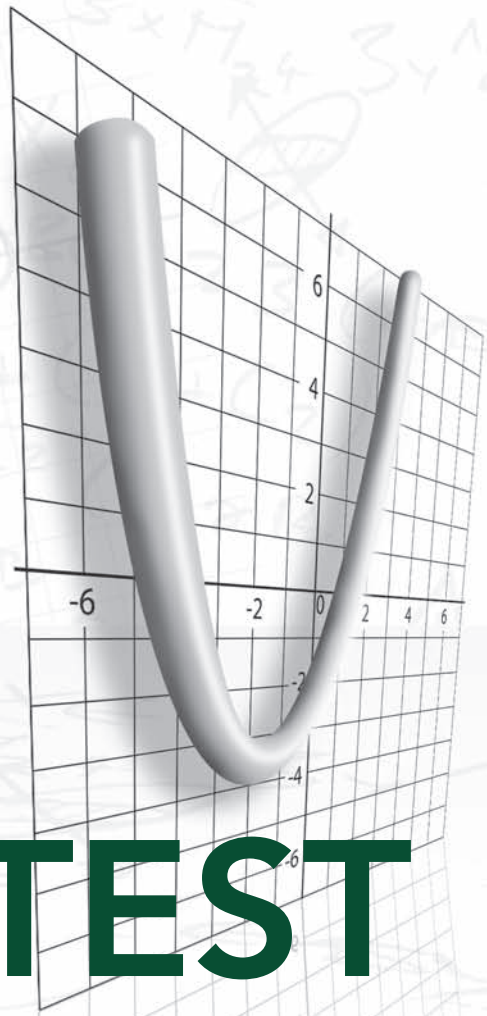
Student Name _____

Teacher Name _____

School _____

System _____




# ALGEBRA II

# PRACTICE TEST

## Tennessee End of Course Assessment

## Algebra II

Algebra II

11026

PEARSON

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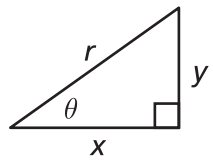
# Algebra II Reference Page

## Trigonometric Functions

$\sin\theta = \frac{y}{r}$, $\csc\theta = \frac{r}{y}$

$\cos\theta = \frac{x}{r}$, $\sec\theta = \frac{r}{x}$

$\tan\theta = \frac{y}{x}$, $\cot\theta = \frac{x}{y}$




$r = \sqrt{x^2 + y^2}$

## Logarithm Properties

$\log_b MN = \log_b M + \log_b N$

$\log_b\left(\frac{M}{N}\right) = \log_b M - \log_b N$

$\log_b M^p = p \log_b M$

$\log_b x = y \Leftrightarrow x = b^y$

## Arithmetic and Geometric Sequences and Series

$a_1 = 1^{\text{st}}$ term $\quad r =$ common ratio $\quad d =$ common difference

$a_n = n^{\text{th}}$ term $\quad n =$ number of terms in series

Arithmetic Sequence: $a_n = a_1 + (n-1)d$ $\quad$ Geometric Sequence: $a_n = a_1 r^{n-1}$

Sum of a Finite Arithmetic Series: $S_n = \frac{n(a_1 + a_n)}{2}$ or $S_n = \frac{1}{2}n[2a_1 + (n-1)d]$

Sum of a Finite Geometric Series: $S_n = \frac{a_1(1-r^n)}{1-r}$, $r \neq 1$

Sum of an Infinite Geometric Series: $S = \frac{a_1}{1-r}$ where $|r| < 1$

## Combinations

$${}_nC_r = \frac{n!}{r!(n-r)!}$$

## Permutations

$${}_nP_r = \frac{n!}{(n-r)!}$$

## Binomial Theorem

$$(a+b)^n = \sum_{r=0}^{n} \binom{n}{r} a^{n-r} b^r$$

## Quadratic Formula

$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

$$y = ax^2 + bx + c$$

## Interest Formulas

Compound interest: $A = P\left(1 + \frac{r}{n}\right)^{nt}$

Continuous compound interest: $A = Pe^{rt}$

$P =$ present value

$A =$ future value

$r =$ annual interest rate

$t =$ time in years

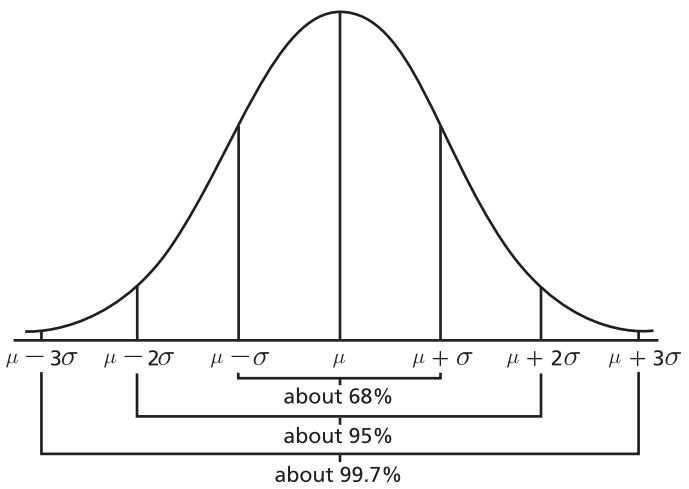
$n =$ frequency of compounding per year

# Algebra II Reference Page

## Conic Sections – Standard Equations

| | | | |
|---|---|---|---|
| Parabola | $y = a(x-h)^2 + k$ | or | $x = a(y-k)^2 + h$ |
| | $(y-k)^2 = 4p(x-h)$ | or | $(x-h)^2 = 4p(y-k)$ |
| Circle | $(x-h)^2 + (y-k)^2 = r^2$ | | |
| Ellipse | $\frac{(x-h)^2}{a^2} + \frac{(y-k)^2}{b^2} = 1$ | or | $\frac{(x-h)^2}{b^2} + \frac{(y-k)^2}{a^2} = 1$ |
| Hyperbola | $\frac{(x-h)^2}{a^2} - \frac{(y-k)^2}{b^2} = 1$ | or | $\frac{(y-k)^2}{a^2} - \frac{(x-h)^2}{b^2} = 1$ |

## Normal Curve Distribution




## Standard Deviation

The standard deviation , $\sigma$, for values $x_1, x_2, x_3, \ldots, x_n$ with mean $\mu$ is determined by the following:

$$\sigma = \sqrt{\frac{(x_1 - \mu)^2 + (x_2 - \mu)^2 + \ldots + (x_n - \mu)^2}{n}}$$

## Probability Formulas

Exclusive

$$P(A \text{ or } B) = P(A) + P(B)$$

Inclusive

$$P(A \text{ or } B) = P(A) + P(B) - P(A \text{ and } B)$$

Independent

$$P(A \text{ and } B) = P(A) \bullet P(B)$$

Dependent

$$P(A \text{ and } B) = P(A) \bullet P(B|A)$$

Conditional

$$P(B|A) = \frac{P(A \text{ and } B)}{P(A)}$$

# Algebra II Reference Page

## Cramer's Rule for Solving a System of Linear Equations

For a $2 \times 2$ System:

$$a_1x + b_1y = c_1$$
$$a_2x + b_2y = c_2$$

$$x = \frac{\begin{vmatrix} c_1 & b_1 \\ c_2 & b_2 \end{vmatrix}}{\begin{vmatrix} a_1 & b_1 \\ a_2 & b_2 \end{vmatrix}} \qquad y = \frac{\begin{vmatrix} a_1 & c_1 \\ a_2 & c_2 \end{vmatrix}}{\begin{vmatrix} a_1 & b_1 \\ a_2 & b_2 \end{vmatrix}}$$

For a $3 \times 3$ System:

$$a_1x + b_1y + c_1z = d_1$$
$$a_2x + b_2y + c_2z = d_2$$
$$a_3x + b_3y + c_3z = d_3$$

$$x = \frac{\begin{vmatrix} d_1 & b_1 & c_1 \\ d_2 & b_2 & c_2 \\ d_3 & b_3 & c_3 \end{vmatrix}}{\begin{vmatrix} a_1 & b_1 & c_1 \\ a_2 & b_2 & c_2 \\ a_3 & b_3 & c_3 \end{vmatrix}} \quad y = \frac{\begin{vmatrix} a_1 & d_1 & c_1 \\ a_2 & d_2 & c_2 \\ a_3 & d_3 & c_3 \end{vmatrix}}{\begin{vmatrix} a_1 & b_1 & c_1 \\ a_2 & b_2 & c_2 \\ a_3 & b_3 & c_3 \end{vmatrix}} \quad z = \frac{\begin{vmatrix} a_1 & b_1 & d_1 \\ a_2 & b_2 & d_2 \\ a_3 & b_3 & d_3 \end{vmatrix}}{\begin{vmatrix} a_1 & b_1 & c_1 \\ a_2 & b_2 & c_2 \\ a_3 & b_3 & c_3 \end{vmatrix}}$$

## Converting Degrees to Radians

Multiply degree measure by $\frac{\pi}{180°}$

## Converting Radians to Degrees

Multiply radian measure by $\frac{180°}{\pi}$

## Definition of "$i$"

$$i^2 = -1$$
$$i = \sqrt{-1}$$

## Absolute Value of a Complex Number

$$|a + bi| = \sqrt{a^2 + b^2}$$

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# Introduction to Algebra II

## Content of tests

The testing program titled the *Tennessee End of Course Assessment* was established to meet the Tennessee mandate for end of course assessments in Tennessee secondary schools. These tests measure the Tennessee State Performance Indicators. Subject areas covered by the end of course assessments include Mathematics, Language Arts, History, and Science.

## Test development

For the *Tennessee End of Course Assessment*, professional item writers experienced in each of the content areas researched and wrote the items. Professional editors and test developers carefully reviewed all items and test directions for content and accuracy. To provide a large pool of items for final test selection, the test developers created approximately 50% more items as were needed in the final editions of the tests.

After items were field tested, student responses were analyzed. Professional content editors and researchers carefully reviewed items, their data, and test directions for content, suitability, and accuracy before including certain items and test directions in operational tests.

### Test administration

*Tennessee End of Course Assessments* are given to students as they are completing courses that are included in the program. Tests may be given midyear for block schedules or at the end of the school year.

This test contains 65 multiple-choice questions.

You will have ample time to read and answer each of the questions. The Algebra II test has been designed to be administered in one session and is not timed. The first 15 minutes are set aside to complete identifying data on the answer sheet.

A reference page, similar to the one located in this Practice Test, will be in the front of the actual test. This page includes a list of formulas, equations, and tables for use during testing.

Calculator use is recommended. Sharing calculators during testing is not permitted.

The following types of calculators/devices may **NOT** be used during the test:

- pocket organizers
- electronic writing pads or input devices
- Some examples of prohibited calculators are:
  - Casio models: CFX-9970G, Algebra FX 2.0
  - Hewlett-Packard models: HP-40G, HP-49G
  - Texas Instruments models: TI-89, TI-92, Voyage 200, TI-NSPIRE - the CAS version (The non-CAS version of TI-NSPIRE is allowable.)
- calculators that can communicate (transfer data or information) wirelessly with other student calculators/devices
- cell phones, PSPs, and/or iPods

Students may use any four-function, scientific, or graphing calculator that does not have any of the above features. The use of devices that have a Computer Algebra System (CAS) is NOT allowed.

# Tips for Taking the Test

### Preparing for the test

- Take this Practice Test several times.
- Review the Tennessee End of Course Item Sampler for Algebra II located at http://tennessee.gov/education/assessment/sec_samplers.shtml on the Tennessee Department of Education Web site.
- Become familiar with the correct way to mark answers on the answer sheet. There is a sample answer sheet in this Practice Test.

### Before the test

- Get a good night's sleep. To do your best, you need to be rested.

### During the test

- Relax. It is normal to be somewhat nervous before the test. Try to relax and not worry.
- Listen. Listen to and read the test directions carefully. Ask for an explanation of the directions if you do not understand them.
- Plan your time. Do not spend too much time on any one question. If a question seems to take too long, skip it and return to it later. First answer all questions that you are sure about.
- Think. If you are not sure how to answer a question, read it again and try your best to answer the question. Rule out answer choices that you know are incorrect and choose from those that remain.

# Answer Sheet for the Practice Test

| | | | | |
|---|---|---|---|---|
| 1 Ⓐ Ⓑ Ⓒ Ⓓ | 14 Ⓕ Ⓖ Ⓗ Ⓙ | 27 Ⓐ Ⓑ Ⓒ Ⓓ | 40 Ⓕ Ⓖ Ⓗ Ⓙ | 53 Ⓐ Ⓑ Ⓒ Ⓓ |
| 2 Ⓕ Ⓖ Ⓗ Ⓙ | 15 Ⓐ Ⓑ Ⓒ Ⓓ | 28 Ⓕ Ⓖ Ⓗ Ⓙ | 41 Ⓐ Ⓑ Ⓒ Ⓓ | 54 Ⓕ Ⓖ Ⓗ Ⓙ |
| 3 Ⓐ Ⓑ Ⓒ Ⓓ | 16 Ⓕ Ⓖ Ⓗ Ⓙ | 29 Ⓐ Ⓑ Ⓒ Ⓓ | 42 Ⓕ Ⓖ Ⓗ Ⓙ | 55 Ⓐ Ⓑ Ⓒ Ⓓ |
| 4 Ⓕ Ⓖ Ⓗ Ⓙ | 17 Ⓐ Ⓑ Ⓒ Ⓓ | 30 Ⓕ Ⓖ Ⓗ Ⓙ | 43 Ⓐ Ⓑ Ⓒ Ⓓ | 56 Ⓕ Ⓖ Ⓗ Ⓙ |
| 5 Ⓐ Ⓑ Ⓒ Ⓓ | 18 Ⓕ Ⓖ Ⓗ Ⓙ | 31 Ⓐ Ⓑ Ⓒ Ⓓ | 44 Ⓕ Ⓖ Ⓗ Ⓙ | 57 Ⓐ Ⓑ Ⓒ Ⓓ |
| 6 Ⓕ Ⓖ Ⓗ Ⓙ | 19 Ⓐ Ⓑ Ⓒ Ⓓ | 32 Ⓕ Ⓖ Ⓗ Ⓙ | 45 Ⓐ Ⓑ Ⓒ Ⓓ | 58 Ⓕ Ⓖ Ⓗ Ⓙ |
| 7 Ⓐ Ⓑ Ⓒ Ⓓ | 20 Ⓕ Ⓖ Ⓗ Ⓙ | 33 Ⓐ Ⓑ Ⓒ Ⓓ | 46 Ⓕ Ⓖ Ⓗ Ⓙ | 59 Ⓐ Ⓑ Ⓒ Ⓓ |
| 8 Ⓕ Ⓖ Ⓗ Ⓙ | 21 Ⓐ Ⓑ Ⓒ Ⓓ | 34 Ⓕ Ⓖ Ⓗ Ⓙ | 47 Ⓐ Ⓑ Ⓒ Ⓓ | 60 Ⓕ Ⓖ Ⓗ Ⓙ |
| 9 Ⓐ Ⓑ Ⓒ Ⓓ | 22 Ⓕ Ⓖ Ⓗ Ⓙ | 35 Ⓐ Ⓑ Ⓒ Ⓓ | 48 Ⓕ Ⓖ Ⓗ Ⓙ | 61 Ⓐ Ⓑ Ⓒ Ⓓ |
| 10 Ⓕ Ⓖ Ⓗ Ⓙ | 23 Ⓐ Ⓑ Ⓒ Ⓓ | 36 Ⓕ Ⓖ Ⓗ Ⓙ | 49 Ⓐ Ⓑ Ⓒ Ⓓ | 62 Ⓕ Ⓖ Ⓗ Ⓙ |
| 11 Ⓐ Ⓑ Ⓒ Ⓓ | 24 Ⓕ Ⓖ Ⓗ Ⓙ | 37 Ⓐ Ⓑ Ⓒ Ⓓ | 50 Ⓕ Ⓖ Ⓗ Ⓙ | 63 Ⓐ Ⓑ Ⓒ Ⓓ |
| 12 Ⓕ Ⓖ Ⓗ Ⓙ | 25 Ⓐ Ⓑ Ⓒ Ⓓ | 38 Ⓕ Ⓖ Ⓗ Ⓙ | 51 Ⓐ Ⓑ Ⓒ Ⓓ | 64 Ⓕ Ⓖ Ⓗ Ⓙ |
| 13 Ⓐ Ⓑ Ⓒ Ⓓ | 26 Ⓕ Ⓖ Ⓗ Ⓙ | 39 Ⓐ Ⓑ Ⓒ Ⓓ | 52 Ⓕ Ⓖ Ⓗ Ⓙ | 65 Ⓐ Ⓑ Ⓒ Ⓓ |

# Directions for Taking the Practice Test

In this Practice Test, you will perform various mathematical operations. You may use your calculator and Reference Page located in the front of this book to help you solve the problems. You may write in the open spaces in this book to work the problems, but remember to fill in the circle on your answer sheet that goes with the answer you choose for each question. Fill in the circle completely and make your mark heavy and dark. If you want to change an answer, erase the mark you made and make a new mark.

You will do the items in this Practice Test by yourself. Remember to read all the directions carefully. When you see the words *Go On* at the bottom of the page, go to the next page. When you come to the word STOP, you have finished this test. When you have finished, you may check your answers.

On your answer sheet, find Number 1. Mark your answers beginning with Number 1.

You may begin.

Stop when you have finished the test.

At the end of the Practice Test, make sure that all your marks are heavy and dark and that you have completely erased any marks that you do not want.

Turn to Page 44 and locate the Answer Key. Check your answers and review those items that you marked incorrectly.

**1** What is the complex conjugate of $\sqrt{-400} + 17$?

**A** $20 - 17i$
**B** $20 + 17i$
**C** $17 - 20i$
**D** $17 + 20i$

**2** Which expression is equivalent to $(14x^2 - 9) + (11x + 6)$?

**F** $25x^3 - 15$
**G** $25x^3 - 3$
**H** $14x^2 + 11x - 15$
**J** $14x^2 + 11x - 3$

**3** Which expression is equivalent to $\cos 150°$?

**A** $\cos 30°$
**B** $\cos 330°$
**C** $\cos(-30°)$
**D** $\cos(-210°)$

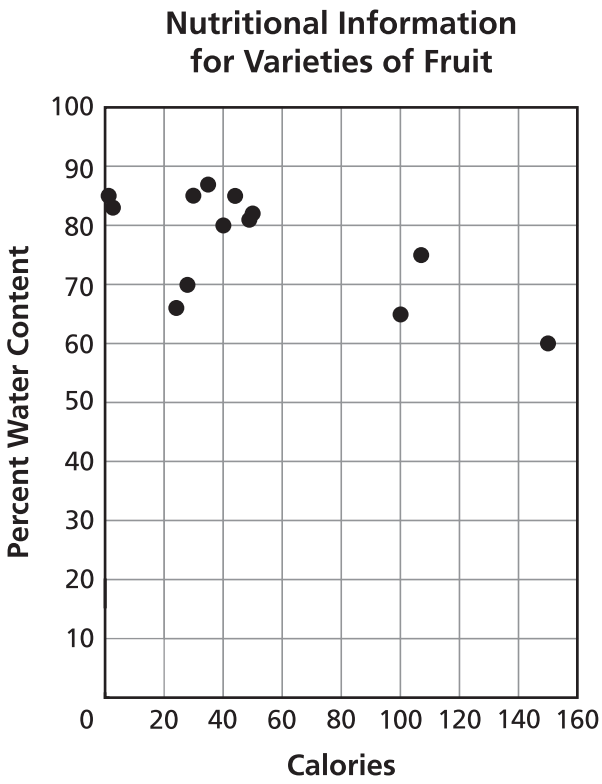
**4** What is the solution set for $(x + 1)^2 = 49$?

**F** $\{-48, 48\}$
**G** $\{-8, 6\}$
**H** $\{-6, 6\}$
**J** $\{-6, 8\}$

Go On ▶

**5** The table and scatterplot below display the calories and water-content percentages for a variety of fruits.

| Fruit | Calories per Piece | Water Content |
|---|---|---|
| Apple (1 average) | 44 | 85% |
| Apple (cooked) | 35 | 88% |
| Apricot | 30 | 85% |
| Avocado | 150 | 60% |
| Banana | 107 | 75% |
| Blackberries (each) | 1 | 85% |
| Blueberries (100 g) | 49 | 81% |
| Cherry (each) | 2.4 | 83% |
| Clementine | 24 | 66% |
| Damson | 28 | 70% |
| Grapes (100 g) seedless | 50 | 82% |
| Grapefruit | 100 | 65% |
| Mango | 40 | 80% |




Which value is the best estimate for the correlation coefficient?

**A** −0.99
**B** −0.65
**C** 0.65
**D** 0.99

Go On ▶

**6** Which table of values best represents the function below?

$$f(x) = 6(0.2)^x$$

**F**

| $x$ | $y$ |
|---|---|
| 0 | 1 |
| 0.25 | 1.05 |
| 0.5 | 1.10 |
| 0.75 | 1.15 |
| 1 | 1.2 |

**G**

| $x$ | $y$ |
|---|---|
| 0 | 0.2 |
| 0.25 | 0.31 |
| 0.5 | 0.49 |
| 0.75 | 0.77 |
| 1 | 1.2 |

**H**

| $x$ | $y$ |
|---|---|
| 0 | 6 |
| 0.25 | 4 |
| 0.5 | 2.7 |
| 0.75 | 1.8 |
| 1 | 1.2 |

**J**

| $x$ | $y$ |
|---|---|
| 0 | 6 |
| 0.25 | 1.2 |
| 0.5 | 0.24 |
| 0.75 | 0.05 |
| 1 | 0.01 |

**7** Which is equivalent to $(2 - 5i)(-2 + 5i)$?

**A** $21$

**B** $-29$

**C** $21 + 20i$

**D** $-29 - 20i$

Go On ▶

**8** Which expression is equivalent to $\frac{x^2 - 9x + 8}{x^2 + 9x + 8} \bullet \frac{x + 8}{8x - 8}$ if no denominators equal zero?

**F** $\frac{-(x + 8)}{8x - 8}$

**G** $\frac{x - 8}{8(x + 1)}$

**H** $\frac{x - 8}{8(x - 1)}$

**J** $\frac{x - 1}{8(x + 1)}$

**9** The daily high temperatures in degrees Fahrenheit (°F) in Chattanooga, Tennessee, for two 1-week periods are listed below.

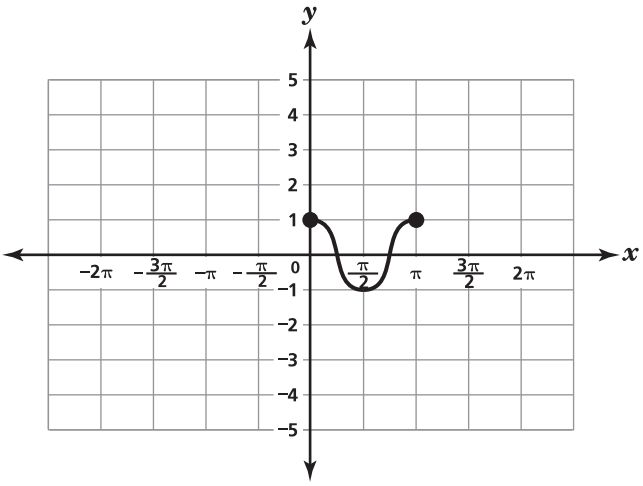
- 90, 86, 91, 85, 82, 89, 90
- 89, 92, 92, 94, 91, 99, 95

What is the interquartile range for these data over the two weeks?

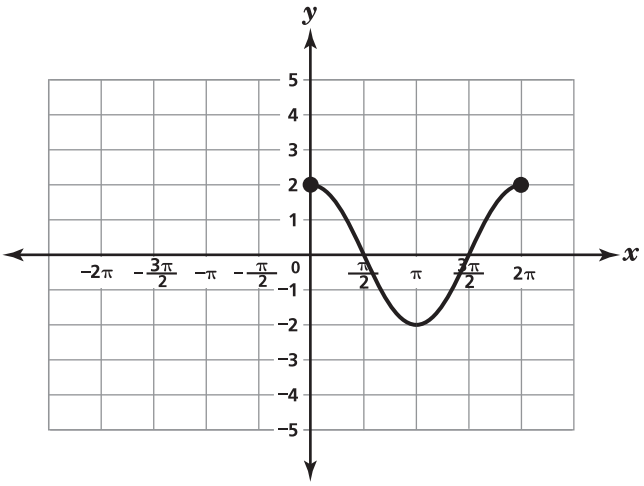
**A** 3°F
**B** 5°F
**C** 10°F
**D** 13°F

Go On ▶

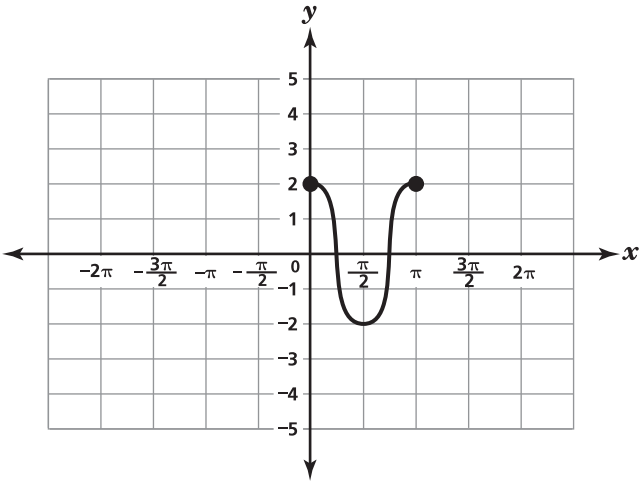
**10** Which graph best represents one cycle of $f(x) = 2\cos x$?



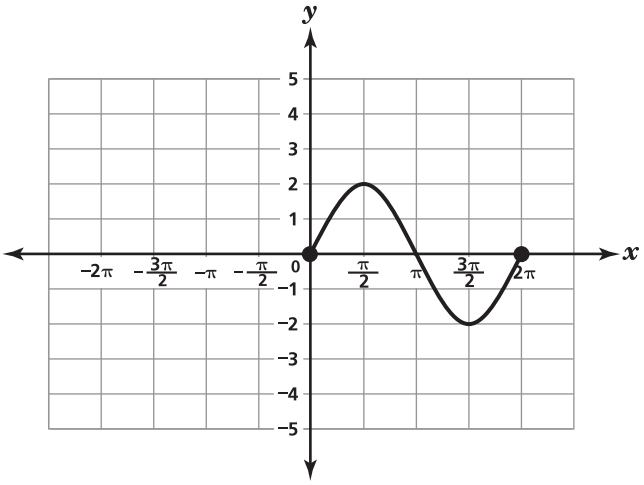

**F**




**H**




**G**




**J**

Go On ▶

**11** What is the value of $g(f(-4))$ for these functions?

$$f(x) = x + 6 \text{ and } g(x) = 4x^2$$

**A** 16
**B** 64
**C** 70
**D** 262

**12** The table shows the amount of oil, in liters, needed to fill a cylindrical can based on the radius, in centimeters, of the can. The height of each can is the same.

**Amount of Oil in Cylindrical Cans**

| Radius of Can (in centimeters) | Amount of Oil (in liters) |
|---|---|
| 10 | 2 |
| 15 | 4.5 |
| 20 | 8 |
| 25 | 12.5 |

These data are best modeled by which type of function?

**F** cubic
**G** linear
**H** quadratic
**J** logarithmic

**13** A researcher is studying the effects of aspirin on the sleep patterns of patients. Which scenario describes an observational study?

**A** Find 100 patients who regularly suffer from headaches, 50 of whom regularly use aspirin, and 50 of whom use an alternative medication. Over a 2-month period, collect data on the sleep patterns of the 100 patients, analyze the data, and draw conclusions.

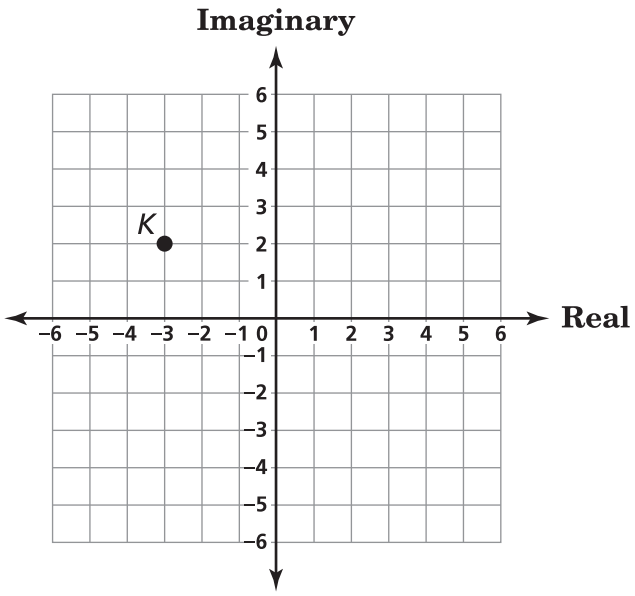
**B** Find 100 patients who regularly suffer from headaches. Randomly assign 50 of the patients to an aspirin treatment, and assign the others to an alternative treatment. Over a 2-month period, collect data on the sleep patterns of the 100 patients, analyze the data, and draw conclusions.

**C** Find 100 patients who suffer from sleep disorders. Assign 50 of the patients to an aspirin treatment, and assign the others to an alternative treatment. Over a 2-month period, collect data on the sleep patterns of the 100 patients, analyze the data, and draw conclusions.

**D** Find 100 patients who regularly take aspirin. Randomly select 50 of the patients to stop their aspirin treatments and to take an alternative medicine instead. Over a 2-month period, collect data on the sleep patterns of the 100 patients, analyze the data, and draw conclusions.

Go On ▶

**14** The grid below represents a complex plane.




Which complex number is best represented by Point $K$?

**F** $-3 + 2i$

**G** $-2 + 3i$

**H** $3 - 2i$

**J** $2 - 3i$

**15** A grocery store manager wants to determine how many servings of fresh fruit her adult customers eat per day. She randomly surveys adult customers in the produce aisle of her store about their eating habits. Which statement best explains why her survey could be biased?

**A** The sample does not include children.

**B** The produce aisle contains more than just fresh fruit.

**C** Adults who do not eat fresh fruit are less likely to shop in a local grocery store.

**D** Adults who do not eat fresh fruit are less likely to be found in the produce aisle.

**16** What is the range of the equation below?

$$y = -|x - 8| + 3$$

**F** all real numbers less than or equal to $-8$

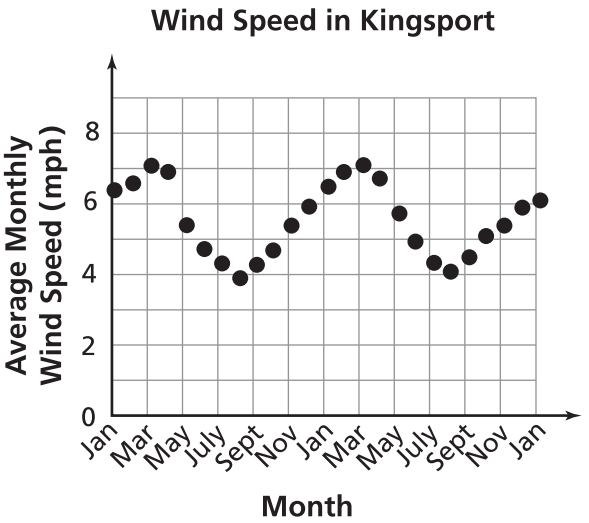
**G** all real numbers less than or equal to 3

**H** all real numbers greater than $-8$

**J** all real numbers greater than 3

Go On ▶

**17** A company analyzes wind patterns to determine whether to install windmills in Kingsport, Tennessee, to generate electricity. The graph below shows the average monthly wind speeds in Kingsport over a two-year period.




A function describing this graph is a transformation of the parent sine function, $y = \sin x$. Which value is closest to the amplitude of this transformed function?

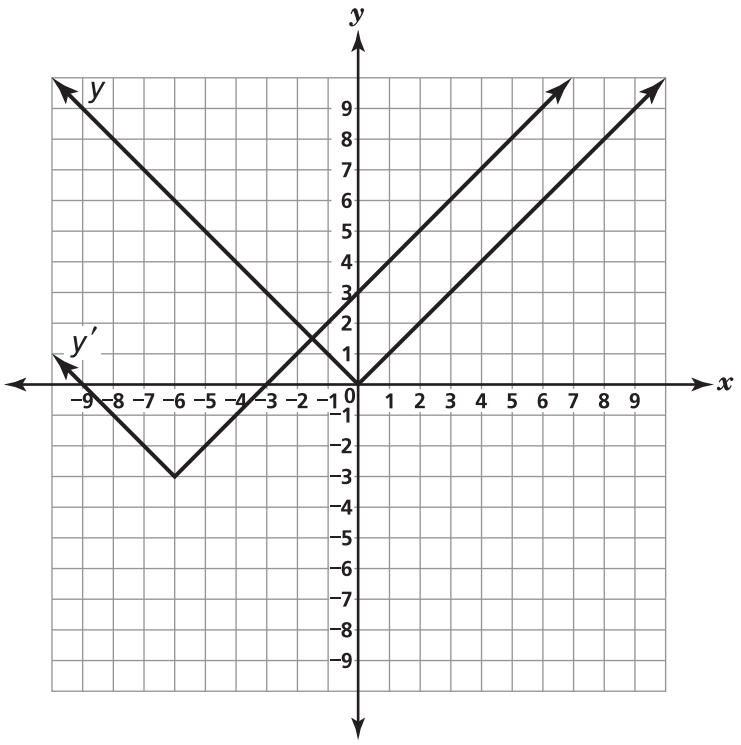
**A** 7.2
**B** 5.6
**C** 3.9
**D** 1.7

**18** What is the value of $\sum_{n=3}^{8} (15 - 4n)$?

**F** −42
**G** −17
**H** 88
**J** 363

Go On ▶

**19** In the grid below, the graph of the equation $y = |x|$ is transformed to create $y'$.




Which equation is <u>best</u> represented by the graph of $y'$?

**A** $y = |x - 6| + 3$

**B** $y = |x + 6| + 3$

**C** $y = |x - 6| - 3$

**D** $y = |x + 6| - 3$

**20** Which expression is equivalent to $(5y - 3)(2y + 5)$?

**F** $10y^2 + 31y - 15$
**G** $10y^2 + 19y - 15$
**H** $10y^2 - 19y - 15$
**J** $10y^2 - 31y - 15$

**21** A building has a square base with an area of 5,625 square feet. A scale model of the building has a base with an area of 0.81 square foot. What is the ratio of the length of the base of the building to the length of the base of the model?

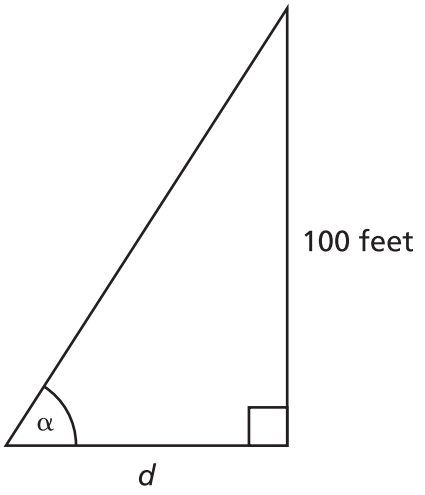
**A** $\frac{250}{3}$

**B** $\frac{2,500}{27}$

**C** $\frac{2,500}{3}$

**D** $\frac{62,500}{9}$

**22** The figure below represents a tower with a height of 100 feet. It is secured to the ground *d* feet from the base of the tower by a wire that makes angle $\alpha$ with the ground.

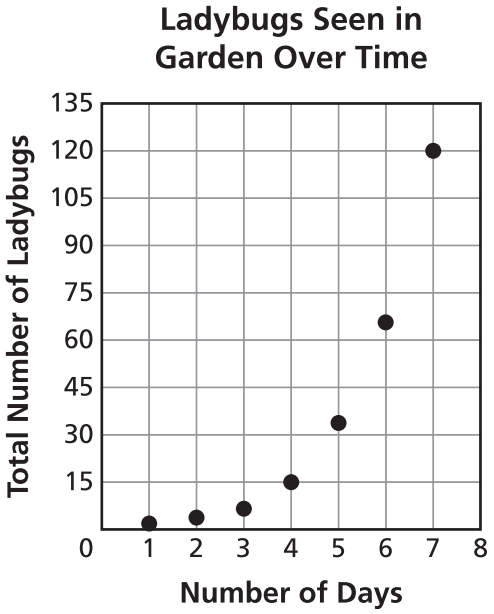



Which function can be used to find the distance between the base of the tower and the point at which the wire is attached to the ground?

**F** $d = 100 \sin \alpha$
**G** $d = 100 \cos \alpha$
**H** $d = 100 \cot \alpha$
**J** $d = 100 \tan \alpha$

Go On ▶

**23** Brittany recorded the total number of ladybugs observed in a garden over a 7-day period. The scatterplot below represents the data she collected.

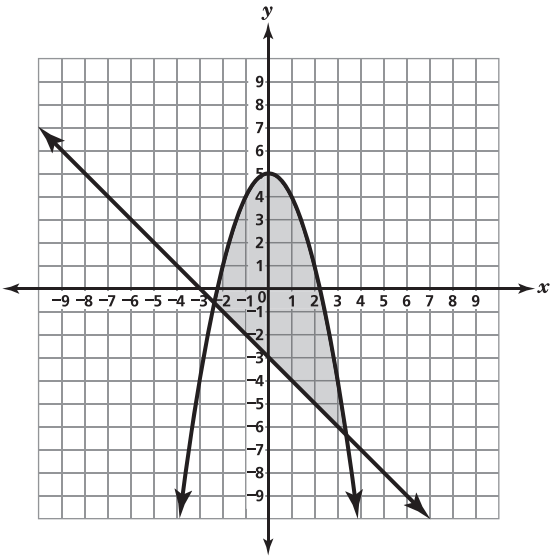



Which type of function do these data points best fit?

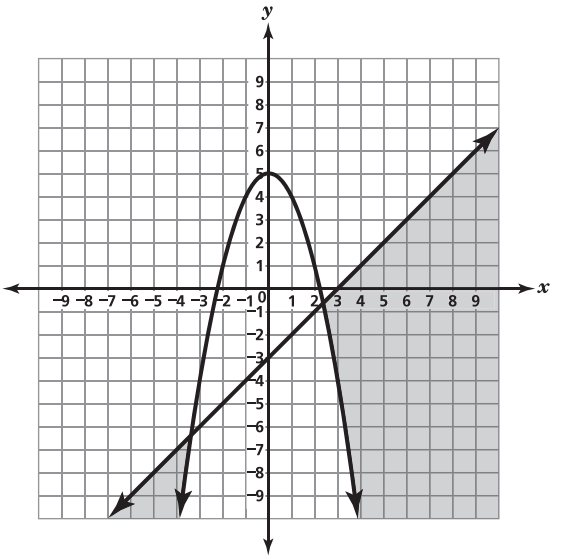
**A** cubic
**B** exponential
**C** linear
**D** quadratic

**24** Which graph best represents this system of inequalities?

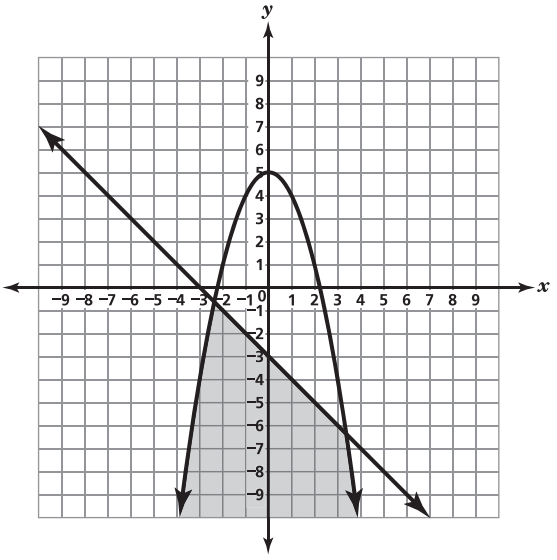
$$\begin{cases} x - y \leq 3 \\ x^2 + y \leq 5 \end{cases}$$



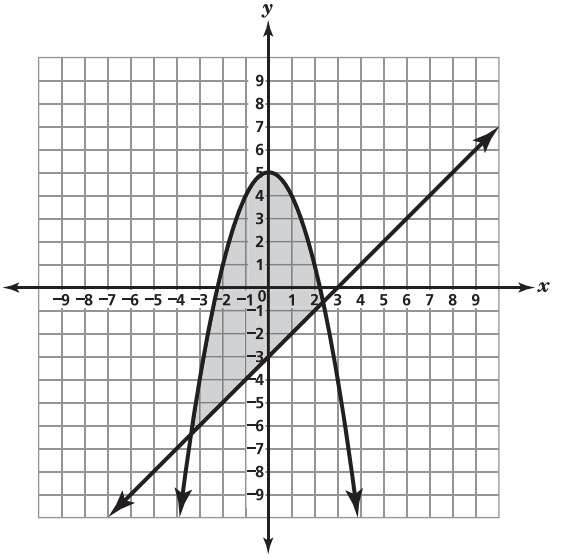
**F**



**H**



**G**



**J**

Go On ▶

**25** Which function does not have an inverse function?

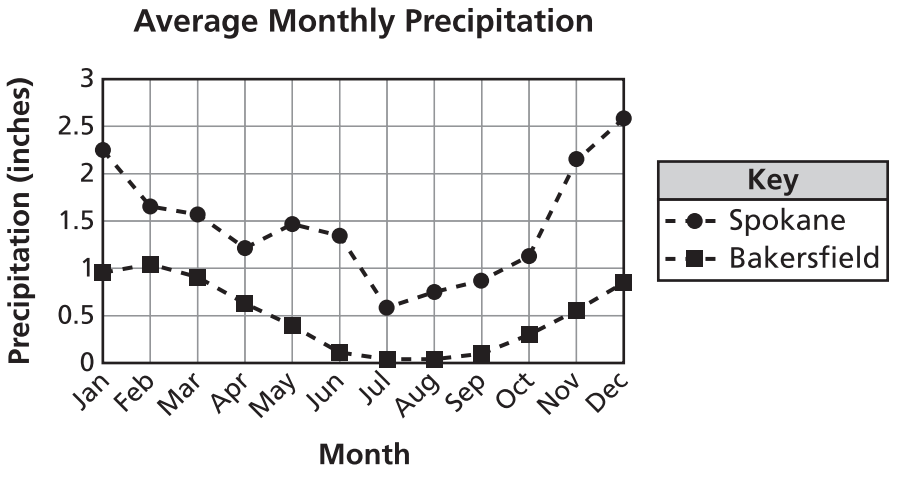
**A** $f(x) = 2x + 7$

**B** $f(x) = \sqrt{x} + 12$

**C** $f(x) = \sqrt{-6x + 9}$

**D** $f(x) = 8 - 3x^2$

**26** The graph shows average monthly precipitation data for Spokane, Washington, and Bakersfield, California.




Which statement about the data shown is true?

**F** Spokane has a greater range of precipitation values than Bakersfield.

**G** Bakersfield receives its greatest amount of precipitation in December.

**H** Bakersfield has a greater annual average precipitation than Spokane.

**J** Spokane receives its greatest amount of precipitation in January.

**27** Dylan performed an experiment by tossing pennies onto a table. He removed the pennies that landed face-up, recorded the number of pennies remaining, and then tossed the remaining pennies onto the table. The chart below shows the number of pennies Dylan had remaining on the table after 4 tosses.

**Penny Tossing Experiment**

| Number of Tosses, $t$ | 0 | 1 | 2 | 3 | 4 |
|---|---|---|---|---|---|
| Number of Pennies Remaining, $p$ | 500 | 232 | 120 | 63 | 30 |

Which regression equation best fits these data?

**A** $p = -111t + 411$

**B** $p = 458t^{\frac{1}{2}}$

**C** $p = 263t^{-1.4}$

**D** $p = 485\left(\frac{1}{2}\right)^t$

**28** A system of equations is given below.

$$2x + y - 3z = -8$$
$$x - 4y + 5z = -13$$
$$x + y + z = -3$$

What is the solution to this system of equations?

**F** $x = -20$, $y = 29$, $z = -24$

**G** $x = -5$, $y = 2$, $z = 0$

**H** $x = 232$, $y = 377$, $z = 87$

**J** $x = -32$, $y = 41$, $z = -44$

Go On ▶

**29** Javier placed the same three ads in a monthly paper for each of the last 10 months. The monthly number of responses he received to each ad are listed below.

Ad 1: 0, 0, 1, 2, 3, 4, 4, 6, 7, 11

Ad 2: 0, 1, 2, 3, 3, 4, 5, 8, 10, 10

Ad 3: 2, 2, 3, 4, 4, 5, 6, 7, 8, 11

Javier used this information to calculate the interquartile range for each ad. Which lists the ads in order from least to greatest interquartile range?

**A** Ad 1, Ad 2, Ad 3
**B** Ad 1, Ad 3, Ad 2
**C** Ad 3, Ad 1, Ad 2
**D** Ad 3, Ad 2, Ad 1

**30** Which equation can be used to graph a circle with a radius of 4 and a center at $(5, -3)$?

**F** $(x-5)^2 + (y+3)^2 = 4$

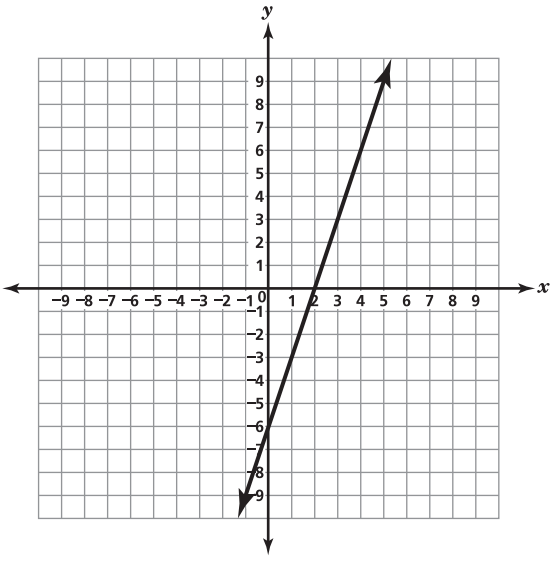
**G** $(x-5)^2 + (y+3)^2 = 16$

**H** $(x+5)^2 + (y-3)^2 = 4$

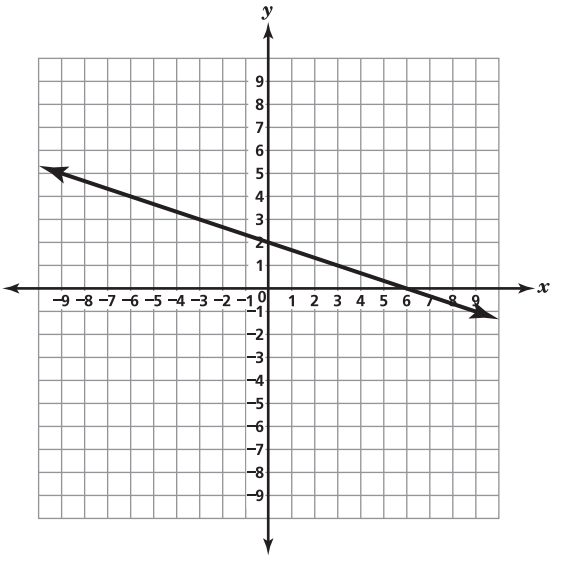
**J** $(x+5)^2 + (y-3)^2 = 16$

Go On ▶

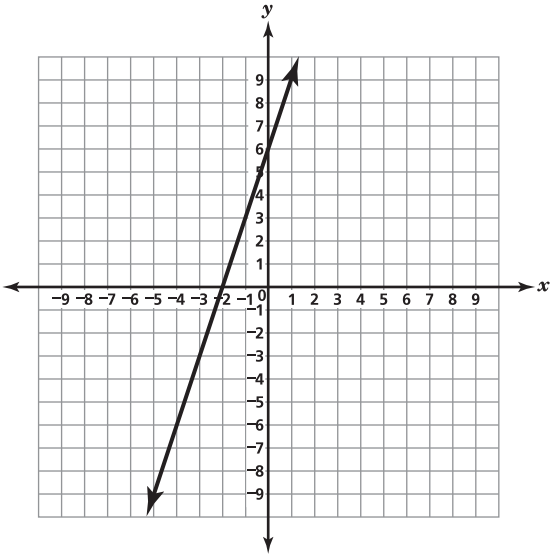
**31** Which graph represents the inverse of $h(x) = -3x + 6$?



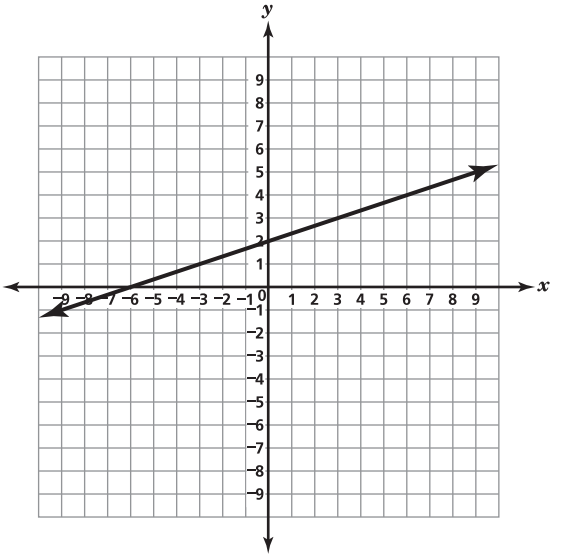
**A**



**C**



**B**



**D**

Go On ▶

**32** A report showed that 20% of the batteries produced in a factory were faulty. What is the probability that a box of 10 batteries produced in this factory will contain exactly 2 faulty batteries?

**F** $(0.20)^2$

**G** $(0.20)^2(0.80)^8$

**H** $2(0.20)^2(0.80)^8$

**J** $45(0.20)^2(0.80)^8$

**33** In a large neighborhood, the values of the homes are normally distributed with a mean of $102,000 and a standard deviation of $17,000. There is a 47.5% probability that the value of a randomly selected home in the neighborhood is greater than $102,000 and less than *d* dollars. Which is closest to the value of *d*?

**A** $110,075
**B** $119,000
**C** $125,750
**D** $136,000

**34** The table shows carbon dioxide concentration levels measured at Mauna Loa, Hawaii.

**Atmospheric Carbon Dioxide at Mauna Loa**

| Year | Carbon Dioxide (in parts per million) |
|---|---|
| 1960 | 316.9 |
| 1970 | 325.6 |
| 1980 | 338.7 |
| 1990 | 354.2 |
| 2000 | 369.4 |

Using the line of best fit for these data, which is the best estimation of the carbon dioxide concentration level, measured in parts per million, at Mauna Loa in 2010?

**F** 362
**G** 381
**H** 385
**J** 389

Go On ▶

**35** If $f(x) = \sqrt{x^2 - 1}$ and $g(x) = \sqrt{x - 1}$, which expression represents $\frac{f(x)}{g(x)}$, for $x > 1$?

**A** $\sqrt{x}$

**B** $\sqrt{x - 1}$

**C** $\sqrt{x + 1}$

**D** $\frac{1}{\sqrt{x + 1}}$

**36** The period for a pendulum to complete one swing is $t$, the time in seconds. The period can be approximated by the formula $t = 2\pi\sqrt{\frac{\ell}{9.81}}$, where $\ell$ is the length of the pendulum in meters. If the period of a pendulum is 2.5 seconds, which is closest to the length of the pendulum?

**F** 1.55 meters
**G** 3.17 meters
**H** 3.90 meters
**J** 9.76 meters

**37** Which value of $x$ makes this equation true?

$$9(x - 7)^{\frac{4}{3}} = 9$$

**A** 1
**B** 7
**C** 8
**D** 34

Go On ▶

**38** Sharan owns stores in both Memphis and Nashville. The number of years of experience for the managers of her stores in the two cities are listed below.

Memphis: 8, 8, 10, 10, 16, 19, 20, 22, 22, 22, 25

Nashville: 11, 11, 13, 13, 15, 17, 18, 19, 20, 20, 21, 25, 26, 28, 28

Which statement about the two sets of data is true?

**F** The median of the data for the Memphis stores is less than the median of the data for the Nashville stores.

**G** The standard deviation for the data for the Memphis stores is greater than the standard deviation of the data for the Nashville stores.

**H** The mean of the data for the Memphis stores is greater than the mean of the data for the Nashville stores.

**J** The interquartile range in the data for the Memphis stores is less than the interquartile range in the data for the Nashville stores.

**39** What is the solution to the following system of equations?

$$\begin{bmatrix} -3 & 2 & 5 \\ 2 & 7 & 4 \\ 1 & 0 & -2 \end{bmatrix}\begin{bmatrix} x \\ y \\ z \end{bmatrix} = \begin{bmatrix} -9 \\ 5 \\ 2 \end{bmatrix}$$

**A** $\begin{bmatrix} x \\ y \\ z \end{bmatrix} = \begin{bmatrix} \frac{1}{4} \\ -1 \\ 1 \end{bmatrix}$

**B** $\begin{bmatrix} x \\ y \\ z \end{bmatrix} = \begin{bmatrix} 47 \\ 25 \\ -13 \end{bmatrix}$

**C** $\begin{bmatrix} x \\ y \\ z \end{bmatrix} = \begin{bmatrix} 39 \\ 17 \\ -29 \end{bmatrix}$

**D** $\begin{bmatrix} x \\ y \\ z \end{bmatrix} = \begin{bmatrix} 4 \\ -1 \\ 1 \end{bmatrix}$

**40** This table displays the results of an experiment on exponential growth.

| $x$ | $y$ |
|---|---|
| 0 | 6 |
| 1 | 9.6 |
| 2 | 15.4 |
| 3 | 24.6 |
| 4 | 39.3 |
| 5 | 62.9 |

Based on these results, which is closest to the value of $y$ when $x = -2$?

**F** $-23$

**G** 0.04

**H** 2.34

**J** 19

Go On ▶

**41** Sonya and Alex shared their work on the equation $|2x + 3| = 13$, as shown below.

Sonya's Work

$$|2x + 3| = 13$$
$$-2x + 3 = 13 \text{ or } 2x + 3 = 13$$
$$-2x = 10 \text{ or } 2x = 10$$
$$x = -5 \text{ or } x = 5$$

Alex's Work

$$|2x + 3| = 13$$
$$2x + 3 = 13 \text{ or } 2x + 3 = -13$$
$$2x = 10 \text{ or } 2x = -16$$
$$x = 5 \text{ or } x = -8$$

Which statement is true?

**A** Alex solved the equation correctly.

**B** Sonya solved the equation correctly.

**C** The only solution for the original equation is 5.

**D** Neither Alex nor Sonya solved the equation correctly.

**42** What is the inverse of

$g(x) = \sqrt{5x - 2} + 1$, for all $x \geq \frac{2}{5}$ ?

**F** $g^{-1}(x) = \frac{(x-1)^2 + 2}{5}$

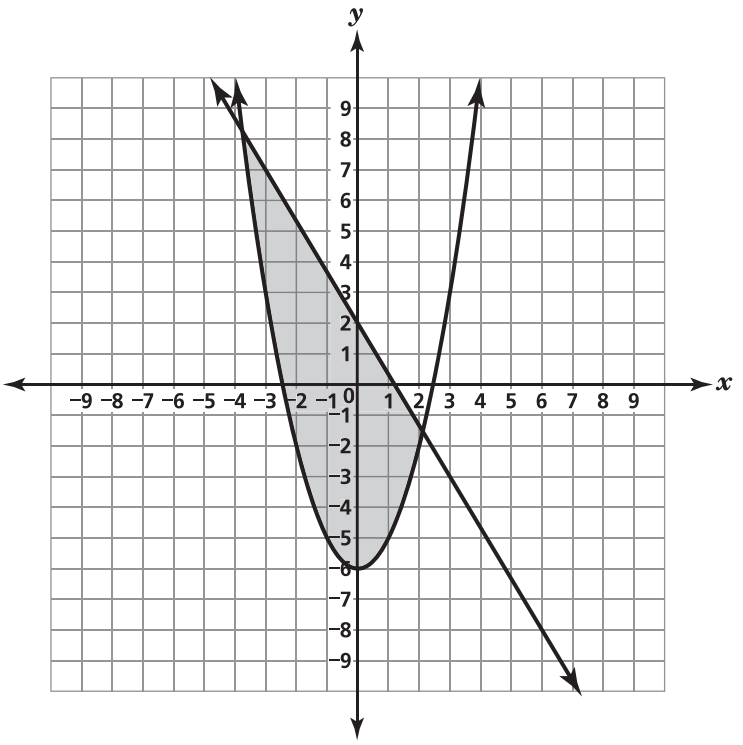
**G** $g^{-1}(x) = \frac{(x-1)^2}{5} + 2$

**H** $g^{-1}(x) = \frac{(x+1)^2 - 2}{5}$

**J** $g^{-1}(x) = \frac{(x+1)^2}{5} - 2$

Go On ▶

**43** Which system of inequalities is best represented by the shaded region of this graph?




**A** $\begin{cases} 3x + 5y \leq 10 \\ x^2 - y \leq 6 \end{cases}$

**B** $\begin{cases} 5x + 3y \leq 6 \\ x^2 - y \leq 6 \end{cases}$

**C** $\begin{cases} 3x + 5y \leq 10 \\ x^2 - y \geq 6 \end{cases}$

**D** $\begin{cases} 5x + 3y \leq 6 \\ x^2 - y \geq 6 \end{cases}$

Go On ▶

**44** The sum of two complex numbers is $-3 + 5i$. If one of these complex numbers is $1 - 8i$, what is the other number?

**F** $-4 + 13i$
**G** $-4 - 3i$
**H** $-2 + 13i$
**J** $-2 - 3i$

**45** If $g \neq 0$ and $h \neq 0$, which expression represents this quotient?

$$\frac{15g^8h^4 - 18g^8h^2 + 15g^5h^3}{3g^5h^2}$$

**A** $5g^3h^2 - 6g^3 + 5h$

**B** $5g^3h^2 - 6g^3h + 5gh$

**C** $12g^3h^2 - 15g^3 + 12h$

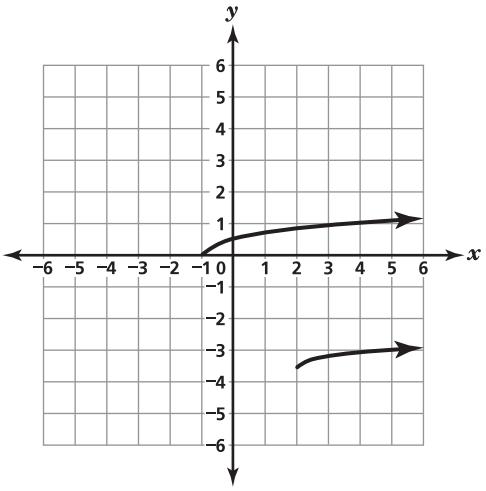
**D** $12g^{13}h^6 - 15g^{13} + 12h^5$

**46** Which ordered pair is a solution to this system of equations?

$$y = x^2 - 6x + 11$$
$$y = -3x + 9$$

**F** (6, 1)
**G** (4, 0)
**H** (2, 3)
**J** (1, 0)

**47** The graph of the equation $y = \log(2x + 3)$ is translated right 3 units and down 3.5 units to form a new graph. Which equation <u>best</u> represents the new graph?



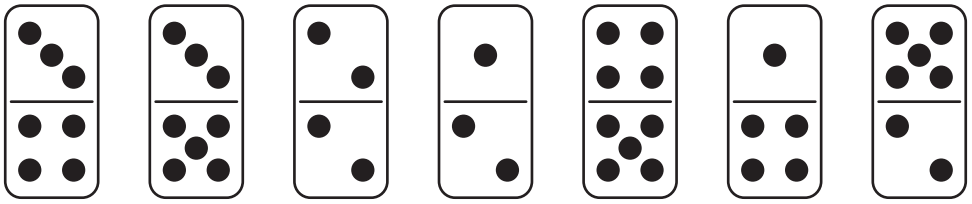

**A** $y = \log(2x + 9) + 3.5$
**B** $y = \log(2x + 9) - 3.5$
**C** $y = \log(2x - 3) + 3.5$
**D** $y = \log(2x - 3) - 3.5$

**48** What is the value of $\sum_{k=2}^{6} -8\left(\frac{1}{2}\right)^k$?

**F** $-3.875$
**G** $-0.125$
**H** 3,280
**J** 4,096

Go On ▶

**49** Carlos is playing a game using tiles. Each tile is divided into two groups of dots. He needs to select a tile with a group of 3 dots or a group of 5 dots to be able to play. The tiles he can choose from are shown below.



Carlos will randomly select one tile at a time, without replacement, until he selects a tile with either a group of 3 dots or a group of 5 dots. What is the probability that he will need to select a total of 4 tiles in order to play?

**A** $\frac{3}{7}$

**B** $\frac{5}{11}$

**C** $\frac{1}{35}$

**D** $\frac{3}{32}$

Go On ▶

**50** Which set contains all the real numbers that are not part of the domain of $f(x) = \frac{x+4}{x^2+4x-32}$?

**F** $\{8\}$
**G** $\{-4\}$
**H** $\{-4, 8\}$
**J** $\{-8, 4\}$

**51** The principal of an elementary school that has a total of 650 students wants to determine which cereal is preferred among the students. Which method of data collection will give the most accurate results?

**A** assign a number to each student in the library and ask which cereal is preferred
**B** assign a number to each student and ask every third grader with a number that is a multiple of 5 which cereal is preferred
**C** assign a number to each classroom and ask all students in 1 selected classroom per grade level which cereal is preferred
**D** assign a number to each classroom and ask the girls in 5 selected classrooms which cereal is preferred

**52** Which expression is equivalent to $\frac{y^{\frac{1}{2}}}{8x^{\frac{4}{3}}} \div \frac{x^{\frac{1}{3}}y^{\frac{5}{2}}}{6}$ for all $x, y \neq 0$?

**F** $\frac{1}{2x^{\frac{5}{6}}y^2}$

**G** $\frac{3}{4x^{\frac{5}{3}}y^2}$

**H** $\frac{3y^2}{4x^{\frac{4}{9}}}$

**J** $\frac{y^3}{48x^4}$

Go On ▶

**53** Which is a correct binomial expansion of $\left(x^{20} + \frac{1}{4}x^5\right)^4$?

**A** $x^{80} + \frac{1}{256}x^{20}$

**B** $x^{80} + x^{25} + \frac{1}{256}x^{20}$

**C** $x^{80} + x^{65} + \frac{3}{8}x^{50} + \frac{1}{16}x^{35} + \frac{1}{256}x^{20}$

**D** $x^{80} + \frac{1}{4}x^{65} + \frac{1}{16}x^{50} + \frac{1}{64}x^{35} + \frac{1}{256}x^{20}$

**54** Nancy made the following statement:

The range of $f(x) = ax + b$ is the set of all real numbers, given $a$ and $b$ are real numbers.

Which produces a counterexample to her statement?

**F** $a = 0$
**G** $b = 0$
**H** $a < 0$
**J** $b < 0$

**55** Three friends paid the same price per pound for each type of fruit. The number of pounds (lb) of each type of fruit bought and the total price paid by each friend are shown below.

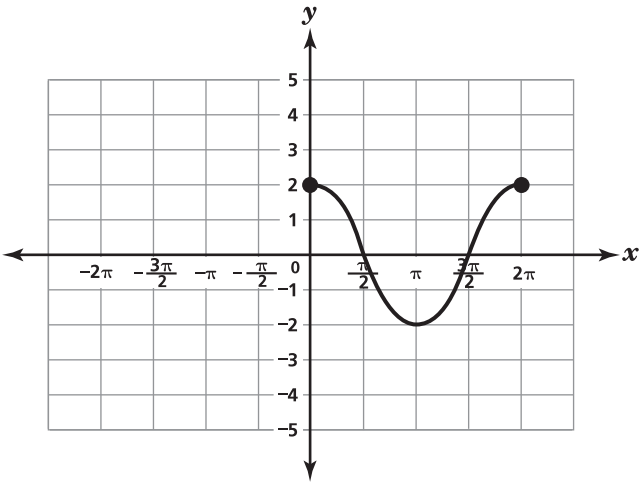
- Rosa bought 2 lb of bananas, 3 lb of peaches, and 1 lb of grapes for $5.94.
- Zack bought 1 lb of bananas, 2 lb of peaches, and 1 lb of grapes for $4.56.
- Kim bought 1 lb of bananas and 1 lb of grapes for $2.78.

What was the price per pound for the bananas, peaches, and grapes they bought?

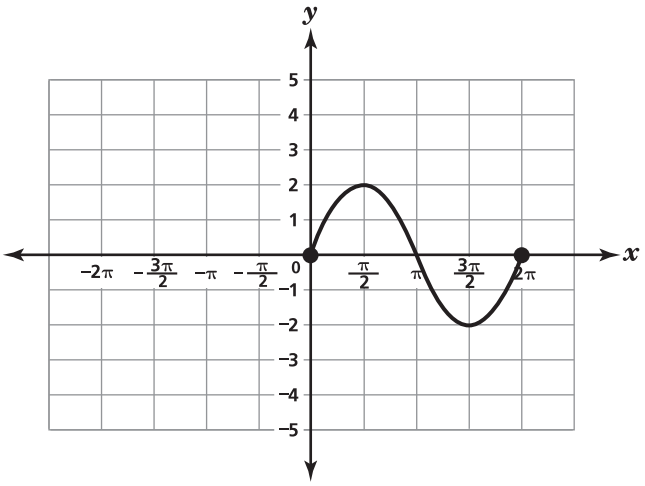
**A** bananas: $0.75; peaches: $0.85; grapes: $1.89
**B** bananas: $1.09; peaches: $0.69; grapes: $1.69
**C** bananas: $1.39; peaches: $0.89; grapes: $1.39
**D** bananas: $0.49; peaches: $0.89; grapes: $2.29

Go On ▶

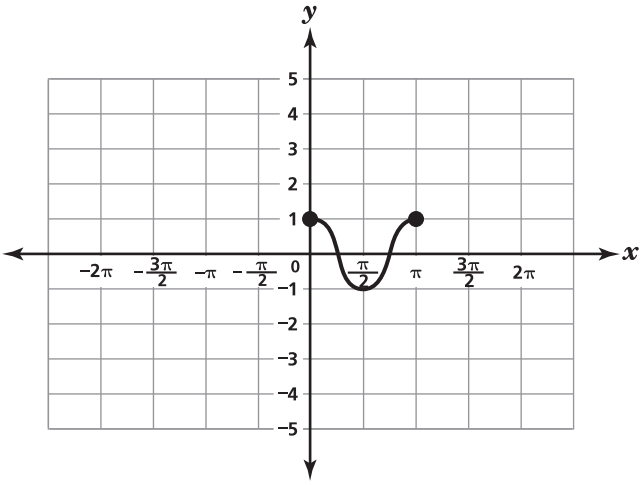
**56** Which graph <u>best</u> represents one cycle of $y = \cos 2x$?



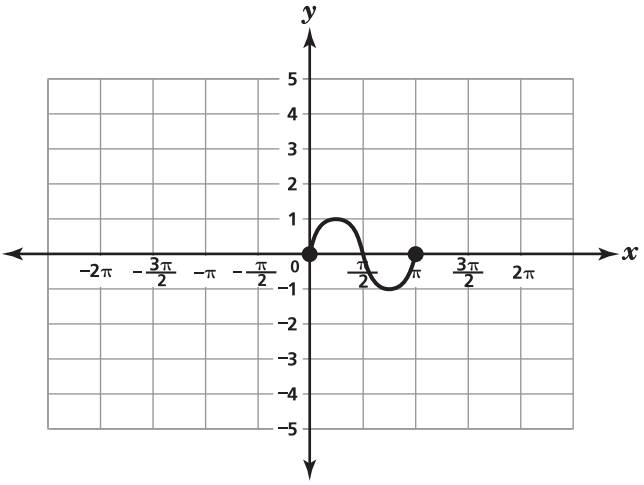

**F**




**H**




**G**




**J**

Go On ▶

**57** The scores from a math quiz are shown in the table.

**Math Quiz Scores**

| Score | Frequency |
|---|---|
| 10 | 1 |
| 20 | 3 |
| 30 | 7 |
| 40 | 10 |
| 50 | 4 |

Which is closest to the value of the standard deviation of these scores?

**A** 105.0
**B** 35.2
**C** 10.2
**D** 5.9

**58** Which is equivalent to $(8 - 12i) - (-1 + 2i)$?

**F** $9 - 10i$
**G** $9 - 14i$
**H** $7 - 10i$
**J** $7 - 14i$

**59** Simplify $\frac{9}{x^{-1} + 1}$ for all values of $x$ for which the expression is defined.

**A** $\frac{9}{2}$

**B** $\frac{9x}{2}$

**C** $\frac{9}{x + 1}$

**D** $\frac{9x}{x + 1}$

Go On ▶

**60** A researcher used a linear regression of the data in this table to determine the relationship between a city's distance from the equator and its average maximum temperature in January.

| City | Distance from Equator (miles) | Temperature (°C) |
|---|---|---|
| Madrid, Spain | 2,781 | 9 |
| Tokyo, Japan | 2,454 | 8 |
| Guatemala City, Guatemala | 1,005 | 23 |
| New Delhi, India | 1,965 | 21 |
| Oslo, Norway | 4,130 | –2 |
| Mexico City, Mexico | 1,333 | 19 |

Which best describes the linear correlation between a city's distance from the equator and its average maximum temperature in January?

**F** strong negative correlation

**G** strong positive correlation

**H** weak negative correlation

**J** weak positive correlation

**61** The mileages of the vehicles in a government fleet are normally distributed with a mean of 60,000 miles and a standard deviation of 8,000 miles. If a vehicle from the fleet is randomly selected, which is closest to the probability that the mileage is greater than 44,000 miles?

**A** 0.48
**B** 0.68
**C** 0.95
**D** 0.98

**62** The volume of a cylinder with a radius of $r$ centimeters and a height that is 3 centimeters shorter than the radius is represented by the function $V(t)$.

$$V(t) = \pi r^2 (r - 3)$$

What is the range of $V(t)$ in this situation?

**F** all real numbers
**G** all real numbers less than $-3$
**H** all real numbers greater than 3
**J** all real numbers greater than 0

Go On ▶

**63** What are all the roots of $x^3 - 3x^2 - x + 3 = 0$?

**A** $-1$ and 1
**B** 1 and 3
**C** $-1$, 1, and 3
**D** 1, $-1$, and $-3$

**64** Which expression must be subtracted from $(10r - 7)$ to result in $(3r + 11)$?

**F** $7r - 18$
**G** $7r - 4$
**H** $13r - 18$
**J** $13r + 4$

**65** Which degree measure is equivalent to $\frac{7\pi}{12}$ radians?

**A** 210°
**B** 105°
**C** 30°
**D** 15°

STOP

# Answer Key

| Item Number | Correct Answer |
|---|---|
| 1 | C |
| 2 | J |
| 3 | D |
| 4 | G |
| 5 | B |
| 6 | H |
| 7 | C |
| 8 | G |
| 9 | A |
| 10 | H |
| 11 | A |
| 12 | H |
| 13 | A |
| 14 | F |
| 15 | D |
| 16 | G |
| 17 | D |
| 18 | F |
| 19 | D |
| 20 | G |
| 21 | A |
| 22 | H |

| Item Number | Correct Answer |
|---|---|
| 23 | B |
| 24 | J |
| 25 | D |
| 26 | F |
| 27 | D |
| 28 | G |
| 29 | C |
| 30 | G |
| 31 | C |
| 32 | J |
| 33 | D |
| 34 | G |
| 35 | C |
| 36 | F |
| 37 | C |
| 38 | G |
| 39 | D |
| 40 | H |
| 41 | A |
| 42 | F |
| 43 | B |
| 44 | F |

| Item Number | Correct Answer |
|---|---|
| 45 | A |
| 46 | H |
| 47 | D |
| 48 | F |
| 49 | C |
| 50 | J |
| 51 | C |
| 52 | G |
| 53 | C |
| 54 | F |
| 55 | D |
| 56 | G |
| 57 | C |
| 58 | G |
| 59 | D |
| 60 | F |
| 61 | D |
| 62 | J |
| 63 | C |
| 64 | F |
| 65 | B |

# Reporting Categories

Below you will find that each item has been linked to its corresponding Reporting Category. These five Reporting Categories will be used to report scores from the actual test.

You can find the Reporting Categories and their Performance Indicators grouped together in the Tennessee End of Course Item Sampler for Algebra II located on the Tennessee Department of Education Web site at http://tennessee.gov/education/assessment/sec_samplers.shtml.

| Item | Reporting Category |
|---|---|
| 1 | 2 – Number & Operations |
| 2 | 3 – Algebra |
| 3 | 4 – Geometry & Measurement |
| 4 | 3 – Algebra |
| 5 | 5 – Data Analysis, Statistics, & Probability |
| 6 | 1 – Mathematical Processes |
| 7 | 2 – Number & Operations |
| 8 | 3 – Algebra |
| 9 | 5 – Data Analysis, Statistics, & Probability |
| 10 | 4 – Geometry & Measurement |
| 11 | 3 – Algebra |
| 12 | 1 – Mathematical Processes |
| 13 | 5 – Data Analysis, Statistics, & Probability |
| 14 | 2 – Number & Operations |
| 15 | 1 – Mathematical Processes |
| 16 | 3 – Algebra |
| 17 | 4 – Geometry & Measurement |
| 18 | 3 – Algebra |
| 19 | 3 – Algebra |
| 20 | 3 – Algebra |
| 21 | 2 – Number & Operations |
| 22 | 1 – Mathematical Processes |

| | |
|---|---|
| 23 | 5 – Data Analysis, Statistics, & Probability |
| 24 | 3 – Algebra |
| 25 | 3 – Algebra |
| 26 | 3 – Algebra |
| 27 | 1 – Mathematical Processes |
| 28 | 3 – Algebra |
| 29 | 5 – Data Analysis, Statistics, & Probability |
| 30 | 3 – Algebra |
| 31 | 3 – Algebra |
| 32 | 3 – Algebra |
| 33 | 5 – Data Analysis, Statistics, & Probability |
| 34 | 5 – Data Analysis, Statistics, & Probability |
| 35 | 3 – Algebra |
| 36 | 3 – Algebra |
| 37 | 2 – Number & Operations |
| 38 | 5 – Data Analysis, Statistics, & Probability |
| 39 | 3 – Algebra |
| 40 | 1 – Mathematical Processes |
| 41 | 1 – Mathematical Processes |
| 42 | 3 – Algebra |
| 43 | 3 – Algebra |
| 44 | 2 – Number & Operations |
| 45 | 3 – Algebra |
| 46 | 3 – Algebra |
| 47 | 3 – Algebra |
| 48 | 3 – Algebra |
| 49 | 5 – Data Analysis, Statistics, & Probability |
| 50 | 3 – Algebra |
| 51 | 1 – Mathematical Processes |
| 52 | 3 – Algebra |
| 53 | 3 – Algebra |

| | |
|---|---|
| 54 | 1 – Mathematical Processes |
| 55 | 3 – Algebra |
| 56 | 4 – Geometry & Measurement |
| 57 | 5 – Data Analysis, Statistics, & Probability |
| 58 | 2 – Number & Operations |
| 59 | 3 – Algebra |
| 60 | 5 – Data Analysis, Statistics, & Probability |
| 61 | 5 – Data Analysis, Statistics, & Probability |
| 62 | 3 – Algebra |
| 63 | 3 – Algebra |
| 64 | 3 – Algebra |
| 65 | 4 – Geometry & Measurement |

End of Course Assessment

# Algebra II

# PRACTICE TEST

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