Basha High School Junior High Competition Test

Pre-Algebra/Algebra Level

Name: _____ Grade: _____ School: _____

1. $3141 \times 10^{-3} = ?$

   a. 3141   b. 31.41   c. 3.141   d. 0.0003141

2. A line travels through the points $(-1,3)$ and $(4,-7)$. What is the slope?

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

3. $\dfrac{1}{2} + \dfrac{1}{3} + \dfrac{1}{4} + \dfrac{1}{5} = ?$ (in lowest terms)

   a. $77/60$ b. $2/7$ c. $154/120$ d. $7/5$

4. The hands of a clock point in exactly the same direction at noon and at midnight. How many other times during the day (24 hours) do the hands of a clock point in the same direction?

   a. 18   b. 20   c. 22   d. 24

5. Replace letters with numbers, given that each letter represents a distinct digit from 0–9 and that leading digits cannot be 0:

   $$MATH + ATH + TH + H = 2012$$

   a. $M = 2, A = 5, T = 1, H = 3$
   b. $M = 2, A = 5, T = 0, H = 3$
   c. $M = 1, A = 4, T = 6, H = 8$
   d. None of these

6. If $\wp = 7$ and $\beta = 6$, what does $\wp \cdot \beta$ equal?

   a. 13   b. 42   c. 24   d. None of these

7. What is the smallest 3-digit number that can be formed by crossing out digits from 4921508?

   a. 105   b. 108   c. 129   d. 150

8. Order the following from least to greatest: $\left\{ 0.1428, 0.1429, \dfrac{1}{7}, 0.14, \dfrac{1}{6} \right\}$

   a. $\left\{ 0.1428, 0.1429, \dfrac{1}{7}, 0.14, \dfrac{1}{6} \right\}$

   b. $\left\{ 0.14, 0.1428, 0.1429, \dfrac{1}{7}, \dfrac{1}{6} \right\}$

   c. $\left\{ 0.1428, \dfrac{1}{7}, 0.1429, 0.14, \dfrac{1}{6} \right\}$

   d. $\left\{ \dfrac{1}{6}, 0.14, 0.1428, 0.1429, \dfrac{1}{7} \right\}$

9. Simplify to an improper fraction or integer:

$$\frac{2^{-1} + 3^{-1}}{6^{-1}}$$

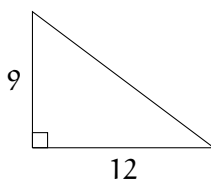a. $\frac{6}{5}$ b. $\frac{5}{6}$ c. 5   d. $\frac{5}{36}$

10. Evaluate:

$$\left(6^2 + 3 - 7 \cdot 4\right)\left(2 \cdot \tfrac{1}{2} + 2 - \tfrac{1}{3} \cdot 9\right)$$

a. 11   b. 1   c. 0   d. None of these

11. Rick rode his bike to school at 12 mph. On the way back, he noticed that his tire was flat, so he walked home at 4 mph along the same route. In total, he spent an hour going to and returning from school. How far away is Rick's house from the school?

a. 1 mile   b. 3 miles   c. 4 miles   d. 8 miles

12. What is the perimeter?

a. 39   b. 21   c. 36   d. None of these

13. Rick rolls three dice consecutively. What is the probability that he rolls a six three times in a row?

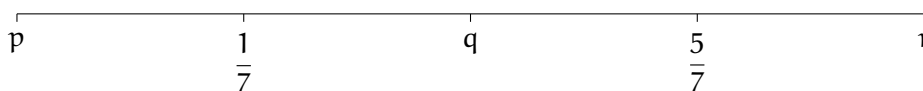a. $\frac{1}{6}$ b. $\frac{1}{1296}$ c. $\frac{1}{36}$ d. $\frac{1}{216}$

14. Rick rolls three dice consecutively. What is the probability that he rolls two fives and a six, in any order?

a. $\frac{1}{36}$ b. $\frac{1}{108}$ c. $\frac{1}{72}$ d. $\frac{1}{6}$

15. Solve for k: $\sqrt{k} = \sqrt{3}(\sqrt{2} + \sqrt{2})$

a. 7   b. 24   c. 12   d. 29

16. The points on this number line are evenly spaced. What is the value of $p + q + r$?

a. $\frac{6}{7}$ b. 1   c. $\frac{8}{7}$ d. $\frac{9}{7}$

17. If $n! = n(n-1)(n-2)...1$ (for example: $5! = 5 \cdot 4 \cdot 3 \cdot 2 \cdot 1 = 120$), then for $n = 100$, what is $\dfrac{(n+1)!}{(n-1)!}$?

    a. 100   b. 101   c. 10100   d. 10101

18. You have a 2.1 kg. crown that consists solely of silver and gold. Measuring the volume by water displacement, you find that it has a volume of 100 cm^3. If the density of gold is 30g/cm^3 and the density of silver is 15g/cm^3, what is the percentage of gold, by volume, in the crown? (Note: density, d, is $\frac{m}{v}$ where m is mass and v is volume.)

    a. 20%   b. 40%   c. 60%   d. 80%

19. Solve for x: $2^3 + 4^2 + 8 = 2^x$.

    a. 5   b. 8   c. 10   d. 12

20. The line with x-intercept 7 and slope $\dfrac{1}{5}$ is translated 5 units right and reflected across the y-axis. What is the equation of the new line?

    a. $y = -\frac{1}{5}x - \frac{7}{5}$ c. $y = 5x - \frac{12}{5}$

    b. $y = \frac{1}{5}x - \frac{12}{5}$ d. $y = -\frac{1}{5}x - \frac{12}{5}$

21. How many unique values can $1 \cdot 3 + 5 - 7$ take with different orders of operation?

    a. 1   b. 2   c. 3   d. 4

22. In how many of the following sets does 0 belong?

Real, rational, imaginary, complex, integers

    a. 3   b. 4   c. 5   d. 2

23. There are seven students and two teachers on a math team. A math club consists of three teams. A math competition involves four math clubs. How many teachers are in a math competition?

    a. 84   b. 36   c. 24   d. 48

24. How many numbers between 1 and 100 have a 7 as a digit?

    a. 19   b. 21   c. 18   d. 20

25. Simplify:

$$\cfrac{1}{1 + \cfrac{1}{1 + \cfrac{1}{2}}}$$

    a. $5/3$ b. $1/2$ c. $2/5$ d. $3/5$

Congratulations! You're done!

Credit goes to the Huntington University Middle Grades Math Competition and the Oklahoma School of Science and Mathematics Middle School Mathematics Contest for problem inspiration.