

ALGEBRA ONE INDIVIDUAL ROUND
2001
MARCH REGIONAL COMPETITION

Choose the correct answer and bubble that letter on your scantron answer sheet.
 If none of the answers (NOTA) are correct, then choose letter E. NOTA

1. FACTOR COMPLETELY: $81 - 4X^2$
 A. $(2X + 9)(2X - 9)$ B. $(9 + 2X)(9 - 2X)$ C. $(9 - 2X)^2$ D. $(3 + 2X)^2(3 - 2X)^2$ E. NOTA

2. SIMPLIFY BY RATIONALIZING THE DENOMINATOR $\frac{3}{\sqrt{7}+2}$
 A. $\sqrt{7} - 2$ B. $\frac{3\sqrt{7}-6}{5}$ C. $\frac{3\sqrt{7}-2}{3}$ D. $\frac{3\sqrt{7}-2}{5}$ E. NOTA

3. SIMPLIFY: $7\sqrt{25XY^2} - 4\sqrt{75XY^2} + 2\sqrt{12XY^2}$ WHERE $X, Y \in \mathbb{R}$ AND $X > 0, Y > 0$
 A. $35Y\sqrt{X} - 16Y\sqrt{3X}$ B. $19Y\sqrt{2X}$ C. $35Y\sqrt{X} - 6Y\sqrt{2X}$ D. $5Y\sqrt{38X}$ E. NOTA

4. SUBTRACT, THEN SIMPLIFY $\frac{3}{X^2+2X+1} - \frac{1}{X+1}$
 A. $\frac{4-X}{X^2+2X+1}$ B. $\frac{-X^2+5X+2}{(X+1)(X^2+2X+1)}$ C. $\frac{-X^2+X+2}{(X^2+2X+1)(X+1)}$ D. $\frac{2-X}{X^2+2X+1}$ E. NOTA

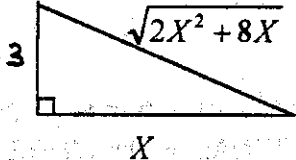
5. THE VALUE OF THE DISCRIMINANT OF $4X^2 - 2X - 7 = 0$ IS
 A. -112 B. -110 C. 114 D. 116 E. NOTA

6. SOLVE $3X^2 + 4X - 2 = 0$
 A. $\frac{-2 \pm 2\sqrt{2}}{3}$ B. $\frac{-2 \pm \sqrt{10}}{3}$ C. $\frac{-2 \pm \sqrt{2}}{3}$ D. $\frac{-2 \pm 2\sqrt{10}}{3}$ E. NOTA

7. SOLVE $\sqrt{2X-1} - \sqrt{X-1} = 1$ THE SUM OF THE SOLUTIONS IS:
 A. 2 B. 4 C. 6 D. 8 E. NOTA

8. FIND THE DISTANCE BETWEEN THE POINTS $(3, 17)$ AND $(-2, 5)$
 A. $\sqrt{145}$ B. 13 C. $3\sqrt{51}$ D. $\sqrt{485}$ E. NOTA

9. Y IS DIRECTLY PROPORTIONAL TO X AND $Y = 35$ WHEN $X = 5$. FIND THE CONSTANT OF PROPORTIONALITY.
- A. $1/7$ B. 7 C. 175 D. $1/175$ E. NOTA
10. GIVEN $f(X) = |X - 3| - 5$, FIND $f(1) - f(5)$
- A. 0 B. 6 C. -10 D. -14 E. NOTA
11. WRITE THE EQUATION OF A LINE THAT PASSES THROUGH $(1, 3)$ AND IS PERPENDICULAR TO THE LINE $2X + 3Y = -512$
- A. $3X - 2Y = -3$ B. $2X + 3Y = 11$ C. $2X - 3Y = -7$ D. $3X + 2Y = 9$ E. NOTA
12. Z VARIES JOINTLY WITH X AND THE SQUARE OF Y AND INVERSELY WITH W . IF $Z = 5$ WHEN $X = 5$, $Y = 3$, AND $W = 6$, FIND THE EQUATION OF VARIATION.
- A. $Z = \frac{35W}{3(X+Y^2)}$ B. $Z = \frac{75W}{2XY^2}$ C. $Z = \frac{15(X+Y^2)}{7W}$ D. $Z = \frac{2XY^2}{3W}$ E. NOTA
13. WHAT IS THE MINIMUM VALUE OF $Y = 2X^2 + 16X + 9$?
- A. -247 B. -55 C. -23 D. 247 E. NOTA
14. MY CAR'S RADIATOR IS FILLED WITH 30 L OF A MIXTURE THAT IS 60% ANTI-FREEZE. HOW MUCH OF THE RADIATOR'S CONTENTS MUST BE DRAINED AND REPLACED WITH 100% ANTI-FREEZE TO MAKE THE RADIATOR'S CONTENTS 80% ANTI-FREEZE ?
- A. 9 L B. 12 L C. 15 L D. 18 L E. NOTA
15. DETERMINE THE PRINCIPAL THAT MUST BE INVESTED AT A RATE OF 8%, COMPOUNDED QUARTERLY SO THAT THE BALANCE IN 40 YEARS WILL BE \$200,000.
- A. \$90,578.10 B. \$47,539.00 C. \$12,416.22 D. \$8,414.00 E. NOTA
16. SOLVE FOR X : $\frac{1}{16} = 2^{7X-5}$
- A. $\frac{9}{7}$ B. $\frac{5}{7}$ C. $\frac{2}{5}$ D. $\frac{1}{7}$ E. NOTA
17. SOLVE $\frac{14}{3X-1} + \frac{6X}{3X+7} = 2$
- A. $X = \frac{-53}{3}$ B. $X = \frac{-44}{3}$ C. $X = \frac{1}{3}$ D. NO SOLUTION E. NOTA

18. DIVIDE AND SIMPLIFY: $\frac{X^2 - 5X + 4}{X^2 + 4} \div \frac{X^2 + 3X - 4}{X + 2}$
- A. $\frac{X^2 - 2X - 8}{X^3 + 4X^2 + 4X + 16}$ B. $\frac{1}{X + 4}$ C. $\frac{X - 4}{X^2 - 2X - 8}$ D. $\frac{X - 4}{X^2 + 6X + 8}$ E. NOTA
19. FACTOR $3RV - 2VT - 6RM + 4MT$ COMPLETELY. ONE OF THE FACTORS IS:
- A. $(3R + 2T)$ B. $(V - 2M)$ C. $-2M$ D. $(6R + 2T)$ E. NOTA
20. SIMPLIFY $2\{[3(X - 1) + 4] - 2[5 - 2(X + 2)]\}$ INTO THE FORM $AX + B$.
A + B = ?
- A. 8 B. 10 C. 12 D. 14 E. NOTA
21. WRITE THE EQUATION OF A HORIZONTAL LINE PASSING THROUGH THE POINT $(2, -5)$.
- A. $4X + Y = 3$ B. $X = 2$ C. $Y = -5$ D. $X + Y = -3$ E. NOTA
22. ~~SOLVE FOR X~~:
 Find M
- 
- LET $M = 3X^2 - 5X + 6$
- A. $M = 4$ B. $M = 8$ C. $M = 10$ D. $M = 12$ E. NOTA
23. SOLVE THE FOLLOWING SYSTEM: $\begin{cases} 3X - 5Y = 2 \\ 4X + 2Y = -3 \end{cases}$ WHAT IS THE SUM OF $X + Y$?
- A. $\frac{-14}{13}$ B. $\frac{-4}{13}$ C. $\frac{4}{13}$ D. $\frac{6}{13}$ E. NOTA
24. THE REMAINDER OF $\frac{6X^3 - 13X^2 + 21X - 6}{2X^2 - 3X + 5}$ IS $\frac{A}{2X^2 - 3X + 5}$. WHAT IS A ?
- A. $A = -2$ B. $A = 4$ C. $A = 10$ D. $A = 12$ E. NOTA
25. SOLVE $(23X - 31)^2 = 2001$ FOR X . ROUND THE NEGATIVE SOLUTION TO THE NEAREST HUNDREDTHS.
- A. -3.29 B. -1.10 C. -0.60 D. -0.29 E. NOTA

26. WRITE $Y = 2X^2 - 4X + 5$ IN THE GRAPHING FORM $Y = a(X-h)^2 + k$. STATE THE SUM OF $a+k$.
- A. 1 B. 2 C. 3 D. 4 E. NOTA
27. THE LARGER OF TWO NUMBERS EXCEEDS TWICE THE SMALLER BY 5. FIND BOTH NUMBERS IF THE LARGER DIVIDED BY THE SMALLER HAS QUOTIENT OF 3 AND A REMAINDER OF 2. STATE THE SUM OF THE LARGER AND THE SMALLER NUMBER.
- A. 14 B. 15 C. 21 D. 28 E. NOTA
28. LET $A@B = 3A - B^2 + AB$ FIND THE VALUE OF $2.1@(1.4@0.8)$ TO THE NEAREST HUNDREDTHS.
- A. -6.21 B. -5.77 C. 3.20 D. 6.21 E. NOTA
29. IT TOOK 1600 BLOCKS TO BUILD EACH ONE OF THE 310 HOUSES. THE MAYOR'S HOUSE TOOK AN ADDITIONAL 4791 MORE BLOCKS. WHAT KIND OF HOUSES DO THESE PEOPLE, INCLUDING THE MAYOR, LIVE IN? TO FIND OUT, COMPUTE THE NUMBER OF BLOCKS USED ON YOUR CALCULATOR. WHEN YOU HAVE DONE SO, TURN YOUR CALCULATOR UPSIDE DOWN TO READ THE ANSWER. SOME NUMBER LETTER COMBINATIONS ARE: 0=O 1=I 3=E 5=S 7=L 8=B 9=G
- A. TEPEES B. IGLOOS C. CABINS D. STALLS E. NOTA
30. IF $A = (16)(5)$ AND $B = -|-3|$ AND $C \equiv$ THE FIFTH POSITIVE PERFECT SQUARE, WHAT DOES $(A+BC-5)^0$ EQUAL?
- A. 0 B. 1 C. 2 D. 3 E. NOTA