

NAME _____

SCHOOL _____

2010 Middle School Math Festival**Individual Round: Algebra**

1. Simplify $-\frac{3x}{5} + \frac{2x}{3}$.

A. $-\frac{x}{15}$

B. $-\frac{x}{3}$

C. $\frac{x}{3}$

D. $\frac{x}{15}$

2. A sweater normally costs \$60. As an employee, you receive a 30% discount. You must still pay the 7% sales tax on the total sales price. What is your total cost?

A. \$30.06

B. \$19.26

C. \$ 44.94

D. \$ 49.00

3. Solve the following equation for a : $T = 2\pi\sqrt{\frac{a^3}{\mu}}$

A. $a = \sqrt[3]{\mu(T^2 - 4\pi^2)}$

C. $a = \sqrt[3]{\frac{\mu T^2}{4\pi^2}}$

B. $a = \sqrt[3]{\frac{4\pi T^2}{\mu}}$

D. $a = \sqrt[3]{\frac{\mu T^2}{2\pi}}$

4. What is the solution? $-\frac{1}{2}y + 5x = -\frac{73}{2}$ and $y = -\frac{3}{5}x - \frac{6}{5}$

A. (-7, 3)

B. (-8, 7)

C. (7, 143)

D. (-2, 0)

5. What is the next term in the following sequence: -13.5, 9, -6, 4,

A. -2.5

B. -3

C. $-\frac{8}{3}$

D. $\frac{8}{3}$

6. Which the following equation in Standard Form: $y + 6 = -\frac{4}{7}(x + 6)$?

A. $4x + 7y = 18$

B. $4x + 7y = -66$

C. $4x - 7y = -66$

D. $y = -\frac{4}{7}x - \frac{66}{7}$

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7. If $f(x) = -\frac{3}{2}x + \frac{2}{9}$ what is $f(-\frac{4}{9})$?

- A. $-\frac{4}{9}$ B. $\frac{4}{27}$ C. $\frac{4}{9}$ D. $\frac{8}{9}$

8. Two angles are complementary. One angle is three degrees more than twice the other angle. What is the measurement of the larger angle?

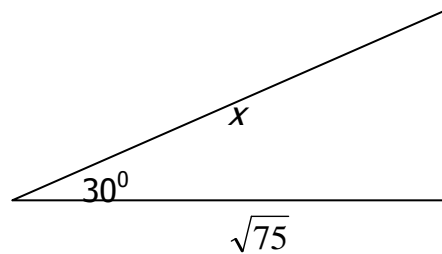
- A. 29° B. 59° C. 61° D. 121°

9. A pole that is 12 feet tall casts a 20-foot shadow. At the same time, what is the length of the shadow cast by a nearby pole which is 20 feet tall?

- A. 12 feet B. $13\frac{1}{2}$ feet C. 28 feet D. $33\frac{1}{3}$ feet

10. What is exact value of x ?

- A. 30 C. 5
B. 10 D. 15



11. Estimate $\sqrt[3]{0.64}$

- A. 0.4 B. 0.21 C. 0.86 D. 1.92

12. Find the mean of the data set.

$$\left\{ -\frac{2}{3}, \frac{3}{4}, \frac{1}{2}, -\frac{5}{12} \right\}$$

- A. $\frac{1}{24}$ B. $\frac{1}{12}$ C. $\frac{1}{6}$ D. $\frac{1}{3}$

13. Solve for x : $\frac{1}{2} - \frac{3}{5}x = \frac{7}{20}$

- A. $-\frac{17}{12}$ B. $-\frac{1}{4}$ C. $\frac{1}{4}$ D. $\frac{1}{10}$

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14. Write an equation for a line perpendicular to the line, $3x - 2y = 8$, which goes through the point $(2, -5)$.

A. $y = -\frac{2}{3}x - \frac{11}{3}$

C. $y = -\frac{2}{3}x - \frac{19}{3}$

B. $y = \frac{2}{3}x - \frac{11}{3}$

D. $y = \frac{3}{2}x - \frac{11}{3}$

15. What is the exact distance between $(-2, 5)$ and $(3, -7)$?

A. $\sqrt{5}$

B. $\sqrt{119}$

C. 7

D. 13

16. Solve for x : $\frac{2}{x+2} - \frac{3}{2-x} = \frac{1}{x^2-4}$

A. $\frac{1}{5}$

B. $-\frac{1}{5}$

C. $\frac{3}{5}$

D. 0

17. Solve for x : $|-3x + 2| < 17$

A. $-\frac{19}{3} < x - 5$

C. $-\frac{19}{3} < x < 5$

B. $-5 < x$ or $x > \frac{19}{3}$

D. $-5 < x < \frac{19}{3}$

18. Find the solution to the following system of equations:

$$\begin{cases} 3x + 2y = 7 \\ x = -\frac{2}{5}y + 1 \end{cases}$$

A. $(-1, \frac{19}{3})$

B. $(-1, 5)$

C. $(5, -1)$

D. $(1, 2)$

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19. A rectangular prism has dimensions of 1 yard by 1 foot by 1 inch. What is the total surface area, in square inches?

- A. 240 in^2 B. 432 in^2 C. 480 in^2 D. 960 in^2

20. Simplify: $\left(\frac{-2x^2}{(3y)^{-1}}\right)^{-2}$

- A. $\frac{9y^2}{4x^4}$ B. $\frac{1}{6x^4y^2}$ C. $\frac{1}{36x^4y^2}$ D. $-\frac{3y^2}{2x^4}$

21. Simplify $\sqrt[3]{54} - \sqrt[3]{128}$

- A. $7\sqrt[3]{54}$ B. $-\sqrt[3]{2}$ C. $\sqrt[3]{2}$ D. $-5\sqrt[3]{2}$

22. Simplify by rationalizing the denominator: $\frac{\sqrt{6} - 2}{\sqrt{6} + 2}$

- A. $5 - 2\sqrt{6}$ B. $1 - 2\sqrt{6}$ C. $1 - \frac{2\sqrt{6}}{5}$ D. -1

23. Solve for x : $\frac{1}{32} = 8^{x+1}$

- A. -2 B. $-\frac{2}{3}$ C. $\frac{8}{3}$ D. $-\frac{8}{3}$

24. Calculate $2^4(2^2 \div 2^5 - 2^0 \times (-2)^{-3})$

- A. 130 B. 4 C. 0 D. -4

25. What is the per cent increase from 200 to 225?

- A. 1.25% B. 10% C. 12.5% D. 25%

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26. Solve for y : $45y(y - 1) = 20$

- A. $\left(-\frac{4}{3}, \frac{1}{3}\right)$ B. $\left(\frac{4}{3}, -\frac{1}{3}\right)$ C. $\left(-1, \frac{4}{9}\right)$ D. $\left(\frac{1}{9}, -4\right)$

27. Solve for y : $15y^2 + y - 14 = -8$

- A. $\left(-\frac{3}{5}, \frac{2}{3}\right)$ B. $\left(\frac{3}{5}, -\frac{2}{3}\right)$ C. $\left(\frac{14}{15}, -1\right)$ D. $\left(-\frac{14}{15}, 1\right)$

28. What is the discriminant of $1 - 9y = 3x(3x + 2)$

- A. -72 B. 0 C. 72 D. $\frac{8}{9}$

29. What is the polynomial with roots of -1, 2, and 3?

- A. $x^3 + 4x^2 - x - 6$ C. $x^3 - 4x^2 + x + 6$
 B. $x^3 - 4x^2 - x + 6$ D. $x^3 + 4x^2 + x - 6$

30. Factor completely: $\frac{2}{5}x^3 - \frac{8}{125}x$

- A. $\frac{2}{5}x\left(x + \frac{2}{5}\right)^2$ C. $\frac{2}{5}x\left(x^2 + \frac{2}{5}x + \frac{4}{25}\right)$
 B. $\frac{2}{5}x\left(x - \frac{2}{5}\right)^2$ D. $\frac{2}{5}x\left(x - \frac{2}{5}\right)\left(x + \frac{2}{5}\right)$

31. What is 120% of 4.8?

- A. 4 B. 5.76 C. 57.6 D. 576

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32. 55.68 is what per cent of 87?

- A. 64% B. 0.64% C. 1.56% D. 15.6%

33. 0.868 is 0.28% of what number?

- A. 0.0024304 B. 0.24304 C. 3.1 D. 310

34. Evaluate $\frac{20!}{18!}$

- A. $1\frac{1}{9}$ B. 2 C. $21\frac{1}{9}$ D. 380

35. Write the equation, in standard form, of the line which passes through the points (10, 3) and (35, -2).

- A. $x + 5y = 5$ B. $x + 5y = 25$ C. $x + 5y = -9$ D. $x - 5y =$

36. Use the Completing the Square Method to change the standard quadratic equation, $x^2 + 8x - 15 = y$, into the following form: $(x - a)^2 = y - b$.

- A. $(x + 4)^2 = y - 11$ C. $(x + 4)^2 = y + 31$
B. $(x + 4)^2 = y + 1$ D. $(x + 4)^2 = y - 31$

37. Find the vertex coordinates of $y + 5 = -\frac{1}{2}(x + 2)^2$.

- A. (-2, 5) B. (-2, -5) C. (1, -5) D. (2, 5)

38. Solve for p : $p(p^2 + p - 9) = 9$

- A. {1, 3, -3} B. {1, 9, -9} C. {-1, 9, -9} D. {-1, 3, -3}

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39. Simplify $\frac{y^2 + 5y + 6}{y^2 + 4y + 3} \div \frac{y^2 - 4}{y^2 - 2y - 3}$

A. $\frac{y - 3}{y - 2}$

B. $\frac{y - 3}{y + 2}$

C. $\frac{y - 2}{y - 3}$

D. $\frac{(y + 2)(y - 1)}{(y + 1)(y - 2)}$

40. Solve for x : $\frac{3}{x + 5} + \frac{2}{x - 1} = 1$

A. (4, -3)

B. (-4, 3)

C. (1, -5)

D. (3, -3)