

Application of Linear Systems (POI)

You are looking to join a gym and go to two local fitness centers to gather information about fees for each month you exercise.

- Gym 1 - Pay an \$40 membership fee plus \$2/day that you go in to exercise
- Gym 2 - Pay \$4/day that you go in to exercise

$$y = mx + b$$

a) Complete the tables below.

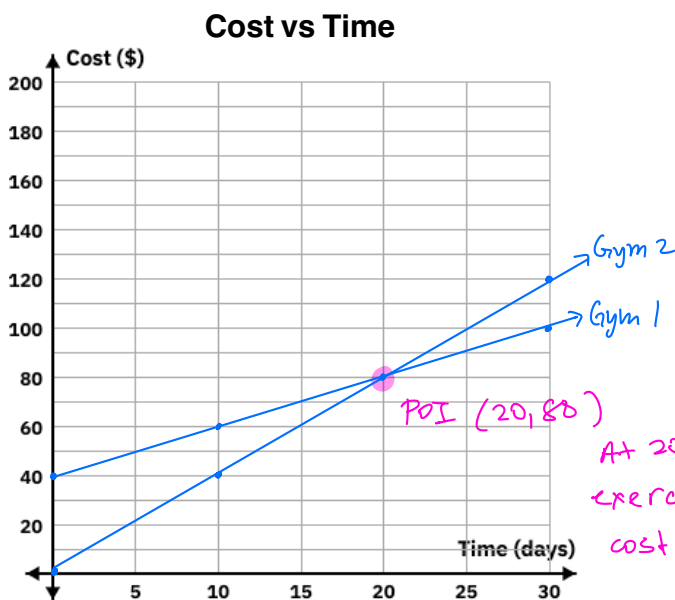
Let C represent the cost (\$) and n represent the time (days) a customer exercises at the centre.

Gym 1	
Equation: $C = 2n + 40$	
# of Days	Cost (\$)
0	40
10	60
20	80
30	100
40	120

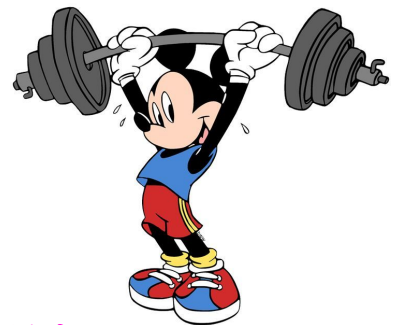
Gym 2	
Equation: $C = 4n$	
# of Days	Cost (\$)
0	0
10	40
20	80
30	120
40	160

$$m = \frac{\Delta y}{\Delta x} = \frac{F.D.'s}{\Delta x} = \frac{20}{10} = 2 \text{ (R.D.C.)}$$

- b) Graph the cost of exercising at each gym, below. Make a well labelled scatter plot
Determine the point of intersection graphically.



At 20 days of exercise, both gyms cost \$80.



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c) Determine the point of intersection **algebraically**. *NEW SKILL*

$$\textcircled{1} C = 2n + 40$$

$$\textcircled{2} C = 4n$$

$$4n = 2n + 40$$

$$\underline{4n} - \underline{2n} = \cancel{2n} + 40 - \cancel{2n}$$

$$\underline{2n} = \underline{40}$$

$$\boxed{n = 20}$$

sub $n=20$ into $\textcircled{1}$ or $\textcircled{2}$

$$\textcircled{2} C = 4n$$

$$C = 4(20)$$

$$\boxed{C = 80}$$

\therefore POI is $(20, 80)$

$\begin{matrix} x \\ \downarrow \\ n \end{matrix} \quad \begin{matrix} y \\ \downarrow \\ C \end{matrix}$

d) Under what conditions should you choose each option?

- At 20 days of exercise, choose either gym (cost the same)
- For less than 20 days of exercise, choose Gym 2 (cheaper)
- For more than 20 days of exercise, choose Gym 1 (cheaper).

