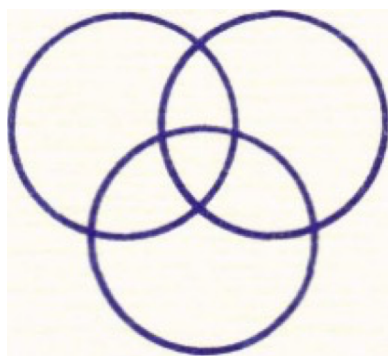


Broward County Council of Teachers of Mathematics



Annual Contest
2016

Algebra 7
Algebra 8

BCCTM Middle School Math Competition 2016: Algebra 7/Algebra 8

DIRECTIONS: You may write on this test copy. Select the best answer for each question. If the answer is not listed, choose (E) NOTA (NONE OF THE ABOVE). Figures are not drawn to scale. Be sure to bubble your answers on your scantron using a #2 pencil within the time allowed. Do NOT change any information or codes on your scantron. If you have any questions, ask the proctor.

You have 45 minutes to complete this test. A 10-minute warning will be given.

1. Jennifer recently saw a silly math question on Instagram. Can you simplify it correctly?

$$3 \div 5(2 \cdot 0 - 1 + 6)$$

Answer it!

- A) 3 B) $\frac{3}{25}$ C) 0 D) $-\frac{1}{5}$ E) NOTA

2. Solve for x: $\frac{4}{5}(2x - 1) = \frac{2}{3}x + 5\frac{1}{3}$

- A) 0 B) $1\frac{19}{21}$ C) $-3\frac{2}{7}$ D) $6\frac{4}{7}$ E) NOTA

3. Which of the following is undefined?

I. $\frac{0}{1}$	II. $\frac{1}{0}$	III. The slope of the line: $y = 1$	IV. The slope of the line: $x = 0$
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- A) I and III B) II and IV C) II and III only D) I only E) NOTA

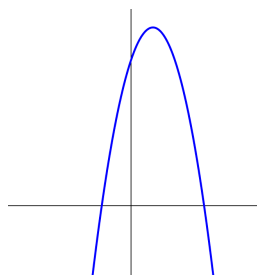
4. Find the sum of the factors: $2x^3 + 3x^2 - 2x - 3$

- A) $2x^2 + 2x + 2$ B) $4x + 3$ C) $2x^2 + 2x + 3$ D) $2x^3 + 3x^2 - 2x - 3$ E) NOTA

5. Find A if $\frac{(0.0035 \times 10^{-10})(0.03 \times 10^4)}{2,100 \times 10^{-39}} = 5 \times 10^A$

- A) 24 B) $\frac{1}{3}$ C) -10 D) 21 E) NOTA

6. Consider the graph of the function, $y = ax^2 + bx + c$, below. Select **ALL** that are true.



I. $a > 0$
II. $c < 0$
III. $b^2 - 4ac < 0$
IV. The equation $ax^2 + bx + c = 0$ has two real solutions.

- A) I only B) IV only C) I and II D) I, II, III, IV E) NOTA

7. What is the area of the region bounded by the graphs of $y = |x|$ and $y = 2$?

- A) 0.5 B) 1 C) 4 D) 8 E) NOTA

8. Jessica has $(3x - 7y - 2)$ pieces of candy before Joan gives her $(7 - 4x + 2y)$ pieces of candy. Then, Nikole eats $(-5x + 6y - 5)$ pieces of Jessica's candy. How many pieces of candy does Jessica have?

- A) $4x - 11y + 10$ B) $-6x + y$ C) $4x - y + 10$ D) $12x + y + 10$ E) NOTA

9. In retaliation, Jessica takes Nikole's hover board and will only give it back if she can solve:

$$3x^2 - 27x - 12 = 0$$

- A) $\frac{9 \pm \sqrt{65}}{2}$ B) $\frac{9 \pm \sqrt{97}}{2}$ C) $\frac{-9 \pm \sqrt{65}}{2}$ D) $\frac{-9 \pm \sqrt{97}}{2}$ E) NOTA

10. Three consecutive odd integers have a sum of 141. Find the sum of the first and the third integer.

- A) 86 B) 90 C) 94 D) 98 E) NOTA

11. Find the sum of the solutions to: $6^x = \frac{36^x}{216^{x-3}}$

- A) $-\frac{11}{3}$ B) $\frac{11}{3}$ C) $-\frac{9}{2}$ D) $\frac{9}{2}$ E) NOTA

12. Two trains leave King's Cross station at the same time. One train travels east at 75 mph and the other west at 80 mph. Approximately how long did it take for the trains to be 775 miles apart?

- A) 9 hours B) 5 hours C) 7.5 hours D) 2 days E) NOTA

13. If $xy = -2$ and $x^2 - 2xy + y^2 = 30$, then $(x + y)^2 = ?$												
A) 16	B) 18	C) 20	D) 22	E) NOTA								
14. Whole numbers are a subset of the _____ numbers.												
A) Natural	B) Rational	C) Irrational	D) Transcendental	E) NOTA								
15. Find the roots of $3x^2 + 14x - 24 = 0$.												
A) $-6, \frac{4}{3}$	B) $6, -\frac{4}{3}$	C) $-3, \frac{8}{3}$	D) $3, -\frac{8}{3}$	E) NOTA								
16. Given the function $f(x) = 3\sqrt{x - 4} + 7$, find the value(s) of k such that $f(k - 1) = 13$.												
A) 9	B) 7	C) 5	D) 3	E) NOTA								
17. If $1 - 7x^2 = -174$, what is the smallest possible value of $4x - 5$?												
A) -25	B) 15	C) 55	D) 95	E) NOTA								
18. A weather balloon is released and as it rises in the air it records the temperatures, in degrees Celsius, as shown in the table. If the temperature continues to decrease at a constant rate, the temperature at 5,500 feet will be												
			<table><tr><td>Height</td><td>$^{\circ}\text{C}$</td></tr><tr><td>2,000 ft</td><td>23 $^{\circ}$</td></tr><tr><td>3,000 ft</td><td>20 $^{\circ}$</td></tr><tr><td>4,000 ft</td><td>17 $^{\circ}$</td></tr></table>	Height	$^{\circ}\text{C}$	2,000 ft	23 $^{\circ}$	3,000 ft	20 $^{\circ}$	4,000 ft	17 $^{\circ}$	
Height	$^{\circ}\text{C}$											
2,000 ft	23 $^{\circ}$											
3,000 ft	20 $^{\circ}$											
4,000 ft	17 $^{\circ}$											
A) 13.5 $^{\circ}$	B) 11 $^{\circ}$	C) -2 $^{\circ}$	D) 12.5 $^{\circ}$	E) NOTA								
19. Simplify: $\frac{1}{x} - \frac{6x^2 + 11x - 2}{5x^2 - 17x + 6} \cdot \frac{20x - 8}{6x - 1}$												
A) 0	B) $-(4x^2 - 9x + 3)$	C) $\frac{-(4x + 3)(x + 1)}{x(x - 3)}$	D) $\frac{-(4x^2 - 9x + 3)}{x(x - 3)}$	E) NOTA								
20. 15 is 0.3% of what number?												
A) 5	B) 500	C) 5,000	D) 50,000	E) NOTA								

<p>21. Evaluate: $\sqrt{12 + \sqrt{12 + \sqrt{12 + \dots}}}$</p> <p>A) 4 B) 3 C) -4 D) -3 E) NOTA</p>
<p>22. Simplify: $10(3^{-1} + 2^{-1})^{-1}$</p> <p>A) 50 B) 2 C) -2 D) 12 E) NOTA</p>
<p>23. When $x^2 - 7x + 3k$ is divided by $x + 2$, the remainder is 3. Find the value of k.</p> <p>A) 13 B) 0 C) 7 D) -1 E) NOTA</p>
<p>24. Simplify: $\frac{\frac{x+3}{x+2} + \frac{1}{x}}{\frac{x^2+4x+2}{x^2+2x}}$</p> <p>A) 0 B) 1 C) x D) $\frac{x}{x+2}$ E) NOTA</p>
<p>25. The clothing retailer “Forever 16” marks clothing items on clearance if they do not sell within 2 weeks. After two weeks the price of each item not sold is marked down weekly by 50%. What is the clearance price of a shirt originally sold for \$16 after being in the store for 4 weeks?</p> <p>A) \$8.00 B) \$4.00 C) \$2.00 D) \$1.00 E) NOTA</p>
<p>26. Find the equation of the line perpendicular to the line $x + 3y = 9$ and passing through the vertex of the parabola $y = -x^2 + 2x + 2$.</p> <p>A) $3x + y = 6$ B) $x - 3y = -8$ C) $3x - y = 0$ D) $x + 3y = 10$ E) NOTA</p>
<p>27. Consider the venn diagram:</p> <div data-bbox="706 1554 917 1764" data-label="Diagram"> </div> <p>Which expression shows the shaded region?</p> <p>A) $(B \cup A) \cap C$ B) $B \cup (A \cap C)$ C) $(B \cap A) \cup C$ D) $B \cap (A \cup C)$ E) NOTA</p>

28. Given the following system of inequalities, what is the shape of the solution set?

$$\begin{cases} x \leq 4 \\ y \leq 6 \\ x - y \geq -2 \\ 2x + 5y \geq 10 \end{cases}$$

- A) triangle B) square C) rectangle D) trapezoid E) NOTA

29. Using the letters in the word ALGEBRA, how many 7-letter combinations can you make?

- A) 7 B) 2520 C) 5040 D) 1000 E) NOTA

30. Newly single bachelors Leonardo DiCaprio and Prince Harry are both trying to get a girlfriend. The probability that a girl agrees to go on a date with Leonardo is $\frac{2}{7}$. The probability that a girl agrees to go on a date with Prince Harry is $\frac{9}{10}$. Believe it or not, both Leonardo and Prince Harry both have low self-esteems, so they are only going to ask out one girl. Given that they both ask the same girl, what is the probability that the girl goes on a date with both Prince Harry and Leonardo?

- A) $\frac{83}{70}$ B) $\frac{9}{35}$ C) 1 D) $\frac{7}{23}$ E) NOTA