46th DICK SCHAFF MATH SUPERBOWL
May 4, 2019
Secondary Math 2 Huddle

Directions:
1. Select the most correct answer for each question and mark it on the Scantron® sheet.
2. ABSOLUTELY NO CALCULATING INSTRUMENTS ARE TO BE USED. This includes watch calculators.
3. Note that N.O.T. means "None of These."

1. Consider the parabola: $(y-5)=\frac{1}{8}(x+4)^2$. Find the radius of the circle whose center is located at the *focus* of the parabola and has the vertex of the parabola as a point on the circle.

(A) 2 (B) $\sqrt{3}$ (C) 4 (D) 8 (E) N.O.T.

2. Find the x-coordinate of the x-intercept of $y=-3(x-3)^2+12$.

(A) -1 (B) 3 (C) 12 (D) 5 (E) N.O.T.

3. Suppose ΔABC is an isosceles triangle with $\overline{AB}=\overline{BC}$. If the measure of $\angle A$ is one-fourth the measure of $\angle B$, then what is the measure of $\angle C$?

(A) 30° (B) 36° (C) 45° (D) 120° (E) N.O.T.

4. Let $g(x)=\begin{cases}\frac{1}{3}x+2 & x<0\\ 2 & 0\le x<1\\ -2x+4 & 2<x\end{cases}$ What is the range of $g(x)$?

(A) $(-\infty,2]$ (B) $(-\infty,\infty)$ (C) $(-\infty,4]$ (D) [-7, ∞) (E) N.O.T.

5. Determine the coordinates of the center of the circle: $x^2+y^2-10x+14y+65=0$.

(A) $(-10,14)$ (B) $(25,-49)$ (C) $(-5,7)$ (D) $(5,-7)$ (E) N.O.T.

6. Determine the radius of the circle: $x^2+y^2-10x+14y+65=0$.

(A) 3 (B) 9 (C) 18 (D) 81 (E) N.O.T.

7. On a graph, the equation $g(x) = f(x-4)$ is the graph of $f(x)$ shifted ___ units _____.

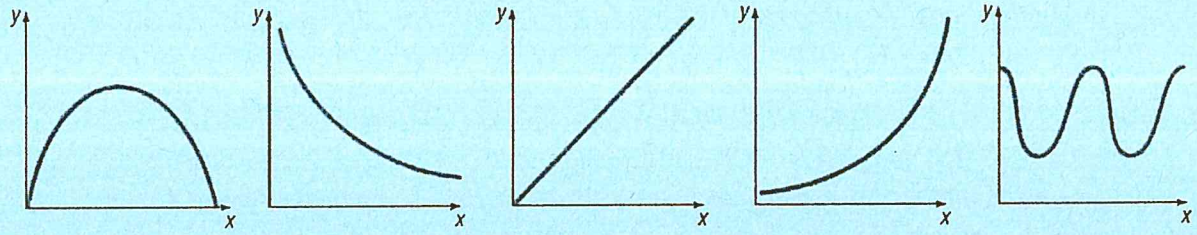
(A) 4, left (B) 4, right (C) 4, up (D) 4, down (E) N.O.T.

8. Given $f(x) = -16x^2 - 5x + 1$, what is $f\left(\frac{1}{3}\right)$?

(A) $\frac{-7}{4}$ (B) $\frac{-7}{9}$ (C) $-\frac{17}{9}$ (D) $-\frac{19}{3}$ (E) N.O.T.

9. Match each of the following options with the graph that best describes the situation.

(a) The temperature of a bowl of soup as a function of time
(b) The number of hours of daylight per day over a 2-year period
(c) The population of Florida as a function of time
(d) The distance traveled by a car going at a constant velocity as a function of time
(e) The height of a golf ball hit with a 7-iron as a function of time



1 **2** **3** **4** **5**

(A) 2,3,2,1,4 (B) 2,5,4,1,3 (C) 2,5,4,3,1 (D) 2,4,5,3,1 (E) N.O.T.

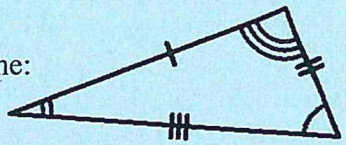
10. If the sex of a baby is determined by the flip of a coin, what is the probability that two sisters who give birth on the same day have two boys?

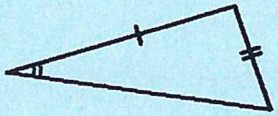
(A) $\frac{1}{8}$ (B) $\frac{1}{6}$ (C) $\frac{1}{2}$ (D) $\frac{2}{3}$ (E) N.O.T.

11. You've just seen your friend flip a coin ten times, and each time a head came up. What is the probability that the next flip is a head?

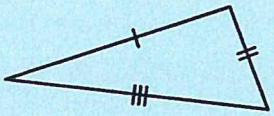
(A) $\left(\frac{1}{2}\right)^{11}$ (B) $\left(\frac{1}{2}\right)^{10} + \frac{1}{2}$ (C) $2\left(\frac{1}{2}\right)^{11}$ (D) $11\left(\frac{1}{2}\right)$ (E) N.O.T.

12. Which of the following triangles might *not* be congruent to this one:

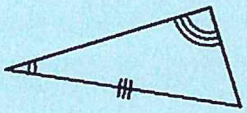




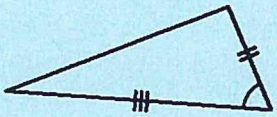
(A)



(B)



(C)



(D) (E) N.O.T.

13. If the radius of a sphere is halved, by what factor does the volume of the sphere decrease?

(A) 8 (B) 6 (C) 4 (D) 3 (E) N.O.T.

14. Starting with a graph of $y = f(x)$, which of the following would represent the graph obtained by reflecting across the y-axis and shifting the resulting graph up by 7 units?

(A) $y = -f(-x) + 7$ (B) $y = -f(x) + 7$ (C) $y = f(-x) - 7$
(D) $y = f(-x) + 7$ (E) N.O.T.

15. Which of the following lines do not intersect $y = -2(x-1)^2 + 3$?

(A) $y = 1$ (B) $y = -4$ (C) $x = -7$ (D) $x = 10$ (E) N.O.T.

16. The annual inflation rate in Modesto has been about 3% over the past three years. Three years ago, a bag of chips cost \$6. How much do they cost today?

(A) $6(1.03)^3$ (B) $6 + 3(0.03)$ (C) $6 - 3(0.03)$ (D) $6(0.03)^3$ (E) N.O.T.

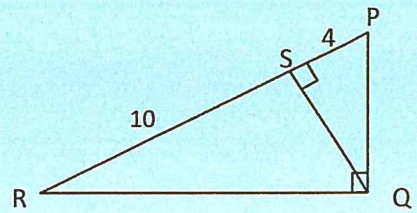
17. Simplify: $(256)^{\frac{5}{8}}$

(A) 32 (B) 512 (C) 8 (D) 64 (E) N.O.T.

18. If $f(x) = |3x - 12|$, when is $f(x) = -(3x - 12)$?

(A) $x < 2$ (B) $x < 3$ (C) $x < 4$ (D) $x > 0$ (E) N.O.T.

19. Use the diagram to the right to find $\overline{QS}$.



(A) $4\sqrt{2}$ (B) $2\sqrt{14}$ (C) $2\sqrt{10}$ (D) $3\sqrt{5}$ (E) N.O.T.

20. Use the diagram from #19 to find $\overline{RQ}$.

(A) $2\sqrt{35}$ (B) $\sqrt{145}$ (C) $2\sqrt{39}$ (D) $6\sqrt{5}$ (E) N.O.T.

21. In a certain bank the positions of cashier, manager, and teller are held by Brown, Jones and Smith, though not necessarily in that order. The teller, who was an only child, earns the least. Smith, who married Brown's sister, earns more than the manager. Who are the teller, manager and cashier, in that order?

(A) Brown, Jones, Smith (B) Smith, Brown, Jones (C) Jones, Brown, Smith (D) Jones, Smith, Brown (E) N.O.T.

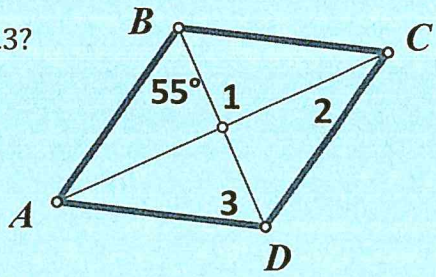
22. A hiker can average two miles per hour uphill and six miles per hour downhill. Going uphill and down, and if he spends no time at the summit, what will be his average speed for an entire trip?

(A) 2.5 *mph* (B) 3 *mph* (C) 3.5 *mph* (D) 4 *mph* (E) N.O.T.

23. Which of the following group of quadrilaterals have congruent diagonals?

(A) Rhombus, Square (B) Rectangle, Rhombus, Square (C) Rhombus, Parallelogram, Square (D) Rectangle, Square, Kite (E) N.O.T.

24. Given the rhombus ABCD. What are m∠1, m∠2, m∠3? The 55° angle in the picture is angle ABD.



(A) 90°, 25°, 65° (B) 90°, 35°, 55° (C) 90°, 37.5°, 52.5° (D) 90°, 40°, 60° (E) N.O.T.

25. What would the value of the discriminant have to be in order for a quadratic to have 2 real irrational zeros?

(A) Less than zero (B) Greater than zero but not a perfect square (C) Greater than zero and a perfect square (D) Exactly zero (E) N.O.T.

26. Write a quadratic function in standard form with the following solutions: 3 and $-\frac{2}{5}$

(A) $5x^2 - 13x + 6 = 0$ (B) $5x^2 - 13x - 6 = 0$ (C) $5x^2 + 17x - 6 = 0$
(D) $x^2 - \frac{13}{5}x + \frac{6}{5} = 0$ (E) N.O.T.

27. A cube measures 5 centimeters on each side. How long is the diagonal that connects two opposite corners of the cube?

(A) $7\sqrt{2}$ (B) $5\sqrt{2}$ (C) $5\sqrt{3}$
(D) $5\sqrt{7}$ (E) N.O.T.

28. $4^8 \times 4^8 \times 4^8 =$

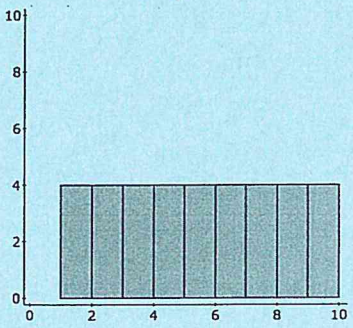
(A) 12^{24} (B) 12^{12} (C) 256^6 (D) 16^6 (E) N.O.T.

29. If $2^x + 2^x + 2^x + 2^x + 2^x + 2^x + 2^x + 2^x = 2^{2019}$, what is the sum of the digits of x?

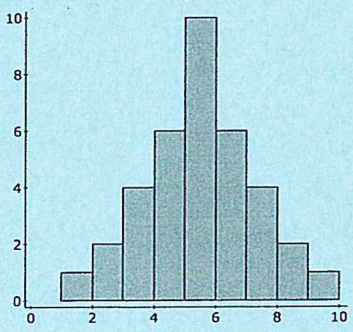
(A) 3 (B) 9 (C) 15 (D) 16 (E) N.O.T.

30. Order the data sets from the least spread to the most spread.

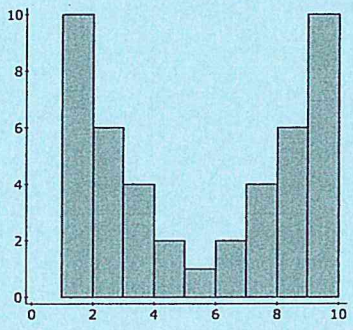
Graph I



Graph II



Graph III



(A) I, II, III (B) I, III, II (C) II, III, I (D) II, I, III (E) N.O.T.