = ?
Distance = 320 km

$$76 \text{ km/h} = \frac{320 \text{ km}}{\text{Time}}$$

$$\therefore \text{Time} = \frac{320 \text{ km}}{76 \text{ km/h}} = 4.21 \text{ hours} = 4 \text{ hours } 13 \text{ mins}$$