2019 TAME High School Practice State Mathematics Test

(1) If $x^2 - y^2 = 64$, and $x + y = 4$, then $x - y$ equals

A) 16 B) 64 C) 32 D) 8

(2) 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°

(3) A bag containing nickels and dimes is worth \$1.50. Of the 25 total coins in the bag, there are k more nickels than dimes. What is k?

A) 10 B) 12 C) 15 D) 18

(4) Ada Twist does not want to spend more than \$300 on ice skating. Her skates will cost \$42, her lessons will cost a total of \$56, and the practice time will cost \$7.50 per hour. Which inequality should Ada use to determine the maximum number of hours, h, she can practice without spending more than \$300?

A) $56 + 7.50h < 300$
B) $42 + 7.50h < 300$
C) $7.50h - 42 - 56 \leq 300$
D) $7.50h + 42 + 56 \leq 300$

(5) In an eighth-grade class of 30 students, the probability that a student chosen at random will be less than 13 years old is $\frac{1}{5}$. How many students in the class are less than 13 years old?

A) 12 B) 6 C) 4 D) 3

(6) If the diagonals of a rhombus are 14 and 22 centimeters (cm) long, find the area of the rhombus.

A) 36 cm^2 B) 177 cm^2 C) 154 cm^2 D) 308 cm^2

(7) How many real roots does the polynomial $p(x) = 2x^3 + 5x^2 + 9x$ have?

A) 0 B) 1 C) 2 D) 3

(8) Carol Danvers drives to Arlington at 60 mph and returns at 30 mph. What was her average speed for the round trip in mph?

A) 40 mph B) 45 mph C) 48 mph D) 52 mph

(9) A glass jar contains 8 red, 6 green, 3 blue, and 3 yellow marbles. Rosalind Franklin randomly picks a red marble. Without replacing the red marble, she randomly picks a second marble. What is the probability of Rosalind choosing another red marble?

A) $\frac{7}{8}$ B) $\frac{7}{16}$ C) $\frac{7}{19}$ D) $\frac{7}{20}$

(10) Some boys and girls are starting a math club. Initially 50% of the group are boys. Shortly thereafter two boys leave, and two girls arrive, and then 40% of the club are boys. How many boys were initially in the club?

A) 8 B) 10 C) 12 D) 14

(11) Suppose a and b are roots of the equation $x^2 + x - 1 = 0$. What is $\frac{1}{a^2} + \frac{1}{b^2}$ equal to?

A) 3 B) 4 C) 5 D) 6

(12) The time on a digital clock reads 1:11. What is the shortest length of time, in minutes, until all of the digits are again equal to each other?

A) 60 minutes B) 71 minutes C) 100 minutes D) 111 minutes

(13) If the radius of a circle is doubled, then the area is increased by how much?

A) 200% B) 300% C) 400% D) 500%

(14) To the nearest degree, what is the angle between the vectors (3, 5) and (-5, 7)?

A) 5° B) 60° C) 67° D) 72°

(15) The price of an item is reduced by 20%. By what percentage must the price increase to return to the original one?

A) 20% B) 25% C) 30% D) 35%

(16) Consider the 20-digit number, 43551234***k***13239136665. How many values of ***k*** would make this number divisible by 9?

A) none B) 1 C) 2 D) 4

(17) In a regular polygon 9 diagonals can be drawn. Find the measure of the interior angle of the polygon.

A) 60° B) 90° C) 120° D) 144°

(18) Express the base 8 repeating 0.3555… as a fraction in base 8.

A) $\frac{32}{77}$ B) $\frac{35}{77}$ C) $\frac{15}{34}$ D) $\frac{32}{70}$

(19) What is the x-intercept of the line defined by: $-2x + 3y = 12$?

A) 6 B) -4 C) -6 D) 4

(20) Dr. Mae Jemison is having a birthday party for her friend, Geordi La Forge. A total of 50 people will be attending. She currently has eight sodas. Which inequality can be used to determine how many 12-packs of sodas (x) she should buy so that each person can have at least two sodas?

A) $12x + 8 \geq 100$ B) $12x + 8 \geq 50$ C) $x + 8 \geq 100$ D) $x + 8 \geq 50$

(21) Which of the following is a factor of $x^3 + 26x^2 - 187x + 160$?

A) $(x + 1)$ B) $(x - 5)$ C) $(x + 16)$ D) $(x - 32)$

(22) What is the number of revolutions of a wheel with fixed center and with an outside radius of 15 feet, required to cause a point on the rim to go one mile? (Note that there are 5280 feet in one mile.)

A) 352 B) $\frac{176}{\pi}$ C) 352π D) 176π

(23) A right triangle inscribed in a circle has hypotenuse length 42. Find the area of the circle.

A) 21π B) 42π C) 441π D) 1764π

(24) The factory listing on Poe Dameron's new car indicated the average mileage would be 30 miles per gallon (mpg). Poe's mpg's for the past three weeks were 27 mpg, 31 mpg, and 30 mpg. What mpg must his car get next week so that the average is equal to the factory listing? (Assume distance driven each week is identical.)

A) 29 miles B) 30 miles C) 32 miles D) 33 miles

(25) If $x \in [0, \pi]$ and $2\cos^2 x - 5\cos x + 2 = 0$, then $x =$

A) $\frac{\pi}{4}$ B) π C) $\frac{\pi}{3}$ D) $\frac{\pi}{6}$

(26) What is the remainder when 2^{14} is divided by 7?

A) 1 B) 2 C) 3 D) 4

(27) What is the maximum value of the function $f(x) = 6x - 2x^3 - 5$, for $-3 \le x \le 3$?

A) -41 B) -1 C) 31 D) 47

(28) Find the larger of two numbers whose product is -16 and the sum of whose squares is a minimum.

A) 2 B) 3 C) 4 D) 6

(29) If $a - b = 3$ and $ab = 8$, then what does $a^3 - b^3$ equal?

A) 99 B) 89 C) 86 D) 66

(30) A farmer wishes to buy a rectangular field which he can subdivide into two rectangular fields of equal area. If he wishes to have a total of 600 square meters of land, what is the minimum amount of fencing he can use? (Note that the length of the dividing fence is to be included.)

A) 120 meters B) 125 meters C) 150 meters D) 175 meters

(31) Given that the vertex of the parabola $y = x^2 + 8x + k$ is on the x–axis, what is the value of k?

A) 8 B) 10 C) 12 D) 16

(32) Three cubes of volume 1, 8 and 64 cubic inches respectively are glued together. What is the smallest possible surface area of the resulting configuration?

A) 96 square inches B) 108 square inches C) 114 square inches D) 120 square inches

(33) A chord of length 24 cm is drawn in a circle of radius 13 cm. Find the distance from the chord to the center of the circle.

A) 5 cm B) 6 cm C) $5\sqrt{3}$ cm D) $6\sqrt{3}$ cm

(34) Find the area bounded by the curves $x - 2y = 1$ and $x = 4 - y^2$.

A) $\frac{8}{3}$ B) $\frac{16}{3}$ C) $\frac{32}{3}$ D) $\frac{64}{3}$

(35) At a particular time of day, a person who is 6 feet tall casts a shadow, along level ground, that is 8 feet in length. At the same time of day, what will be the distance from the top of a tree that is 15 feet tall to the tip of the shadow of the tree?

A) 20 feet B) 24 feet C) 25 feet D) 30 feet

(36) There are 30 students in a classroom. Among them 11 speak Wakandan, 24 speak English and 3 speak neither Wakandan nor English. How many students in the classroom speak both Wakandan and English?

A) 2 B) 4 C) 6 D) 8

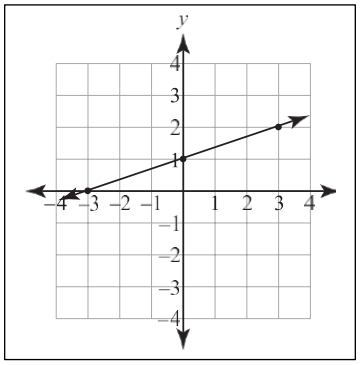
(37) The points (-3, 2), (1, 5) and (-2, 9) are three coordinates of vertices of a square. What are the coordinates of the fourth vertex?

A) (-6, 6) B) (-6, 4) C) (-6, 5) D) (6, -6)

(38) What value of b will make the determinant of $\begin{bmatrix} 3 & b \\ -2 & 5 \end{bmatrix}$ equal to 1?

A) -7 B) 7 C) -1 D) 1

(39) What is the equation of the straight-line graph shown to the right?



A) $y = 3x - 3$

B) $y = \frac{1}{3}x + 1$

C) $y = 3x + 3$

D) $y = \frac{1}{3}x - 3$

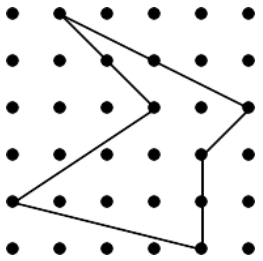
(40) A local ice cream store offers 31 different flavors of ice cream. Suppose you wish to order a triple scoop, with each scoop a different flavor. How many different combinations of three flavors are possible? (Note that the order of the scoops does not matter.)

A) 26,970 B) 13,485 C) 8,990 D) 4,495

(41) What is the greatest common factor of $30xy$, $35y^2$, and $50x^2y^2$?

A) $5y$ B) $30y$ C) $21\,x^2y^2$ D) $10\,x^2y^2$

(42) What is the numerical value of the area of the polygon on the grid to the right?



A) $9\frac{1}{2}$

B) 10

C) $10\frac{1}{2}$

D) 11

(43) Dr. Ellie Sattler's botany exhibit has an area $(x^2 - 5x - 6)$ square feet and a length of $(x + 1)$ feet. What is the width of the exhibit in feet?

A) $(x + 6)$ B) $(x^2 - 4x - 5)$ C) $(x^2 - 6x - 7)$ D) $(x - 6)$

(44) Find the average value of $y = \ln(x)$ over the domain $1 \le x \le 2$.

A) $\ln(2)$ B) $\ln(2) + 1$ C) $2\ln(2)$ D) $2\ln(2) - 1$

(45) Find the slope of the tangent line to the graph $y^2 - 2x^2 = xy$ at the point (3,6).

A) -2 B) 1 C) $\frac{12}{11}$ D) 2

(46) Find the geometric mean of 50 and 98.

A) 70 B) 74 C) 4,900 D) 5,476

(47) If $a_n = 3n - 2$, what is the 15th term in the sequence?

A) 39 B) 43 C) 45 D) 47

(48) Miles Morales is sketching quick design ideas for a new prototype. If Miles can sketch 6 designs every 15 minutes, how many designs can he sketch in 3 hours?

A) 12 B) 36 C) 72 D) 360

(49) The legs of a right triangle measure 5 and 12. Find the cosine of the smallest angle in the triangle.

A) $\frac{5}{13}$ B) $\frac{5}{12}$ C) $\frac{12}{13}$ D) $\frac{13}{12}$

(50) If the product $(x + y)^8$ is fully expanded and like terms collected, then what is the coefficient of y^3x^5 in the resulting expression?

A) 28 B) 56 C) 70 D) 96

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Answer Key

(1) A
(2) D
(3) C
(4) D
(5) B
(6) C
(7) B
(8) A
(9) C
(10) B
(11) A
(12) B
(13) B
(14) C
(15) B
(16) C
(17) C
(18) C
(19) C
(20) A
(21) B
(22) B
(23) C
(24) C
(25) C
(26) D
(27) C
(28) C
(29) A
(30) A
(31) D
(32) C
(33) A
(34) C
(35) C
(36) D
(37) A
(38) A
(39) B
(40) D
(41) A
(42) A
(43) D
(44) D
(45) D
(46) A
(47) B
(48) C
(49) C
(50) B