5.1 Write an Equation Given the Slope and a Point

Answers

1. $y = mx + b$, $m = slope$, $b = y-intercept$

2. **Step 1:** Begin by writing the formula for slope-intercept form: $y = mx + b$.
   Step 2: Substitute the given slope for. m
   Step 3: Use the ordered pair you are given (x, y) and substitute these values for the variables x and y in the equation.
   Step 4: Solve for b (the $y-$ intercept of the graph).
   Step 5: Rewrite the original equation in Step 1, substituting the slope for m and the $y-$ intercept for b .

3. $y = 7x - 2$

4. $y = -5x + 6$

5. $y = -2x + 7$

6. $y = \frac{2}{3}x + \frac{4}{5}$

7. $y = -\frac{1}{4}x + 0$

8. $y = \frac{2}{3}x + \frac{3}{5}$

9. $y = -1x + \frac{4}{5}$

10. $y = -\frac{2}{3}x - \frac{2}{3}$

11. $y = -3x + 4$

12. $y = 1/2x - 2$

13. $y = -1x + 4$

5.2 Write an Equation Given Two Points

Answers

1. Start with the slope–intercept form of the line, $y = mx + b$

2. $y = -2x + 10$

3. $y = -2x + -12$

4. $y = \frac{5}{6}x + 2\frac{1}{2}$

5. $y = 2\frac{1}{2}x - 10$

6. $y = -1x + 4$

7. $y = 4x - 6$

5.3 Write a Function in Slope-Intercept Form

Answers

1. $3, -3, -13$

2. $4, 10, 16$

3. $y = 5x + -3$

4. $y = -2x + 5$

5. $y = -7x + 13$

6. $y = \frac{1}{3} + 1$

7. $y = 4.2x + 19.7$

8. $y = 2x + \frac{5}{4}$

9. $y = -2x$

10. $y = -x$

5.4 Linear Equations in Point-Slope Form

Answers

1. $y - y_1 = m(x - x_1)$

2. Accept answers that are logical and thought out. Examples may be; Gives you a easy means for checking your work if you know two points on the line.

3. $y = \frac{1}{3}x - 4$

4. $y - 2 = -\frac{1}{10}(x - 10)$

5. $y - 125 = -75(x - 0)$

6. $y + 2 = 10(x - 8)$

7. $y - 3 = \frac{5}{4}(x + 2)$ *or* $y + 2 = \frac{5}{4}(x + 1)$

8. $y - 0 = 2(x - 0)$ *or* $y - 2 = 2(x - 1)$

9. $y - 12 = -\frac{13}{5}(x - 10)$ *or* $y - 25 = -\frac{13}{5}(x - 5)$

10. $y - 3 = 0(x - 2)$ *or* $y - 3 = 0(x - 0)$

11. $y - 0 = \frac{3}{5}(x - 5)$

12. $y + 5.5 = -6(x - 1)$

13. $y + 2 = -\frac{7}{5}(x + 4)$ *or* $y - 12 = -\frac{7}{5}(x - 8)$

14. $y = 3x - 1$

15. $y = -\frac{2}{3}x - 8$

16. $0y = x + 5$

17. $y = \frac{1}{4}x - 6$

18. $y - 7 = -\frac{1}{5}(x - 0)$

19. $y - 5 = -12(x + 2)$

20. $y - 5 = -\frac{9}{10}(x + 7)$ *or* $y + 4 = -\frac{9}{10}(x - 3)$

21. $y - 0 = -1(x - 6)$ *or* $y - 6 = -1(x - 0)$

22. $y + 9 = 3(x - 2)$

23. $y - 32 = -\frac{9}{5}(x - 0)$

24. $y - 250 = 25(x - 0)$

25. $y - 0 = \frac{5}{9}(x - 32)$ *or* $y - 25 = \frac{5}{9}(x - 77)$

5.5 Forms of Linear Equations

Answers

1. $Ax + By = C,$ They represent integers, and A & B are not both zero.

2. Clearing the fractions requires removing fractions from an equation by multiplying the entire equation by the denominator(s).

3. $slope = \frac{-A}{B}$ and $y - intercept = \frac{C}{B}$.

4. $-3x + y = -8$

5. $x = y = -6$

6. $= \frac{5}{3x} + y = -4$

7. already in standard form

8. $-1/6x + y = -5$

9. $5x + y = 67$

10. $-6x + 2y = 9$

11. $-\frac{9}{4}x + y = \frac{1}{4}$

12. $-\frac{2}{3x} + y = -1\frac{14}{15}$

13. $-4x = 3y = -50$

14. $y = \frac{5}{2}x - 7\frac{1}{2}$

15. $y = -\frac{1}{2}x + 4\frac{1}{6}$

16. $y = \frac{1}{8}x - \frac{3}{2}$

17. $y = \frac{3}{7}x - 2\frac{6}{7}$

18. $y = x - \frac{4}{9}$

19. $y = -6x + 3$

20. $y = x - 9$

21. $y = -\frac{8}{3}x + 5$

22. $y = -\frac{4}{9}x + \frac{1}{9}$

23. $y - 5 = -1(x + 3), \quad y = -x + 2$

24. $y - 0 = -\frac{1}{4}(x - 4), \quad y = -\frac{1}{4}x + 1$

25. $y + 2 = -\frac{3}{5}(x - 5)$ *or* $y - 4 = -\frac{3}{5}(x + 5), \quad y = -\frac{3}{5}x + 1$

26. $y + 2 = \frac{3}{8}(x + 3)$ *or* $y - 1 = \frac{3}{8}(x - 5), \quad y = \frac{3}{8}x - \frac{7}{8}$

27. $y + 1 = \frac{3}{4}(x - 1)$ *or* $y - 2 = \frac{3}{4}(x - 5), \quad y = \frac{3}{4}x - 1\frac{3}{4}$

28.

5.6 Applications Using Linear Models

Answers

1. y = money paid in one year, x = monthly payments $y = 350x + 1500$

2. y = represents the height of the rose, x represents the week. $y = 4x + 2$. It was two inches tall when she planted it.

3. $y = \frac{1}{40}x + 1$, The spring should be 4.5 inches long with Amardeep on it.

4. $y = \frac{1}{2}x + 215$, The cord should be 290 feet long with a 150lb weight.

5. $y = \frac{1}{40}x + 17.5$, The spring should be 17.5 in long, unstretched.

6. $y = 17.5x - 400$, At the time $x = 5$, the depth would have been -312.5 feet

7. $y = 6x + 1300$, Her base salary is $1,300 per month

8. 1.2 pounds of corn

9. 165 baked-fish dinners

10. $6x + 10y = 366$, He needs to work 36 hours at $6 per hour

11. $0.05x + 0.07y \leq 400$,

5.7 Equations of Parallel Lines

Answers

1. Parallel **lines** are the same distance apart at any given point.

2. $Slope = -5$

3. $Slope = \frac{1}{4}$

4. $Slope = undefined$

5. $Slope = 0$

6. $Slope = 1/5$

7. $y = -\frac{3}{5}x - 2$

8. $y = \frac{5}{2}x - 15$

9. $y = x + 1$

10. $x = -2$

5.8 Equations of Perpendicular Lines

Answers

1. Two lines that intersect and for 4 90 degree angles.
2. The product of their slope is always -1
3. Slope of -1
4. Slope of 4
5. Slope of 0
6. Undefined slope
7. Slope of -5
8. Parallel
9. Neither
10. Parallel
11. Perpendicular
12. Parallel

13. Neither

14. Neither

15. $y = 4x + 10$

16. $y = -3x + 2$

17. $y = -\frac{5}{3}x + 8$

18. $y = \frac{1}{2}x - 3$

19. $y = -x - 2$

20. $y = -\frac{3}{5}x + 2\frac{4}{5}$

21. $y = -\frac{3}{2}x + 13$

5.9 Families of Lines

Answers

1. A set of lines that have something in common with each other

2. $y = \frac{5}{2}x - 5\frac{1}{2}$

3. $y = \frac{5}{2}x + 3$

4. $y = \frac{2}{7} + 2\frac{4}{7}$

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

6. $y = -\frac{7}{2} + 3$

7. $y = \frac{3}{2}x$

8. $y = mx + 4$

9. $y = \frac{3}{4}x + b$

10. $y = 4x + b$

11. $y = mx - 1$

12. $y = \frac{1}{2}x + b$

13. $y = -2x + b$

5.10 Fitting Lines to Data

Answers

1. Sample answer: A scatter plot is a graph of individual unconnected data points

2. Sample answer: A line of best fit is a linear approximation of scatter plot data.

3. Sample answer: An outlier is a data point that is not generally representative of the data set. On a scatter plot, an outlier occurs significantly away from the general data grouping.

4. Sample answer: A line of fit may be found by 'eyeballing' the data and calculating the equation that describes the chosen line, or may be calculated using technology.

5. Sample answer: Graph the data on a scatter plot, select a straight line that best represents the trend of the data, calculate the equation of the selected line. Determining a line of fit this way introduces error through visual estimation.

6. The line should be approximately $y = x + 11$

7. The line should be approximately $y = -\frac{1}{3}x + 20$

8. The line should be approximately $y = 2x + 6.5$

9. $y = 0.81x + 3.49$

10. $y = 0.965x + 10.83$

11. $y = -0.884x + 25.03$

12. $y = 2.4x + 28$, At $x = 14$, $y = 61.6$, He should be ready. The y-intercept represents the number of Samosas he eats with no training. The slope is the rate at which he increases his eating ability.

13. $y = 0.75x - 1$, An initial height of 88cm corresponds to a 65cm bounce. The y-intercept should indicate the bounce height if the ball were dropped from 0cm (it does not work, of course). The slope indicates the rate at which the bounce height increases compared to increased drop height.

14. A 14.5oz candle should burn for approximately 95 hours.

15. The expected median income in 2010 would be $81,081. The slope describes the yearly rate of median income increase. The y-intercept represents the income in year 1995 (0 years after the start of records).

5.11 Linear Interpolation and Extrapolation

Answers

1. Linear interpolation is the process of identifying missing data points between identified values. It is most useful for linear data with relatively limited ranges.

2. Extrapolation involves estimating values either above or below the identified range. Extrapolation is often more accurate than interpolation for non-linear data.

3. The problem with using linear extrapolation to estimate the time of a run in 2010 is that the last recorded data point is of questionable accuracy.

4. $y = -0.0265x + 12.295$

5. Using, $y = -0.02x + 22.1$, the Median age at First Marriage for females in 1946 was about 20.8.

6. Using $y = .13x + 12.25$, the Median age at First Marriage for females in 1984 was about 22.9.

7. Using $y = \frac{7}{100}x + 20$, the Median age at First Marriage for males in 1995 was about 26.7.

8. Using $y = -\frac{7}{20}x + 47.2$, the percentage of pregnant smokers in 1997 was 13.25.

9. Using $y = -\frac{1}{5}x + 11$, the percentage of pregnant smokers in 2006 was 9.8.

10. Using $y = -\frac{2}{15}x + 15.7$, the estimated 100 meter record time in 1920 is 13.03.

11. Using $y = 4x + 21.4$, the high temperature for a day with 13.2 hours is 74.2.

12. Using linear extrapolation and $y = -4x + 101$, the high temperature for a day with 9 hours is 65. This is misleading since the 10hrs data point is an outlier. Using the line of best fit and $y = 3.2x + 29.7$, the temperature is 58.5.

5.12 Problem Solving with Linear Models

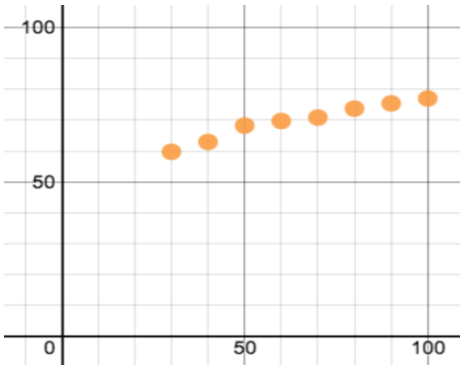
Answers

1. A sample answer: A mathematical model is an equation describing the trend of the relationship between two sets of data.

2. A sample answer: Linear modeling is the process of identifying the equation of a line to represent the trend of the relationship between two sets of data.

3. Using $y = -2.1x + 51$, the water level at 17 seconds was 15.3 cm.

4.



5. Using $y = 0.25x + 54$, a person born in 1955 would expect to live 70.25 years.

6. Using $y = \frac{3}{20}x + 61$, a person born in 1955 would expect to live 69.25 years.

7. Using $y = 0.25x + 54$, a person born in 1976 would expect to live 73 years.

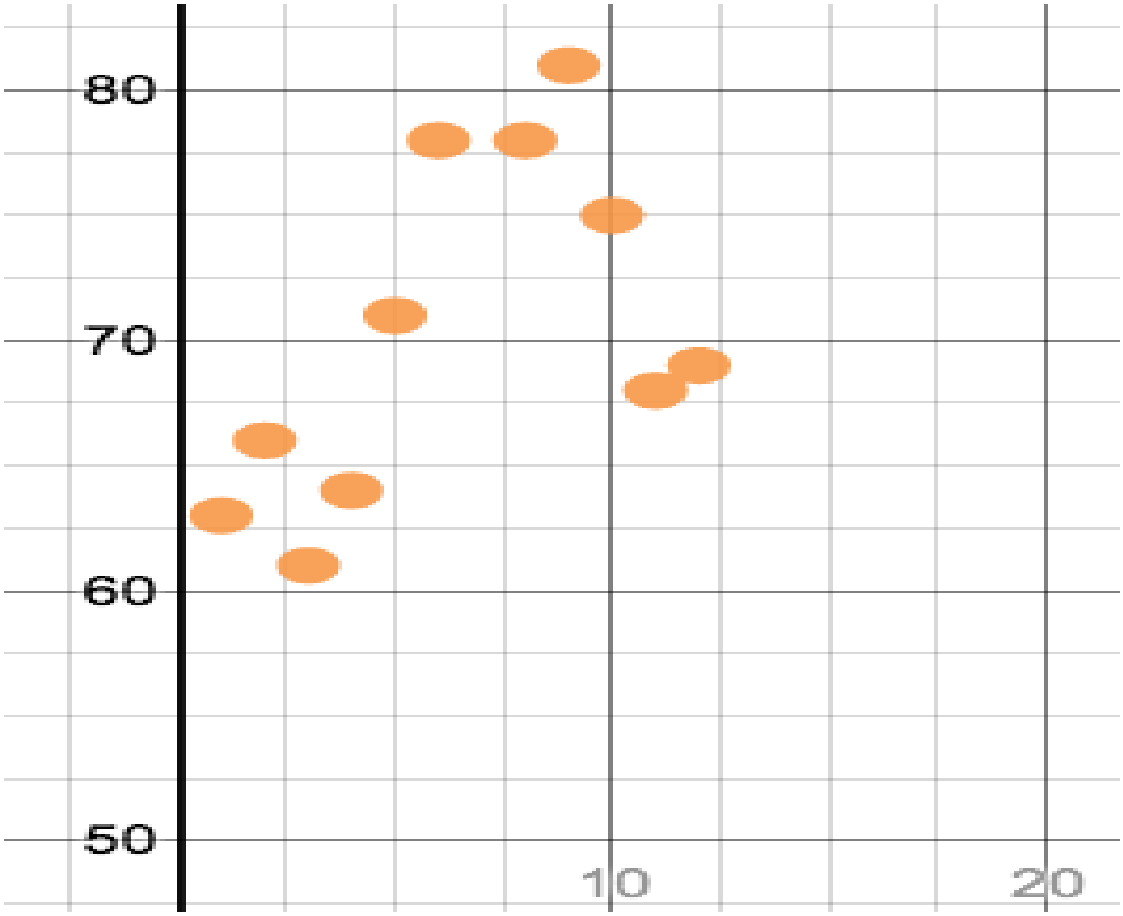
8. Using $y = 0.11x + 63$, a person born in 1976 would expect to live 71.4 years.

9. Using $y = 0.25x + 54$, a person born in 2012 would expect to live 82 years.

10. Using $y = 0.16x + 61$, a person born in 1976 would expect to live 78.9 years.

11. A sample answer: Linear extrapolation data is likely more accurate as the last three points exhibit linear data.

12.



13. Using $y = x + 65$ at month 4.5, the estimated temperature would be 69.5 deg.

14. Using $y = 7x + 36$, at month 4.5 the estimated temperature is 67.5 deg.

15. Using $y = x + 65$ at month 13, the estimated temperature would be 78.6 deg.

16. Using $y = x + 57$, at month 13, the estimated temperature would be 70 deg.

17. Answers will vary

5.13 Dimensional Analysis

Answers

1. False
2. They are canceled out
3. 5280 feet in a mile
4. 63360 inches in a mile
5. 86400 seconds in a day
6. 31536000 seconds in a year
7. 660 feet in a furlong
8. 3600 inches on a football field
9. 12.7 centimeters in 5 inches
10. 27.432 meters between first and second base
11. 14.6304 meters in 16 yards
12. 25.3605 cups in 6 liters
13. 1.80469 cubic inches make one ounce
14. 236.588 milliliters make 8 ounces
15. 45359.2 grams in 100 pounds.
16. .3858 grains of medication in one pill
17. 4080 beats per hour
18. 5456 fathoms

19. $536.36 dollars per gallon

20. 5865696000000 miles per year

21. 273196.8 AU from earth

22. 696960 square feet in 16 acres

23. 264 pounds is equal to 119.75 kilograms

24. 104.61km/hr

25. 57.75 cu inches

26. 41067 feet per second

27. 336 hours in a fortnight

28. 52 fortnights in two years

29. 16 tons

30. One gallon