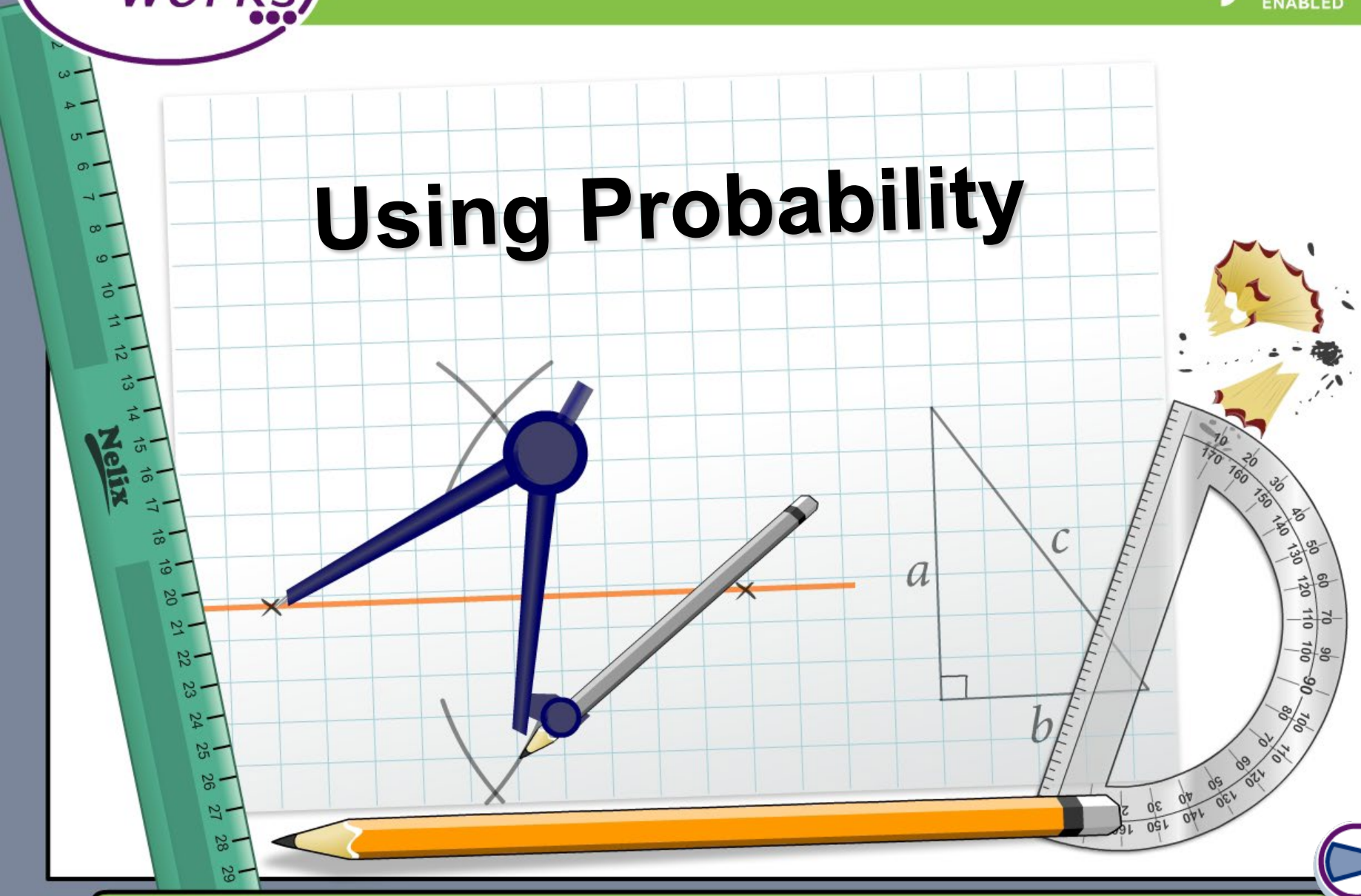
Using Probability



Information

Common core icons

This icon indicates a slide where the Standards for Mathematical Practice are being developed. Details of these are given in the Notes field.

Slides containing examples of mathematical modeling are marked with this stamp.

This icon indicates an opportunity for discussion or group work.

The **Standards for Mathematical Practice** outlined in the Common Core State Standards for Mathematics describe varieties of expertise that mathematics educators at all levels should seek to develop in their students.

These are:

1) Make sense of problems and persevere in solving them.

2) Reason abstractly and quantitatively.

3) Construct viable arguments and critique the reasoning of others.

4) Model with mathematics.

5) Use appropriate tools strategically.

6) Attend to precision.

7) Look for and make use of structure.

8) Look for and express regularity in repeated reasoning.

This icon indicates that the slide contains activities created in Flash. These activities are not editable.

This icon indicates teacher's notes in the Notes field.

Student voting

Four students from the sophomore class are running for class president. An informal survey is taken to determine student preferences and the data found is recorded in the table.

name	theoretical probability
Marie	40%
Andre	30%
Sandy	20%
Sienna	10%

Marie decides to conduct a simulation to find the experimental probability that a random student supports her.

She assigns the digits 0 to 9 to the candidates and uses a random number generator to simulate voting.

How many digits are assigned to each candidate based on the theoretical probabilities?

Marie gets 4 digits, Andre gets 3, Sandy gets 2 and Sienna gets 1.

Random number simulation

Marie assigns the digits 0 to 9 as shown in the table. She decides to conduct 20 trials.

Using the random number generator on a calculator and calculate the experimental probability of voting for Marie.

name	digits	tally	frequency
Marie	0 1 2 3	/////////	9
Andre	4 5 6	///////	7
Sandy	7 8	///	3
Sienna	9	/	1

Press **MATH** on the graphing calculator and arrow right to **PRB**. Scroll to select **randInt(**.

Type **0,9,20)** to show that you want 20 random integers from 0 to 9. The numbers will appear on the next line.

Record the data in a table. Sample data is shown above.

The experimental probability from the sample data is **9/20** or **0.45**

What result did you get?

Basketball practice

At practice during the off season Maria was working on improving her free-throw record for basketball. On average, she made 20 out of 30 shots every day.

Maria designs a probability model using a circular spinner to predict whether she will make her first free-throw of the season.

How many degrees of the spinner should represent successful shots? How many degrees should represent missed shots?

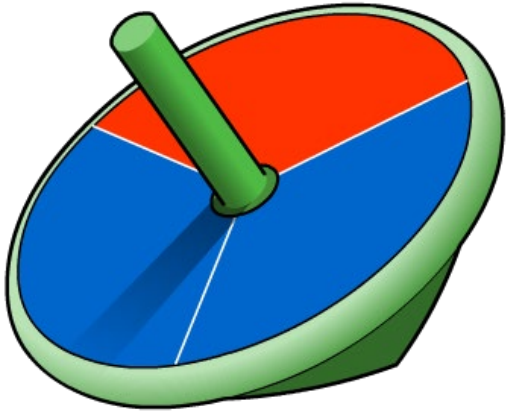
Successful shots: 20/30 = 2/3 so 2/3 × 360° = **240°**

Missed shots: 10/30 = 1/3 so 1/3 × 360° = **120°**

Using a geometric model

The table shows sample data from using the spinner 40 times. Blue represents a successful shot and red represents a miss.

outcome	tally	frequency
blue (success)	////////////////////////	24
red (miss)	//////////////////	16
total		40



What is the experimental probability that Maria makes her free-throw shot the next time she is at the foul line?

The spinner landed on blue 24 times, out of a total of 40 spins.

The probability of a successful shot is: $\frac{24}{40}$ = **0.6**

Target practice

The yellow bullseye of an archery target has a 3 inch radius. Each outer color circle adds 2 inches to target's radius. The largest circle has a radius of 11 inches.

Question: 1/3

What is the probability of hitting the yellow area?

9/121	3/11
5/11	3/121

Using line segments

A Green Line subway train arrives at the Prudential station in Boston every 15 minutes.

Gretchen arrives at the Prudential station at a random time and wonders if she has enough time to get a coffee.

Use the length of a line segment to find the probability that she will have to wait 5 or more minutes for her train.

$$P(\text{5 or more}) = \frac{\text{length of favorable segment}}{\text{length of whole segment}}$$

$$= \frac{10}{15} \approx \mathbf{0.67}$$

Genetic screening

A new screening test has been developed for a specific genome. The test sometimes gives "false positive" and "false negative" results. Here is some data from a random sample:

status	number of people	false results
have the genome	600	20 tested negative
do not have the genome	400	50 tested positive
total	1000	70

Brad is tested and gets a positive result. It is not known whether he has the genome.

Use a tree diagram to find the probability, given this result, that he actually has the genome.

Press next to see the tree diagram.

next