ARITHMETIC (Q 1, PAPER 1)

2008

1 (a) John works from 09:00 hours to 13:00 hours and again from 14:00 hours to 17:30 hours.
   He is paid €18·50 per hour.
   Find his total pay for the day.

(b) Alice frequently travels from her home to Cork, a distance of 85 km. The journey usually takes 1 hour 15 minutes.

   (i) Find her average speed in kilometres per hour for the journey.

   (ii) On a day of very heavy rain her average speed on a 28 km section of the journey was reduced to 35 km/h.
   How long did this section of the journey take on that day?

   (iii) How much longer did the total journey take on that day, if she completed the rest of the journey at her usual average speed?
   Give your answer correct to the nearest minute.

(c) A retailer buys an item for €73. She wants to apply a mark-up of 40% of the cost price of the item. She must then add VAT at 21% to this amount to find the price that she would need to charge the customer.

   (i) Find this price, correct to the nearest cent.

   The retailer adjusts the price charged to the customer so that it is 1 cent less than a multiple of €10, while keeping the mark-up as close as possible to 40%.

   (ii) Using this adjusted price, calculate the actual percentage mark-up achieved, correct to the nearest percent.

SOLUTION

1 (a)
No. of hours worked: 7.5 hours
Total pay: $18.5 \times 7.5 = €138.75$

1 (b) (i)
Distance $s = 85$ km
Time $t = 1.25$ hours
Velocity $v = ?$

$$v = \frac{8.5 \text{ km}}{1.25 \text{ h}} = 68 \text{ km/h} \qquad \boxed{v = \frac{s}{t}} \ \dotsb \ \textcolor{red}{4}$$

1 (b) (ii)

Distance $s = 28$ km

Time $t = ?$

Velocity $v = 35$ km/h

$$35 = \frac{28}{t} \Rightarrow t = \frac{28}{35} \text{ h} = \frac{4}{5} \text{ h} = 48 \text{ mins.} \qquad \boxed{v = \frac{s}{t}} \quad \text{.......} \quad ④$$

1 (b) (iii)

28 km of the road is at the slower speed of 35 km/h.

The other 57 km (85 km – 28 km) is at 68 km/h.

You need to find out how long it takes to complete the journey at the faster speed.

Distance $s = 57$ km

Time $t = ?$

Velocity $v = 68$ km/h

$$68 = \frac{57}{t} \Rightarrow t = \frac{57}{68} = 0.838 \text{ h} = 0.838 \times 60 \text{ mins} = 50 \text{ mins} \qquad \boxed{v = \frac{s}{t}} \quad \text{.......} \quad ④$$

Total time for journey = 48 mins. + 50 mins. = 98 mins.

1 (c) (i)

Cost price = €73

Mark-up price = €73×1.4 = €102.20

Mark-up price including VAT = €102.20×1.21 = €123.66

1 (c) (ii)

'The retailer adjusts the price charged to the customer so that it is 1 cent less than a multiple of €10, while keeping the mark-up as close as possible to 40%.'

€120 is the next multiple of 10 below €123.66.

€119.99 is one cent less than this.

This value exclusive of VAT $= \dfrac{€119.99}{1.21} = €99.165$

The amount added on to the cost price = €99.165 − €73 = €26.165

% mark-up $= \dfrac{€26.165}{€73} \times 100\% = 36\%$