

LESSON
6•6**Another Grouping Symbol**

A fraction bar (sometimes referred to as the *vinculum*) indicates division.

An expression such as $(8 + 4) \div (5 - 2)$ can be written as $\frac{(8 + 4)}{(5 - 2)}$.

A fraction bar also acts as a grouping symbol. Both the numerator and the denominator can be treated as if there were parentheses around them. Any operations in the numerator or the denominator must be performed before the division.

Example: Evaluate $72 \div \left(\frac{29 + 7}{4 * 3}\right)$.

$$72 \div \left(\frac{29 + 7}{4 * 3}\right) = 72 \div \frac{(29 + 7)}{(4 * 3)} = 72 \div \frac{36}{12} = 72 \div 3 = 24$$

Evaluate each expression.

1. $20 - \frac{4 + 5}{3} =$ _____

2. $\frac{4(5 + 7)}{6(6 - 4)} =$ _____

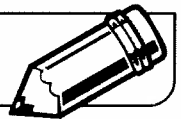
3. $\frac{7(8 - 1) + (42 \div 3)}{(10 - 7)3} =$ _____

4. $\frac{6[24 - 2(7 - 3)]}{27 \div 9} =$ _____

Name _____

Date _____

Time _____

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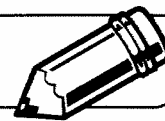
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LESSON
6•6**Order of Operations**

Please Excuse My Dear Aunt Sally
Parentheses Exponents Multiplication Division Addition Subtraction

Evaluate each expression. Compare your result to a partner's. If you don't agree, discuss how you evaluated the expression to decide which result is correct.

1. $26 + 15 * 2 - 6 =$ _____

2. $18 - 5 + 10^2 =$ _____

3. $50 + 70 / 2 =$ _____

4. $39 + 1 - 24 / 6 =$ _____

5. $18 / 3 + (37 + 13) =$ _____

6. $10 + 28 \div 14 - 5 =$ _____

7. $42 + 6 / 6 - 8 =$ _____

8. $5 + 3^2 * 4 / 2 =$ _____

STUDY LINK
6•7

Number Sentences



1. a. Draw a circle around each number sentence.

$17 < 27$

$3 * 15 < 100$

$56 / 8$

$(5 - 4) * 20 = 20$

$(4 + 23) / 9$

$12 \neq 12$

- b. Choose one item that you did not circle. Explain why it is not a number sentence.

2. Tell whether each number sentence is true or false.

a. $9 - (6 + 2) > 0.5$ _____

b. $94 = 49 - 2 * 2$ _____

c. $\frac{24}{6} < 33 / 11$ _____

d. $70 - 25 = 45$ _____

3. Insert parentheses to make each number sentence true.

a. $28 - 6 + 9 = 31$

b. $20 < 40 - 9 + 11$

c. $36 / 6 / 2 < 12$

d. $4 * 8 - 4 = 16$

4. Write a number sentence for each word sentence. Tell whether the number sentence is true or false.

Word sentence	Number sentence	True or false?
a. If 14 is subtracted from 60, the result is 50.	_____	_____
b. 90 is 3 times as much as 30.	_____	_____
c. 21 increased by 7 is less than 40.	_____	_____
d. The square root of 36 is greater than half of 10.	_____	_____

Practice

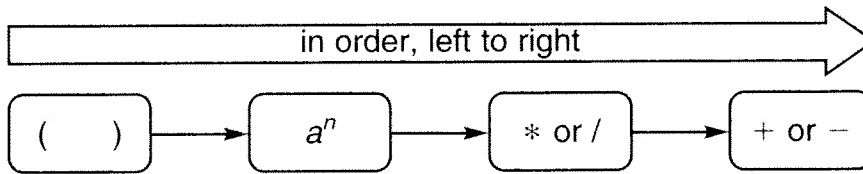
5. $1.867 - 0.947 =$ _____ 6. $6 - 2.49 =$ _____ 7. $256.3 - 4.785 =$ _____

LESSON
6•7

Ordering Operations



The order of operations is shown in the diagram below.



Use the diagram to help you label which operation you should perform first, second, third, and so on when evaluating an expression.

Example: Label the order in which you should perform the operations to evaluate the expression $9 / (8 - 5) + 12 * 4 - 11$. Then evaluate the expression.

$$\textcircled{2} \quad \textcircled{1} \quad \textcircled{4} \quad \textcircled{3} \quad \textcircled{5}$$

$$9 / (8 - 5) + 12 * 4 - 11$$

$\textcircled{1}$ Do the operation inside the parentheses. $(8 - 5) = 3$

$\textcircled{2-3}$ Divide and multiply in order from left to right. $9 / 3 = 3$
 $12 * 4 = 48$

$\textcircled{4-5}$ Add and subtract in order from left to right. $3 + 48 = 51$
 $51 - 11 = 40$

$$9 / (8 - 5) + 12 * 4 - 11 = 40$$

For each expression, label the operation you would perform first, second, third, and so on. Then evaluate the expression.

1. $7 * 2^3 =$ _____

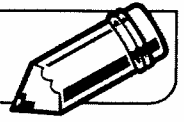
2. $6 + 0.3 * 10 =$ _____

3. $6 + 4 * 4^2 =$ _____

4. $(9 + 1) / 2 * 3^2 =$ _____

5. $14 - 28 / 7 * 2 =$ _____

6. $1 * 7 + 5 / 1 =$ _____



Name _____

Date _____



Name _____

Date _____

Name _____

Date _____

Name _____

Date _____

STUDY LINK
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Solving Simple Equations



1. Find the solution to each equation.

a. $b - 7 = 12$ _____ b. $53 = n + 29$ _____

c. $45 / y^2 = 5$ _____ d. $m * \frac{2}{3} = 1 - \frac{13}{15}$ _____

2. Translate the word sentences below into equations. Then solve each equation.

Word sentence	Equation	Solution
a. If you divide a number by 6, the result is 10.	_____	_____
b. Which number is 7 less than 200?	_____	_____
c. A number multiplied by 48 is equal to 2,928.	_____	_____
d. 27 is equal to 13 increased by which number?	_____	_____

3. For each problem, use parentheses and as many numbers and operations as you can to write an expression equal to the target number. You may use each number only once in an expression. Write expressions with more than two numbers.

a. Numbers: 3, 9, 11, 12, 19 Target number: 36 _____

b. Numbers: 1, 2, 6, 14, 18 Target number: 50 _____

c. Numbers: 4, 5, 8, 14, 17 Target number: 22 _____

d. Numbers: 6, 7, 12, 14, 20 Target number: 41 _____

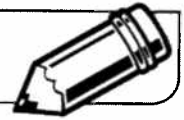
Practice

Complete.

4. $540 \div 90 = \underline{\quad} \div 9$ 5. $36 \div 6 = \underline{\quad} \div 0.6$ 6. $\underline{\quad} \div 11 = 1.21 \div 0.11$

LESSON
6•8

Solving Challenging Equations



1. $x - x = 0$ $n + 5 = 1$ $a + 8 < 3$ $y \neq y$ $\frac{0}{g} \geq 1$

Which of the above sentences have

a. no solution? _____

b. more than one solution? _____

c. a solution that is a negative number? _____

2. Find the solution to each equation below.

a. $x + (x + 1) + (x + 2) = 90$ _____

(Hint: Think of this equation as a sum of three numbers.)

b. $a + (a + 1) + (a + 2) + (a + 3) + (a + 4) = 90$ _____

3. Whole numbers are said to be **consecutive** if they follow one another in an uninterrupted pattern. For example, 5, 6, 7, 8, 9, and 10 are six consecutive whole numbers.

a. Find three consecutive whole numbers whose sum is 90.

(Hint: Replace each variable x in Problem 2a with the solution of the equation.)

_____ + _____ + _____ = 90

b. Find five consecutive whole numbers whose sum is 90.

_____ + _____ + _____ + _____ + _____ = 90

c. Find four consecutive whole numbers whose sum is 90.

_____ + _____ + _____ + _____ = 90

4. Each letter in the subtraction problem below represents a different digit from 0 through 9. The digits 3 and 5 do not appear. Replace each letter so the answer to the subtraction problem is correct.

$$\begin{array}{r} \text{GRAPE} \\ - \text{PLUM} \\ \hline \end{array} \quad \begin{array}{l} \text{G} = \text{_____} \\ \text{R} = \text{_____} \\ \text{A} = \text{_____} \\ \text{P} = \text{_____} \end{array}$$

$$\begin{array}{l} \text{APPLE} \\ \text{E} = \text{_____} \\ \text{L} = \text{_____} \\ \text{U} = \text{_____} \\ \text{M} = \text{_____} \end{array}$$

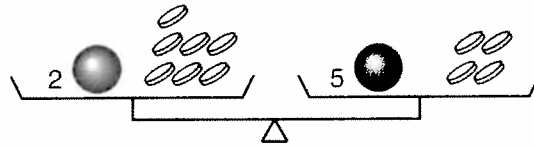
STUDY LINK
6•9

Solving Pan-Balance Problems

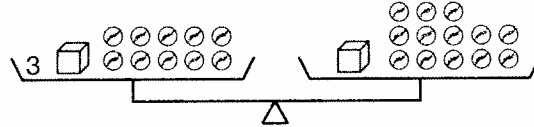


Solve these pan-balance problems. In each figure, the two pans are balanced.

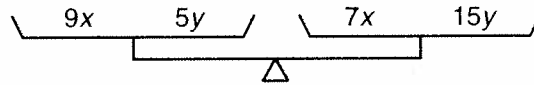
1. One ball weighs
as much as _____ coin(s).



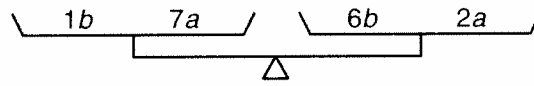
2. One cube weighs
as much as _____ marble(s).



3. One x weighs
as much as _____ y (s).



4. One a weighs
as much as _____ b (s).



Make up two pan-balance problems for a classmate to solve.

5. _____

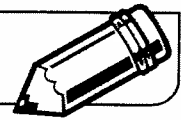
6. _____

Practice

7. $605 * \frac{1}{10} = 605 \div$ _____ 8. $72 * \text{_____} = 72 \div 4$
9. _____ $* 30 = (2 * 30) \div 3$ 10. _____ $* (x + 5) = \frac{x + 5}{2}$

LESSON
6•9

Pan-Balance Problems



Problems 1 and 2 each consist of two parts. You need to solve one part before you have enough information to solve the other part. You must figure out which statement to complete first—it may be either the first or the second statement.

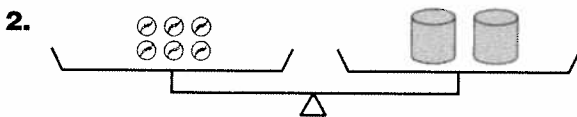
In each of the figures for Problems 1–3, the two pans are balanced.



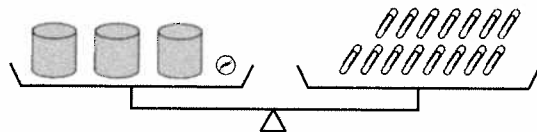
One cube weighs as much as
 _____ marbles.



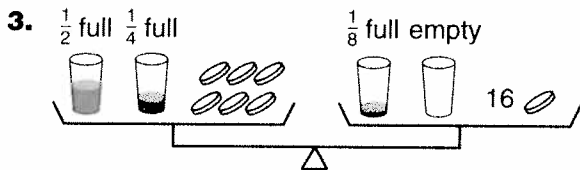
One coin weighs as much as
 _____ marbles.



One marble weighs as much as
 _____ paper clips.



One can weighs as much as
 _____ paper clips.



An empty juice glass weighs as much as 5 coins.

If the juice glass is full, the juice in the glass weighs as much as _____ coins.

If the juice glass is full, the juice and the glass weigh as much as _____ coins.

STUDY LINK
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Balancing Equations



For Problem 1, record the result of each operation on each pan.

1. Original pan-balance equation

Operation
(in words) **(abbreviation)**

Subtract 4.

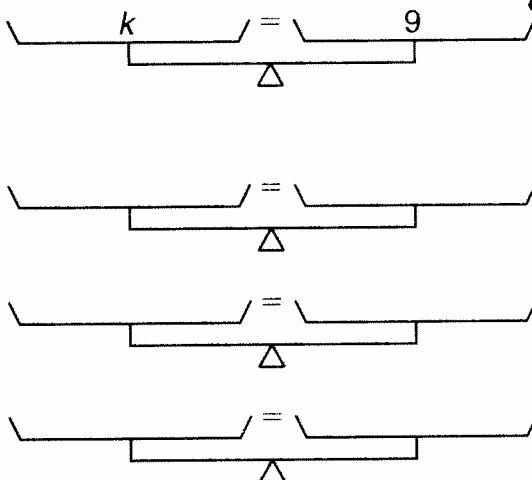
S 4

Multiply by 3.

M 3

Add $17k$.

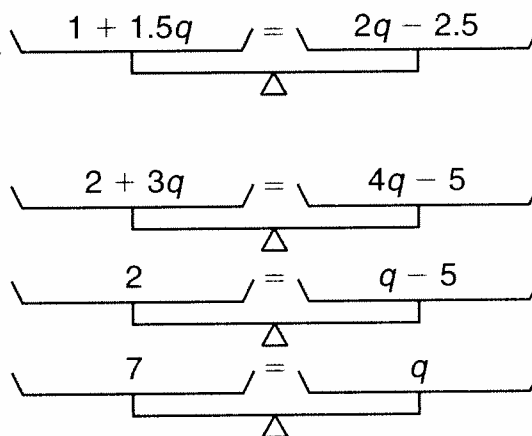
A $17k$



For Problems 2 and 3, record the operation that was used to obtain the result on each pan balance.

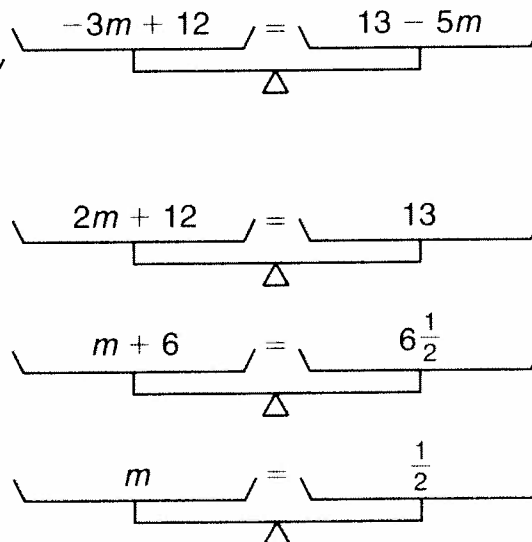
2. Original pan-balance equation

Operation
(in words) **(abbreviation)**



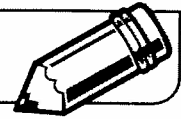
3. Original pan-balance equation

Operation
(in words) **(abbreviation)**



LESSON
6•10

Equations



A pan balance is a good model for an equation. To keep the pans balanced, do the same thing to both pans.

Example:


You can find the value of the variable n by removing, or subtracting, 17 from the left pan and the right pan.

$$n + 17 - 17 = 98 - 17$$

$$n = 81$$

To check the solution, replace n with 81.

$$81 + 17 = 98 \quad \text{true}$$

Fill in the missing numbers that will keep the pans balanced. Check each solution.

1.

$$76 - \boxed{} = y + 33 - \boxed{}$$

$$43 = y$$

2.

$$m - 45 + \boxed{} = -10 + \boxed{}$$

$$m = 35$$

3.

$$k * 5 \div \boxed{} = 130 \div \boxed{}$$

$$k = 26$$

4.

$$b \div 4 * \boxed{} = 31 * \boxed{}$$

$$b = 124$$

5. You can use one operation to undo another. Name the operation that will undo each of the following:

a. addition _____

b. multiplication _____

STUDY LINK
6•12

Review



1. Write a number sentence for each word sentence.

Word sentence

Number sentence

a. 15 is not equal to 3 times 7.

b. 5 more than a number is 75.

c. 13 more than 9 divided by 9 is less than or equal to 14.

2. Insert parentheses to make each equation true.

a. $200 \div 4 * 5 = 10$

b. $16 + 2^2 - 5 + 3 = 12$

3. Use the order of operations to evaluate each expression.

a. $5 * 6 + 8 * 2 =$ _____

b. $20 - \frac{8}{2^2} =$ _____

c. $40 + 8 - 24 * 2 =$ _____

d. $4^2 \div (4 * 2) + 3 * 2 =$ _____

4. Solve each equation.

a. $3x - 5 = 5x - 3$

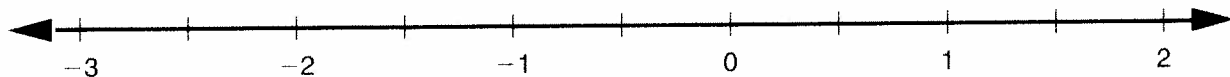
b. $\frac{(4y + 5)}{2} = y + 9$

Solution _____

Solution _____

5. Name three solutions of the inequality. Then graph the solution set.

a. $f < -\frac{3}{2}$ _____



Practice

6. $\$2.52 \div 12$ Estimate _____ Quotient _____

7. $45 \overline{)57.60}$ Estimate _____ Quotient _____

8. $120 \overline{)93,720}$ Estimate _____ Quotient _____

LESSON
6•12
Reviewing Relation Symbols and Inequalities


1. Translate between word and number sentences.

Word sentence

Number sentence

a. $\frac{7}{9}$ is greater than $\frac{2}{3}$.

b. _____

$19 \neq 54 \div 3$

c. 20 is greater than or equal to 5 less than 5 squared.

d. The product of 4 and 19 is less than 80.

e. 62 plus a number y is greater than -28 .

f. _____

$2 \leq \frac{x}{17}$

2. Indicate whether each inequality is true or false.

a. $5 * 4 < 20$ _____

b. $(7 + 3) * 6 \neq 60$ _____

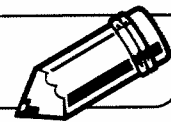
c. $54 / 9 > 7$ _____

d. $45 \geq 9 * 5$ _____

e. $29 - 12 \leq \frac{51}{3}$ _____

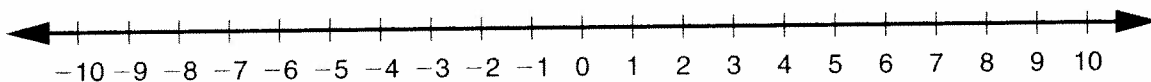
f. $18 < 2 * 7 + 6$ _____

3. Are the inequalities $17 - 6 \geq 9$ and $9 \leq 17 - 6$ equivalent? Explain.

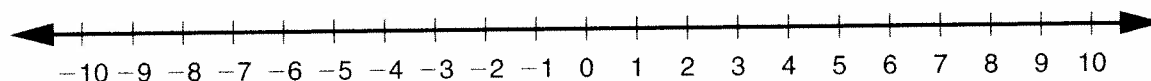
LESSON
6·12**Graphing Compound Inequalities**

Graph all solutions of each inequality.

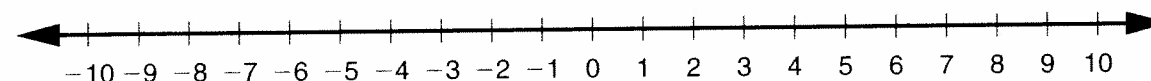
1. $-1 \leq x < 8$

(Hint: $-1 \leq x < 8$ means $x \geq -1$ and $x < 8$. For a number to be a solution, it must make both number sentences true.)

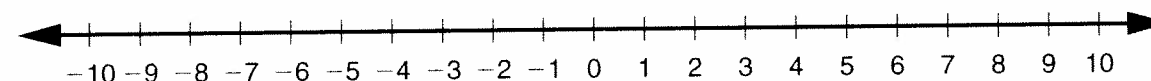
2. $3 < y + 2 \leq 7$



3. $m \neq -2$

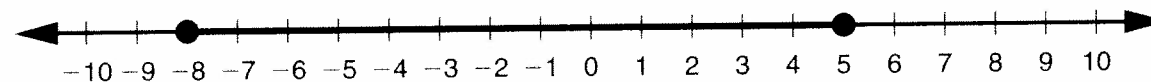


4. $x^2 \geq 9$

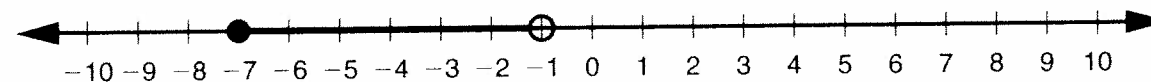


Write an inequality for each graph.

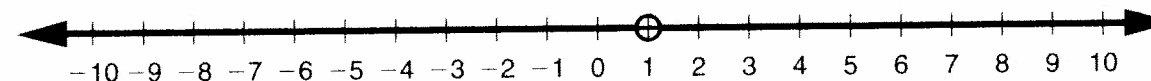
5. _____



6. _____



7. _____





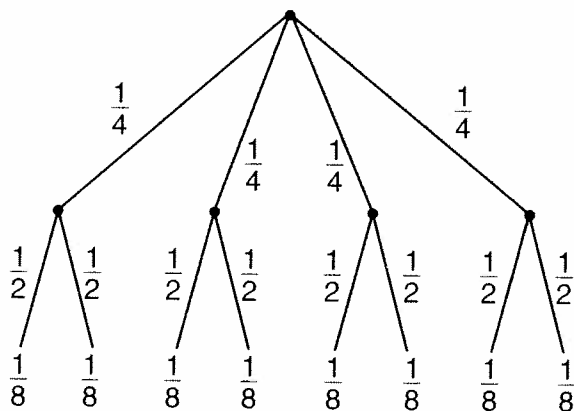
Probability and Discrete Mathematics

All of us are aware that the world is filled with uncertainties. As Ben Franklin wrote, “Nothing is certain except death and taxes!” Of course, there are some things we can be sure of: The sun will rise tomorrow, for example. We also know that there are degrees of uncertainty—some things are more likely to happen than others. There are occurrences that, although uncertain, can be predicted with reasonable accuracy.

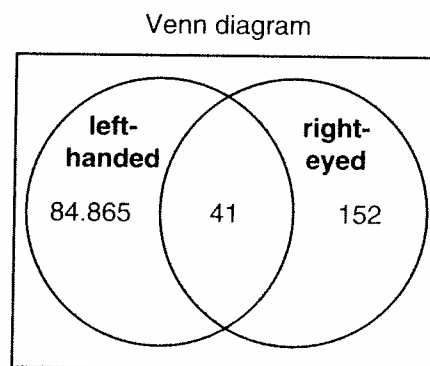
While predictions are usually most reliable when they deal with general trends, it is possible and often helpful to predict the outcomes of specific situations. In Unit 7, your child will learn how to simulate a situation with random outcomes and how to determine the likelihood of various outcomes. Additionally, the class will analyze games of chance to determine whether or not they are fair; that is, whether or not all players have the same chance of winning.

We will be looking at two tools for analyzing probability situations: tree diagrams (familiar from single-elimination sports tournaments) and Venn diagrams (circle diagrams that show relationships between overlapping groups).

One lesson concerns strategies for taking multiple-choice tests based on probability. Should test-takers guess at answers they don’t know? Your child will learn some of the advantages and disadvantages of guessing on this type of test.



Tree diagram



Please keep this Family Letter for reference as your child works through Unit 7.

Vocabulary

Important terms in Unit 7:

equally likely outcomes Outcomes of a chance experiment or situation that have the same probability of happening. If all the possible outcomes are equally likely, then the probability of an event is equal to:

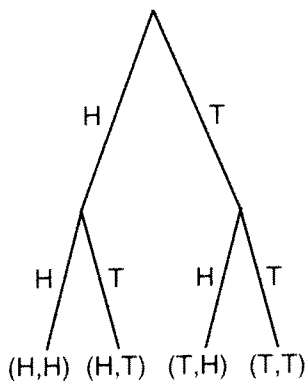
$$\frac{\text{number of favorable outcomes}}{\text{number of possible outcomes}}$$

expected outcome The average outcome over a large number of repetitions of a random experiment. For example, the expected outcome of rolling one die is the average number of dots showing over a large number of rolls.

outcome A possible result of a chance experiment or situation. For example, heads and tails are the two possible outcomes of tossing a coin.

probability A number from 0 through 1, giving the likelihood that an event will happen. The closer a probability is to 1, the more likely the event is to happen.

probability tree diagram A drawing used to analyze a *probability* situation that consists of two or more choices or stages. For example, the branches of the probability tree diagram below represent the four *equally likely outcomes* when one coin is flipped two times.



random number A number produced by a random experiment, such as rolling a die or spinning a spinner. For example, rolling a fair die produces random numbers because each of the six possible numbers 1, 2, 3, 4, 5, and 6 has the same chance of coming up.

simulation A model of a real situation. For example, a fair coin can be used to simulate a series of games between two equally matched teams.

Venn diagram A picture that uses circles or rings to show relationships among sets. The Venn diagram below shows the number of students who have a dog, a cat, or both.

