2005 Hoover High School Math Tournament
Algebra I Written Test
March 5, 2005

1. Solve the following inequality: $2x-9|-8 \le 19$

A. $x \le 18$ B. $9 \le x \le 18$ C. $-9 \le x \le 18$ D. $-16 \le x \le 18$ E. None of these

2. Solve the system of equations: $\frac{1}{2}x - \frac{3}{4}y = -4$
$\frac{3}{4}x + \frac{7}{8}y = 10$

A. (14, 4) B. (4, 8) C. (−4, 8) D. (8, 4) E. None of these

3. $h(x) = \frac{x^2+5x-6}{x+3}$, *find* $\frac{h(-2)+h(2)}{h(-1)}$

A. $\frac{52}{5}$ B. $\frac{-52}{5}$ C. $\frac{-52}{25}$ D. $\frac{52}{25}$ E. None of these

4. Factor Completely: 21 + 3x +9z - 7y – xy – 3yz

A. (7 + x +3z)(3 – y) B. (7 + 3y)(x – 3 + z) C.(x + 7 - 3z)(3 - y)

D. (y + 3)(x - 7 +3z) E. None of these

5. Solve for x: $9+\sqrt{4x+8}=11+x$

A. −1 B. −2 C. 2 D. 2 , −2 E. None of these

6. Simplify: $343^{\frac{-1}{3}}+16^{\frac{-3}{4}}$

A. $\frac{2}{11}$ B. $\frac{9}{14}$ C. $\frac{11}{28}$ D. $\frac{2}{9}$ E. None of these

7. Simplify: $x^{\frac{1}{2}} \cdot x^{\frac{3}{4}} \cdot x^{\frac{1}{5}}$

A. $x^{\frac{3}{5}}$ B. $x^{\frac{5}{11}}$ C. $x^{\frac{29}{20}}$ D. $x^{\frac{4}{5}}$ E. None of these

8. State the range of the graph $y=\frac{1}{x^2}$.

A. $y>0$ B. y is any real number except 0 C. $y<0$ D. $y\geq 0$ E. None of these

9. Jimmy is making a rectangular garden. He wants it to be $x-11$ yards long and $x-1$ yards wide. He needs a walkway 3 yards wide around the garden. If the total area of both the garden and the walkway is 119 square yards, solve for x.

A. 12 yds. B. 28 yds. C. 10 yds. D. 15 yds. E. None of these

10. Write $x = 0.1\overline{4}$ in fraction form.

A. $\frac{13}{90}$ B. $\frac{13}{40}$ C. $\frac{14}{100}$ D. $\frac{7}{50}$ E. None of these

11. A^2 varies directly as B and inversely as C^3. If A = 8 when B = 400 and C = 5, then what is B when A = 5 and C = 4.

A. 20 B. 130 C. 100 D. 80 E. None of these

12. Given the equation of the line 3x - 5y = 17, find the sum of its intercepts.

A. $\frac{34}{15}$ B. $\frac{17}{3}$ C. $\frac{-17}{5}$ D. $\frac{136}{15}$ E. None of these

13. Write the equation of a line in standard form that is perpendicular to 7x + 19y = 17 and passes through the point $(-3, \frac{5}{3})$.

A. 21x + 57y = 32 B. 57x 21y = -206 C. 57x – 21y = 206

D. 57x - 21y = 136 E. None of these

14. Simplify: $\sqrt{1372} + \sqrt{5819} + \sqrt{2023} + \sqrt{10933}$

A. $21\sqrt{7} + 23\sqrt{11} + 29\sqrt{13}$ B. $3\sqrt{7} + 52\sqrt{24}$ C. $31\sqrt{7} + 23\sqrt{11} + 29\sqrt{13}$

D. $18\sqrt{2} + 16$ E. None of these

15. James threw a ball off the top of a 1024 ft tall building. If the ball bounces halfway up each time, how far would it have traveled when it hit the ground for the fifth time?

A. 2944 ft B. 32 ft. C. 2976 ft. D. 3008 ft. E. None of these

16. Solve for a: $\frac{4a^2b}{3cd^3}=\frac{2a^3}{7c^2+d}$

A. $\frac{7bc^2}{3cd^3}$ B. $\frac{2b}{3cd^2}$ C. $\frac{14c^2+2d}{3b^3cd}$ D. $\frac{14bc^2+2bd}{3cd^3}$ E. None of these

17. Factor completely: $24h^5k^3+6h^4k^5-9h^3k^7$.

A. $3h^2k^2(2h^2k-hk^3)(4h+3k^2)$ B. $3h^3k^3(8h^2+2hk^2-3k^4)$
C. $3h^3k^3(2k+k^2)(4h-3k^2)$ D. $3h^3k^3(2h-k^2)(4h+3k^2)$ E. None of these

18. Simplify: $\frac{\sqrt{2527}+\sqrt{4375}}{\sqrt{7}}$

A. 24 B. $\frac{44\sqrt{7}}{7}$ C. 44 D. 308 E. None of these

19. A train leaves a station and travels north at 75 km/hr. Two hours later, a second train leaves on a parallel track and travels north at 125 km/hr. How far from the station will they meet?

A. 250 km B. 375 km C. 175 km D. 325 km E. None of these

20. Joshua earned $264 last week. He worked a total of 44 hours, part at an hourly rate of $5.50 and part of an hourly rate of $8.25. How much money did he earn at the $8.25 rate?

A. $8 B. $66 C. $36 D. $198 E. None of these

21. The principal plans to randomly select a committee of three people from three boys and five girls. What is the probability that the committee will have no boys?

A. $\frac{3}{8}$ B. $\frac{13}{28}$ C. $\frac{3}{28}$ D. $\frac{5}{28}$ E. None of these

22. Find the ratio of the interior diagonal of a cube with side 16 feet long to the interior diagonal of a rectangular prism with length 4 feet, width 5 feet and height 22 feet.

A. $\frac{16\sqrt{7}}{35}$ B. $\frac{3\sqrt{3}}{440}$ C. $\frac{2\sqrt{2}}{509}$ D. $\frac{64}{441}$ E. None of these

23. Simplify: $\frac{x+12}{4x-16} - \frac{x^2+8x+16}{2x^2-32}$

A. $\frac{-x+5}{8(x^2-2x-2)}$ B. -4 C. $\frac{x^2-48x+64}{2x^2-16}$ D. $\frac{-1}{4}$ E. None of these

24. The time that a traffic light remains yellow is 1.2 seconds longer than 0.05 times the speed limit. What is the yellow time for a traffic light on a street with a speed limit of 45 mph?

A. 1.05 sec B. 10.5 sec. C. 3.45 sec. D. 0 .345 sec. E. None of these

25. When rolling two dice, what is the probability that the sum of the die is six?

A. $\frac{5}{36}$ B. $\frac{1}{6}$ C. $\frac{25}{36}$ D. 0.5 E. None of these

TIEBREAKERS

TB1
When $(3x + y)^6$ is expanded, what is the coefficient for the term that contains x^4y^2 ?

TB2
Find all the solutions for $(x^2 - 4)^2 = 36$

TB3
Simplify using rational exponents:

$$\frac{x^{\frac{2}{3}} x^{\frac{1}{5}}}{\sqrt[7]{x^9}}$$