1. A city council decided to levy a 10¢-per-cup tax on fancy coffee drinks sold there. They estimated the tax would gross about $6 million per year. About how many fancy coffee drinks are sold per year in that city?

    a. 1,666,667 drinks per year
    b. 60,000 drinks per year
    c. 600,000 drinks per year
    d. 6,000,000 drinks per year
    e. 60,000,000 drinks per year

2. A rhombus has sides that are each 12 decimeters in length. Which statement is true about this rhombus?

    a. The area of the rhombus is at least 144 square decimeters.
    b. The area of the rhombus is 144 square decimeters.
    c. The area of the rhombus is at most 144 square decimeters.
    d. The area of the rhombus is less than 144 square decimeters.
   e. The area of the rhombus is 48 square decimeters.

3. Calculate $\dfrac{54 + 35}{9 + 7}$.

    a. $5\dfrac{9}{16}$
    b. 5.9
    c. 11
    d. $1\dfrac{1}{5}$
    e. 30

4. What is the closest estimate of the area of this sheet of paper?

    a. 60 square centimeters
    b. 6 square decimeters
    c. 0.6 square meters
    d. 6 square centimeters
   e. 60 square millimeters

5. A bicycle rider climbs a slope at the rate of 50 meters per minute. He descends the same slope at 150 meters per minute. If the round trip takes 24 minutes, how long is the slope?

    a. 100 meters
    b. 200 meters
    c. 900 meters
    d. 3600 meters
    e. 4800 meters

6. A square-shaped spiral is plotted on a coordinate plane. The first 8 points in the spiral are
    (0, 0), (–1, 1), (–2, 0), (–1, –1), (0, –2), (1, –1), (2, 0), and (1, 1). If the spiral is continued in
    this manner, what will be the coordinates of the first point in the pattern that is at least 3 units
    from the origin? (Consider the distance from the origin to (1, 0) as one unit. Assume that the
    distance from the origin to (0, 1) is also 1 unit.)

    a. (3, 0)
    b. (0, -3)
    c. (-1, 3)
    d. (3, 1)
    e. (–3, 0)
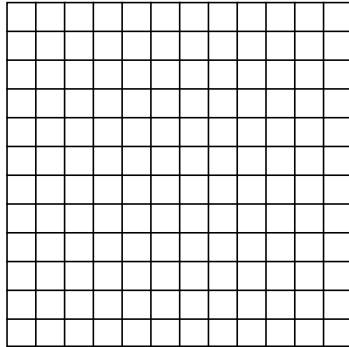
7. The center of the circle below is point B and $\overline{IH}$, a diameter of the circle, is 4 units in length.
    Angles IBA, ABL, LBC and CBH each measure 45 degrees. $\overline{BL}$ is perpendicular to $\overline{AC}$.
    Find the area of the **shaded** region.
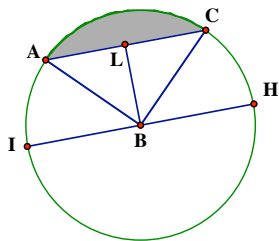
    a. $2\pi - 5$ square units
    b. $\pi - 2$ square units
    c. $\pi - 1$ square units
    d. $8(\pi - 1)$ square units
    e. $\dfrac{\pi}{4}$ square units

8. Kobe and Allen are first and second in the scoring average competition. The scoring average
    is calculated by dividing the total number of points scored by the total number of games
    played. Kobe's average is 34.8125 points per game for 64 games. Allen has scored 1926
    points in 58 games for an average that rounds to 33.2 points per game. If Kobe scores 34
    points in his next game, how many points would Allen have to score in his next game to have
    a greater scoring average?

    a. 336 points
    b. 128 points
    c. 2 points
    d. 36 points
    e. 13 points

9. When I enter 25^{25} in my calculator, displays 8.881784197E34. Which statement is true?

    a. The answer the calculator gave is only an approximation of the correct answer.
    b. If the screen were big enough, the result of 25^{25} would display 34 zeros after the 97.
    c. If the screen were big enough, the result of 25^{25} would display 33 zeros after the 97.
    d. If the screen were big enough, the result of 25^{25} would display 25 zeros after the 97.
    e. If the screen were big enough, the result of 25^{25} would display 24 zeros after the 97.

10. The figure shown here represents $2\frac{2}{5}$.
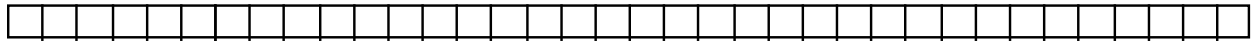
    Which of the figures below would represent $\frac{2}{3}$ of 1 (not $\frac{2}{3}$ of $2\frac{2}{5}$).

    a.
    b.
    c.
    d.
    e.

11. The Department of the Treasury pays $42.2222 per troy ounce for gold. One troy ounce weighs 31.1034 grams. How much would one kilogram of gold be worth? Round to the nearest penny.

    a. $1,313.25
    b. $1,357.48
    c. $7,366.60
   d. $4,222.22
    e. $736.66

12. Sixteen students were standing in a line in order of their height from shortest to tallest. The mean of their heights was 65 inches. The median was 64 inches. The mode was 62 inches. The tallest student was 72 inches tall. Consider these statements about the height data:
    Statement A: No one was 64 inches tall.
    Statement B: No one was 62 inches tall.
    Statement C: At least one student was less than 64 inches tall.
    Which of the following is true?

    a. Only Statement A could be true.
    b. Only Statement B could be true.
    c. Only Statement C could be true.
    d. Only Statements A and C could be true.
    e. All the statements could be true.

13. Seventy-five percent of the metal in a nickel is copper. A nickel weighs 5 grams. How many nickels could be made with a kilogram of copper? How many milligrams of copper would be left over after the maximum number of nickels have been made? (Round to the nearest milligram.)

    a. 266 nickels can be made with 667 milligrams left over.
    b. 266 nickels can be made with 67 milligrams left over.
    c. 266 nickels can be made with 7 milligrams left over.
    d. 266 nickels can be made with 2.5 milligrams left over.
    e. 266 nickels can be made with 2500 milligrams left over.

14. One hundred fifty middle school students were asked how many TV shows they watched on the previous Saturday. The results are shown in the graph below.

Number of TV Shows Watched on Saturday Morning
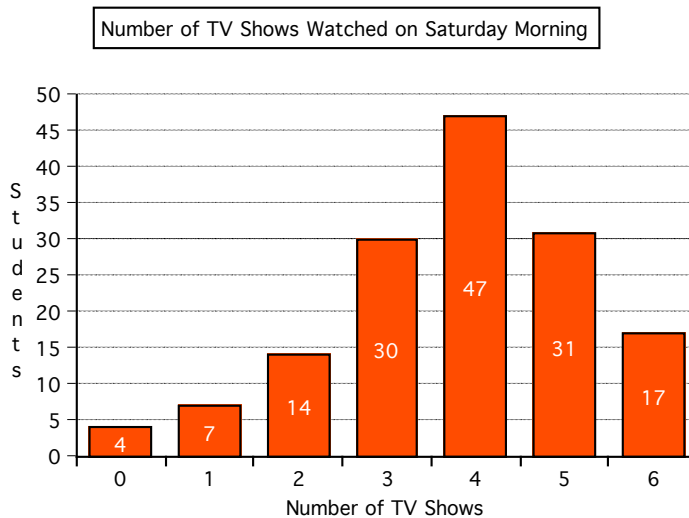
What is the mean (average) number of shows per student in this group? (Round to the nearest tenth.)

    a. 2.1 shows per student
    b. 3.0 shows per student
    c. 3.5 shows per student
    d. 3.8 shows per student
    e. 21.4 shows per student

15. If 27,720 is the least whole number that is evenly divisible by the first 12 counting numbers, what is the least whole number that is evenly divisible by the first 15 counting numbers?

    a. 360,360
    b. 415,800
    c. 75,675,600
    d. 5,045,040
    e. 277,200

16. A function f is defined as pairing a whole number $\{0, 1, 2, 3, 4, ...\}$ with the remainder when the whole number is divided by 4. Here are some true equations:

$$f(21) = 1$$
$$f(34) = 2$$
$$f(40) = 0$$

Which of the following statements are true for all whole numbers x?

    a. $f(x + 4) = f(x)$
    b. $f(x \cdot 4) = f(x)$
    c. $f(x^2) = f(x)$
    d. $f(x + 2) = f(x)$
    e. $f(x + 1) = f(x + 3)$

17. In the equations below each letter stands for a digit (0, 1, 2, 3, 4, 5, 6, 7, 8, or 9). In this problem if E stood for 4 and F stood for 3, EF would mean forty three, not 4×3. (Also, in these equations, $\times$ is a multiplication sign, not a variable.)

    $A + A = BC$ $A \times A = CB$

If both the equations shown above are true, which choice must be true?

    a. A is odd.
    b. B is even.
    c. C is odd.
    d. B is greater than 1.
    e. C is less than B.

18. The base of our numeration system is ten. In base seven, this equation is true: $24_{seven} + 24_{seven} = 51_{seven}$. For what base x must this equation be true? $26_x + 26_x = 50_x$

    a. $x = $ six
    b. $x = $ eight
    c. $x = $ nine
    d. $x = $ eleven
    e. $x = $ twelve

19. A scale at the grocery weighs to the nearest hundredth of a pound. You decide to buy three bunches of grapes. You weigh each bunch separately. The scale reads 1.28 pounds for the first bunch, 1.74 pounds for the second bunch, and 2.02 pounds for the third bunch. If the scale is accurate to the nearest hundredth of a pound, what is the least total actual weight possible for all three bunches of grapes?

    a. 5.035 pounds
    b. 5.04 pounds
    c. 5.039 pounds
   d. 5.031 pounds
    e. 5.025 pounds

20. Which statement is true?

    a. $\dfrac{3}{4} < \left(\dfrac{3}{4}\right)^{30}$

    b. $\left(\dfrac{2}{3}\right)^{60} < \left(\dfrac{4}{9}\right)^{30}$

    c. $\left(\dfrac{2}{3}\right)^{30} < \left(\dfrac{3}{4}\right)^{20}$

    d. $\left(\dfrac{20}{30}\right)^{3} < \left(\dfrac{2}{3}\right)^{30}$

    e. $1 < \left(\dfrac{3}{4}\right)^{30}$

21. There are three square tiles in a bag that are identical except for color. Two are green and one is blue. A player reaches into the bag and draws two tiles at the same time. If they match, the player wins. If the tiles do not match, the player loses. What is the probability of winning twice in a row?

    a. $\dfrac{1}{9}$

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

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

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

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

22. The figure below is a square that has been subdivided into twelve congruent rectangles.
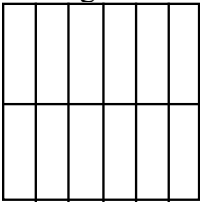

    The perimeter of each rectangle is 48 units. What is the area of the square?

    a. 576 square units
    b. 1296 square units
    c. 324 square units
    d. 5184 square units
    e. 1152 square units

23. In 1837, a penny contained 2,375 milligrams of copper. In 1962, the composition was changed so that a penny has 62.5 milligrams of copper. What percent change is that in the amount of copper in a penny? (Round to the nearest tenth of a percent.)

    a. A decrease of 92.5%
    b. A decrease of 97.4%
    c. A decrease of 37%
    d. A decrease of 370%
    e. A decrease of 3700%

24. On the number line shown below, which mark should be the position of -0.385?
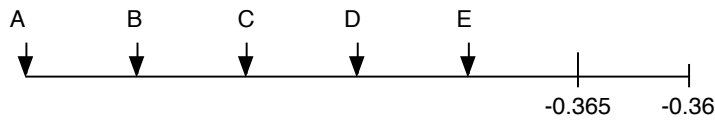
    a. Point A
    b. Point B
    c. Point C
    d. Point D
    e. Point E

25. Which of the following pairs of algebraic expressions are equivalent? (Equivalent expressions have the same value whenever the same number is substituted for the variable.)

    a. $(x + y)^2$ and $x^2 + y^2$
    b. $a(bc)$ and $(ab)(ac)$
    c. $(x + y) - z$ and $x + (y - z)$
    d. $(x - y) + z$ and $x - (y + z)$
    e. $\dfrac{x^2}{y^2}$ and $\dfrac{x}{y}$

26. Frank and Ernest took a load of apples to the market. During the first hour they sold half the apples plus half an apple. During the second hour they sold one third of the remaining apples plus one third of an apple. During the third hour they sold one fourth of the apples that were left plus three fourths of an apple. During the fourth hour, they sold one fifth of the rest of the apples plus one fifth of an apple. During all the transactions, they never cut up any apples. They returned home with 19 apples. With how many apples did they start?

    a. 95 apples
    b. 97 apples
    c. 99 apples
    d. 101 apples
    e. 103 apples

27. In your pocket you have a quarter, two dimes, and three pennies. If all amounts are equally likely, what is the probability that you can match the "change" part of your bill? (If the bill were $7.10, the change part would be the $0.10.)

    a. 6%
    b. 12%
    c. 20%
    d. 21%
    e. 24%

28. Lynn walks 18 inches with each step. Lynn's cousin walks 14 inches with each step. If Lynn walks one mile and her cousin takes the same number of steps as Lynn, how far behind will the cousin be when Lynn completes the mile?

    a. 83 feet and 8 inches
    b. 4106 feet and 8 inches
    c. 1173 feet and 4 inches
    d. 83 feet and 4 inches
    e. 528 feet and 6 inches

29. A group of people will be seated in a single row at an awards ceremony. Some of the people are teachers and some are not teachers. Teachers are not allowed to sit next to each other because they talk too much. Let N represent a non-teacher and T represent a teacher.
    • If there is only one person in the row, there are two possibilities: T or N.
    • If there are two people in the row, there are three possibilities: NN, TN, NT (We can't have TT because the two teachers would talk.)
    How many different arrangements of teachers and non-teachers are possible for a row of 15 people?

    a. 16
    b. 32,768
    c. 119
    d. 1597
    e. 135

30. Three bugs were in a race. When Bug A crossed the finish line, Bug B was 12 centimeters behind and Bug C was 15 centimeters from the finish line. The race continued to determine the second place winner. Bug B beat Bug C by 5 centimeters. If each bug scurried at a constant rate, how long was the race track?

    a. 60 cm
    b. 50 cm
    c. 45 cm
    d. 30 cm
    e. 27 cm