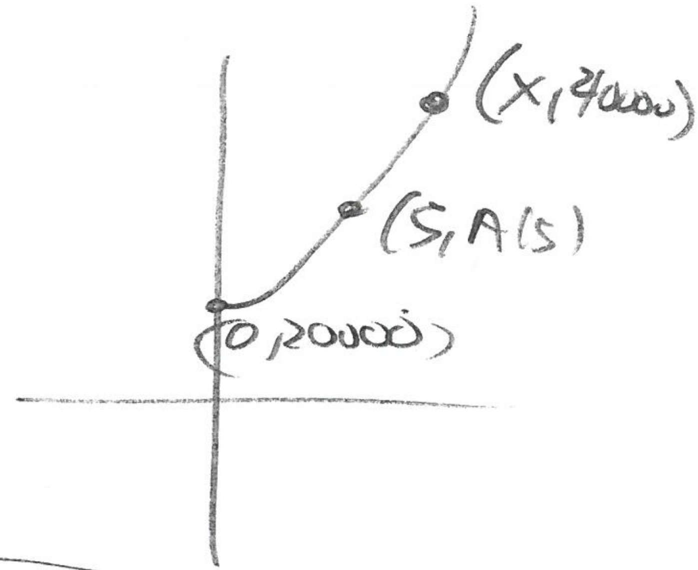
20000 investment weekly

$A(x) = P\left(1+\frac{r}{n}\right)^{nt}$



$P = 20000$

$r\% = 2.56\%$

$r = 0.0256$

$n = 52$ (weekly)

Model

$A(x) = 20000\left(1+\frac{0.0256}{52}\right)^{52x}$

$\boxed{A(5) = 22730.34}$

Balance after 5 yrs ↗

Earnings after 5 yrs

$22730.34 - 20000$

2730.34

$40000 = 20000\left(1+\frac{0.0256}{52}\right)^{52x}$

$\frac{40000}{20000} = \frac{20000\left(1+\frac{0.0256}{52}\right)^{52x}}{20000}$

$2 = \left(1+\frac{0.0256}{52}\right)^{52x}$

By Defn

$\log_{\left(1+\frac{0.0256}{52}\right)}(2) = 52x$

$x = \frac{\log_{1+\frac{0.0256}{52}}(2)}{52}$

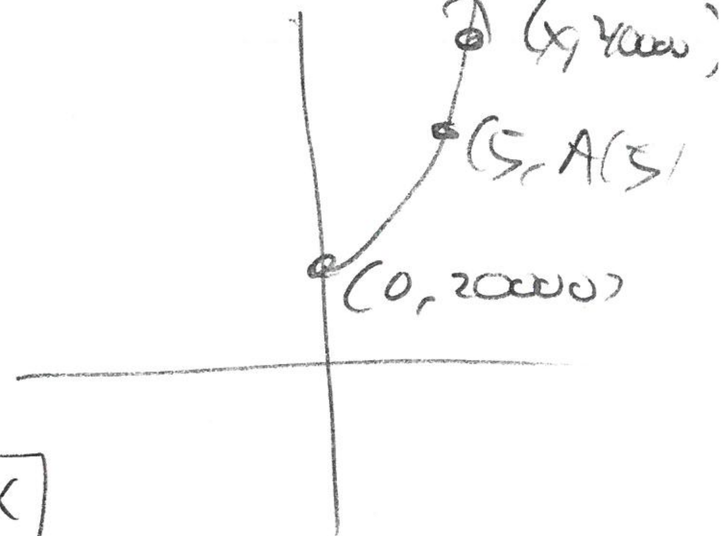
≈ 27.0827

✓✓

$A(27.0827) = 39999.97$

Doubling time ↗

20000 Investment (Monthly)



$P = 20000$

$n = 12$ (monthly)

$r\% = 2.56\%$

$r = 0.0256$

$$\boxed{A(x) = 20000\left(1+\frac{0.0256}{12}\right)^{12x}}$$

model

$$\boxed{A(5) = 22727.96}$$

Balance after 5 years

Earnings after 5 years

$22727.96 - 20000$

2727.96

$$40000 = 20000\left(\left(1+\frac{0.0256}{12}\right)^{12x}\right.$$

$$\frac{40000}{20000} = \frac{20000\left(1+\frac{0.0256}{12}\right)^{12x}}{20000}$$

$$2 = \left(1+\frac{0.0256}{12}\right)^{12x}$$

By Defn

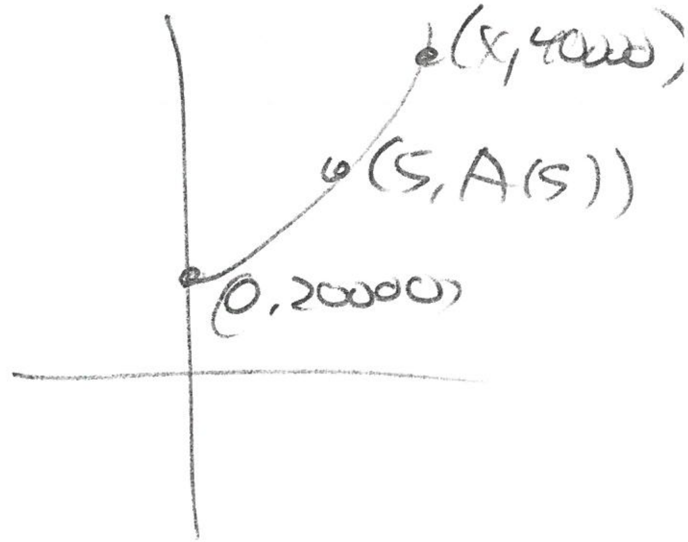
$$\log_{1+\frac{0.0256}{12}}(2) = 12x$$

$$\boxed{x = \frac{\log_{1+\frac{0.0256}{12}} 2}{12} \qquad x \approx 27.1049}$$

Doubling Time

$$\boxed{✓✓\ A(27.1049) \approx 39999.97}$$

20000 cts compounded



$P = 20000$

$n =$ cts compounded

$r\% = 2.56\%$

$r = 0.0256$

Model

$$\boxed{A(x) = 20000e^{0.0256x}}$$

$$\boxed{A(5) = 22731.06}$$

Balance after 5 years

Earnings after 5 years

$22731.06 - 20000$

2731.06

$$40000 = 20000e^{0.0256x}$$

$$\frac{40000}{20000} = \frac{20000e^{0.0256x}}{20000}$$

$$2 = e^{0.0256x}$$

By Defn

$$\ln 2 = 0.0256x$$

$$x = \frac{\ln 2}{0.0256}$$

$$x \approx 27.0761$$

Doubling Time

✓✓ $A(27.0761) \approx 40000.04$

Given Model $A(x) = 18000\, e^{0.052x}$

$P = 18000$ ← Principal

$r = 0.052$ ← Rate as a Decimal

$r\% = 100(0.052)$

$r\% = 5.2\%$ ← Rate as a Percent

compounds interest continuously

$$\boxed{A(10) = 18000\, e^{0.052(10)} = 30276.50}$$

Balance after 10 years

$A(x) = 18000 + 5000 = 23000$ ← Balance when you EARN \$5000

Solve $23000 = 18000\, e^{0.052x}$

$$\frac{23000}{18000} = \frac{18000\, e^{0.052x}}{18000}$$

$$\frac{23000}{18000} = e^{0.052x}$$

By Defn $\log_e\left(\frac{23000}{18000}\right) = \ln\left(\frac{23000}{18000}\right) = 0.052x$

time it takes to earn 5000

$$\boxed{x = \frac{\ln\left(\frac{23000}{18000}\right)}{0.052} \approx 4.7139 \text{ years}}$$

$A(4.7139) \approx 23000.01$

What rate to invest at? Problem

① $P = 75000$ $\quad A = 500000$

$r = ?$

$X = \text{time} = 18$ $\quad$ cts compounded

$A(x) = Pe^{rx}$

$A(18) = 500000 = 75000e^{r(18)}$

$500000 = 75000e^{18r}$

$\frac{500000}{75000} = \frac{75000e^{18r}}{75000}$

$\frac{500000}{75000} = e^{18r}$

By Defn $\ln\left(\frac{500000}{75000}\right) = 18r$

$\boxed{r = \frac{\ln\left(\frac{500000}{75000}\right)}{18} = \frac{\ln\left(\frac{20}{3}\right)}{18}}$

exact r

$\boxed{r \approx 0.1054}$

approx r $\quad$ r% (approx

$\boxed{r\% \approx 10.54\%}$

✓✓ $\boxed{A(18) = 75000\left(e^{0.1054(18)}\right) \approx 500040.01}$