NAME: _____ DATE: _____

PROBABILITY PERIOD: _____

What Is the Fundamental Counting Principle?

(Topic #11)

You can use multiplication instead of making a tree diagram to find the total number of possible outcomes in a sample space. This is called the **Fundamental Counting Principle**.

Fundamental Counting Principle
If event M has m possible outcomes and event N has n possible outcomes, then event M followed by event N has $\boldsymbol{m \times n}$ possible outcomes. This principle can be extended to three or more events.

EXAMPLE 1: Finding the Total Number of Possible Outcomes

Find the total number of outcomes when a coin is tossed and a number cube is rolled.

How To Use The Fundamental Counting Principle	
STEP 1:	Find the number of events.
STEP 2:	Fill in the spots with the number of possible events.
STEP 3:	Multiply the possible outcomes.

PRACTICE: Read each question carefully. *Show your work.*

1. Your soccer team's uniform choices include yellow and green jerseys, white, black, and green shorts, and four colors of socks. How many different uniforms are possible?	2. You are choosing a password that starts with 3 letters and then has 2 digits. How many different passwords are possible?

3. You are choosing a personal identification number (PIN) for a debit card. The PIN must be four digits long. How many different PINs are possible?	4. A license plate is composed of 3 letters followed by 4 digits. How many different license plates are possible?

EXAMPLE 2: Using the Fundamental Counting Principle to Find the Probability of an Event

a) Find the total number of outcomes from rolling a number cube with sides labeled 1-6 and choosing a letter from the word NUMBERS. Then find the probability of rolling a 6 and choosing an M.

b) Find the number of different jeans available at The Jeans Shop. Then find the probability of randomly selecting a size 32 x 34 slim fit. Is it likely or unlikely that the jeans would be chosen?

The Jeans Shop		
Waist Size	**Length (in.)**	**Style**
30	30	Slim fit
32	32	Bootcut
34	34	Loose fit
36		
38		

PRACTICE: Read each question carefully. *Show your work.*

5. Find the number of different outfits that can be made from 3 sweaters, 4 blouses, and 6 skirts. Then find the probability of randomly selecting a particular sweater-blouse-skirt outfit. Is the probability of this event likely or unlikely?

NAME: _____ DATE: _____

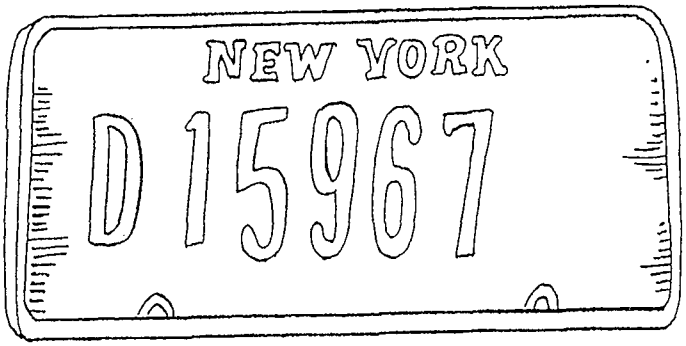
PROBABILITY PERIOD: _____

HOMEWORK - (Topic #11)

The Fundamental Counting Principle

Solve each problem. Show your work.

1. Students at Highland Junior High School must participate in three extracurricular activities each year. They can choose from 6 sports, 7 committees, and 8 clubs. How many choices does a Highland student have?	2. If three clubs and two committees are deleted, how many possible choices will a Highland student have?
3. If two sports are also deleted, how many possible choices will a Highland student have?	4. If a state vehicle license plate has 2 letters, excluding I and O, and 4 digits (0-9), how many different license plates are possible?
5. If a state vehicle license plate has one letter, excluding I and O, and 5 digits (0-9), how many different license plates are possible?	6. If a state license plate has five letters, excluding I and O, and no digits, how many different license plates are possible?



NAME: KEY DATE: _____

PROBABILITY PERIOD: _____

What Is the Fundamental Counting Principle?

(Topic #11)

You can use multiplication instead of making a tree diagram to find the total number of possible outcomes in a sample space. This is called the **Fundamental Counting Principle**.

Fundamental Counting Principle
If event M has m possible outcomes and event N has n possible outcomes, then event M followed by event N has $\boldsymbol{m \times n}$ possible outcomes. This principle can be extended to three or more events.

EXAMPLE 1: Finding the Total Number of Possible Outcomes

Find the total number of outcomes when a coin is tossed and a number cube is rolled.

$$\underset{\text{coin}}{2} \cdot \underset{\#\text{ cube}}{6} = 12$$

How To Use The Fundamental Counting Principle	
STEP 1:	Find the number of events.
STEP 2:	Fill in the spots with the number of possible events.
STEP 3:	Multiply the possible outcomes.

PRACTICE: Read each question carefully. *Show your work.*

1. Your soccer team's uniform choices include yellow and green jerseys, white, black, and green shorts, and four colors of socks. How many different uniforms are possible?

$$\underset{\text{jerseys}}{2} \cdot \underset{\text{shorts}}{3} \cdot \underset{\text{socks}}{4} = 24$$

2. You are choosing a password that starts with 3 letters and then has 2 digits. How many different passwords are possible?

$$\underset{\text{letter}}{26} \cdot \underset{\text{letter}}{26} \cdot \underset{\text{letter}}{26} \cdot \underset{\text{digit}}{10} \cdot \underset{\text{digit}}{10} = 1{,}757{,}600$$

3. You are choosing a personal identification number (PIN) for a debit card. The PIN must be four digits long. How many different PINs are possible?	4. A license plate is composed of 3 letters followed by 4 digits. How many different license plates are possible?
$\frac{10}{\text{digit}} \cdot \frac{10}{\text{digit}} \cdot \frac{10}{\text{digit}} \cdot \frac{10}{\text{digit}} = 10,000$	$\frac{26}{\text{letter}} \cdot \frac{26}{\text{letter}} \cdot \frac{26}{\text{letter}} \cdot \frac{10}{\text{digit}} \cdot \frac{10}{\text{digit}} \cdot \frac{10}{\text{digit}} \cdot \frac{10}{\text{digit}} =$ $175,760,000$

EXAMPLE 2: Using the Fundamental Counting Principle to Find the Probability of an Event

a) Find the total number of outcomes from rolling a number cube with sides labeled 1-6 and choosing a letter from the word NUMBERS. Then find the probability of rolling a 6 and choosing an M.

$\frac{6}{\#\text{cube}} \cdot \frac{7}{\text{letter}} = 42$

$P(6) \times P(M)$

$\frac{1}{6} \cdot \frac{1}{7}$

$\frac{1}{42}$

b) Find the number of different jeans available at The Jeans Shop. Then find the probability of randomly selecting a size 32 x 34 slim fit. Is it likely or unlikely that the jeans would be chosen?

$\frac{5}{\text{size}} \cdot \frac{3}{\text{length}} \cdot \frac{3}{\text{style}} = 45$

$P(32) \times P(34) \times P(\text{slim})$

$\frac{1}{5} \cdot \frac{1}{3} \cdot \frac{1}{3}$

$\frac{1}{45}$ unlikely

The Jeans Shop		
Waist Size	**Length (in.)**	**Style**
30	30	Slim fit
32	32	Bootcut
34	34	Loose fit
36		
38		

PRACTICE: Read each question carefully. *Show your work.*

5. Find the number of different outfits that can be made from 3 sweaters, 4 blouses, and 6 skirts. Then find the probability of randomly selecting a particular sweater-blouse-skirt outfit. Is the probability of this event likely or unlikely?

$\frac{3}{\text{sweaters}} \cdot \frac{4}{\text{blouses}} \cdot \frac{6}{\text{skirts}} = 72$

$P(\text{sweater}) \times P(\text{blouse}) \times P(\text{skirt})$

$\frac{1}{3} \cdot \frac{1}{4} \cdot \frac{1}{6}$

$\frac{1}{72}$ unlikely

NAME: KEY DATE: _____

PROBABILITY PERIOD: _____

HOMEWORK - (Topic #11)

The Fundamental Counting Principle

Solve each problem. Show your work.

1. Students at Highland Junior High School must participate in three extracurricular activities each year. They can choose from 6 sports, 7 committees, and 8 clubs. How many choices does a Highland student have?

$\frac{6}{\text{Sports}} \cdot \frac{7}{\text{Committees}} \cdot \frac{8}{\text{Clubs}} = 336$

2. If three clubs and two committees are deleted, how many possible choices will a Highland student have?

$\frac{6}{\text{Sports}} \cdot \frac{5}{\text{Committees}} \cdot \frac{5}{\text{Clubs}} = 150$

3. If two sports are also deleted, how many possible choices will a Highland student have?

$\frac{4}{\text{Sports}} \cdot \frac{5}{\text{Committees}} \cdot \frac{5}{\text{Clubs}} = 100$

4. If a state vehicle license plate has 2 letters, excluding I and O, and 4 digits (0-9), how many different license plates are possible?

$\frac{24}{\text{letter}} \cdot \frac{24}{\text{letter}} \cdot \frac{10}{\text{digit}} \cdot \frac{10}{\text{digit}} \cdot \frac{10}{\text{digit}} \cdot \frac{10}{\text{digit}}$

5,760,000

5. If a state vehicle license plate has one letter, excluding I and O, and 5 digits (0-9), how many different license plates are possible?

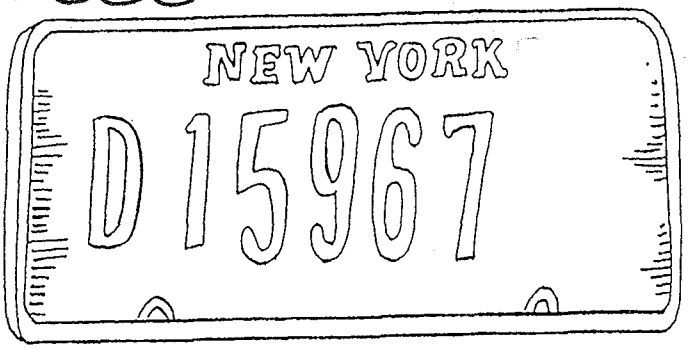
$\frac{24}{\text{letter}} \cdot \frac{10}{\text{digit}} \cdot \frac{10}{\text{digit}} \cdot \frac{10}{\text{digit}} \cdot \frac{10}{\text{digit}} \cdot \frac{10}{\text{digit}}$

2,400,000

6. If a state license plate has five letters, excluding I and O, and no digits, how many different license plates are possible?

$\frac{24}{\text{letter}} \cdot \frac{24}{\text{letter}} \cdot \frac{24}{\text{letter}} \cdot \frac{24}{\text{letter}} \cdot \frac{24}{\text{letter}}$

7,962,624



NAME: KEY DATE: _____

STATISTICS & PROBABILITY PERIOD: _____

How Can I Find The Total Number Of Possible Outcomes Without Using A Tree Diagram Or Using An Organized List?

DO NOW:

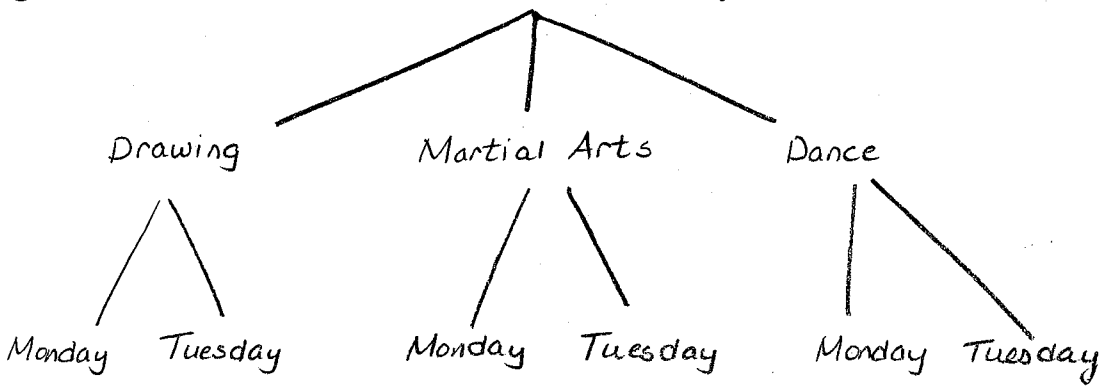
Tyler wants to take a class at the community center. The table shows the class options he is considering. All of the classes are offered only on Monday and Tuesday.

Class	Day
Drawing	Monday
Martial Arts	Tuesday
Dance	

1. According to the table, how many classes is he considering? 3

2. How many days are the classes offered? 2

3. Draw a tree diagram to find the number of different class and day outcomes.



4. Find the product of the two numbers you found in Exercises 1 and 2.

$3 \cdot 2 = 6$

5. How does the number of outcomes compare to the product?

The # of outcomes equals the product.