1. Arvind has 4 tablespoons of Sparkling Water. He has unlimited juice and wants to make sparkling juice. If the ratio of sparkles to juice should be $1:60$ How many gallon(s) of sparkling juice can be made at most? Recall that one gallon is 256 tablespoons.

(A) 1 **(B)** 0 **(C)** 3 **(D)** 4 **(E)** 5

2. Ladka13 is deciding which of four restaraunts he should go to. He wants to go to the one that is closer to his house. 100 meters east of his house is his school and midway between his house and school is the post office. Bob's Burgers is 200 meters east of the post office. 150 meters to the north is the arcade. Midway between his house and the arcade is the bank. 150 meters from the bank is Pam's Pancakes. 200 meters to the west is the park and midway between it and his house is the library, 175 meters to the west of which is Sam's Sandwiches. The last restaurant Fred's Falafel which is 135 meters south pf his friend Joe's house which is midway between his and Jill's house which is 250 meters away from his. Which restaruant will Ladka13 go to?

(A) $Bob's\ Burgers$ **(B)** $Pam's\ Pancakes2$ **(C)** $Sam's\ Sandwiches$ **(D)** $Fred's\ Falafel$ **(E)** $Multiple\ options$

3. Jake pours $\frac{1}{3}$ of the juice in a jug into his cup and Harry pours the rest of the juice into his cup. However, Jake wants the cups to contain an equal amount of juice, so he pours $\frac{2}{5}$ of the juice from Harry's cup into his cup and then pours 10 ml of juice back into Harry's cup. If the cups now have an equal amount of juice in them, how much ml of juice did the jug originally have?

(A) 80 **(B)** 100 **(C)** 120 **(D)** 140 **(E)** 160

4. Sarah has a large bag of candy and wants to share it with her friends and family. She gives away a fifth of the bag to her brother. She then gives away a fourth of the bag to her parents. A third of the bag goes to her friend Jeff and she then eats 13 pieces of candy and has 115 pieces left. How many pieces of candy did she start out with?

(A) 7680 **(B)** **(C)** 115 **(D)** 6900 **(E)** 6120

5. If $4^x = 8^{2y}$ What is the value of $x \div y$?

(A) 4 **(B)** 0.25 **(C)** 0.75 **(D)** 3 **(E)** 2

6. n is the largest two digit multiple of 7 in which both of it's digits evenly divide it. How many factors does n have?

(A) 77 **(B)** 4 **(C)** 2 **(D)** 84 **(E)** 12

7. Pascal is thinking of a four digit number. It is a multiple of 11. The tens digit is twice the thousands digit. What is the probability that the number is even?

(A) $\frac{18}{37}$ **(B)** $\frac{19}{37}$ **(C)** $\frac{38}{74}$ **(D)** $\frac{1}{2}$ **(E)** $\frac{7}{18}$

8. If $LCM(3, 18) = 0.5x$. What is the value of $GCD(x, 14)$?

(A) 77 **(B)** 4 **(C)** 2 **(D)** 84 **(E)** 12

9. Gauss is trying to find the height of a large pole. There is a small pole in front of the large pole and a rock in front of the small pole. The height of the small pole is 3 and the distance from the rock to the small pole is 4. The distance from the small pole to the large pole is 4. What is the height of the large pole?

(A) 10 **(B)** 3 **(C)** 4 **(D)** 5 **(E)** 12

10. What is the largest number x that satisfies the following conditions?

· x is smaller than 1000
· x is a multiple of 7 and 5 but not 10
· x is a multiple of 3 but not 6

(A) 945 **(B)** 840 **(C)** 980 **(D)** 995 **(E)** 990

11. A store marks up the price of an item by x percent. The next day, they mark the price up by $2x$ percent. The new price of the item is 149.50 percent of the original price. What is the value of x?.

(A) 20 **(B)** 10 **(C)** 15 **(D)** 25 **(E)** 50

12. What is the sum of the probabilities that when three dice are rolled the numbers are either in ascending or descending order from the first die to the third die?

(A) $\frac{5}{54}$ **(B)** $\frac{5}{27}$ **(C)** $\frac{5}{72}$ **(D)** $\frac{5}{108}$ **(E)** $\frac{7}{216}$

13. Jeffrey wants to buy a drone. On the International Web Store there are many deals on drones and Jeffrey wants to pick the cheapest one. A Farkle = 1.53 USD,a Mirkle = 2.54 USD, a Gorkle = 3.57 USD, a Garfunkle = 2.89 USD, and Toortle = 1.58 USD. Deal 1 for the drone costs 130 Farkles, deal 2 costs 78 Mirkles, deal 3 costs 56 Gorkles, deal 4 costs 126 Toortles, and deal 5 costs 69 Garfunkles. Which deal should Jeffrey pick?

(A) *Deal* 1 **(B)** *Deal* 2 **(C)** *Deal* 3 **(D)** *Deal* 4 **(E)** *Deal* 5

14. The book club with only boys and girls is holding it's annual elections. There are three positions open: president, vice president, and secretary. Two boys are part of the club and $\frac{3}{4}$ of the club are girls. If no one person may hold multiple positions what is the probability that the majority of leadership positions are held by girls?

(A) $\frac{15}{28}$ **(B)** $\frac{5}{14}$ **(C)** $\frac{5}{7}$ **(D)** $\frac{4}{7}$ **(E)** $\frac{25}{28}$

15. Mr. Domath is stuck in a very dark elevator with buttons labeled from 1 to 9 inside, but they aren't in order. The elevator door will only open if he presses three different buttons, and at least one of them is labeled with an even number. If Mr. Domath randomly presses three different buttons on the elevator, what is the probability that the doors will open?

(A) $\frac{11}{12}$ **(B)** $\frac{37}{42}$ **(C)** $\frac{20}{21}$ **(D)** $\frac{6}{7}$ **(E)** $\frac{23}{27}$

16. Let $ABCDEF$ be a regular hexagon, find the ratio of the sum of it's lines of symmetry to the perimeter of the hexagon.

(A) $\sqrt{3}$ **(B)** 2 **(C)** 1 **(D)** $\sqrt{2}$ **(E)** $2\sqrt{3}$

17. A train is travelling along a 360 mile track from City A to City B. a tunnel starts and ends somewhere along the track. After 1.5 hours, the train is half way along the track, and $\frac{2}{7}$ way along the tunnel. After the train exits the tunnel, it takes 1.4 hours to reach City B. how many miles was the tunnel?

(A) 12 **(B)** 14.2 **(C)** 15.5 **(D)** 16.8 **(E)** 18

18. A random subset S is to be chosen from $(1, 2, 3, \cdots, 10)$, what's the probability that $(1, 3)$ isn't a subset of S, but $(5, 7, 8)$ is?

(A) $\frac{1}{8}$ **(B)** $\frac{1}{32}$ **(C)** $\frac{3}{32}$ **(D)** $\frac{9}{32}$ **(E)** $\frac{1}{16}$

19. A circle with diameter 8 is inscribed inside of a isosceles triangle with base AB and vertex C. The length of the altitude from C to AB has length 9. Let P be point of tangency of AC and the circle. What is the length of the altitude from P to AB?

(A) $4\sqrt{3}$ **(B)** $\frac{9\sqrt{3}}{7}$ **(C)** $\frac{36}{5}$ **(D)** $\frac{27}{7}$ **(E)**

20. $\triangle ABC$ is an isosceles triangle with $AB = AC$. Points X and Y are positioned on AB such that $BC = CY$ and X is the midpoint of AY. Point Z is positioned on AC such that $ZY \perp AC$. If $\triangle XYZ$ is an equilateral triangle, what is the measure of $\angle AXC$?

(A) 115° **(B)** 120° **(C)** 135° **(D)** 145° **(E)** 150°

21. Mr. Domath has 5 identical red pills and 5 identical blue pills. He lines them up in a row, in groups of two. He

makes sure that if a group has pills that are the same color, any group lined up next to it should not have pills that are the same color. How many ways can Mr. Domath line up the pills?

(A) 96 **(B)** 112 **(C)** 128 **(D)** 136 **(E)** 164

22. $\triangle ABC$ has $\angle C = 90^\circ$ and $\angle B = 30^\circ$. Point D is the intersection of the angle bisector of $\angle A$ and the altitude of $\triangle ABC$ perpendicular to AB. What is the ratio of the area of $\triangle ACD$ to the area of $\triangle ABC$?

(A) $\frac{\sqrt{3}}{8}$ **(B)** $\frac{1}{8}$ **(C)** $\frac{\sqrt{3}}{6}$ **(D)** $\frac{1}{6}$ **(E)** $\frac{\sqrt{2}}{9}$

23. How many ordered pairs of integers (a, b, c) satisfy the equation $a^2 - 2ab + 2b^2 - 2ac + 3c^2 = 0$?

(A) 1 **(B)** 0 **(C)** 3 **(D)** 4 **(E)** 5

24. There is at least one nickle, dime, and quarter in a jar.
· If half of the nickles are removed, there are x coins left in the jar.
· If half of the dimes are removed, there are $x + 7$ coins left in the jar.
· If half of the quarters are removed, there are $x + 14$ coins left in the jar.
What is the minimum value of x?

(A) 8 **(B)** 13 **(C)** 28 **(D)** 29 **(E)** 33

25. Mr. Domath randomly distributes 4 red candies, 3 green candies, and 2 blue candies into 3 different bags, so that each bag contains the same number of candies. What is the probability that at least one of the bags contains candies that are all the same color?

(A) $\frac{23}{140}$ **(B)** $\frac{5}{28}$ **(C)** $\frac{5}{84}$ **(D)** $\frac{23}{420}$ **(E)** $\frac{7}{9}$