# St. "Pi"trick's Day Meeting
# Problem Set

**Pi Problems**

1. _____ March 14 (3/14) is often celebrated as Pi Day since $\pi$ is estimated to be about 3.14. However, in reality, when $\pi$ is written as a decimal, it is a number that never ends and never repeats. Therefore, many people enjoy memorizing as many digits of $\pi$ as they can. The 2003 School Competition had a question related to this: In March 2000, a high school senior in Fargo, N.D. won his school's annual Pi Memorization Contest by reciting 5005 digits of $\pi$. He recited the digits in 55 minutes. On average, how many digits did he recite each minute?

2. _____ Since we don't all have time to memorize that many digits of $\pi$, it is often helpful to use approximations. Around 2000 BC the Babylonians approximated the value of $\pi$ to be $3\frac{1}{8}$, and the Egyptians approximated the value of $\pi$ to be $4(\frac{8}{9})^2$. What is the positive difference between these two approximations of the value of $\pi$? Express your answer as a decimal to the nearest thousandth.

3. _____ The value of $\pi$ comes from the ratio of the circumference of a circle to its diameter. Mary decided to approximate the value of $\pi$ by collecting some data. The data that follow are her measurements for the circumference and diameter, in mm, of five different circles. What is the mean of the circumference-to-diameter ratios of these circles? Express your answer as a decimal to the nearest thousandth.

| **Circle** | **I** | **II** | **III** | **IV** | **V** |
|---|---|---|---|---|---|
| **Circumference, mm (C)** | 89 | 67 | 58 | 35 | 97 |
| **Diameter, mm (D)** | 29 | 21 | 18 | 11 | 31 |
| **Circum. to Diam. (C/D)** | | | | | |

*For #4 and #5, students should use the $\pi$ button on their calculator rather than any approximation for $\pi$.*

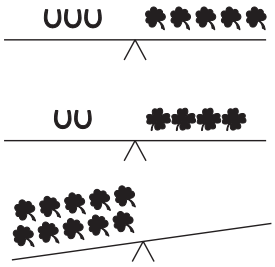
4. _____ Cory's buggy has front wheels each with a diameter of 12 inches and back wheels each with a diameter of 18 inches. If Cory pushes the buggy for 300 yards, how many more revolutions than each of the back wheels does each of the front wheels make? Express your answer as a decimal to the nearest tenth.

5. _____ Semicircle A's radius is twice as long as semicircle B's radius. The length of semicircle B's radius is 20% of the length of semicircle C's radius. None of the semicircles overlap one another. If semicircle A's radius is 10 cm, what is the sum of the areas of semicircles A, B and C, in sq cm? Express your answer as a decimal to the nearest tenth.

**St. Patrick's Day Problems**

*March 17 is St. Patrick's Day. We wish you the luck o' the Irish as you tackle these problems.*

6. _____ How many four-leaf clovers would need to be placed on the right side of the third scale to balance it?



7. _____ Riley sees a rainbow that reaches a maximum height of 0.5 miles above the ground and has ends that appear to touch the ground 1 mile apart. If the rainbow is an arc of a circle, how many degrees is the arc that Riley sees from the point it leaves the ground to the point it returns to the ground?

8. _____ Patti writes "Saint Patrick's Day" on a strip of paper and cuts it so that each of the 16 letters is on its own piece of paper. (She discards the apostrophe.) If she puts all of the letters in a hat and will draw out exactly five letters at random and without replacement, what is the probability that she will draw all five letters of her name? Express your answer as a common fraction.

9. _____ Margaret painted a mural for St. Patrick's Day and mixed her own green paint. She used a ratio of 3 parts yellow to 2 parts blue. Maureen also wanted to paint a mural with the same green color, but she currently has 8 cups of green paint that is a mixture of 40% yellow paint and 60% blue paint. To get the same shade of green as Margaret, how many cups of yellow paint must she add to her mixture?

10. _____ Let's now take a look at the word GREEN. There are not too many real words that can be made from rearranging the letters in GREEN. For this problem, though, let's see how many distinct ways we can arrange the five letters in the word GREEN, even if they don't form real words. Let's also add a restriction: Any arrangement must keep the two Es together. How many such arrangements exist?

****Answers to these problems are on page 46 of the *2008-2009 Club Resource Guide*.****