

Creating Linear Equations from Word Problems

A linear equation is usually written in the form:

$$y = mx + b$$

or

$$y = (\text{slope})x + (\text{y-int})$$

or

$$\text{dep. var.} = \text{rate} \times \text{ind. var.} + \text{initial value}$$

Word Problems

1. The radius of a tree trunk grows 4 cm per year. The radius is currently 13 cm. Create a linear equation and use it to determine the radius of the tree in 10 years.



dep. var. \rightarrow Let R represent the radius of the tree trunk (cm)

ind. var. \rightarrow Let t represent the elapsed time (years).

① r.o.c. = 4cm/year

initial v. = 13cm

dep. var. = rate \times ind. var. + initial value

$$R = 4t + 13$$

set $t = 10$

$$R = 4(10) + 13$$

$$R = 40 + 13$$

$$R = 53\text{cm}$$

2. A train is traveling 125 km/hr. The train has already traveled 210 km from Guelph. Use a linear equation to determine how far the train will be from Guelph in 3.5 hours.

dep. var. \rightarrow Let d represent the distance traveled from Guelph (km).
 ind. var. \rightarrow Let t represent the elapsed time (hours).
 r.o.c. = 125 km/hr

initial v. = 210 km

dep. var. = rate \times ind. var. + initial v.

$$d = 125t + 210$$

$$\text{set } t = 3.5$$

$$d = 125(3.5) + 210$$

$$d = 647.5 \text{ km}$$

3. The cost to rent a hall is \$1200 plus \$45/person.

- a) Create a linear equation and use it to determine the cost to rent the hall for 135 guests.

dep. var. \rightarrow Let C represent the cost to rent the hall (\$).

ind. var. \rightarrow Let n represent the number of guests.

r.o.c. = \$45/person

initial v. = 1200

dep. var. = rate \times ind. var. + initial v.

$$C = 45n + 1200$$

$$\text{set } n = 135$$

$$C = 45(135) + 1200$$

$$C = \$7275$$

- b) Use the equation to determine how many guests can attend the Hall if the rental cost is \$10875?

$$C = 45n + 1200$$

$$\text{set } C = 10875$$

$$10875 = 45n + 1200$$

$$-45n = 1200 - 10875$$

$$\underline{-45n = -9675}$$

$$\underline{-45 \quad -45}$$

$$n = 215 \text{ guests}$$

Word Problems: Practice

1. John and Lucy are getting married. They want to rent Pythagorean Hall for the reception. To rent the hall, they must pay a flat fee of \$800 plus \$30 per person. Create an equation that models the total cost of the hall in relation to the number of guests attending. If they budgetted \$5000 for this portion of the wedding, how many guests can they invite?
2. Lauren is traveling in her car from Guelph to Kingston. She is traveling at a fixed speed of 105 km/hr. Lauren is currently 85 km from Guelph. Create an equation that model's Lauren's distance from Guelph in relation to the time that has elapsed. If the total distance from Guelph to Kingston is 340 km, when will Lauren arrive?
3. The radius of a tree trunk grows at a rate of 12 cm every 5 years. If the radius of the tree trunk is currently 34 cm, use an equation to determine how large the tree radius will be in 25 years.