Date Completed: _____
Mentor Initials: _____



# Linear Equations (Advanced)

## Multiple Choice

**1.** Sherman purchases a coral reef tank for his bedroom. He puts 30 critters in the tank after setting it up and then begins to add critters at a rate of 2 per week. Which of the following represents the number of critters, $y$, in terms of $x$ days?

A) $y = 2x + 30$
B) $y = 30x + 2$
C) $y = \frac{2}{7}(x + 105)$
D) $y = 30x - 2$

**2.** Jolene sells her hand-thrown ceramic plates at the farmer's market. There is a \$30 flat fee to rent a booth, and Jolene sells her pottery for \$9 per plate. If $x$ represents the number of plates sold, which of the following represents Jolene's profits at the end of the day?

A) $9x - 30$
B) $30x - 9$
C) $9x + 30$
D) $-30x - 9$

**3.** In the $xy$-plane, the graph of which of the following equations is perpendicular to the graph of the equation $-3x + 4y = 12$?

A) $4x + 3y = 24$
B) $-4x + 3y = 12$
C) $-3x - 4y = 24$
D) $3x + 4y = 12$

**4.** The graph of the equation $3x + 2y = a$, where $a$ is a constant, is a line in the $xy$-plane. What are the coordinates of the point at which the line crosses the $x$-axis?

A) $(\frac{a}{2}, 0)$
B) $(\frac{a}{3}, 0)$
C) $(\frac{2}{a}, 0)$
D) $(\frac{3}{a}, 0)$

**5.** Gemma opens a lemonade stand. She takes out a $5.00 loan from her mom to pay for supplies and promises to pay her back at the end of the day. Gemma sells lemonade for $0.50 per cup. If $x$ represents the number of cups sold, which of the following equations represents Gemma's lemonade profit, after she pays her mom back?

A) $5x + 0.5$
B) $0.5x - 5$
C) $0.5x + 5$
D) $5x - 0.5$

**6.** Which linear equation has exactly one solution?

A) $6x + 12 = 6x$
B) $6x + 12 = 6x + 12$
C) $6x + 12 = 3(2x + 4)$
D) $6x + 12 = 3(3x + 5)$

**7.** The Berkeley Community Supported Agriculture (CSA) would like to increase membership by a total number of $n$ people per year. There were $s$ people in the CSA at the beginning of this year. Which function best models the total number of people, $y$, the CSA plans to have as members $x$ years from now?

A) $y = nx - s$
B) $y = nx + s$
C) $y = s\text{x} - n$
D) $y = sx + n$

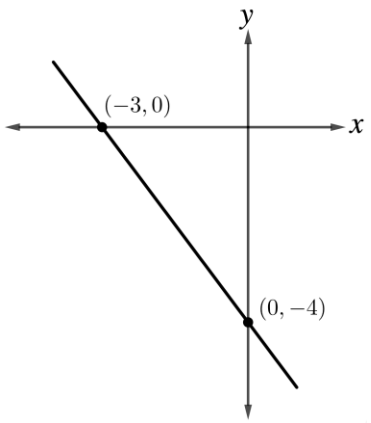
**8.** The function $f$ is linear, and $f(3) = 12$. When the value of $x$ increases by 1, the value of $f(x)$ decreases by 4. Which of the following defines $f$?

A) $f(x) = -3x - 4$
B) $f(x) = -3x - 13$
C) $f(x) = -3x - 13$
D) $f(x) = -4x + 24$

**9.** The water level of a river decreases by 1 foot every 2 days. The initial level of the water of the river is 34 feet. Which equation gives the water level $l$, in feet, of the river after $d$ days?

A) $l = -\frac{d}{2}$
B) $l = -2d$
C) $l = -2d + 34$
D) $l = -\frac{d}{2} + 34$

**10.** The graph in the standard $(x, y)$ coordinate plane below represents which of the following equations?




A) $4x + 3y = -12$
B) $3x + 4y = -16$
C) $3x + 4y = 16$
D) $4x + 3y = 12$

## Grid-In

**11.** In the $xy$-plane, the point $(8, 4)$ lies on the graph of the line $y = kx + 2$, where $k$ is a constant. What is the value of $k$?

**12.** The function $q$ is defined by $q(x) = \frac{3}{4}x + \frac{5}{4}$. Function $p$ is parallel to function $q$ and goes through the point $\left(0, \frac{7}{4}\right)$. What is the slope of the graph of $y = p(x)$ in the $xy$-plane?

**13.** Maria draws the line $4y - 2x = 8$ and draws another line that is perpendicular to that line. She then draws a third line that is perpendicular to the second line. What is the slope of the third line that Maria draws?

**14.** $7x + 5 = bx + 3$

In the given equation, $b$ is a positive integer constant less than 8. The equation has exactly one solution. What is the greatest possible value of $b$ ?

**15.** $F(x) = \frac{9}{5}x + 32$

The function $F$ gives the temperature in degrees Fahrenheit that corresponds to a temperature of $x$ degrees Celsius. If the temperature increases by 2.5 degrees Celsius, what is the corresponding temperature increase in degrees Fahrenheit?