2007 Hoover HS Math Tournament
Algebra I Written

1. Evaluate the expression $(a+b)^2 \div (2a) - b^2$ if a = 6 and b = 4.

A. $\frac{-23}{3}$ B. -13 C. -25 D. $\frac{25}{16}$ E. NOTA

2. $-3\begin{bmatrix} x & \frac{1}{9}y \\ a-2b & \frac{1}{5} \end{bmatrix} - 5\begin{bmatrix} -2x & y \\ a+\frac{1}{2}b & \frac{2}{5} \end{bmatrix} =$

A. $\begin{bmatrix} 7x & \frac{-16y}{3} \\ -8a+\frac{17b}{2} & \frac{-7}{5} \end{bmatrix}$ B. $\begin{bmatrix} 7x & -\frac{16}{3}y \\ -8a+\frac{7}{2}b & -\frac{13}{5} \end{bmatrix}$ C. $\begin{bmatrix} 7x & \frac{-4y}{3} \\ -8a+\frac{11b}{2} & \frac{-1}{5} \end{bmatrix}$ D. $\begin{bmatrix} 7x & -8y \\ -8a+b & -2 \end{bmatrix}$ E. NOTA

3. Louise can trim the shrubbery in 6 hours working alone. Her father can do it in 5 hours. They worked together until dinner but trimmed only $\frac{11}{15}$ of the shrubbery. How long did they work?

A. 15 hrs B. 4 hrs C. 7.5 hrs D. 2 hrs E. NOTA

4. Solve for x: $\frac{5}{x} + \frac{3}{2-x} = \frac{-6}{x^2+2x}$

A. -2 B. 4 C. 8 D. no solution E. NOTA

5. Write an equation of the line containing the given point and perpendicular to the given line. $(-6,2); 3x-9y=2$

A. $y = \frac{1}{3}x + 4$ B. y = -3x-16 C. y = -3x +20 D. $y = \frac{-1}{3}x$ E. NOTA

6. Simplify. $[-(7a-b)-(a+5b)]-[2(a+\frac{1}{2}b)+3(7a-\frac{5}{3}b)]$

A. -31a-8b B. 11a-2b C. -31a D. -31a+12b E. NOTA

7. Amy is paid time-and-a-half for hours worked in excess of 40 (Monday-Saturday) and double-time for hours worked on Sunday. If Amy had gross weekly wages of $342.00 for working 50 hours, 4 of which were on Sunday, what is her regular hourly rate?

A. $6.33 B. $5.70 C. $6.84 D. $6 E. NOTA

8. Simplify $\frac{x(5x+1)-3(x^2+1)}{(x-1)^2}$

A. $\frac{(2x+3)(x-1)}{x^2+1}$ B. $\frac{2x+3}{x-1}$ C. $\frac{2(x+1)}{x-1}$ D. $\frac{2x+3}{x+1}$ E. NOTA

9. Simplify. $[4x(x-1)]^2$

A. $16x^4+16x^2$ B. $4x^4-8x^3+4x^2$ C. $16x^4-16x^2$ D. $16x^4-32x^3+16x^2$ E. NOTA

10. Solve for all values of x. $8x^2(x^2+3)^{-3} - 2(x^2+3)^{-2} = 0$

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

11. Find the sum of the solutions of the following system of equations: $\begin{aligned} x &= 2z+14 \\ y &= 3z+15 \\ 2x-3 &= 3y-z \end{aligned}$

A. 9 B. -1 C. -9 D. 1 E. NOTA

12. State the sum for the solutions for: $\sqrt{3x-2} = x-2$

A. $\frac{3 \pm i\sqrt{15}}{2}$ B. 5 C. 7 D. -3 E. NOTA

13. Find the solutions for $10x^3 - 7x^2 - 12x = 0$

A. $0, -\frac{5}{4}, \frac{2}{3}$ B. $\frac{5}{4}, -\frac{2}{3}$ C. $\frac{4}{5}, -\frac{3}{2}$ D. $0, -\frac{4}{5}, \frac{3}{2}$ E. NOTA

14. Find $\left(2n^3\right)^2$ if $(n+2)(n+3) = (4-n)(12-n)$

A. 144 B. 128 C. 256 D. 784 E. NOTA

15. The denominator of a fraction is 3 more than the numerator. If 25 is added to each, the resulting fraction is equivalent to 0.9. Find the original fraction.

A. $\frac{22}{3}$ B. $\frac{27}{29}$ C. $\frac{16}{15}$ D. $\frac{2}{5}$ E. NOTA

16. Simplify: $\frac{4x^2-21x-18}{2x^2-72} \div \frac{12x^2-7x-12}{x^2+7x+6}$

A. $\frac{x+1}{2(3x-4)}$ B. $\frac{x+1}{2(3x+4)}$ C. $\frac{2(x+1)}{4x-3}$ D. $\frac{2(3x-4)}{x+1}$ E. NOTA

17. $\frac{1}{(a-b)(a-c)} + \frac{1}{(b-c)(b-a)} + \frac{1}{(c-a)(c-b)} = ?$

A. $\frac{2}{(a-b)(b-c)}$ B. 1 C. 0 D. $\frac{-2}{(b-c)(a-c)}$ E. NOTA

18. Find the solution of the system of equations: $\begin{aligned} \frac{3}{4}x + \frac{1}{2}y &= \frac{11}{12} \\ \frac{1}{2}x - \frac{1}{4}y &= \frac{1}{8} \end{aligned}$

A. $\left(\frac{2}{3}, \frac{5}{6}\right)$ B. $\left(\frac{25}{42}, -\frac{17}{21}\right)$ C. $\left(\frac{2}{3}, -\frac{5}{6}\right)$ D. $\left(\frac{25}{42}, \frac{17}{21}\right)$ E. NOTA

19. Simplify: $\frac{3\sqrt{2}-\sqrt{3}}{\sqrt{8}} - \sqrt{\frac{3}{2}}$

A. $\frac{6-3\sqrt{6}}{4}$ B. $\frac{6-\sqrt{6}-\sqrt{3}}{4}$ C. $\frac{\sqrt{3}-6}{2}$ D. $\frac{4-3\sqrt{6}}{8}$ E. NOTA

20. Five years ago, Suzie was 50 years older than Tom was. Fifteen years from now, Suzie will be 3 times as old as Tom will be. What is the sum of their ages now?

A. 55 B. 60 C. 65 D. 70 E. NOTA

21. Solve $|2y-1| \geq y+4$

A. $y \leq \frac{-5}{3}$ or $y \geq 5$ B. $\frac{-y-3}{2} \leq y \leq \frac{y+5}{2}$ C. $y \leq -1$ or $y \geq 5$ D. $\frac{y+3}{2} \geq y \geq \frac{y+5}{2}$ E. NOTA

22. Factor completely: $x^4-(x-1)^4$

A. $[x^2-x-1](2x^2+1)$ B. $(2x^2-2x+1)(2x-1)$ C. -1 D. $(2x^2+2x-1)(2x+1)$ E. NOTA

23. Simplify: $\dfrac{\frac{c}{d}-3+\frac{2d}{c}}{\frac{4d}{c}-\frac{c}{d}}$

A. $\dfrac{c^2-3cd+2d^2}{4dc-c^2}$ B. $\dfrac{d-c}{2d+c}$ C. $\dfrac{(c-2d)(c-d)}{2d+c}$ D. $\dfrac{c-d}{2d+c}$ E. NOTA

24. Solve for y: $(y-13)^2+(y+13)^2=4712$

A. $\pm 27\sqrt{3}$ B. $\pm 17\sqrt{6}$ C. $\pm 2\sqrt{589}$ D. $\pm 5\sqrt{101}$ E. NOTA

25. A gardener has 46 feet of fencing to be used to enclose a rectangular garden that has a border 2 feet wide surrounding it. The length of the garden is twice its width, what is the area of the garden in square feet?

A. 50 B. 60 C. 75 D. 128 E. NOTA

TB1 Expand $(5x+2)^3$

TB2 Factor completely: $2x^2+x-2-x^3$

TB3 The area of a rectangle is 204 in². The perimeter of the same rectangle is 58 in². Find the length of its diagonal.