Ivy Global

Math: Passport to Advanced Math

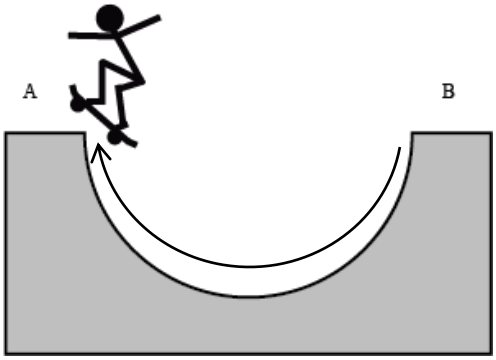
Practice for the New SAT (2016)

Ivy Global

Problem Set 3: 10 Questions

Math: Passport to Advanced Math

Questions 1-2 refer to the following information.



A skateboarder travels along a cement half cylinder, as shown above. He starts from a complete stop at side *A*, and comes to another complete stop at side *B*. His speed while skating can be approximated by a quadratic function.

1. The skateboarder travels from side *A* to side *B* in 2.5 seconds and reaches a maximum speed of 10 feet per second. Which equation best represents the skateboarder's speed, *s*, as a function of time in seconds, *t*, during this 2.5-second interval?

(A) $s = -\frac{(t-1.25)^2}{1.25^2} + 9$

(B) $s = -\frac{(t-1.25)^2}{0.15625} + 10$

(C) $s = -\frac{(t-2.5)^2}{1.25^2} + 9$

(D) $s = -\frac{(t-2.5)^2}{0.15625} + 10$

2. Another skateboarder travels from side *A* to side *B* along the same cement half cylinder. The following equation gives her speed, *s*, as a function of time in seconds, *t:*

$$s - 8 = -\frac{(t-8)^2}{8}$$

If her speed is 6 feet per second, for how many seconds could she have been skating?

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3. Which expression is equivalent to $\frac{x^{-2}}{x^2} + \sqrt{x^3} \times x^4 - x$?

(A) $\frac{1}{x^4} + x^{\frac{3}{2}+4} - x$

(B) $1 + x^{\frac{4}{3}} - x$

(C) $x^4 + x^{\frac{3}{2}+4} - x$

(D) $x^4 + x^6 - x$

4. If $x^3 - y^3 = 35$, $x^2 - y^2 = -5$, and $x^2 + 2xy + y^2 = 1$, what is the value of xy?

$(x + y) \neq 1$

(A) 25
(B) 6
(C) 1
(D) -6

5. If $x^2 + x + y = 20$, what is the greatest possible value for the *x*-intercept?

(A) -5
(B) -4
(C) 0
(D) 4

6. If $6x + 12y = 168$, what is the value of $\frac{x}{2} + y$?

(A) 1
(B) 4
(C) 8
(D) 14

7. If $g(x) = \frac{1}{x}$ and $f(x) = \frac{\sqrt{x}}{x}$, what is $g(f(4))$?

8. For what values of *x* is $f(x) = 2x + 2$ equal to $f(x) = x^2 + x + 2$?

(A) -1 and 0
(B) 0 and 1
(C) 1 and 2
(D) 2 and 3

9. $a = 6x^2 - 19x - 7$
$b = 2x^2 - x - 21$

Based on the equations above, which of the following expressions is equivalent to $\frac{a}{b}$?

(A) $4x^2 - 18x + 14$

(B) $3x^2 - 19 - \frac{1}{3}$

(C) $\frac{3x+1}{x+3}$

(D) $\frac{x+3}{3x+1}$

10. The following equation represents the number of wooden blocks, *b*, that a company can produce per minute using wooden boards, *w*:

$$b^2 = \frac{w}{2} - 2$$

It costs the company $1 to purchase each board, and the company sells its blocks for $7 each. How many blocks should the company make per minute make in order to maximize its profit? (Profit is equal to total sales minus total costs.)

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11. The population of mosquitoes in Gainesville changes according to the formula $m = -(t-3)^2 + 9$, where *m* represents the number of mosquitoes, in thousands, and *t* represents the number of months since the mosquitoes have spawned. If mosquitoes spawn in the middle of May, during which month does Gainesville's mosquito population drop to zero?

    (A) August
    (B) September
    (C) October
    (D) November

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12. A factory's output of widgets, *w*, from units of metal, *m*, is expressed by the function $w(m) = -(2m - m^2)$. The factory then uses its widgets, *w*, to create gears, *g*, according to the function $g(w) = -(2w - w^2)$.

    How many gears can the factory make with 3 units of metal?

$$\frac{x(x-1)-6}{x+3} = x - 2$$

13. How many possible solutions exist for the equation above?

    (A) 0
    (B) 1
    (C) 2
    (D) Infinitely many

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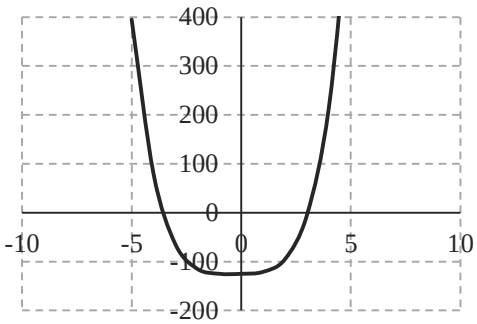
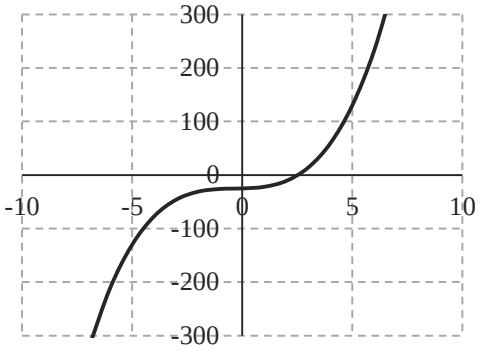
14. The equation $ax^4 + bx^3 + cx^2 + N$ could be represented by which of the following graphs below?

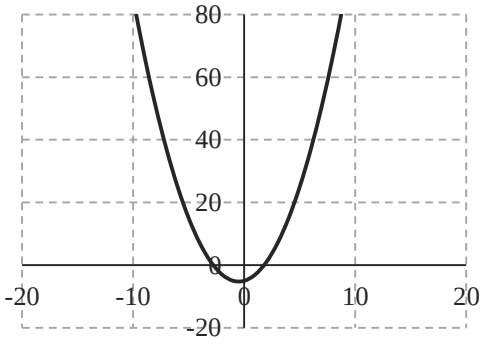
(A)

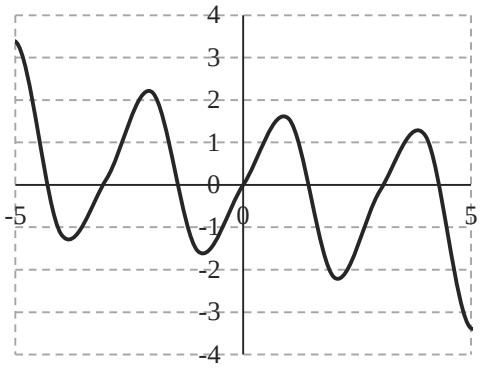


(B)



(C)





(D)

Summary

14 Questions	
0 Easy, 7 Medium, 7 Hard	Estimated Time: 35 minutes

Answers

Answers	Difficulty	Topic	Other Topics
1) B	Hard, Multi-part	Create a quadratic function.	
2) 4 or 12	Hard, Multi-part	Determine the most suitable form of an equation to reveal a particular trait.	
3) A	Medium	Create equivalent expressions involving rational exponents and radicals.	
4) D	Hard	Create an equivalent form of an algebraic expression.	Solve quadratic equations. Rewrite simple rational expressions.
5) D	Medium	Solve a quadratic equation having rational coefficients.	
6) D	Medium	Perform arithmetic operations on polynomials.	
7) 0.25	Medium	Solve an equation in one variable that contains radicals.	
8) B	Medium	Solve a system of one linear equation and one quadratic equation.	Solve quadratic equations.

9) C	Hard	Rewrite simple rational expressions.	
10) 2	Hard	Interpret parts of nonlinear expressions in terms of their context.	
11) D	Medium	Use properties of factorable polynomials to solve conceptual problems relating to zeros.	
12) 3	Medium	Use function notation, and interpret statements using function notation.	
13) B	Hard	Rearrange an equation to isolate a single variable of interest.	
14) A	Hard	Select a graph corresponding to a given nonlinear equation.	