Name _____

Teacher Notes:

- Review "Probability" on page 9 of the *Student Reference Guide.*

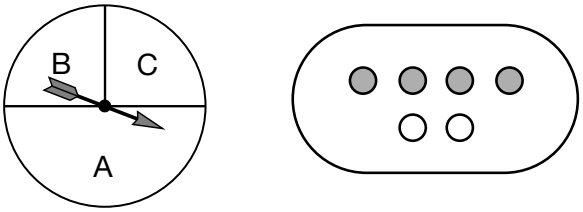
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Focus on

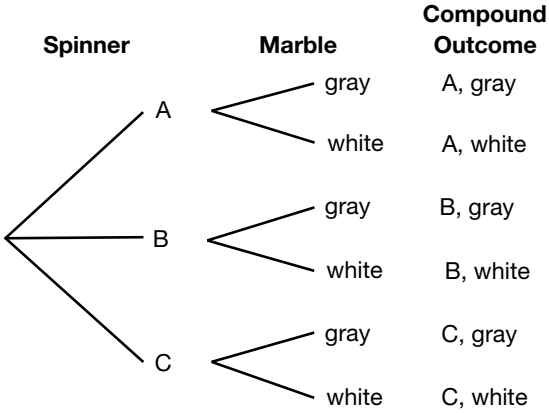
• Compound Experiments

- **Compound experiments** have two or more parts performed in order.
- Consider this compound experiment:

  A spinner with sectors A, B, and C is spun; then a marble is drawn from a bag that contains 4 gray marbles and 2 white marbles.



- This experiment has two parts: spinning and drawing a marble.
- Use a **tree diagram** to show all the **compound outcomes.**



There are three possible outcomes for the spinner: A, B, or C.

There are two possible outcomes for drawing a marble: gray or white.

- Notice that the total number of compound outcomes is the product of the number of possible outcomes for the two parts. ($3 \times 2 = 6$)
- The probability of a **compound outcome** is the product of the probabilities of each part of the outcome.

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- To find the probability of "A, gray":

    1. Find the probability of **spinning an "A."** Sector A takes up half of the circle. So the probability of spinning A is $\frac{1}{2}$.

    2. Find the probability of **drawing a gray marble.** Four of the six marbles are gray. So, the probability of drawing a gray marble is $\frac{4}{6}$.

    3. Multiply the probabilities of each part.

        $$\frac{1}{2} \times \frac{4}{6} = \frac{4}{12}$$

        This reduces to $\frac{1}{3}$.

        The probability of "A, gray" is $\frac{1}{3}$.

For problems **1–6,** calculate the probability of each compound outcome to complete the table. For the last row, find the sum of the probabilities of the six compound outcomes.

Outcome	Probability
A, gray	$\frac{1}{2} \cdot \frac{2}{3} = \frac{1}{3}$
A, white	**1.**
B, gray	**2.** $\frac{1}{4} \times \frac{\quad}{3} = \frac{\quad}{\quad}$
B, white	**3.** $\frac{\quad}{\quad} \times \frac{\quad}{3} = \frac{\quad}{\quad}$
C, gray	**4.**
C, white	**5.**
sum of probabilities	**6.**

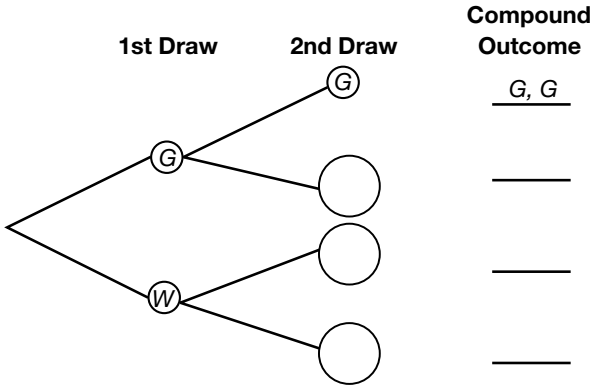
In the previous experiment, the outcome of the spin does not affect the chances of drawing a certain marble. These are **independent events.**

For problems **7–9,** consider this experiment:

A bag of marbles contains four gray marbles and two white marbles. One marble is drawn from the bag and not replaced. Then a second marble is drawn from the bag.

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7. Complete this tree diagram showing all four possible compound outcomes.



- Because the first marble drawn is not replaced, the probability changes for each part.
- To find the probability of "G, G":
  1. Find the probability of **drawing a gray marble on the first draw:**

     $\frac{4}{6}$ (reduces to $\frac{2}{3}$)

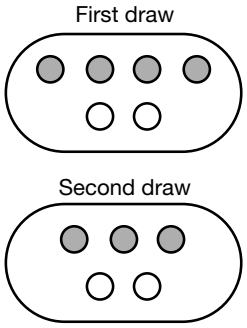
  2. Find the probability of **drawing a gray marble on the second draw:**

     Five marbles remain. Three are gray.
     So the probability of drawing a gray marble is now $\frac{3}{5}$.

  3. Multiply the probabilities of each part.

     $$\frac{2}{3} \times \frac{3}{5} = \frac{2}{5}$$

     The probability of "G, G" is $\frac{2}{5}$.



8. Calculate the probability of each compound outcome to complete the table. For the last row, find the sum of the probabilities of the four compound outcomes.

Outcome	Probability
gray, gray	$\frac{2}{3} \cdot \frac{3}{5} = \frac{2}{5}$
gray, white	
white, gray	
white, white	
sum of probabilities	

If a white marble is drawn first, **five** marbles will remain for the second draw.

How many are gray? _____

It may help to draw pictures.

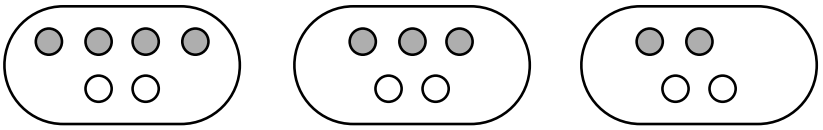
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- In the previous experiment, the first draw affects the chances of picking a certain marble on the second draw. These are **dependent events.**

9. Suppose we draw three marbles from the bag, one at a time and without replacement. What is the probability of drawing three white marbles? What is the probability of drawing three gray marbles?

white white white

$\frac{\quad}{6} \times \frac{\quad}{5} \times \frac{\quad}{4} = _____$



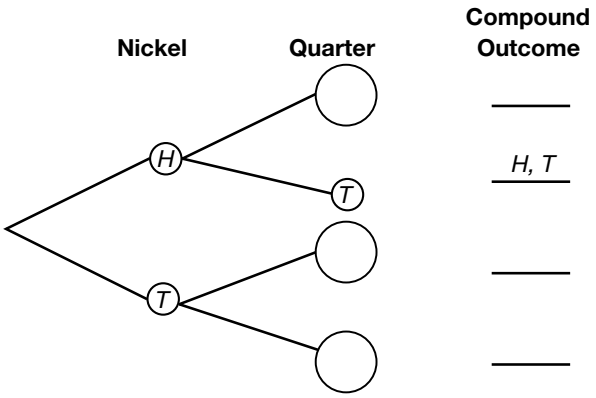
gray gray gray

$\frac{\quad}{6} \times \frac{\quad}{5} \times \frac{\quad}{4} = _____$

Consider this experiment for problems **10–14.**

A nickel is flipped; then a quarter is flipped.

10. Complete this tree diagram to show all possible compound outcomes.



11. Complete this table to show the probability of each compound outcome.

Outcome	Probability
H, T	$\frac{1}{2} \cdot \frac{1}{2} = \frac{1}{4}$

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Use the table you made in problem **11** to answer problems **12–14.**

12. What is the probability that one of the coins shows "heads" and one of the coins shows "tails"? _____

Two outcomes are like this, _____ and _____.

_____ + _____ = _____

13. What is the probability that at least one of the coins shows "heads"? _____

There are _____ outcomes like this.

14. What is the probability that the nickel shows "heads" and the quarter shows "tails"? _____

There is _____ outcome like this.

For Problems **15–18,** determine if the events are independent or dependent.

Independent events	The probability of one event occurring is not changed by the other event occurring.
Dependent events	The probability of one event occurring is changed when the other event occurs.

15. An experiment is conducted in which a nickel is flipped and then a quarter is flipped. Are the events "nickel lands on heads" and "quarter lands on tails" independent or dependent?

_____

Does the outcome of the nickel flip affect the outcome of the quarter flip?

16. Zaida has a stack of 52 alphabet cards; 26 show lowercase letters, and 26 show capital letters. She will draw two cards from the stack without putting them back. Are the events "selects a vowel on first draw" and "selects a vowel on second draw" independent or dependent?

_____

Does the outcome of the first draw affect the probability of selecting a vowel on the second draw?

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17. The class will divide into two groups for a scavenger hunt. Two leaders will be selected randomly. There are two students named Nicholas. Consider these two events:

Event 1: Nicholas P. is selected as a group leader.
Event 2: Nicholas G. is selected as a group leader.

Are these events dependent or independent? _____

18. Two number cubes are rolled together. Consider these two events:

Event 1: A "1" is rolled on the first cube.
Event 2: A "1" is rolled on the second cube.

Are these events dependent or independent? _____

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