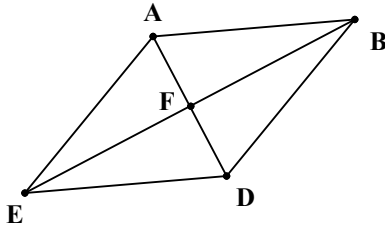1. Quadrilateral ABDE is a rhombus. The measure of angle ABF is 23˚. What is the measure of angle BDE?

   a. 134˚
   b. 164˚
   c. 67˚
   d. 46˚
   e. There is not enough information given to determine the measure of angle BDE.

2. Two prime numbers are randomly selected without replacement from among the first eight prime numbers. What is the probability that their sum will be 24?

   a. $\dfrac{1}{56}$

   b. $\dfrac{1}{28}$

   c. $\dfrac{1}{32}$

   d. $\dfrac{3}{56}$

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

3. Three pairs of socks are in a basket. The socks are identical except that each pair is a different color. The baby sitter, who is watching tv as she is dressing the triplets, reaches into the basket without looking and puts the socks on the children without noticing that the socks are different colors. What is the probability that each child has on a pair of socks that match?

   a. $\dfrac{1}{8}$

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

   c. $\dfrac{3}{16}$

   d. $\dfrac{1}{15}$

   e. $\dfrac{1}{10}$

4. The diagonal of a rectangle is equal to the sum of the shorter side and half the longer side. Find the ratio of the shorter side to the longer.

    a. 1:2
    b. 2:3
    c. 1:4
    d. 3:4
    e. 2:5

5. A dart thrown by someone wearing a blindfold hits the square target shown below. The length of the side of each square is as indicated. What is the probability that the dart hit a shaded region of the target?
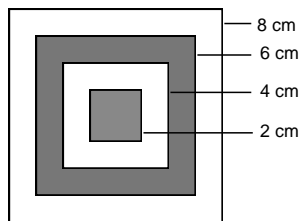
    a. $\dfrac{1}{8}$

    b. $\dfrac{3}{4}$

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

    d. $\dfrac{1}{4}$

    e. $\dfrac{3}{8}$

6. This figure has squares whose sides have length 1, 2, 4, and 8 inches. What percent of the figure is shaded?

    a. $54\dfrac{11}{16}\%$

    b. $56\dfrac{1}{4}\%$

    c. $59\dfrac{3}{8}\%$

    d. $62\dfrac{1}{2}\%$

    e. $64\dfrac{3}{16}\%$
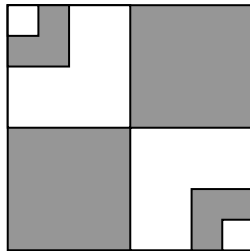
7. What is the greatest integer, less than $n^3 - n$, that divides $n^3 - n$? (n is an integer greater than 1.)

    a. 2
    b. 3
    c. 4
    d. 5
    e. 6

8. The table below shows the first ten counting numbers in base seven and in base five. If the base seven number 142 is converted to base five, what digit will be in the ones position?

Amount	*	**	***	****	*****	******	*******	******* *	******* **	******* ***
Base seven	1	2	3	4	5	6	10	11	12	13
Base five	1	2	3	4	10	11	12	13	14	20

    a. 0
    b. 1
    c. 2
    d. 3
    e. 4

9. The points E and F are located one third of the way from A toward B and D respectively. The points G and H are located one third of the way from C toward B and D respectively. If the length of the side of the square shown below is s, what is the area of the shaded rectangular region in terms of s?


    a. $\dfrac{1}{3}s^2$

    b. $\dfrac{4}{9}s^2$

    c. $\dfrac{1}{2}s^2$

    d. $\dfrac{5}{9}s^2$
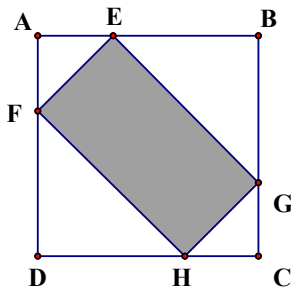
    e. $\dfrac{2}{3}s^2$

10. Which number is a solution of the inequality $7x + 3 < 11$?

    a. 1
    b. 2
    c. 3
    d. 4
    e. 5

11. It took Tina 30 minutes to run from her home to the park. She sat down and rested at the park for 5 minutes. Then she walked back home. The following graph shows distance from home on the vertical axis and time on the horizontal axis. If the graph represents the situation described, which statement is true?
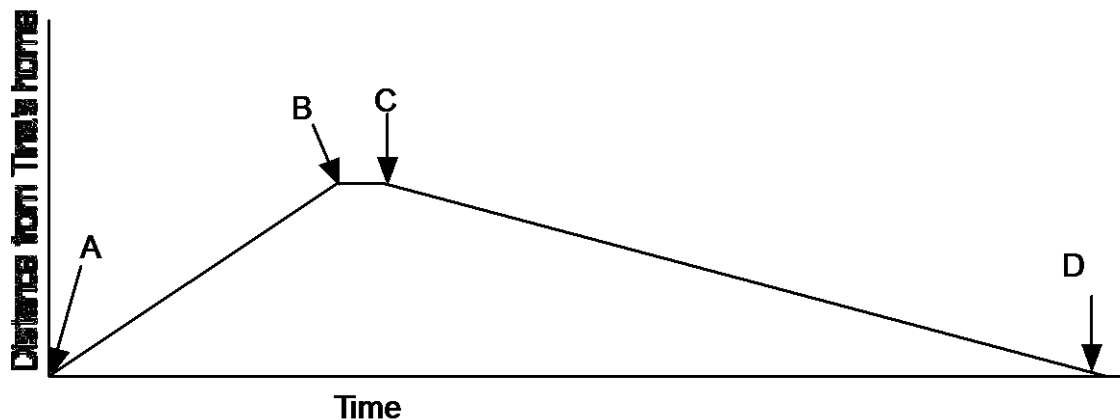
    a. The segment between A and B has a steeper slope than the segment between C and D because Tina was going faster on her way to the park than she was on the way home.
    b. The segment between A and B indicates that Tina ran up a hill on her way to the park.
    c. The segment between B and C is shorter than either of the other two segments of the graph because Tina was moving more slowly at that time.
    d. The graph does not show that Tina went back home.
    e. No information can be gained from a graph that does not have numbers on the axes.

12. When Bob gives change, he always gives the least number of coins possible. If a customer gives him a one-dollar bill for an item that costs 38¢, he gives two quarters, a dime, and two pennies in change. (He never keeps half-dollars in his cash register.) The last five customers of the day, listed below, each paid with a one-dollar bill. Ann spent 55¢. Bill spent 62¢. Carl spent 73¢. Donna spent 51¢. Elaine spent 25¢. Who got the most coins in change from Bob?

    a. Ann
    b. Bill
    c. Carl
    d. Donna
    e. Elaine

13. In a field there are twice as many birds as cows and one-third as many horses as birds. There
    are 640 legs in all. If no animal is missing a leg, how many animals are there?

    a. 60
    b. 120
    c. 220
    d. 260
    e. 300

14. The arithmetic mean (average) of a set of 50 numbers is 38. If the two numbers 45 and 55
    are deleted from the group, what is the mean of the remaining 48 numbers?

    a. 36.5
    b. 37
    c. 37.2
    d. 37.5
    e. 37.52

15. The following bar graph shows the highway fuel economy ratings for 171 SUV models and
   78 pickup truck models. According to the graph, which statement is true?

Highway Mileage Rating Comparison of
171 SUV Models and 78 Pickup Truck Models
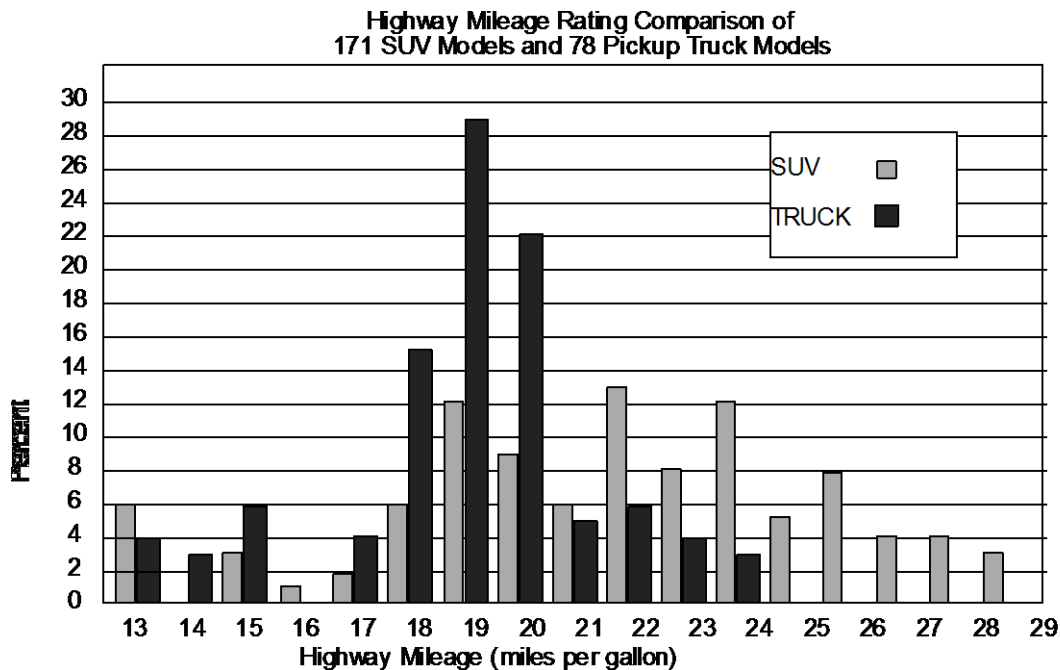
    a. There were 12 SUVs that were rated 19 miles per gallon.
    b. The mean highway mileage rating for the pickup trucks was about 21 miles per gallon.
    c. The mean highway mileage rating for the SUVs was lower than that of the trucks.
    d. The median mileage rating for the trucks was 19.5 miles per gallon.
    e. The median mileage rating for the SUV's was 22 miles per gallon.

16. Which of the following figures always has exactly two lines of symmetry?

    a. A square
    b. A non-square rhombus
    c. An isosceles trapezoid that has exactly one pair of parallel sides
    d. A kite that is not a rhombus
    e. A non-rectangular parallelogram that is not equilateral

17. Triangle ABC is rotated 90° counterclockwise about the origin (0, 0) to create triangle
    A′B′C′. What are the coordinates of C′?
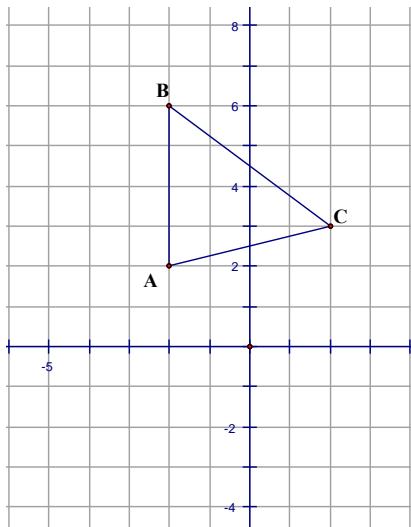
    a. (-2, -2)
    b. (2, -3)
    c. (-2, 3)
    d. (0, 0)
    e. (-3, 2)

18. The side lengths of Quadrilateral ABCD are 5 cm, 6 cm, 7 cm, and 8 cm. The side lengths of
    Quadrilateral EFGH are also 5 cm, 6 cm, 7 cm, and 8 cm. Let $a1$ be the area of Quadrilateral
    ABCD and $a2$ be the area of Quadrilateral EFGH. Let $p1$ be the perimeter of Quadrilateral
    ABCD and $p2$ be the perimeter of Quadrilateral EFGH. Which of the following statements
   must be true?

   a. Quadrilateral ABCD and Quadrilateral EFGH must be congruent.
    b. If Quadrilateral ABCD and Quadrilateral EFGH are not congruent, $a1 = a2$ but $p1 \neq p2$.
    c. If Quadrilateral ABCD and Quadrilateral EFGH are not congruent, $p1 = p2$ but $a1$ is not
       necessarily equal to $a2$.
    d. If Quadrilateral ABCD and Quadrilateral EFGH are not congruent, $a1 = a2$ and $p1 = p2$.
    e. If Quadrilateral ABCD and Quadrilateral EFGH are not congruent, $a1 \neq a2$ and $p1 \neq p2$.

19. The radius of a circle is increased by 100%. By what percent was the area of the circle increased?

    a. 100%
    b. 200%
    c. 300%
    d. 400%
    e. 10 000%

20. The price of an item is reduced by 10%. To restore it to its original price, by what percent should the new price be increased?

    a. 10%
    b. $9\frac{1}{9}\%$
    c. $9\frac{5}{9}\%$
    d. 11%
    e. $11\frac{1}{9}\%$

21. The greatest common factor of x and y is 18. The least common multiple of x and y is 1386. Neither x nor y is 18. Neither x nor y is 1386. Which statement must be true?

    a. The product of x and y is 1386.
    b. The product of x and y is 1404.
    c. x and y are both divisible by 7.
    d. x and y are both divisible by 11.
    e. x and y are both divisible by 3.

22. Which measurement is closest to the volume of a baseball?

    a. 230 cubic centimeters
    b. 230 cubic millimeters
    c. 230 cubic decimeters
    d. 2.3 cubic meters
    e. 23 cubic decimeters

23. What is the remainder when the product 3486 x 9111 x 7632 x 8043 is divided by 5?
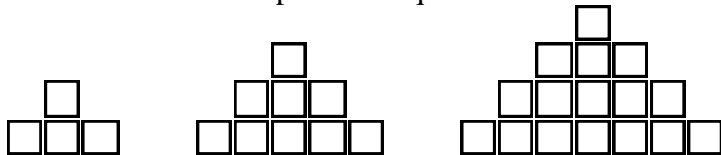
    a. 0
    b. 1
    c. 2
    d. 3
    e. 4

24. Three numbers in a ratio of 8:3:2 have a sum of 182. What is the difference between the greatest and the least of the three numbers?

    a. 36
    b. 48
    c. 84
    d. 96
    e. 104

25. Which of the following nets will form a cube?

    a.

    b.

    c.

    d.

    e.
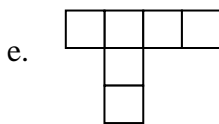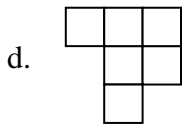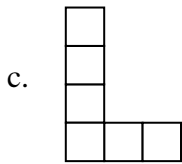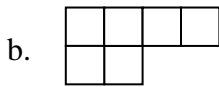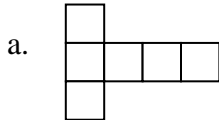
26. The first four shapes in a sequence are shown here.

    How many small squares would be in the 125th shape in the sequence?

    a. 15,626
    b. 15,876
    c. 15,625
    d. 15,376
    e. 15,624

27. How many even 4-digit whole numbers have a one's digit that is the sum of the other three digits in the number? (Here's one example: 1416. No 4-digit number begins with 0.)

a. 202
b. 102
c. 90
d. 82
e. 70

28. The store sells three oranges for the same price as two apples. Matt has enough money to buy 24 oranges, but he decides to buy a combination of apples and oranges instead. Which of the combinations below would cost the same amount as 24 oranges?

a. 10 apples and 9 oranges
b. 8 apples and 9 oranges
c. 12 apples and 12 oranges
d. 12 apples and 3 oranges
e. 16 apples and 3 oranges

29. The sum of three different positive integers is 30. Which of the statements must be true?

a. At least two of the integers are greater than ten.
b. None of the integers is odd.
c. One of the integers is a multiple of 3.
d. The difference between the greatest and the least of the three integers is divisible by 3.
e. At least one of the integers is even.

30. Al, Beth, Cory, Dante, and Emma baked 36 cookies; they left one third of the cookies plain and put chocolate chips in the rest. After they ate some of the cookies, there were 1 ½ dozen cookies left, half of which were plain. Emma is allergic to chocolate. Al ate twice as many chocolate chip cookies as plain cookies. Beth and Cory each ate the same number of cookies as Al and Emma combined. Beth ate more chocolate chip cookies than Cory. Only the bakers ate cookies and each of them ate at least one cookie. Which statement must be true?

a. Al ate 4 cookies.
b. Beth did not eat any plain cookies.
c. Cory ate 5 cookies.
d. Dante ate 5 cookies.
e. Emma ate 2 plain cookies.