

John	Fred	Lisa

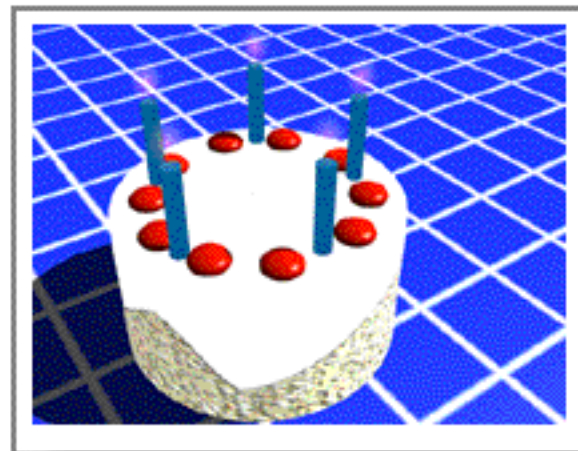
Warm-Up:

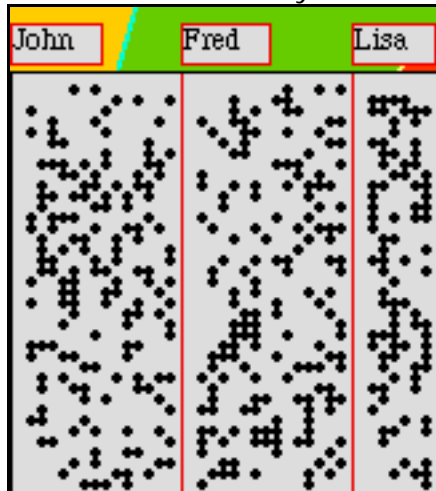
To help him celebrate his birthday, John shares a large piece of his birthday cake with his friends, Fred and Lisa. Lisa, however, wants only half as much cake as Fred and John. The square in the animation window represents the piece of cake to be divided. What fractional part of the cake will each person get? Type your answers in the table on the right

ACTIVITY CENTRAL

← SCREEN 1 OF 4 →

	Part Of The Cake
Lisa	1/5
Fred	2/5
John	2/5





Warm-Up:

Suppose that Lisa sprinkles a package of 500 chocolate chips on top of the cake before it's cut. About how many chips do you think will fall on each person's portion?

Run the animation to see if you were correct.

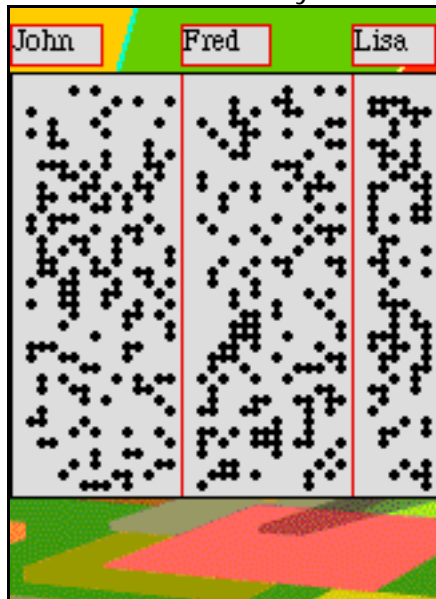
John's and Fred's portions will each have about 200 chips. About 100 chips will fall on Lisa's portion.

ACTIVITY CENTRAL

SCREEN 2 OF 4


- John
- Fred
- Fred
- Lisa
- Fred
- John
- John
- Lisa
- Fred

Values	A	B
	Freq.	
a		
John	199	
Fred	192	
Lisa	109	
Sum:	500	



Warm-Up:

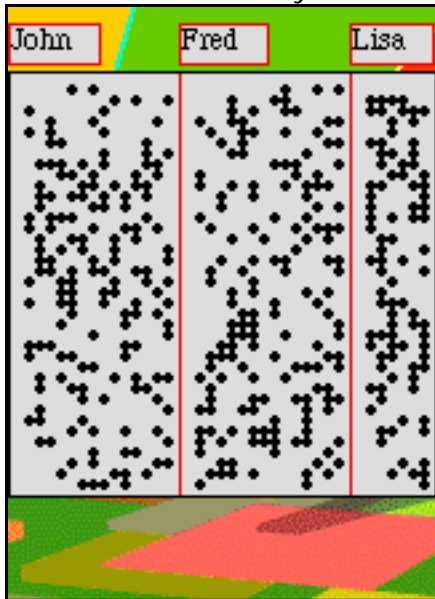
Before cutting the cake, Fred decides to drop a cherry on top of the cake. In the table, record the probability of each friend getting the cherry on his or her piece of cake.

ACTIVITY CENTRAL   SCREEN 3 OF 4 

	Part Of The Cake
Lisa	$1/5$
Fred	$2/5$
John	$2/5$

	Probability
John	0.4
Fred	0.4
Lisa	0.2

- John
- Fred
- Fred
- Lisa
- Fred
- John
- John
- Lisa
- Fred






Warm-Up:

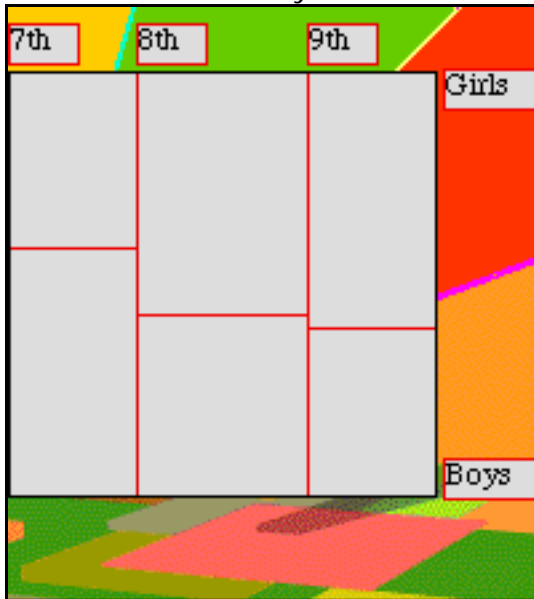
You have completed this activity.
Now you can choose another activity
from this subsection:

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

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

ACTIVITY CENTRAL   SCREEN 4 OF 4 

- John
- Fred
- Fred
- Lisa
- Fred
- John
- John
- Lisa
- Fred

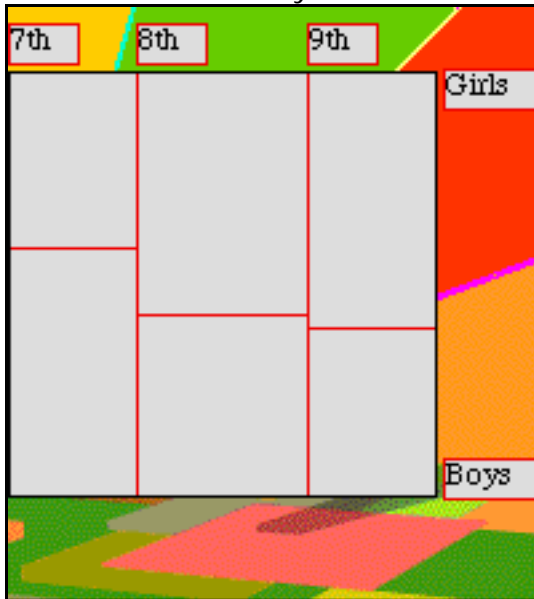


Exploration:

The square in the model window represents the enrollment in the A. A. Milne Middle School. Each of the six rectangles represents the distribution of girls and boys in three grades. The vertical divisions indicate the three grades, and the horizontal divisions represent the number of girls and boys in each grade.

ACTIVITY CENTRAL   SCREEN 1 OF 15 





Exploration:

Which grade appears to have the greatest number of students?

8th grade

Does the school have more boys or more girls?

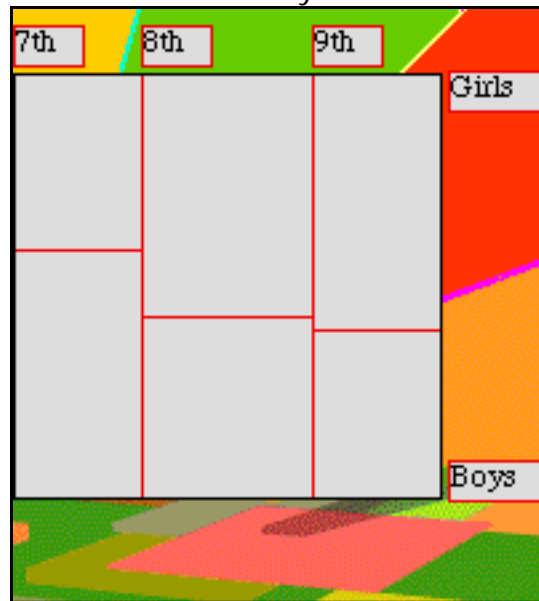
girls

ACTIVITY
CENTRAL



SCREEN 2 OF 15



**Exploration:**

The actual numbers of boys and girls in each grade are given in the table below.

- 2 Open the Modify Model dialog and verify that the model correctly represents these data. What is the relationship among the numbers of boys and girls in each grade and the area (size) of the corresponding rectangle in the model?

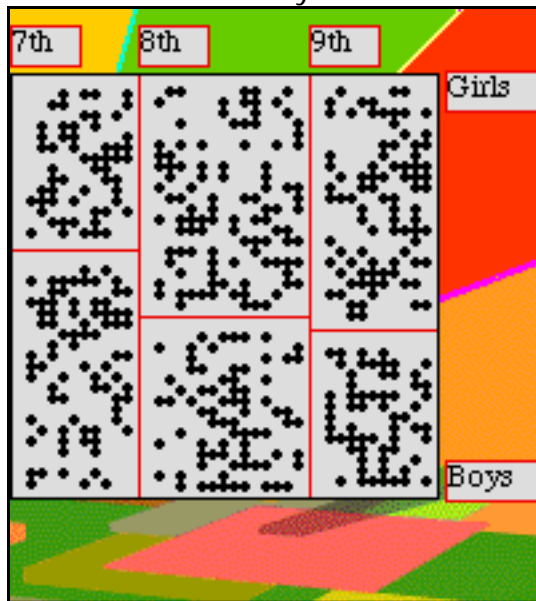
The larger the enrollment of boys and girls in each grade, the larger the area of the corresponding rectangle.

ACTIVITY
CENTRAL

SCREEN 3 OF 15



Grade	Girls	Boys	Total
7th	77	106	183
8th	138	102	240
9th	108	69	177
Total	323	277	600



Exploration:

If you were to simulate the distribution of 600 students using this area model, do you think the experimental results would agree with the actual data?

- 2 Run the animation and compare the resulting frequencies of each outcome in the spreadsheet to the actual data.

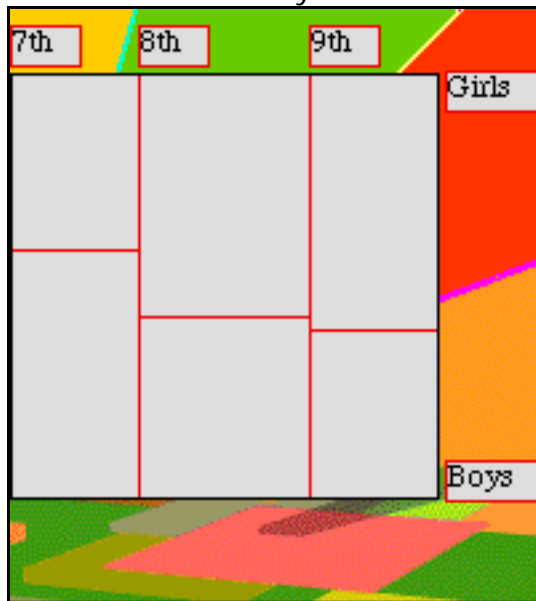
The experimental results would be close, but not all equal, to the actual data.

ACTIVITY CENTRAL SCREEN 4 OF 15

7th Boys
8th Girls
9th Boys
7th Boys
8th Boys
9th Girls
7th Boys
9th Girls
8th Boys

Grade	Girls	Boys	Total
7th	77	106	183
8th	138	102	240
9th	108	69	177
Total	323	277	600

	A	B
	Freq.	
7th Girls	76	
7th Boys	95	
8th Girls	126	
8th Boys	105	
9th Girls	114	
9th Boys	84	
Sum:	600	

**Exploration:**

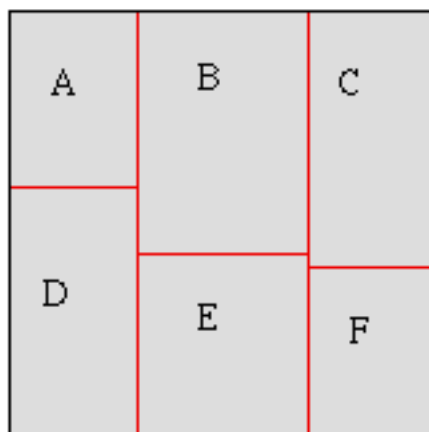
The letters A, B, C, D, E, and F in the picture represent the areas of each rectangle in the model. Suppose a student is to be randomly selected from all the students in the school. Find the probability of selecting a 7th grader.

- 2 What is the probability of choosing a 7th grader? Express your answer in terms of the corresponding letters in the picture.

$$(A + D)/(A+B+C+D+E+F)$$

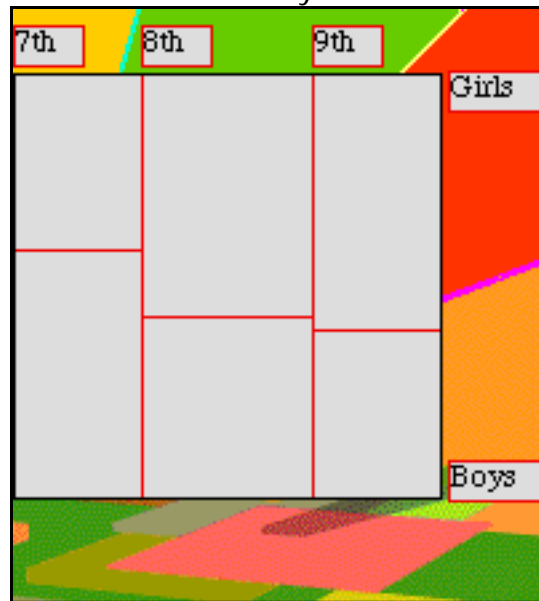
ACTIVITY
CENTRAL

SCREEN 5 OF 15

**Probability in an Area Model**

The probability that a certain region will be selected is the ratio between the area of the region and the total area of the model.

Close

**Exploration:**

Use the enrollment in the table to compute the probability that, if a student is randomly selected from all the students in the school, he or she will be a 7th grader.

- 2 Express your answer both as a fraction and a decimal.

(Use the calculator to express your answer as a decimal.)

$$183/600 = 0.305$$

ACTIVITY
CENTRAL

SCREEN 6 OF 15



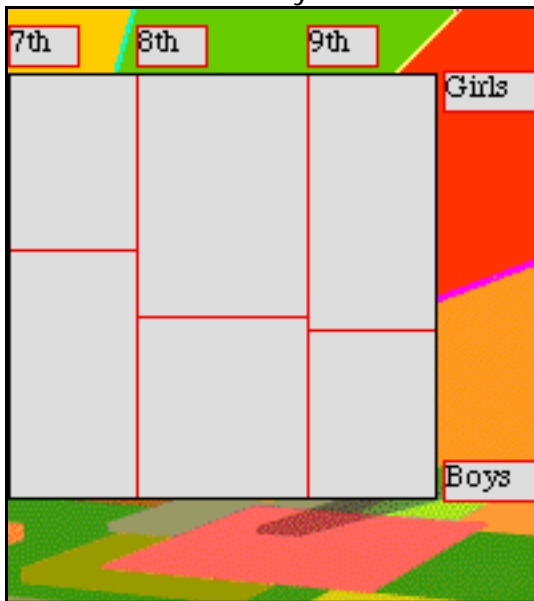
Grade	Girls	Boys	Total
7th	77	106	183
8th	138	102	240
9th	108	69	177
Total	323	277	600

Help

Given set X and set Y, with Y a subset of X. If an item is randomly selected from X, then the probability that it belongs to Y is:

$\frac{\text{the number of items in Y}}{\text{the number of items in X}}$

Close

**Exploration:**

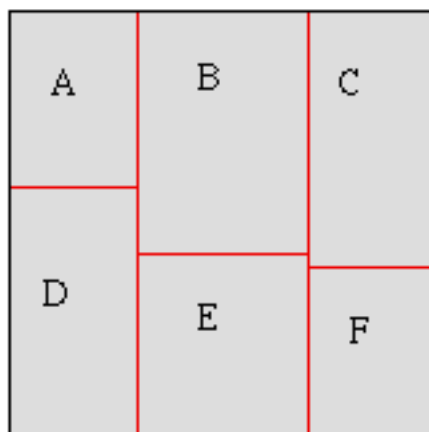
Suppose a student is randomly selected from all the students in the school. This time, find the probability that the student is an 8th grade boy.

- 2 Express this probability in terms of the corresponding letters in the picture below.

$$E / (A+B+C+D+E+F)$$

ACTIVITY
CENTRAL

SCREEN 7 OF 15


Probability in an Area Model

The probability that a certain region will be selected is the ratio between the area of the region and the total area of the model.

Close

7th	8th	9th

Girls

Boys

Exploration:

Use the enrollment in the table to calculate the probability that a student randomly selected from all the students will be an 8th grade boy. Express your answer as a fraction and as a decimal.
 ? Express your answer as a fraction and as a decimal.
 (Use the calculator to express your answer as a decimal.)

$$102/600 = 0.17$$

ACTIVITY
CENTRAL

SCREEN 8 OF 15



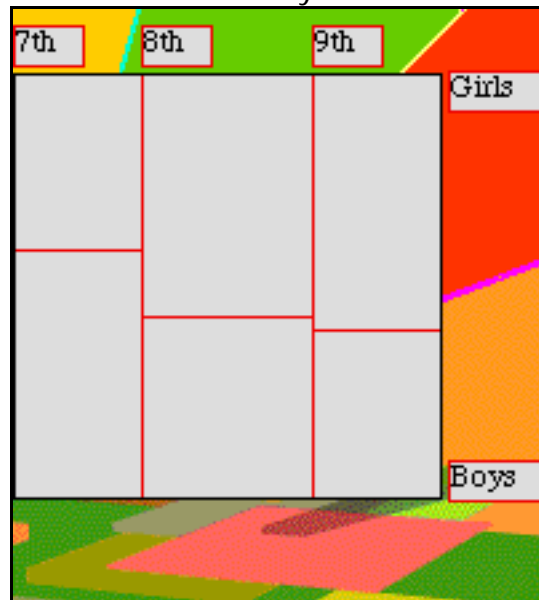
Grade	Girls	Boys	Total
7th	77	106	183
8th	138	102	240
9th	108	69	177
Total	323	277	600

Help

Given set X and set Y, with Y a subset of X. If an item is randomly selected from X, then the probability that it belongs to Y is:

$\frac{\text{the number of items in Y}}{\text{the number of items in X}}$

Close

**Exploration:**

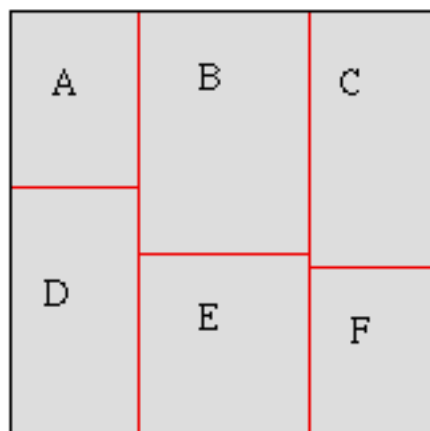
Suppose a girl was randomly selected from all the female students in the school. Now, find the probability that she is a 9th grader.

- 2 Express this probability in terms of the corresponding letters in the picture below.

$$C / (A + B + C)$$

ACTIVITY
CENTRAL

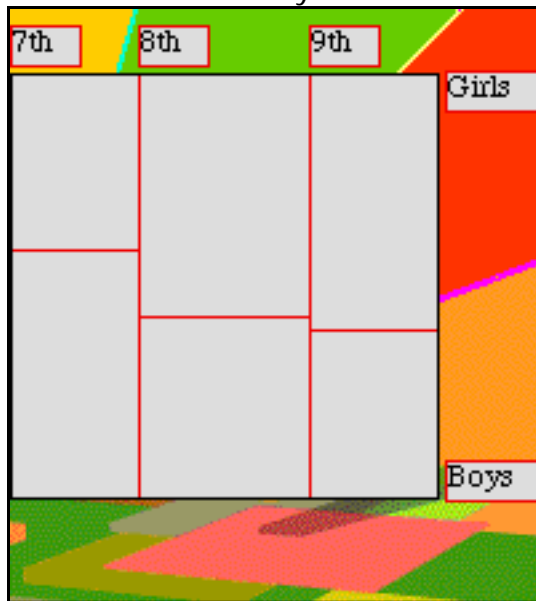
SCREEN 9 OF 15

**Probability in an area model**

Given regions X and Y, with Y contained in X. If an item is randomly selected from region X, the probability that it will be from region Y is

$$\frac{\text{Area of Y}}{\text{Area of X}}$$

Close

**Exploration:**

Use the enrollment in the table to calculate the probability that the girl randomly selected from all the girls in the school will be a 9th grader.

- 2 Express your answer as a fraction and as a decimal rounded to the nearest hundredth. (Use the calculator to express your answer as a decimal.)

$$108/323 = 0.334$$

ACTIVITY
CENTRAL

SCREEN 10 OF 15



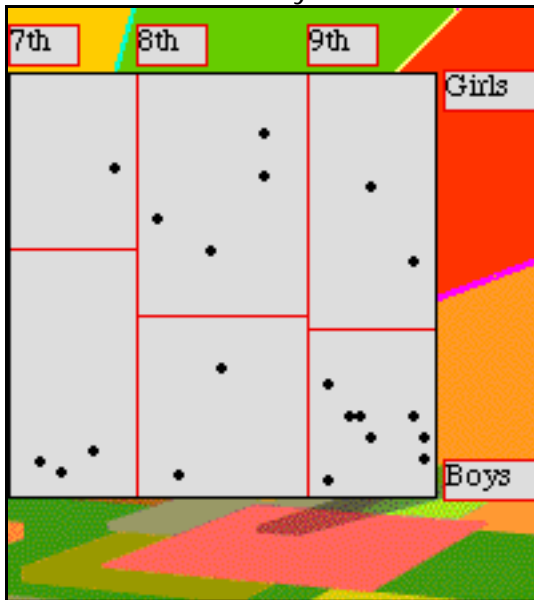
Grade	Girls	Boys	Total
7th	77	106	183
8th	138	102	240
9th	108	69	177
Total	323	277	600

Help

Given set X and set Y, with Y a subset of X. If an item is randomly selected from X, then the probability that it belongs to Y is:

$\frac{\text{the number of items in Y}}{\text{the number of items in X}}$




Close



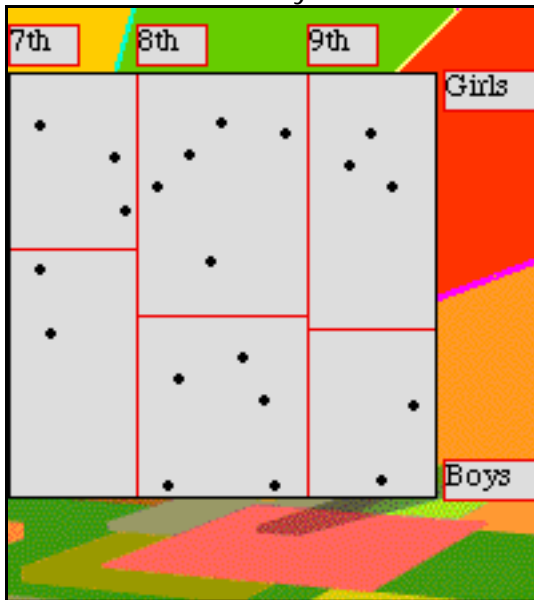
Exploration:

A delegation of 20 students from the A. A. Milne School is to represent the school on a visit to its twin-city school in France. How could the area model be used to determine the number of students from each grade that should represent the school?

Run the animation with the number of tries set at 20 and see where the points fall. Each point represents a student in a particular grade.

ACTIVITY CENTRAL   SCREEN 11 OF 15 

- 8th Boys
- 8th Girls
- 7th Boys
- 8th Girls
- 9th Boys
- 8th Boys
- 9th Boys
- 9th Girls
- 9th Boys



Exploration:

Run the animation and count the number of points that land in each region of the model.

Use the experimental results to determine the total number of students from each grade that should represent the school. Enter the number for each grade into the table.

Experimental Results

Grade	Number of Students
7th	5
8th	10
9th	5

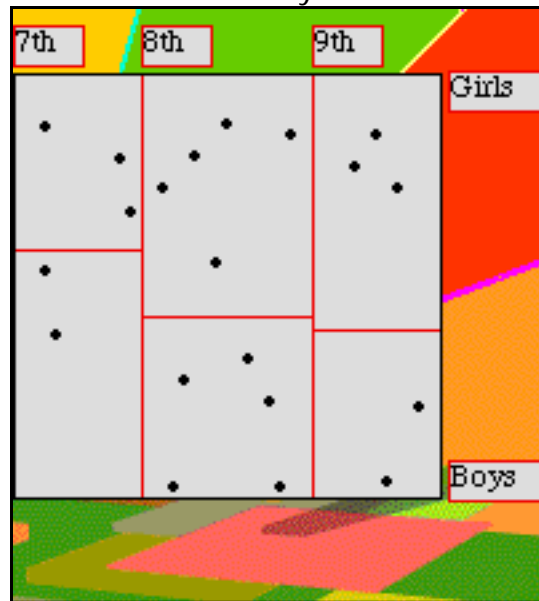
ACTIVITY CENTRAL



SCREEN 12 OF 15



- 7th Girls
- 7th Girls
- 9th Boys
- 9th Girls
- 7th Girls
- 9th Boys
- 9th Girls
- 8th Boys
- 8th Girls



- 7th Girls
- 7th Girls
- 9th Boys
- 9th Girls
- 7th Girls
- 9th Boys
- 9th Girls
- 8th Boys
- 8th Girls

Exploration:

Based on the enrollment in each grade, how many students from each grade would be a fair representation of 20 students? (Enter your answers in the table labeled Fair Results.) Explain. Compare the tables. Are the results you obtained using the model fair?

The ratio among the students from each grade in the delegation should be close to the ratio among the total number of students in each grade.

ACTIVITY
CENTRAL

SCREEN 13 OF 15



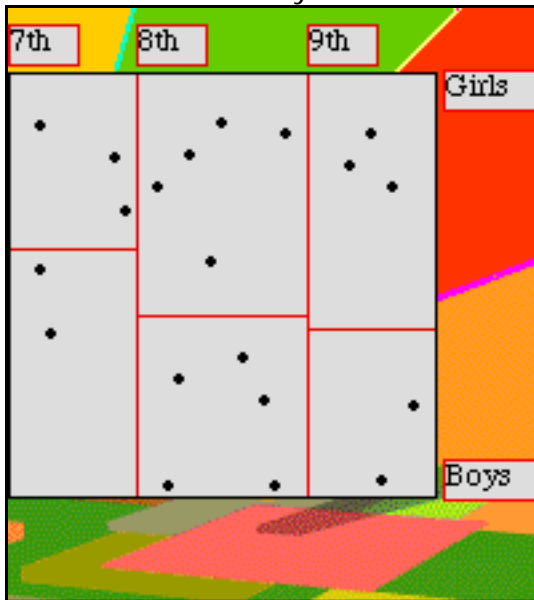
Grade	Girls	Boys	Total
7th	77	106	183
8th	138	102	240
9th	108	69	177
Total	323	277	600

Experimental Results

Grade	Number of Students
7th	5
8th	10
9th	5

Fair Results

Grade	Number of Students
7th	6
8th	8
9th	6



Exploration:

Is there any other factor to consider in order to be sure that the delegation is as representative of the school as possible?

The delegation should also represent the approximate number of boys and girls in each grade.

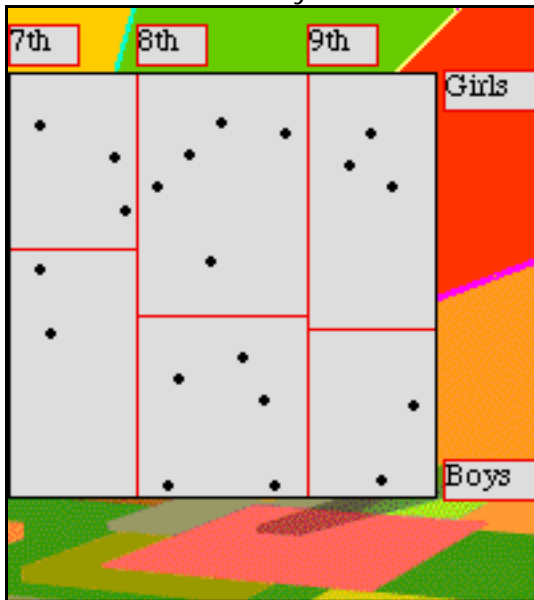
ACTIVITY CENTRAL



SCREEN 14 OF 15



- 7th Girls
- 7th Girls
- 9th Boys
- 9th Girls
- 7th Girls
- 9th Boys
- 9th Girls
- 8th Boys
- 8th Girls



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 15 OF 15




- 7th Girls
- 7th Girls
- 9th Boys
- 9th Girls
- 7th Girls
- 9th Boys
- 9th Girls
- 8th Boys
- 8th Girls

American	Foreign	
		Smoker
		N-smoker

Problem:

At a certain university in the United States, 75% of the students are Americans and 25% are foreign.

Seventy percent of the foreign students smoke, but only 30% of the American students smoke.

 Edit the parameters in the Modify Model dialog to reflect these data. Click Apply when you are done.

ACTIVITY
CENTRAL



SCREEN 1 OF 7

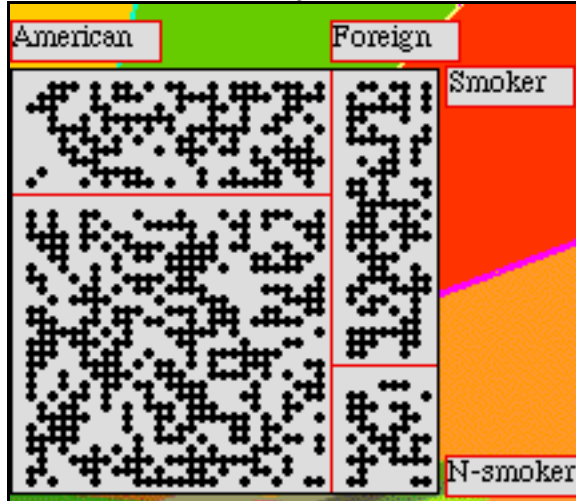


Of all students:
75% American
25% Foreign

Of all Americans:
30% smoke
70% don't smoke

Of all Foreign:
70% smoke
30% don't smoke





Problem:

The percentage of each group as part of the whole student population is shown in the brown table below:
 Assume that the total university enrollment is 1,000 students. To see if you've set up the model correctly, run the animation one or more times and examine the percentages reported in the spreadsheet. If they are not approximately equal to the data in the table, change the parameters in the Modify Model.

Of all students:
 75% American
 25% Foreign

Of all Americans:
 30% smoke
 70% don't smoke

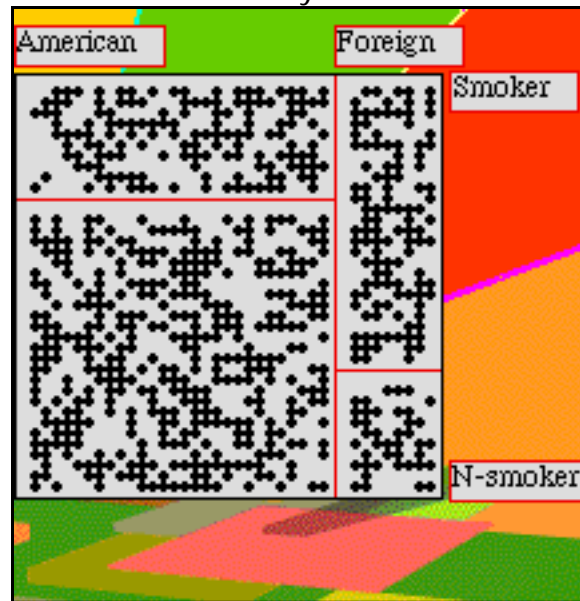
Of all Foreign:
 70% smoke
 30% don't smoke

ACTIVITY CENTRAL SCREEN 2 OF 7

- American N-smoker
- American Smoker
- American Smoker
- Foreign Smoker
- American N-smoker
- American N-smoker
- American N-smoker
- Foreign Smoker
- American N-smoker

Group of Students	% of Student Population
American smokers	22.5
American nonsmokers	52.5
Foreign smokers	17.5
Foreign non smokers	7.5

	A	B
	Rel. Freq.	
American Smoker	20.8%	
American N-smoker	55.4%	
Foreign Smoker	17.6%	
Foreign N-smoker	6.2%	
Sum:	100%	



- American N-smoker
- American Smoker
- American Smoker
- Foreign Smoker
- American N-smoker
- American N-smoker
- American N-smoker
- Foreign Smoker
- American N-smoker

Problem:

If you randomly select a student from all the students at the university, what is the probability that the selected student is a smoker?

ACTIVITY CENTRAL SCREEN 3 OF 7

Of all students:
 75% American
 25% Foreign

Of all Americans:
 30% smoke
 70% don't smoke

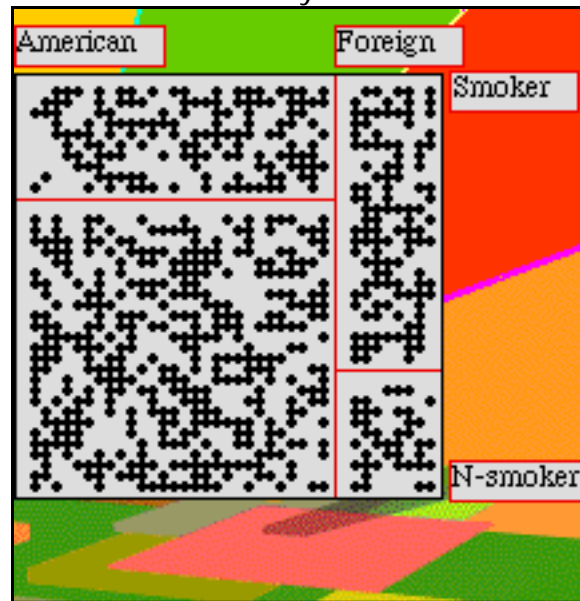
Of all Foreign:
 70% smoke
 30% don't smoke

Hint

Look at the numbers in the Modify Model dialog box.

10

Close



Problem:

2 Use the spreadsheet to determine the probability that a student randomly selected from all the students will be a nonsmoking foreign student.

0.075

ACTIVITY CENTRAL



SCREEN 4 OF 7



Of all students:
75% American
25% Foreign

Of all Americans:
30% smoke
70% don't smoke

Of all Foreign:
70% smoke
30% don't smoke

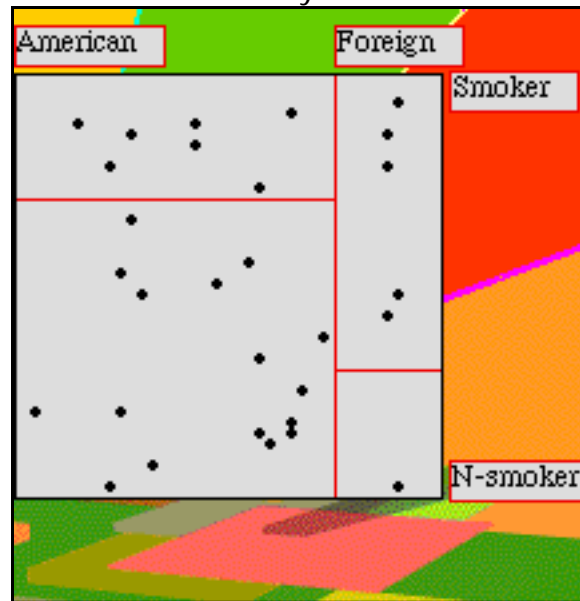
- American N-smoker
- American Smoker
- American Smoker
- Foreign Smoker
- American N-smoker
- American N-smoker
- American N-smoker
- American N-smoker
- Foreign Smoker
- American N-smoker

Hint

Use the pop-up menu at the top of a column in the spreadsheet to find the probability of each outcome in terms of a fraction, decimal, and/or percent.

Close

	A	B
	Prob.	
American Smoker	0.225	
American N-smoker	0.525	
Foreign Smoker	0.175	
Foreign N-smoker	0.075	
Sum:	1	



Problem:

There has been pressure by the smokers on campus to allow smoking in the cafeteria. The student council proposed conducting a survey: 30 students would be randomly selected from all the students. If 60% or more of the students selected were smokers, then smoking would be allowed. Use the model to simulate such a survey. View the results in the spreadsheet. Based on your survey, will smoking be allowed?

Most likely not.

Of all students:
 75% American
 25% Foreign

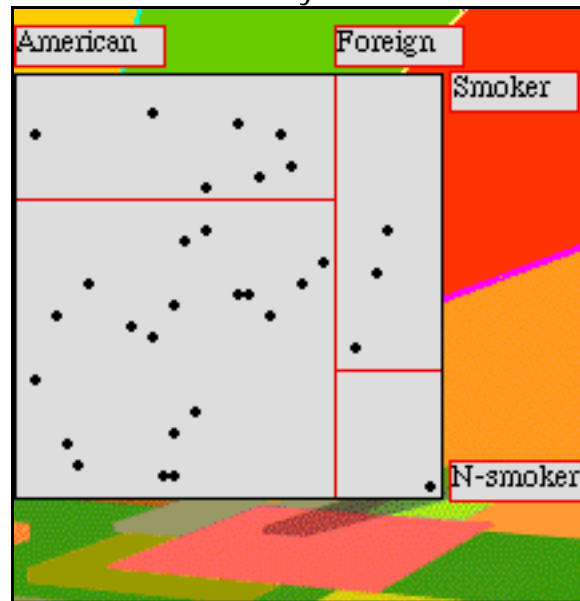
Of all Americans:
 30% smoke
 70% don't smoke

Of all Foreign:
 70% smoke
 30% don't smoke

ACTIVITY CENTRAL SCREEN 5 OF 7

- American Smoker
- American N-smoker
- Foreign Smoker
- American Smoker
- Foreign Smoker
- American N-smoker
- American N-smoker
- American N-smoker
- American N-smoker
- American N-smoker

	A	B
	Rel. Freq.	
<input type="checkbox"/> <input type="checkbox"/>		
American Smoker	26.7%	
American N-smoker	53.3%	
Foreign Smoker	16.7%	
Foreign N-smoker	3.3%	
Sum:	100%	



Problem:

Run the animation several more times. Each time, view the results in the spreadsheet. Describe in your own words how likely it is that as a result of the survey smoking will be allowed.

It is very unlikely.

ACTIVITY CENTRAL



SCREEN 6 OF 7



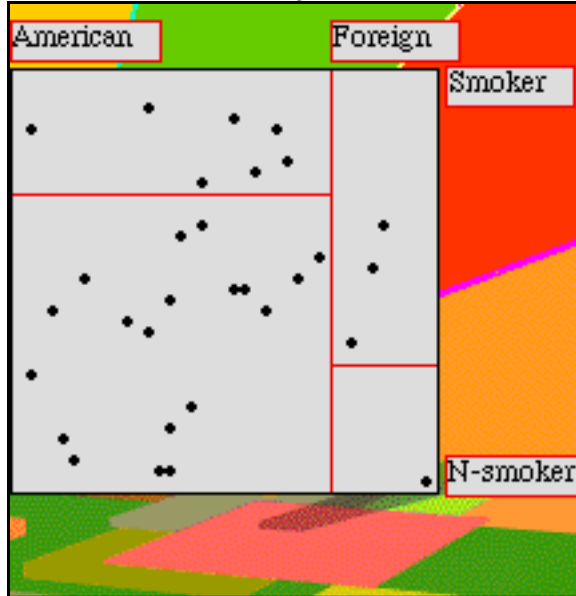
**Of all students:
75% American
25% Foreign**

**Of all Americans:
30% smoke
70% don't smoke**

**Of all Foreign:
70% smoke
30% don't smoke**

- American N-smoker
- Foreign N-smoker
- American Smoker
- American N-smoker
- American Smoker
- Foreign Smoker
- American N-smoker
- American N-smoker
- American N-smoker

	A	B
	Rel. Freq.	
<input type="checkbox"/> <input type="checkbox"/>		
American Smoker	23.3%	
American N-smoker	63.3%	
Foreign Smoker	10.0%	
Foreign N-smoker	3.3%	
Sum:	100%	



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 7 OF 7 

Of all students:
75% American
25% Foreign

Of all Americans:
30% smoke
70% don't smoke

Of all Foreign:
70% smoke
30% don't smoke

- American N-smoker
- Foreign N-smoker
- American Smoker
- American N-smoker
- American Smoker
- Foreign Smoker
- American N-smoker
- American N-smoker
- American N-smoker

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](#)