3.1.3

Friday, October 11, 2019   11:37 AM

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IM 2
Classwork...

## 3.1.3 What model should I use?

Probability Models

In this lesson you will review ideas of probability as you use systematic lists, tree diagrams, and area models to represent all of the elements in a sample space, account for outcomes that are not equally likely, and identify events. You will find that certain tools may work better for particular situations. As you work with your team, keep the following questions in mind:

What are the possible outcomes?
Are the outcomes equally likely?
Will a tree diagram, list, or area model help?
What is the probability for this event?

3-24. There is a new game at the school fair called "Pick a Tile", in which the player reaches into two bags and chooses one square tile and one circular tile. The bag with squares contains three yellow, one blue, and two red squares. The bag with circles has one yellow and two red circles. In order to win the game (and a large stuffed animal), a player must choose one blue square and one red circle.   *2 red squares*

Since it costs $2 to play the game, Marty and Gerri decide to calculate the probability of winning before deciding whether to play.

Gerri suggests they make a systematic list of all the possible color combinations in the sample space, listing squares first then circles:
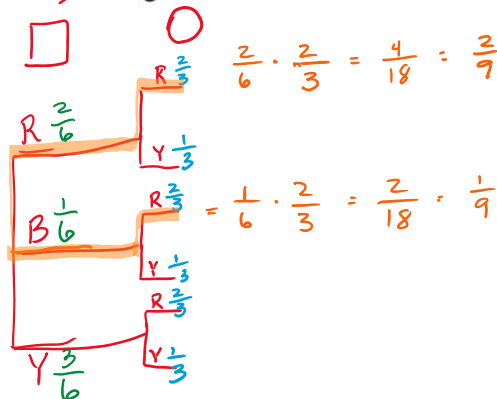
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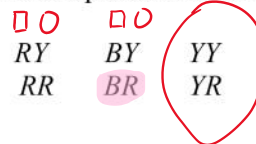
"So," says Gerri, "the answer is $\frac{1}{6}$."

a. Do you agree with Gerri's answer? Explain.

No, You are more likely to get a Yellow ☐ first

b. Make a tree diagram for this situation. Remember to take into account the duplicate tiles in the bags.   *fork*

☐   ○

R $\frac{2}{6}$
  R $\frac{2}{3}$ $\frac{2}{6} \cdot \frac{2}{3} = \frac{4}{18} = \frac{2}{9}$
  Y $\frac{1}{3}$

B $\frac{1}{6}$
  R $\frac{2}{3}$ $= \frac{1}{6} \cdot \frac{2}{3} = \frac{2}{18} = \frac{1}{9}$
  Y $\frac{1}{3}$

  R $\frac{2}{3}$
Y $\frac{3}{6}$ Y $\frac{1}{3}$

**c.** What is the probability of a player choosing the winning {blue square, red circle} combination?

$$\frac{2}{18} = \frac{1}{9} = 11.1\%$$

d. Should Gerri and Marty play this game? Would you? Why or why not?

No, 89% chance of losing ¨⌢

3-25. Now draw a probability area model for the "Pick a Tile" game in problem 3-24.
a. Use the probability area model to calculate the probability of each possible color combination of a square and a circular tile.

Pick #1 ☐

R   B   Y $\frac{3}{6}$

Pick#2

O
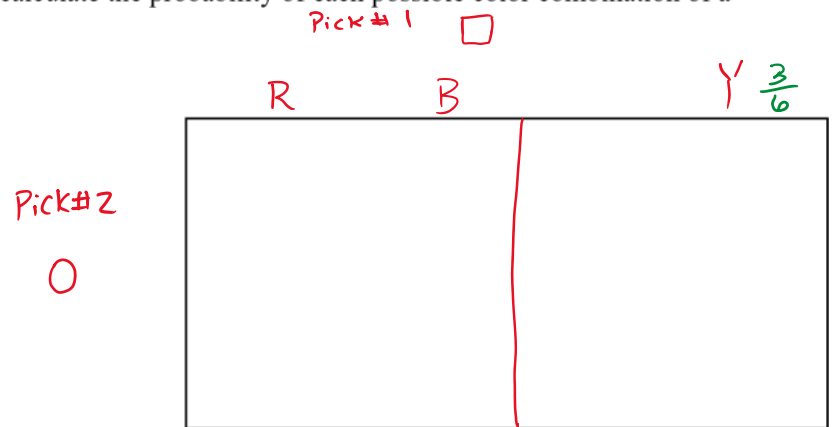
b. Explain to Marty and Gerri why the probability area model is called an *area* model.

c. Discuss which model you preferred using to solve the "Pick a Tile" problem with your team. What are your reasons for your preference?

3-26. BASKETBALL: Shooting One-and-One Free Throws
Rimshot McGee has a 70% free throw average. The opposing team is ahead by one point. Rimshot is at the foul line in a one-and-one situation with just seconds left in the game. (A one-and-one situation means that Rimshot shoot a free throw and if he makes the shot, he shoots another. If he misses the first shot, he does not get a second shot. Each shot made is worth one point.)

a. First, take a guess. What do you think is the most likely outcome for Rimshot: zero points, one point, or two points?

b. Draw a tree diagram to represent this situation.

c. Jeremy is working on the problem with Jenna, and he remembers that area models are sometimes useful for solving problems related to probability. They set up the probability area model at right. Discuss this model with your team. Which part of the model represents Rimshot getting one point? How can you use the model to help calculate the probability that Rimshot will get exactly one point?
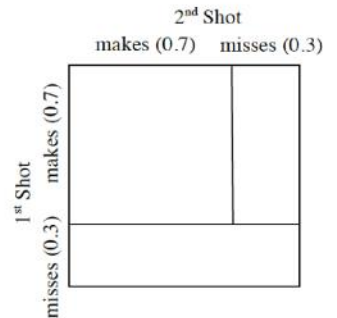
d. Use either your tree diagram or the area model to help you calculate the probabilities that Rimshot will get either zero or two points. What is the most likely of the three outcomes?

3-27. With your team, examine the probability area model from problem 3-26.
a. What are the dimensions of the large rectangle? Explain why these dimensions make sense.

b. What is the total area of the model? Express the area as a product of the dimensions and as a sum of the parts.

c. What events and probabilities are represented by the entire area model?