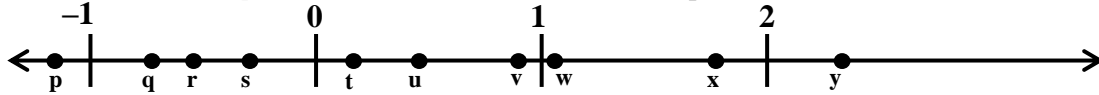


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- The sum of two natural numbers is 100 and their positive difference is 42. What is the positive difference of the squares of these two natural numbers?
A. 1600 B. 2800 C. 3600 D. 4200 E. 8400
- The sum of 16 consecutive integers is 2008. What is the largest of these?
A. 132 B. 133 C. 134 D. 135 E. 141

Use this number line, with ten points labeled with letters, to answer questions #3 and #4, below.



- Which of these points is closest to the sum $q + u$?
A. r B. s C. t D. v E. w
- Which of these points is closest to r^2 ?
A. q B. s C. t D. u E. v
- For every 3°C rise in temperature, the volume of a certain gas increases by 4 cubic centimeters. 50 cubic centimeters of this gas at -8°C is heated from -8°C to 19°C . By what percent does the volume increase?
A. 36% B. 42% C. 58% D. 60% E. 72%
- If two standard 6-sided dice are tossed, what is the probability that the product of the two numbers rolled is even?
A. $1/4$ B. $1/2$ C. $5/8$ D. $19/39$ E. $3/4$
- For all families with an income over \$30,000, a state's income tax is \$900 plus 4% of all income over \$30,000. If a family's income is \$56,500, what amount of state income tax do they pay?
A. \$1960 B. \$2260 C. \$2460 D. \$2860 E. \$3160
- From an $8 \times 8 \times 8$ cube, a $2 \times 2 \times 2$ cube is removed from each corner. What fraction of the $8 \times 8 \times 8$ cube is removed?
A. $1/4$ B. $1/8$ C. $1/2$ D. $3/32$ E. $3/8$
- Gabe was born on February 29th, 1916. So his first true 'birthday' was February 29th, 1920. By today, how many 'true' birthdays has Gabe celebrated?
A. 21 B. 22 C. 23 D. 24 E. 25
- What is the sum of all positive factors of 60?
A. 145 B. 149 C. 151 D. 168 E. 180

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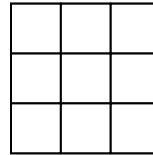
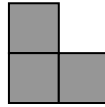
11. In September, 2006, a team led by mathematicians from the University of Central Missouri found the 44th Mersenne Prime. It is: $2^{32,582,657} - 1$. What is its units' digit?

- A. 1 B. 3 C. 5 D. 7 E. 9

12. Assume that one gallon of water weighs 8.34 pounds and has a volume of 0.134 cubic feet. If a rectangular box 1 foot by 2 feet by 1.5 feet is filled with water, how much does the water weigh? Round to the nearest pound.

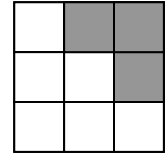
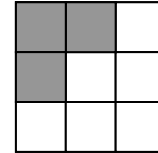
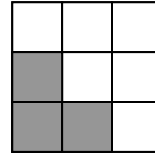
- A. 3 B. 68 C. 146 D. 187 E. 280

13. The first play of a game is to place this L-shape: onto a 3x3 grid so that exactly 3 squares are covered. How many different first plays are possible?



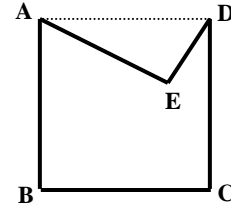
Note: The following three first plays are considered different:

- A. 8 B. 10 C. 12
D. 14 E. 16



14. ABCD is a square and $\angle AED = 90^\circ$. AE = 30 cm and DE = 16 cm. In square centimeters, what is the area of the region ABCDE?

- A. 676 B. 884 C. 916
D. 1844 E. 1876



15. Given: 1 mile = 5280 feet = 8 furlongs; 1 furlong = 40 rods
A horse's average speed in a 6 furlong, 20 rod race is 39 feet per second.
"Fur" (☺) how long, in seconds, does the horse take to complete this race?

- A. 90 B. 96 C. 102 D. 104 E. 110

16. For how many natural numbers N does \sqrt{N} differ from 20 by less than 1?

- A. 78 B. 79 C. 80 D. 81 E. 82

17. Ann rides at a constant speed. By 10:00 AM, she has completed 2/5 of her ride; by 10:42 AM, she has completed 3/4 of her ride. At what time did Ann start her ride?

- A. 9:06 AM B. 9:12 AM C. 9:18 AM D. 9:24 AM E. 9:30 AM

18. **A** and **B** are digits in the 3-digit number: **1AB**. The number **1AB** equals $1! + A! + B!$. What is A+B?

- A. 5 B. 6 C. 7 D. 8 E. 9

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19. This sheet of paper is numbered from 1 through 16, as shown. While lying on a table, this sheet of paper is folded in half four times. After the following sequence of four folds, in this order, the square with which number will be on top (even if you can't see the number)?

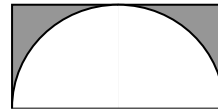
1	2	3	4
5	6	7	8
9	10	11	12
13	14	15	16

“Top half over Bottom half”
“Right half over Left half”
“Left half over Right half”
“Bottom half over Top half”

- A. 6 B. 10 C. 13 D. 14 E. 15
20. US and Mexican citizens who often drive across the border can purchase their gasoline in the US or in Mexico. Lupe intends to purchase 70 liters of gasoline that would cost 7.01 pesos per liter in Mexico. In the US, he could buy the gasoline for \$2.85 per gallon. There are 3.785 liters to a gallon. One US dollar is worth 10.73 pesos. Rounded to the nearest US dollar, how much would he lose or save by purchasing the 70 liters in Mexico?

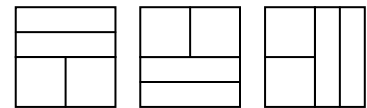
- A. Save \$7 B. Save \$2 C. Lose \$2 D. Lose \$5 E. Lose \$8

21. A semi-circle with diameter 18 cm is inscribed in a rectangle. Rounded to the nearest tenth, what per cent of the rectangular region is shaded?



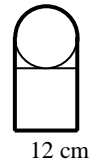
- A. 21.5% B. 22.8% C. 23.4% D. 24.2% E. 25%

22. A square magazine page, 12 cm by 12 cm, is to be filled with any mix of ads that each measure 12x6, 6x12, 6x6, 12x3, or 3x12. If at least one 3x12 or 12x3 ad is used, how many different designs are possible? Note: Being a magazine page, these three sample designs are considered distinct.



- A. 7 B. 12 C. 14 D. 16 E. 21

23. A circle with diameter 12 cm sits on top of a square with side 12 cm. Pulled tight, a piece of tape is wrapped exactly once (without overlap) to hold the square and circle together, as shown. To the nearest tenth of a centimeter, what is the length of the piece of tape?



- A. 66.8 B. 73.7 C. 85.7 D. 104.5 E. 123

24. The first three numbers in a sequence are **512**; **1/32**; **16**. Each new number in the sequence is the product of the previous two numbers. If 512 is the first number in the sequence, what is the 8th number?

- A. 1/64 B. 32 C. 64 D. 128 E. 4096

25. You have 2 dimes, 8 pennies, and 4 nickels. In how many different ways can you make \$0.26? (Note: A solution such as “4 nickels and 6 pennies” counts only once even though you would have a choice of which 6 of 8 pennies to use.)

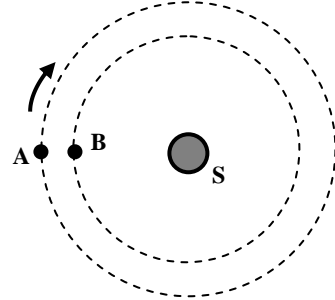
- A. 2 B. 3 C. 4 D. 5 E. 6

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26. A 3-digit natural number is divisible by 5 but not by 10. The hundreds' digit is odd and the tens' digit is twice the hundreds' digit.
What is the sum of all numbers that meet all of these conditions?

A. 490 B. 540 C. 560 D. 600 E. 660

27. In this solar system, planet A takes 12 years to orbit its sun while planet B takes 8 years. If each planet orbits clockwise in a circular orbit with center S from the indicated starting positions, in 35 years what will be the measure of minor angle ASB?



A. 140° B. 145° C. 150°
D. 160° E. 165°

28. When all of the students in a school lined up for a parade in rows of 5, there was one extra student; in rows of 6, two extra students; in rows of 7, three extra students. If there were fewer than 400 students, how many extra students were there when they lined up in rows of 8?

A. 0 B. 2 C. 3 D. 4 E. 6

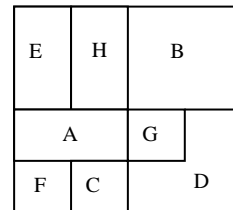
29. The “digit-sum” of 744 is $7+4+4 = 15$. How many even 3-digit numbers have a digit-sum of 18?

A. 22 B. 25 C. 27 D. 30 E. 36

30. A bag contains only blue marbles, green marbles, and 24 red marbles. If the probability of drawing a blue marble is $\frac{1}{2}$ and the probability of drawing a green marble is $\frac{1}{8}$, how many green marbles are in the bag?

A. 3 B. 4 C. 5 D. 6 E. 8

31. Eight identical sheets of paper were placed, one at a time, overlapping as shown in the diagram.
Which sheet(s) of paper could have been the fifth one placed?



A. Only A B. Only E C. Only G
D. Only A or G E. Only D or G

32. In the board game *Careers*, when Zan is sent to the Park Bench square she rolls two standard 6-sided dice on each turn. She can leave the Park Bench square only if she rolls a sum of 7, a sum of 11, or rolls the same number on each die.

What is the probability that she can leave Park Bench on her first turn there?

A. $\frac{7}{18}$ B. $\frac{1}{3}$ C. $\frac{1}{2}$ D. $\frac{13}{36}$ E. $\frac{2}{9}$

33. In a lake with 4000 fish, 90% are labeled ‘small’ which means that they are less than 5 cm long. How many of these ‘small’ fish must be removed from the lake to reduce the percent of small fish in the lake from 90% to 75%?

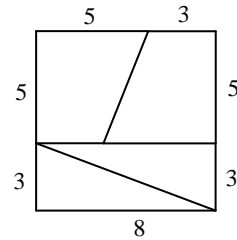
A. 600 B. 1000 C. 1800 D. 2400 E. 2800

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34. When the decimal point of a certain positive number is moved one place to the right, the positive difference between the two numbers is 18.072. What is the sum of these two numbers?

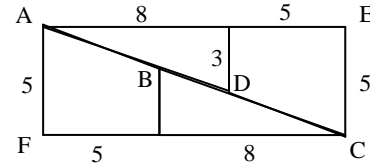
A. 22.088 B. 22.88 C. 220.08 D. 220.88 E. 222.08

35. Two pairs of congruent shapes that form a square are shown to the right. They are rearranged (without overlap) to form the given rectangle AECF. Lengths are in centimeters.



What is the area in square centimeters of the region ABCD?

A. 0 B. 0.25 C. 0.5
D. 1 E. 1.5



36. Mark is playing the computer game, “Flip the Coin”. Mark starts with 64 chips. On each turn he guesses “Heads” or “Tails” and there is a 50% probability of each outcome. On each turn he bets 1/2 of his remaining chips; he will either lose or win that number of chips. In his first 6 turns, Mark loses 2 times and wins 4 times.

What is the maximum number of chips he could have after these 6 turns?

A. 72 B. 81 C. 96 D. 104 E. 12

37. When expanded, how many 0’s are at the end of: $20^{60} \cdot 25^{30} \cdot 14^{10}$?

A. 60 B. 90 C. 100 D. 120 E. 130

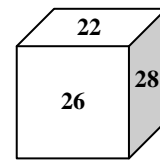
38. **$2.487 + 4020.9 + 367.1 + 51.5 = 8455.6$**

This addition problem is incorrect because only one of the five decimal points is in the correct location in its number. Move four of the five decimal points to make a correct sum.

Which number was not changed?

A. 2.487 B. 4020.9 C. 367.1 D. 51.5 E. 8455.6

39. The six numbers on the faces of this cube are consecutive even numbers. The sums of the two numbers on each pair of opposite faces are equal. What number is on the face opposite 22?



A. 18 B. 20 C. 24 D. 30 E. 32

40. This quadrilateral can be divided into 4 identical quadrilaterals. What is the perimeter of each of these 4 quadrilaterals?

A. $4 + \sqrt{2}$ cm B. $4 + 2\sqrt{2}$ cm C. $8 + \sqrt{2}$ cm
D. $6 + \sqrt{2}$ cm E. $8 + 2\sqrt{2}$ cm

