Lesson 6-2

TEKS
7.6L
7.6A
7.6D
7.6E
7.1E

Theoretical Probability of Compound Events

Q How do you find the theoretical probability of a compound event?

A. Write the _____ of the number of ways the event can _____ to the total number of _____ outcomes.

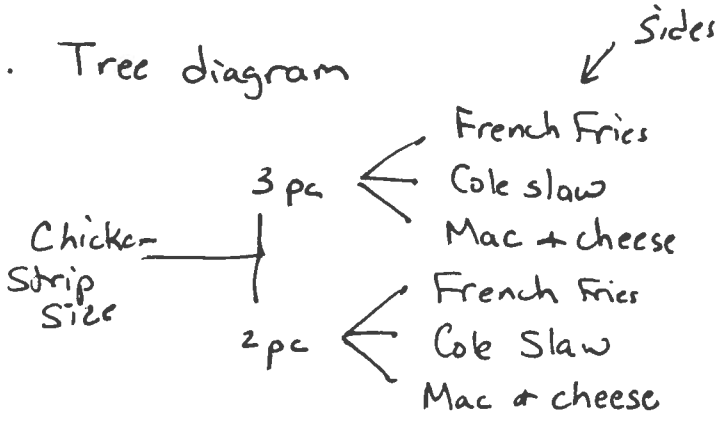
There are 3 ways to represent theoretical probability

1. Table

	H	T
H	HH	TH
T	HT	TT

2 x 2 = 4 outcomes

2. Tree diagram



2 x 3 = 6 outcomes

3. List see example on pg 195

Name _____ Date _____ Class _____

LESSON 6-2

Theoretical Probability of Compound Events

Reading Strategies: Choose a Strategy

Probability is a measure of how likely an event is to occur. To find probability, you must identify the number of possible outcomes.

- A **simple** *event* is an event with a single outcome.
- A **compound event** combines two or more simple events.

To find the number of possible outcomes for a compound event, you must find all the combinations of each of the outcomes of the simple events.

To keep track of the combinations of outcomes, you can create an organized list, table, or tree diagram.

Consider the following guidelines when choosing an organizer.

- A tree diagram will have a branch for each choice of each event. When there are more than three branches or three events, a tree diagram may not be the best choice.
- When an event includes computation, a table can provide both a system for doing the mental math and a place to store the results.
- No matter which organizer you choose, if the possible outcomes involve long words, consider using a code for each choice.

	Organized List	Tree Diagram	Table
2 events	✓	✓	✗
3 events	✓	✓	✗
More than 3 events	✗	✗	✓

Identify the number of events and choices in each situation. Tell which method you would choose to find all possible outcomes.

1. During an early-morning power outage, Sara must get dressed in the dark. Her clothing options include black or blue pants, a white or yellow shirt, and a solid red or a striped scarf.

_____

2. Hector can go to the movies with either Eddie or Miguel. He will see either a comedy or a drama.

_____

3. Ben rolls two six-sided number cubes. If the product of the numbers is an even number, he gets 5 points. If the sum of the numbers is an even number, he gets 2 points.

_____

Name _____ Date _____ Class _____

LESSON 6-2

Theoretical Probability of Compound Events

Success for English Learners

Problem 1

Sal's pizza sells 6 toppings.

extra cheese (C)	onion (O)
green olives (GO)	peppers (P)
mushrooms (M)	tomato (T)

Find the total number of 2-topping combinations.

	C	GO	M	O	P	T
C	~~C-C~~	~~C-GO~~	~~C-M~~	~~C-O~~	~~C-P~~	~~C-T~~
GO	GO-C	~~GO-GO~~	~~GO-M~~	~~GO-O~~	~~GO-P~~	~~GO-T~~
M	M-C	M-GO	~~M-M~~	~~M-O~~	~~M-P~~	~~M-T~~
O	O-C	O-GO	O-M	~~O-O~~	~~O-P~~	~~O-T~~
P	P-C	P-GO	P-M	P-O	~~P-P~~	~~P-T~~
T	T-C	T-GO	T-M	T-O	T-P	~~T-T~~

The pizza must have 2 different toppings. Cross out doubles.

Order does not matter. Cross out duplicates.

There are 15 unique combinations of 2-topping pizzas.

Look at the highlighted cell for T-GO above.

$$P(\text{tomato + green olive}) = \frac{1}{15}$$

1 combo out of 15 is tomato + green olive.

1. Why are more than half of the combinations crossed out?

2. What pattern do you see in the table?

3. What other ways could you have used to find the combinations?

Name _____ Date _____ Class _____

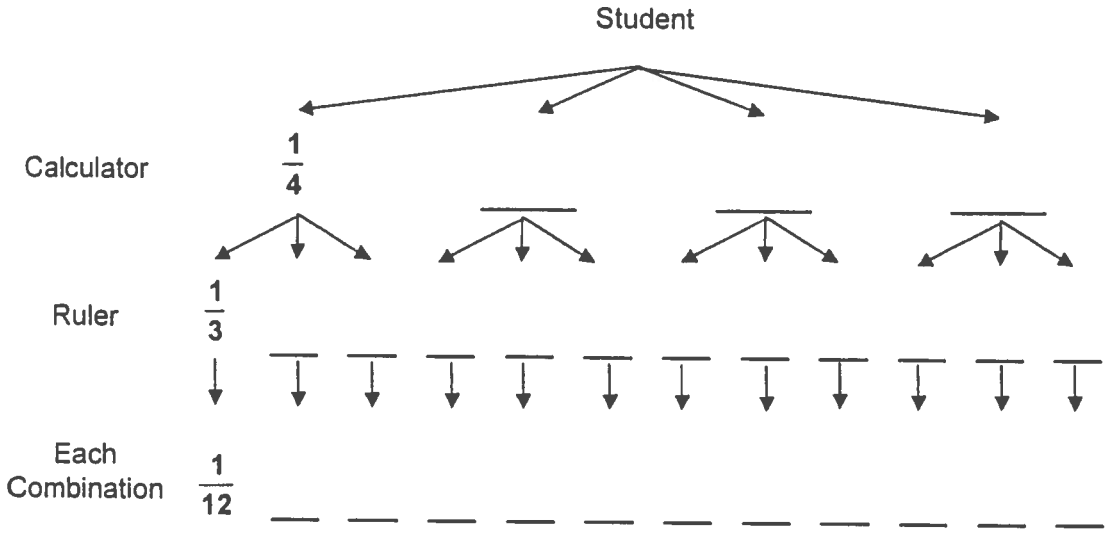
LESSON 6-2

Theoretical Probability of Compound Events

Practice and Problem Solving: D

Solve.

1. Each student receives one of 4 calculator models and one of 3 types of ruler. Fill in the tree diagram to show the probabilities of receiving each type of calculator and ruler. The first one in each row is done for you.



Use the tree diagram to complete Exercises 2–4.

2. What is the probability of receiving each calculator? _____

3. What is the probability of receiving each ruler? _____

4. What is the probability of receiving a certain combination of calculator and ruler? Show how this probability is calculated.

_____

Solve. The first one is done for you.

5. Two students are playing a game with a quarter and a spinner that is divided into equal sixths, with the sections numbered 1 to 6. Each player tosses the coin and spins the spinner.

   a. How many outcomes are possible for the coin toss? List them.

   two: (heads, tails)

   b. How many outcomes are possible for the spin? List them.

   _____

   c. How many outcomes are possible for the toss and spin? List them.

   _____

Name _____ Date _____ Class _____

LESSON 6-2

Theoretical Probability of Compound Events

Practice and Problem Solving: A/B

Use the table of probabilities to answer questions 1–3.

	Burrito	Taco	Wrap
Cheese	$P = \frac{1}{9}$	$P = \frac{1}{9}$	$P = \frac{1}{9}$
Salsa	$P = \frac{1}{9}$	$P = \frac{1}{9}$	$P = \frac{1}{9}$
Veggie	$P = \frac{1}{9}$	$P = \frac{1}{9}$	$P = \frac{1}{9}$

1. List the members of the sample space that include a taco. Use parentheses.

   _____

2. List the members of the sample space that include cheese. Use parentheses.

   _____

3. What is the probability of choosing a burrito with cheese and a taco or a wrap with salsa? Explain.

   _____

   _____

Use the information below to answer questions 4–6.

A basket of 40 pairs of pliers at a discount hardware store includes 5 pairs of 6-inch pliers. A second basket contains 20 hammers, including 3 large hammers.

4. What is the probability of drawing a 6-inch pair of pliers from the first basket without looking? _____

5. What is the probability of **not** drawing a large hammer from the second basket without looking? _____

6. What is the probability of drawing a pair of 6-inch pliers and **not** drawing a large hammer? _____

7. What is the probability of drawing a pair of 6-inch pliers from the second basket? Explain. _____

Lesson 6-2

TEKS
7.6L
7.6A
7.6D
7.6E
7.1E

Theoretical Probability of Compound Events

Q How do you find the theoretical probability of a compound event?

A. Write the ratio of the number of ways the event can happen to the total number of possible outcomes.

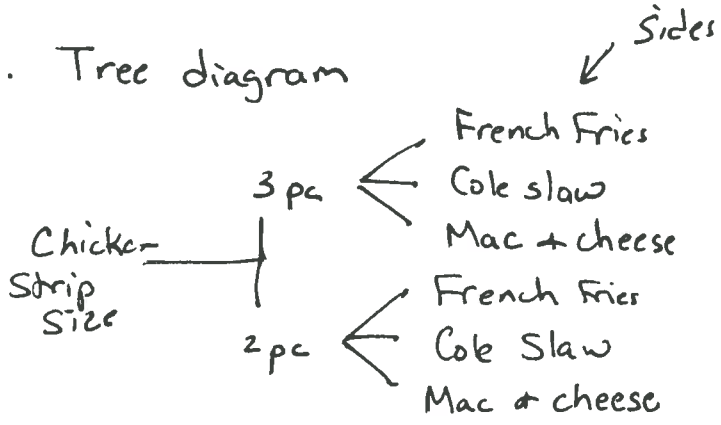
There are 3 ways to represent theoretical probability

1. Table

	H	T
H	HH	TH
T	HT	TT

2 x 2 = 4 outcomes

2. Tree diagram



2 x 3 = 6 outcomes

3. List see example on pg 195

Name Key Date _____ Class _____

LESSON 6-2

Theoretical Probability of Compound Events

Reading Strategies: Choose a Strategy

Probability is a measure of how likely an event is to occur. To find probability, you must identify the number of possible outcomes.

- A **simple** *event* is an event with a single outcome.
- A **compound event** combines two or more simple events.

To find the number of possible outcomes for a compound event, you must find all the combinations of each of the outcomes of the simple events.

To keep track of the combinations of outcomes, you can create an organized list, table, or tree diagram.

Consider the following guidelines when choosing an organizer.

- A tree diagram will have a branch for each choice of each event. When there are more than three branches or three events, a tree diagram may not be the best choice.
- When an event includes computation, a table can provide both a system for doing the mental math and a place to store the results.
- No matter which organizer you choose, if the possible outcomes involve long words, consider using a code for each choice.

	Organized List	Tree Diagram	Table
2 events	✓	✓	✖
3 events	✓	✓	✖
More than 3 events	✖	✖	✓

Identify the number of events and choices in each situation. Tell which method you would choose to find all possible outcomes.

1. During an early-morning power outage, Sara must get dressed in the dark. Her clothing options include black or blue pants, a white or yellow shirt, and a solid red or a striped scarf.

   $2 \times 2 \times 2 = 8$

   Tree there are 3 events pants, shirt, scarf each with 2 possible outcomes

2. Hector can go to the movies with either Eddie or Miguel. He will see either a comedy or a drama.

   List or Table 2 events people, movie $2 \times 2 = 4$ outcomes

3. Ben rolls two six-sided number cubes. If the product of the numbers is an even number, he gets 5 points. If the sum of the numbers is an even number, he gets 2 points.

   Use a table

Name _____ Date _____ Class _____

LESSON 6-2

Theoretical Probability of Compound Events

Success for English Learners

Problem 1

Sal's pizza sells 6 toppings.

extra cheese (C)	onion (O)
green olives (GO)	peppers (P)
mushrooms (M)	tomato (T)

Find the total number of 2-topping combinations.

	C	GO	M	O	P	T
C	~~C-C~~	~~C-GO~~	~~C-M~~	~~C-O~~	~~C-P~~	~~C-T~~
GO	GO-C	~~GO-GO~~	~~GO-M~~	~~GO-O~~	~~GO-P~~	~~GO-T~~
M	M-C	M-GO	~~M-M~~	~~M-O~~	~~M-P~~	~~M-T~~
O	O-C	O-GO	O-M	~~O-O~~	~~O-P~~	~~O-T~~
P	P-C	P-GO	P-M	P-O	~~P-P~~	~~P-T~~
T	T-C	T-GO	T-M	T-O	T-P	~~T-T~~

The pizza must have 2 different toppings. Cross out doubles.

Order does not matter. Cross out duplicates.

There are 15 unique combinations of 2-topping pizzas.

Look at the highlighted cell for T-GO above.

$$P(\text{tomato + green olive}) = \frac{1}{15}$$

1 combo out of 15 is tomato + green olive.

1. Why are more than half of the combinations crossed out?

they are duplicates

2. What pattern do you see in the table?

the doubles form a diagonal line

3. What other ways could you have used to find the combinations?

Tree diagram

Name Key Date _____ Class _____

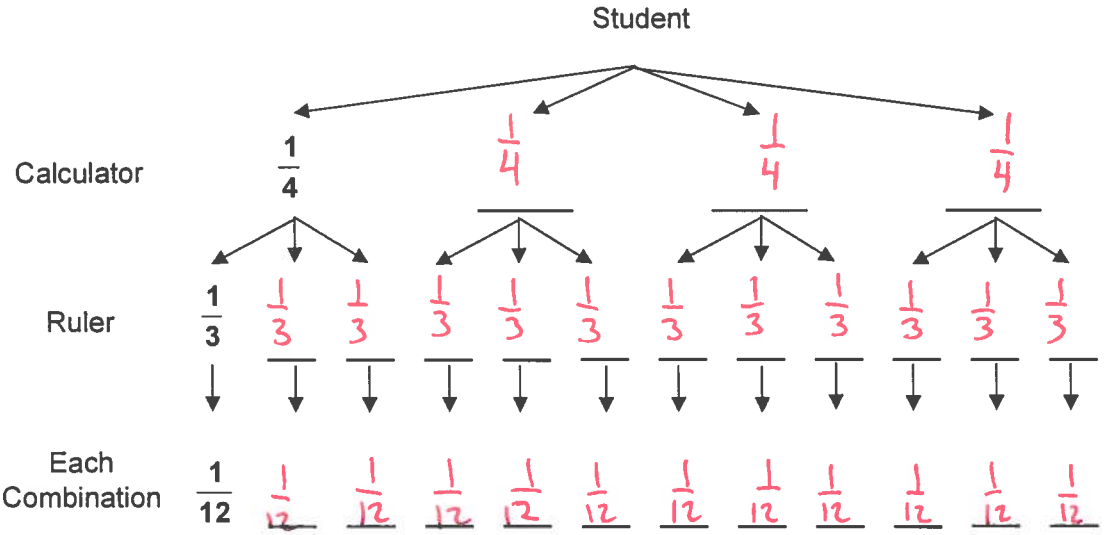
LESSON 6-2

Theoretical Probability of Compound Events

Practice and Problem Solving: D

Solve.

1. Each student receives one of 4 calculator models and one of 3 types of ruler. Fill in the tree diagram to show the probabilities of receiving each type of calculator and ruler. The first one in each row is done for you.



Use the tree diagram to complete Exercises 2–4.

2. What is the probability of receiving each calculator? $\frac{1}{4}$

3. What is the probability of receiving each ruler? $\frac{1}{3}$

4. What is the probability of receiving a certain combination of calculator and ruler? Show how this probability is calculated.

$\frac{1}{4} \times \frac{1}{3} = \frac{1}{12}$

Solve. The first one is done for you.

5. Two students are playing a game with a quarter and a spinner that is divided into equal sixths, with the sections numbered 1 to 6. Each player tosses the coin and spins the spinner.

   a. How many outcomes are possible for the coin toss? List them.

   two: (heads, tails)

   b. How many outcomes are possible for the spin? List them.

   6: (1, 2, 3, 4, 5, 6)

   c. How many outcomes are possible for the toss and spin? List them.

   2 × 6 = 12 H1 H2 H3 H4 H5 H6 T1 T2 T3 T4 T5 T6