

3.1 Solving linear equations – Practice exercises

1. A truck hauling bags of grass seed weighs 3,900 pounds when it's empty. Each bag of seed it carries weighs 4.2 pounds. The equation for the gross weight W pounds is

$$W = 3,900 + 4.2B$$

for B bags of grass seed.

Story also appears in 2.1 #1 & 3.2 #1

- (a) Set up and solve an equation to determine the number of bags of grass seed being carried by the truck with gross weight of 14,500 pounds.

$$\begin{array}{r} \cancel{3,900} + 4.2B = 14,500 \\ - \cancel{3,900} \\ \hline 4.2B = 10,600 \\ \underline{4.2} \quad \underline{4.2} \end{array}$$

$\approx 2,524$ bags

$$B = 10600 \div 4.2 = 2,523.8 \dots$$

- (b) Do the same for a truck with gross weight 8 tons. A ton is 2,000 pounds

$$W = 8 \text{ tons} \times \frac{2,000 \text{ pounds}}{\text{ton}} = 8 \times 2,000 = 16,000 \text{ pounds}$$

$$\begin{array}{r} \cancel{3,900} + 4.2B = 16,000 \\ - \cancel{3,900} \\ \hline 4.2B = 12,100 \\ \underline{4.2} \quad \underline{4.2} \end{array}$$

$$B = 12,100 \div 4.2 = 2,880.95 \dots$$

$\approx 2,881$ bags

Check:

B	W
2524	14,500.8 ✓
2881	16,000.2 ✓

$3900 + 4.2 \times 2524 =$
 $3900 + 4.2 \times 2881 =$

2. Is laughter really the best medicine? A study examined the impact of comedy on anxiety levels. Subjects' anxiety levels were rated on a scale of 1 to 5 before and after the study. Levels averaged 4.3 before the study. There was no significant change in subjects in the control group. Subjects who watched the comedy videos showed a noticeable difference, and it depended on the hours of comedy watched. Anxiety levels fell an average of .098 (on the 1 to 5 scale) for each hour of comedy watched.

- (a) Make a table showing average anxiety levels for subjects who watched comedy videos for 0 hours (control group), 2 hours, 10 hours, and 20 hours, according to these findings.

$$4.3 - 2 \times .098 =$$

H	0	2	10	20
L	4.3	4.104	3.32	2.34

- (b) Use successive approximation to guess the number of hours watching comedy needed to lower the average anxiety level below 2 (on that scale of 1 to 5).

H	20	25	23	24	≈ 24 hours
L	2.34	1.85	2.046	1.948	
vs. 2	HIGH	LOW	HIGH	LOW	

- (c) Name the variables and write an equation relating them. Anxiety is measured on a unitless scale.

H = time watched comedy videos (hours) ~ indep
 L = anxiety level (unitless!) ~ dep

$$L = 4.3 - .098H$$

- (d) Solve your equation to determine the number of hours watching comedy needed to lower the average anxiety level below 2.

$$\begin{array}{r} 4.3 - .098H = 2 \\ -4.3 \quad -4.3 \\ \hline \end{array}$$

$$\begin{array}{r} -.098H = -2.3 \\ \hline \end{array}$$

$$H = (-2.3) \div (-.098) = 23.469 \dots$$

≈ 24 hours

3. Lizbeth wants to send her mom truffles for mother's day. It cost \$ C to send a box of T truffles where

$$C = 1.90T + 7.95$$

- (a) Make a table of values showing the charges for a box of 8 truffles, 12 truffles, or 30 truffles.

$$1.90 \times 8 + 7.95 =$$

T	8	12	30
C	23.15	30.75	64.95

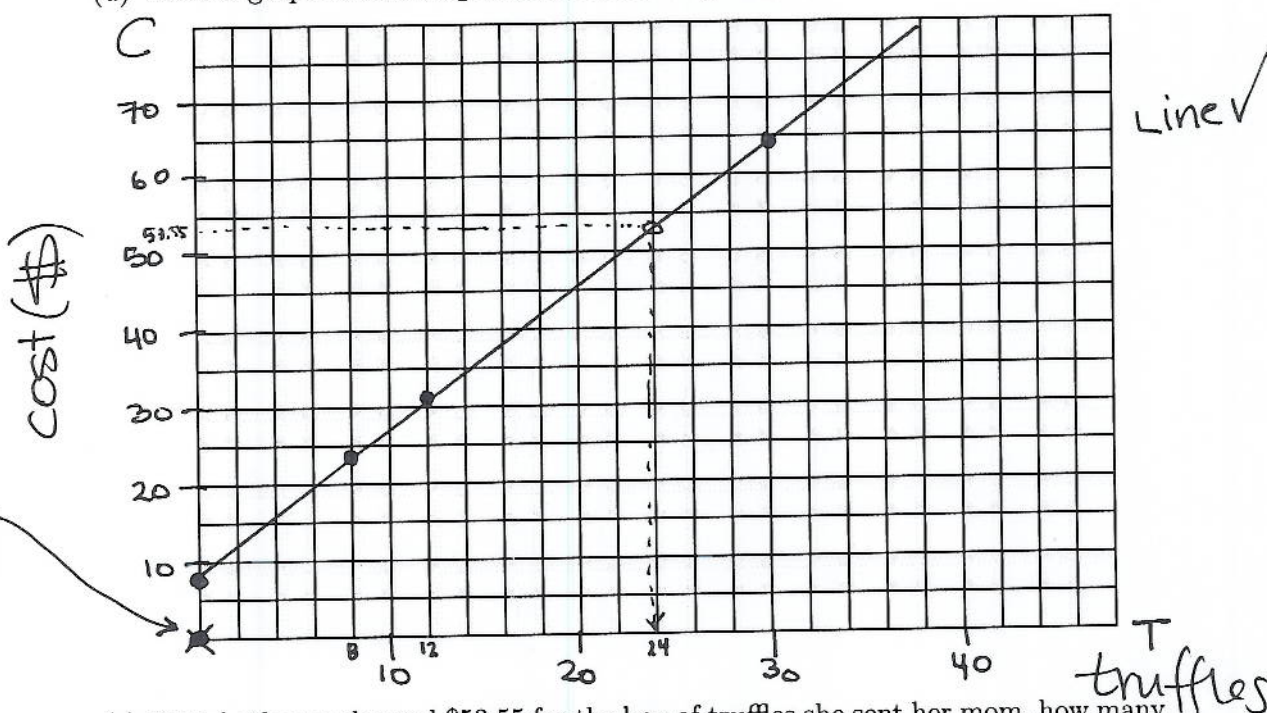
- (b) What are the units on 1.90 and what does it mean in the problem?

\$/truffle It's the cost per truffle.

- (c) What are the units on 7.95 and what does it mean in the problem?

\$ It's the shipping & handling charge.

- (d) Draw a graph illustrating the cost of sending truffles.



- (e) If Lizbeth was charged \$53.55 for the box of truffles she sent her mom, how many truffles were there? Set up and solve an equation to answer the question.

$$1.90T + 7.95 = 53.55$$

$$\begin{array}{r} -7.95 \\ \hline 1.90T = 45.60 \end{array}$$

$$\frac{1.90T}{1.90} = \frac{45.60}{1.90}$$

$$T = 45.60 \div 1.90 = 24 \text{ truffles}$$

agrees w/ graph ✓

4. The local burger restaurant had a promotion this summer. They reduced the price on a bacon double cheeseburger by 2¢ for each degree in the daily high temperature. The equation is

$$B = 7.16 - .02H$$

where B is the price of the bacon double cheeseburger and H is the daily high temperature, in $^{\circ}\text{F}$. *Story also appears in 2.1 Exercises*

- (a) What is the usual price of a ~~bacon~~ double cheeseburger?

\$7.16

- (b) Ronald paid \$5.34 for a bacon double cheeseburger on Tuesday. How hot was the temperature that day? Set up and solve an equation.

$$\begin{array}{r} 7.16 - .02H = 5.34 \\ -7.16 \\ \hline -.02H = -1.82 \\ \hline \quad .02 \end{array}$$

$$t = (-) 1.82 \div (-) .02 = 91^{\circ} \text{F}$$

- (c) What was the high temperature on Sunday when Wendy bought a bacon double cheeseburger for only \$5.70? Set up and solve an equation.

$$\begin{array}{r} 7.16 - .0241 = 5.70 \\ -7.16 \qquad \qquad -7.16 \\ \hline - .0241 = -1.4 \\ \underline{- .02} \quad \underline{- .02} \end{array}$$

$$\Rightarrow H = (-)1.46 \div (-).02 = 73^\circ\text{F}$$

- (d) Leroy is holding out for a \$5 burger. What temperature will make Leroy's wish to come true? Set up and solve an equation.

$$\begin{array}{r} 7.16 - 0.21 = 5.00 \\ - 7.16 \\ \hline -0.02 + 1 = -2.16 \\ \hline -0.02 \end{array}$$

$$\rightarrow H = (-) 2.16 \div (-).02 = 108^\circ \text{F}$$