1. Write the number below in scientific notation:

602000000000000000000000

A. 0.6×10^{24} B. 6.02×10^{23} C. 60.2×10^{22} D. 602×10^{21} E. NOTA

2. The Student Government Organization at a particular school has 57 members on its roster. The group is trying to pass an ordinance requiring the school to provide a daily nap period. If the by-laws require 80% of the members to vote for a proposal, then what is the minimum number of students who must vote yes?

A. 44 B. 45 C. 46 D. 47 E. NOTA

3. Solve the inequality: $5 \le 3x - 2 < 8$.

A. $1 \le x < 2$ B. $\frac{7}{3} \le x < \frac{10}{3}$ C. $\frac{7}{3} \le x < 3$ D. $4 \le x < 7$ E. NOTA

4. Find the positive difference between the mean and the median of the data shown in the stem-and-leaf plot below. $4|3$ represents 4.3.

4	3 7 9
5	3 5 7 7
6	2 6 9

A. 0.02 B. 0.1 C. 0.2 D. 1.02 E. NOTA

5. Six people are in line to receive a bag of chestnuts. Brad is not first in line but is right behind his friend Barbara. Barbara is somewhere in line behind Bart but before Belinda. Billy is somewhere in line behind Betty. No girl is standing beside another girl, and no boy is standing beside another boy. How many possible ways are there to arrange the six people given the conditions above?

A. 0 B. 1 C. 2 D. 3 E. NOTA

6. Evaluate and simplify the following if a = 3, b = -7, and c = -6.

$$\frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

A. -3, $\frac{2}{3}$ B. 3, $-\frac{2}{3}$ C. -4, $\frac{7}{6}$ D. 4, $-\frac{7}{6}$ E. NOTA

7. Find the mean of *a*, *b*, and *c* given the following:

a = the median of {2, 21, 7, 8, 100, 60, 63}
b = the mode of {31, 67, 22, 31, 48, 61, 23, 22, 31}
c = the range of {5, 23, 17, 19, 64, 35}

A. 37 B. 62 C. 111 D. 186 E. NOTA

8. Bette and Betty, the Boop twins, are both obsessive compulsive. Bette washes her hands every seven minutes all day every day, and Betty washes her feet every 18 minutes all day every day. Finally, at 12:00 noon, Brother Boop yells, "Stop it, you two! You're driving me nuts!" at precisely the same moment his sisters wash their feet and hands. Being slightly obsessive compulsive himself, Brother Boop then begins yelling "Stop it, you two! You're driving me nuts!" every 42 minutes thereafter. At what time will the three siblings coincide a second time with hand washing, feet washing, and yelling?

A. 1:26 p.m. B. 1:48 p.m. C. 2:06 p.m. D. 4: 12 p.m. E. NOTA

9. Which of the following is the standard equation of the line that contains the points (0, 3), (2, 10), and (-4, -11)?

A. $7x - 2y = -6$
B. $7x + 2y = 6$
C. $-7x - 2y = 6$
D. $7x - 2y = 6$
E. NOTA

10. Bertha is an acclaimed artist whose specialty is the anatomical features of mythological monsters. Her latest project is the eye of the Cyclops. The eye is a circle with an iris whose diameter is equal to the radius of the eye. If the diameter of the eye is 15 inches, how many square inches of canvas will be covered by the iris? (It is well-known among artists whose specialty is the anatomical features of mythological creatures that the Cyclops has no pupil.)

A. $\frac{15}{2}\pi$ B. $\frac{225}{4}\pi$ C. $\frac{225}{16}\pi$ D. 225π E. NOTA

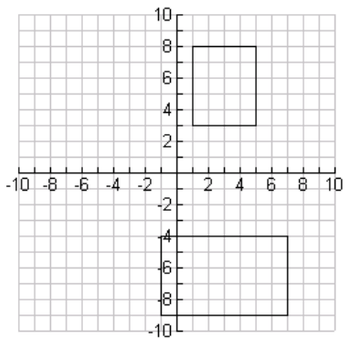
11. The radii of two circles are 9 and 16. Find the ratio of the circumference of the first circle to the second circle.

A. $\frac{9}{16}$ B. $\frac{81}{256}$ C. $\frac{3}{4}$ D. $\frac{1}{2}$ E. NOTA

12. C is the midpoint of segment AB. D is the midpoint of segment AC. E is the midpoint of segment AD. F is the midpoint of segment AE. G is the midpoint of segment AF and H is the midpoint of segment AG. If the measure of segment AB is 3.6, find the measure of segment CE.

A. 1.05 B. 1.15 C. 1.25 D. 1.35 E. NOTA

13. The rectangle in the first quadrant undergoes a transformation as shown below.



Which of the following describes the transformation?

A. $(x, y) \rightarrow (2x-3, 1-y)$
B. $(x, y) \rightarrow (2x-3, -1-y)$
C. $(x, y) \rightarrow (3x-2, -1-y)$
D. $(x, y) \rightarrow (3x-2, 1-y)$
E. NOTA

14. What is $x+y$?

$$6x+3y=11$$
$$3x+9y=23$$

A. $\frac{7}{3}$ B. $\frac{8}{3}$ C. 2 D. 3 E. NOTA

15. Barney the Bear lives in a zoo and is attached by a chain to the corner of an 4' x 8' block in the middle of the yard area of his pen. If the chain is 10 feet long, how much yard area (in square feet) of his pen can Barney the Bear access?

A. 65π B. 85π C. 100π D. 100π –32 E. NOTA

16. Three concentric circles form a target. The radii of the three circles are consecutive integers. The smallest radius is the third prime integer greater than the quotient $\left(\frac{\pi}{2}\right)^2$. If Region 1 is the area of the smallest circle, Region 2 is the area between the smallest and middle circles, and Region 3 is the area between the middle and largest circles, which region has the least probability of being hit?

A. Region 1 B. Region 2 C. Region 3 D. All 3 have equal probabilities E. NOTA

17. A class was told to design a flag to represent their class. They had available for their use a mauve crayon, a beige crayon, and a cauliflower green crayon. 33 students used a mauve crayon. 57 students used a beige crayon and 57 students used a cauliflower green crayon. 25 students used both mauve and beige crayons. 15 students used both mauve and cauliflower green crayons and 22 students used both beige and cauliflower green crayons. 10 students used all three crayons. How many students used mauve but not beige or cauliflower green?

A. 3 B. 5 C. 8 D. 10 E. NOTA

18. How many integral divisors does the number 342 have?

A. 12 B. 22 C. 24 D. 28 E. NOTA

19. Harold and Kumar are doing math problems while consuming White Castle hamburgers, drinking soda, and watching movies they just rented from Netflix. Let A be the number of letters in the first sentence of this problem and let B be the number A in base 2. What is the sum of the digits in A and B (the base does not count as a digit)?

A. 9 B. 10 C. 11 D. 12 E. NOTA

20. A traveling salesman arrives at the front of a castle with four gates and a sign posted on each gate. The guard at the front of the castle tells the salesman that behind one gate is an eager crowd waiting to buy his wares. Behind the remaining three gates are vicious dogs waiting to bite the seat out of his pants. The sign of the gate behind which waits the crowd is truthful, but the signs on the gates behind which wait the dogs are false. Which gate is the gate behind which the crowd waits?

GATE 1	GATE 2
Gate 4 is truthful.	There are dogs behind this gate and Gate 3.
GATE 3	**GATE 4**
There are dogs behind Gates 1 and 2.	The crowd is behind this gate.

A. Gate 1
B. Gate 2
C. Gate 3
D. Gate 4
E. Cannot be Determined

21. Three couples (Arnie and Abby, Barney and Brenda, and Chuck and Claudia) are seated around a hexagonal table. No husband is sitting next to his wife. Arnie and Barney, being good friends, are seated next to each other, but Abby and Claudia, being mortal enemies, are not seated next to each other. Chuck is allergic to Barney's aftershave and cannot sit next to him. Claudia is sitting across from either Barney or Abby. Who is sitting across from Barney?

A. Abby B. Brenda C. Chuck D. Claudia E. NOTA

22. How many complete days will pass in 313 hours, 1972 minutes, and 2177 seconds?

A. 15 B. 14 C. 13 D. 12 E. NOTA

23. A bag contains 6 red, 4 blue, and 2 green marbles. What is the probability of the following sequence of events occurring?

A red marble is drawn and put back into the bag.
A blue marble is drawn and left outside the bag.
A green marble is drawn.

A. $\frac{1}{30}$ B. $\frac{1}{33}$ C. $\frac{1}{36}$ D. $\frac{2}{55}$
E. NOTA

24. Bob is thinking of a number greater than 100 with a remainder of 4 when divided by 5, a remainder of 1 when divided by 6, a remainder of 4 when divided by 7, a remainder of 5 when divided by 8, and a remainder of 1 when divided by 9. Find the sum of the digits of the smallest integer that meets the requirements above.

A. 10 B. 11 C. 12 D. 13 E. NOTA

25. The O sequence is the sequence whose first term is 1, whose second term is 1, and whose consecutive terms are the sum of the previous two terms. However, these conditions make the O sequence exactly like Fibonacci's sequence. So, let us modify the O sequence so that every fourth term is the sum of the two previous terms plus 2. What is the positive difference between the 13^{th} term of the modified O sequence and Fibonacci's sequence?

A. 96 B. 128 C. 144 D. 208 E. NOTA

TB1 There are 81 balls and a balance on a table. All of the balls weigh the same except for one, which weighs more. What is the least number of times you need to use the balance to accurately determine and guarantee the heaviest ball?

TB2 What is the third term on the seventh row of Pascal's triangle if the first row of the triangle has one term?

TB3 A box with an open top is going to be created out of a 10 by 10 foot piece of cardboard by cutting squares out of each corner of the flat piece of cardboard and then folding the sides up. What size square should be cut from each corner of the flat piece of cardboard if the remaining cardboard should have an area of $\frac{884}{9}$ square feet? Give your answer as dimensions in inches.