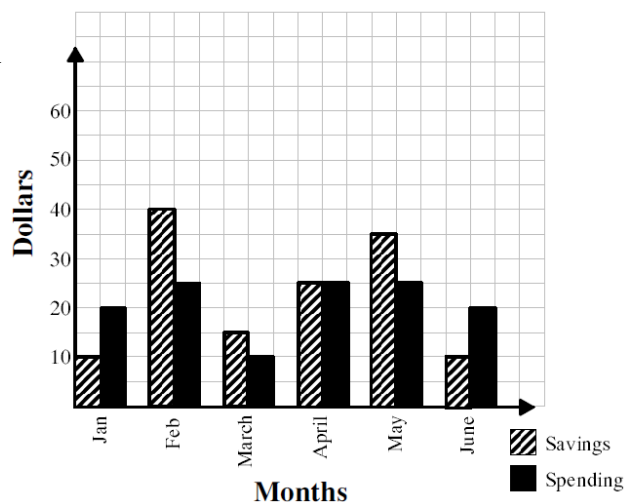


# 2018 TAME High School Practice State Mathematics Test

- (1) Evaluate:  $5 + 5(8 - 4 \times 3 \div 2)$ .  
 A) 15                                      B) 20                                      C) 35                                      D) 39
- (2) Find the equation of the line that contains the point (6, 4) and is perpendicular to the line  $y = \frac{1}{2}x + 10$ .  
 A)  $y = \frac{1}{2}x + 10$                       B)  $y = -\frac{1}{2}x + 7$                       C)  $y = 2x + 16$                       D)  $y = -2x - 2$
- (3) Alex can box thirty books in 2 minutes, James can box thirty books in 3 minutes, and Marianne can box thirty books in 5 minutes. How many minutes does it take all three of them, working together with no loss in productivity, to box one-hundred books?  
 A) 1 minute                              B) 3 minutes                              C)  $\frac{10}{3}$  minutes                              D)  $\frac{100}{31}$  minutes
- (4) Arthur, Michael, and Grant have a combined total of 48 chocolate bars. Grant has four times as many chocolate bars as Arthur. Arthur has three times as many chocolate bars as Michael. How many chocolate bars does Grant have?  
 A) 20                                      B) 24                                      C) 32                                      D) 36
- (5) Find the sum of the y-intercept and the x-intercept(s) of  $y = 5x^2 - 10x - 15$ .  
 A) -15                                      B) -13                                      C) -5                                      D) 2
- (6) If the function  $y = 3x^2 + 9x - 4$  is reflected over the x-axis, what is the new equation?  
 A)  $x = 3y^2 + 9y - 4$                       B)  $x = -3y^2 - 9y - 4$                       C)  $y = -3x^2 - 9x - 4$                       D)  $y = -3x^2 - 9x + 4$
- (7) Naomi is trying to figure out the true age of Anna. Liana is four times as old as Anna right now. In six years, Liana will be twice as old as Anna. How old is Anna right now?  
 A) 3 years                                      B) 6 years                                      C) 9 years                                      D) 12 years

(8) The graph to the right shows Elizabeth's spending and savings in the first half of 2000. In what month(s) did she spend more than she saved?

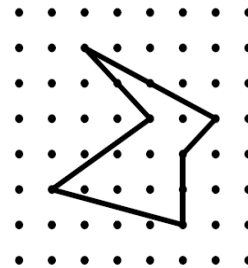
- A) April  
 B) January and June  
 C) February, March, and May  
 D) February, March, April, and May



- (9) Diane, Genny, and Ryan save stamps. One day, Diane announced, "I have  $x$  stamps." So Genny counted hers and said, "I have three times as many as you do." Ryan then added, "I have 15 less than the two of you put together." Which expression represents the number of stamps Ryan has?  
 A)  $2x - 15$                               B)  $3x - 15$                               C)  $4x - 15$                               D)  $4x + 15$

- (10) Which one of the following ordered pairs must be removed so that the set,  $\{(0, 3), (1, 4), (2, 21), (3, 30), (2, 67)\}$ , represents a function?
- A) (2, 21)                      B) (0, 3)                      C) (3, 30)                      D) (1, 4)

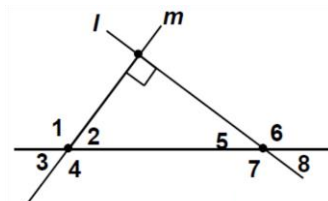
- (11) What is the area of the polygon on the grid to the right?
- A)  $9\frac{1}{2}$   
 B) 11  
 C)  $10\frac{1}{2}$   
 D) 10



- (12) A circle is drawn inside a rectangle so that it is tangent to three sides of the rectangle. If the dimensions of the rectangle are 2 and 3 then the ratio of the circumference of the circle to the perimeter of the rectangle is of what value?
- A)  $\frac{\pi}{5}$                       B)  $\frac{\pi}{6}$                       C)  $\frac{\pi}{10}$                       D)  $\frac{\pi}{12}$

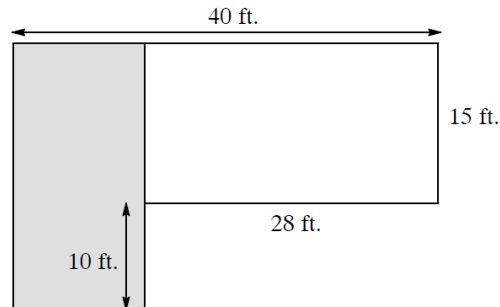
- (13) A tangent to a circle is always perpendicular to the radius of the circle drawn to the point of tangency. What is the slope of the tangent to the circle whose equation is  $(x - 2)^2 + (y - 1)^2$  at the point (6, 4)?
- A)  $\frac{3}{4}$                       B)  $-\frac{3}{4}$                       C)  $-\frac{4}{3}$                       D)  $\frac{4}{3}$

- (14) In the figure to the right, line  $l$  is perpendicular to line  $m$ . Which of the following is a pair of complementary angles?
- A)  $\angle 1, \angle 5$   
 B)  $\angle 3, \angle 7$   
 C)  $\angle 2, \angle 3$   
 D)  $\angle 3, \angle 8$

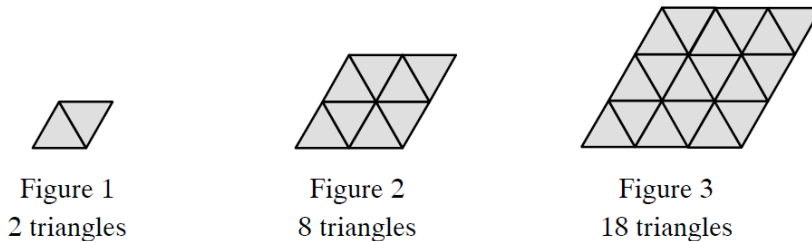


- (15) Given the equation of the following ellipse  $9x^2 + 25y^2 - 54x + 50y = 119$ , if two circles are each drawn sharing the same center as the ellipse and each circle touches the ellipse twice, what is the sum of the radii of these two circles?
- A) 5                      B) 8                      C) 15                      D) 24

- (16) Shayna has a greenhouse in the shape shown in the figure to the right. She keeps new plants in the room represented by the shaded area. What is the perimeter of the room that is shaded?
- A) 74 feet  
 B) 86 feet  
 C) 93 feet  
 D) 130 feet

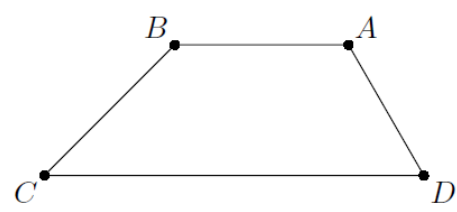


- (17) Amanda is choosing a shape to tessellate a wall for an art project. Which shape will tessellate?  
 A) regular pentagon      B) regular octagon      C) regular decagon      D) regular hexagon
- (18) How many of the small triangles would be in the fifth figure of the pattern below?



- A) 25                              B) 36                              C) 50                              D) 72
- (19) Which conic best describes the following: The equation of this conic would be the locus of a point which moves so that it is always equidistant from the point  $(4, 2)$  and from the line  $x - y = 0$ .  
 A) a hyperbola                  B) a circle                          C) a parabola                      D) an ellipse
- (20) What is the perimeter of a right triangle with hypotenuse  $H$  and area  $A$ ?  
 A)  $H + \sqrt{H + 2A}$               B)  $H + \sqrt{H^2 + 4A}$               C)  $H^2 + \sqrt{H^2 + 2A}$               D)  $H + \sqrt{H + A^2}$
- (21) An equilateral triangle is inscribed in a circle with radius of 2. What is the perimeter of the equilateral triangle?  
 A)  $18\sqrt{3}$                           B)  $12\sqrt{3}$                           C)  $9\sqrt{3}$                               D)  $6\sqrt{3}$

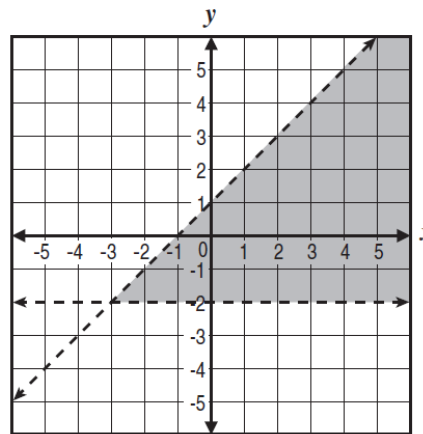
(22) In the trapezoid  $ABCD$  shown to the right,  $\overline{AB} \parallel \overline{DC}$ ,  $\overline{AB} = 8$ ,  $\overline{BC} = 6\sqrt{2}$ ,  $\angle ADC = 60^\circ$ , and  $\angle BCD = 45^\circ$ . Determine the length of  $\overline{CD}$ .



- A) 14  
 B)  $20 + \sqrt{3}$   
 C)  $14 + 2\sqrt{3}$   
 D) 18
- (23) A square has two of its vertices located at the points  $(0, 0)$  and  $(0, 8)$ . Which of the following points cannot be a location of another vertex?  
 A)  $(-8, 8)$                           B)  $(-8, 0)$                           C)  $(-4\sqrt{2}, 4\sqrt{2})$                           D)  $(8, 8)$
- (24) Find the point  $(a, b)$  on the line  $y = 3x + 1$  which is equidistant from  $(0, 0)$  and  $(5, 1)$ . What is  $a - b$ ?  
 A)  $-2$                                   B)  $-4$                                   C)  $-5\frac{1}{2}$                                   D)  $-2\frac{1}{2}$
- (25) Where is the center of the hyperbola whose equation is:  $2x^2 - 3y^2 + 4x + 3y - 23 = 0$ ?  
 A)  $(-2, 1)$                               B)  $(1, -\frac{1}{2})$                               C)  $(-1, \frac{1}{2})$                               D)  $(2, -1)$

- (26) If you invest \$300 in an account paying 3.1% compounded continuously, how long will it take your money to double?  
 A) 22.4 years                      B) 8.6 years                      C) 19.5 years                      D) 37.4 year
- (27) What is the domain of the function:  $f(x) = \ln(2 - x)$ ?  
 A)  $(2, \infty)$                       B)  $(-\infty, 2)$                       C)  $(-2, \infty)$                       D)  $(-\infty, -2)$
- (28) Organic green beans cost three times as much as their non-organic counterpart. Noah buys 4 pounds of non-organic beans and 1.5 pounds of organic beans for a total cost of \$5.53. What is the cost per pound of the non-organic beans?  
 A) 52¢                      B) 65¢                      C) \$1.94                      D) \$3.30

- (29) What system of inequalities best represents the graph shown to the right?



- A)  $y < -2$  and  $y < x + 1$   
 B)  $y < -2$  and  $y > x + 1$   
 C)  $y > -2$  and  $y > x + 1$   
 D)  $y > -2$  and  $y < x + 1$

- (30) Two consecutive positive integers have the property that one integer times twice the other equals 612. What is the sum of these two integers?  
 A) 33                      B) 35                      C) 37                      D) 39
- (31) Which of the following statements is true about the graphs of  $y = 3(x - 5)^2 + 1$  and  $y = 3(x + 5)^2 + 1$ ?  
 A) Their vertices are maximums.  
 B) The graphs have the same shape with different vertices.  
 C) The graphs have different shapes with different vertices.  
 D) One graph has a vertex that is a maximum, while the other graph has a vertex that is a minimum.
- (32) Which statement describes the graph of the equation  $x^2 + y^2 + 4x - 6y - 3 = 0$ ?  
 A) a hyperbola with center  $(-2, 3)$  and vertices  $(4, -3)$  and  $(-4, 3)$   
 B) a hyperbola with center  $(-2, 3)$  and vertices  $(2, -3)$  and  $(3, -2)$   
 C) a circle with center  $(-2, 3)$  and radius 8  
 D) a circle with center  $(-2, 3)$  and radius 4
- (33) Evaluate:  $\log_{10}\left(\frac{1}{2}\right) + \log_{10}\left(\frac{2}{3}\right) + \log_{10}\left(\frac{3}{4}\right) + \dots + \log_{10}\left(\frac{98}{99}\right) + \log_{10}\left(\frac{99}{100}\right)$ .  
 A) -2                      B) -1                      C) 0                      D) 2
- (34) If  $3^P + 34 = 90$ ,  $2^R + 44 = 76$  and  $53 + 6^S = 1421$ , what is the product,  $(P)(R)(S)$ , equal to?  
 A) 27                      B) 40                      C) 50                      D) 70



- (45) The graph of the exponential function of the form  $y = Ae^{Bx}$  passes through the points (1, 2) and (5, 10). What is the value of  $A$ ?
- A)  $\frac{\ln 5}{4}$                       B)  $\frac{3}{\sqrt[4]{4}}$                       C)  $\frac{2}{\sqrt[4]{8}}$                       D)  $\frac{8}{5}$
- (46) A circle of radius 5 units is centered at the origin in the  $xy$ -plane. A point Q on the circle is located  $60^\circ$  counterclockwise from the point (5, 0). Where does the line tangent to the circle at Q cross the  $x$ -axis?
- A) (10, 0)                      B) (5, 0)                      C) (6, 0)                      D) (2, 0)
- (47) If  $\log_3 5 = A$ , then what is the value of  $\log_3 \left( \frac{9}{25\sqrt{15}} \right)$ ?
- A)  $\frac{5}{2} - \frac{1}{2}A$                       B)  $\frac{3}{2} - \frac{5}{2}A$                       C)  $1 - 2A - \sqrt{A}$                       D)  $\frac{3}{2} - 2A - \sqrt{A}$
- (48) Which of the following is a solution to  $15\sin x + 12\tan x = 28$ ?
- A)  $\tan^{-1} \frac{4}{3}$                       B)  $\sin^{-1} \frac{15}{7}$                       C)  $\tan^{-1} \frac{12}{5}$                       D)  $\sin^{-1} \frac{3}{7}$
- (49) A professor lectured to an audience for an hour. During that hour, ten percent of the audience slept through the entire lecture and twenty percent heard the entire lecture. Half of the remainder of the audience heard one-third of the lecture, and the other half heard two-thirds of the lecture. What was the average number of minutes of the lecture heard by the members of the audience?
- A) 24                      B) 30                      C) 33                      D) 36
- (50) The product of a  $3 \times 4$  matrix with a  $4 \times 2$  matrix is what type of matrix?
- A)  $4 \times 2$                       B)  $4 \times 3$                       C)  $3 \times 4$                       D)  $3 \times 2$
- (51) The radius of a circular oil spill is growing at a constant rate of 2 km per day. At what rate per day is the area of the spill growing 4 days after it began? Assume the thickness is constant.
- A)  $4\pi \frac{km^2}{day}$                       B)  $16\pi \frac{km^2}{day}$                       C)  $32\pi \frac{km^2}{day}$                       D)  $64\pi \frac{km^2}{day}$
- (52) Find the maximum volume of a rectangular open-top box made from a piece of cardboard measuring 24 inches long and 9 inches wide by cutting out identical squares from the four corners and turning up the sides.
- A)  $2 \text{ in}^3$                       B)  $4 \text{ in}^3$                       C)  $144 \text{ in}^3$                       D)  $200 \text{ in}^3$
- (53) What is the volume of a tetrahedron defined by the points (3, 2, 6), (1, 2, 3), (7, 1, 4) and (4, 7, 8)?
- A)  $\frac{79}{6}$                       B)  $\frac{79}{4}$                       C)  $\frac{79}{3}$                       D)  $\frac{79}{2}$
- (54) Consider the function  $Z(r)$ ,  $Z(r) = \begin{cases} 2r+3, & \text{if } r < 3 \\ 2, & \text{if } r = 3 \\ 7-2r, & \text{if } r > 3 \end{cases}$ . What is  $\lim_{x \rightarrow 3^+} Z(r)$ ?
- A) 1                      B) 2                      C) 3                      D) 9



**2018 TAME High School Practice State Mathematics Test  
Answer Key**

- (1) A
- (2) C
- (3) D
- (4) D
- (5) B
- (6) D
- (7) A
- (8) B
- (9) C
- (10) A
- (11) A
- (12) A
- (13) C
- (14) D
- (15) B
- (16) A
- (17) D
- (18) C
- (19) C
- (20) B

- (21) D
- (22) C
- (23) C
- (24) B
- (25) C
- (26) A
- (27) B
- (28) B
- (29) D
- (30) B
- (31) B
- (32) D
- (33) A
- (34) B
- (35) D
- (36) B
- (37) C
- (38) B
- (39) B
- (40) C

- (41) A
- (42) D
- (43) B
- (44) C
- (45) C
- (46) A
- (47) D
- (48) A
- (49) C
- (50) D
- (51) C
- (52) D
- (53) A
- (54) A
- (55) A
- (56) B
- (57) D
- (58) B
- (59) A
- (60) B