

## Section A - Numerical Reasoning

### Part 1 - Pen Manufacture

$$1) \% \text{ increase} = \frac{\text{difference}}{\text{original value}} \times 100\%$$

$$\Rightarrow \% \text{ increase}_{(\text{week 1 to 2})} = \frac{120 - 100}{100} \times 100\%$$

$$= \underline{\underline{20\%}}$$

$$\% \text{ increase}_{(\text{week 2 to 3})} = \frac{144 - 120}{120} \times 100\%$$

$$= \underline{\underline{20\%}}$$

$$\therefore \% \text{ increase}_{(\text{week 1 to 2})} = \% \text{ increase}_{(\text{week 2 to 3})}$$

Sum of geometric progression

$$S_n = \frac{a_1(1 - r^n)}{1 - r} \quad r \neq 1$$

where

$S_n$  = Sum of GP with  $n$  terms

$a_1$  = the first term (100)

$r$  = common ratio (1.2)

$n$  = No. terms (8)

$$\Rightarrow S_8 = \frac{100 (1 - 1.2^8)}{1 - 1.2}$$

$$= 1,649.90_{848}$$

$$= \underline{\underline{1,650}} \quad (\text{to 3.s.f})$$

2) No. pens produced per week

Total pens per week = no machines

x pens per hour

x hours per day

x days per week

~~Ans~~

$$= 2 \times 10 \times 6 \times 5$$

$$= \underline{\underline{600}} \text{ pens per week}$$

Total pens in 8 weeks

$$\text{Total pens for 8 weeks} = 600 \times 8$$

$$= \underline{\underline{4,800}}$$

Max Capacity of warehouse = 2,000

$$\therefore \text{minimum no. pens to sell} = 4,800 - 2,000$$

$$= \underline{\underline{2,800}} \text{ pens}$$

## Part 2 - Pen Sales

1) Break even CPC = Max CPC

$$\text{Max CPC} = \text{Operating margin} \times \text{Conversion rate}$$

$$\text{Operating margin} = \text{Revenue per pen} - \text{Cost per pen}$$

$$\therefore \text{Max CPC} = \left( \text{Revenue per pen} - \text{Cost per pen} \right) \times \text{Conversion rate}$$

When Conversion rate = 20%

$$\begin{aligned} \text{Max CPC} &= (£10.00 - £6.00) \times 0.2 \\ &= £4.00 \times 0.20 \\ &= \underline{\underline{£0.80}} \text{ per unit to break even} \end{aligned}$$

2) When conversion rate = 30%

$$\begin{aligned} \text{Max CPC} &= £4.00 \times 0.30 \\ &= \underline{\underline{£1.20}} \text{ per unit to break even} \end{aligned}$$

3) Incremental cost: the total change a company experiences within its balance sheet or income statement due to production and sale of an additional ~~item~~ <sup>unit</sup> of product. Source: Investopedia.com

$$\therefore \text{Incremental cost} = \frac{(\$350 - \$300)}{(210 - 200)}$$

$$= \underline{\underline{\$50}} / 10$$

$$= \underline{\underline{\$5}} \text{ per incremental sale}$$

### Part 3 - International Expansion

1)  $1 \text{ GBP} = 1.132 \text{ EUR}$   
 $1 \text{ EUR} = 1.149 \text{ CHF}$

Sale price to France = 12 EUR

Sale price to Switzerland = 15 CHF

Sales to France = 200 units

Sales to Switzerland = 300 units

Cost of manufacture = £6

Shipping + FX fees = £0

Conversion to GBP

$$1 \text{ GBP} = 1.132 \text{ EUR}$$

$$\therefore 1 \text{ EUR} = \frac{1}{1.132} \text{ GBP}$$

$$\Rightarrow 12 \text{ EUR} = \frac{12}{1.132} \text{ GBP}$$

$$= £10.6007 \text{ GBP}$$

$$= \underline{£10.60 \text{ GBP}} \text{ to 2.d.p.}$$

$$1 \text{ EUR} = 1.149 \text{ CHF}$$

$$\therefore 1 \text{ CHF} = \frac{1}{1.149} \text{ EUR}$$

$$\therefore 15 \text{ CHF} = \frac{15}{1.149} \text{ EUR}$$

$$\text{We know } 1 \text{ EUR} = \frac{1}{1.132} \text{ GBP}$$

$$\therefore 15 \text{ CHF} = \frac{15 \times \left( \frac{1}{1.132} \right)}{1.149} \text{ GBP}$$

$$= \pounds 11.53_{25} \text{ GBP}$$

$$= \pounds \underline{11.53} \text{ GBP (to 2.d.p.)}$$

Calculate Total Revenue (TR)

$$\begin{aligned} \text{TR} &= (200 \times \pounds 10.60) + (300 \times \pounds 11.53) \\ &= \pounds \underline{5,579.90} \text{ (to 2.d.p.)} \end{aligned}$$

Calculate Cost of Goods Sold (COGS)

$$\begin{aligned} \text{COGS} &= (200 + 300) \times \pounds 6 / \text{unit} \\ &= \pounds \underline{3,000.00} \end{aligned}$$

Calculate Gross Profit (GP)

$$GP = TR - COGS$$

$$= £5,579.90 - £3,000.00$$

$$= \underline{\underline{£2,579.90}} \quad (\text{to 2.d.p.})$$