Name: _____ School Name: _____

1. The formula $f(x) = \dfrac{9}{5}x + 32$ converts Celsius to Fahrenheit and $g(x) = \dfrac{5}{9}(x-32)$ converts from Fahrenheit to Celsius. At which temperature do the two scales agree?

A. 0° B. 32° C. -40° D. -32° E. -1°

2. Subtract in base 8.
   7031_8
   -5017_8
   $\overline{}$

A. 2012_8 B. 2013_8 C. 2011_8 D. 2010_8 E. 2014_8

3. From experience, the owner of an electronics store knows that if a popular set of headphones is priced at $30, the store will sell 40 each day. For each decrease of $0.50, one additional sale will be made. Find the formula that models this situation then find the number of $0.50 decreases that will give the most revenue.

A. 8   B. 5   C. 1   D. 10   E. 14

4. Which of the following is/are true?

I. $\sqrt{x^2 + y^2} = x + y$

II. $(-8)^{\frac{1}{3}}$ is a real number.

III. A factor of $(x^4 - y^4) + (-2x^3 y + 2xy^3)$ is $(x+y)$.

IV. Given $|x| > 5$ means that x is any number greater than 5 only.

A. All are true   B. I, IV   C. I, II, IV   D. II, III, IV   E. II, III

5. An artist created a piece of work that weighs 14 oz. The artwork contains 75% bronze. He had on hand two alloys that were 60% and 80% bronze. How many ounces of the 60% alloy did he use?

A. 10.5 oz   B. 3.5 oz   C. 4.13 oz   D. 0.45 oz   E. 4.5 oz

6. If it is currently October, what month will it be in 105 months?

A. September   B. October   C. July   D. May   E. August

7. Determine the general term for the sequence: $-3,\ \ 9,\ \ -27,\ \ 81,...$

A. -3^{-n} B. -3^n C. 3^n D. $(-1)^n 3^n$ E. 3^{-n}

Use the following function to answer questions 8 and 9.

$$h(x) = \begin{cases} x+2, & x \geq 2 \\ 4, & -1 \leq x < 2 \\ -x^2 + 1, & x < -1 \end{cases}$$

8. Give the domain.
9. Give the range.

Use the choices below to answer both questions.

A. $(-\infty, 0) \cup [4, \infty)$
B. $(-\infty, \infty)$
C. $(-\infty, 4)$
D. $[-1, 4]$
E. $(-\infty, -1) \cup (-1, 2) \cup (2, \infty)$

10. A red sack contains 6 white and 14 green marbles. A blue sack contains 14 white and 11 green marbles. A marble is drawn from the red sack and then transferred to the blue sack. A marble is then drawn from the blue sack. What is the probability that the transferred marble was white?

A. $\frac{15}{26}$ B. $\frac{10}{13}$ C. $\frac{3}{10}$ D. $\frac{11}{20}$ E. $\frac{21}{26}$

11. How many points (x, y), where x and y are integers, are in/on the rectangle where $-10 \leq x \leq 10$ and $1 \leq y \leq 10$?

A. 210   B. 200   C. 220   D. 100   E. 242

12. Consider the set of points (x, y), where x and y are integers, that are in/on the rectangle where $-10 \leq x \leq 10$ and $1 \leq y \leq 10$. How many of these points reside between the branches of $f(x) = x^2$.

A. 6   B. 36   C. 42   D. 46   E. 32

13. Given $2^x \cdot 16^y = 32$ and $\dfrac{27^y}{9^x} = 1$, solve the equations for x and y. What is the product of x and y?

A. 0   B. $\dfrac{150}{121}$ C. $\dfrac{1}{4}$ D. 4   E. $\dfrac{15}{12}$

14. Let $f(x) = 3 - x^2$. Calculate $\dfrac{f(x+h) - f(x)}{h}$.

A. -1

B. $\dfrac{-2x^2 - h^2}{h}$

C. $-2x^2 - h$

D. $\dfrac{-2x^2 + 2xh - h^2}{h}$

E. $-2x - h$

15. The volume of a sphere varies directly as the cube of the radius. A sphere has a diameter of 6 mm and a volume of 36π mm^2. Find the volume of a sphere having a radius of 5 mm.

A. $\dfrac{500}{3}\pi$ mm^2 B. 750π mm^2 C. $\dfrac{50}{3}\pi$ mm^2 D. $\dfrac{125}{6}\pi$ mm^2 E. 20π mm^2

16. Given the graphs of four linear functions with slopes m_1, m_2, m_3 and m_4 as labeled below. Order the slopes in descending order.
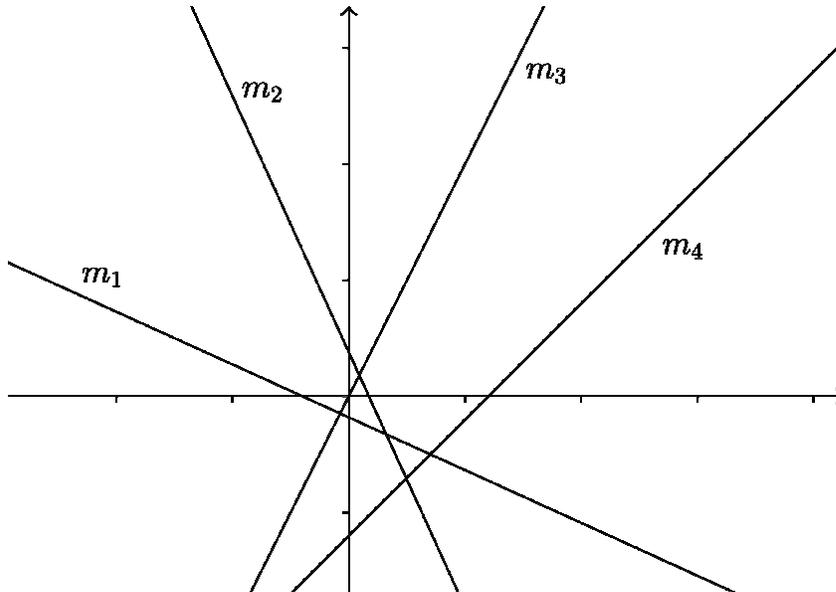
A. m_4, m_1, m_2, m_3

B. m_2, m_1, m_3, m_4

C. m_1, m_2, m_3, m_4

D. m_4, m_3, m_2, m_1

E. m_3, m_4, m_1, m_2

17. Jack and Janet decide to meet at a park to go cycling. Janet doesn't get there on time, so Jack decides to start cycling from the park at 3 miles per hour. An hour later, Janet gets to the park and starts cycling in the same direction as Jack at 4 miles per hour. She cycles until they meet. How many hours later do they meet?

A. 2   B. 6   C. 1   D. 4   E. 5

18. A coat was originally priced at $200. It was successively discounted by 10%, 15% and 20%. What is the price of the coat after the third discount?

A. $170.00   B. $122.40   C. $110.00   D. $90.00   E. $100.00

19. Ten horses are running a race. In how many ways can these horses come in first, second, and third place? (Assume that there are no ties.)

A. 3   B. 10   C. 720   D. 30   E. 1,000

20. Determine which point is NOT in the solution set of $\begin{cases} 3x+y>1 \\ -y-.5x^2 \le -4 \\ -15x+4y>0 \end{cases}$

A. (0, 10)   B. (2, 9)   C. (-1, 6)   D. (0, -1)   E. (1, 15)

21. Give the area of the triangle with vertices (2,1), (3,3) and (4,-1).

A. 8/3   B. 3   C. 10/3   D. 11/3   E. 4

22. Give a value of a so that there is no solution to $\begin{pmatrix} 2x-3y=4 \\ 3x+ay=7 \end{pmatrix}$.

A. -7/2   B. -4   C. -9/2   D. -5   E. -11/2

23. A parabola has x-intercepts at -4 and 2, and the y coordinate of the vertex is 6. Give the y-intercept of the parabola.

A. 4   B. 13/3   C. 14/3   D. 5   E. 16/3

24. Give conditions on the number a so that the graph of $f(x)=3+a\left(2x+x^2\right)$ does not have an x-intercept.

A. $|a-2|>1$ B. $\left|a-\dfrac{3}{2}\right|>\dfrac{3}{2}$ C. $|a-1|>2$ D. $a<1$ E. $a>2$