

ARITHMETIC (Q 1, PAPER 1)

2001

- 1 (a) A cookery book gives the following instruction for calculating the amount of time for which a turkey should be cooked:

“Allow 15 minutes per 450 grammes plus an extra 15 minutes.”

For how many hours and minutes should a turkey weighing 9 kilogrammes be cooked?

- (b) (i) The answer to  $3.58 + 2.47$  was given as 6.50.  
What was the percentage error correct to one decimal place?

- (ii) Calculate the value of

$$\frac{3.1 \times 10^5 - 1.5 \times 10^4}{5.9 \times 10^6}$$

and write your answer as a decimal number.

- (c) IR£5000 was invested for 3 years at compound interest.

The rate for the first year was 4%. The rate for the second year was  $4\frac{1}{2}\%$ .

- (i) Find the amount of the investment at the end of the second year.

At the beginning of the third year a further IR£4000 was invested.

The rate for the third year was  $r\%$ .

The total investment at the end of the third year was IR£9811.36.

- (ii) Calculate the value of  $r$ .

**SOLUTION**

**1 (a)**

$$1000 \text{ grammes (g)} = 1 \text{ kilogram (kg)}$$

Change all units of mass to grammes.

Weight of turkey = 9 kg = 9,000 g

Work out the number of 450 g in 9,000 g by dividing.

$$\text{Number of minutes} = \frac{9000}{450} \times 15 + 15 = 315 \text{ minutes}$$

$$\begin{aligned} 60 \text{ seconds} &= 1 \text{ minute} \\ 60 \text{ minutes} &= 1 \text{ hour} \end{aligned}$$

315 minutes = 5 hours 15 minutes

**1 (b) (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 =  $\frac{\text{Absolute Error}}{\text{True Value}} \times 100\%$

$$\% \text{ Error} = \frac{\text{Absolute Error}}{\text{True Value}} \times 100\% \quad \dots\dots \textcircled{2}$$

1. True value =  $3.58 + 2.47 = 6.05$       Estimated value = 6.50

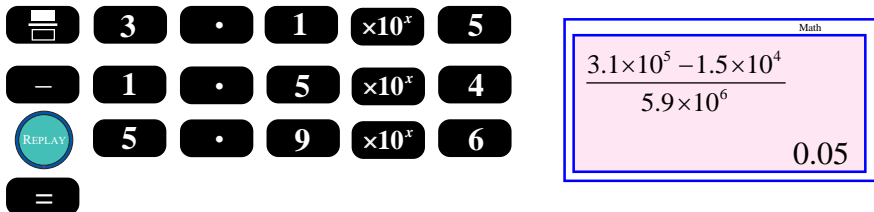
$$\text{Absolute error} = |6.50 - 6.05| = 0.45$$

2. Fractional error =  $\frac{0.45}{6.05}$

3. % error =  $\frac{0.45}{6.05} \times 100\% = 7.4\%$

1 (b) (ii)  $\frac{3.1 \times 10^5 - 1.5 \times 10^4}{5.9 \times 10^6} = 0.05$  [Use calculator]

**CALCULATOR:** Calculate  $\frac{3.1 \times 10^5 - 1.5 \times 10^4}{5.9 \times 10^6}$ .



The calculator interface shows a grid of buttons: a display screen, a 'REPLAY' button, and buttons for digits 0-9, decimal point, equals, and scientific notation ( $\times 10^x$ ). The screen displays the calculation  $\frac{3.1 \times 10^5 - 1.5 \times 10^4}{5.9 \times 10^6}$  and the result 0.05.

**1 (c) (i)**

**Year 1:**

$P = \text{£}5,000$

$n = 1$

$R = 4\%$

$A_1 = ?$

$$A = P \left( 1 + \frac{R}{100} \right)^n \quad \dots\dots \textcircled{3}$$

$$A_1 = 5000 \left( 1 + \frac{4}{100} \right)^1 = 5000(1.04) = \text{£}5200$$

**Year 2:**

$P = \text{£}5020$

$n = 1$

$R = 4.5\%$

$A_2 = ?$

$$A_2 = 5020 \left( 1 + \frac{4.5}{100} \right)^1 = 5020(1.045) = \text{£}5243$$

**1 (c) (ii)**

**Year 3:**

$$P = £5434 + £4000 = £9434$$

$$n = 1$$

$$R = ?$$

$$A = £9811.36$$

$$9811.36 = 9434 \left(1 + \frac{R}{100}\right)^1 \Rightarrow \frac{9811.36}{9434} = \left(1 + \frac{R}{100}\right)$$

$$\Rightarrow 1.04 = 1 + \frac{R}{100} \Rightarrow 0.04 = \frac{R}{100}$$

$$\therefore R = 4\%$$