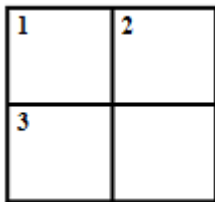


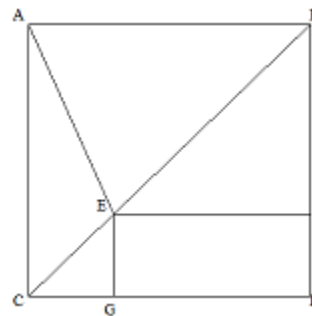
1. How many letters are in this question?
2. How many nickels are equal in value to 14 quarters?
3. It is winter in BCA and naturally the students there hibernate for the winter. Each person in the 9th grade hibernates for 9 days, each person in the 10th grade hibernates for 10 days, each person in the 11th grade hibernates for 11 days, and each person in the 12th grade hibernates for 12 days. If there are 100 people in each grade, how many total cumulative days does the whole school hibernate?
4. Simplify the sum $\frac{3}{7} + \frac{7}{3}$.
5. A kitten is chasing a dog, and both are running in a straight line. The kitten starts 108 feet behind the dog. They start running at the same time; the kitten runs at 12 feet per second, and the dog runs at 9 feet per second. How many seconds will it take the kitten to catch the dog?
6. Find $\frac{2^6 \cdot 5^7}{10^6}$.
7. What is $(-1)^x + (-1)^{x+101}$ if x is an integer?
8. What is the remainder when 112358132134 is divided by 9?
9. If $\frac{36}{84} = \frac{x}{28}$, what is x ?
10. Claire, Ryan, Dominic, and Kevin take the Joe Holbrook Memorial Math Competition, and each of them finishes in the top 4. Given that both Kevin and Claire place higher than Dominic, and Ryan does not finish in the bottom 2, who comes in 4th?
11. 2012 people are in a room, and each wears either a red or blue hat. Each person is able to see the hats of everyone in the room except their own. One of the people inside the room, Kelley, surveys the room and counts 1451 red hats, while another, JP, counts only 1450. How many people are wearing blue hats?
12. If a square has the same perimeter as an equilateral triangle with side length 12, what is the area of that square?
13. If $24a + 20b = 240$, then what is the value of $\frac{a}{5} + \frac{b}{6}$?
14. Mr. Lemma initially arranged his marching band in a square formation, before realizing that he preferred arranging them in 6 equal rows. If Mr. Lemma has between 100 and 150 students, how many people are in marching band?
15. Mr. Wojcik gives his math class an 8-question True-False test. If Steven guesses every answer, what is the probability he gets all of them right?
16. A rectangle has integer side lengths and perimeter 30. What is the maximum possible area?
17. If the mean of the numbers 3, 7, 5, and $2x$ is x , find x .
18. $ABCD$ is a quadrilateral with right angles at B and D , $AB = 7$, $BC = 24$, $CD = 20$, and $DA = 15$. What is the area of this quadrilateral?

19. What is the probability of rolling a 2 or a 5, but not both, when rolling a pair of fair, six-sided dice?

For problems 20 through 23, fill in the following crossword puzzle, putting a single digit in each box.



20. (1 across) A perfect cube
21. (1 down) A perfect square
22. (2 down) A multiple of 8
23. (3 across) A multiple of 13
24. If it takes 3 painters 4 days to paint 10 houses, then how many painters will it take to paint 85 houses in 17 days?
25. $a\#b = a \cdot b - a$. For example, $5\#7 = 5 \cdot 7 - 5 = 35 - 5 = 30$. What is $((((25\#16)\#9)\#4)\#1)$?
26. How many ordered pairs of positive integers (a, b) satisfy $4^6 = a^b$?
27. In a new game called Kopemon, a Kopemon called Kipachu uses an attack called Shocking Thunder, which does 100 damage. However, there is a 10% chance that it will be ultra-effective! and do double the damage. What is the average damage that can be done by a Kipachu's Shocking Thunder?
28. The values of a, b, c , and d are chosen without replacement from the numbers $-3, -2, -1, 0, 1, 2, 3$. What is the largest possible value of $(a^b) - cd$?
29. How many ways are there to arrange sedans, SUVs, and semitrucks in a parking lot of 10 side by side spaces if a sedan takes up 1 space, a SUV takes up 2 spaces, and a semitruck takes up



- 4 spaces? (The order in which they are arranged does not matter)
30. In the diagram above, $ABCD$ is a square with side length 12, $EF = 2 \cdot EG$. What is the area of $\triangle AEC$?
31. Sally only likes to sort the stamps in her collection in groups of 2 or 5. What is the smallest number of stamps that could not be sorted in this manner?
32. Find the largest power of 2 that evenly divides 2012^{2012} .

33. What is the minimum number of colors needed to color the edges of a cube so that no two edges of the same color meet at a vertex?
34. 75% of boys at BCA take Spanish, while 40% of girls do. If half of all kids take Spanish, what is the ratio of boys to girls at BCA?
35. Two congruent circles of radii 3 intersect such that each circle passes through the center of the other. What is the perimeter of this entire figure?
36. Find all possible values of x , given that $x + 4 = \sqrt{x + 6}$.
37. On a five-question math test, two students each get 2 problems correct. What is the probability that at least one problem was correctly solved by both students?
38. A room has 20 teachers, 12 of which are male and 8 are female. Each male teacher shakes hands twice with every other male teacher, each female teacher shakes hands three times with every other female teacher, and each teacher shakes hands once with every teacher of the opposite gender. How many total handshakes happen in the room?
39. A circle is inscribed in a regular hexagon. If the area of the circle is 4π , what is the area of the hexagon?
40. What is the smallest number with exactly 12 positive integer divisors (including 1 and itself)?
41. A bug starts at point A of equilateral triangle ABC. Each second, the bug randomly moves to one of the adjacent vertices, each with probability $\frac{1}{2}$. What is the probability that after 3 seconds the bug has visited all 3 vertices? (Note: the bug has already visited point A, since that is its starting point).
42. Without repeating any letters, how many ways are there to form a 5 letter sequence using the letters $a, b, c, d, e, f, g, h, i, j$ that contains the letter e ?
43. What is the greatest integer that must always divide a product of five consecutive positive even integers?
44. Michael flips a fair coin 4 times, and JP flips a fair coin 3 times. What is the probability, that Michael will get more heads than JP?
45. A certain solid has 8 triangular faces and 6 octagonal faces. How many edges does it have?
46. A point P inside rectangle $ABCD$ satisfies $PA = 7$, $PB = 8$, and $PC = 5$. What is the length of PD ?
47. How many ordered pairs of positive integers (a, b) satisfy $8a - 3b + 2ab = 36$?
48. What is the remainder when 3^{2013} is divided by 16?
49. Izzy and Arthur play a game where they take turns flipping an unfair coin that comes up heads with probability $\frac{4}{7}$. Whoever gets a heads first wins. If Izzy starts flipping first, what is the probability that she will win?
50. $ABCD$ is a parallelogram with $AB = 6$. Let DE be perpendicular to BC . Extend AB and DE to intersect at F . If $BF = 24$, what is the ratio of the areas of triangles BFE and CDE ?