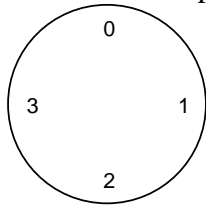


1. Below is a picture of a 4-hour clock.



Clock addition (\oplus) works like this:

$$1 \oplus 1 = 2$$

$$1 \oplus 2 = 3$$

$$1 \oplus 3 = 0$$

$$1 \oplus 4 = 1$$

$$1 \oplus 5 = 2$$

With a 4-hour clock $25 \oplus 25 =$ what number?

- 0
 - 1
 - 2
 - 3
 - 50
2. Which of these measurements is the best approximation of the radius of a tennis ball?
- 6 centimeters
 - 3 centimeters
 - 3 decimeters
 - 6 millimeters
 - 6 decimeters
3. Quadrilateral ABCD has diagonals that are perpendicular to each other and they bisect each other. Which statement **MUST** be true about quadrilateral ABCD?
- Its diagonals are congruent to each other.
 - Quadrilateral ABCD is equiangular.
 - Quadrilateral ABCD is not a parallelogram.
 - Quadrilateral ABCD is a rhombus.
 - Quadrilateral ABCD is a trapezoid with exactly one pair of parallel sides.
4. Nolan Ryan has been clocked throwing a baseball 100 miles per hour. At this speed, how long does it take the ball to travel from the pitcher to home plate? (The pitcher's mound is 60 feet 6 inches from home plate. Round to the nearest ten-thousandth of a second.)
- 0.0068 seconds
 - 0.0412 seconds
 - 0.4125 seconds
 - 0.4132 seconds
 - 0.6050 seconds

9. A bat ate a total of 1050 mosquitoes on four consecutive nights. Each night she ate 25 more than on the night before. How many did she eat the third night?
- 225
 - 262
 - 275
 - 300
 - 325
10. The perimeter of a triangle is 76 centimeters. The second side is twice as long as the first side. The third side is 4 centimeters shorter than the second side. What is the ratio of the length of the second side to the length of the third side?
- $\frac{8}{7}$
 - $\frac{5}{2}$
 - $\frac{1}{2}$
 - $\frac{4}{3}$
 - $\frac{4}{7}$
11. A basketball team won 5 games last season. They hired a new coach, and the next season the team won 15 games. By what percentage did the team increase their win total?
- 200%
 - $66\frac{2}{3}\%$
 - 20%
 - 300%
 - $13\frac{1}{3}\%$
12. The greatest common factor of A and B is 17. The least common multiple of A and B is 204. Neither A nor B is 17. Neither A nor B is 204. What statement MUST be true?
- The product of A and B is 204.
 - Neither A nor B is even.
 - A and B must both be even.
 - Neither A nor B is a multiple of 3.
 - Either A or B is a multiple of 3.

13. In the grid shown below the numbers 1, 2, 3, 4, 5, 6, 7, and 8 are represented by the letters A, B, C, D, E, F, G, and H in no particular order. (In other words, A may or may not represent 1, B may or may not represent 2, and so on.) The numbers in the rightmost column are the PRODUCT of the other three numbers in that row. The numbers in the last row are the PRODUCT of the other three numbers in that column. In other words, 60 is the product of A, D, and F. When the grid is filled in correctly with the numbers 1 through 9, which statement must be true?

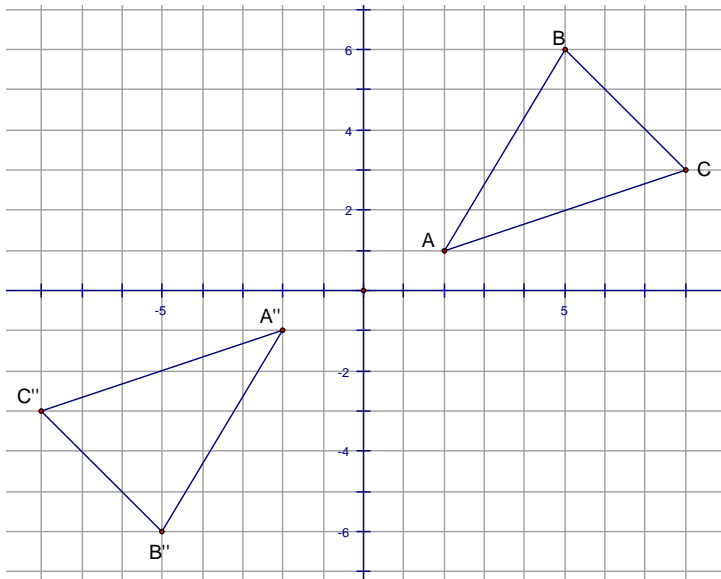
A	B	C	18
D	9	E	126
F	G	H	160
60	36	168	

- $C = 6$
 - $D = 4$
 - $B = 1$
 - $H = 2$
 - $A = 3$
14. In the pencil-and-paper method for subtraction shown below, what is the actual value of the 11 that is written above the 2 in 3.1623?

$$\begin{array}{r}
 \overset{2}{\cancel{3}}.\overset{10}{\cancel{1}}\overset{15}{\cancel{6}}\overset{11}{\cancel{2}}\overset{13}{\cancel{3}} \\
 - 0.1798 \\
 \hline
 2.9825
 \end{array}$$

- 11 tenths
 - 11 hundredths
 - 11 thousandths
 - 11 ten-thousandths
 - There is no numerical value for the 11. It is just the result of following the rules.
15. A rectangular box is twice as long as it is wide and its height is two units more than its width. If w represents the width of the box, which of the following represents the volume of the box?
- $4w^3$
 - $w^3 + 4w^2 + 4w$
 - $w + 2w + (w + 2)$
 - $2w^3 + 4w^2$
 - $w + 2w + 2w$

16. On the graph shown below Triangle ABC was reflected across the y -axis to create Triangle $A'B'C'$ which is not shown. Triangle $A'B'C'$ was then reflected across the x -axis to create Triangle $A''B''C''$ as shown. Which statement is true?



- Triangle $A''B''C''$ is also the image of Triangle ABC translated to the left 4 units and down 2 units.
 - Triangle $A''B''C''$ is also the image of Triangle ABC rotated 180° about the origin $(0, 0)$.
 - Triangle $A''B''C''$ is also the image of Triangle ABC reflected across the line $y = x$.
 - Triangle $A''B''C''$ is also the image of Triangle ABC reflected across the line $y = -x$.
 - There is no single transformation of Triangle ABC that would result in Triangle $A''B''C''$.
17. Two consecutive terms in an arithmetic sequence are 13 and 19. Let n be a whole number that tells the position of the term in the sequence. Which of the following could be a formula for the value of each term of the sequence?
- $6n - 1$
 - $6n + 1$
 - $12n + 1$
 - $13n + 6$
 - $13n$
18. When the radius of a circle is increased by 100%, by what percent is the area increased?
- 100%
 - 200%
 - 300%
 - 400%
 - 450%

19. Which of the following equations can be used to generate the table of values given below?

x	y
-2	6
0	0
2	2

- a. $y = x^2 - x$
 - b. $y = x$
 - c. $y = -2x + 2$
 - d. $y = 1.5x^2$
 - e. $y = 4 - x$
20. Everyone at a party shakes hands with everyone else once. If there are 28 handshakes, how many people are at the party?
- a. 14
 - b. 28
 - c. 56
 - d. 8
 - e. 7
21. In a recent traffic jam, a car took 45 minutes to drive 2 miles. During that time, what was the average speed of the car? (Round to the nearest hundredth.)
- a. 2.45 miles per hour
 - b. 0.75 miles per hour
 - c. 2.75 miles per hour
 - d. 2.67 miles per hour
 - e. 3.00 miles per hour
22. Which of the following triangles would be impossible to construct?
- a. An obtuse scalene triangle
 - b. A right triangle whose side lengths are 5 cm, 12, cm, and 13 cm
 - c. An acute isosceles triangle
 - d. A right equilateral triangle
 - e. A triangle whose side lengths are 5 cm, 5 cm, and 8 cm

23. 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 draw, without looking, one coupon from the bag. Each keeps the coupon he or she drew. What is the probability that all three get their preference?

- a. $\frac{1}{2}$
- b. $\frac{1}{3}$
- c. $\frac{1}{6}$
- d. $\frac{2}{3}$
- e. 0

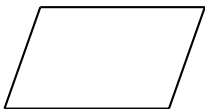
24. Which statement is true for any pyramid whose base has n sides?

- a. The number of edges on the pyramid is $2n$.
- b. The number of faces on the pyramid is $2n$.
- c. The number of vertices on the pyramid is $2n$.
- d. The number of vertices plus the number of faces is equal to the number of edges.
- e. The number of lateral faces is $n - 1$.

25. Amy left home going to Ben's house. After traveling 7.5 km, she thought to herself, "I'm three fifths of the way there!" How much farther does Amy have to travel to get to Ben's house?

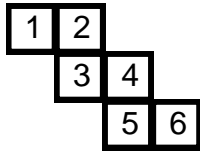
- a. 4.5 km
- b. 12.5 km
- c. 5 km
- d. 7.9 km
- e. 8.1 km

26. How many lines of symmetry does the parallelogram shown here have? (It is not a rhombus.)

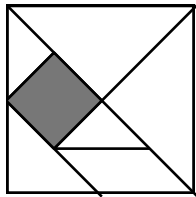


- a. 0
- b. 1
- c. 2
- d. 3
- e. 4

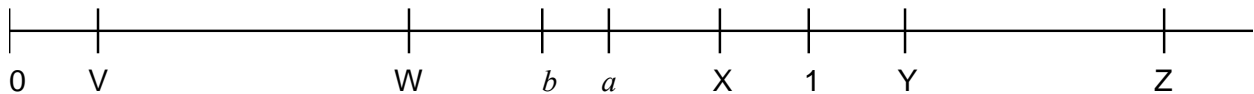
27. If the net shown here were folded into a cube, what number would be on the face that is on the opposite side of the face numbered 1?



- a. 2
b. 3
c. 4
d. 5
e. 6
28. There are seven pieces to the tangram puzzle: five right isosceles triangles, one square, and one non-rectangular parallelogram. The large square shown below is composed of the set of seven tangram pieces. If the length of the side of the shaded square is 1 inch, what is the length of the side of the large square?

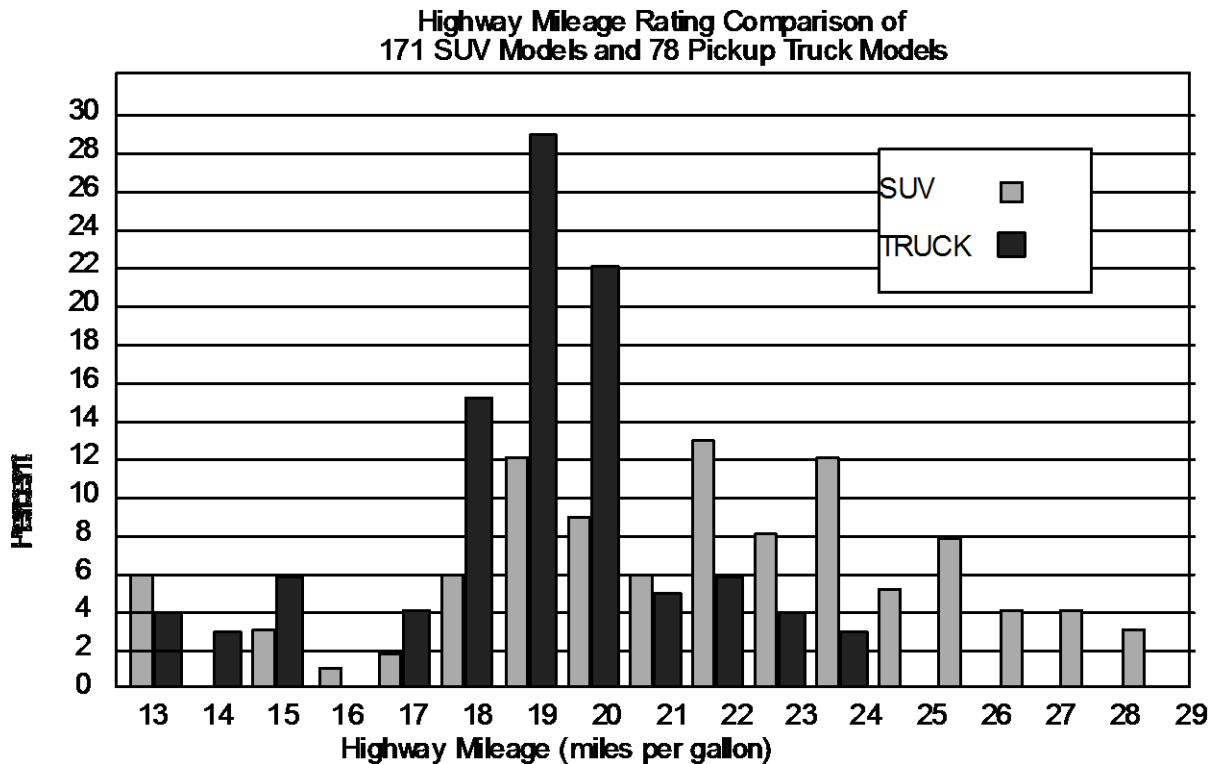


- a. 2 inches
b. 2.5 inches
c. 2.25 inches
d. $\sqrt{8}$ inches
e. 3 inches
29. On the number line below, 0 and 1 are marked; a and b are fractions between 0 and 1 with $a > b$. If the number line markings are in proportion, which position on the number line shown here could be the value of $a \div b$?



- a. V
b. W
c. X
d. Y
e. Z

30. Based on the double bar graph shown here, which statement is true?



- The mode for the pickup trucks is 19 mpg and the mode for the SUV's is 22 mpg.
- The median for both the pickup trucks and the SUV's is 21 mpg.
- There were 19 truck models that got 29 miles per gallon.
- The mean for the pickup trucks must be greater than 20.
- The mean for the SUV's must be less than the mean for the trucks.