Name _____ Date _____

Choose Wisely!

Understanding Non-Linear Graphs and Inequalities

Problem Set

Choose the function that represents each problem situation.

1. Tonya is walking to school at a rate of 3 miles per hour.

   A $f(x) = 3x^2$ **B** $f(x) = 3x$ **C** $f(x) = 3^x$

   B $f(x) = 3x$

2. Guests at a craft fair are asked to guess how many beads are in a jar. The jar contains 220 beads. All guests within 10 beads of the correct answer win a prize.

   A $f(x) = |x - 220|$ **B** $f(x) = 220 - x$ **C** $f(x) = 220^x$

3. Mario buys a car for $25,000. Each year the car loses $\frac{1}{6}$ of its value.

   A $f(x) = 25{,}000 - \frac{1}{6}x$ **B** $f(x) = \frac{1}{6}x^2 + 25{,}000$ **C** $f(x) = 25{,}000\left(\frac{5}{6}\right)^x$

4. A bathtub filled with 50 gallons of water is drained. The water drains at a rate of 5 gallons per minute.

   A $f(x) = 50 - 5x$ **B** $f(x) = 5x^2 - 50$ **C** $f(x) = 50 - 5^x$

5. Rodell throws a football straight up with a speed of 25 feet per second. The acceleration of the ball due to gravity is 32 feet per second.

   A $f(x) = -32x + 25$ **B** $f(x) = -32x^2 + 25x$ **C** $f(x) = |32x - 25|$

6. A pasta company is filling boxes with pasta sold by weight. Each box should contain 16 ounces of pasta. The specifications allow for a difference of 0.5 ounce.

   A $f(x) = 16x - 0.5$ **B** $f(x) = 16x^2 - 0.5x$ **C** $f(x) = |x - 16|$

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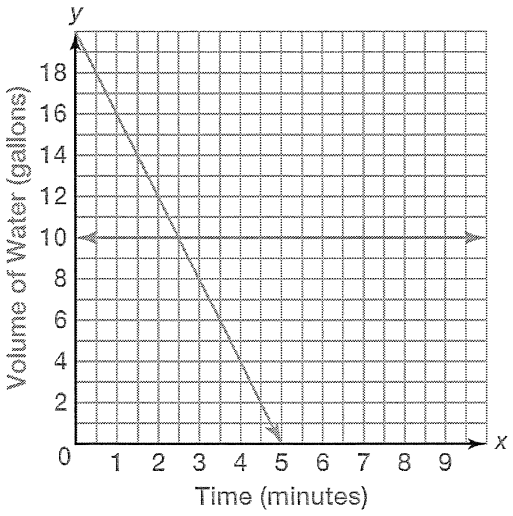
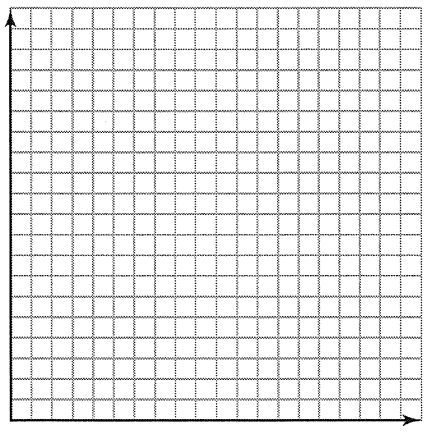
Graph the function that represents each problem situation. Use the graph to answer the question.

7. A fish tank filled with 20 gallons of water is drained. The water drains at a rate of 4 gallons per minute. The function $f(x) = 20 - 4x$ represents the volume of water in the fish tank as it drains. Graph the function. How many minutes does it take for half of the water to drain from the tank?



After 2.5 minutes, half of the water in the tank (10 gallons) will be drained.

8. A pasta company is filling boxes with pasta sold by weight. Each box should contain 32 ounces of pasta. The specifications allow for a difference of 1.5 ounces. The function $f(x) = |x - 32|$ represents the difference between the weight of a box of pasta and the specifications. Graph the function. What weights meet the specifications?



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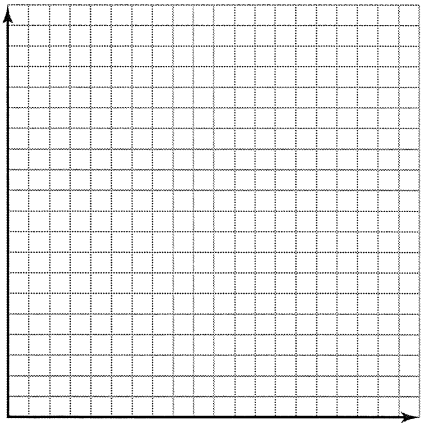
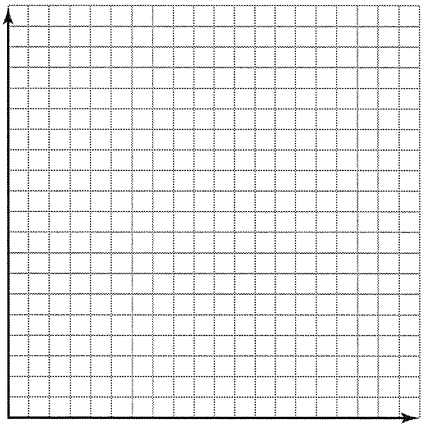
9. Ronna buys a car for \$20,000. Each year the car loses $\frac{1}{4}$ of its value. The function $f(x) = 20{,}000\left(\frac{3}{4}\right)^x$ represents the value of the car over time. Graph the function. Ronna wants to eventually sell the car and make at least \$10,000 in the sale. Estimate the number of years Ronna can own the car before she must resell and still make at least \$10,000.



10. Serena is driving to her aunt's house at a rate of 55 miles per hour. The function $f(x) = 55x$ represents the distance Serena travels over time. Graph the function. Estimate how long it will take Serena to get to her aunt's house which is 192 miles away.



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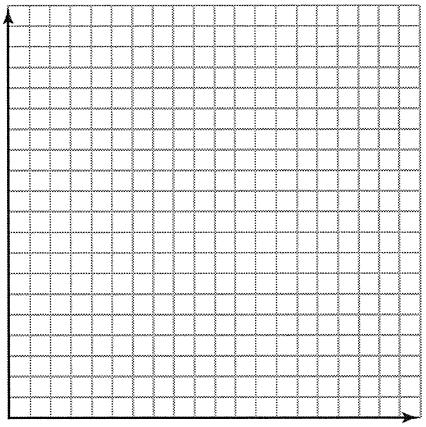
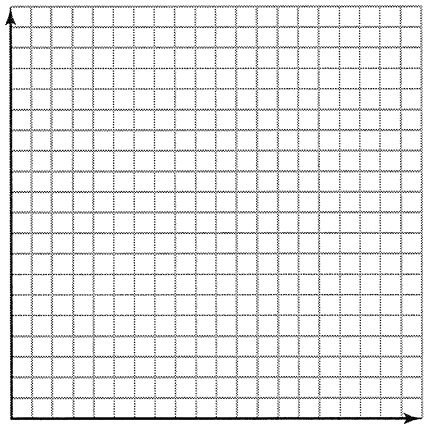
11. Hector throws a softball straight up with a speed of 50 feet per second. The acceleration of the ball due to gravity is 32 feet per second. The function $f(x) = -32x^2 + 50x$ represents the height of the softball as it travels up in the air and back to the ground. Graph the function. Estimate the length of time the softball is in the air.



12. Guests at a craft fair are asked to guess how many beads are in a jar. The jar contains 180 beads. All guests within 20 beads of the correct answer win a prize. The function $f(x) = |x - 180|$ represents the difference between a guess and the actual number of beads in the jar. Graph the function. What possible guesses will win a prize?



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