Name _____

Inequalities on a Number Line

R 12-1

To solve an inequality, you must find the value that makes the inequality true.

For example: $x < 4$ is an inequality. This means "x is less than 4."

What numbers make the inequality true? What numbers are less than 4?

0, 1, 2, and 3 are all less than 4. They can solve the inequality.

5, 6, and 7 are greater than 4. They cannot solve the inequality.

To graph the solutions to the inequality $x < 4$, first draw an open circle at 4 on the number line. Then draw an arrow over the solutions.

Name three solutions to each inequality and graph all the solutions on a number line.

1. $b > 5$

_____

2. $a < 9$

_____

3. $d > 0$

_____

4. $m < 13$

_____

5. Number Sense Could $7 - 4$ be a solution to the inequality $c < 2$? Explain.

_____

Name_____

Translating Words to Equations

R 12-2

When you are translating words to equations, the words give clues about which operation you should use in the equation.

The words *plus*, *added*, and *more* tell you that you should use addition.

Sentence	Equation
y plus 9 is equal to 17.	$y + 9 = 17$

The words *minus*, *less than*, and *difference* tell you that you should use subtraction.

Sentence	Equation
8 less than m is 7.	$m - 8 = 7$

Divided by and *equally between* refer to division, and *product*, *times*, and *each* refer to multiplication.

Sentence	Equation
16 split equally between n is 4.	$16 \div n = 4$
5 times n is 25.	$5n = 25$

Write an equation for each sentence.

1. 12 times t is 132.

_____

2. 8 minus r equals 2.

_____

3. 70 plus w is 102.

_____

4. 100 divided by x is 10.

_____

Write an equation for the problem.

5. **Number Sense** Harry had $45 and gave $5 to his brother. How much money does Harry have left?

_____

Name _____

Equations and Graphs

R 12-3

Use the equation $y = x + 2$. Find the value of y if $x = 3$.

First substitute 3 for x. $y = 3 + 2$

Then add. $y = 5$

So when $x = 3$, $y = 5$.

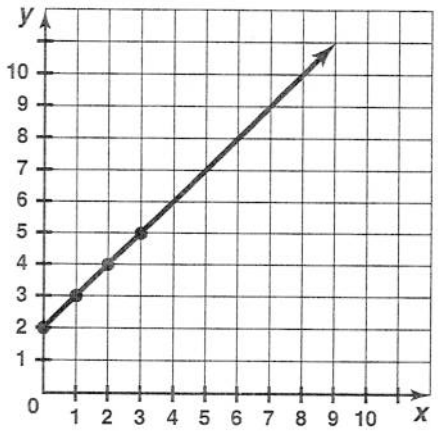
x	y
0	2
1	3
2	4
3	5

Here is a table of values made from the equation $y = x + 2$.

The table of values can be used to make a graph of the line $y = x + 2$. Plot each ordered pair from the table. For example, (0, 2).

Then connect the plotted points with a straight line.

Other ordered pairs on the graph of the equation are (4, 6), (5, 7), and (6, 8).



Use the equation $y = 3x + 1$ to find the value of y for each value of x.

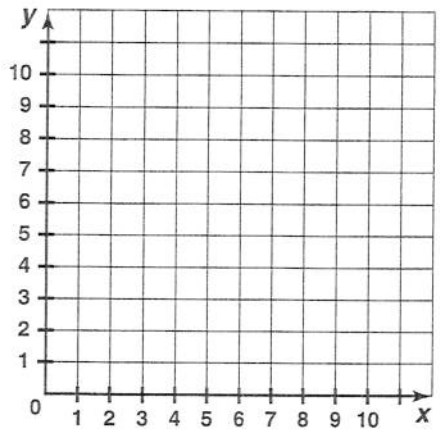
1. $x = 0$ _____

2. $x = 2$ _____

3. $x = 4$ _____

4. $x = 6$ _____

5. Graph the equation $y = x - 2$ on the coordinate grid at the right.



6. List five ordered pairs on the graph of the equation $y = x + 9$.

_____

_____

_____

Name _____

PROBLEM-SOLVING SKILL **R 12-4**

Extra or Missing Information

Butterflies The largest butterfly is the female Queen Alexandra Birdwing butterfly, which has a wingspan of 32 cm. The next largest butterfly is the Goliath Birdwing, which has a wingspan of 28 cm. The smallest butterfly is the Western Pygmy Blue, which has a wingspan of only 1.5 cm. How many centimeters longer is the wingspan of the largest butterfly than that of the smallest?

Read and Understand

Step 1: What do you know?

The Queen Alexandra Birdwing is the largest and has a 32 cm wingspan. The Western Pygmy Blue is the smallest and has a wingspan of 1.5 cm.

Step 2: What are you trying to find?

How much longer is the wingspan of the largest butterfly than that of the smallest butterfly?

Plan and Solve

Step 3: Find and use the needed information.

32 cm − 1.5 cm = 30.5 cm. The difference between the longest wingspan and the shortest wingspan is 30.5 cm.

The wingspan of the Goliath Birdwing was extra information.

Decide if the problem has extra information or not enough information. Tell any information that is not needed or that is missing. Then solve the problem if you have enough information.

1. A group of 12 teens went skiing. Three of them took a chairlift up the hill, and the rest used the T-bar. The chairlift ticket costs $3.00 more than the T-bar ticket. How many teens used the T-bar?

_____

_____

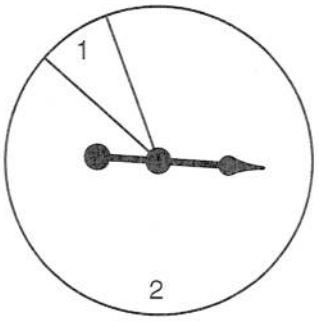
Name _____

Understanding Probability

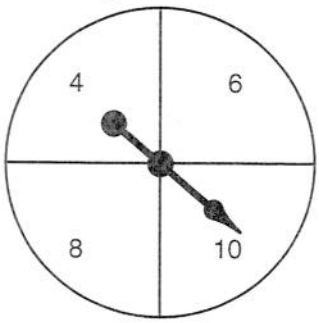
R 12-5

Probability is the chance that a certain event will happen. Events can be likely, unlikely, impossible, or certain.

Spinner A



Spinner B



In Spinner A, it is likely that the number 2 will be spun. Over half of the spinner area is number 2.

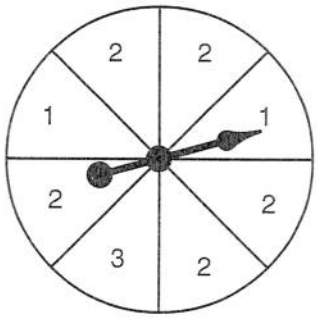
In Spinner A, spinning a 1 is unlikely.

In Spinner A, spinning a 3 is impossible. There is no 3 on the spinner.

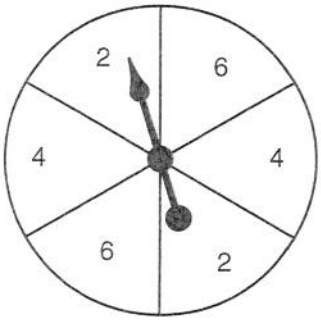
In Spinner B, spinning an even number is certain. All of the numbers are even.

Tell whether each event is likely, unlikely, impossible, or certain.

Spinner C



Spinner D



1. Spinning a 2 on Spinner C

   _____

2. Spinning a 2 on Spinner D

   _____

3. Spinning an even number on Spinner D _____

4. Spinning a 4 on Spinner C _____

5. **Reasoning** Describe an event using Spinner D that would be impossible.

   _____

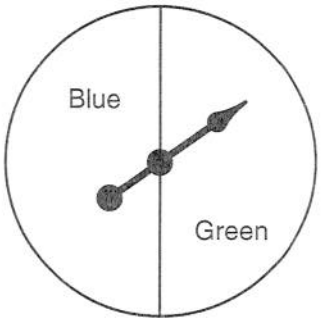
Name _____

Listing Outcomes

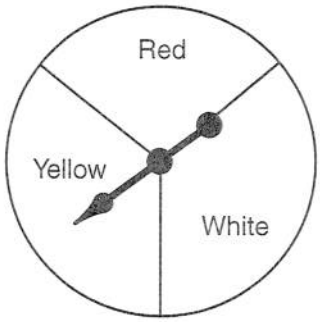
R 12-6

List all the possible outcomes for the spinners shown.

Spinner A



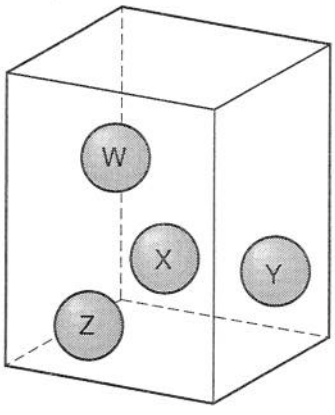
Spinner B



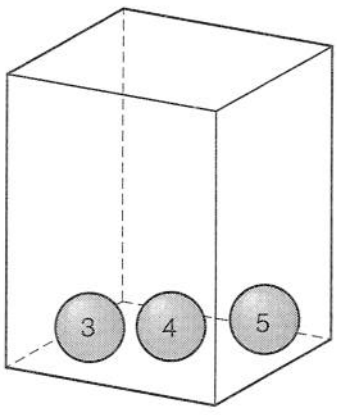
Spinner A	Spinner B	Possible Outcomes
Blue	Red	Blue, Red
	White	Blue, White
	Yellow	Blue, Yellow
Green	Red	Green, Red
	White	Green, White
	Yellow	Green, Yellow

List all the possible outcomes for selecting a marble from each box, without looking.

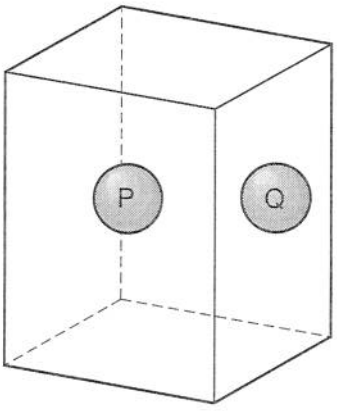
Box A



Box B



Box C



1. Box A _____

2. Boxes B and C _____

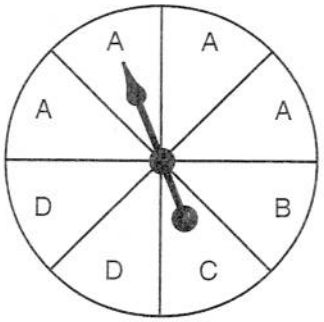
Name _____

Finding Probability

R 12-7

You can write a fraction to describe the probability of an event.

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



The probability of spinning an A is $\frac{4}{8}$ or $\frac{1}{2}$.

The probability of spinning a B is $\frac{1}{8}$.

The probability of spinning a D is $\frac{2}{8}$, or $\frac{1}{4}$.

The probability of spinning a letter between A and D is $\frac{8}{8}$, or 1. It is certain you will spin a letter between A and D.

The probability of spinning an L is $\frac{0}{8}$, or 0. It is impossible to spin an L, because there isn't one on the spinner.

Write the probability of drawing each letter when the letters from the word MATHEMATICS are drawn without looking.

1. a vowel _____

2. not a vowel _____

3. a capital letter _____

4. the letter *M* _____

5. the letter *L* _____

6. the letter *C* _____

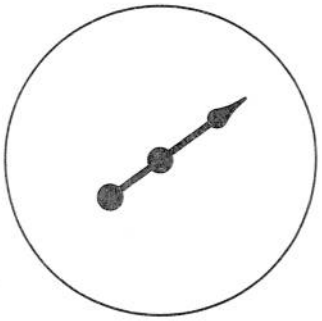
7. **Number Sense** In the problem above, is the event of drawing a vowel likely, unlikely, impossible, or certain? Explain.

_____

_____

_____

8. **Reasoning** Complete the spinner at the right by drawing and labeling to show that the probability of spinning a red is $\frac{3}{4}$.

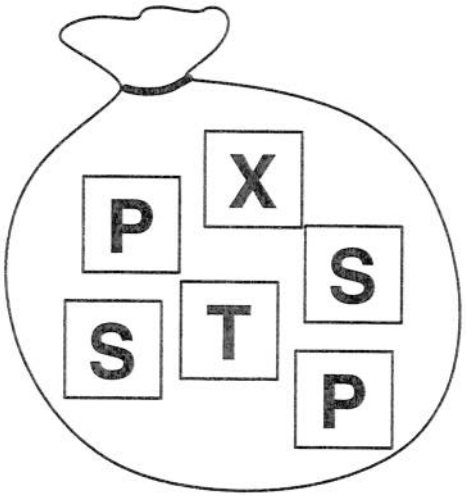


Name _____

Making Predictions

R 12-8

Predict the number of times the letter *p* will be drawn when you pick a letter 15 times. The letter is returned to the bag after each pick.



To make the prediction, take the probability, $\frac{1}{3}$, and find an equivalent fraction with the number of picks in the denominator.

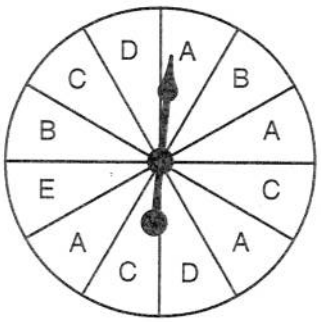
$$\frac{1}{3} = \frac{\quad}{15}$$

To go from a 3 to a 15, you multiply by 5. To make an equivalent fraction, you must multiply the numerator and denominator by the same number. $1 \times 5 = 5$

$$\frac{1}{3} = \frac{5}{15}$$

The prediction is that out of 15 draws, a *p* will be drawn 5 times.

Use the spinner to predict how many times each letter will be spun.



1. *D* when you spin 12 times

   _____

2. *E* when you spin 48 times

   _____

3. *A* when you spin 9 times _____

4. *B* when you spin 60 times _____

5. *C* when you spin 100 times _____

6. **Reasoning** A meteorologist predicted that it would rain 1 out of 3 days this month. If there are 30 days in the month, about how many days would you expect it to rain?

   _____

Name _____

PROBLEM-SOLVING STRATEGY **R 12-9**

Work Backward

Morning Routine Brenda takes 30 min to get dressed for school. She eats breakfast for 20 min more, then walks to school. It takes Brenda 15 min to walk to school. Brenda needs to be at school by 8:55 A.M. What time is the latest she should get out of bed in the morning?

Read and Understand

Step 1: What do you know?

Brenda takes 30 min to get ready, 20 min for breakfast, and 15 min to walk to school. She must be at school by 8:55 A.M.

Step 2: What are you trying to find?

What time is the latest Brenda should get up?

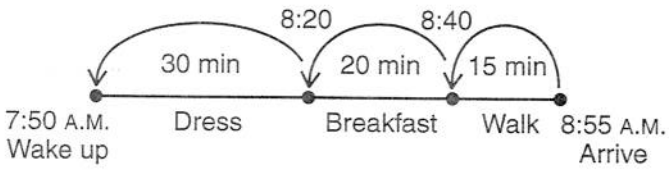
Plan and Solve

Step 3: What strategy will you use?

Strategy: Work backward

Work backward from the end, doing the opposite of each step.

I need to move backward, or subtract from the school arrival time, one step at a time.



Brenda must get up by 7:50 A.M. at the latest to make it to school in time.

Look Back and Check

Step 4: Is your work correct?

Yes. If I follow the times forward, I end at 8:55 A.M.

1. When Christopher Columbus was 41 years old he sailed across the Atlantic Ocean for the first time. He went on his final expedition 10 years later, which took 2 years. He died 2 years after his final expedition ended, in 1506. What year was Columbus born?

_____

Name_____

PROBLEM-SOLVING APPLICATION **R 12-10**

Veronica's Monday

Veronica rides the train every day to work. She needs to arrive at work by 9:00 A.M. It takes her 1 hr and 20 min to get ready for work. Her train ride lasts 30 min. What time is the latest that Veronica can get out of bed and still make it to work on time?

First, identify the time Veronica must arrive: 9:00 A.M.

Then work backwards using the information you know. Her train ride takes 30 min, and it takes her 1 hr 20 min to get ready. That is a total of 1 hr 50 min. One hour before 9:00 A.M. is 8:00 A.M., and 50 min before 8:00 A.M. is 7:10 A.M. So Veronica must get up by 7:10 A.M.

1. Veronica bought lunch, 2 sets of earrings, and a pair of tennis shoes at the mall. The earrings were $4.29 for each set and her tennis shoes were on sale for $22.79. She had $6.21 left when she was finished shopping. How much did she begin with?

2. In the afternoon, Veronica's coworker Keisha asked to borrow one of Veronica's pens. Veronica had 12 pens in her desk drawer. Three of them were black, 7 were blue, and 2 were red. What is the probability that Veronica will pick a red pen from her drawer?

3. Veronica worked 8 hr. Her manager asked her to work 3 more hours Tuesday than she did on Monday. Write an equation for *3 more than 8 hr.*