**Pink**

R1) ABCD is a convex quadrilateral such that AB = 20x, BC = 24x, CD = 7x, DA = 15x, and ∠DAB is a right angle. Find x to the nearest whole number if the area of ABCD is KEY.

R2) A triangular number is one that can be written in the form 1 + 2 + … + n for some positive number n. 1 is clearly both triangular and square. What is the smallest number greater than KEY that is both triangular and square?

R3) If a = 3b, 5b = 3c, and c = 2d, find .

Let x be the sum of the three answers above. The sum of the digits of x is the KEY to the next set of clues.

If your new KEY is over 27, you’re done! Make sure you’ve collected four cards of different colors. (If not, you probably messed up somewhere!)

Otherwise, locate the stash labeled with your new key.

**Orange**

Y1) In how many ways can KEY basketball players of different heights line up in a single row so that no player is standing between two people taller than herself?

Y2) Find the constant term in the expansion of .

Y3) KEY people, three of whom are in the Maﬁa and one of whom is a police inspector, randomly sit around a circular table. What is the probability that the inspector does not sit next to any of the Mafia? Express your answer as a percent, to the nearest percent.

Find the largest of your three answers divided by the smallest of your three answers. Round to the nearest whole number. This is your KEY to the next set of clues.

If your final result is over 9000, you’re done! Express your final result in scientific notation, if it’s *that* much over 9000. Make sure you’ve collected four cards of different colors. (If not, you probably messed up somewhere!)

Otherwise, locate the stash labeled with your new key.

**Green**

G1) A circle is inscribed in a square of side length KEY. A second circle, tangent to the original circle and two sides of the square, is constructed in a corner of the square. Find the radius of the second circle, to the nearest whole number.

G2) Each problem on a particular math contest awards 5 points for a correct answer, 1 point for a blank, and 0 points for a wrong answer. If there are KEY problems in all, how many total positive scores are possible?

G3) What is the area of the graph enclosed by |KEY x| + |2y| = KEY2?

Find the sum of the units’ digits of your three answers. This is your new KEY to the next set of clues.

Locate the stash labeled with your new key.

**Blue**

B1) The cubic function ax3 + bx2 + cx + d passes through the points (-2,0), (2,0), and (0, KEY). Find the value of b.

B2) Alaskan oil reserves would potentially last for KEY years if used only by the United States. If the same reserves are also utilized by China, they will last for only KEY – 20 years. How many years would this oil last if only used by China?

B3) Jake has taken three tests so far in math class and his grades have been 87, 100, and 92. Suppose she gets a score of KEY on her fourth test. If m is the mean score of her ﬁrst three tests and M is the mean score of her ﬁrst four tests, what is m − M?

Find the sum of your three answers. This is your new KEY to the next set of problems.

If your new KEY is not an integer, you are done! Make sure you have four different colored cards. (If not, you probably messed up somewhere.)

Otherwise, locate the stash labeled with your new key.

**White**

W1) Suppose that r, s, and t are the solutions to the polynomial x3 + 2x2 + (KEY)x + 2 = 0. Compute r2 + s2 + t2.

W2) Two ducks are racing on an x-y plane, from the y-axis to the line x = 10. The first duck follows the line y = x. The second duck follows the line y = x / TNYWR. Both ducks start at the same time, and finish at the same time. If the first duck is travelling at 10 miles per hour, how fast is the second duck travelling, to the nearest mile per hour?

W3) Angus and Maggie walk from home to a mountain, climb up, climb back down, and walk back home. Their return trip follows exactly the same route as their forward trip. On the flat terrain from home to the mountain, they make 4 mph. Climbing up the mountain, they make 3 mph. Climbing down, they make 6 mph. It takes them KEY hours to make this entire journey. How many miles did they travel in all?

Find W3 + W2 + W1. This is your new KEY to the next set of clues.

If your new KEY is one less than a multiple of 19, you’re done! Make sure you have four different colored cards. (If not, you probably messed up somewhere.)

Otherwise, locate the stash labeled with your new key.