2006 Hoover HS Math Tournament
Algebra I Written Test

1. Solve the inequality for y: $|2y-1| \geq y+4$

   A. $-5 \leq y \leq 1$ B. $y \geq 5$ *or* $y \leq -1$ C. $-1 \leq y \leq 5$
   D. $y \geq 5$ E. NOTA

2. Solve for x: $\frac{\sqrt{3}}{18}x - \frac{5}{4} + \frac{1}{8}x = 0$

   A. $\frac{90+\sqrt{3}}{-2}$ B. $\frac{90+\sqrt{3}}{2}$ C. $\frac{270-120\sqrt{3}}{11}$ D. $\frac{-360-810\sqrt{3}}{227}$ E. NOTA

3. The points (3, -4) and (-2, a) lie on a line with the slope $-\frac{3}{5}$. Find the value of a.

   A. 7 B. -1 C. $-\frac{1}{3}$ D. -7 E. NOTA

4. $-\frac{3}{4}$ and $\frac{5}{6}$ are solutions for a quadratic equation. Write the equation in standard form.

   A. $24x^2-38x+15=0$ B. $24x^2+38x+15=0$ C. $24x^2+2x-15=0$
   D. $24x^2-2x-15=0$ E. NOTA

5. Write as one fraction: $1+\cfrac{1}{1+\cfrac{1}{2+\cfrac{1}{2+\frac{1}{3}}}}$

   A. $\frac{41}{24}$ B. $\frac{35}{3}$ C. $\frac{19}{3}$ D. $\frac{31}{7}$ E. NOTA

6. Factor completely: $\left(a^2-9\right)^2 - (3-a)^2$

   A. $(a-3)^2(a-2)(a+4)$ B. $(a+3)^2(a-2)(a+4)$ C. $(a-3)^2(a+2)(a+4)$
   D. $(a-3)(a+3)(a+2)(a+4)$ E. NOTA

7. Simplify. $[8(x-2)+9x] - \{7[3(2y-5) - (8y+7)] + 9\}$

   A. $17x-34y+87$ B. $5x+34y-87$ C. $15x-14y-129$
   D. $17x+14y+129$ E. NOTA

8. Evaluate. $(x-y)(x^{y-x}-y^{x-y})$ when $x=1$ and $y=-2$

   A. -21 B. 23 C. 27 D. 24 E. NOTA

9. What is the 30th term of the sequence 1, 2, 5, 10, 17, 26, ….

A. 962 B. 901 C. 842 D. 785 E. NOTA

10. Simplify: $\dfrac{\dfrac{1}{b}+\dfrac{1+\frac{1}{b}}{a}}{\dfrac{1}{a}+\dfrac{1}{b}}$

A. 1 B. $\dfrac{2+a}{2}$ C. $\dfrac{a+b+1}{a+b}$ D. $\dfrac{a+2b}{a+b}$ E. NOTA

11. A photo is twice as long as it is wide. It is mounted in a frame 2 cm wide. If the area of the frame is 112 cm², find the area of the photo.

A. 16 cm² B. 8 cm² C. 128 cm² D. 240 cm² E. NOTA

12. Given $(x-y)^2=15$ and $xy=3$, find x^2+y^2

A. 3 B. 7 C. 9 D. 21 E. NOTA

13. Solve: $\sqrt{3x-5}=\sqrt{x-2}\ +\ 1$

A. $\dfrac{-3\pm i\sqrt{15}}{2}$ B. $-1, 6$ C. 2 D. 2, 3 E. NOTA

14. Simplify. $\left(\dfrac{-4x^4y^{-2}}{5x^{-1}y^4}\right)^{-4}$

A. $\dfrac{625y^{24}}{256x^{20}}$ B. $\dfrac{-625y^{10}}{256x^9}$ C. $\dfrac{5y^2}{4x^3}$ D. $\dfrac{256y^2}{625x^3}$ E. NOTA

15. If $h(x)=\dfrac{3x^3+81}{5x^2+35x+60}$ and $g(x)=\dfrac{45-5x^2}{x^2+7x+12}$, find $\dfrac{h(x)}{g(x)}$

A. $\dfrac{3(x^2-3x+9)}{25(x-3)}$ B. $\dfrac{3(x^2-3x+9)}{-25(x-3)}$ C. $\dfrac{-3(x^2+3x-9)}{5(x-3)}$ D. $\dfrac{3(x^2-3x+9)}{5(x-3)}$ E. NOTA

16. Find the number halfway between $\dfrac{11}{12}$ and $\dfrac{10}{11}$

A. $\dfrac{241}{132}$ B. $\dfrac{241}{176}$ C. $\dfrac{241}{264}$ D. $\dfrac{110}{131}$ E. NOTA

17. Simplify. $\dfrac{a^2-b^2}{a^2-a-2} \bullet \dfrac{a^2-2a-3}{b-a} \div \dfrac{a^2+ab}{a^2-2a}$

A. $\dfrac{(a-b)(a-3)}{b-a}$ B. a – 3 C. $\dfrac{(a+b)^2(3-a)}{(a-2)^2}$ D. $3-a$ E. NOTA

18. Solve for v: $s = vt - \frac{1}{2}gt^2$

A. $s+\frac{1}{2}gt$ B. $\dfrac{2s+gt^2}{t}$ C. $\dfrac{2s+gt^2}{2t}$ D. $s+2gt^2$ E. NOTA

19. Given $f(x)=\dfrac{1-x}{x}$, find $\dfrac{f(x+h)-f(x)}{h}$

A. $\dfrac{-h}{x^2+xh}$ B. $\dfrac{1}{x(x+h)}$ C. $\dfrac{-2x^2-2xh-x-h}{x(x+h)}$ D. $\dfrac{-1}{x(x+h)}$ E. NOTA

20. Solve: $6x^4-19x^2+10=0$

A. $\dfrac{\pm\sqrt{5}}{2}, \dfrac{\pm\sqrt{2}}{3}$ B. $\pm\dfrac{5}{4}$ C. $\pm\dfrac{\sqrt{10}}{2}, \pm\dfrac{\sqrt{6}}{3}$ D. $\dfrac{4}{6}, \dfrac{25}{4}$ E. NOTA

21. Given, $f(x)=6x^2-13x-28$, A = sum of the roots of $f(x)=0$, B = product of the roots of $f(x)=0$. Find $(A+B)^2$.

A. $\dfrac{169}{36}$ B. $\dfrac{225}{36}$ C. $\dfrac{25}{4}$ D. $\dfrac{25}{16}$ E. NOTA

22. A sales representative must visit 8 cities exactly once on her route. How many possible routes can she take?

A. 16 B. 40,320 C. 64 D. 20,160 E. NOTA

23. Solve for x: $3x(x^2-4)=12(x^2-4)$

A. -2, 2, 4 B. 4 C. 2, 4 D. 2 E. NOTA

24. The sum of three numbers is 5. The first number minus the second plus the third is 1. The first minus the third is 3 more than the second. Find the product of the three numbers.

A. 5 B. -20 C. -8 D. -32 E. NOTA

25. Find A and B that satisfy the equation $\dfrac{x+4}{x^2-x-2}=\dfrac{A}{x-2}+\dfrac{B}{x+1}$

A. $A=0, B=0$ B. $A=4, B=0$ C. $A=2, B=2$
D. $A=2, B=-1$ E. NOTA

TB1. Find the sum in base 5. $211_3+301_4=$ _____$_5$

TB2. Simplify: $\sqrt{a^{-2}+b^{-2}}$

TB3. Write an equation of the line, in slope intercept form, containing the given point and perpendicular to the given line. $\left(-\frac{7}{3},\frac{5}{4}\right)$; $5x-6y=2$