Skills Practice

Name _____ **Date** _____

I. Solving Linear Equations

A. Solve each equation. Write the properties that justify each step.

1. $-3(x - 4) = -9(x - 1)$

2. $8x - 2(x + 3) = 4x + 2$

3. $\dfrac{-2x + 1}{2} + 6 = \dfrac{3x}{2} - 10$

4. $12x - 4\left(\dfrac{1}{2}x - 5\right) = \dfrac{1}{3}(6x - 15)$

5. $\dfrac{7(x - 1)}{4} - \dfrac{3}{4} = -8x + \dfrac{3}{4}$

6. $-4(2x - 9) + 6(-x + 1) = -8x - 5\left(3x - \frac{5}{6}\right)$

B. Determine if the equation has one solution, no solution, or infinite solutions. Show your work.

1. $3(x + 2) = 3x + 6$

2. $5x + 4 = 5x - 3$

3. $20x - 2(x + 10) = -(5 - 2x)$

4. $\frac{3}{5}(x - 12) = -4(x + 9) + 1$

5. $-7(x - 1) = -15x + 8(x + 2)$

6. $\frac{8(x - 3)}{2} + 5x = 9(x - 1) - 3$

C. Write a linear equation to model each problem situation and use the equation to answer the question.

1. Autumn creates custom bracelets as a hobby and is planning to start selling them online for $10 per bracelet. Autumn has already sold 5 custom bracelets. Her bracelets are so popular that she expects to sell every bracelet that she makes. How many additional bracelets does Autumn need to sell if she wants to make $300?

2. Antonio works at the circus making balloon animals, charging $3 for a balloon animal. Before he took a lunch break at noon, he sold 14 balloon animals. After lunch, he goes back to selling balloon animals for the rest of the day. How many balloon animals would Antonio need to sell after lunch to make $117 for the day?

3. Violet is trying to start an Intramural Club at her school. The principal tells her she must get signatures from students to show support. Each filled sheet contains 25 signatures. By Monday, she and her friend already have 6 sheets filled with signatures. How many more sheets must Violet fill with signatures if she needs 325 in all?

4. Tremaine thought it would be okay to check his email, text, listen to music, and eat free food for 1 hour of each of his shifts at Slow Food to Go. He lasted for 6 shifts, and then (to put it nicely) he was let go. If Tremaine actually worked a total of 18 hours during his 6 shifts at Slow Food to Go, how many hours was he scheduled to work each shift?

5. Dr. Betz, a vet, is running a free rabies clinic. He estimates that it will take him 12 minutes for each animal he treats. Dr. Betz has already seen 20 animals, the last of which was a shaggy dog. How many more animals can Dr. Betz treat in his 8 hour shift?

6. Every day at an animal shelter, Nakida cleans the cages of the birds that started the morning at the shelter. She doesn't know how many birds were at the shelter this morning, but 4 adorable birds were adopted today. Each remaining bird has its own cage, each of which takes Nakida 3 minutes to clean. If Nakida finished cleaning cages in 15 minutes, how many of the birds were at the shelter this morning?

II. Solving Literal Equations

A. Convert each equation from standard form to slope-intercept form.

1. $4x + 6y = 48$

2. $3x - 5y = 25$

3. $-4x + 9y = 45$

4. $6x - 2y = -52$

5. $-x - 8y = 96$

6. $12x + 28y = -84$

B. Convert each equation from point-slope form to slope-intercept form.

1. $y - 2 = 3(x - 1)$

2. $y - (-6) = 4x$

3. $y + 5 = \frac{3}{4}(x + 4)$

4. $y - 3 = -\frac{1}{5}(x + 10)$

5. $y - 4 = 5(x - 3)$

6. $y = -\frac{1}{3}(x - 6)$

C. Solve each equation for the variable indicated.

1. The formula for the area of a triangle is $A = \frac{1}{2}bh$. Solve the equation for h.

2. The formula for the area of a trapezoid is $A = \frac{1}{2}(b_1 + b_2)h$. Solve the equation for b_1.

3. The formula for the volume of a cylinder is $V = \pi r^2 h$. Solve the equation for h.

4. The formula for the volume of a pyramid is $V = \frac{1}{3}lwh$. Solve the equation for w.

5. The Ideal Gas Law is $pV = nRT$. Solve the equation for T.

6. Solve the literal equation $\frac{1}{R} = \frac{1}{R_1} + \frac{1}{R_2}$ for R_1.

7. Solve the literal equation $\frac{a_1}{a_0} = \frac{b_1}{b_0}$ for b_0.

8. Solve the literal equation $Z = \frac{4x}{Y^2} + 3W$ for x.

III. Solving Linear Inequalities

A. Carlos works at an electronics store selling computer equipment. He can earn a bonus if he sells $10,000 worth of computer equipment this month. So far this month, he has sold $4000 worth of computer equipment. He hopes to sell additional laptop computers for $800 each to reach his goal. The function $f(x) = 800x + 4000$ represents Carlos's total sales as a function of the number of laptop computers he sells.
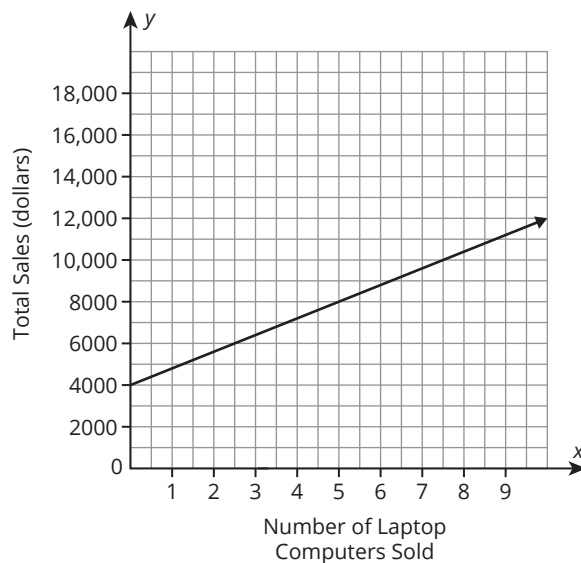
Use the graph to write an equation or inequality to determine the number of laptop computers Carlos would need to sell to earn each amount.

1. at least $10,000

2. less than $7000

3. less than $6000

4. at least $9000

5. more than $12,000

6. exactly $8000

B. Elena works at the ticket booth of a local playhouse. On the opening night of the play, tickets are $10 each. The playhouse has already sold $500 worth of tickets during a presale. The function $f(x) = 10x + 500$ represents the total sales as a function of tickets sold on opening night.
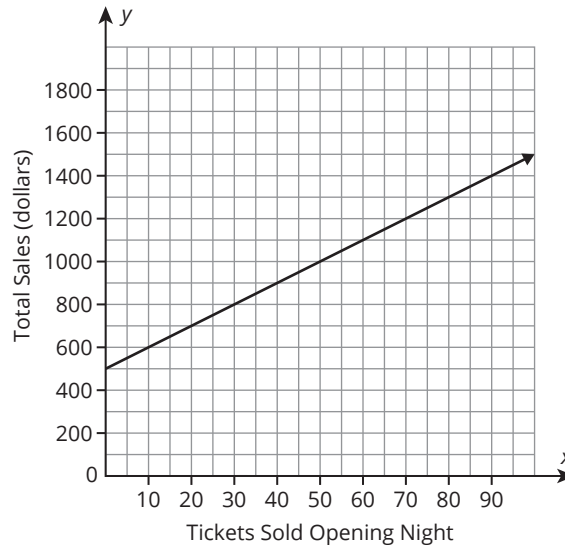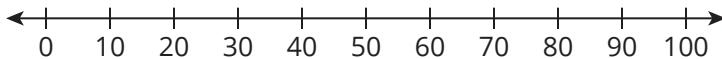

Use the graph of the function to answer each question. Graph each solution on the number line.
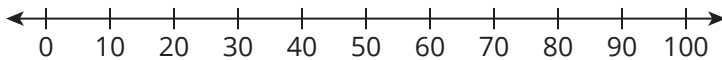
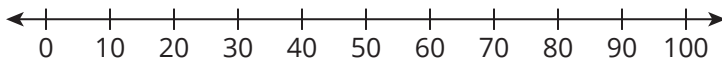**1.** How many tickets must Elena sell in order to make at least $1000?
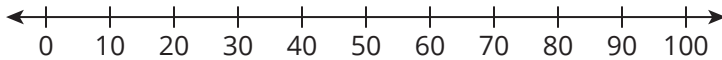
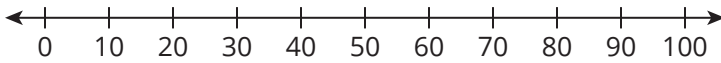**2.** How many tickets must Elena sell in order to make less than $800?

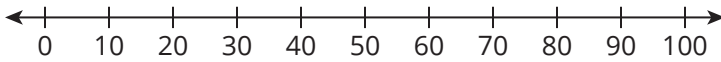**3.** How many tickets must Elena sell in order to make at least $1200?

4. How many tickets must Elena sell in order to make exactly $1400?

5. How many tickets must Elena sell in order to make less than $600?

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←—+——+——+——+——+——+——+——+——+——+——→
   0   10  20  30  40  50  60  70  80  90  100
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6. How many tickets must Elena sell in order to make exactly $900?

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←—+——+——+——+——+——+——+——+——+——+——→
   0   10  20  30  40  50  60  70  80  90  100
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C. Write and solve a linear inequality to answer each question.

1. A hot air balloon at 4000 feet begins its descent. It descends at a rate of 200 feet per minute. The function $f(x) = -200x + 4000$ represents the height of the balloon as it descends. How many minutes have passed if the balloon is below 3000 feet?

2. A bathtub filled with 55 gallons of water is drained. The water drains at a rate of 5 gallons per minute. The function $f(x) = -5x + 55$ represents the volume of water in the tub as it drains. How many minutes have passed if the tub still has more than 20 gallons of water remaining in it?

3. Lea is walking to school at a rate of 250 feet per minute. Her school is 5000 feet from her home. The function $f(x) = 250x$ represents the distance Lea walks. How many minutes have passed if Lea still has more than 2000 feet to walk?

4. Franco is riding his bike to school at a rate of 600 feet per minute. His school is 9000 feet from his home. The function $f(x) = 600x$ represents the distance Franco rides. How many minutes have passed if Franco has less than 3000 feet left to ride?

5. A submarine begins to dive from its current depth at a rate of 20 feet per minute. The function $f(x) = -20x - 30$ represents the depth of the submarine as it dives. How many minutes have passed if the submarine is at least 160 feet below the surface?

6. Leon plays on the varsity basketball team. So far this season he has scored a total of 52 points. He scores an average of 13 points per game. The function $f(x) = 13x + 52$ represents the total number of points Leon will score this season. How many more games must Leon play in order to score at least 100 points?

D. Solve each inequality and then graph the solution set on the number line.
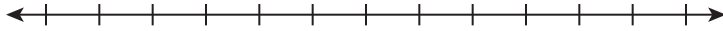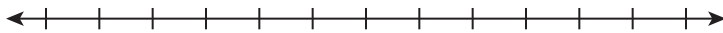
1. $4x + 3 \leq 3x - 5$
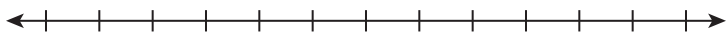
2. $-2x > 6$
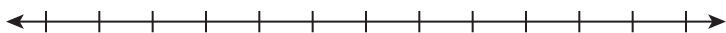
3. $\frac{1}{8}(3x - 16) < 4$

4. $\dfrac{x-3}{2} \geq -5$

5. $-4(2-x) \leq 6(x+2)$

6. $-\dfrac{1}{2}(4x+20) < -7\left(x+\dfrac{15}{7}\right)$