

1. Lynn took a 10-question test. The first four questions were true-false. The last six questions were multiple choice--each with 4 choices. If Lynn guessed each answer without reading the problem, the probability that she missed all the questions is how many times as likely as the probability that she got all of them correct?
 - a. Lynn is 3 times as likely to miss all of them as to get all right.
 - b. Lynn is 6 times as likely to miss all of them as to get all right.
 - c. Lynn is 18 times as likely to miss all of them as to get all right.
 - d. Lynn is 36 times as likely to miss all of them as to get all right.
 - e. Lynn is 729 times as likely to miss all of them as to get all right.

2. Below are the first 6 rows in a pattern. What is the sum of the numbers in the 21st row?

1
 3 5
 7 9 11
 13 15 17 19
 21 23 25 27 29
 31 33 35 37 39 41

- a. 6,859
 - b. 8000
 - c. 9,261
 - d. 12,648
 - e. 12,167

3. Figure A has a circle inscribed in a square. Figure B has a square inscribed in a circle. The radius of the circle in Figure A is a . The radius of the circle in Figure B is b . If the shaded area in Figure A is equal to the shaded area in Figure B, what is the value of $\frac{a}{b}$? (Round to the nearest hundredth.)

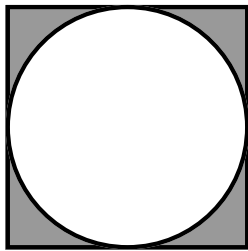


Figure A

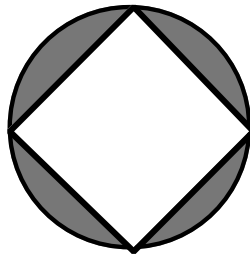
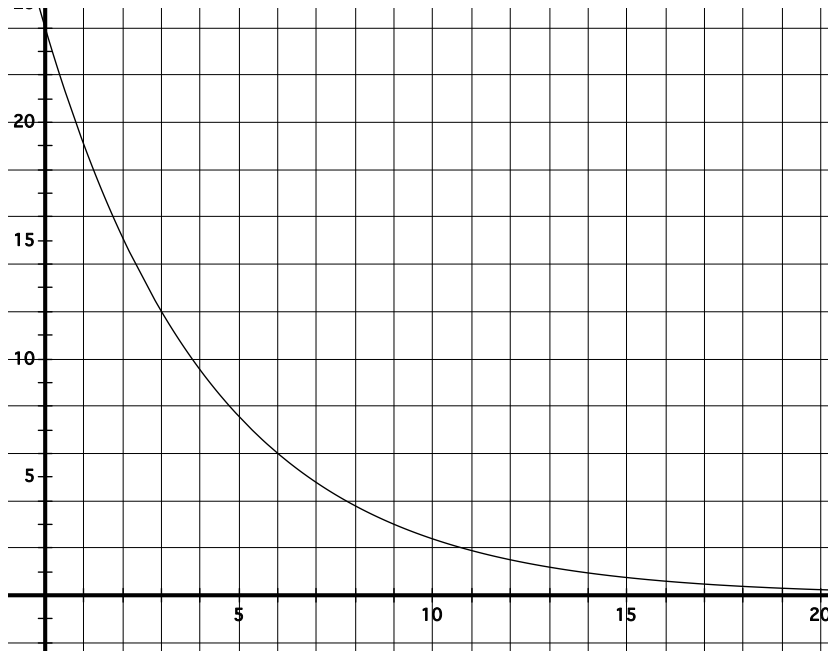


Figure B

- a. 1.00
- b. 1.15
- c. 1.57
- d. 1.77
- e. 3.14

4. Exactly seventy five percent of the members of a club fill exactly $\frac{5}{6}$ of the chairs in the room. What is the smallest possible number of people in the club?
- 15 people
 - 18 people
 - 20 people
 - 24 people
 - 30 people
5. Which measurement is closest to the volume of a standard chicken egg?
- 7 cubic centimeters
 - 70 cubic centimeters
 - 700 cubic centimeters
 - 0.07 cubic centimeters
 - 0.7 cubic centimeters
6. Below is a graph of the function that shows the amount of a radioactive substance as a function of time. (The amount of the substance in grams is shown on the y -axis. The number of days is shown on the x -axis.) The half-life of a radioactive substance is the amount of time required for half of the substance to degrade ("disappear"). According to the graph, what is the half-life of the radioactive substance modeled?

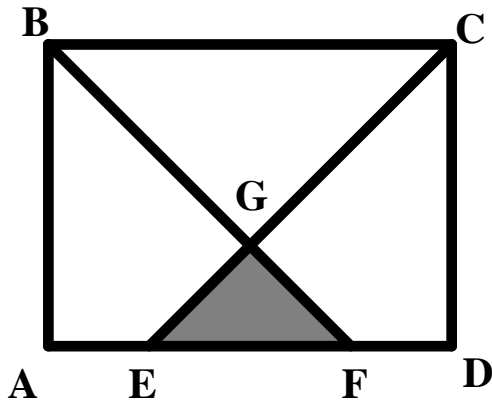


- 1 day
- 3 days
- 6 days
- 12 days
- 24 days

7. Use the graph in the previous problem to estimate the number of days it would take for the amount of radioactive substance to be 2 grams.
- approximately 15 days
 - approximately 14 days
 - approximately 11 days
 - approximately 8 days
 - approximately 2 days
8. A water tank has three pipes that can be used to fill it. The smallest pipe can fill the tank in 25 minutes. The middle pipe can fill the tank in 15 minutes. The largest pipe can fill the tank in 10 minutes. All three pipes are turned on at the same time. How long will it take to fill the tank? Round to the nearest minute.
- 8 minutes
 - 7 minutes
 - 6 minutes
 - 5 minutes
 - 4 minutes
9. What value of x will make $\frac{2 \cdot 6^2}{x} + \frac{1}{6} \cdot 2 \cdot 3^2 = 12$ a true statement?
- 0
 - 1
 - 6
 - 8
 - 12
10. How many different triangles are possible if the length of each side must be a whole number of inches and the perimeter must be 15 inches? (Two triangles are different if they are not congruent. So a 4-5-6 triangle is the same as a 6-5-4 or 6-4-5.)
- 225 different triangles
 - 19 different triangles
 - 15 different triangles
 - 7 different triangles
 - 5 different triangles
11. Five buckets are arranged in a row. Some number of tennis balls, b , is put in the first bucket. Next, $b + k$ balls are put into the second bucket. Then $b + 2k$ balls are put into the third bucket. Then $b + 3k$ balls are put into the fourth bucket. Finally $b + 4k$ balls are put into the fifth bucket. There are exactly 100 tennis balls to be split among the buckets. Assuming that $k \geq 1$, what is the greatest number of balls that can go in the fifth bucket?
- 20 balls
 - 25 balls
 - 30 balls
 - 32 balls
 - 38 balls

12. How many different ways are there to make one dollar with exactly 50 coins? You may use any combination of pennies, nickels, dimes, and quarters.
- 50 ways
 - 20 ways
 - 8 ways
 - 2 ways
 - 1 way
13. Points $(2,1)$ and $(10, 7)$ are the endpoints of the diameter of a circle. If the distance from $(0,0)$ to $(0, 1) =$ the distance from $(0, 0)$ to $(1, 0) = 1$ centimeter, what is the area of the circle? Round to the nearest square centimeter.
- 79 sq cm
 - 314 sq cm
 - 158 sq cm
 - 168 sq cm
 - 247 sq cm
14. Lynn walked seven miles. After walking one mile, she increased her speed by one mile per hour and arrived 30 minutes sooner than she would have arrived if she had maintained her original speed. What was the speed at which she walked the last six miles?
- 6 miles per hour
 - 4 miles per hour
 - 2 miles per hour
 - 5 miles per hour
 - 3 miles per hour
15. A solid steel cube was nine centimeters long on each edge. The entire cube was then split into 3 parts. Each of the three parts was then melted and reshaped into a solid cube. The first new cube was 6 cm on each edge. The second was 1 cm on each edge. What is the SURFACE AREA of the third cube formed?
- 216 square centimeters
 - 384 square centimeters
 - 512 square centimeters
 - 64 square centimeters
 - 256 square centimeters
16. A square tablecloth is folded in half to form a rectangle. The perimeter of the rectangle is 3.9 meters. How many **square decimeters** will the unfolded square tablecloth cover?
- 16.9 square decimeters
 - 169 square decimeters
 - 1521 square decimeters
 - 152.1 square decimeters
 - 39 square decimeters

17. Quadrilateral ABCD is a rectangle with a length to width ratio of 3:4, with \overline{AB} one of the shorter sides. Angle BGC is a right angle. \overline{BF} bisects angle B. \overline{CE} bisects angle C. What is the ratio of the area of a shaded region to the area of rectangle ABCD?



- a. 1:4
 b. 1:6
 c. 1:8
 d. 1:12
 e. 1:18
18. What is the final result if the whole numbers from 0 to 100 are combined in the pattern shown below:

$$0 + 1 - 2 + 3 - 4 + 5 - 6 + 7 - 8 + \dots + 95 - 96 + 97 - 98 + 99 - 100$$

- a. 0
 b. 100
 c. 50
 d. -50
 e. 49
19. Each of the following is a true equation.
- $\log_2(8) = 3$ $\log_3(81) = 4$ $\log_{10}(10) = 1$ $\log_5(625) = 4$ $\log_7(49) = 2$

Which one of the following equations is true?

- a. $\log_2(12) = 6$
 b. $\log_4(36) = 3$
 c. $\log_2(0.5) = -1$
 d. $\log_{10}(50) = 5$
 e. $\log_4(8) = 2$

20. Below is a table showing the total costs for various combinations of 3 items. Tax is not considered. All folders are the same price. All packs of paper are the same price. All packages of pencils are the same price.

Number of Folders	Number of Packages of Paper	Number of Packages of Pencils	Total Cost
1	1	1	\$3.99
0	2	1	\$4.55
2	1	0	\$3.08

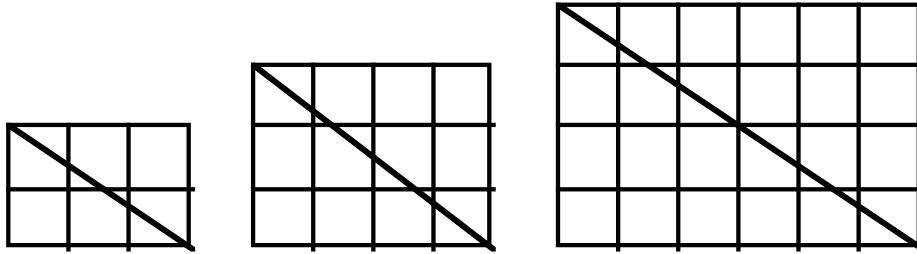
How much would it cost to buy 2 folders and 1 package of pencils?

- a. \$3.43
 - b. \$2.66
 - c. \$2.52
 - d. \$3.52
 - e. \$3.24
21. There are 15 stones. The 15 stones are arranged in 3 piles. It is not necessary for each pile to have the same number of stones. Each pile has at least one stone. How many different ways are there to put the 15 stones into 3 piles? (Note: one way would be to put 1 stone in Pile A, 1 stone in Pile B, and 13 stones in Pile C. Putting 1 stone in Pile A, 13 stones in Pile B, and 1 stone in Pile C is NOT a different way.)
- a. 22
 - b. 20
 - c. 19
 - d. 18
 - e. 17
22. Choose any whole number greater than 1. Square that number and then subtract 4 from the result to produce a whole number, k . Which statement is true about k ?
- a. Exactly one possible value of k is prime.
 - b. Four is not a factor of any possible value of k .
 - c. k must be an odd number.
 - d. No possible value of k is prime.
 - e. k must be an even number.
23. What is the units (ones) digit of the product of the first 50 prime numbers?
- a. 0
 - b. 2
 - c. 4
 - d. 6
 - e. 8

24. The number $2^{48} - 1$ has two factors that are between 50 and 75. What are they?

- a. 57 and 63
- b. 59 and 61
- c. 63 and 65
- d. 61 and 67
- e. 55 and 65

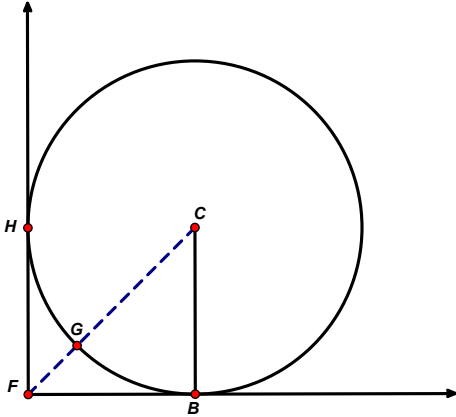
25. A diagonal is drawn in a rectangle that has a square grid as shown below.



Note that in the 2×3 grid the diagonal intersects the interiors of 4 squares. The diagonal intersects the interiors of 6 squares on the 3×4 grid. The diagonal intersects the interiors of 8 squares on the 4×6 grid. In a 42×96 rectangle the interiors of how many squares will be intersected by the diagonal?

- a. 137
 - b. 135
 - c. 134
 - d. 133
 - e. 132
26. A vegetable canning company decides to make its cans 20% shorter. If they want to keep the volume of the can the same, by what percent should they increase the radius of the can? (Round to the nearest percent.)
- a. The radius should be 25% longer.
 - b. The radius should be 125% longer.
 - c. The radius should be 12% longer.
 - d. The radius should be 112% longer.
 - e. The radius should be 20% longer.
27. The mean of two three-digit numbers can be expressed by simply putting a decimal point between the two numbers. What is the sum of the two numbers?
- a. 999
 - b. 998
 - c. 997
 - d. 996
 - e. 995

28. In the diagram below, \overline{FH} is perpendicular to \overline{FB} . The circle, with center C , is tangent to \overline{FH} at point H , and tangent to \overline{FB} at B . The radius of the circle is 1 unit. Point G is the intersection of the circle and \overline{CF} . What is the length of \overline{FG} ?



- a. $\sqrt{2} - 1$ units
 b. $\frac{\sqrt{2} - 1}{2}$ units
 c. $\frac{2 - \sqrt{2}}{2}$ units
 d. 2 units
 e. $\frac{3 - 2\sqrt{2}}{2}$ units
29. The sum of four numbers, a, b, c, d , is 125. If you increase a by 4, decrease b by 4, multiply c by 4, and divide d by 4, you produce 4 equal numbers. What is the ratio of $ac : bd$?
- a. 1:25
 b. 1:24
 c. 1:5
 d. 4:125
 e. 2:5
30. The country of Coinland has three kinds of coins. Seven Plinks have the same value as four Dinks. Five Grinks have the same value as six Dinks. Which arrangement below shows the coins in order from least to greatest value?
- a. Plink, Grink, Dink
 b. Dink, Plink, Grink
 c. Grink, Plink, Dink
 d. Plink, Dink, Grink
 e. Grink, Dink, Plink