

TMATYC - Survey of Mathematics Test - 2015

- If $a + b = 6$ and $a - b = 4$, then $a^2 - b^2 =$
A. 24 B. 20 C. 10 D. 4 E. 2
- If $A = \{1, 2, 3, 4, 5, 6\}$, $B = \{2, 4, 6, 8\}$, and $C = \{1, 5, 7, 8, 9\}$, then $(A \cap B) \cup C =$
A. $\{1, 5, 8, 9\}$ B. $\{8\}$ C. $\{1, 2, 3, 4, 5, 6, 8\}$ D. $\{1, 2, 4, 5, 6, 7, 8, 9\}$ E. $\{1, 2, 4, 5, 6\}$
- What is the inverse of the following statement?
"If you are sleeping, then you are breathing"
A. If you are sleeping, then you are not breathing
B. If you are breathing, then you are sleeping
C. If you are not sleeping, then you are not breathing
D. If you are not breathing, then you are not sleeping
E. If you are breathing, then you are not sleeping
- A class is exactly 40% female. When 3 male students are replaced by 3 female students, the class becomes exactly 44% female. How many more males than females are in the original class?
A. 10 B. 12 C. 15 D. 18 E. 20
- For set S , the set consisting of all the subsets of S is called the *powerset* of S . How many elements are in the powerset of $\{0, 1, 2, 3, 4, 5\}$?
A. 30 B. 32 C. 34 D. 62 E. 64
- How many positive three-digit numbers are divisible by neither 3 nor 5?
A. 420 B. 434 C. 466 D. 480 E. 533
- Ed can paint a large room in 6 hours. Fred can paint the same room in 4 hours. If they work together, how long will it take them to paint the room?
A. 2 hrs 2 mins B. 2 hrs 24 mins C. 2 hrs 40 mins D. 3 hrs 10 mins E. 5 hrs
- Find the equation of the line that passes through the point $(-3, -1)$ and is perpendicular to the line $3x + 4y - 5 = 0$.
A. $4x + 3y + 15 = 0$ B. $4x - 3y + 9 = 0$ C. $3x - 4y - 5 = 0$
D. $3x + 4y + 13 = 0$ E. $3x + y - 10 = 0$
- In a group of 90 students, 59 are taking an English class, 17 are taking both an English class and a math class, and 3 are taking neither an English class nor a math class. How many of the students are taking a math class?
A. 11 B. 25 C. 28 D. 41 E. 45
- Martha's salary two years ago was \$30,000. Last year she received a pay raise of 10%. This year, she received a 10% reduction in pay. What is her current salary?
A. \$30,000 B. \$30,300 C. \$29,700 D. \$30,030 E. \$29,970

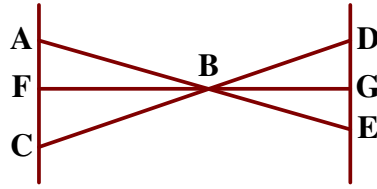
11. Consider the first four iterations of a sequence below.



How many squares will there be in the 99th iteration of this sequence?

- A. 4950 B. 5050 C. 4900 D. 5000 E. 4990
12. A nickel, a dime, and a penny are all tossed. What is the probability that they do not all land the same way (that is, they are not all heads nor are they all tails)?
- A. $33\frac{1}{3}\%$ B. 60% C. $66\frac{2}{3}\%$ D. 75% E. $88\frac{8}{9}\%$
13. A bicycle travels at s feet per minute. When its speed is expressed in inches per second, the numerical value decreases by 16. Find s . (1 foot = 12 inches)
- A. 12 B. 16 C. 18 D. 20 E. 24
14. A radio station advertises, "Traffic every 10 minutes, 24 hours a day; 1000 reports each week." What is the difference between the advertised number of reports and the exact number of reports expected from the advertisement?
- A. 8 B. 12 C. 16 D. 20 E. 24
15. Fran drove at an average speed of 70 mile per hour (mph) for 30 minutes. For the next 20 minutes, Fran drove at an average speed of 40 mph. For the next 10 minutes, Fran drove at an average speed of 30 mph. What was Fran's average speed for the whole hour? (Round to the nearest mile per hour.)
- A. 47 mph B. 53 mph C. 60 mph D. 62 mph E. 65 mph
16. Trina has two dozen coins, all dimes and nickels, worth between \$1.72 and \$2.11. What is the least number of dimes she could have?
- A. 10 B. 11 C. 15 D. 18 E. 19
17. Three cubes are stacked on top of each other. The top cube has a side length half that of the middle cube. The middle cube has a side length half that of the bottom cube. The top cube has a volume of 5 cubic feet. What is the total volume of all three cubes? (Express your answer in cubic feet.)
- A. 30 B. 65 C. 125 D. 250 E. 365
18. A door is 4 feet wide and 7 feet high. If the door is standing open at a 90° angle with the door frame, what is the greatest distance in feet from the outer top corner of the door to a point on the door frame?
- A. 8 B. 9 C. 9.5 D. 10 E. 11

19. In the figure below, AC is parallel to DE. AE, FG, and CD intersect at the point B. FG is perpendicular to AC and DE. The length of DE is 5 inches, the length of BG is 8 inches and the length of AC is 6 inches. What is the area, in square inches, of triangle ABC?



- A. 28.8 B. 20 C. 24 D. 15 E. 36
20. A newspaper advertises that it sells the Sunday paper for one-third the price of the rest of the week's papers. If a weekly subscription costs between \$2.20 and \$2.30, what is the cost of one Sunday paper and one Monday paper? Assume cost of paper is the same for Monday through Saturday and the costs for any paper cannot include fractional cents.
- A. \$0.56 B. \$0.81 C. \$0.84 D. \$0.87 E. \$1.12
21. The average of A and $2B$ is 7 and the average of A and $2C$ is 8. What is the average of A , B , and C ?
- A. 3 B. 4 C. 5 D. 6 E. 9
22. If two, fair 6-sided dice are rolled, what is the probability that their product is at least 10?
- A. $\frac{3}{5}$ B. $\frac{7}{12}$ C. $\frac{17}{36}$ D. $\frac{19}{36}$ E. $\frac{1}{2}$
23. What is the sum of the solutions to the equation $x^{-2} + 5x^{-1} + 4 = 0$?
- A. $\frac{5}{4}$ B. $-\frac{5}{4}$ C. 5 D. -5 E. 0
24. If $0 < a < 0.5$, which of the following statements is true?
- A. $a^{20} > a^{10}$ B. $(2a)^{20} = 2(a)^{20}$ C. $a^{20} < a^{40}$ D. $a^{20} < a$ E. $(2a)^{20} = a^{40}$
25. The length of a rectangle is increased by 20% and its width is increased by 50%. What is the percent increase in its area?
- A. 10% B. 30% C. 70% D. 80% E. 100%