

# 2003 Washington State Math Championship

Unless a particular problem directs otherwise, give an exact answer or one rounded to the nearest thousandth.

## Individual Test - Grade 8

The first 10 problems are multiple choice and will count toward your team score. Answer by putting the appropriate letter in the blank on the answer sheet.

1. On a compact disk each bit of information is  $5 \times 10^7$  meters long. The entire track of all these bits on the CD is 5 kilometers long. The number of bits on the entire track is closest to

a. 25      b.  $10^4$       c.  $10^{10}$       d.  $10^{21}$       e.  $10^{25}$

2. Congruent copies of which of the following can not cover a flat surface without gaps or overlaps?

a. rhombus      b. trapezoid      c. convex quadrilateral  
d. non-convex quadrilateral      e. all can cover

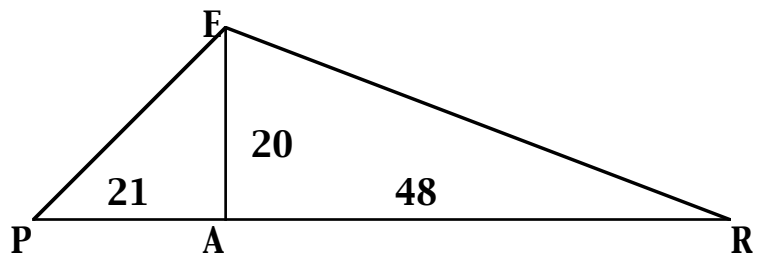
3. Two dice are rolled. What is the probability that one die is less than 4 and the other is more than 4?

a.  $\frac{2}{3}$       b.  $\frac{1}{2}$       c.  $\frac{1}{3}$       d.  $\frac{1}{4}$       e.  $\frac{1}{6}$

4. What is the smallest number boards 2 units || 3 units || 8 units that can be stacked into the shape of a cube?

a. 576      b. 288      c. 48      d. 24      e. 12

5. Which choice is nearest to the perimeter of  $\triangle PER$ ?  $\overline{EA}$  is an altitude of  $\triangle PER$ .

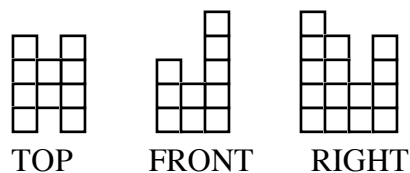


a. 100      b. 125      c. 150      d. 175      e. 200

6. If  $2^a 3^b 5^c = 360,000$ , then  $a + b + c = ?$

a. 12      b. 10      c. 9      d. 8      e. 12000

7. Three views are given of the same block structure. The highest part of the structure is in which corner?



- a. left back                      b. right back  
c. left front                      d. right front
8. Which of the following equations is not equivalent to the others?

a.  $\frac{x}{3} + \frac{4}{3} = 8$

b.  $0.3x \div 14 = 8$

c.  $\frac{5x}{6} + \frac{1}{3} = 17$

d.  $0.003x \div 0.006 = 0.054$     e.  $\frac{x}{3} + \frac{2}{3} = 4$

9. Tom has grades of 88, 93, 98, and 84 on the first 4 tests. What is the minimum score he needs on the fifth test in order to have an average of at least 88?

- a. 77                      b. 87                      c. 88                      d. 90                      e. 96

10. Sinbad has 5 white signal flags and 5 black signal flags. He can fly only 5 flags at a time. How many different 5-flag messages can he send?

- a. 5                      b. 10                      c. 25                      d. 32                      e. 50

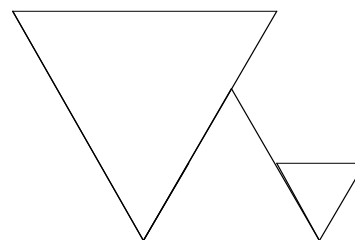
*Problems 11-30 will count toward your individual score but not your team score.*

11. The approximate radius of the meteorite that caused the extinction of the dinosaurs 65 million years ago was 3.1 miles. Assuming the meteorite was spherical, to the nearest cubic mile what was its volume?

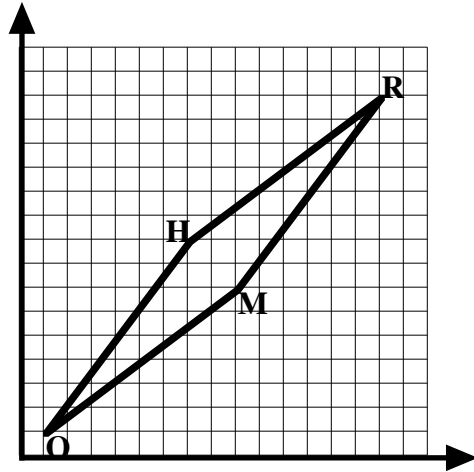
12. A speed of 60 miles per hour is equivalent to 88 feet per second. If Boris traveled 75 miles in 3 hours and 45 minutes, to the nearest tenth what was his average speed in feet per second?

13. Evaluate:  $\frac{1}{3 \cdot \frac{8}{4+2}} \div \frac{5 \div 6}{9 \div 7}$

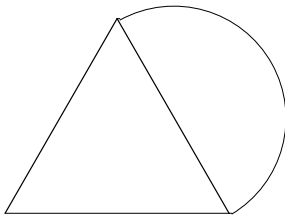
14. Three equilateral triangles are pictured. The smallest has side lengths that are  $\frac{1}{3}$  of the largest, and the other triangle has side lengths that are  $\frac{2}{3}$  of the largest. If the largest triangle has side lengths of 12, what is the perimeter of the entire figure?



15. In the previous problem the area of the smallest triangle is  $4\sqrt{3}$ . What is the area of the entire figure?
16. A badger weighs the same as 4 marmots, and 3 marmots weigh the same as 5 weasels. So that we can replace all six of the stinking badgers, how many weasels weigh the same as 6 badgers?
17. What is the area of rhombus  $RHOM$ ?  
[Assume that each small square is one unit on a side.]



18. If  $RHOM$  is rotated  $90^\circ$  clockwise around point  $R$ , what will be the new coordinates of point  $O$ ?
19. If  $52a + 68b = 156$ , then what does  $39a + 51b$  equal?
20. If 75 cents added to Kamal's hourly wage increases it by 15%, what was his original hourly wage?
21. Using a standard 52 card deck, what is the probability of drawing a queen or a diamond or a club? [Answer as a reduced fraction.]
22. The combined perimeter of 2 different sized squares is 1200. If the area of the larger square is 16 times the smaller, what is the area of the smaller square?
23. If the area of the semicircle is  $\frac{25\pi}{2}$ , to the nearest tenth what is the perimeter of the entire figure?



24. In the first 25% of the season the Crows won 25% of their games. To the nearest tenth of a percent, what percentage of their remaining games must they win to have won at least 60% of their games by season's end.

25. How many positive integers values of  $x$  are there such that  $\frac{72}{x-5}$  is an integer?

26. What is the perimeter of the pentagon formed by these graphs?

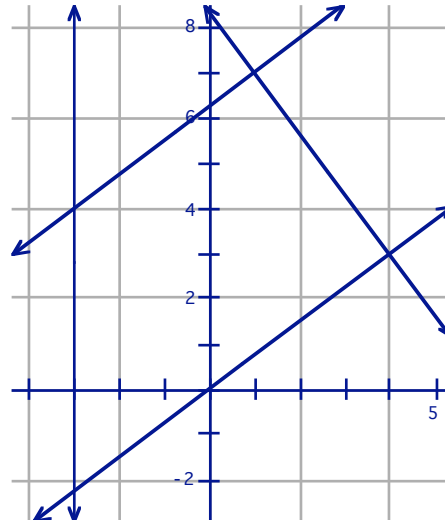
$$x = -3$$

$$y = 0$$

$$y = \frac{3}{4}x + \frac{25}{4}$$

$$y = -\frac{4}{3}x + \frac{25}{3}$$

$$y = \frac{3}{4}x$$



27. Ben paid \$1238.08 for his computer including 7.8% sales tax. To the nearest cent, what was the price of computer without tax?

28. How many 4 digit whole numbers are possible if the first digit must be odd, the second digit must be prime, the third digit must be even and prime or odd and composite, and the fourth digit even?

29. What is the area of the region bounded by these graphs?

$$\begin{aligned} x + y &= 4 \\ -2x + y &= 1 \\ x &= 5 \end{aligned}$$

30. Two different sized cubes have a combined surface area of 50,544. If the volume of the larger cube is 125 times that of the smaller, what is the volume of the larger cube?