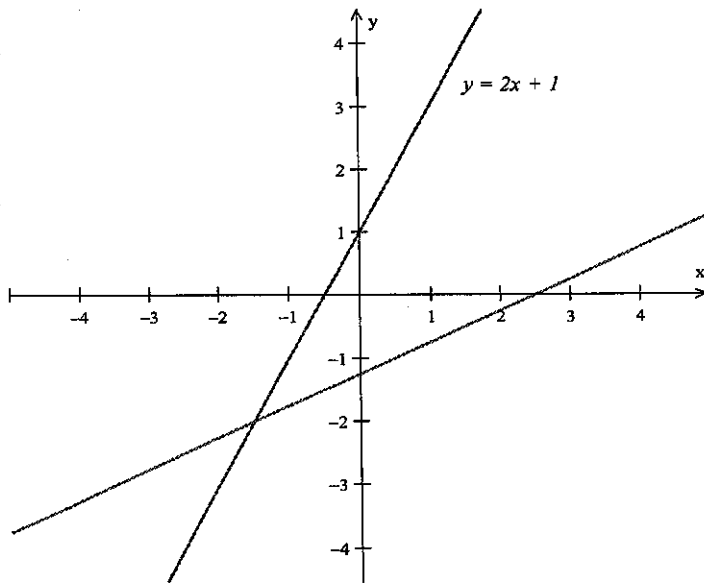


Math Contest – Level 1
March 7, 2014

- 1) Allen gives $\frac{1}{2}$ of his marbles to Bill. Bill gives $\frac{1}{3}$ of these to Carl. Carl gives $\frac{1}{4}$ of these to Dan. If Dan was given 4 marbles, how many did Allen have originally?
- A) 24 B) 48 C) 64 D) 72 E) 96
- 2) If the length of a side of a square is 8 inches, what is the radius of the circumscribed circle (a circle that passes through all four corners) ?
- A) 4 B) $2\sqrt{2}$ C) $4\sqrt{2}$ D) π E) 2π
- 3) Which of the following numbers is closest to 1?
- A) $\frac{11}{10}$ B) $\frac{111}{100}$ C) 1.101 D) $\frac{1111}{1000}$ E) 1.011
- 4) Fifty-six biscuits are to be fed to 10 pets. Each pet is either a cat or a dog. Each dog is to get six biscuits and each cat is to get 5 biscuits. How many dogs are there?
- A) 8 B) 7 C) 6 D) 5 E) 4

- 5) The interior angle at vertex B of a triangle ABC is 72° and the exterior angle at vertex A is 145° . What is the exterior angle at vertex C ?
- A) 43° B) 77° C) 95° D) 107° E) 135°

- 6) One of the lines below is labeled with its equation, $y = 2x + 1$



Which of the following could be an equation of the other line shown?

- A) $y = \frac{1}{2}x - 1.25$ B) $y = -\frac{1}{2}x - 1.25$
- C) $y = \frac{1}{2}x + 2.5$ D) $y = 2x - 1.25$
- 7) Today is Friday. Tomorrow is Saturday. In 2 days it will be Sunday. What day of the week will it be in 2014 days?
- A) Saturday B) Sunday C) Monday D) Tuesday E) Wednesday

- 8) Suppose a certain number when divided by 91 yields a remainder of 52. If we add 103 to our original number, what is the remainder when this new number is divided by 7?
- A) 1 B) 2 C) 3 D) 4 E) 5

- 9) What is the angle formed by the minute and hour hands of a standard 12-hour clock when the time is 6:43 PM?
- A) 32.5° B) 48° C) 52.5° D) 56.5° E) 78°

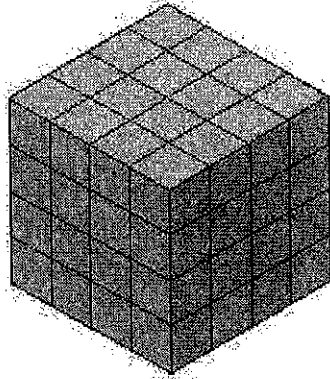
- 10) What is the correct ordering of the numbers 2^{48} , 5^{24} , and 10^{16} ?

- A) $10^{16} < 2^{48} < 5^{24}$ B) $2^{48} < 5^{24} < 10^{16}$ C) $5^{24} < 2^{48} < 10^{16}$
D) $2^{48} < 10^{16} < 5^{24}$ E) $10^{16} < 5^{24} < 2^{48}$

- 11) According to a survey of 36 high school students, 16 students liked History, 19 students liked English, 18 students liked Math, 8 students liked Math and English, 5 students liked History and English, 7 students liked History and Math, and 3 students liked all three subjects. How many students liked only Math?

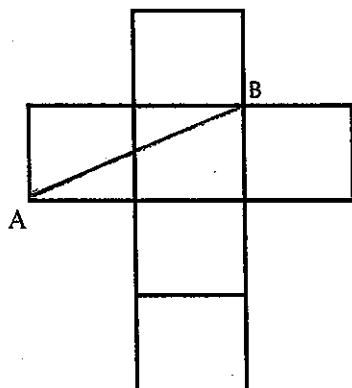
- A) 18 B) 8 C) 6 D) 5 E) 4

- 12) Consider a cubical structure composed of unit cubes with four cubes on an edge as shown below. How many different cubes are there? In other words, how many sub-cubes are there in a $4 \times 4 \times 4$ cube? Be sure to include the largest cube, the one that is of size $4 \times 4 \times 4$ in your total.



- A) 65 B) 92 C) 94 D) 99 E) 100
- 13) For some real number t , the first three terms of an arithmetic sequence are $2t$, $5t - 1$, and $6t + 2$. What is the numerical value of the fourth term?
- A) 4 B) 8 C) 10 D) 16 E) 19
- 14) Let the function f be defined by $f(x) = x^2 - 7x + 10$. If $f(t+1) = 0$, which of the following is a possible value of t ?
- A) 2 B) 3 C) 4 D) 5 E) 6

- 15) A cross is composed of six congruent squares as shown. If $AB = 10$, what is the area of the cross?

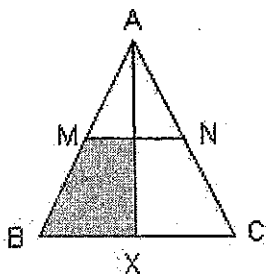


- A) $10\sqrt{5}$ B) $12\sqrt{5}$ C) 120 D) 150 E) 600

- 16) How many different chords are determined by n distinct points lying on a circle?

- A) $n(n-1)$ B) $\frac{n(n-1)}{2}$ C) $\frac{n(n-2)}{2}$ D) n^2 E) $\frac{n^2}{2}$

- 17) Triangle ABC has $\overline{AB} \cong \overline{AC}$ with M and N midpoints and $\overline{AX} \perp \overline{BC}$. What is the ratio of the area of the shaded region to the area of the triangle ABC ?



- A) $\frac{5}{16}$ B) $\frac{11}{32}$ C) $\frac{3}{8}$ D) $\frac{7}{16}$

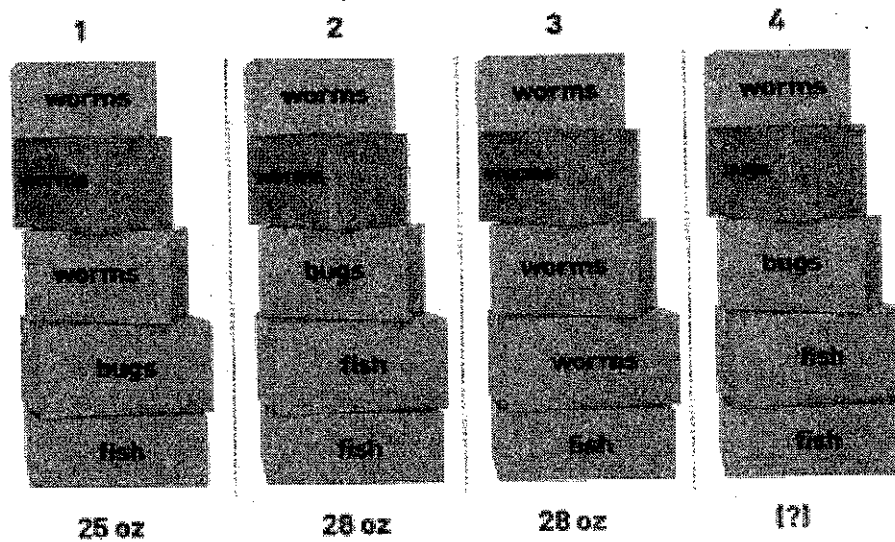
18) If the area of a square inscribed in a circle is 15 square centimeters, what is the area of the square inscribed in a semi-circle of the same circle?

- A) 4.5 sq. cm B) 6 sq. cm C) 7.5 sq. cm D) 9 sq. cm E) 15 sq. cm

19) Find the value of the constant k for which the graphs of $2y + x + 3 = 0$ and $3y + kx + 2 = 0$ are perpendicular.

- A) -6 B) $-\frac{3}{2}$ C) 6 D) $\frac{3}{2}$

20) The bait boxes below look alike but they have different weights. Worms are sold by one weight, fish are sold by another and bugs by a third. The weight of the three orders is shown. What is the weight of the fourth order?



- A) 25 oz. B) 26 oz. C) 27 oz. D) 28 oz. E) 32 oz.

21) The fraction $\frac{5x-11}{2x^2+x-6}$ was obtained by adding the two fractions

$\frac{A}{2x-3}$ and $\frac{B}{x+2}$. Find the value of $A+B$

A) 2 B) 4 C) 1 D) -2 E) -4

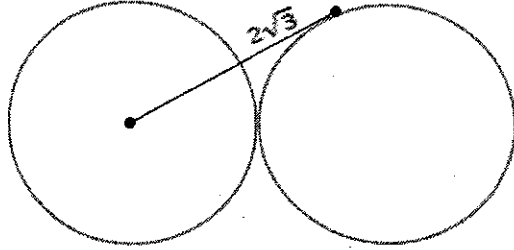
22) A hiker starts a hike at 10:00 AM and returns 6 hours later. One third of the total distance hiked is uphill, one third is level, and one third is down hill. If his hiking speed is 2 miles per hour when he is going uphill, 4 miles per hour when he is on level ground, and 6 miles per hour when he is going down hill. Approximately how many miles did he walk?

A) 19.6 B) 21.4 C) 22.8 D) 24.0 E) 26.2

23) The sum of the zeros of the function $f(x) = (5x+5)(2x-11) - (x+5)$ is:

A) 41 B) $-\frac{9}{2}$ C) $\frac{11}{2}$ D) $\frac{3}{5}$ E) $-\frac{11}{5}$

- 24) In the figure shown below, the two circles have the same radius and the circles are externally tangent. The length of the tangent from the center of the circle on the left to the other circle is $2\sqrt{3}$. What is the combined area of the two circles?



- A) 8π B) $\sqrt{3}\pi$ C) 4π D) $\sqrt{2}\pi$ E) 2π

- 25) How many different amounts of money can you have if you have coins consisting of quarters, dimes, and nickels and the total number of coins you have is 4? (You don't have to have some of each coin. You could have, for example, 4 quarters, no dimes, and no nickels).

- A) 11 B) 12 C) 13 D) 14 E) 15