a)i

$A_1 = 1000 (1.06) - 72$

~~$A_2 = (A_1)(1.06)$~~

∴ at beginning of 2nd year.

$A_1 = 1000 (1.06) - 72$

$= 988$

∴ balance $= \$988.00$

ii)

a)iii

$$0 = 1000(1.06)^n - \frac{90\left[(1.06)^n - 1\right]}{0.06}$$

$$\therefore 1000(1.06)^n = \frac{90\left[(1.06)^n - 1\right]}{0.06}$$

$$\therefore 60(1.06)^n = 90\left[(1.06)^n - 1\right]$$

$$\therefore \frac{2}{3}(1.06)^n = (1.06)^n - 1$$

$$\therefore -\frac{1}{3}(1.06)^n = -1$$

$$\therefore (1.06)^n = 3$$

$$\therefore \ln(1.06)^n = \ln(3)$$

$$\therefore n = \frac{\ln(3)}{\ln(1.06)}$$

$$= 18.85 \quad (2dp)$$

∴ prize can be funded for 18 more years.

b)i

~~Time for bus = $\frac{15t + 250t\tan\theta}{}$~~

~~$\therefore t = \frac{250\tan\theta}{15}$~~

Time for bus = $S = \frac{d}{t}$

$$\therefore 15 = \frac{2000 + x}{t}$$

$$\therefore \ 15 = \frac{2000 + 250 \tan \theta}{t}$$

$$\therefore \ t = \frac{2000 + 250 \tan \theta}{15}$$

Time for claire: $\qquad s = \dfrac{d}{t}$

$$4 = \frac{x}{t}$$

where $x = \dfrac{250}{\cos \theta}$

$$\therefore \ 4 = \frac{\left(\dfrac{250}{\cos \theta}\right)}{t}$$

$$\therefore \ t = \frac{\left(\dfrac{250}{\cos \theta}\right)}{4}$$

$$\therefore \ t = \frac{250}{4 \cos \theta}$$

$$\therefore \ t = \frac{125}{2 \cos \theta}$$

01WB4