SOLUTIONS

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.

$3{,}900 + 4.2B = 14{,}500$

$-3{,}900 \quad -3{,}900$

$4.2B = 10{,}600$ (10,600 ÷ 4.2 =)

$\frac{4.2B}{4.2} = \frac{10{,}600}{4.2}$

$B = 2{,}523.8\ldots$

The truck has ≈ 2524 bags of grass seed

Check: 3900 + 4.2 × 2524 = 14,500.8 ✓

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

$8 \text{ tons} * \frac{2{,}000 \text{ pounds}}{1 \text{ ton}} = 8 \times 2000 = 16{,}000 \text{ pounds}$

$3{,}900 + 4.2B = 16{,}000$

$-3{,}900 \quad -3{,}900$

$4.2B = 12{,}100$

$\frac{4.2B}{4.2} = \frac{12{,}100}{4.2}$

$B = 2880.95\ldots$

The truck has ≈ 2,881 bags of grass seed

Check: 3900 + 4.2 × 2881 = 16,000.2 ✓

Be sure you showed process of solving the equation.

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
L	2.34	1.85	2.046	1.948
vs. 2	HIGH	LOW	HIGH	LOW

≈ 24 hours

   (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.

show how to solve

$$4.3 - .098H = 2$$
$$-4.3 \qquad -4.3$$
$$\frac{-.098H}{-.098} = \frac{-2.3}{-.098}$$

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

≈ 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.

T	8	12	30
C	23.15	30.75	64.95

$1.90 \times 30 + 7.95 =$

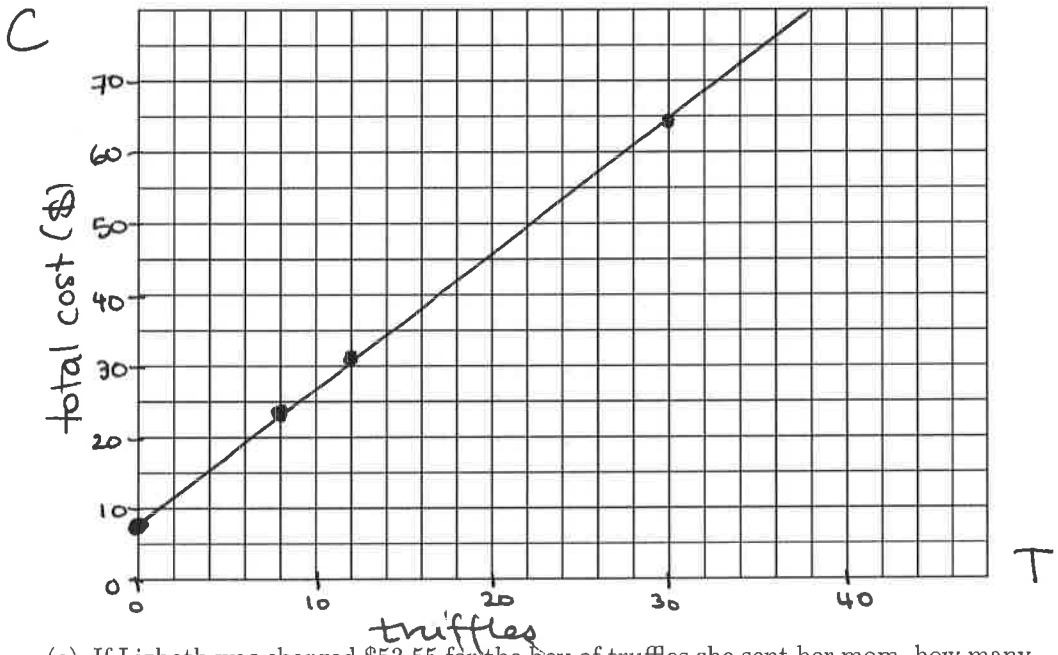
(b) What are the units on 1.90 and what does it mean in the story?

$/truffle Each truffle costs $1.90

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

$ Probably $7.95 for "shipping and handling."

(d) Draw a graph illustrating the cost of sending truffles. Include $T = 0$. $1.90 \times 0 + 7.95 = 7.95$



check: graph is a line, as expected

(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.*

show how to solve

$$1.90T + 7.95 = 53.55$$
$$-7.95 \quad -7.95$$
$$\frac{1.90T}{1.90} = \frac{45.60}{1.90}$$
$$T = 24 \text{ truffles}$$

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 °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.

B

$7.16 - .02H = 5.34$
$-7.16 \quad -7.16$
$\frac{-.02H}{-.02} = \frac{-1.82}{-.02}$

$H = (-)1.82 \div (-).02 = 91°F$

(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.

B

$7.16 - .02H = 5.70$
$-7.16 \quad -7.16$
$\frac{-.02H}{-.02} = \frac{-1.46}{-.02}$

$H = (-)1.46 \div (-).02 = 73°F$

(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.

B

$7.16 - .02H = 5.00$
$-7.16 \quad -7.16$
$\frac{-.02H}{-.02} = \frac{-2.16}{-.02}$

$H = (-)2.16 \div (-).02 = 108°F$