# ARITHMETIC (Q 1, PAPER 1)

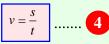
## 2003

- 1 (a) A train leaves Cork at 09:05 and arrives in Dublin at 12:25. The distance from Cork to Dublin is 250 km. Find the average speed of the train in km/h.
  - (b) The present reading on the electricity meter in John's house is 63792 units. The previous reading was 62942 units.
    - (i) How many units of electricity were used since the previous reading?
    - (ii) What is the cost of the electricity used, if electricity costs 9.52 cent per unit?
    - (iii) A standing charge of €7.00 is added and VAT is then charged on the full amount. If John's total bill is €98.91, calculate the rate at which VAT is charged.
  - (c) (i) When using a calculator to add 1.7 and 2.2, a student strikes the multiplication key instead of the addition key.Calculate the percentage error in the result, correct to one decimal place.
    - (ii) What sum of money invested at 6% per annum compound interest will amount to €5000 in 7 years?Give your answer correct to the nearest euro.

#### **SOLUTION**

1 (a)

Hours	Minute
12	25
9	05
3	20



$$s = 250 \text{ km}$$

$$t = 3 \text{ hr } 20 \text{ min} = 3\frac{1}{3} \text{ hr}$$

$$\therefore v = \frac{250 \text{ km}}{3\frac{1}{3} \text{ hr}} = 75 \text{ km/hr [Using calculator]}$$

### 1 (b)

- (i) Present reading = 63792 units Previous reading = 62942 units Units used = 850 units
- (ii) 1 unit costs 9.52 c850 units costs  $850 \times 9.52 c = 8092 c = $80.92$
- (iii) Add on the standing charge: €80.92 + €7.00 = €87.92 VAT amount: €98.91 - €87.92 = €10.99

Rate of VAT = 
$$\frac{10.99}{80.92} \times 100\% = 12.5\%$$

1 (c) (i) Finding the Percentage Error

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

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

- 1. True value = 1.7 + 2.2 = 3.9 Estimated value =  $1.7 \times 2.2 = 3.74$ Absolute error = |3.9 - 3.74| = 0.16
- **2**. Fractional error =  $\frac{0.16}{3.9}$
- 3. % error =  $\frac{0.16}{3.9} \times 100\% = 4.1\%$

1 (c) (ii)

$$R = 6\%$$
  
 $A = €5,000$ 

$$n = 7$$
  
 $P = ?$ 

$$A = P\left(1 + \frac{R}{100}\right)^n \qquad .....$$

$$5000 = P \left( 1 + \frac{6}{100} \right)^7 \Rightarrow 5000 = P(1.06)^7$$

$$\therefore P = \frac{5000}{(1.06)^7} = \text{\&}3,325$$