VIRGINIA STANDARDS OF LEARNING

TEST ITEM SET

ALGEBRA II

2009 Mathematics Standards of Learning

Released Spring 2015

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SAMPLE A

Which expression is equivalent to $\sqrt{\frac{7x}{16}}$?

- **A** $\frac{7x}{4}$
- **B** $\frac{7x}{8}$
- **C** $\frac{\sqrt{7x}}{4}$
- **D** $\frac{\sqrt{7x}}{8}$

Directions: Type your answer in the box.

SAMPLE B

What value of x makes $\sqrt{x} - 3 = 6$ true?

Which expression is equivalent to $\sqrt{20x^{16}y^{25}}$ for positive x and y values?

- **A** $2x^4y^5\sqrt{5}$
- **B** $5x^4y^5\sqrt{2}$
- **C** $2x^8y^{12}\sqrt{5y}$
- **D** $5x^8y^{12}\sqrt{2y}$

Which expression is equivalent to $\sqrt[3]{6w^7} \cdot \sqrt[3]{4w^5}$?

- **A** $2w^4\sqrt[3]{3}$
- **B** $2w^4\sqrt[3]{6}$
- **C** $2w^{11}\sqrt[3]{3w^2}$
- **D** $2w^{11}\sqrt[3]{6w^2}$

The steps used to solve an equation are shown.

Step 1: $\frac{2}{3}r = 14i$

Step 2: $\left(\frac{3}{2}\right)\frac{2}{3}r = 14i\left(\frac{3}{2}\right)$

Step 3: $\left(\frac{3}{2}\cdot\frac{2}{3}\right)r = 14i\left(\frac{3}{2}\right)$

Step 4: $1\cdot r = 21i$

Step 5: $r = 21i$

What property justifies the work between Step 4 and Step 5 ?

- **A** Identity property of multiplication
- **B** Inverse property of multiplication
- **C** Commutative property of multiplication
- **D** Associative property of multiplication

Which expression is equivalent to the following expression if no denominators equal zero?

$$\frac{\frac{11-w}{30w^2}}{\frac{w-11}{5w^6}}$$

- A $\frac{-w^4}{6}$
- B $\frac{-6}{w^3}$
- C $\frac{w^3}{6}$
- D $\frac{6}{w^4}$

What is the complete factorization of $(18x^4 + 12x^3 - 6x)$?

- **A** $6x^3(3x + 2)$
- **B** $6x(3x^3 + 2x^2)$
- **C** $6x(3x - 1)(x + 1)$
- **D** $6x(3x^3 + 2x^2 - 1)$

Which of these is equivalent to i^{75} ?

- **A** i
- **B** $-i$
- **C** 1
- **D** -1

For which value of b is $x^2 + bx - 60$ factorable over the set of integers?

- **A** 61
- **B** 23
- **C** -7
- **D** -16

If no denominator equals zero, which expression is equivalent to $\frac{25-4x^2}{6x^2+9x-15} \cdot \frac{6x^2-2x-4}{2x^2-x-10}$?

- **A** -2
- **B** 2
- **C** $\frac{-2(3x+2)}{3(x+2)}$
- **D** $\frac{2(3x+2)}{3(x+2)}$

Assuming the denominators do NOT equal zero, which expression is equivalent to $\frac{12}{x+1}+\frac{1}{x-4}$?

- **A** $\frac{13x-47}{(x+1)(x-4)}$
- **B** $\frac{13}{(x+1)(x-4)}$
- **C** $\frac{13x-47}{2x-3}$
- **D** $\frac{13}{2x-3}$

Which expression is equivalent to $\sqrt{36x^9y^{25}}$, where $x > 0$ and $y > 0$?

- **A** $6x^3y^5$
- **B** $6x^{\frac{9}{2}}y^{\frac{25}{2}}$
- **C** $18x^3y^5$
- **D** $18x^{\frac{9}{2}}y^{\frac{25}{2}}$

What nonzero value of x is a solution to the following equation?

$$\frac{x+2}{x}+\frac{x-6}{3x}=\frac{2x+9}{5x}$$

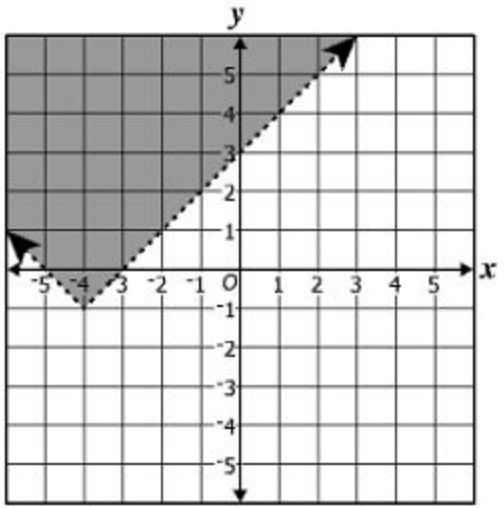
- A $x=\frac{27}{14}$
- B $x=\frac{17}{14}$
- C $x=\frac{13}{14}$
- D $x=\frac{5}{14}$

How many values of x will satisfy the equation $-2|3x-5|=0$?

- **A** 0
- **B** 1
- **C** 2
- **D** 3

Which graph best represents the solutions for $y < |x + 4| - 1$?

A



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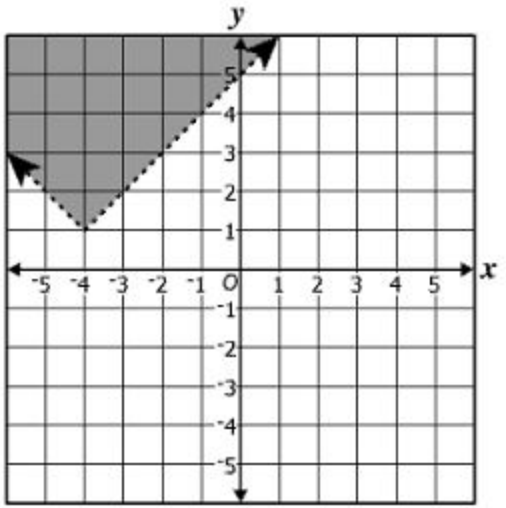
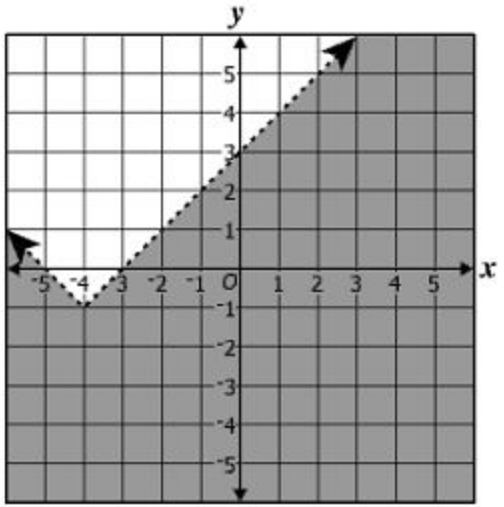


B



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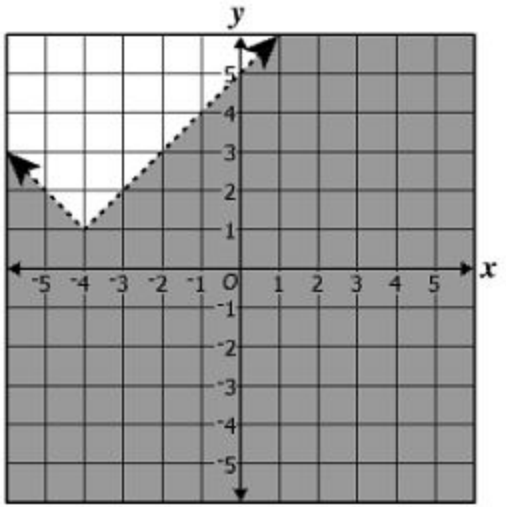
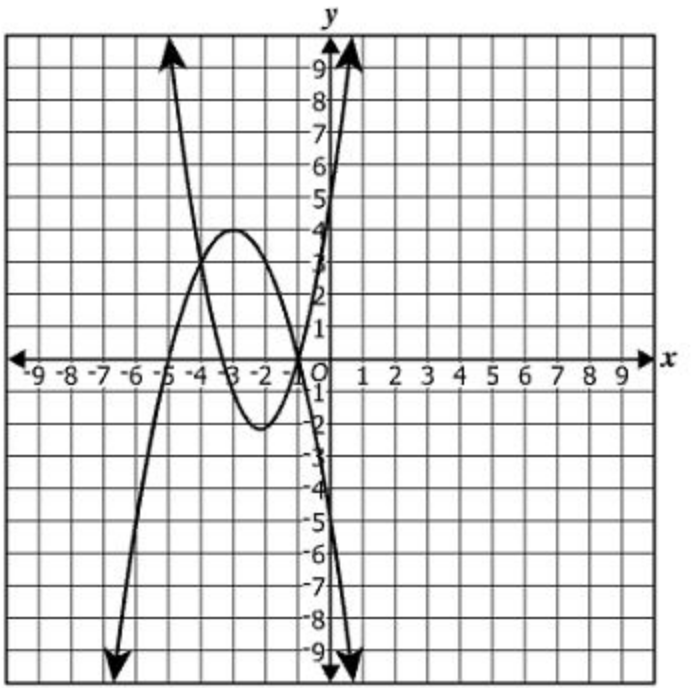


What is a solution of $\sqrt{7-2x}+5=8$?

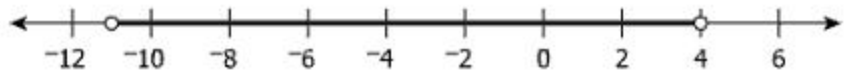
- **A** $x=-26$
- **B** $x=\frac{-19}{2}$
- **C** $x=\frac{-13}{2}$
- **D** $x=-1$

Which is the apparent solution set of the system of equations graphed on the following grid?



- **A** $\{(0, -5), (0, 5)\}$
- **B** $\{(-3, 4), (-2, -2)\}$
- **C** $\{(-4, 3), (-1, 0)\}$
- **D** $\left\{(-5, 0), \left(-3\frac{1}{3}, 0\right), (-1, 0)\right\}$

This graph best represents the solution to which inequality?



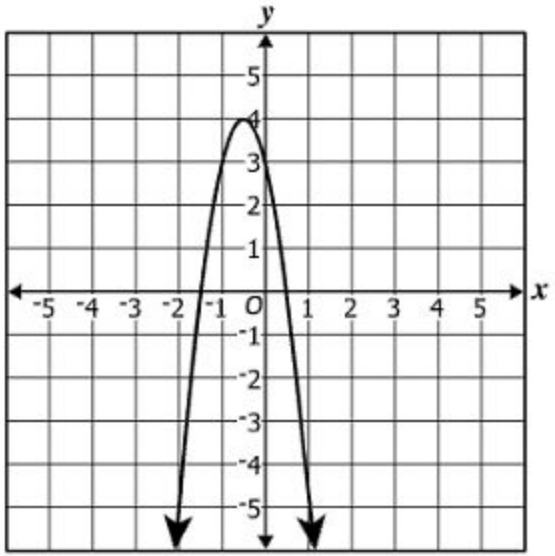
- **A** $|x-11|>4$
- **B** $|x-11|<4$
- **C** $|2x+7|>15$
- **D** $|2x+7|<15$

Directions: Type your answer in the box.

What value of x makes $\sqrt[3]{2x-5} = 3$ true?

$x =$

What are the apparent roots of the equation graphed on the coordinate grid?



- A $\{0, 3\}$
- B $\left\{\frac{-1}{2}, 4\right\}$
- C $\left\{\frac{-3}{2}, \frac{1}{2}\right\}$
- D $\{-2, 1\}$

If no denominator is equal to zero, what is the solution set for the following equation?

$$\frac{3x-4}{x^2}=\frac{3}{2x}$$

- A $\left\{\frac{8}{3}\right\}$
- B $\left\{\frac{8}{9}\right\}$
- C $\left\{\frac{-2}{3}, 2\right\}$
- D $\left\{\frac{-2}{3}, \frac{2}{3}\right\}$

What is the solution set for the following system of equations?

$$\begin{cases} y = 4x + 2 \\ y = x^2 + x - 8 \end{cases}$$

- **A** $\{(-5, -18), (2, 10)\}$
- **B** $\{(-1, -2), (6, 26)\}$
- **C** $\{(-6, -22), (1, 6)\}$
- **D** $\{(-2, -6), (5, 22)\}$

Directions: Click on all the correct answers.

Identify all the points where the graph of $h(x) = (x + 1)(x^2 + 8x + 16)$ intersects the x-axis.

$(-4,0)$	$(1, 0)$
$(-2,0)$	$(4, 0)$
$(-1,0)$	$(16, 0)$

The function $f(x) = (1 - x)^2 - 4$ is decreasing throughout the interval —

- **A** $-4 < x < \infty$
- **B** $-\infty < x < 1$
- **C** $-1 < x < 3$
- **D** $-\infty < x < \infty$

Given: $f(x) = 4x^4 - 15$ **and** $g(x) = 2x + 11$

What is the value of $g(f(x))$ **?**

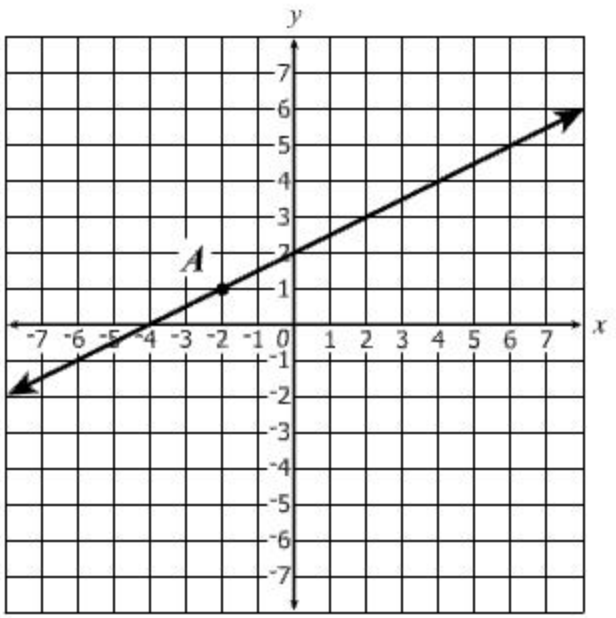
- **A** $8x^5 + 44x^4 - 30x - 165$
- **B** $8x^5 - 165$
- **C** $8x^4 - 4$
- **D** $8x^4 - 19$

A normally distributed data set has a mean of 0 and a standard deviation of 0.5 . Which is closest to the percent of values between -1 and 1 ?

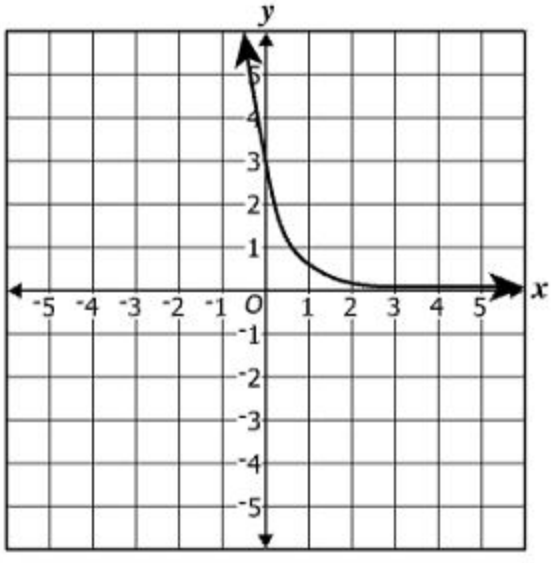
- **A** 34%
- **B** 50%
- **C** 68%
- **D** 95%

Directions: Click on the grid to plot the correct point.

Point A lies on the graph of $f(x) = \frac{1}{2}x + 2$. Locate the image of Point A that lies on the graph of $f^{-1}(x)$.



Which equation best represents this graph?



- **A** $f(x) = 3\left(\frac{1}{5}\right)^x$
- **B** $f(x) = 3\sqrt{5x}$
- **C** $f(x) = \frac{1}{3}\log(5x)$
- **D** $f(x) = \frac{1}{3}(5)^x$

If $f(x) = x^2 + 3x$ and $g(x) = 2x^2$, what is $g(f(-1))$?

- **A** -4
- **B** 0
- **C** 8
- **D** 10

The volume of a cone (V) varies jointly with its height (h) and the square of its radius (r). If k is the constant of proportionality, which of the following equations represents the correct relationship between volume, radius, and height?

- **A** $V = k(rh)^2$
- **B** $V = \frac{kr^2}{h}$
- **C** $V = \frac{k}{r^2h}$
- **D** $V = kr^2h$

What is the equation of the horizontal asymptote of the graph of the following equation?

$$f(x) = 4^{(x+1)} - 10$$

- **A** $y = 4$
- **B** $y = 0$
- **C** $y = -1$
- **D** $y = -10$

As x approaches negative infinity, which of the following describes the end behavior of $f(x) = -x^7 + bx^3 + c$?

- **A** $f(x)$ approaches c
- **B** $f(x)$ approaches 0
- **C** $f(x)$ approaches positive infinity
- **D** $f(x)$ approaches negative infinity

Jessica paid $23,000 for her car and kept a record of its value.

Number of Years (x)	Value (in dollars) (y)
0	23,000
1	20,000
2	16,000
3	14,000
4	12,000
5	10,000

Assuming the relationship is exponential, which equation best models the curve of best fit for the data?

- **A** $y = 21{,}000(1.20)^x$
- **B** $y = 22{,}300(2.60)^x$
- **C** $y = 23{,}100(0.85)^x$
- **D** $y = 23{,}500(0.70)^x$

What is the sum of the infinite geometric series $9 - 6 + 4 - \frac{8}{3} + \ldots$?

- A $\frac{29}{3}$
- B $\frac{25}{3}$
- C $\frac{27}{5}$
- D $\frac{18}{5}$

Which number is a zero of $f(x) = 7x^2 + 16x - 48$?

- **A** 12
- **B** 4
- **C** $\frac{12}{7}$
- **D** $\frac{4}{7}$

Which function is the inverse of $g(x) = x^3 + 11$?

- **A** $g^{-1}(x) = \sqrt[3]{x - 11}$
- **B** $g^{-1}(x) = \sqrt[3]{x + 11}$
- **C** $g^{-1}(x) = x - \sqrt[3]{11}$
- **D** $g^{-1}(x) = x + \sqrt[3]{11}$

What is the domain of $g(x) = \log(x - 1)$?

- **A** $\{x | x > 10\}$
- **B** $\{x | x > 9\}$
- **C** $\{x | x > 1\}$
- **D** $\{x | x > 0\}$

A scientist obtained a sample that contained 80 grams of radioactive Barium-122 that decays exponentially over time. The amount of Barium-122 that remained in the sample at observed times is shown in the table.

Radioactive Decay of Barium-122

Time (minutes)	Mass of Remaining Barium-122 (grams)
0	80.0
1	56.6
2	40.0
3	28.3
4	20.0

If the radioactive decay continues at the same rate, which is closest to the amount of the sample of Barium-122 remaining at 5 minutes?

- **A** 8.3 grams
- **B** 10.0 grams
- **C** 11.7 grams
- **D** 14.1 grams

What is the sum of the first 20 terms of the arithmetic sequence shown?

$$\frac{1}{3}, \frac{2}{3}, 1, \frac{4}{3}, \frac{5}{3}, \ldots$$

- **A** 5
- **B** 20
- **C** 70
- **D** 140

Directions: Type your answer in the box.

What is the number of possible permutations of 8 objects taken 3 at a time?