Linear Equations – Study Guide

Direct Variation

Tell whether x and y show direct variation. If so, determine the constant of proportionality.

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

2. \( y + x = 3 \)

3. 
   \[
   \begin{array}{cccc}
   x & 2 & 4 & 6 \\
   y & 3 & 5 & 7 \\
   \end{array}
   \]

4. 
   \[
   \begin{array}{cccc}
   x & -1 & 0 & 1 \\
   y & 4 & 0 & -4 \\
   \end{array}
   \]

5. 

6. 

Slope

7. Refer to the diagram on the right.
   a. Which of the line(s) have a positive slope?
   b. Which of the line(s) have a negative slope?

8. Describe the slope of each line below.
Find the slope of the lines below.

9. \[ \text{The line that passes through } (-1, -4) \text{ and } (1, 4) \]

10. \[ \text{The line that passes through } (1, 2) \text{ and } (-3, 2) \]

11. The line that passes through (-1, -4) and (1, 4)

12. The line that passes through (1, 2) and (-3, 2)

13. \[
\begin{array}{c|c|c|c|c}
 x & 0 & 2 & 4 & 6 \\
 y & -4 & -1 & 2 & 5 \\
\end{array}
\]

14. \[
\begin{array}{c|c|c|c|c}
 x & -4 & -1 & 0 & 3 \\
 y & 7 & 4 & 3 & 0 \\
\end{array}
\]

15. A ramp used to remove furniture from a moving truck has a slope of \( \frac{2}{5} \). The height of the ramp is 4 feet. How far does the base of the ramp extend from the end of the truck?

16. The graph shows the cost of a long distance phone call.
   a. Find the slope of the line.
   b. Explain the meaning of the slope as a rate of change.
   c. How much money is added to the phone bill if you talk for 5 extra minutes?
   d. How many minutes did you talk if the phone call costs $3?
Slope-Intercept Form

Find the slope and y-intercept of the graph of the linear equation.

17. \( y = x + 4 \) \hspace{2cm} 18. \( y = -\frac{5}{7}x - 2 \)

Graph the linear equation.

19. \( y = 3x - 2 \) \hspace{2cm} 20. \( y = -\frac{1}{4}x \)

21. There is a $10 monthly membership fee to download music. There is a $0.50 fee for each song downloaded.
   
   a. Write a linear equation that models the cost of downloading \( x \) songs per month.

   b. Graph the equation.

   c. What is the cost of downloading 15 songs?
22. An entrepreneur is opening a business to market pies and pie fillings based on her family’s recipes. The price of every item in the store is $6.

   a. Write a linear equation that models the amount of revenue $y$ (in dollars) taken in for selling $x$ items.

   b. Graph the equation.

   c. The monthly cost of rent and utilities for the store space is $1100. What is the minimum number of items that must be sold each month in order to make a profit?

Point-Slope and Point-Point Form

Write the equation of the line that passes through the given point and has the given slope.

23. $(-6, 3); m = \frac{1}{3}$

24. $(-1, -5); m = 2$

Write the equation of the line that passes through the given points.

25. $(2, 3)$ and $(3, 7)$

26. $(-5, -8)$ and $(10, 4)$
Parallel and Perpendicular Lines

Use the given information about lines A, B and C to answer the following questions:

- The equation of line A is \( y = \frac{1}{3}x - 2 \).
- Line B is parallel to Line A and passes through (6, 4)
- Line C is perpendicular to line B and passes through (0, 1)

27. Find the equation of line B
28. Find the equation of line C

29. Graph lines A, B and C on the graph

30. Write the equation of a line that passes through point (-1, 3) and parallel to line AB which passes through (3, -5) and B(-2, 15).

31. Find the value of k so that the line passing through the points \((k, -1)\) and \((-2, 8)\) is parallel to the equation \(3x + y = -7\).