

ALGEBRA I INDIVIDUAL TEST

REGIONAL MATHEMATICS COMPETITION - MARCH 9, 1991

1. **SIMPLIFY:** $(10 \frac{1}{2} + 3)3 \div \frac{1}{3} - 12 \div \frac{3}{4}$
- a. -1 b. 7 c. 63 d. 191 e. NOTA
2. The following statement is an illustration of which property of the real numbers:
- $$2[a + (3 + a)] = 2[a + (a + 3)]$$
- a. commutative for multiplication
b. distributive
c. associative for addition
d. reflexive property of equality
e. NOTA
3. Name the sum of the one digit divisors of 29376648.
- a. 33 b. 32 c. 39 d. 40 e. NOTA
4. The ratio of boys to girls in a certain high school is six to five. How many are boys if the school population is 2200 students?
- a. 1200 b. 1100 c. 1000 d. 1180 e. NOTA

5. If $a = \frac{b(x - c)}{2d}$, solve for x .

a. $\frac{2ad + bc}{b}$

b. $bc + 2ad$

c. $\frac{bc - ab}{2d}$

d. $\frac{2ad - bc}{b}$

e. NOTA

6. 16 is .5% of what number?

a. 8 b. 320 c. 800 d. 3200 e. NOTA

7. Solve for x : $|x - 6| < 2$

a. $x = 8$ or $x = 4$

b. $x < 8$ or $x > 4$

c. $4 < x < 8$

d. $-8 < x < -4$

e. NOTA

8. SIMPLIFY: $(3x - 2)^2 - (3x + 2)^2$

- a. 8 b. 0 c. $-24x + 8$ d. $-24x$ e. NOTA

9. If $3a + 2b = 5$
And $5a + 3b = 7$
Find the sum of $a + b$.

- a. 2 b. 3 c. 4 d. 5 e. NOTA

10. Solve for x . $(4^2)(2^{x+2}) = 2^{10}$

- a. {3} b. {4} c. {1/2} d. {6} e. NOTA

11. Name the slope of the line through the points $(-2,3)(4,-9)$

- a. $-1/2$ b. -2 c. 1 d. $1/2$ e. NOTA

12. $|3x - 2| = 8$ Name the sum of the solutions.

- a. $10/3$ b. 2 c. 0 d. $4/3$ e. NOTA

13. If the GCF of 56 and 238 is 14, what is the LCM?

- a. 13328 b. 952 c. 784 d. 3332 e. NOTA

14. If $f(x) = 3x^3 + 2x^2$, find $f(-4)$

- a. -112 b. -4 c. 222 d. -160 e. NOTA

15. Name the distance between $(-2,4)$ and $(4,-4)$.

- a. 2 b. 14 c. $3\sqrt{10}$ d. 10 e. NOTA

16. If set A has 16 elements
And the intersection of A and B has 12 elements
And the union of A and B has 22 elements,
Then how many elements are there in set B?
- a. 10 b. 14 c. 18 d. 20 e. NOTA
17. Write an equation (in the form $Ax + By + C = 0$ where
 $A, B, C \in \text{integers}, A > 0$) for a line that is the
perpendicular bisector of the line segments whose end
points are $(3,-2)$ and $(-3,6)$. Name the sum of $A + B + C$.
- a. 7 b. -7 c. 1 d. 6 e. NOTA
18. If $\sqrt{x} = 1/3$ then find the value of $\frac{\frac{3}{x}}{\frac{x}{3}}$
- a. 81 b. 1 c. 729 d. 27 e. NOTA
19. How many milliliters of water must be added to 120 ml of
62 1/2% solution to dilute it to a 37 1/2% acid solution?
- a. 75 b. 45 c. 60 d. 80 e. NOTA

20. SIMPLIFY:

$$\frac{x}{x+3} + \frac{x}{x^2-9}$$

$$\frac{1}{x-3} + \frac{1}{x+3}$$

a. $\frac{x}{x+3}$

b. $\frac{1}{x-3}$

c. $\frac{x+3}{x-3}$

d. $\frac{x-3}{x+3}$

e. NOTA

21. Joe does $\frac{2}{3}$ of a job in 4 hours. Kara can do $\frac{3}{4}$ of what remains to be done in 1 hour. Gloria can do what then remains to be done in 20 mins. How long would it take to do the job if the three worked together?

a. $\frac{3}{2}$ hrs. b. 4 hrs. c. $\frac{25}{12}$ hrs. d. $\frac{5}{3}$ hrs. e. NOTA

22. Find the value of k that will produce a zero remainder for the following division problem.

$$(2x^3 - 10x^2 + kx + 66) \div (x - 3)$$

a. -10 b. -22 c. -12 d. -70 e. NOTA

23. If $4x^3 - 36x = 0$, name the sum of the solutions.

a. $\frac{2}{3}$ b. 0 c. 6 d. 3 e. NOTA

24. Factor $20x^2 - 9x - 18$ into the form $(Ax + B)(Cx + D)$ and then name the sum of $A + B + C + D$.

- a. 18 b. 6 c. 12 d. 15 e. NOTA

25. SIMPLIFY: $\frac{x^2 + 5x + 6}{x^2 + 5x + 4} \cdot \frac{x + 1}{x - 1} \div \frac{x^2 + x - 6}{x^2 + 3x - 4}$

a. 1

b. $\frac{x + 2}{x - 2}$

c. $\frac{x - 1}{x + 2}$

d. $\frac{x + 2}{x - 1}$

e. NOTA

26. The sum of the squares of two negative odd integers is 74. Name the larger of the two integers.

- a. -7 b. 5 c. -5 d. 7 e. NOTA

27. Compute the sum of $3\sqrt{8} + 2\sqrt{72} - 5\sqrt{18}$

- a. $9\sqrt{2}$ b. $2\sqrt{2}$ c. $3\sqrt{2}$ d. $15\sqrt{2}$ e. NOTA

28. Rationalize the denominator and simplify:

$$\frac{3 + \sqrt{3}}{3 - \sqrt{3}}$$

a. -1

b. $2 + 6\sqrt{3}$

c. $2 + \sqrt{3}$

d. $2 - \sqrt{3}$

e. NOTA

29. Solve for x: $2x^2 - 14x + 11 = 0$

a. $\{-7 + 3\sqrt{3}, -7 - 3\sqrt{3}\}$

b. $\{-7 + \sqrt{71}, -7 - \sqrt{71}\}$

c. $\left\{\frac{7 + 3\sqrt{3}}{2}, \frac{7 - 3\sqrt{3}}{2}\right\}$

d. $\left\{\frac{7 + \sqrt{71}}{2}, \frac{7 - \sqrt{71}}{2}\right\}$

e. NOTA

30. If $(x + y)^2 = 60$

And $(x - y)^2 = 40$

Find the value of $x^2 + xy + y^2$

a. 100

b. 55

c. 50

d. 20

e. NOTA