



NEW JERSEY CENTER
FOR TEACHING & LEARNING

Mathematics Content Knowledge (5161) Diagnostic Assessment

This diagnostic assessment is designed to help guide your decisions about which courses you should study to increase the likelihood of success on the Praxis. That is its sole purpose.

These questions represent the best judgement of NJCTL as to what is assessed on the Praxis exam and the last course in the sequence of NJCTL courses in which that topic is taught. Hence, if you do well on the questions from an early course, you can better focus your efforts on later courses.

To make this effective it is important that you **do not guess** on questions since if you get them correct by chance you may mislead yourself. Similarly, **do not excessively struggle or take an excessive amount of time** to do a problem, you may be better served by leaving it blank since it would probably be worth learning that topic more thoroughly.

Since this assessment cannot thoroughly probe each aspect of all topics, given its limited length, taking the above instructions to heart would give you a more informative result than by trying your best to maximize your score.

The questions are grouped such that the easier questions are at the beginning. Do not be discouraged if you find as you proceed through the test it becomes difficult to answer questions. That is simply providing you the information you need as to where you should begin the sequence of courses leading to taking the Praxis.

Name _____

Date _____

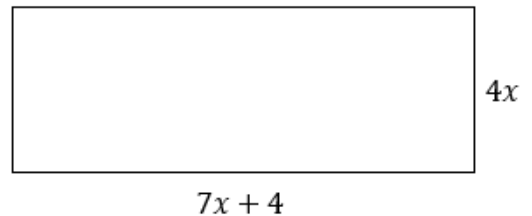
| Number | Answer | Number | Answer | Number | Answer | Number | Answer |
|--------|--------|--------|--------|--------|--------|--------|--------|
| 1 | | 26 | | 51 | | 76 | |
| 2 | | 27 | | 52 | | 77 | |
| 3 | | 28 | | 53 | | 78 | |
| 4 | | 29 | | 54 | | 79 | |
| 5 | | 30 | | 55 | | 80 | |
| 6 | | 31 | | 56 | | 81 | |
| 7 | | 32 | | 57 | | 82 | |
| 8 | | 33 | | 58 | | 83 | |
| 9 | | 34 | | 59 | | 84 | |
| 10 | | 35 | | 60 | | 85 | |
| 11 | | 36 | | 61 | | 86 | |
| 12 | | 37 | | 62 | | 87 | |
| 13 | | 38 | | 63 | | 88 | |
| 14 | | 39 | | 64 | | 89 | |
| 15 | | 40 | | 65 | | 90 | |
| 16 | | 41 | | 66 | | 91 | |
| 17 | | 42 | | 67 | | 92 | |
| 18 | | 43 | | 68 | | 93 | |
| 19 | | 44 | | 69 | | 94 | |
| 20 | | 45 | | 70 | | 95 | |
| 21 | | 46 | | 71 | | 96 | |
| 22 | | 47 | | 72 | | 97 | |
| 23 | | 48 | | 73 | | 98 | |
| 24 | | 49 | | 74 | | 99 | |
| 25 | | 50 | | 75 | | | |

- The band at the local high school is selling candy to raise money for their annual trip to Carnegie Hall. They paid \$50 for the candy and are selling each candy bar for \$1.25 each. How many candy bars does the band need to sell before they start making a profit?
 - 30
 - 40
 - 20
 - 25
- Below is a list of numbers written in scientific notation.

- -2.1×10^2
- -7.8×10^3
- 9.2×10^{-2}
- -6.5×10^{-3}

What is their order from least to greatest?

- I, IV, II, III
 - III, II, IV, I
 - IV, III, I, II
 - II, I, IV, III
- Which equation best represents the formula for the perimeter of the rectangle?
 - $P = \frac{1}{2}(4x)(7x + 4)$
 - $P = (4x)(7x + 4)$
 - $P = 2(4x) + 2(7x + 4)$
 - $P = (4x) + (7x + 4)$



- Karin asked her classmates at lunch how they travel to school each morning. She created a table to record the results of her poll. If she brings the table to one of her teachers to choose a random student, what is the probability that they will select a student who rides in a car or bus?

- $\frac{9}{47}$
- $\frac{17}{47}$
- $\frac{21}{47}$
- $\frac{38}{47}$

| Transportation Mode | Number of Students |
|---------------------|--------------------|
| Bike | 3 |
| Bus | 21 |
| Car | 17 |
| Walk | 6 |

5. A father is trying to teach his baby boy how to wave. The father waves at him every 4 seconds. The son waves back at his father every six seconds. When will the father and son wave to each other at the same time?
- A. 24 seconds
 - B. 12 seconds
 - C. 6 seconds
 - D. 18 seconds

6. Simplify: $162 \div [2(9 + 3^2)]$
- A. 4.5
 - B. 3
 - C. 972
 - D. 5.4

7. During a semi-annual sale, a bedroom set is 25% off its original price of \$2600. After the sale, the bedroom set can be purchased with a coupon for 15% off the sale price. What is the price of the bedroom set after the sale with a coupon?
- A. \$1457.54
 - B. \$1521.35
 - C. \$1657.50
 - D. \$1725.35

8. Order the following rational numbers from greatest to least.

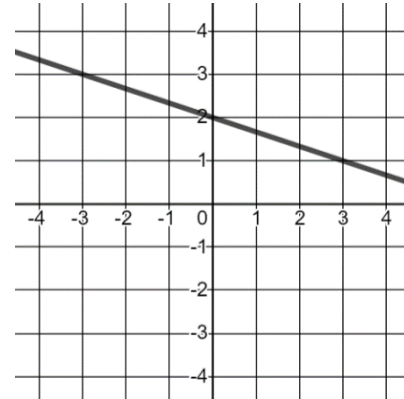
$$\left\{ 8.8, \frac{26}{3}, \sqrt{64}, 8\frac{2}{7} \right\}$$

- A. $8\frac{2}{7}, \frac{26}{3}, 8.8, \sqrt{64}$
 - B. $8.8, \frac{26}{3}, 8\frac{2}{7}, \sqrt{64}$
 - C. $\frac{26}{3}, \sqrt{64}, 8.8, 8\frac{2}{7}$
 - D. $\sqrt{64}, 8\frac{2}{7}, \frac{26}{3}, 8.8$
9. Evaluate the expression if $a = -2$, $b = -4$, and $c = 13$.
- $$\frac{3ac + b^2}{a + 3}$$
- A. -62
 - B. -12.4
 - C. 18.8
 - D. -94

10. In high school, Jordan ran an average of 30,000 meters per week on the cross-country team. When he got to college, he focused on his training and ran an average of 60 kilometers a week. How much farther does Jordan now run each week in college than he did in high school?
- A. 300 km
 - B. 3 km
 - C. 30 km
 - D. 60 km
11. On a map of South Carolina, Columbia and Myrtle Beach are about 8.4 inches apart. If the scale is 1 inch = 15 miles, how far apart are the two cities?
- A. 126 miles
 - B. 179 miles
 - C. 56 miles
 - D. 252 miles
12. What is the value of x if $63 = \frac{3}{4}x + 9$?
- A. 96
 - B. 40.5
 - C. 72
 - D. 54
13. If $f(x) = \frac{7x^2}{6x-9}$ for all $x \neq \frac{3}{2}$, what is the value of $f(-6)$?
- A. $\frac{28}{3}$
 - B. $-\frac{28}{5}$
 - C. -7
 - D. $\frac{28}{5}$
14. Evaluate the expression: 4^{-3}
- A. 64
 - B. $\frac{1}{64}$
 - C. -64
 - D. -12
15. Perform the indicated operation: $(4d^2 + 9) + (3d - 7) - (d^2 + d - 2)$
- A. $3d^2 + 2d + 4$
 - B. $3d^2 + 4d + 4$
 - C. $3d^2 + 4d$
 - D. $5d^3$

16. What is the slope of the line shown in the graph?

- A. $\frac{1}{3}$
- B. $-\frac{1}{3}$
- C. 3
- D. -3



17. Which set of ordered pairs represents y as a function of x ?

- A. $(3, -4), (3, -1), (7, 8), (7, 6)$
- B. $(1, -5), (1, 1), (1, 5), (1, 8)$
- C. $(2, -5), (-3, 1), (2, 5), (7, 8)$
- D. $(1, 3), (-2, 6), (0, -5), (8, 3)$

18. The stem and leaf plot below shows the weights (in pounds) of different packages shipped from a mailing center. What was the median of the package weights?

- A. 39 lbs
- B. 25 lbs
- C. 11 lbs
- D. 5 lbs

| Stem | Leaf |
|------|-------|
| 1 | 1 7 |
| 2 | 3 5 |
| 3 | 4 9 9 |

19. On the xy -plane, the y -intercept of a line is 6, and the x -intercept of a line is 3. Which equation represents this line?

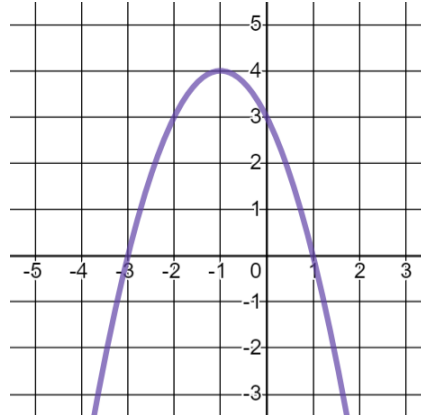
- A. $y = 6x + 3$
- B. $3x + 6y = 0$
- C. $y = -2x + 6$
- D. $y = 3x + 6$

20. What is the range of the function $y = 2x^2 + 6x - 5$?

- A. $\{y|y \neq -1.5\}$
- B. $\{y|y \in \mathbb{R}\}$
- C. $\{y|y \geq -1.5\}$
- D. $\{y|y \geq -9.5\}$

21. What are the roots of the function shown?

- A. $(-3,0)$ & $(3,0)$
- B. $(0,3)$ & $(-3,0)$
- C. $(1,0)$ & $(0,3)$
- D. $(1,0)$ & $(-3,0)$



22. What is the y -intercept of the function $4x - 5y = 20$?

- A. $(0,5)$
- B. $(0,4)$
- C. $(0,-5)$
- D. $(0,-4)$

23. At a garage sale Christina buys 4 shirts and 3 skirts for \$13.30. Later, her sister Jenna buys 1 shirt and 2 skirts for \$6.20. If the prices of the items were the same price all day, what was the cost of a shirt?

- A. \$2.30
- B. \$3.90
- C. \$1.60
- D. \$10.80

24. Let set $M = \{x, -5, 16, x, 8, -1, 0, -7, 8, 2, 9\}$. In set M , if x is 5 less than the highest numerical value present, what is the median of the set?

- A. 2
- B. 5
- C. 8
- D. 0

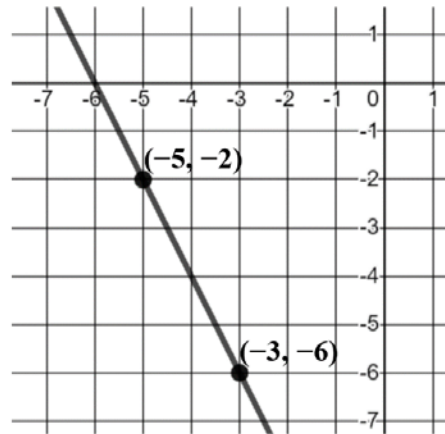
25. A cell phone company is coming out with a new cellular plan for a retirement village. This monthly plan would have a base rate for the phone and then only charge \$0.50 per text. Research has shown that seniors send less than 30 text messages per month, so this plan would be more cost effective for them. If this situation represents a function, what is the domain of the function?

- A. how many seniors are in the retirement village
- B. all nonnegative multiples of 0.5
- C. all rational numbers
- D. nonnegative integers less than 30

26. What are the point(s) of intersection for the graphs of $y = -x$ and $y = x^2$?
- A. $(-1,1)$ & $(0,0)$
 - B. $(1,1)$ & $(0,0)$
 - C. $(1,-1)$ & $(0,0)$
 - D. $(-1,-1)$ & $(0,0)$

27. What would $2a + b$ equal if we know that $4a + 1 = 21$ and $\frac{1}{3}b = 7$?
- A. -11
 - B. 19
 - C. 38
 - D. 31

28. What is the equation of the line shown in this graph?
- A. $y = -2x - 12$
 - B. $y = -2x + 12$
 - C. $y = 2x - 12$
 - D. $y = -4x - 12$

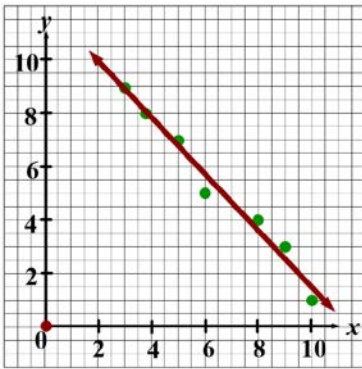


29. Francisco has \$6.50 to spend at the ice cream shop. A sundae costs \$4.35 plus \$0.55 per topping. Which of the following inequalities represents the possible amount of toppings that Francisco can order?
- A. $4.35 + 0.55t \leq 6.50$
 - B. $4.35 + 0.55t \geq 6.50$
 - C. $0.55 + 4.35t \leq 6.50$
 - D. $4.35 + 6.50 < 0.55t$
30. A chemist needs a 20% acid solution for a certain test, but the supplier only ships a 15% solution and a 30% solution. Rather than pay a surcharge to have the supplier make a 20% solution, the scientist decides to mix the 15% solution with the 30% solution, to make their own 20% solution. The scientist needs 20 liters of the 20% acid solution. About how many liters of the 30% solution will the scientist need?
- A. 4.67 liters
 - B. 15.33 liters
 - C. 6.67 liters
 - D. 13.33 liters

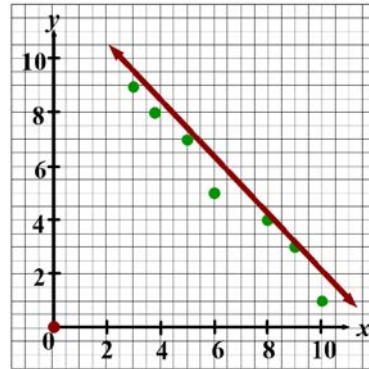
31. A new food truck company starts with a fleet of 54 trucks and adds 54 more trucks over its first three years. If the company's growth is represented by a linear function and it continues to grow at this rate, how many trucks will the company have at the end of the next 3 years (6 years after the company started)?
- A. 54
 - B. 108
 - C. 162
 - D. 216
32. A new food truck company starts with a fleet of 54 trucks and adds 54 more trucks over its first three years. If the company's growth is represented by an exponential function and it continues to grow at this rate, how many trucks will the company have at the end of the next 3 years (6 years after the company started)?
- A. 54
 - B. 108
 - C. 162
 - D. 216
33. Audra finds some dimes, nickels, and quarters as she empties the clothes out of her washing machine. She finds three fewer dimes than quarters and 6 more nickels than quarters. She finds a total of 33 coins. Which equation can be used to find how many quarters she found?
- A. $q(q - 3)(q + 6) = 33$
 - B. $(q - 3) + (q + 6) = 33$
 - C. $q + q + q = 33 - (q - 3) + (q + 6)$
 - D. $q + (q - 3) + (q + 6) = 33$
34. Factor this expression: $x^2 + 10x - 24$
- A. $(x + 8)(x + 3)$
 - B. $(x - 12)(x + 2)$
 - C. $(x + 6)(x + 4)$
 - D. $(x - 2)(x + 12)$
35. Ricky mows lawns on the weekend for some extra money. He charges an initial fee of \$30 and then \$10 per lawn. If Ricky changes his initial fee to \$15, how would the graph of his fees change?
- A. The starting point of the graph would increase
 - B. The starting point of the graph would decrease
 - C. The slope would decrease
 - D. The slope would increase

36. Which of the following represents the line of best fit for the given data?

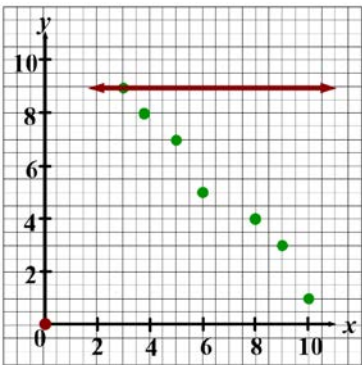
A.



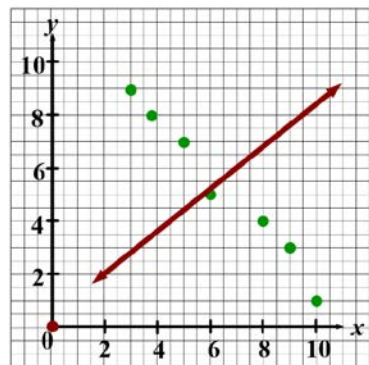
B.



C.



D.



37. Which equation could represent the relationship shown in the table below?

- A. $c = 5a \cdot b$
- B. $c = 5a + 5b$
- C. $c = a - 5b$
- D. $c = 5a$

| a | b | c |
|----|---|-----|
| -3 | 1 | -8 |
| -2 | 2 | -12 |
| -1 | 3 | -16 |
| 0 | 4 | -20 |

38. Given this system of equations, what is $x^2 - y$?

- A. 10
- B. 8
- C. 2
- D. 4

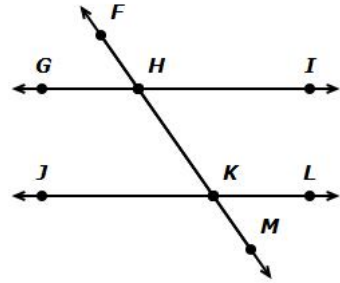
$$\begin{cases} 2x - 3y = 9 \\ -5x + 2y = -17 \end{cases}$$

39. Triangle ΔABC is a triangle in the xy -plane with vertices at $A(-4,2)$, $B(0,6)$, and $C(3,2)$. What is the perimeter of ΔABC ?

- A. $4 + 3\sqrt{2}$
- B. $12 + 2\sqrt{2}$
- C. $4 + 4\sqrt{2}$
- D. $12 + 4\sqrt{2}$

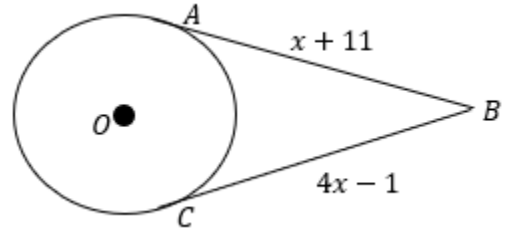
40. In this diagram, \overleftrightarrow{GI} and \overleftrightarrow{JL} are parallel. Which of the angles are alternate exterior angles?

- A. $\angle JKH$ and $\angle IHK$
- B. $\angle GHF$ and $\angle LKM$
- C. $\angle JKH$ and $\angle FHI$
- D. $\angle FHI$ and $\angle HKL$



41. Find the value of x given that \overline{AB} and \overline{BC} are tangents to circle O .

- A. $x = 3$
- B. $x = 4$
- C. $x = 2$
- D. $x = -5$



42. $\triangle ABC$ is a triangle in the xy -plane with vertices at $A(-4,2)$, $B(0,6)$, and $C(3,2)$. What is the perimeter of $\triangle ABC$?

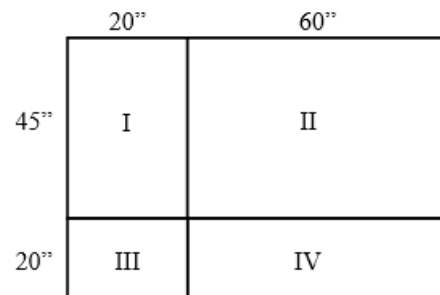
- A. $4 + 3\sqrt{2}$
- B. $12 + 2\sqrt{2}$
- C. $4 + 4\sqrt{2}$
- D. $12 + 4\sqrt{2}$

43. In the coordinate plane, the coordinates of point C are $(5, -6)$. What are the coordinates of C' after a reflection over $y = -x$ followed by a translation of 5 units left and 2 units down?

- A. $(-1, 3)$
- B. $(1, -7)$
- C. $(-11, 3)$
- D. $(11, -7)$

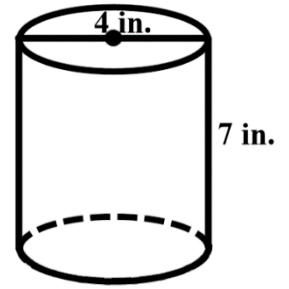
44. A dart hits the board. What is the probability that it will hit the board in region III?

- A. $\frac{9}{52}$
- B. $\frac{27}{52}$
- C. $\frac{4}{13}$
- D. $\frac{1}{13}$



45. Charlie wants to make several containers like this one. He is going to cut them from a sheet of metal that has an area of 8000 in^2 . Assuming that can be done so that there is no unused metal, about how many containers can he make?

A. 127
B. 70
C. 28
D. 39



46. Line m has an equation $y = -9x + 4$. Line n is parallel to line m and passes through the points $(-6, 1)$ and $(x, 19)$. What is the value of x ?

A. -7
B. -8
C. 8
D. -4

47. A triangle has three angles: x° , $(x + 6)^\circ$, and $(5x + 6)^\circ$. What is the measure of the smallest angle of the triangle?

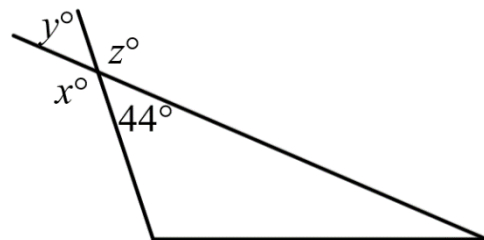
A. 24°
B. 126°
C. 30°
D. 60°

48. At a certain time of day, a building is casting a shadow that is 9 meters long. At the same time, a man who is 2 meters tall, casts a shadow that is 0.3 meters long. How tall is the building?

A. 6 m
B. 135 m
C. 1.35 m
D. 60 m

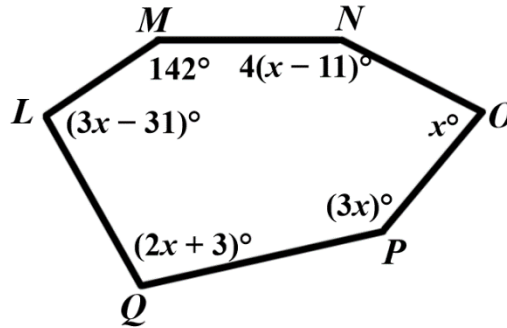
49. Find the degree value of y .

A. 44
B. 136
C. 180
D. 36



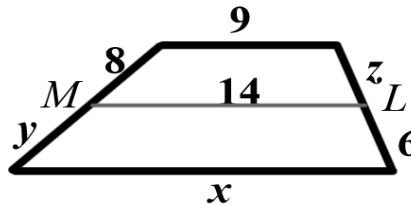
50. Polygon $LMNOPQ$ is a hexagon. What is the measure of the largest angle?

- A. 50°
- B. 103°
- C. 142°
- D. 156°



51. \overline{ML} is the midsegment of the below trapezoid. What is the value of $x + y + z$?

- A. 23
- B. 33
- C. 42
- D. 47



52. Determine if the statement is always, sometimes, or never true: A rhombus is a square.

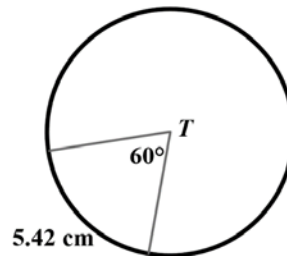
- A. Always
- B. Sometimes
- C. Never

53. If the radius of $\odot C$ measures 9.6 meters, what is the measure of its longest chord?

- A. 9.6 m
- B. 7.2 m
- C. 19.2 m
- D. Not enough information

54. Find the circumference of $\odot T$.

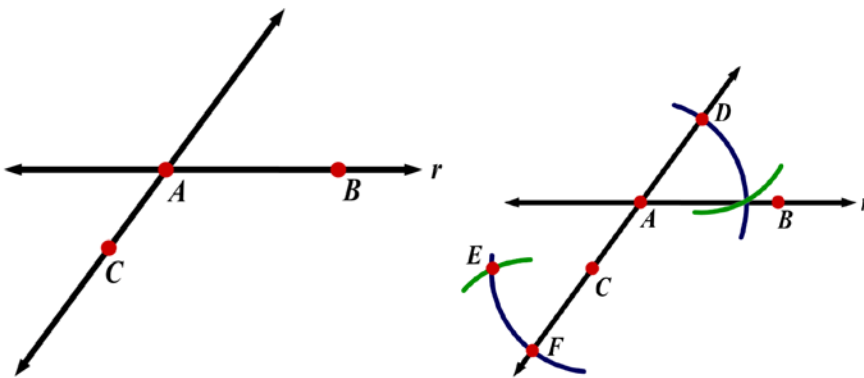
- A. 32.52 cm
- B. 3.25 cm
- C. 27.1 cm
- D. 42.58 cm



55. A right square pyramid has a slant height of 4 feet and a base edge of 6 inches. What is the surface area of the pyramid?
- 216 square feet
 - 4.25 square feet
 - 84 square feet
 - 48 square feet

56. What is the midpoint between $(-8, 3)$ and $(-4, -7)$?
- $(-6, 5)$
 - $(-6, -2)$
 - $(-12, -4)$
 - $(6, -2)$

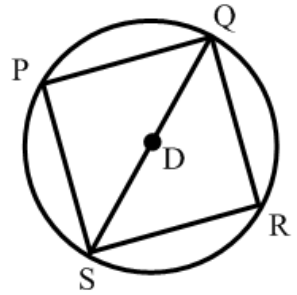
#57-58: The diagram below shows line r , and point C not on line r . Also shown is \overleftrightarrow{AC} .



57. Consider the partial construction of a line parallel to r through point C . What would be the final step in the construction?
- Draw a line through points D and E .
 - Draw a line through points F and B .
 - Draw a line through points C and E .
 - Draw a line through points C and B .
58. Once the construction is complete, which of the reasons listed could contribute to proving the validity of the construction?
- When two lines are cut by a transversal and the complementary angles are congruent, the lines are parallel.
 - When two lines are cut by a transversal and the alternate exterior angles are congruent, the lines are parallel.
 - Definition of an angle bisector
 - Definition of a segment bisector

59. Square PQRS is inscribed in circle D. The area of circle D is $20.25\pi \text{ m}^2$. Find the perimeter of square PQRS.

- a. 40.50 m
- b. 25.46 m
- c. 6.36 m
- d. 12.73



60. Which of the following expression is equivalent to $(2x - 3y)^4$ for all values of x and y ?

- a. $16x^4 - 81y^4$
- b. $16x^4 - 96x^3y + 216x^2y^2 - 216xy^3 + 81y^4$
- c. $16x^4 + 96x^3y - 216x^2y^2 + 216xy^3 - 81y^4$
- d. $16x^4 - 64x^3y + 216x^2y^2 - 244xy^3 + 81y^4$

61. Which of the following expressions is equivalent to $(p^4q^{-\frac{3}{4}})(p^{-\frac{1}{3}}q^3)$, where p and q are integers?

- a. $\sqrt[12]{p^{44}q^{27}}$
- b. $\frac{p^{\frac{11}{3}}}{q^{-\frac{15}{4}}}$
- c. $\sqrt[12]{p^{52}q^{45}}$
- d. $\frac{p^{\frac{13}{3}}}{q^{-\frac{9}{4}}}$

62. 120 gamers were surveyed about their gaming systems it was found that 66 own an Xbox, 49 own a PlayStation and 12 own both. _____ gamers own an Xbox or PlayStation and _____ own neither an Xbox nor PlayStation.

- a. 17, 103
- b. 78, 42
- c. 103, 17
- d. 115, 5

63. What is the value of the product of $6 + 7i$ and its conjugate?

- a. 13
- b. 36
- c. 49
- d. 85

64. In the state of Louisiana, random license plates are created by selecting 3 letters followed by 3 numbers, 0 through 9. How many license plates are possible?
- 12,654,720
 - 15,600,000
 - 17,576,000
 - 45,697,600
65. A function is defined by $y = -(x - 4)^2 + 2$ for all real values x such that y is a real number.
- The domain is $[-4, \infty)$. The range is $[2, \infty)$.
 - The domain is $[-4, \infty)$. The range is $(-\infty, \infty)$.
 - The domain is $(-\infty, \infty)$. The range is $(-\infty, 2]$.
 - The domain is $(-\infty, \infty)$. The range is $(-\infty, \infty)$.
66. The graphs $y = -x - 2$ and $y = x^3 + x^2 - 3x - 2$ intersect at more than one point. Find the coordinates for each point of intersection.
- (-1.5, 1.5)
 - (-1, 0)
 - (0, 0)
 - (-2, 0)
67. What are the roots of the function $f(x) = 2x(x - 3)(x + 2)(x^2 + 16)$?
- 3, 2, $\pm 4i$
 - 2, 0, 3, $4i$
 - 2, 0, 3, $\pm 4i$
 - 3, 0, 2, $4i$
68. Which of the polynomial functions have zeros of -3, 1 and 5?
- $x^3 - 7x + 6$
 - $x^3 - 3x^2 - 13x + 14$
 - $-x^2 + x + 6$
 - $-2x^3 + 6x^2 + 26x - 30$
69. You decide to open two "rainy day" accounts. An amount of \$1,500 is deposited in account one paying 2.5% interest compounded monthly. An amount of \$1,000 is deposited in account two paying 4% interest compounded continuously. What is the total interest earned on both accounts in 9 years, if no other transactions are made on the accounts?
- \$754.45
 - \$789.64
 - \$811.37
 - \$837.45

70. In the coordinate plane, the graph of a parabola is $y = x^2$. If the parabola is translated p units right and q units down, what is the translated equation of the parabola?

- a. $y = (x - p)^2 - q$
- b. $y = (x + p)^2 - q$
- c. $y = (x + p)^2 + q$
- d. $y = (x - p)^2 + q$

71. Which of the equations has zeros at $x = 3$, $x = 2$ and $x = -4$?

- a. $x^3 - 9x^2 + 26x - 24$
- b. $x^3 - x^2 - 14x + 24$
- c. $x^3 - 3x^2 - 10x + 24$
- d. $x^3 + x^2 - 14x - 24$

72. Jonathan can mow the lawn alone in 3 hours. It only takes 2 hours for Jonathan and his brother to mow the lawn together. If Johnathan's brother worked alone, how long will it take him to mow the lawn?

- a. 4 hours
- b. 6 hours
- c. 4 hours and 30 minutes
- d. 5 hours and 30 minutes

73. If the sequence $\{R_n\}$ is defined by the recursive equations shown below, which of the following equations is true for all integers of the sequence?

$$R_1 = -11 \qquad R_n = R_{n-1} + 7$$

- a. $R_n = -11n + 7$
- b. $R_n = 11n - 18$
- c. $R_n = 7n - 11$
- d. $R_n = 7n - 18$

74. Which of the following are zeros of the function $f(x) = 3x^2 - 4x + 8$?

- a. $\frac{2+2i\sqrt{5}}{3}$
- b. $\frac{2+2\sqrt{7}}{3}$
- c. $\frac{2+2i\sqrt{7}}{3}$
- d. $\frac{2-2\sqrt{7}}{3}$

75. Which of the following is the equivalent form of $y = x^2 + 4x + 1$?

- a. $y = (x + 2)^2 + 3$
- b. $y = (x + 2)^2 - 3$
- c. $y = (x - 2)^2 - 3$
- d. $y = (x - 2)^2 + 3$

76. An ellipse is represented by the equation $2y^2 + 8y + 3x^2 - 18x - 25 = 0$. What is the center of the ellipse?

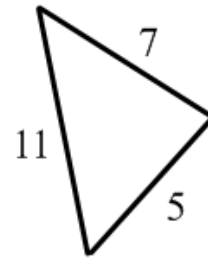
- a. (3, 2)
- b. (-3, -2)
- c. (3, -2)
- d. (-3, 2)

77. Solve the equation: $\log_4 x + \log_4(x - 12) = 3$

- a. $x=4$
- b. $x=16$
- c. $x=8$
- d. $x=-4, 16$

78. What is the measure of the largest angle of the given triangle?

- a. 132.2°
- b. 17.9°
- c. 28.1°
- d. 19.7°



79. The $\cot x = \frac{\sqrt{3}}{3}$ and $\cos x < 0$. Find $\csc x$.

- a. -2
- b. $\sqrt{3}$
- c. $-\frac{2\sqrt{3}}{3}$
- d. $\frac{\sqrt{3}}{2}$

80. Solve $e^{x^2} = 25^x$. Round the solution to the nearest hundredth.

- a. 3.22
- b. 3.52
- c. 3.77
- d. 3.97

81. Find a solution of the equation: $\sqrt{10 \sin x - 1} = 2$

- a. $\pi/2$
- b. $\pi/3$
- c. $\pi/4$
- d. $\pi/6$

82. What is the determinant of this matrix?

- a. 3
- b. 1
- c. -3
- d. 27

$$\begin{bmatrix} 6 & -5 \\ -3 & 2 \end{bmatrix}$$

83. The graph of a parabola has the following equation. What is the focus of the parabola?

- a. $(-\frac{11}{2}, 3)$
- b. $(-\frac{9}{2}, 3)$
- c. $(-\frac{11}{2}, -3)$
- d. $(-\frac{9}{2}, -3)$

$$x = \frac{1}{2}(y - 3)^2 - 5.$$

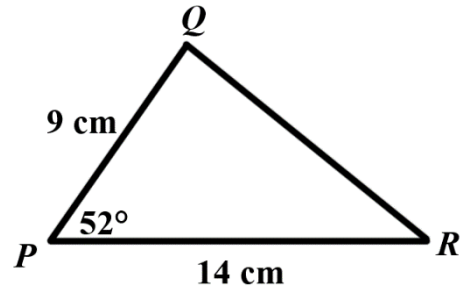
$$\begin{bmatrix} -2 & 1 & -4 \\ 6 & 2 & -6 \\ 5 & -1 & -3 \end{bmatrix}$$

84. What is the inverse of the matrix?

- a. $\begin{bmatrix} -\frac{3}{19} & \frac{7}{76} & \frac{1}{38} \\ -\frac{3}{19} & \frac{13}{38} & -\frac{9}{19} \\ -\frac{4}{19} & \frac{3}{76} & -\frac{5}{38} \end{bmatrix}$
- b. $\begin{bmatrix} \frac{3}{19} & \frac{7}{76} & \frac{1}{38} \\ -\frac{3}{19} & \frac{13}{38} & \frac{9}{19} \\ \frac{4}{19} & \frac{3}{76} & -\frac{5}{38} \end{bmatrix}$
- c. $\begin{bmatrix} -\frac{3}{19} & \frac{7}{76} & \frac{1}{38} \\ \frac{3}{19} & \frac{13}{38} & \frac{9}{19} \\ -\frac{4}{19} & \frac{3}{76} & \frac{5}{38} \end{bmatrix}$
- d. $\begin{bmatrix} -\frac{3}{19} & -\frac{7}{76} & \frac{1}{38} \\ -\frac{3}{19} & -\frac{13}{38} & -\frac{9}{19} \\ -\frac{4}{19} & \frac{3}{76} & -\frac{5}{38} \end{bmatrix}$

85. What is the area of $\triangle PQR$? Round your answer to the nearest tenth.

- a. 49.6 cm²
- b. 52.4 cm²
- c. 55.8 cm²
- d. 58.2 cm²



86. Given the Matrices A , B , and C are given below, which matrix will result from performing the matrix operation $2A + 3B - 5C$?

$$A = \begin{bmatrix} -5 & 9 \\ 1 & 7 \end{bmatrix} \quad B = \begin{bmatrix} 1 & -3 \\ -8 & 4 \end{bmatrix} \quad C = \begin{bmatrix} -2 & -6 \\ 2 & 3 \end{bmatrix}$$

- a. $\begin{bmatrix} 3 & 39 \\ -32 & 11 \end{bmatrix}$
- b. $\begin{bmatrix} -17 & -21 \\ -12 & 41 \end{bmatrix}$
- c. $\begin{bmatrix} -3 & 51 \\ -23 & 14 \end{bmatrix}$
- d. $\begin{bmatrix} -27 & -9 \\ -3 & 44 \end{bmatrix}$

87. Evaluate $\lim_{x \rightarrow -3} \frac{x^2 + 2x - 15}{x^2 + x - 20}$.

- a. 0
- b. $\frac{6}{7}$
- c. 2
- d. ∞

88. The data in the table below shows the mean and standard deviations of four different versions of the district midterm exam. On which exam did the students perform best?

| Midterm Version | Mean | Standard Deviation |
|-----------------|------|--------------------|
| Version 1 | 87 | 3 |
| Version 2 | 83 | 8 |
| Version 3 | 91 | 8 |
| Version 4 | 84 | 6 |

- a. Version 1
- b. Version 2
- c. Version 3
- d. Version 4

89. A particle is moving along a straight line so that its velocity is $v(t) = t^2 - 4t + 5$ meters per second at a time t . Find the displacement over the time interval $3 \leq t \leq 9$.

- a. 50 m
- b. 126 m
- c. 48 m
- d. 120 m

90. There are 20 marbles in a bag, where 10 are blue, 4 are red, and 6 are yellow. You draw two marbles out of the bag, one at a time, and do not replace them. What is the probability that you draw a blue marble, and then a yellow marble?

- a. $\frac{6}{95}$
- b. $\frac{4}{5}$
- c. $\frac{3}{20}$
- d. $\frac{3}{19}$

91. Which of the following statements is true?

- a. If the $\lim_{x \rightarrow a} f(x)$ exists, then f is differentiable at a .
- b. If the $\lim_{x \rightarrow a} \frac{f(x) - f(a)}{x - a}$ exists, then f is differentiable at a .
- c. If f is continuous at a , then f is differentiable at a .
- d. If f is differentiable at a , then $\lim_{x \rightarrow \infty} f(x) = f(a)$.

92. Find the equation of the line tangent to $f(x) = \frac{2}{3}x^3 - \frac{5}{2}x^2 - 3$ at $x = 4$.

- a. $y = 3x$
- b. $y = -\frac{1}{12}x$
- c. $y = 12x - \frac{145}{3}$
- d. $y = \frac{1}{12}x - \frac{2}{3}$

93. On the set of \mathbb{R} , $x \sim y \leftrightarrow x > y$. Determine whether the statement is an equivalence relation.

- a. Yes, this is an equivalence relation.
- b. The relation is not reflexive.
- c. The relation is symmetric.
- d. The relation is not transitive.

94. Rewrite the conditional statement using symbolic notation.

If Michael strictly follows his budget or gets his year-end bonus, he can afford to go on a vacation with his family.

- a. $(p \wedge q) \rightarrow r$
- b. $p \rightarrow (q \wedge r)$
- c. $p \rightarrow (q \vee r)$
- d. $(p \vee q) \rightarrow r$

95. Using the given values in the table, find the left hand rectangular approximation of the area under the curve $f(x)$.

- a. 35.0
- b. 35.2
- c. 85.0
- d. 88.0

| | | | | | |
|--------|----|----|---|---|----|
| x | -3 | 1 | 4 | 5 | 7 |
| $f(x)$ | 21 | -3 | 0 | 5 | 21 |

96. If $F(x) = f(g(x))$, where $f(-1) = -1$, $f'(-1) = 3$, $g(1) = -1$ and $g'(1) = 1$. Find $F'(1)$.

- a. 3
- b. 4
- c. 5
- d. 6

97. The table shows the number of the three-point field goals made by a girl's high school basketball team in each season.

| | | | | | | | | |
|------------|------|------|------|------|------|------|------|------|
| Year | 2012 | 2013 | 2014 | 2015 | 2016 | 2017 | 2018 | 2019 |
| 3-pointers | 37 | 45 | 55 | 54 | 53 | 66 | 63 | 77 |

If $t = 0$ corresponds to the year 2010, find the correlation coefficient of the linear regression model. (Round to the nearest ten-thousandth)

- a. 0.7587
- b. 0.7985
- c. 0.8345
- d. 0.9413

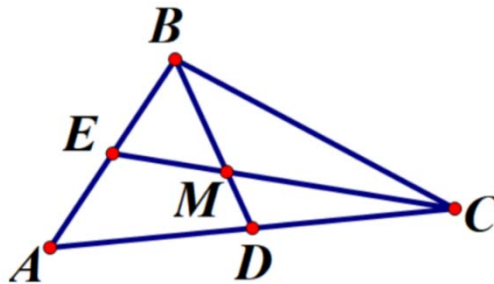
| Genre | Number of Moviegoers |
|-----------------|----------------------|
| Action | 93 |
| Drama | 37 |
| Horror | 62 |
| Romantic Comedy | 56 |
| Other | 52 |
| Total | 300 |

98. The above table above shows the results of a survey of moviegoers. The participants were asked what genre they saw on their latest trip to the movies. If a circle graph was constructed using the data in the table, what is the measure of the angle, in degrees, used to represent romantic comedy?

- a. 44.4
- b. 56.0
- c. 67.2
- d. 74.4

99. M is the centroid of $\triangle ABC$, and $BM = 21$. What is the length of the median \overline{BD} ?

- a. $BD = 14$
- b. $BD = 7$
- c. $BD = 31.5$
- d. $BD = 20.5$



Score Analysis

| Number | Answer | Student | % Correct by Course |
|--------|--------|---------|---------------------|
| 1 | B | | 6401 Pre-Algebra |
| 2 | D | | |
| 3 | C | | |
| 4 | D | | |
| 5 | B | | |
| 6 | A | | |
| 7 | C | | |
| 8 | B | | |
| 9 | A | | |
| 10 | C | | |
| 11 | A | | |
| 12 | C | | |

| Number | Answer | Student | % Correct by Course |
|---------------|---------------|----------------|----------------------------|
| 13 | B | | 6403 Algebra I |
| 14 | B | | |
| 15 | A | | |
| 16 | B | | |
| 17 | D | | |
| 18 | B | | |
| 19 | C | | |
| 20 | D | | |
| 21 | D | | |
| 22 | D | | |
| 23 | C | | |
| 24 | C | | |
| 25 | D | | |
| 26 | A | | |
| 27 | D | | |
| 28 | A | | |
| 29 | A | | |
| 30 | C | | |
| 31 | C | | |
| 32 | D | | |
| 33 | D | | |
| 34 | D | | |
| 35 | B | | |
| 36 | A | | |
| 37 | C | | |
| 38 | A | | |

| Number | Answer | Student | Remarks | % Correct by Course |
|---------------|---------------|----------------|----------------|--------------------------------|
| 39 | B | | | 6405 Geometry |
| 40 | B | | | |
| 41 | B | | | |
| 42 | D | | | |
| 43 | B | | | |
| 44 | D | | | |
| 45 | B | | | |
| 46 | B | | | |
| 47 | A | | | |
| 48 | D | | | |
| 49 | A | | | |
| 50 | D | | | |
| 51 | B | | | |
| 52 | C | | | |
| 53 | C | | | |
| 54 | A | | | |
| 55 | B | | | |
| 56 | B | | | |
| 57 | C | | | |
| 58 | B | | | |
| 59 | B | | | |

| Number | Answer | Correct | Course % Correct |
|--------|--------|---------|---------------------|
| 60 | B | | 6407 Algebra II |
| 61 | A | | |
| 62 | C | | |
| 63 | D | | |
| 64 | C | | |
| 65 | C | | |
| 66 | D | | |
| 67 | C | | |
| 68 | D | | |
| 69 | C | | |
| 70 | A | | |
| 71 | B | | |
| 72 | B | | |
| 73 | D | | |
| 74 | A | | |
| 75 | B | | |
| 76 | C | | |
| 77 | B | | |
| 78 | A | | |
| 79 | C | | |
| 80 | A | | |
| 81 | D | | |
| 82 | C | | |
| 83 | B | | |
| 84 | A | | |
| 85 | A | | |
| 86 | A | | |

| Number | Answer | Correct | Course % Correct |
|--------|--------|---------|--|
| 87 | B | | 6413 K12 Capstone & Praxis Prep (5161) |
| 88 | A | | |
| 89 | D | | |
| 90 | D | | |
| 91 | B | | |
| 92 | C | | |
| 93 | B | | |
| 94 | D | | |
| 95 | C | | |
| 96 | A | | |
| 97 | D | | |
| 98 | C | | |
| 99 | C | | |