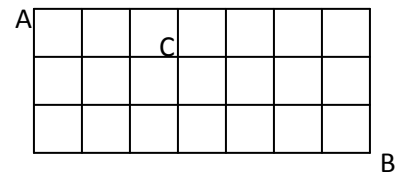


2012 Rocket City Junior Math Mania
Algebra and Probability – 7th Grade

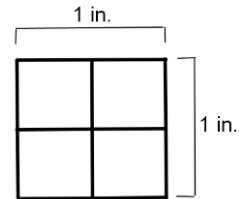
1. What value(s) of w satisfy $4w - 9 = 2w + 57$?
2. If six identical candy bars are to be distributed among four people so that each person gets at least one candy bar, how many different distributions are possible?
3. If the lines $Ax + By = 15$ and $Ax - By = 9$ intersect at the point $(2, 3)$, then what is the value of $2A + 2B$?
4. Anne and Babs are in the same class. Anne can make Christmas cards for all of her classmates in 2 hours. Babs can make Christmas cards for all of her classmates in 3 hours. How many **minutes** will it take them to make a single set of Christmas cards for all of their classmates if they work together?
5. A bag of marbles contains three blue marbles and two white marbles. When two marbles are drawn without replacement, what is the probability the first is white and the second is blue?
6. The number that is 45% of 240 is 24% of what number?
7. When the digits of a positive two-digit number are reversed to form a new positive two-digit number, the new number is 54 greater than the original number. What is the largest possible value of the original number?
8. When 10 liters of a 10% acid solution are combined with 40 liters of a 40% acid solution, what percent of the resulting solution is acid?
9. In how many ways can a class of 34 students select two members to be its representatives to the student council?
10. What is the distance between the x-intercepts of the parabola $y = 3x^2 - 23x + 40$?
11. The number of wolves in North Cascades National Park is directly proportional to the number of grizzly bears. If there were 36 wolves and 8 grizzly bears in 2010, how many wolves will there be in 2020 if there are expected to be 14 grizzly bears?
12. In the array of unit squares to the right, how many paths moving only down and to the right go from A to B and pass through C?
13. Express in simplest radical form: $\sqrt{252}$
14. A bag contains only red marbles and blue marbles, but there are 8 more blue marbles than red ones. If the probability of drawing a blue is $\frac{5}{8}$, how many total marbles are in the bag?
15. Evaluate: $\frac{(36 \times 48)}{12}$
16. When two marbles are drawn without replacement from a bag containing three red marbles and four blue marbles, what is the probability that both marbles are red?
17. Evaluate: $5^5 - 4^4 + 3^3 - 2^2 + 1^1$



18. I drive to school at an average speed of 40 miles per hour. I drive back home at 60 miles per hour. What was my average speed for the entire trip (to school and back).
19. $2^0 + 2^1 + 2^2 + 2^3 + 2^4 + 2^5 + 2^6 + 2^7 + 2^8 + 2^9 + 2^{10} =$
20. Two dice are rolled and the numbers on top are added. This sum is then multiplied by 4, then 7 is added. What is the probability that the resulting number is 23?

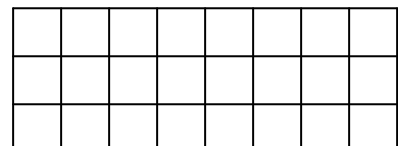
2012 Rocket City Junior Math Mania
Geometry & Potpourri – 7th Grade

1. What is the next number in the pattern: 11, 121, 1331, 14641, ... ?
2. Two concentric circles with radii of 6 m and 10 m are drawn. What is the length, in meters, of a chord of the larger circle that is tangent to the smaller circle?
3. What is the area of the largest circle that fits in the space between the two circles in problem #3?
4. A unit square is sectioned into four smaller congruent squares. What is the sum of the areas of all the rectangles which can be found within the given diagram?



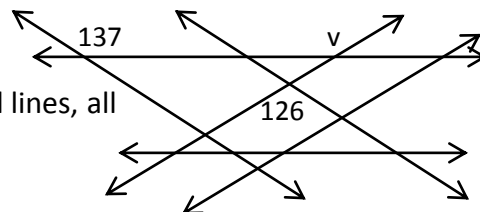
5. The difference between the squares of two consecutive positive integers is 43. What is the sum of the two integers?
6. Express the base ten number 234_{10} as a base nine number.
7. Two congruent cubes are on top of a table. Ryan picks up one cube and stacks it on top of the other. If one face of one cube has a side of length 4, then what is the total area of all the visible faces?
8. A cow is tethered to the outside of a square barn with no open doors. If the barn has sides measuring 50 m and the cow is tethered against the side of the barn 10 m from a corner using a rope that is 30 m long, what is the area, in square meters, in which the cow can wander?
9. How many positive integers are multiples of 6 and also factors of 120?
10. How many total diagonals can be drawn in a convex octagon?
11. What are the next **two** numbers in the pattern: 7, 11, 13, 17, 19, 23, 29, ... ?
12. What is the measure, in degrees, of a base angle of an isosceles triangle with a vertex angle measuring 48° ?
13. If Set B is the set of positive two-digit prime numbers and Set C is the set of integers less than 60 containing the digit 3 at least once, how many elements are in the set $B \cap C$ (B and C)?
14. A 6 ft. by 8 ft. room is tiled with 6 in. square tiles. To confirm that the room is square, the contractor measures the diagonal to be 10 ft. As he is measuring, how many tiles does his string cross?

15. How many squares of any size are there in the array of unit squares to the right?



16. Evaluate: $2 + \frac{3}{2 + \frac{3}{2 + \frac{3}{2}}}$

17. In the figure to the right, which consists of three pairs of parallel lines, all angles are measured in degrees. What is the value of v ?



18. What is the sum of the first twenty terms of an arithmetic sequence with a first term of 15 and a common difference of 4?
19. In simplest radical form, what is the length of the other leg of a right triangle with a hypotenuse of length 36 and one leg of length 30?
20. What would be the perimeter of 2012 triangles placed in a row like the rows below, which contain one, two, and three triangles respectively?

