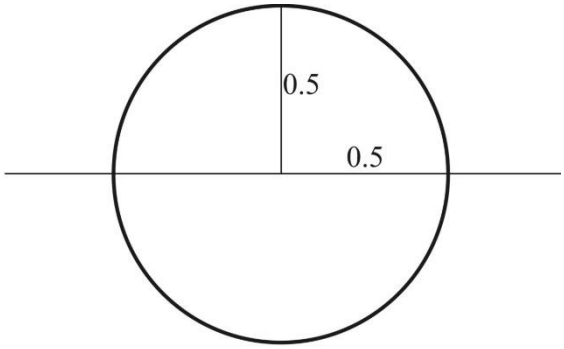
MATHCOUNTS® Problem of the Week Archive

St. Patrick's Day – March 17, 2025

Problems & Solutions

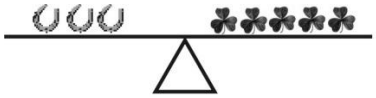
Riley sees a rainbow with ends that appear to touch the ground 1 mile apart and reaches a maximum height of 0.5 miles above the ground. If the rainbow is an arc of a circle, how many degrees is the arc that Riley sees?

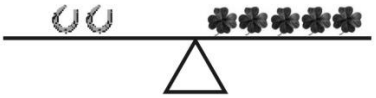
First, let's draw a diagram.



We quickly see that the only way for the chord length to be twice the length of the highest distance from the center of the circle is if the chord is also the diameter. This means that the arc measure must be ***180°***.

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





We know we have 10 three-leafed clovers on the last scale that we need to balance out. By using the information from the first scale, we can see that 10 three-leafed clovers would be equivalent to 6 horseshoes. Then, by looking at the second scale, we see that 2 × 3 = 6 horseshoes would be equivalent to 5 × 3 = 15 four-leafed clovers. So, 10 three-leafed clovers are equal to ***15 four-leafed clovers****.*

Patti writes Saint Patrick's Day on a strip of paper and cuts it so that each letter is on its own piece of paper. If she puts all of the letters in a hat what is the probability that she draws all five letters of her name in exactly five draws (without replacement)?

When finding probability, you are essentially finding the "number of desired outcome possibilities"/"the total number of outcome possibilities". For this question, we need to know how many arrangements of the letters of Patti's name exist and the total possible number of 5-letter arrangements that exist using the letters from the words Saint Patrick's Day.

Using the letters in Patti's name, there are (5!)(3)(2) = 720 possible arrangements. (Note: we multiply by 3 because there are 3 a's available in "Saint Patrick's Day," and we multiply by 2 because there are 2 i's available in "Saint Patrick's Day".)

The total number of arrangements is (16)(15)(14)(13)(12) = 524,160.

Therefore, the probability of drawing the letters of her name is 720/524,160 = ***1/728****.*

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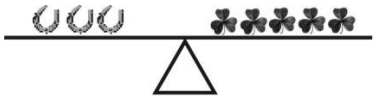

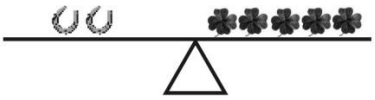

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