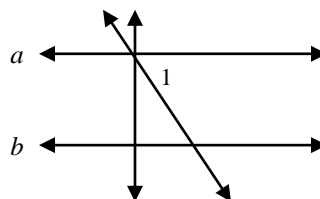


2005 Pizitz Mathematics Tournament  
Eighth Grade Written Test

1. If  $x$  is nine less than seven and  $y$  is nine less seven, what is  $x$  less  $y$ ?
- A. 4                      B. 0                      C.  $-4$                       D. 2                      E. NOTA
2. Solve:  $2(x + 7) = 13 - (x - 4)$
- A.  $-\frac{5}{3}$                       B.  $\frac{10}{3}$                       C.  $\frac{16}{3}$                       D. 1                      E. NOTA
3. What is the reciprocal of the sum of the reciprocals of the first five natural numbers?
- A.  $\frac{60}{77}$                       B.  $\frac{60}{137}$                       C.  $\frac{12}{25}$                       D.  $\frac{25}{12}$                       E. NOTA
4. Simplify:  $-2 \begin{bmatrix} 6 & -4 \\ -2 & \frac{5}{6} \end{bmatrix} + \frac{3}{4} \begin{bmatrix} -8 & \frac{2}{3} \\ -\frac{4}{3} & 2 \end{bmatrix}$ .
- A.  $\begin{bmatrix} -18 & 8\frac{1}{2} \\ 3 & -\frac{1}{6} \end{bmatrix}$                       B.  $\begin{bmatrix} -18 & 8\frac{1}{2} \\ 3 & -\frac{1}{3} \end{bmatrix}$                       C.  $\begin{bmatrix} -6 & 8\frac{1}{2} \\ 3 & -\frac{1}{6} \end{bmatrix}$                       D.  $\begin{bmatrix} -6 & 8\frac{1}{2} \\ 3 & -\frac{1}{3} \end{bmatrix}$                       E. NOTA
5. Find the average of the mean, median, mode, and range for 8, 1, 6, 11, 6, 6, 4.
- A. 6.5                      B. 7                      C. 6.8                      D. 7.25                      E. NOTA
6.  $A = \{0, 1, 2, 4, 8, 9\}$ ,  $B = \{1, 3, 6, 7, 9\}$ ,  $C = \{0, 2, 4, 6, 10\}$ , and  $D = \{9\}$ .  
Find the set of  $[(A \cup B) \cap C] \cup D$ .
- A.  $\{9\}$                       C.  $\{0, 2, 4, 6, 9\}$   
B.  $\{0, 1, 2, 3, 4, 6, 7, 8, 9, 10\}$                       D.  $\{ \}$                       E. NOTA
7. An 80% decrease followed by a 100% increase is the same as a 50% decrease followed by what other percent decrease?
- A. 130%                      B. 80%                      C. 75%                      D. 20%                      E. NOTA
8. Find the ratio of the surface area of a 3 cm by 4 cm by 6 cm rectangular prism to the surface area of a 4 cm by 7 cm by 5 cm rectangular prism.
- A. 54:83                      B. 83:54                      C. 18:35                      D. 35:18                      E. NOTA
9. Shoes were on sale at 15% off at Harris Shoes. Gabe paid \$54, including an 8% sales tax, for a pair of shoes. What was the sale price?
- A. \$49.68                      B. \$42.50                      C. \$46                      D. \$58.82                      E. NOTA
10. Solve for  $x$ :  $2^{2x+4} \cdot 2^{4x} = 2^{4x-8}$ .
- A. 8                      B. -6                      C. -8                      D. -4                      E. NOTA

11. Find the perimeter of the right triangle, given that  $a \parallel b$ , the shortest side is 2, and  $m\angle 1 = 60$ .



- A. 12                      C.  $6 + 2\sqrt{3}$
- B.  $12 + \sqrt{3}$               D.  $6 + 3\sqrt{2}$               E. NOTA
12. Find the sum of the coefficients in the expansion of  $(3x + 4)^3$ .
- A. 343                      B. 279                      C. 307                      D. 289                      E. NOTA
13. What is the sum of the solutions for  $3|2x - 7| - 9 = 15$ ?
- A. 9                      B. 7                      C. 8                      D. 6                      E. NOTA
14. Semeon either jogs the 5 miles to school in 30 min. or rides his bike in 20 min. What is his average speed going to school?

- A. 11 mph                      B. 25 mph                      C. 12 mph                      D. 12.5 mph                      E. NOTA

15. Convert  $101110_2$  to base 3.

- A.  $112_3$                       B.  $1021_3$                       C.  $46_3$                       D.  $1201_3$                       E. NOTA

16. Simplify:  $5\sqrt{\frac{3}{2}} + 2\sqrt{6}$ .

- A.  $\frac{9\sqrt{6}}{2}$                       B.  $\frac{9\sqrt{6}}{6}$                       C.  $\frac{13\sqrt{6}}{4}$                       D.  $\frac{13\sqrt{3}}{2}$                       E. NOTA

17. At Pizitz, 48 students take math team, 20 are in Scholars Bowl and 78 take band. 6 students are in both band and Scholars Bowl, 8 take both Scholars Bowl and math team, 21 take both math team and band, and 3 take all three activities. What percent of math team students only participate in math team?

- A. 50%                      B.  $37\frac{1}{2}\%$                       C. 25%                      D.  $33\frac{1}{3}\%$                       E. NOTA

18. Wayne left track practice at 4:52. It took him 6 min. to get home and  $\frac{2}{5}$  hr. to eat a snack. Before starting his math team homework, he glanced at his watch and, of course, calculated the measure of the smallest angle formed by the hour and minute hands. What was the measure?

- A.  $29^\circ$                       B.  $32^\circ$                       C.  $27^\circ$                       D.  $31^\circ$                       E. NOTA

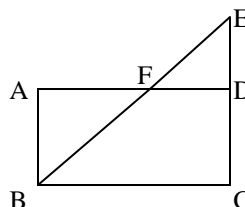
19. The expressions  $a + 3$ ,  $2b$ ,  $2c + 5$ , and  $a + c$  are equal in value. Find the value of  $b$ .

- A.  $3\frac{3}{4}$                       B.  $-4$                       C. 5.5                      D.  $-1.5$                       E. NOTA

20. The difference between the areas of  $\triangle AFB$  and  $\triangle EFD$  is 5.

In rectangle ABCD,  $\overline{AB} = 4$  and  $\overline{BC} = 9$ .

What is the area of  $\triangle BEC$ ?



- A. 27                      B. 31                      C. 91                      D. 25                      E. NOTA
21. While concocting an acid solution, Mingchun accidentally poured 15 mL of pure acid into a test tube

containing a 30% acid solution. If the resulting solution is 35% acid, how many millimeters of the 30% solution were in the test tube?

- A. 23 mL                      B. 195 mL                      C. 230 mL                      D. 19.5 mL                      E. NOTA

22. Students need a 4-character password to log onto school computers. The first two characters are letters of the alphabet and may not be repeated. The last 2 are digits from 1 through 9 and can be repeated. How many different passwords are possible?

- A. 52,650                      B. 54,756                      C. 65,000                      D. 58,500                      E. NOTA

23. A is the midpoint for (6, 7) and (2, -1). B is the midpoint for (-4, 5) and (-2, -1). What is the distance between A and B?

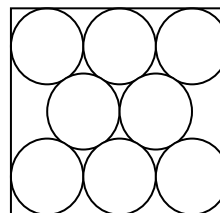
- A.  $\sqrt{26}$                       B. 7                      C.  $4\sqrt{3}$                       D.  $5\sqrt{2}$                       E. NOTA

24. Which of the following has the greatest number in its answer?

- I. The surface area of a sphere with a radius of 5 (use 3.14 for  $\pi$ )  
 II. The volume of a triangular pyramid with a base area of 24 sq. units and a height of 30 units  
 III. The y-intercept of a line with the equation  $\frac{1}{12}x + \frac{1}{16}y = 20$   
 IV. The LCM for 14, 21, and 35

- A. I                      B. II                      C. III                      D. IV                      E. NOTA

25. Eight circles are tightly packed inside a rectangle as shown. The diameter of each circle is 4 in. What is the area of the rectangle?



- A.  $24\sqrt{2} + 24$                       C.  $48\sqrt{2} + 48$   
 B.  $24\sqrt{3} + 24$                       D.  $48\sqrt{3} + 48$                       E. NOTA

**Tiebreakers** Write the answer to each tiebreaker on the back of the scantron.

TB1. A 45-45-90 triangle and a 30-60-90 triangle share a hypotenuse. A leg of the isosceles triangle is 6 in. What is the measure of the longest leg in the 30-60-90 triangle?

TB2. Write the simplified improper fraction for  $4.\overline{848}$ .

TB3. Solve:  $3x^2 - 12 = 15$ .