TMATYC - Survey of Mathematics Test - 2017

1. Which of the following pairs are both composite numbers?

A. 37, 73 B. 27, 72 C. 35, 53 D. 307, 703 E. 13, 31

2. Pump A can drain a large pool in 50 hours and pump B can drain that pool in 80 hours. How long does it take the pumps working together to drain that pool to the nearest minute?

A. 26 hrs, 6 min B. 30 hrs, 7 min C. 30 hrs, 46 min D. 36 hrs, 4 min E. 36 hrs, 22 min

3. What is the contrapositive of the following statement? "If x is red, then y is colorful."

A. If y is red, then x is colorful. B. If y is not colorful, then x is not red.
C. If x is colorful, then y is red. D. If y is not red, then x is not colorful.
E. If x is not red, then y is not colorful.

4. If set A is the set of all real numbers and the set B is the set of all rational numbers so that $B \subset A$, then what is B' (the complement of B)? The set of all

A. positive real numbers B. whole numbers C. integers D. natural numbers E. irrational numbers

5. Given an angle measured in degrees, what is its supplement less its complement? Give answer in degrees.

A. 90 B. 180 C. 60 D. 0 E. Not enough information to determine this quantity

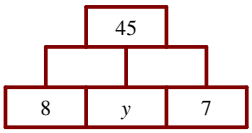
6. The lengths of the sides of two right triangles are 6, 8, 10 meters and 8, 15, 17 meters. What is the perimeter (in meters) of the new, larger triangle formed by placing the 2 triangles side by side, but not overlapping?

A. 64 B. 56 C. 48 D. 40 E. 24

7. What is the average of the solutions to the equation $x^2 - 1296 = 0$?

A. 0 B. 18 C. 36 D. 72 E. 648

8. Use an addition pattern to find the value of y pictured in the blocks.



A. 4 B. 11 C. 15 D. 30 E. 90

9. Simplify $-\left(-\frac{1}{2^{-2}}\right)^{-2}$

A. 8 B. $\frac{1}{8}$ C. $-\frac{1}{8}$ D. $\frac{1}{16}$ E. $-\frac{1}{16}$

10. If the length of each side of Cube A is tripled to form Cube B, how many times larger is the volume of Cube B compared to the original Cube A?

A. 3 B. 4 C. 6 D. 9 E. 27

11. If two fair dice are rolled, what is the probability that the sum of the numbers rolled is a factor of 6, including 6?

A. $\frac{1}{36}$ B. $\frac{1}{12}$ C. $\frac{1}{6}$ D. $\frac{5}{36}$ E. $\frac{2}{9}$

12. For the function f, find $f(3)$ using the table below.

x	0	1	2	3
$f(x)$	3	4	5	6

A. 0 B. 3 C. 4 D. 5 E. 6

13. Find the mean length of phone calls represented in the following frequency table. Express your answer in minutes.

Phone call length (in minutes)	15	30	45	60
Frequency	5	2	1	2

A. 15 B. 30 C. 36 D. 37.5 E. 45

14. What are the odds against picking Wednesday out of a basket with each day of the week written once on a separate piece of paper?

A. 1:6 B. 6:1 C. 1:7 D. 7:1 E. 17%

15. What is the minimum number of 12-inch × 12-inch tiles that would be needed to lay side-by-side and corner-to-corner to tile a 24-foot × 36-foot patio floor?

A. 6 B. 72 C. 144 D. 864 E. 10,368

16. In a medical laboratory, a petri dish holds 6.1×10^{8} bacteria that are each 6.1×10^{-8} mm in length. Approximately how many millimeters long would it be if they were all laid end to end?

A. 6 B. 6×10^{16} C. 120 D. 37 E. 370

17. (Multiples of 12) $\cup$ (multiples of 6) $\cap$ (multiples of 3) = ?

A. multiples of 3 B. multiples of 6 C. multiples of 12 D. all real numbers E. the empty set

18. If the polynomial below is expanded, what is the greatest common factor of the terms?

$$4x(4x^3 - 2x^2 + 12x)$$

A. $4x$ B. $4x^2$ C. $8x$ D. $8x^2$ E. $48x$

19. You bought the car of your dreams for an 18% discount. After paying $400 down, you still owe $14,999. What was the original price of your car to the nearest dollar?

A. $85,500 B. $18,779 C. $18,171 D. $17,804 E. $15,417

20. Entrance to the Wyoming State Fair is $5 for adults and $3.50 for children 12 years and younger. On Monday $3011 were taken in from the sale of 721 tickets. How many adult tickets were sold on that Monday?

A. 661 B. 602 C. 396 D. 325 E. 127

21. If a, b, and c are nonzero real numbers, what is the slope of the line **perpendicular** to the line represented by $ax - by = c$?

A. $-\frac{b}{a}$ B. $\frac{a}{b}$ C. a D. $-\frac{1}{a}$ E. $\frac{a}{c}$

22. If a number Q has 3 and 8 as some of its divisors, while another number P has 2 and 9 as some of its divisors, which number below is for sure a common factor of the two numbers, P and Q?

A. 4 B. 6 C. 8 D. 11 E. 12

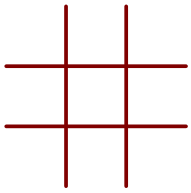
23. Sarah's Courier Service is trying a new formula for mailing charges. The new fees use the formula $C = 0.55(2 + x) + 0.20$ where C is the cost in dollars to mail x ounces. Use this formula to determine the charge for a one pound package.

A. \$10.10 B. \$9.90 C. \$9.00 D. \$5.70 E. \$1.85

24. Multiply: $(x - 2)^2(x + 2)$

A. $x^3 - 4x - 4$ B. $x^3 - 4x + 4$ C. $x^3 + 4x + 8$ D. $x^3 - 2x^2 - 4x + 8$ E. $x^3 + 2x^2 - 8x + 8$

25. What is the most number of X's you can put in a Tic-tac-toe board without making three-in-a-row in any direction?



A. Four B. Five C. Six D. Seven E. Eight