



Louisiana Mu Alpha Theta

affiliated with
Mu Alpha Theta
National High School and Junior College
Honorary Mathematics Club

50th State Convention March 25-27, 2010 Baton Rouge, Louisiana

Theta - Algebra Y

TEST RULES

1. Do not begin test until you are told to do so.
2. You must supply your own #2 pencil.
3. Only ACT approved calculators are allowed on all tests.
4. Print your name and school in the name blank, your code in the date blank, and the area test in the subject blank on your Scantron answer sheet
5. Standard procedure for machine graded papers must be followed. Use only a #2 pencil, marking the appropriate spaces carefully.
6. In case of a tie, winners will be determined according to the order in which the answer sheet was turned into the moderator.
7. Do all scratch work on your test.

2010 Algebra Y Area Test

Multiple Choice

Identify the choice that best completes the statement or answers the question.

NOTA → None of the above

1. Divide and simplify. Assume that all variables are positive.

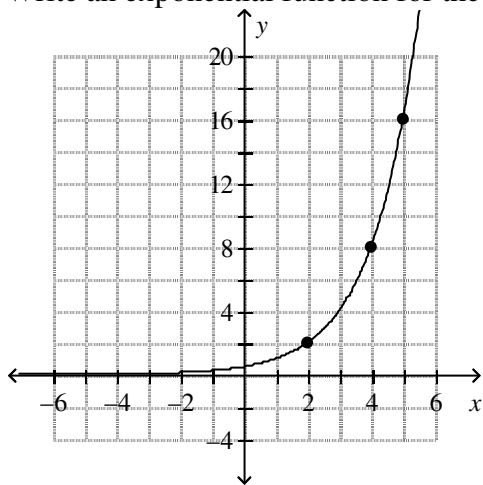
$$\frac{\sqrt[3]{270x^{20}}}{\sqrt[3]{5x}}$$

- A) $2x\sqrt[3]{3x^6}$ B) $3x^6\sqrt[3]{2x}$ C) $\sqrt[3]{135x^{19}}$ D) $3x^6\sqrt{135x}$ E) NOTA

2. Write the radical expression $\frac{8}{\sqrt[7]{x^{15}}}$ in exponential form.

- A) $\frac{7}{8x^{15}}$ B) $\frac{15}{8x^7}$ C) $\frac{15}{8x^7}$ D) $\frac{7}{8x^{15}}$ E) NOTA

3. Write an exponential function for the graph.



- A) $y = 0.5(2)^x$ B) $y = 2(0.5)^x$ C) $y = (2 \cdot 0.5)^x$ D) $y = 2(5)^x$ E) NOTA

4. Solve the given equation. If necessary, round to four decimal places.

$$2 + 6e^{4x} = 19$$

- A) 0.2604 B) 0.4907 C) 0.5074 D) 2.8333 E) NOTA

5. Simplify the radical expression. Use absolute value symbols if needed.

$$\sqrt[4]{81x^{20}y^8}$$

- A) $3|x^5|y^2$ B) $9|x^{25}|y^4$ C) $9x^{25}|y^4|$ D) $3x^5|y^2|$ E) NOTA

6. Multiply.

$$(-5 - \sqrt{3})^2$$

- A) $28 + 10\sqrt{3}$ B) $28 - 10\sqrt{3}$ C) $-13 + 5\sqrt{3}$ D) $25 - 10\sqrt{3}$ E) NOTA

7. Use the properties of logarithms to evaluate $\log_3 9 + \log_3 36 - \log_3 4$.
- A) 2 B) 4 C) 8 D) 41 E) NOTA
8. A construction explosion has an intensity I of $4.85 \times 10^{-2} \text{ W/m}^2$. Find the loudness of the sound in decibels if $L = 10 \log \frac{I}{I_0}$ and $I_0 = 10^{-12} \text{ W/m}^2$. Round to the nearest tenth.
- A) 146.9 decibels C) 106.9 decibels E) NOTA
 B) 115.8 decibels D) 48.5 decibels
9. Multiply.
- $$(7 - \sqrt{2})(8 + \sqrt{2})$$
- A) $54 + 56\sqrt{2}$ C) $13 + 15\sqrt{2}$ E) NOTA
 B) $54 - \sqrt{2}$ D) $58 + 56\sqrt{2}$
10. Multiply and simplify if possible. $\sqrt{7x}(\sqrt{x} - 7\sqrt{7})$
- A) $x\sqrt{7} - 49\sqrt{x}$ C) $x\sqrt{7} - x\sqrt{49}$ E) NOTA
 B) $\sqrt{7x} - 49x$ D) $-\sqrt{42x}$
11. Simplify the expression. $(2 + 5i)(-1 + 5i)$
- A) $-27 + 5i$ C) $-2 + 25i$ E) NOTA
 B) $23 + 5i$ D) $-2 + 5i$
12. The sales of lawn mowers t years after a particular model is introduced is given by the function $y = 5500 \ln(9t + 4)$, where y is the number of mowers sold. How many mowers will be sold 2 years after a model is introduced? Round the answer to the nearest whole number.
- A) 37,897 mowers C) 15,901 mowers E) NOTA
 B) 7,383 mowers D) 17,000 mowers
13. Solve the quadratic equation. $3x^2 + 7x = -9$
- A) $\frac{7}{6} \pm \frac{\sqrt{20}}{6}i$ C) $-\frac{7}{6} \pm \frac{\sqrt{59}}{6}i$ E) NOTA
 B) $-\frac{7}{3} \pm \frac{\sqrt{101}}{3}i$ D) $\frac{7}{3} \pm \frac{\sqrt{59}}{3}i$
14. Radioactive iodine is used to determine the health of thyroid gland. It decays according to the equation $y = ae^{-0.0856t}$, where t is in days. Find the one-third life of this substance.
- A) 6 C) 16 E) NOTA
 B) 13 D) 67
15. A rope is $\sqrt{150}$ units long. The rope is cut into two pieces, so that the lengths of the pieces are in the ratio 2 : 3. What is the length of the longer piece expressed in simplest radical form?
- A) $6\sqrt{5}$ units C) $2\sqrt{6}$ units E) NOTA
 B) $3\sqrt{6}$ units D) $6\sqrt{2}$ units

