# MATH CALCULATOR

1. $k(x) = 260x$

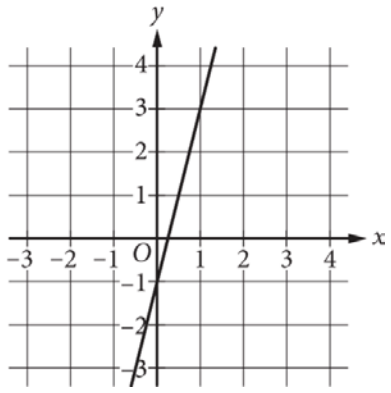
The function gives the total amount $k(x)$, in dollars, Kayla earned after working x weeks at a bookstore. What is the total amount Kayla earned, in dollars, after working 10 weeks at the bookstore?

A. 2,600
B. 2,610
C. 2,626
D. 2,860

2. The function f is defined by $f(x) = x + 4$. What is the value of $f(x)$ when $x = 5$?

A. 9
B. 5
C. 4
D. 1

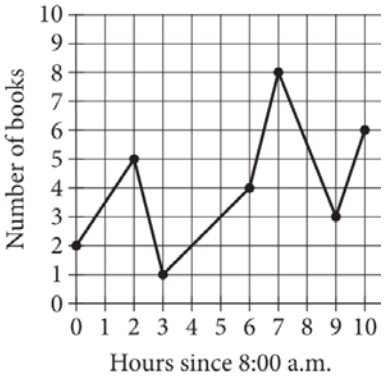
3.




What is an equation of the graph shown?

A. $y = -4x - 1$
B. $y = -4x + 1$
C. $y = 4x - 1$
D. $y = 4x + 1$

4.




What is the minimum number of books in the book drop recorded during this time?

A. 5
B. 4
C. 3
D. 1

5. $\sqrt{m^2} = \sqrt{64^2}$

What is the positive solution to the given equation?

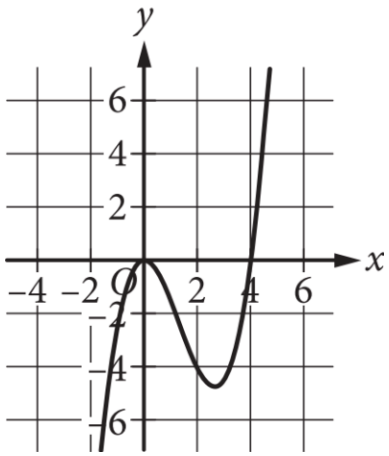
A. 4
B. 8
C. 16
D. 64

6.

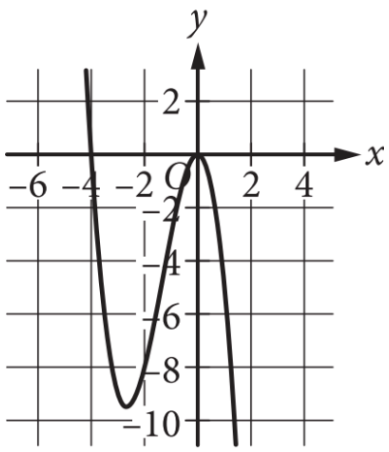
| $x$ | -4 | -1 | 1 |
|---|---|---|---|
| $f(x)$ | 0 | 3 | 5 |

For the polynomial function f, the table shows some values of x and their corresponding values of $f(x)$. Which of the following could be the graph of y equals $f(x)$?

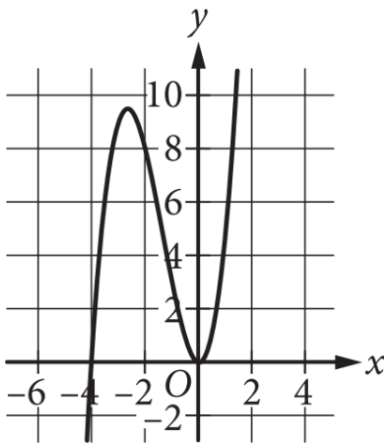
A.



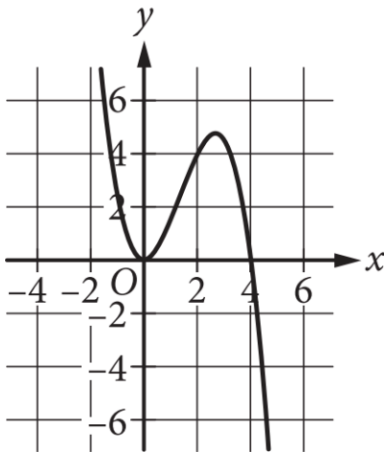

C.



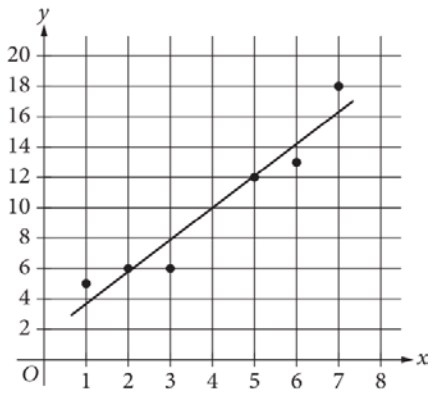

B.




D.




7.




The scatterplot shows the relationship between two variables, x and y. A line of best fit for the data is also shown. For $x = 4$, which of the following is closest to the y-value predicted by the line of best fit?

A. 10
B. 12
C. 14
D. 16

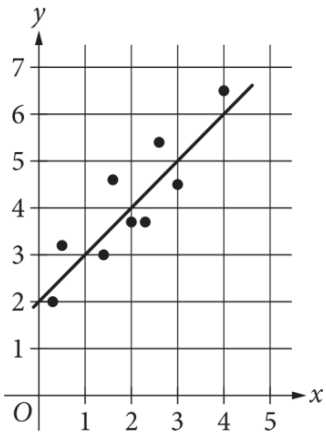
8. In a group of 8 children, 2 have freckles and 6 do not have freckles. If one of the 8 children is selected at random, what is the probability of selecting a child who has freckles?

A. 0.25
B. 0.33
C. 0.50
D. 0.75

9. The ratio of Jupiter's diameter to Saturn's diameter is approximately 1.2 to 1. The diameter of Jupiter is 143,000 kilometers. What is the diameter, to the nearest ten thousand kilometers, of Saturn?

A. 24,000
B. 83,000
C. 120,000
D. 170,000

10. In the given scatterplot, a line of best fit for the data is shown.




Which of the following is an equation for the line of best fit?

A. $y = x$
B. $y = 2x$
C. $y = 1 + x$
D. $y = 2 + x$

11.

| x | $f(x)$ |
|---|---|
| 0 | 13 |
| 10 | 9 |
| 25 | 3 |

For the linear function f, the table shows three values of x and their corresponding values of $f(x)$. Which equation defines f?

A. $f(x) = -4x + 13$
B. $f(x) = -2x + 13$
C. $f(x) = -\frac{5}{2}x + 13$
D. $f(x) = -\frac{2}{5}x + 13$

12. $2 - x^2 - x^2 - 2$

Which of the following is equivalent to the given expression?

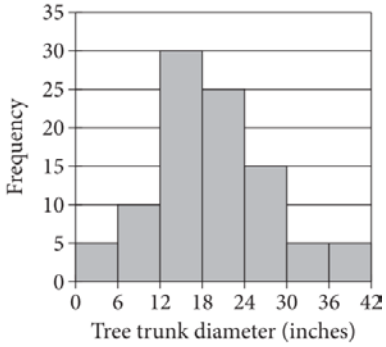
A. 0
B. 2
C. $-x^2$
D. $-2x^2$

13. A data set consists of 100 values. The least value is 30, and the greatest two values are 80 and 125. If the value 125 is removed from the original data set to create a new data set with 99 values, which statement must be true?

A. The means of the two data sets will be the same.
B. The mean of the new data set will be less than the mean of the original data set.
C. The medians of the two data sets will be the same.
D. The median of the new data set will be less than the median of the original data set.

Questions 14 and 15 refer to the following information.

A forestry department measures tree trunk diameter, in inches, at a constant height from the ground for each tree growing in a certain area. The data for 95 of these trees are summarized in the histogram. The first bar represents trees with a trunk diameter less than 6 inches. The second bar represents trees with a trunk diameter of at least 6 inches but less than 12 inches, and so on.




14. Approximately what percentage of these trees have a trunk diameter less than 6 inches?

A. 2.6%
B. 5.3%
C. 10.5%
D. 15.8%

15. Which of the following is a possible value for the median trunk diameter, in inches, of these trees?

A. 10
B. 15
C. 20
D. 25

16. The three candidates who ran for a city council position in Memphis in 2015 received a total of 14,705 votes. The ratio of votes for the first candidate to votes for the second candidate was approximately 4 to 1. The ratio of votes for the first candidate to votes for the third candidate was approximately 100 to 13. Based on this information, which of the following is closest to the number of votes received by the first candidate?

A. 1,911
B. 3,676
C. 10,656
D. 14,601

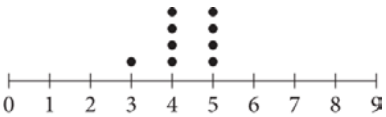
17. Kai went on a bike ride. During the first mile of his bike ride, he rode at a constant speed, s. After the first mile of his ride, Kai increased his speed by 100%. Which of the following expressions represents the speed Kai rode his bike after the first mile, in terms of s ?

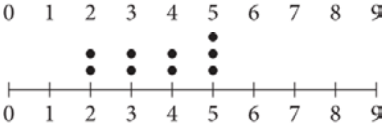
A. s
B. s + 1
C. 1.5s
D. 2s

18. Which of the following dot plots represents the data set with the greatest standard deviation?

A.



B.



C.



D.



Questions 19 and 20 refer to the following information.

A state representative wants to increase the amount of driving practice time required before a student can earn a driver's license. The representative surveyed a random sample of 50 from the 250 students taking the driver's education class at Jefferson High School. The survey reported that 62% of students taking the class agree that driving practice time should be increased, with an associated margin of error of 5%.

19. Based on the results of the survey, how many of the students surveyed agree with the proposed change?

A. 19
B. 31
C. 124
D. 155

20. Which of the following populations can the results of the survey at Jefferson High School be extended to?

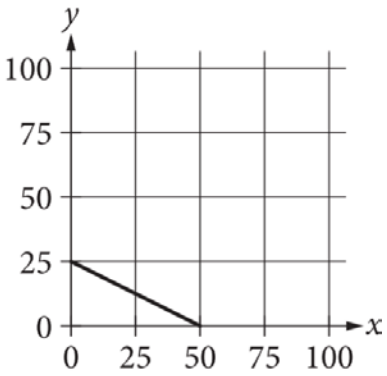
A. Students at any US high school
B. Students taking a driver's education class at any US high school
C. Students at Jefferson High School
D. Students taking a driver's education class at Jefferson High School

21. Which quadratic equation has exactly one distinct real solution?

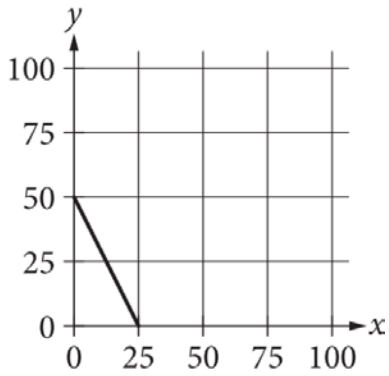
A. $x^2 + 4x + 16 = 0$
B. $x^2 - 8x - 16 = 0$
C. $x^2 - 6x - 16 = 0$
D. $x^2 - 8x + 16 = 0$

22. In a school debate club, each student earns 2 credits if they participate in a debate and lose, and 4 credits if they participate in a debate and win. A student receives an award after earning 100 credits. The credits needed for the award can be modeled by the equation $2x + 4y = 100$, where x is the number of times a student participated in a debate and lost, and y is the number of times the student participated in a debate and won. Which graph represents this situation?

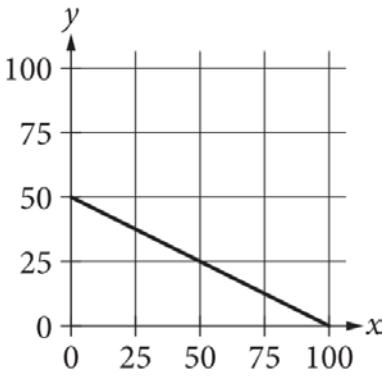
A.



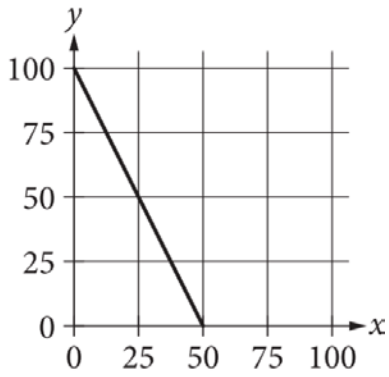

C.




B.




D.



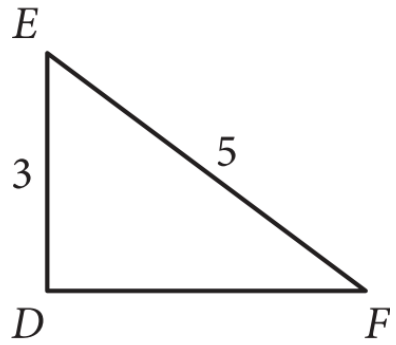

23. Rectangle X has a length of 12 centimeters (cm) and a width of 2.5 cm. Right triangle Y has a base of 10 cm. The area of rectangle X is three times the area of right triangle Y. What is the height, in cm, of right triangle Y?

A. 1
B. 2
C. 3
D. 6

24. According to a 2008 study, there were five known subspecies of tigers, including the Amur and Bengal, living in the wild. Scientists estimated that there were a total of 4,000 tigers in the wild. Of these, 450 were Amur tigers and x were Bengal tigers. Which inequality represents all possible numbers of tigers in the wild in 2008 that belonged to the Bengal tiger subspecies?

A. $5x \geq 4000$
B. $\frac{x}{5} \geq 4000$
C. $1 \leq x \leq 3547$
D. $3547 < x \leq 4000$

25.




Which of the following additional pieces of information provides enough information to prove whether triangle DEF is a right triangle?

I. The measure of angle D
II. The length of segment DF

A. I only
B. II only
C. Either I or II
D. Neither I nor II

26. According to a model, if 100 people see a sequence of three letters, 87 of them will recall this sequence immediately after seeing it. The model predicts that this number will decrease by 14% of the number the previous second for each second that passes. Which function represents this model, where $f(t)$ is the predicted number of people who will recall the sequence after t seconds have passed?

A. $f(t) = 14(0.87)^t$
B. $f(t) = 87(0.14)^t$
C. $f(t) = 87(0.86)^t$
D. $f(t) = 87(1.14)^t$

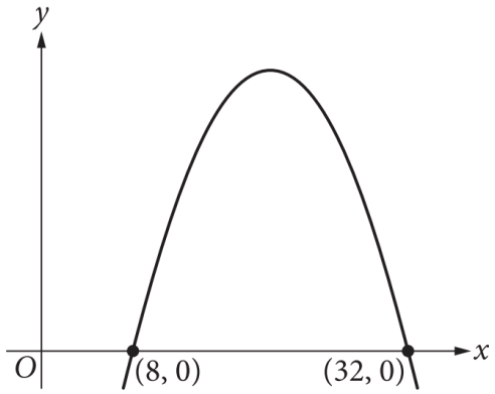
27. One of the two linear equations in a system is $-6x + 7y = -6$. The system has no solution. Which equation could be the second equation in this system?

A. $6x - 7y = 0$
B. $-\frac{21x}{4} + \frac{49y}{8} = -\frac{21}{4}$
C. $-\frac{21x}{4} - 14y = 0$
D. $6x - 7y = 6$

28. A cottonwood tree had a trunk diameter of 2.00 inches at the time it was planted. The tree had a trunk diameter of 22.24 inches x years after it was planted. The equation $0.64x + 2 = 22.24$ represents this situation. Which statement is the best interpretation of $0.64x$ in this context?

A. The total increase of the tree's trunk diameter x years after it was planted
B. The tree's trunk diameter x years after it was planted
C. The maximum trunk diameter of the tree over its lifetime
D. The total increase of the tree's trunk diameter each year after it was planted

29.




The graph of the equation $y = -x^2 + 40x - 256$ is shown. Which of the following equivalent forms of the equation shows the maximum value of y as a constant or coefficient?

A. $y = -(x - 8)(x - 32)$
B. $y = -(x - 20)^2 + 144$
C. $y = -x(x - 40) - 256$
D. $y = -x^2 + 8(5x - 32)$

30. If $\frac{x-3}{7} = \frac{x-3}{9}$, the value of $x - 3$ is between which of the following pairs of values?

A. -7 and -9
B. -1 and 1
C. 2.5 and 3.5
D. 6.75 and 9.25

31. An object has a mass of 200 grams and a volume of 10 cubic centimeters. What is the density, in grams per cubic centimeter, of the object?

32. An artist decorates square plates using the same pattern of blue and green tiles, where the ratio of blue to green tiles is 3 to 2. For a certain plate, the artist uses 120 blue tiles and $20n$ green tiles. What is the value of n?

33.

$$y = 3x + 9$$
$$y = -3x + 3$$

The solution to the given system of equations is $(x, y)$. What is the value of y?

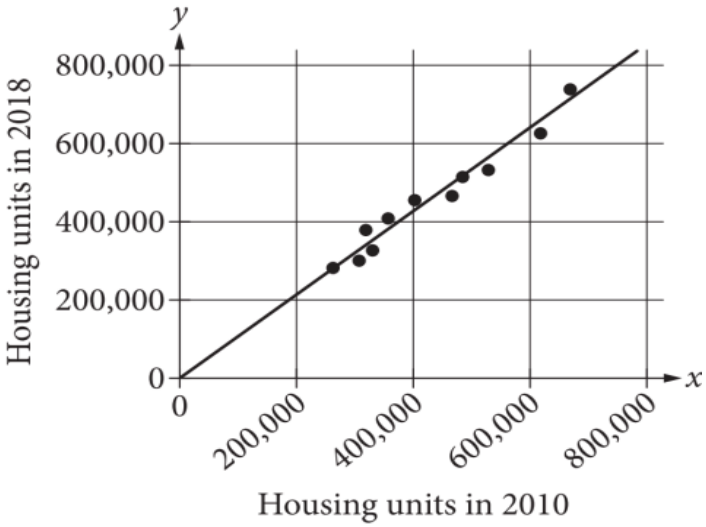
34. A circle has been divided into three nonoverlapping regions: I, II, and III. The area of region I is $4\pi$ square centimeters $(cm^2)$, the area of region II is $12\pi\ cm^2$, and the area of region III is $16\pi\ cm^2$. If a point in the circle is selected at random, what is the probability of selecting a point that does not lie in region II? (Express your answer as a decimal or fraction, not as a percent.)

35. In 1980, the world population was 4.44 billion people. A model created at the time predicted that this population would grow at a rate of 0.076 billion people each year after 1980. In 2015, the world population was 7.35 billion people. What is the positive difference, in billions of people, between the actual world population in 2015 and the model's predicted world population in 2015?

36. $M(t) = 10\left(\frac{1}{2}\right)^{\frac{t}{5730}}$

The given function M models the mass of the radioactive isotope carbon-14 in a sample, in picograms, t years after the initial measurement. How much time, in years, does it take for the mass of carbon-14 in the sample to decrease to 5 picograms?

37.




The scatterplot shows the number of housing units in 2010 and 2018 for each of 11 US states. A line of best fit with equation $y = ax$, where a is a constant, is also shown. A point lies above this line if and only if it represents a state with an increase in housing units from 2010 to 2018 greater than 7%. What is the value of a?

38. A circle in the xy-plane has its center at $(4, -5)$ and has a radius of 2. An equation of the circle is $x^2 - 8x + y^2 + 10y + c = 0$, where c is a constant. What is the value of c?

MATH-CALCULATOR

| Question | Correct Answer | Your Answer | Difficulty | Subscores/Cross-Test Scores |
|---|---|---|---|---|
| 1 | A | ✓ | ■□□ | Analysis in History/ Social Studies<br>Heart of Algebra |
| 2 | A | ✓ | ■□□ | Heart of Algebra |
| 3 | C | ✓ | ■□□ | Heart of Algebra |
| 4 | D | ✓ | ■□□ | Problem Solving and Data Analysis |
| 5 | D | ✓ | ■□□ | Passport to Advanced Math |
| 6 | B | ✓ | ■□□ | Passport to Advanced Math |
| 7 | A | ✓ | ■□□ | Problem Solving and Data Analysis |
| 8 | A | ✓ | ■□□ | Problem Solving and Data Analysis |
| 9 | C | ✓ | ■□□ | Analysis in Science<br>Problem Solving and Data Analysis |
| 10 | D | ✓ | ■□□ | Problem Solving and Data Analysis |
| 11 | D | ✓ | ■□□ | Heart of Algebra |
| 12 | D | ✓ | ■□□ | Passport to Advanced Math |
| 13 | B | ✓ | ■■□ | Problem Solving and Data Analysis |
| 14 | B | ✓ | ■□□ | Analysis in Science<br>Problem Solving and Data Analysis |
| 15 | C | ✓ | ■■□ | Analysis in Science<br>Problem Solving and Data Analysis |
| 16 | C | ✓ | ■■□ | Analysis in History/ Social Studies<br>Problem Solving and Data Analysis |
| 17 | D | ✓ | ■■□ | Problem Solving and Data Analysis |
| 18 | D | ✓ | ■■□ | Problem Solving and Data Analysis |
| 19 | B | ✓ | ■□□ | Analysis in History/ Social Studies<br>Problem Solving and Data Analysis |
| 20 | D | ✓ | ■■□ | Analysis in History/ Social Studies<br>Problem Solving and Data Analysis |

| | | | | |
|---|---|---|---|---|
| 21 | D | ✓ | ■■□ | Passport to Advanced Math |
| 22 | A | ✓ | ■■□ | Analysis in History/ Social Studies<br>Heart of Algebra |
| 23 | B | A | ■■□ | N/A |
| 24 | C | ✓ | ■■□ | Analysis in Science<br>Heart of Algebra |
| 25 | C | ✓ | ■■□ | N/A |
| 26 | C | ✓ | ■■□ | Analysis in History/ Social Studies<br>Passport to Advanced Math |
| 27 | A | ✓ | ■■■ | Heart of Algebra |
| 28 | A | D | ■■■ | Analysis in Science<br>Heart of Algebra |
| 29 | B | ✓ | ■■■ | Passport to Advanced Math |
| 30 | B | ✓ | ■■■ | Heart of Algebra |
| 31 | 20 | ✓ | ■□□ | Problem Solving and Data Analysis |
| 32 | 4 | ✓ | ■■□ | Problem Solving and Data Analysis |
| 33 | 6 | ✓ | ■■□ | Heart of Algebra |
| 34 | 5/8,.625 | ✓ | ■■□ | Problem Solving and Data Analysis |
| 35 | 1/4,.25 | ✓ | ■■□ | Analysis in History/ Social Studies<br>Heart of Algebra |
| 36 | 5730 | ✓ | ■■□ | Analysis in Science<br>Passport to Advanced Math |
| 37 | 107/100,1.07 | ✓ | ■■■ | Analysis in History/ Social Studies<br>Problem Solving and Data Analysis |
| 38 | 37 | ✓ | ■■■ | N/A |