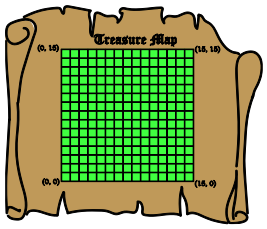
MATHCOUNTS® Problem of the Week Archive

Treasure Hunt – September 16, 2024

Problems & Solutions

Mr. Freitas decides to have a "treasure" hunt with his math class. He takes his class out to the playground where he has marked out a 15-yard by 15-yard square region. He gives his students a map, which divides the playground into a coordinate plane. Somewhere within this region, Mr. Freitas has buried a box full of prizes for the students, but they need to figure out the coordinates of the treasure's location. They are given the 1-hour class time to find the treasure.

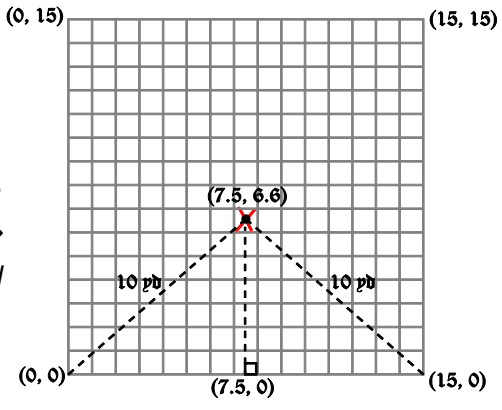


As the students begin searching, they realize they are able to completely search about 5 square feet per minute. They realize that at this pace, they will not finish in the 1-hour time limit. At their current rate, how many more hours would they need to guarantee they find the treasure? Express your answer as a decimal to the nearest hundredth.

The search area has dimensions 15 yards by 15 yards or 15 × 3 = 45 feet by 45 feet. The area the students need to search is 45 × 45 = 2025 square feet. If they are searching at 5 square feet per minute, then it will take the students 2025 ÷ 5 = 405 minutes or 405 ÷ 60 = 6.75 hours to search. This means they would need 6.75 – 1 = ***5.75*** *more hours to search the entire region.*

Mr. Freitas gives his students a hint to help them locate the treasure in the allotted time. He tells them that the treasure is located a distance of 10 yards from (0, 0) on the treasure map and also 10 yards from (15, 0). What are the coordinates of the location where Mr. Freitas's students will find the treasure? Express your answer as an ordered pair and each coordinate as a decimal to the nearest tenth.

Because the treasure is the same distance from point (0, 0) and (15, 0), we know that the x-coordinate of the treasure will be on the x-axis, halfway between the two at x = (15 – 0) ÷ 2 = 15 ÷ 2 = 7.5. The treasure will be along the line x = 7.5 and 10 yards from (0, 0). Using the Pythagorean theorem, we can solve for the y-coordinate. We have $7.5^2 + b^2 = 10^2 \rightarrow b^2 = 10^2 - 7.5^2 \rightarrow b^2 = 43.75 \rightarrow b = \sqrt{43.75} \approx 6.6$*. Therefore, the treasure is located at* ***(7.5, 6.6)****.*



Once they dig up the treasure and open the box, the students see it is a box full of candy. There are enough pieces of candy for each student to have one piece, but there are three different types: chocolate, licorice and bubble gum. There are twice as many pieces of chocolate as licorice and three times as many pieces of bubble gum as licorice. The students decide to just randomly pick pieces of candy from the box without looking. What is the probability that the first student picks licorice? Express your answer as a common fraction.

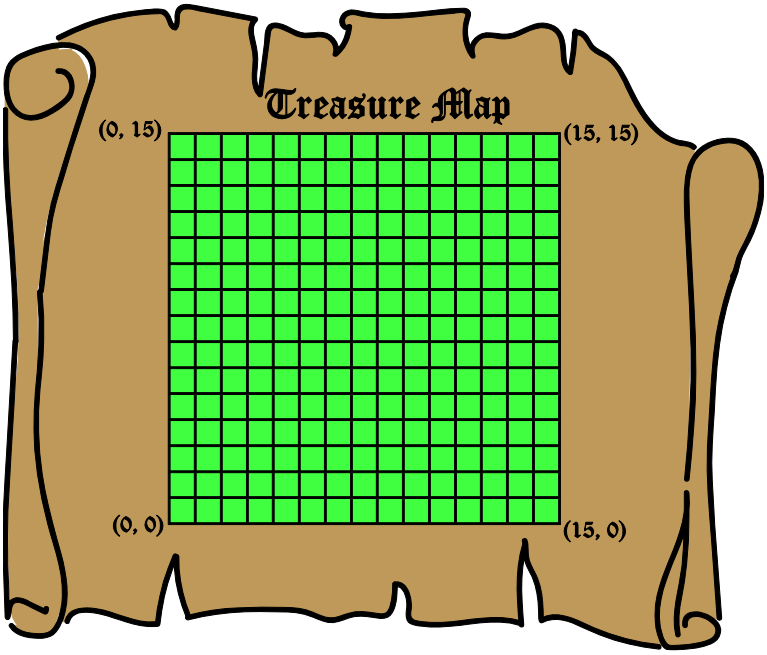
If we use L to represent the number of pieces of licorice, then there are 2L pieces of chocolate and 3L pieces of bubble gum. The probability that the first student picks a piece of licorice is L/(L + 2L + 3L) = L/6L = ***1/6****.*

MATHCOUNTS® Problem of the Week Archive

Treasure Hunt – September 16, 2024

Problems

Mr. Freitas decides to have a "treasure" hunt with his math class. He takes his class out to the playground where he has marked out a 15-yard by 15-yard square region. He gives his students a map, which divides the playground into a coordinate plane. Somewhere within this region, Mr. Freitas has buried a box full of prizes for the students, but they need to figure out the coordinates of the treasure's location. They are given the 1-hour class time to find the treasure.



As the students begin searching, they realize they are able to completely search about 5 square feet per minute. They realize that at this pace, they will not finish in the 1-hour time limit. At their current rate, how many more hours would they need to guarantee they find the treasure? Express your answer as a decimal to the nearest hundredth.

Mr. Freitas gives his students a hint to help them locate the treasure in the allotted time. He tells them that the treasure is located a distance of 10 yards from (0, 0) on the treasure map and also 10 yards from (15, 0). What are the coordinates of the location where Mr. Freitas's students will find the treasure? Express your answer as an ordered pair and each coordinate as a decimal to the nearest tenth.

Once they dig up the treasure and open the box, the students see it is a box full of candy. There are enough pieces of candy for each student to have one piece, but there are three different types: chocolate, licorice and bubble gum. There are twice as many pieces of chocolate as licorice and three times as many pieces of bubble gum as licorice. The students decide to just randomly pick pieces of candy from the box without looking. What is the probability that the first student picks licorice? Express your answer as a common fraction.