1. What is the solution to the equation $9t - 6(t +1) = 3\,t + 6$?

    a. $t = 1$
    b. $t = 0$
    c. $t = -1$
    d.   Any real number will make the equation a true statement.
    e.   The equation has no solution.

2. Which of the following is a solution to the inequality $7 - 2(a - 5) < 8$?

    a. $a = 4$
    b. $a = 10$
    c. $a = 0$
    d.   Any real number will make the inequality a true statement.
    e.   The inequality has no solution.

3. The set of ordered pairs below belongs to the graph of what line?

    $$\{(-1, -1),\ (1, 3), (3, 7)\}$$

    a. $y = 1 - 2x$
    b. $y = 3x - 3$
    c. $2x + y = 1$
    d. $y - 2x = 1$
    e. $y + 1 = 2x$

4. Numbers that are palindromes read the same forward and backward. For example, 30203 is a five-digit palindrome. If a single number is chosen randomly from the set of all three-digit numbers, find the probability that the number will be a palindrome. (Round to the nearest thousandth.)

    a.   0.010
    b.   0.090
    c.   0.100
    d.   0.099
    e.   0.900

5. The points (6,12) and (0, -6) are connected by a straight line. Which of the points below is also on that line?

    a.   (3,3)
    b.   (2,1)
    c.   (7,16)
    d.   (-1,-4)
    e.   (-3,-8)

6. Two numbers are chosen randomly without replacement from the set given here:
   $$\{-2, -4/3, -1/2, 0, 1/2, 3/4, 3\}$$
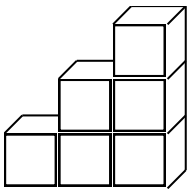   What is the probability that the numbers will be the slopes of two perpendicular lines?

   a. $\dfrac{1}{42}$

   b. $\dfrac{1}{21}$

   c. $\dfrac{1}{14}$

   d. $\dfrac{2}{21}$

   e. $\dfrac{4}{21}$

7. Which equation represents the relationship between x and y in the table below?

 | x | y |
   |-----|-----|
   | 1 | 0 |
   | 4 | 15 |
   | 6 | 35 |
   | 9 | 80 |
   | 10 | 99 |

   a. $y = x + 1$
   b. $y = 5x - 5$
   c. $y = 10x - 10$
   d. $y = x^2 - 1$
   e. $y = 1 - x^2$

8. The solid shown below has a volume of 6 cubic inches (as indicated). What is its surface area?

   a. 6 square inches
   b. 24 square inches
   c. 18 square inches
   d. 9 square inches
   e. 20 square inches

9. George bought a red car and a blue car. He sold the red car for $12,000, which was 20% less than he paid for it. He also sold the blue car for $12,000, which was 20% more than he paid for it. What was the net result of all George's car transactions?

    a. no loss or gain
    b. loss of $1000
    c. gain of $1000
    d. loss of $2000
    e. gain of $2000

10. The circumference of a circle is equal to the perimeter of a square. Which statement MUST be true?

    a. Their areas are equal.
    b. The area of the circle is greater than the area of the square.
    c. The area of the square is greater than the area of the circle.
    d. The area of the circle is π times that of the square.
    e. The area of the circle is 2π times that of the square.

11. Let a be a two-digit number. Let b be the two-digit number formed by reversing the digits of a. What number is not necessarily a factor of $a^2 - b^2$?

    a. 1
    b. 9
    c. 11
    d. the product of the digits
    e. the sum of the digits

12. The base of a triangle is 4 times as long as a side of a square, and the figures have equal areas. What is the ratio of the altitude of the triangle to the side of the square?

    a. 1:4
    b. 1:2
    c. 1:1
    d. 2:1
    e. 4:1

13. Let Equation A be $y = \dfrac{2x^2 + 2x}{2x}$. Let Equation B be $y = x + 1$. Which statement is true?

    a. Every solution of Equation B is a solution of Equation A.
    b. Equation A and Equation B have exactly one solution in common.
    c. Equation A and Equation B have exactly two solutions in common.
    d. (0, 0) is a solution of Equation A but not of Equation B.
    e. (0, 1) is a solution of Equation B but not of Equation A.

14. The box-and-whisker plots below show the distribution of highway mileage ratings in miles per gallon for 172 models of 4-wheel-drive SUV's and 79 models of 4-wheel-drive pickup trucks. Based on the box-and-whisker plot, which statement is not true?

Highway Fuel-Economy Rating for
Four-Wheel-Drive Pickup Trucks and SUV's
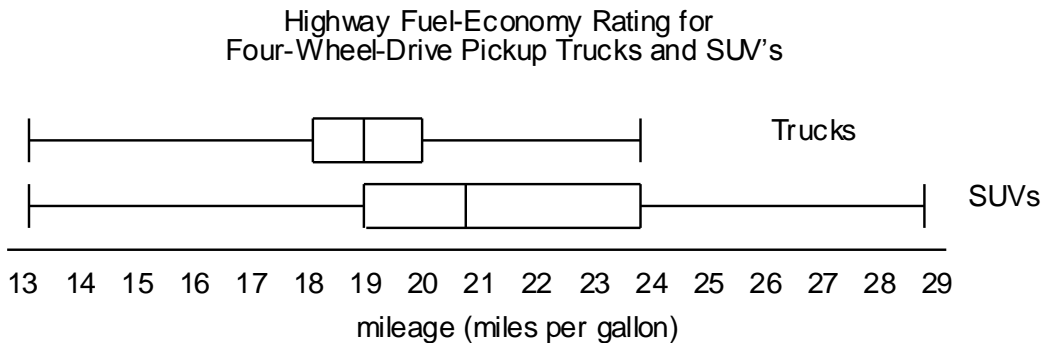
a. The lowest fuel-economy rating of any truck or SUV in the survey is 13 miles per gallon.
b. The reason the truck graph is shorter than the SUV graph is that there are fewer trucks than SUV's in the data.
c. About 25% of the SUV's have a better mileage rating than any of the trucks.
d. There are about the same percentage of trucks that are rated between 13 and 18 miles per gallon as there are trucks that are rated between 19 and 20 miles per gallon.
e. About 75% of the SUV's are rated 19 miles per gallon or more.

15. Ann prefers ice cream cups. Ben and Clay prefer ice cream sandwiches. The cafeteria manager puts one coupon for an ice cream cup and two coupons for ice cream sandwiches in a bag. Ann, Ben, and Clay each reach in and without looking draw one coupon from the bag. Each keeps the coupon drawn. What is the probability that exactly two of them get their preference?

a. $\dfrac{1}{2}$

b. $\dfrac{1}{3}$

c. $\dfrac{1}{6}$

d. $\dfrac{2}{3}$

e. 0

16. A quadrilateral has diagonals that bisect each other. Which statement MUST be true about this quadrilateral?

a. The diagonals must be congruent to each other.
b. The diagonals must be perpendicular to each other.
c. The quadrilateral has exactly one pair of parallel sides.
d. The quadrilateral has four congruent angles.
e. Both pairs of opposite angles of the quadrilateral are congruent.

17. The net of a cone is composed of a circle (the base) and the sector of a circle whose radius is greater than that of the base. The sector forms the lateral surface of the cone. Below is a sector that could be the lateral surface of a cone. To assemble the cone, the two straight edges of the sector come together; the curved edge of the lateral surface must match the edge of the base. If the 270° sector with radius of 6 cm forms the lateral surface of a cone, what is the radius of the base of that cone?

6 cm
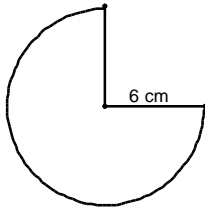
   a. 3 cm
   b. 3.5 cm
   c. 4 cm
   d. 4.5 cm
   e. 5 cm

18. Quadrilateral ABCE is a parallelogram. The measure of angle EDC is 48°. What is the measure of angle ABC?
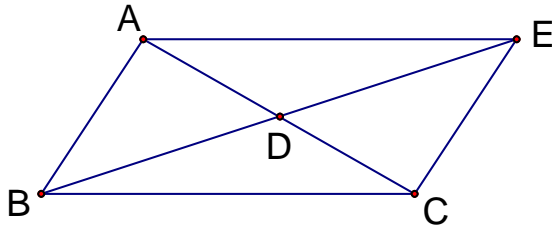
   a. 132°
   b. 56°
   c. 24°
   d. 32°
   e. There is not enough information given to determine the measure of angle ABC.

19. The sum of 3 consecutive counting numbers is one-eighth of their product. What is their product?

   a. 80
   b. 96
   c. 104
   d. 120
   e. 136

20. Calculate $\dfrac{1}{3+\dfrac{1}{3+\dfrac{1}{3\frac{1}{3}}}}$.

    a. $\dfrac{3}{28}$

    b. $\dfrac{28}{3}$

    c. $\dfrac{109}{33}$

    d. $\dfrac{33}{109}$

    e. $\dfrac{3}{37}$

21. Lynn agreed to work for a neighbor for 30 days. At the end of the 30 days, the neighbor would pay Lynn $858 plus a puppy. Lynn quit the job after 20 days. The neighbor paid Lynn $538 and the puppy. Assuming the pay was in accordance with the original agreement, how much was the puppy worth?

    a. $102
    b. $1020
    c. $320
    d. $32
    e. $213

22. For six days in a row when Meg and Jay raced in a 100-yard dash, Meg ran across the finish line just as Jay got to the 90-yard marker. So they decided to give Jay a head start to make the race more even. Consider each of these situations:

    A. Meg starts 10 yards behind the starting line and Jay starts on the starting line.
    B. Meg starts on the starting line and Jays starts 10 yards ahead of her.
    C. Meg starts 5 yards behind the starting line and Jay starts 5 yards ahead of the starting line.

    Which statement is true if Meg and Jay maintain their speeds as they did the past six days?

    a. In all three situations Meg and Jay would cross the finish line at the same time.
    b. Meg would win in Situation A; they would tie in Situation B; Jay would win Situation C.
    c. Jay would win in Situation A and Situation B. They would tie in Situation C.
    d. Jay would win in Situation B; Meg would win in Situation A; they would tie in Situation C.
    e. Meg would win in Situation A and Situation C. They would tie in Situation B.

23. Triangle A has side lengths of 17.97 cm, 6.43 cm, and 12.75 cm. Which statement must be true about Triangle A?

    a. Triangle A is an obtuse triangle.
    b. Triangle A is an acute triangle.
    c. If Triangle B has side lengths of 17.97 cm, 6.43 cm, and 12.75 cm, Triangle A is not necessarily congruent to Triangle B.
    d. Triangle A does not exist because it would be impossible to create with those side lengths.
    e. Triangle A is isosceles.

24.   Ann, Ben, Coy, Don, and Ella ride these buses: 4, 15, 18, 27, and 30 (not necessarily in that order). They all forgot their bus numbers. Each did remember something about his or her bus.
    - Ann knows her bus number has a 1 in it.
    - Ben knows that his bus number is divisible by 3.
    - Coy knows that the sum of the digits in his bus number is 9 and that his bus number is greater than Ben's.
    - Don knows his bus is yellow.
    - Ella knows that her bus number is twice that of Ann's.
    Which statement is true?

    a. Ann rides bus 15.
    b. Ben rides bus 30.
    c. Coy rides bus 18.
    d. Don rides 27.
    e. Ella rides bus 4.

25. What is the value of $1 - 3 + 5 - 7 + 9 \ldots - 99$? (Note that subtraction and addition are alternating in the sequence of odd numbers.)

    a. 99
    b. –99
    c. 50
    d. –50
    e. –49

26. Mersenne primes are prime numbers that can be written in the form 2^n-1. Which of the following numbers is NOT a Mersenne prime?

    a. 3
    b. 7
    c. 31
    d. 127
    e. 513

27. Class A and Class B took the same 100-point test. There were 28 students in Class A, and the average (mean) score for them was 85.0. The average (mean) score for class B was 90.1. The average (mean) score for the two classes combined was 87.3. Which statement <u>must</u> be true?

    a. The combined class mean was calculated incorrectly.
    b. Class B has fewer students than Class A.
    c. Class B has more students than Class A.
    d. The two classes have the same number of students.
    e. The given information is insufficient to determine the number of students in Class B.

28. The middle school basketball team won. Kim scored 15% of the points, Jan scored 15% of the points. Lynn scored 25% of the points. There were four players, not already named, who each scored 10% of the points. Sal scored the remaining 3 points. How many points did Lynn score?

    a. 12
    b. 13
    c. 14
    d. 15
    e. 16

29. A non-rectangular parallelogram has a perimeter of 24 cm and an area of 28 sq cm. The lengths of all its sides and its altitude are whole numbers. Which of the following statements is true?

    a. There is one non-rectangular parallelogram that fits all the stated conditions.
    b. There are two non-congruent non-rectangular parallelograms that fit all the stated conditions.
    c. There are three non-congruent non-rectangular parallelograms that fit all the stated conditions.
    d. There are four non-congruent non-rectangular parallelograms that fit all the stated conditions.
    e. There are infinitely many non-congruent non-rectangular parallelograms that fit all the stated conditions.

30. Will signed a contract to build 35 birdhouses in one month. According to the contract, he received $20 for every birdhouse he finished by the end of the month, but he was fined $6 for each one he failed to make. At the end of the month, he received a check for $388. How many birdhouses did Will make by the end of the month?

    a. 19
    b. 20
    c. 21
    d. 22
    e. 23