






Warm-Up:

The model in this experiment involves taking marbles out of a jar. The jar contains 6 marbles: 1 green, 2 red, and 3 blue ones.

- ? Run the animation several times and examine the results displayed in the Model Outcome panel. Describe what is happening in this experiment and the types of outcome that result.

ACTIVITY CENTRAL   SCREEN 1 OF 5 

Answer:

The experiment involves taking two marbles out of the jar at a time. The second marble is taken out without replacing the first. With only 1 try at a time, The outcomes of the experiment are the colors of the two marbles.



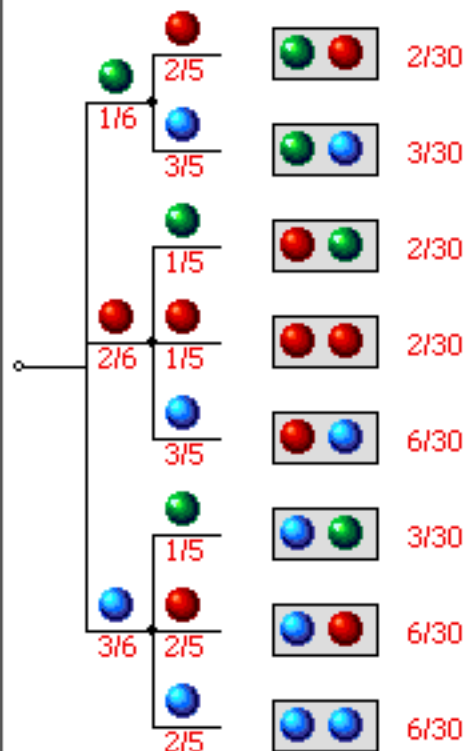
Warm-Up:

The outcomes of this experiment can be represented by a tree diagram. Run the animation again several times and examine the tree after each animation. Describe the relationship between the outcome of an experiment and how the corresponding branches and sub-branches of the tree are highlighted.

The color of the first marble drawn is highlighted in the first level of the tree on the left. The color of the second marble drawn is highlighted in the second level of the tree.

ACTIVITY
CENTRAL

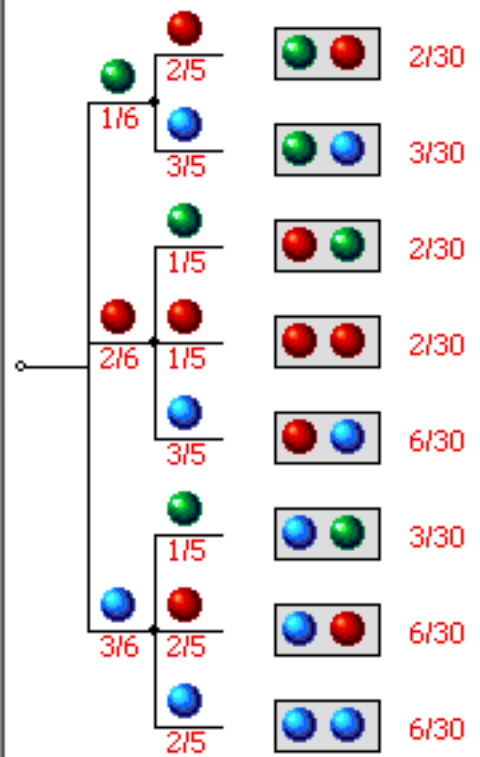
SCREEN 2 OF 5



Warm-Up:

What do the pairs of colored marbles to the far-right of the tree represent?

They represent all the possible outcomes of this experiment.



Warm-Up:

Each level of the tree displays the colors of the marbles available at that level.

The marbles in the jar come in 3 different colors (green, red and blue). Explain why there are only 2 possible colors available in the second level in the upper part of the tree diagram.

It is not possible for two marbles to be green since there is only one green marble in the jar.

ACTIVITY
CENTRAL

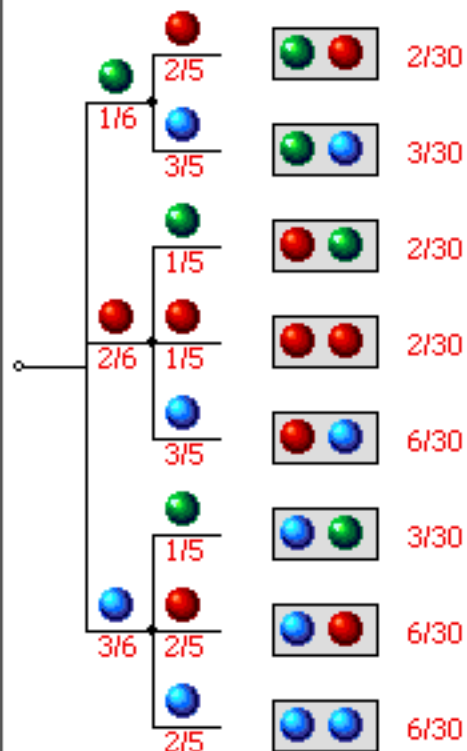


SCREEN 4 OF 5

**Hint**

How many marbles of each color are in the jar?

Close



Warm-Up:

You have completed this activity.
Now you can choose another activity from this subsection:

[Exploration](#)
[Problem](#)

You may click the Activity Central icon below to return to Activity Central.

ACTIVITY
CENTRAL



SCREEN 5 OF 5



Exploration:

The "Phoenix" is a popular sports car that comes in 3 exterior colors: blue, gray, and white. Thirty-five percent of the cars are blue, 20% are gray, and 45% are white.

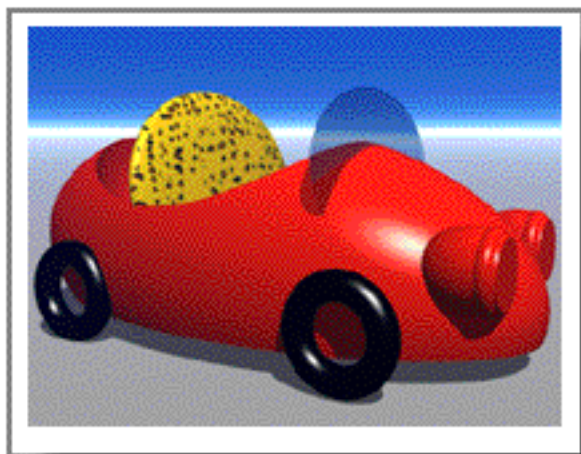
What is the probability that the next Phoenix you see will be blue? (Write your answer as a decimal.)

ACTIVITY
CENTRAL

SCREEN 1 OF 17



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Exploration:

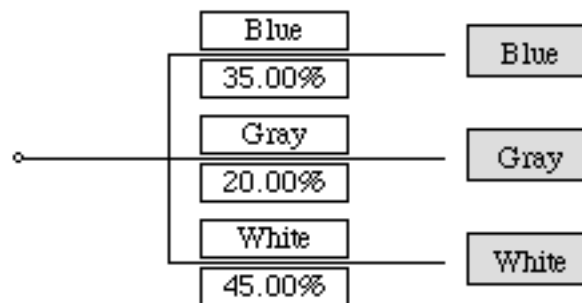
Suppose you are standing by the road observing the passing cars, waiting to see what color the next Phoenix will be.

What are the possible outcomes of the color of the next Phoenix that goes by?

The next Phoenix could be blue, gray, or white.

ACTIVITY
CENTRAL

SCREEN 2 OF 17



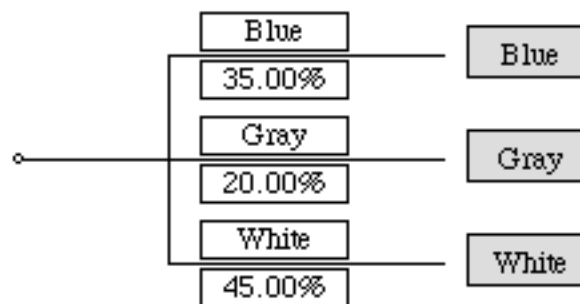
Exploration:

Examine the tree that represents this experiment. Describe the relationship between the possible outcomes and the branches of the tree.

The first level of the tree contains 3 branches. Each branch represents an outcome. The probability that the next Phoenix you see will be blue is 35%; the probability that it will be gray is 20%; the probability that it will be white is 45%.

ACTIVITY
CENTRAL

SCREEN 3 OF 17



Exploration:

Phoenix buyers can choose an interior color as well as an exterior color. Cars with blue exteriors can have a blue, black, or burgundy interior. Of these, the percentage of cars with blue interiors is 60%, of black interiors is 20%, and of burgundy interiors is 20%.

These, as well as the interior colors for gray and white cars, are listed in the table below.

How many possible combinations of exterior and interior colors are available?

ACTIVITY
CENTRAL

SCREEN 4 OF 17



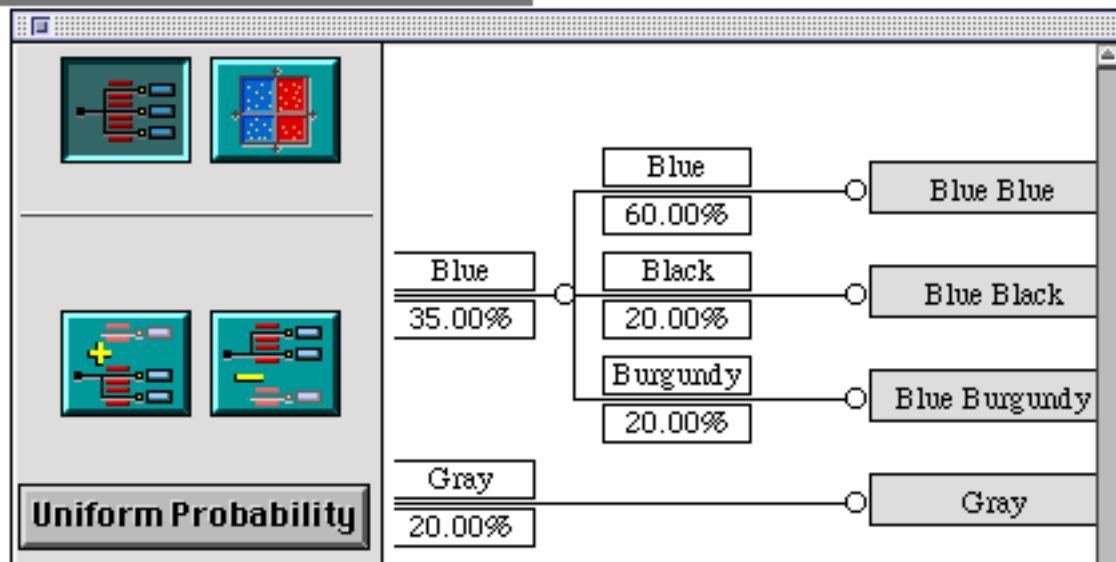
Exterior Color	Interior Color	Percentage
Blue	Blue	60%
	Black	20%
	Burgundy	20%
Grey	Black	30%
	Beige	40%
	Burgundy	30%
White	Beige	60%
	Burgundy	40%

Exploration:

To create a tree-model that represents the distribution of exterior and interior colors in the table, open the Modify Model window. The first level of the tree lists the three exterior colors. Click the branch labeled Blue and then click the Add Branch button 3 times to create 3 sub-branches extending from it. Label the new sub-branches Blue, Black, and Burgundy and set the probabilities to 60%, 20%, and 20% respectively. If you create an extra branch or a branch in the wrong place by mistake, click this branch and click the Delete Branch button.

ACTIVITY
CENTRAL

SCREEN 5 OF 17



Exploration:

Use the data in the table to add sub-branches to the gray and white branches in Level 1 of the tree. These new branches will correspond to the interior colors that are available with each of these exterior colors. When you are done, click Apply and close the Model Modify dialog box.

ACTIVITY
CENTRAL

SCREEN 6 OF 17



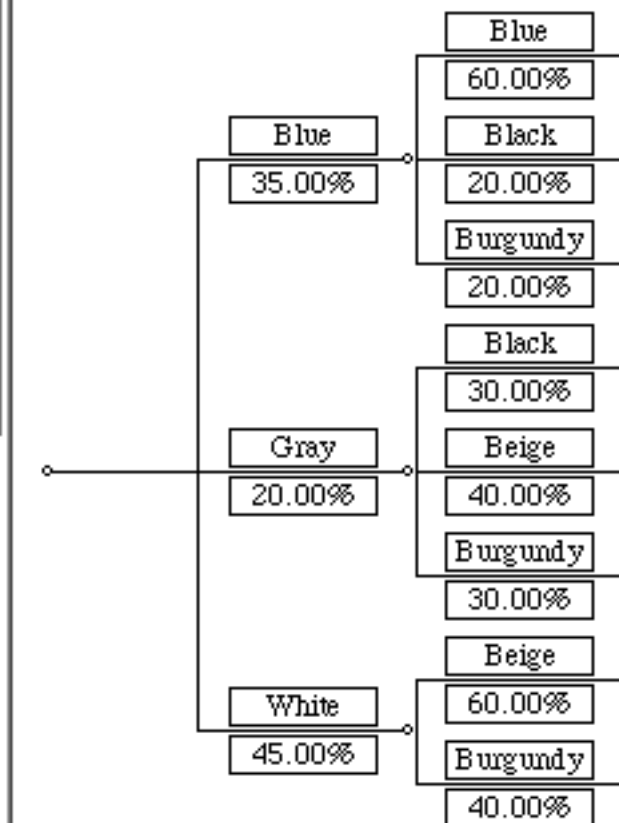
Exterior Color	Interior Color	Percentage
Blue	Blue	60%
	Black	20%
	Burgundy	20%
Grey	Black	30%
	Beige	40%
	Burgundy	30%
White	Beige	60%
	Burgundy	40%

Exploration:

Examine the set of color combinations displayed at the far right side of the tree. How many combinations are there (exterior-interior)?
 (Use the scroll bars in the tree display to view the whole tree.)

ACTIVITY
CENTRAL

SCREEN 7 OF 17



Gray Black
 Blue Blue
 Blue Blue
 White Beige
 Gray Burgundy
 Blue Black
 White Beige
 Blue Blue
 Gray Black
 Gray Burgundy

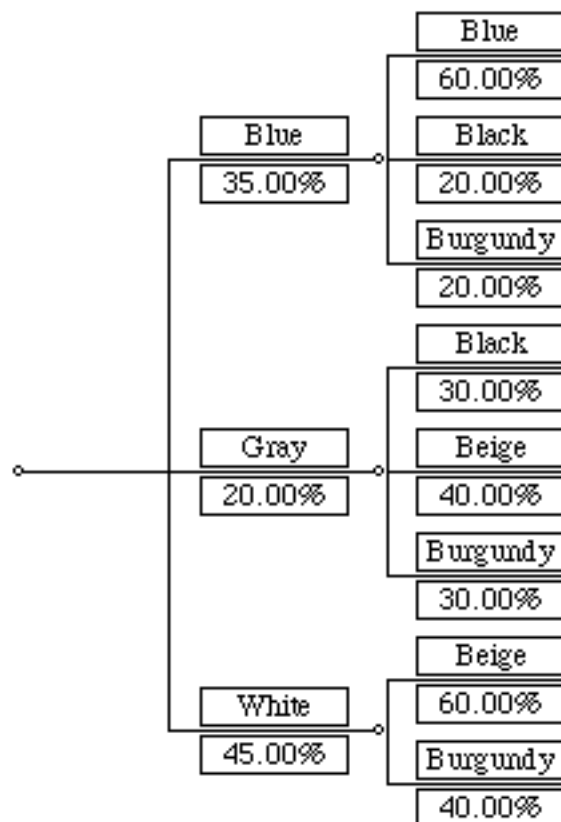
Exploration:

Run the animation.
 Describe what happens in the tree while the animation runs.

First, one of the possible colors in Level 1, the exterior color of the car, is highlighted. Second, one of the possible colors in Level 2, the interior color of the car, is highlighted. Last, the resulting color-combination is highlighted.

ACTIVITY
CENTRAL

SCREEN 8 OF 17



- Gray Black
- Blue Blue
- Blue Blue
- White Beige
- Gray Burgundy
- Blue Black
- White Beige
- Blue Blue
- Gray Black
- Gray Burgundy

Exploration:

What real-life experimental situation could the animation represent?

Answers may vary.

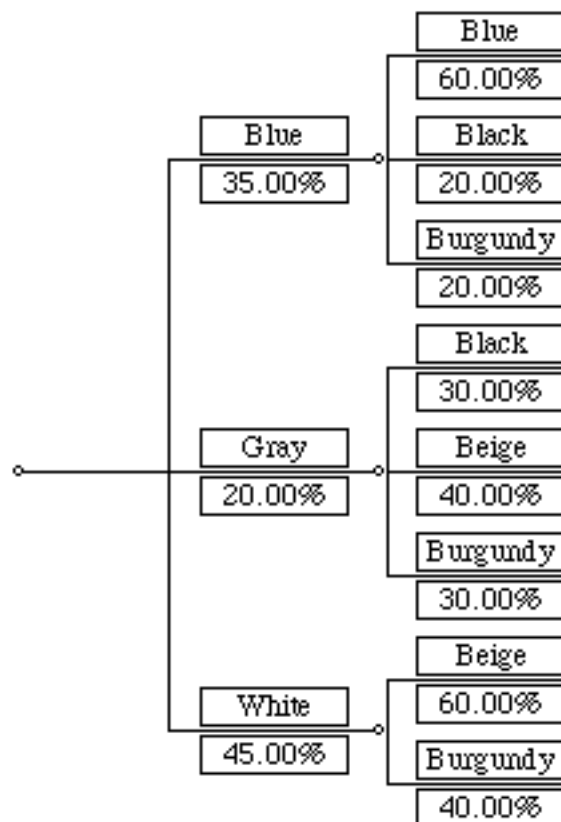
One possible answer:

The animation represents the color combinations of the next 10 Phoenix cars that go by.

ACTIVITY CENTRAL



SCREEN 9 OF 17



White Burgundy

Blue Blue

White Beige

White Beige

Blue Burgundy

White Beige

White Beige

White Beige

Blue Blue

White Burgundy

Exploration:

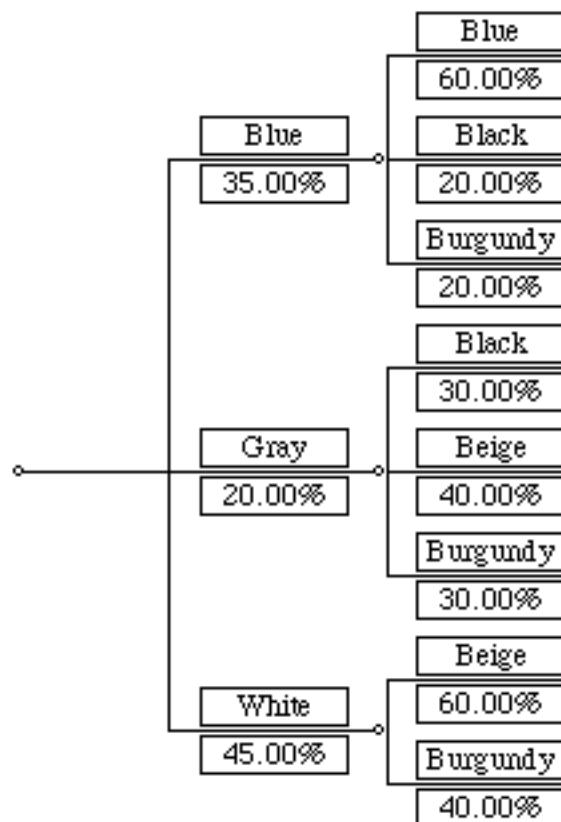
Run the experiment several more times, observing the exterior and interior colors of the Phoenix cars that pass by.

How many outcomes are possible? Explain.

There are 8 possible outcomes. The number of outcomes is the same as the number of color combinations.

ACTIVITY
CENTRAL

SCREEN 10 OF 17



White Burgundy

Blue Blue

White Beige

White Beige

Blue Burgundy

White Beige

White Beige

White Beige

Blue Blue

White Burgundy

Exploration:

Suppose you call the local Phoenix dealership and tell the salesperson that you want to buy a Phoenix with a blue exterior and a blue interior. The dealer tells you that there is only one car left on the lot.

2 What is the probability that its exterior color is what you want? Express your answer as a decimal.

2 What is the probability that this car has the color combination you want? Express your answer as a decimal.

ACTIVITY



SCREEN 11 OF 17



The probability that the car has a blue exterior is...

The probability that the car has a blue exterior and a blue interior is...

Blue	Blue Blue	21.00%
Black	Blue Black	7.00%
Burgundy	Blue Burgundy	7.00%
Black	Gray Black	6.00%
Beige	Gray Beige	8.00%
Burgundy	Gray Burgundy	6.00%
Beige	White Beige	27.00%
Burgundy	White Burgundy	18.00%

White Burgundy

Blue Blue

White Beige

White Beige

Blue Burgundy

White Beige

White Beige

White Beige

Blue Blue

White Burgundy

Exploration:

The salesperson at the Phoenix dealership tells you that the exterior color of the car is blue, but that he doesn't know what the interior color is.

- ❓ What is the probability that the interior of the car is blue?

ACTIVITY



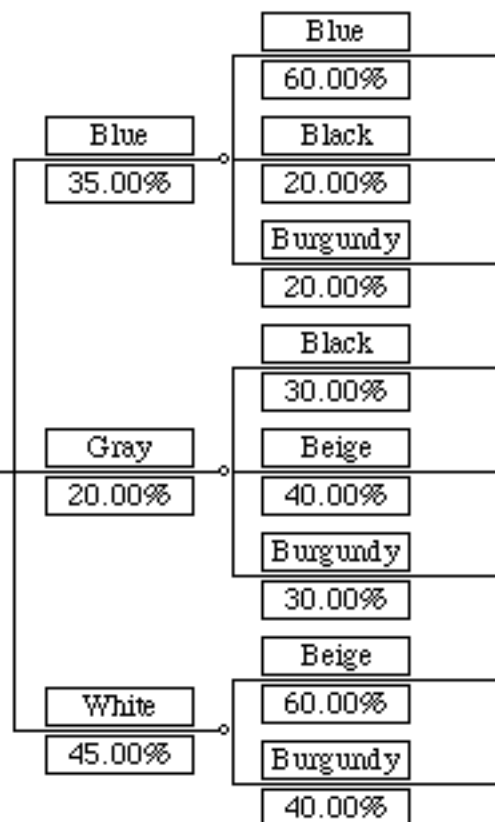
SCREEN 12 OF 17



The probability that the car has a blue exterior is...

The probability that the car has a blue exterior and a blue interior is...

The probability that the car has a blue interior is...



White Burgundy

Blue Blue

White Beige

White Beige

Blue Burgundy

White Beige

White Beige

White Beige

Blue Blue

White Burgundy

Exploration:

What is the arithmetic relationship among the three probabilities you just found?

$$0.35 * 0.6 = 0.21$$

ACTIVITY



SCREEN 13 OF 17



The probability that the car has a blue exterior is...

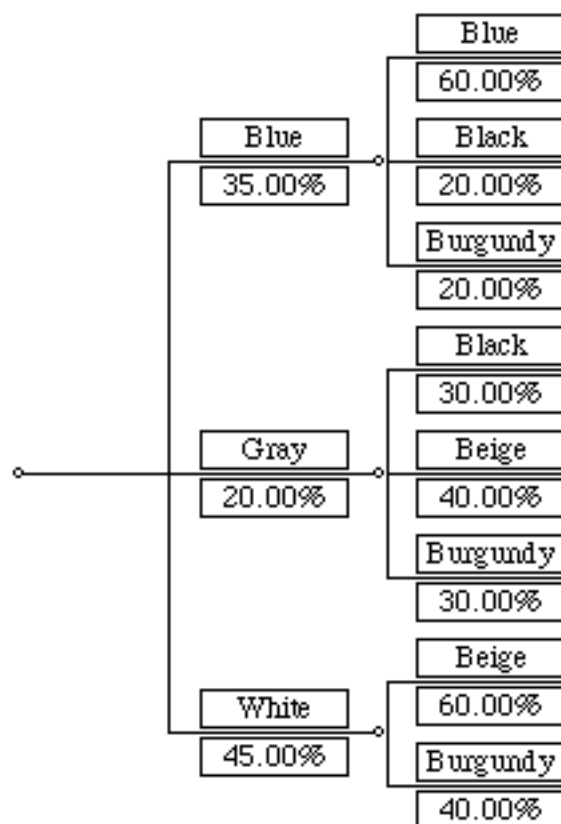
0.35

The probability that the car has a blue exterior and a blue interior is...

0.21

The probability that the car has a blue interior is...

0.6



White Burgundy
 Blue Blue
 White Beige
 White Beige
 Blue Burgundy
 White Beige
 White Beige
 White Beige
 Blue Blue
 White Burgundy

Exploration:

- ?** Based on the result of your answer, what generalization could you make about calculating each outcome?

The probability of each outcome is the product of the probabilities of the branches that lead to that outcome.

ACTIVITY
CENTRAL



SCREEN 14 OF 17

**Hint**

Examine the probabilities of the outcomes at the far-right side of the tree, and compare them to the probabilities along the branches leading to each outcome.

Close

Blue	Blue Blue	21.00%
.00%		
Black	Blue Black	7.00%
.00%		
Burgundy	Blue Burgundy	7.00%
.00%		
Black	Gray Black	6.00%
.00%		
Beige	Gray Beige	8.00%
.00%		
Burgundy	Gray Burgundy	6.00%
.00%		
Beige	White Beige	27.00%
.00%		
Burgundy	White Burgundy	18.00%
.00%		

White Burgundy

Blue Blue

White Beige

White Beige

Blue Burgundy

White Beige

White Beige

White Beige

Blue Blue

White Burgundy

Exploration:

Look at the outcomes in the gray boxes along the far right-side of the tree. How many outcomes correspond to cars with a black interior?

- 2 What is the probability that the next Phoenix you see will have black interior? Enter the value as a decimal.

Two outcomes:
 $0.06 + 0.07 = 0.13$

ACTIVITY
CENTRAL

SCREEN 15 OF 17



Finding Probabilities in a Tree Diagram

To find the probability of a certain criterion (e.g. black interior) add the probabilities of all the outcomes that satisfy this particular criterion.

Close

Blue	Blue Blue	21.00%
Black	Blue Black	7.00%
Burgundy	Blue Burgundy	7.00%
Black	Gray Black	6.00%
Beige	Gray Beige	8.00%
Burgundy	Gray Burgundy	6.00%
Beige	White Beige	27.00%
Burgundy	White Burgundy	18.00%

- White Burgundy
- Blue Blue
- White Beige
- White Beige
- Blue Burgundy
- White Beige
- White Beige
- White Beige
- Blue Blue
- White Burgundy

Exploration:

What is the most common interior color for Phoenix cars?

beige

What is the probability that the next Phoenix you see will have this interior color?

0.35

ACTIVITY CENTRAL



SCREEN 16 OF 17



Blue	Blue Blue	21.00%
Black	Blue Black	7.00%
Burgundy	Blue Burgundy	7.00%
Black	Gray Black	6.00%
Beige	Gray Beige	8.00%
Burgundy	Gray Burgundy	6.00%
Beige	White Beige	27.00%
Burgundy	White Burgundy	18.00%

- White Burgundy
- Blue Blue
- White Beige
- White Beige
- Blue Burgundy
- White Beige
- White Beige
- White Beige
- Blue Blue
- White Burgundy

Exploration:

You have completed this activity.
Now you can choose another activity from this subsection:

[Warm-Up](#)
[Problem](#)

You may click the Activity Central icon below to return to Activity Central.

ACTIVITY
CENTRAL



SCREEN 17 OF 17



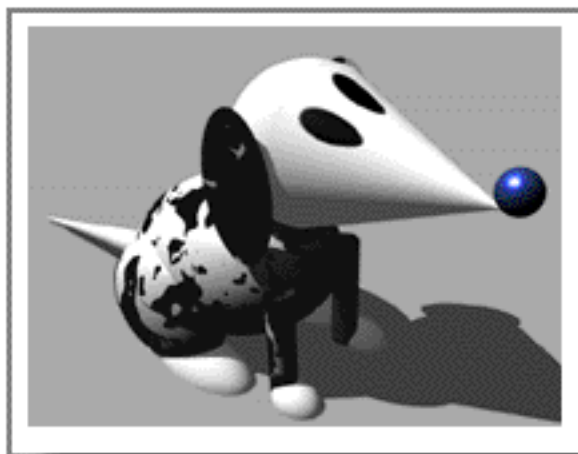
Problem:

A T.V. game show features the following game. A contestant rolls a die. If a 6 turns up, the contestant gets to choose one of three curtains that hide different prizes: a car, a cruise, or a lawn mower. If the contestant rolls anything other than a 6, he or she chooses from two other curtains: one that hides a lawn mower and one that hides a puppy.

Roll Result (level 1)	Choose (Level 2)
6	Car
	Cruise
	Mower
Not 6	Mower
	Puppy

ACTIVITY
CENTRAL

SCREEN 1 OF 5



Problem:

- Open the Modify Model dialog box and construct a probability tree that corresponds to the situation described.
- Note that there are two parts to this experiment: rolling a die and then choosing a curtain, so the tree should have two levels.
- You may click the help icons below, in sequence, to see the steps involved:

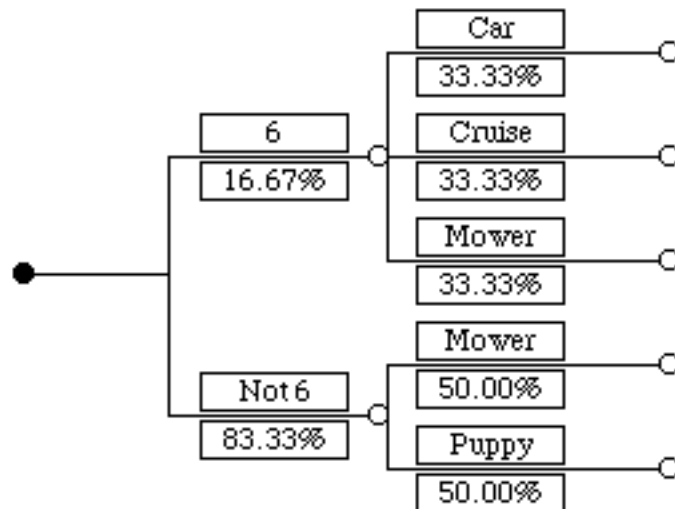
1. ? 3. ? 5. ?
2. ? 4. ?

Roll Result (level 1)	Choose (Level 2)
6	Car
	Cruise
	Mower
Not 6	Mower
	Puppy

ACTIVITY
CENTRAL

Uniform Probability

Symmetric Tree



6 Cruise
6 Car
Not 6 Mower

Problem:

Suppose that the show is on five times a week, and three different people play the game each day.

Set the animation so that each time you run it, it will give you the prizes won during one week. Run the animation five times (for five weeks).

Which prize is won most frequently?
(Fill in the table to help you keep track.)

ACTIVITY
CENTRAL



SCREEN 3 OF 5



	Week 1	Week 2	Week 3	Week 4	Week 5
Cars					1
Cruises				1	1
Lawn Mowers	3	2	2	1	1
Puppies		1	1	1	

6 Cruise
6 Car
Not 6 Mower

Problem:

Examine the tree and calculate the probability of the prize that is won most often. Express your answer as a decimal.

The probability of a lawn mower is 0.472.

What is the probability of winning a puppy? Express your answer as a decimal.

0.417

ACTIVITY
CENTRAL

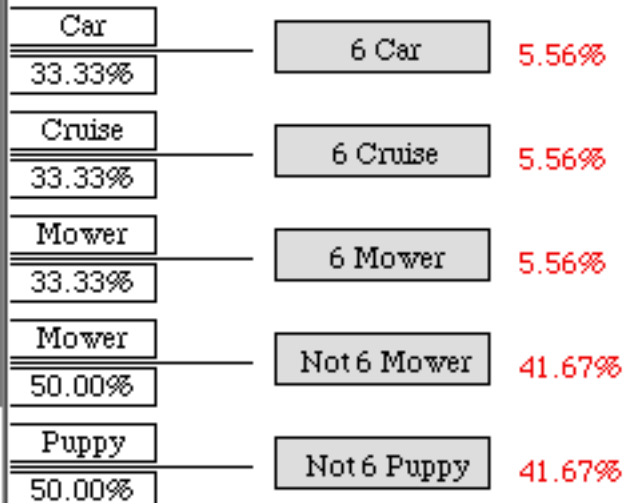


SCREEN 4 OF 5

**Hint**

Look at the outcomes listed in the gray boxes along the far right-side of the tree.
To find the probability of winning a certain prize, add the probabilities of every outcome that corresponds to that prize.

Close



- 6 Cruise
- 6 Car
- Not 6 Mower

Problem:

You have completed this activity.
Now you can choose another activity from this subsection:

[Warm-Up](#)
[Exploration](#)

You may click the Activity Central icon below to return to Activity Central.

ACTIVITY CENTRAL   SCREEN 5 OF 5 

Printing *Probability Constructor*

This CD includes material to help you prepare your use of *Probability Constructor* activities in the classroom.


You can access information about Installation, Logon, or the product itself by clicking the chapter name below.

For each activity listed at right there are: pictures of the on-screen activities including the text, the Model Window, any displays used in the activity, and the suggested answers.

- **To print a file**, click the chapter or activity name.

Then choose Print from the File menu.

- **To reaccess this list**, click the “Last Page”

icon  in the toolbar above.

Installation

Logon

About *Probability Constructor*

Frequency

[Frequency of Heads and Tails](#)
[Frequency and Dice](#)
[Frequency of Colors in Turning Wheels](#)

Relative Frequency

[Exploring Relative Frequency with Marbles](#)
[Displaying Relative Frequency](#)
[Relative Frequency and Area](#)

Probability

[Calculating Probability](#)
[Properties of Probability](#)
[Geometric Probability](#)
[Probability Trees](#)