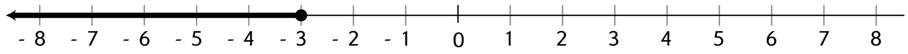
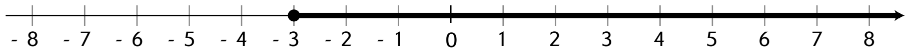
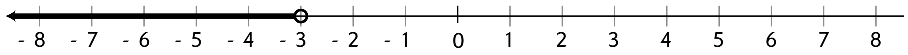
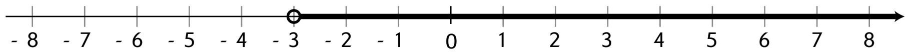
41. Which of the following graphs illustrates the solution to $\frac{2-x}{5} < 1$?

A. 

B. 

C. 

D. 

Time (minutes)	*Population*
0	1000
10	5000

42. The table above gives the population of a deadly bacterium at two different times. The growth of the bacteria is modeled by the function $Q(t) = Q_0e^{xt}$. Based on this information, what is the value of x?

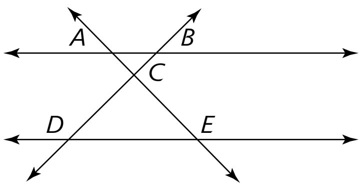
A. $\frac{\ln 5}{10}$
B. $\ln 5$
C. $\ln 10 - \ln 5$
D. $\ln\frac{1}{5}$

43. Which of the following functions is the polynomial of lowest degree that has zeroes at –5, $\frac{1}{2}$, 4, and –3?

A. $P(x) = x(x+5)(x-\frac{1}{2})(x-4)(x+3)$
B. $P(x) = (x-5)(2x+1)(x+4)(x-3)$
C. $P(x) = (x+5)(2x-1)(x-4)(x+3)$
D. $P(x) = 2x(x+5)(x-\frac{1}{2})(x-4)(x+3)$

44. Which of the following sets is the domain of the function $y = \frac{3}{x^2-4}$?

A. $\{x|x$ is a real number such that $x \neq 2$ or $x \neq -2\}$
B. $\{x|x$ is a real number such that $x \neq 4$ or $x \neq -4\}$
C. $\{x|x$ is a real number such that $x = \pm 2\}$
D. $\{x|x$ is a real number$\}$



45. In the figure shown above, $\overleftrightarrow{AB} \parallel \overleftrightarrow{DE}$, which of the following geometric theorems would most likely be used in proving that $\triangle ABC \approx \triangle CDE$?

I. Corresponding sides of similar triangles are proportional.
II. If two parallel lines are cut by a transversal, then any pair of alternate interior angles is congruent.
III. If two angles of one triangle are congruent to two corresponding angles of another triangle, then the triangles are similar.

A. I and II only
B. I and III only
C. II and III only
D. I, II, and III

46. For what value of x is the matrix $\begin{bmatrix} 2x & -4 \\ 12 & 3 \end{bmatrix}$ NOT invertible?

A. –48
B. –8
C. 8
D. 48

47. What is the volume of a right hexagonal prism that is 30 centimeters in height and whose bases are regular hexagons that are 6 centimeters on a side?

A. 468 cm^3
B. 1080 cm^3
C. 2806 cm^3
D. 3240 cm^3

Answer Explanations for Practice Test 2

1. C. The question asks you to identify the mathematical technique that is key for converting $y = ax^2 + bx + c$ into the form $y - k = a(x - h)^2$. The following procedure shows how you can achieve the conversion.

First, write $y = ax^2 + bx + c$ as $y - c = a(x^2 + \frac{b}{a}x)$. Next, make the expression inside the parentheses on the right into a perfect square. You do this by "completing the square"; that is, take half the coefficient of x, square it, and add the result, which is $\frac{b^2}{4a^2}$, to the quantity inside the parentheses. Since there is a factor of a outside the parentheses, this is equivalent to adding $\frac{b^2}{4a}$ to the right side of the equation. To keep the equation balanced, you must add $\frac{b^2}{4a}$ to the left side of the equation as well, yielding the equation $y - c + \frac{b^2}{4a} = a(x^2 + \frac{b}{a}x + \frac{b^2}{4a^2})$, which can be rewritten as $y - c + \frac{b^2}{4a} = a\left(x + \frac{b}{2a}\right)^2 \Rightarrow y - (c - \frac{b^2}{4a}) = a\left(x - \left(-\frac{b}{2a}\right)\right)^2 \Rightarrow y - k = a(x - h)^2$, where $k = c - \frac{b^2}{4a}$ and $h = -\frac{b}{2a}$. As you can see, the mathematical technique of "completing the square" is key to achieving the conversion of $y = ax^2 + bx + c$ into the form $y - k = a(x - h)^2$, so Choice C is the correct response. The techniques in the other answer choices are not useful for achieving the desired conversion.

2. A. This question is an example of a multiple-response set question. One approach to answering this type of question is to follow the following steps. First, read the question carefully to make sure you understand what the question is asking; next, identify choices that you know are incorrect from the Roman numeral options, and then draw a line through every answer choice that contains a Roman numeral you have eliminated; and then examine the remaining answer choices to determine which Roman numeral options you need to consider.

Looking at the three properties given in the Roman numeral options, you can immediately eliminate Roman III because there are no parentheses in the computation sequence, meaning that the distributive property did not come into play. Draw a line through choices B, C, and D because each of these answer choices contains Roman numeral III. This leaves answer Choice A as the correct response. This choice includes commutativity (Roman I) and associativity (Roman II), both of which are used in the computation sequence.

3. B. Since the answer choices are given as exponential expressions, the best way to work this problem is to perform on x the sequence of operations indicated by the function machine, using the exponential form for the operation: $x \to \sqrt{x} = x^{\frac{1}{2}} \to \sqrt{x^{\frac{1}{2}}} = \left(x^{\frac{1}{2}}\right)^{\frac{1}{2}} = x^{\frac{1}{4}} \to \sqrt{x^{\frac{1}{4}}} = \left(x^{\frac{1}{4}}\right)^{\frac{1}{2}} = x^{\frac{1}{8}} \to \left(x^{\frac{1}{8}}\right)^6 = x^{\frac{6}{8}} = x^{\frac{3}{4}}$, Choice B. The other answer choices result if you fail to use the rules for exponents correctly.

4. C. The graph of the function $y = \frac{5}{16x^2 + kx + 9}$ will have vertical asymptotes at values of x for which the denominator, $16x^2 + kx + 9$, equals zero. The trinomial, $16x^2 + kx + 9$, will have exactly one zero when it is a perfect square. For $16x^2 + kx + 9$ to be a perfect square, the coefficient, k, of x needs to be $2 \cdot \sqrt{16} \cdot \sqrt{9}$, which is $2 \cdot 4 \cdot 3 = 24$, choice C. If k is 0 (Choice A) or 12 (Choice B), the graph of y does not have a vertical asymptote. If k is 48 (Choice D), the graph of y has two vertical asymptotes.

Tip: You can check your answer by substituting into the equation the values for *k* given in the answer choices and graphing the resulting functions using your graphing calculator. However, it is best that you work out the problem analytically, rather than use only your graphing calculator to determine a solution because on a graphing calculator, the graphs of functions that have asymptotes are sometimes misleading.

5. C. Analyze the problem. When two lines are perpendicular, their slopes are negative reciprocals of each other. You can write the equation of a line when you know the slope of the line and a point on the line. Devise a plan. To find the equation of the line that is perpendicular to the line whose equation is $5x - 6y = 4$ and passes through the point (3, 1) will take three steps. First, find the slope, m, of the line whose equation is $5x - 6y = 4$; next, find the negative reciprocal of m, which is $-\frac{1}{m}$; and then use the point-slope form to determine the equation of the line with slope $-\frac{1}{m}$ that passes through the point (3, 1).