Arithmetic (Q 1, Paper 1)

2002

1 (a) Copper and zinc are mixed in the ratio 19 : 6.
The amount of copper used is 133 kg.
How many kilogrammes of zinc are used?

(b) Four telephone calls cost €3.85, €7.45, €8.40 and €11.55.
(i) John estimates the total cost of the four calls by ignoring the cent part in the cost of each call. Calculate the percentage error in his estimate.

(ii) Anne estimates the total cost of the four calls by rounding the cost of each call to the nearest euro. Calculate the percentage error in her estimate.

(c) A raffle to raise money for a charity is being held.
The first prize is €100, the second is €85, the third is €65 and the fourth is €50.
The cost of printing tickets is €42 for the first 500 tickets and €6 for each additional 100 tickets. The smallest number of tickets that can be printed is 500.
Tickets are being sold at €1.50 each.
(i) What is the minimum possible cost of holding the raffle?

(ii) If 500 tickets are printed, how many tickets must be sold in order to avoid a loss?

(iii) If 1000 tickets are printed and 65% of the tickets are sold, how much money will be raised for the charity?

Solution

1 (a) Copper and zinc are mixed in the ratio 19 : 6.
19 + 6 = 25.

$\frac{19}{25}$ of the mixture is copper and $\frac{6}{25}$ is zinc.

$\frac{19}{25}$ of mixture = 133 kg

$\frac{1}{25}$ of mixture = $\frac{133}{19}$ kg

$\frac{6}{25}$ of mixture = $\frac{133}{19} \times 6 = 42$ kg

1 (b) Finding the Percentage Error

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

$$\% \text{ Error} = \frac{\text{Absolute Error}}{\text{True Value}} \times 100\% \quad \ldots\ldots \ (2)$$

1 (b) (i)

1. True value = €3.85 + €7.45 + €8.40 + €11.55 = €31.25
Estimated value = €3 + €7 + €8 + €11 = €29

Absolute error $= |31.25 - 29| = 2.25$

2. Fractional error $= \dfrac{2.25}{31.25}$

3. % error $= \dfrac{2.25}{31.25} \times 100\% = 7.2\%$

1 (b) (ii)

1. True value = €3.85 + €7.45 + €8.40 + €11.55 = €31.25
Estimated value = €4 + €7 + €8 + €12 = €31

Absolute error $= |31.25 - 31| = 0.25$

2. Fractional error $= \dfrac{0.25}{31.25}$

3. % error $= \dfrac{0.25}{31.25} \times 100\% = 0.8\%$

1 (c) First prize: €100
Second prize: €85
Third prize: €65
Fourth prize: €50
Printing costs: €42 for first 500 tickets (minimum allowed) + €6 for each additional 100 tickets
Price of ticket: €1.50

(i) Minimum cost of holding the raffle: Printing (€42) and prizes are the costs.
Total prize fund: €100 + €85 + €65 + €50 = €300
Printing costs: €42
Total cost: €300 + €42 = €342

(ii) You need to sell enough tickets to clear your costs of €342. Each ticket costs €1.50.

Minimum number of tickets $= \dfrac{342}{1.50} = 228$

(iii) 65% of 1000 tickets = $0.65 \times 1000 = 650$ tickets
Sales from tickets: $650 \times 1.50 = €975$
Printing costs: $€42 + 5 \times €6 = €72$
Total prize fund: €300
Total costs: €72 + €300 = €372