

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 ratio 4:3.

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

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

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

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

1 (a) (ii)

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

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

1 (b) (i)

$$€1 = £0.88$$

$$€\frac{1}{0.88} = £1$$

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

1 (b) (ii)

$$105\% = £231$$

$$1\% = £\frac{231}{105}$$

$$100\% = £\frac{231}{105} \times 100 = £250$$

1 (c) (i)**STEPS**

1. Find the absolute error: Absolute error = |True value – Estimate|

2. Find the fractional error: Fractional error = $\frac{\text{Absolute Error}}{\text{True Value}}$

3. Find the percentage error: % Error = $\frac{\text{Absolute Error}}{\text{True Value}} \times 100\%$

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

True value = 57 km/h

Estimate = 60 km/h

Absolute error = 3 km/h

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

1 (c) (ii)

$$105.3\% = 110 \text{ km/h}$$

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

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

1 (c) (iii)

$$\text{Speed } (v) = \frac{\text{Distance } (s)}{\text{Time } (t)}$$

$$v = \frac{s}{t}$$

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

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

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