LEARNING THROUGH SPORTS™

Mathematics:
Statistics

The following section of this customized textbook includes material from these skill areas:

Skill Description

2209: analyze data

4.MD.9: Draw a scaled picture graph and a scaled bar graph to represent a data set with several categories. Solve one- and two-step "how many more" and "how many less" problems using information presented in scaled bar graphs. NOTE: This is a reinforcement standard from the 3rd grade standard 3.MD.3.

2255: read and interpret charts and tables

4.MD.9: Draw a scaled picture graph and a scaled bar graph to represent a data set with several categories. Solve one- and two-step "how many more" and "how many less" problems using information presented in scaled bar graphs. NOTE: This is a reinforcement standard from the 3rd grade standard 3.MD.3.

2257: construct line graphs to represent data

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2261: construct tree diagrams to represent data

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2265: read and interpret bar graphs

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2268: read and interpret line graphs

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2271: read and interpret pictographs

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2272: read and interpret tallies

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2273: read and interpret Venn diagrams

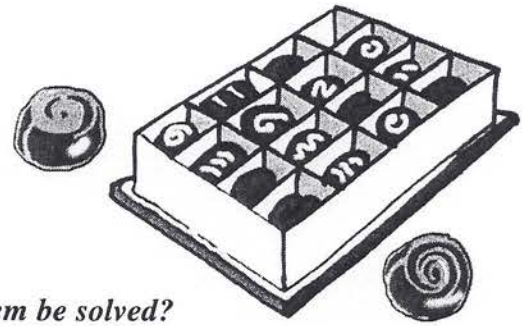
4.MD.9: Draw a scaled picture graph and a scaled bar graph to represent a data set with several categories. Solve one- and two-step "how many more" and "how many less" problems using information presented in scaled bar graphs. NOTE: This is a reinforcement standard from the 3rd grade standard 3.MD.3.

6420: define statistical terms

4.MD.9: Draw a scaled picture graph and a scaled bar graph to represent a data set with several categories. Solve one- and two-step "how many more" and "how many less" problems using information presented in scaled bar graphs. NOTE: This is a reinforcement standard from the 3rd grade standard 3.MD.3.

Approaching Problems

Defining the Problem



A **problem** is a question to be answered.
When you read a problem, try to identify the problem clearly.

Ask yourself:

What is the exact question to be answered? Can the problem be solved?

The longest bone in the human body is the femur (thighbone). The humerus (the upper arm bone) is 5.53 in. shorter than the femur. How long is the humerus?

The question is:
How long is the humerus?

There is not enough information to solve this problem.

In Switzerland, people consume an average of 26 pounds of chocolate each year. This is 2 pounds more than twice the consumption of the average Australian. What is the per person chocolate consumption in Australia?

The question is:
What is the per person chocolate consumption in Australia?

This problem can be solved.

Examining the Information

Identify the information needed to solve the problem. Sometimes there is more than you need. Sometimes information is missing.

In Denmark, people chew more gum than anywhere else in the world. They chew three times as much gum as people in Japan. On the average, how much do the Japanese chew each year?

There is not enough information.

To solve the problem, you need to know how much gum is chewed in Denmark.

In Norway, 2.6 kg of potato chips are eaten per person per year. Norwegians eat more frozen food than any other country. Swedes eat 1.6 kg of potato chips (per person) each year. How much greater is the amount of potato chips eaten by the average Norwegian?

There is too much information.

You do not need to know the frozen food consumption in order to solve the problem.

Make a Table or Graph

If there is a lot of data to consider in solving a problem, try putting it into a table. That way you can easily see relationships between numbers. A graph can also help you see relationships between numbers.

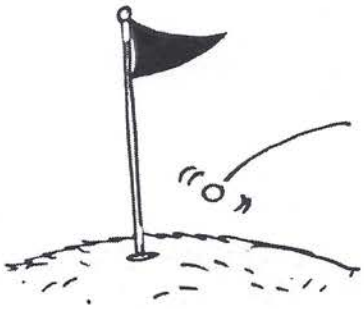
A line graph is especially helpful if you need to see how amounts change over time.

The Problem:

Two golfing friends traveled frequently to play in golf tournaments. In January, Chad traveled 14 days out of the month. Tad traveled $\frac{1}{2}$ the days that Chad traveled. In each of the next five months, Chad traveled two days more a month than in the previous month. In February through June, Tad traveled four days more each month than Chad had in February.

Month	Chad	Tad
Jan	14	7
Feb	16	20
Mar	18	20
Apr	20	20
May	22	20
Jun	24	20

Who traveled more days over the 6-month period?

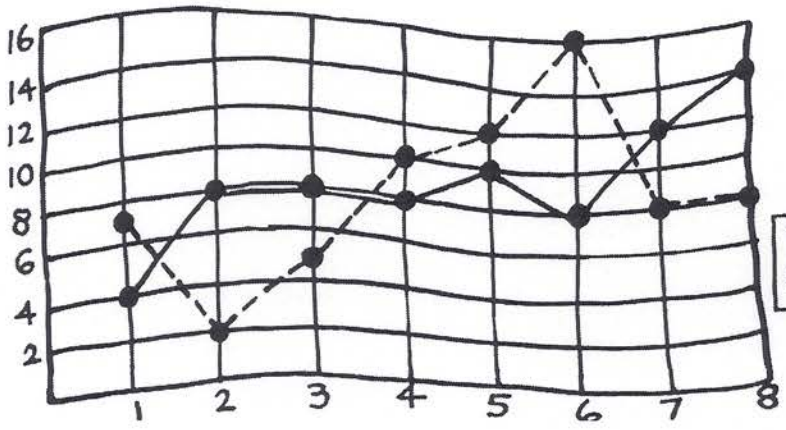


The table can be used to write the data for travel time for each golfer for each month. Then, it takes only quick column addition to discover that Chad has more days.

The Problem:

Chad and Tad also kept track of their hours of practice for 8 weeks before they started traveling. Which golfer had the greatest increase in practice time in a 2-week period?

Between which weeks did that increase occur?



The graph makes it easy to answer the question.

Chad had an 8-hour increase between weeks 2 and 4.

Work Backwards

Sometimes it is helpful to start at the end of a problem and work backwards to find a missing fact. This is especially useful when a problem has a missing fact somewhere in the middle (or at the beginning) or many items of data. Here is one problem that calls for this approach.

The Problem:

Sabrina walked 30 minutes into town. After she got to town, she stopped at the shoe store where she spent 12 minutes choosing new athletic shoes and 21 minutes standing in line to pay for them. It took 4 minutes to get to the market, where she spent 7 minutes buying water and energy bars. She walked another 10 minutes to the gym, and did a workout that took 1 hour and 55 minutes. Then she jogged home in 21 minutes. She arrived home at 4:13 pm.

What time did she leave home?

arrived home		4:13
left gym	-21 min	3:52
arrived at gym	- 1 hr 55 min	1:57
left market for gym	- 10 min	1:47
arrived at market	-7 min	1:40
left shoe store	-4 min	1:36
got in line at shoe store	- 21 min	1:15
arrived at shoe store	- 12 min	1:03
left home for shoe store	-30 min	12:33

Use a Formula

Some problems just need a formula. Usually a formula is a shortcut to a solution, so be alert for chances to use one. Make sure you choose the correct formula and use it accurately.

The Problem:

That hungry Sabrina came home and ate a full box of veggie crackers.
The box measured 25 by 10 by 15 centimeters.
Each cubic centimeter in the box holds 0.1 grams of crackers.

What is the weight of the crackers she ate?

Use the formula for volume of a rectangular prism. Then, multiply the volume by 0.1 grams to calculate the weight.

$V = l \times w \times h$

$25 \times 10 \times 15 = 3750\ cm^3$

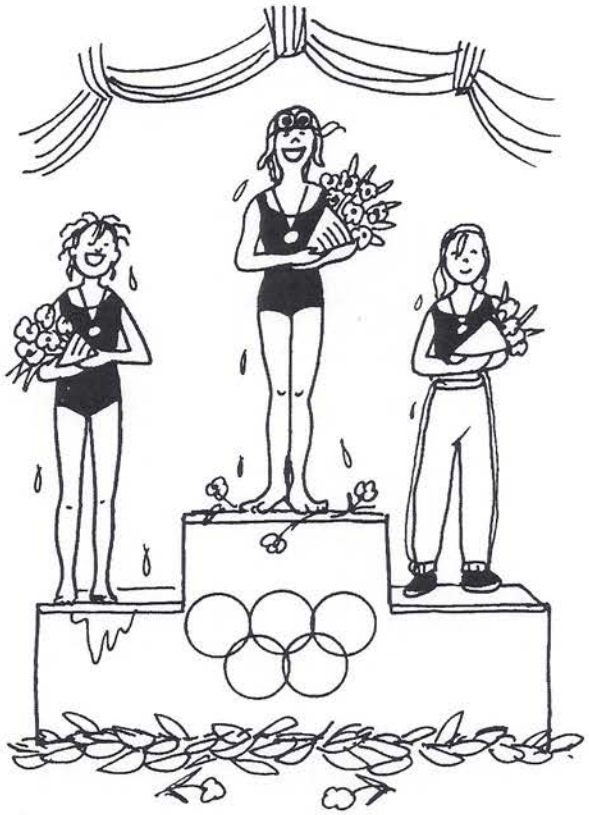
$3750 \times 0.1 = 375\ grams$

THE FINAL COUNT

When the Olympic Games are over, the medals are counted. At the Summer Olympic Games in Atlanta, 842 medals were awarded. This is the way the final count looked for the top 20 medal-winning countries. Use the chart to solve the problems below.

Summer Olympic Games
Final Medal Standings for Top 20 Countries

Country	Gold	Silver	Bronze	Total Medals
United States	44	32	25	
Germany	20	18		65
Russia		21	16	63
China	16	22	12	
Australia	9		23	41
France		7	15	37
Italy	13	10	12	
South Korea	7	15		27
Cuba	9	8		25
Ukraine		2	12	23
Canada	3		8	22
Hungary		4	10	21
Romania	4		9	20
Netherlands	4	5		19
Poland	7	5	5	
Spain	5	6	6	
Bulgaria	3	7	5	
Brazil	3		9	15
Great Britain	1	8	6	
Belarus	1	6		15



1. Write the missing numbers in the spaces on the chart.
2. Which four countries won the same total number of medals? _____
   _____
3. Which two countries won 17 medals?
   _____
4. Which three countries each won 12 bronze medals? _____
   _____
   _____
5. Which country won the same number of gold and bronze medals? _____
6. Which country won 8 times as many bronze medals as gold medals? _____
7. Which country won twice as many medals as Cuba? _____
8. Which country won more bronze medals than the U.S.? _____
9. How many more gold medals did Russia win than Ukraine? _____
10. Which country won half of its medals in silver? _____

Use with page 233.

THE FINAL COUNT, CONT.

The medal count is quite different at the Winter Olympics because there are fewer events. The chart below tells the final medal count for all medal-winning countries at the Winter Olympic Games in Lillehammer, Norway. Use the information to solve the problems below.

1. Write the missing numbers in the spaces on the chart.

_____ 2. Find the total number of medals awarded in 1994.

_____ 3. How many medals did the top 6 countries win?

_____ 4. How many medals did the other 16 countries win?

_____ 5. Which country won more gold medals than Norway?

_____ 6. Which country won more silver and bronze, but fewer gold medals than the U.S.?

_____ 7. Which country won three times the gold medals of Canada?

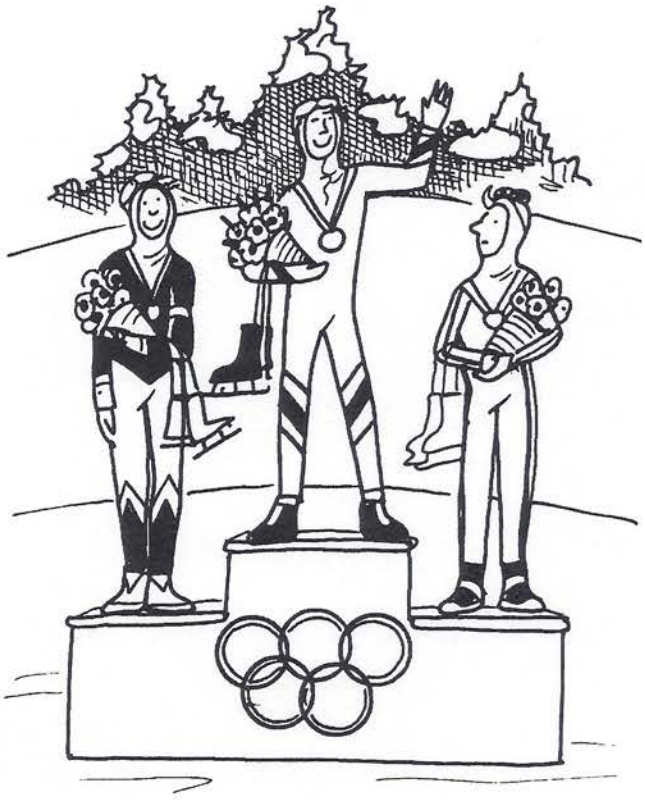
_____ 8. Which country won the same number of gold medals as Switzerland?

_____ 9. Which country won 17 more medals than China?

_____ 10. Which country won 22 fewer medals than Norway?

Winter Olympic Games
Final Medal Standings

Country	Gold	Silver	Bronze	Total Medals
Norway	10	11	5	
Germany	9	7		24
Russia	11		4	23
Italy	7	5	8	
United States	6		2	13
Canada		6	4	13
Switzerland		4	2	9
Austria	2	3	4	
South Korea		1	1	6
Finland	0		5	6
Japan	1	2		5
France	0		4	5
Netherlands	0	1	3	
Sweden		1	0	3
Kazakstan	1	2	0	
China	0		2	3
Slovenia	0	0		3
Ukraine		0	1	2
Belarus	0	2	0	
Great Britain	0		2	2
Uzbekistan	1	0		1
Australia		0	1	1



Use with page 232.

Answer key page 11, unit 233

FLIPPING OVER NUMBERS

The Baker kids have been having a great time doing flips on their backyard trampoline. In order to keep track of everyone's total flips, Biff made a chart. By mistake, he left out some numbers. Finish the chart and answer the questions.

	Front Flips	Back Flips	Straddle Flips	Twist Flips	Totals
Biff	4		3	7	18
Bob	2	8	4	4	
Ben		1	6	10	22
BUD	3		3	3	12
Barb	7	9	1	1	
Bonnie	8	6		7	21
Totals					

1. Total Front Flips? _____
2. Who did the most flips? _____
3. Three kids who tied? _____

   _____ _____
4. Who did the most Front Flips? _____
5. Who did the least Straddle Flips? _____
6. Who did the same number of all four kinds of flips? _____
7. Who did the most Twist Flips? _____
8. Who tied in Twist Flips? _____
9. Kind of flip done most? _____
10. Kind of flip done least? _____
11. Barb's most successful flip? _____
12. Bonnie's least successful flip? _____
13. Whose total was 10 more than Bud's? _____
14. What flip total was $\frac{1}{3}$ of Bonnie's total flips? _____
15. Who flipped 3 more than Barb? _____
16. Total of all flips? _____

Answer key page 13, unit 256

OUTRAGEOUS COLLECTIONS

What strange things some people collect! Many people have collections, but some take it to extremes. People who collect thousands of magnets, clovers, mousetraps, or airsickness bags may do this for the love of collecting. Or they may do it to get in the record books!

The table below shows **data** (numerical information) for some outrageous record collections. Use the information on the table to answer the questions.

1. Which collection is the largest?

   _____

2. Which collection is the smallest?

   _____

3. Who has more items, Hugh or Ted?

   _____

4. How many clovers are in George's collection? _____

5. Who collected four times as many items as Sonja? _____

6. Who collected about five times as many items as Louise?

   _____

7. Which 3 collections are very close to 2000?

   _____

   _____

   _____

OUTRAGEOUS COLLECTIONS

Collection	Collector	Record Number Collected
mousetraps	Reinhard Hellwig	2,334
golf balls	Ted J. Hoz	43,824
items of underwear	Imelda Marcos	1,700
shoes	Sonja Bata	10,000
watches	Florenzo Barindelli	3,562
light bulbs	Hugh Hicks	60,000
airsickness bags	Nick Vermeulen	2,112
gnomes & pixies	Anne Atkin	2,010
bandages (unused)	Brian Viner	3,750
refrigerator magnets	Louise J. Greenfarb	21,500
clovers	George Kaminski	13,382 four-leaf 1,336 five-leaf 78 six-leaf 6 seven-leaf
bubble gum	Thomas & Volker Martins	1,712
parking meters	Lotta Sjölin	292
nutcrackers	Jürgen Löschner	2,200
ballpoint pens	Angelika Unverhau	108,500
piggy banks	Ove Nortstrom	3,575
jet fighters	Michel Pont	100
marbles	Sam McCarthy-Fox	40,000

8. Which collection has about the same number as the bubble gum collection? _____
9. How many collections are larger than the underwear collection? _____
10. How many collections are smaller than the piggy bank collection? _____
11. Whose collection is about the same in number of items as the watches? _____
12. Which collection surprises you most? _____

    Why? _____

Use with page 277.

Answer key page 15, unit 276

OUTRAGEOUS COLLECTIONS, CONT.

Curious visitors come to see many of the world record-setting collections described on page 276. This table is about visitors to some other collections that have not set any records. Use the table to answer the questions.

CURIOUS VISITORS

Numbers of Visitors May-June

Collection Visited	May	June	July	August
Elvis souvenirs	666	900	1,001	768
ski poles	89	320	465	345
shoes	1,000	1,590	1,899	1,200
marbles	707	933	955	700
safety pins	30	66	71	14
stuffed animals	4,500	4,811	5,736	4,801
spoons	691	699	741	366
gum wrappers	190	580	711	533
cash registers	1,101	2,801	4,138	3,100
lightbulbs	1,400	1,451	1,478	1,410
shoelaces	57	84	99	150

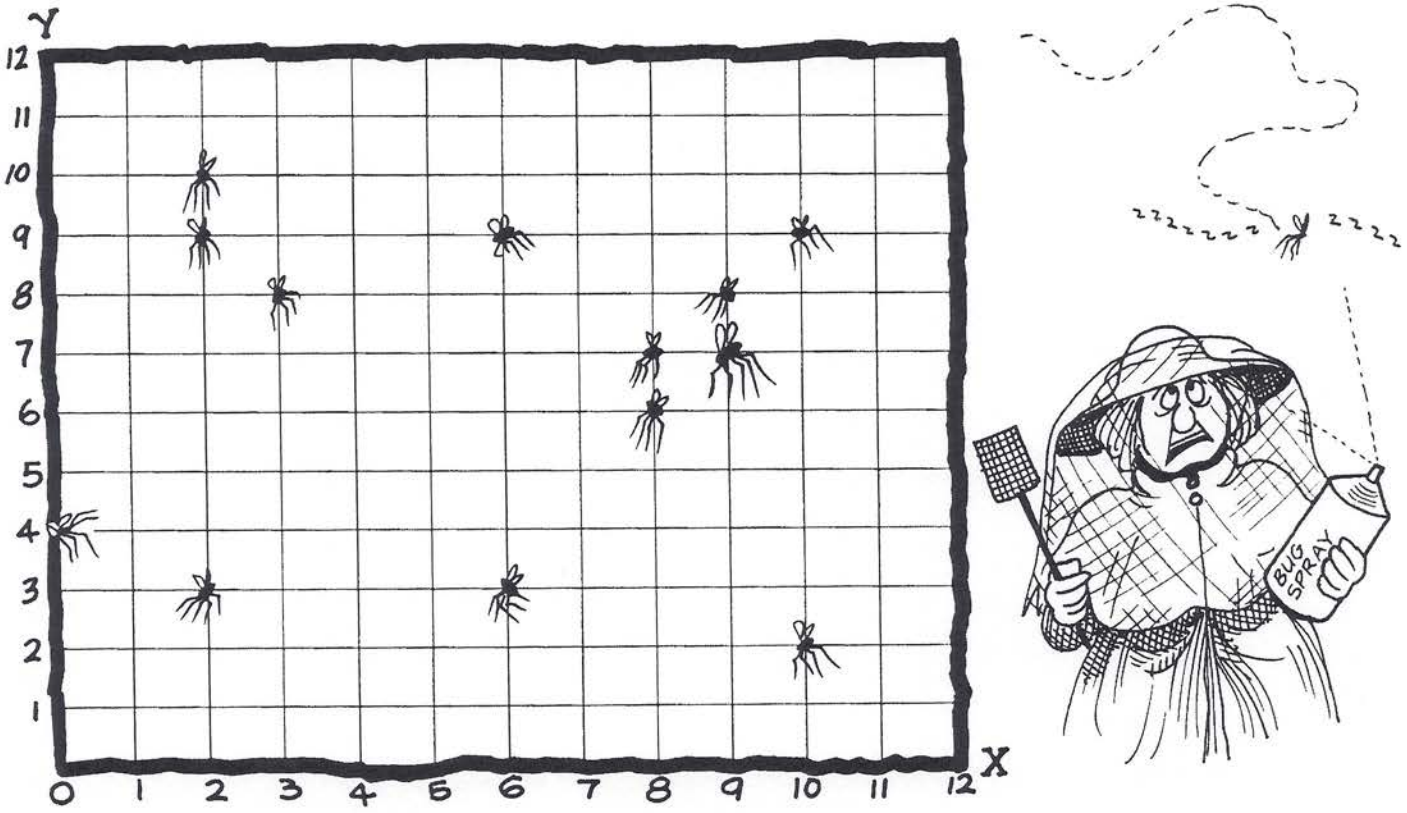
1. For which collection was the number of visitors about the same over all four months? _____
2. Which month was the best for most of the collections? _____
3. Most collections had (more, less) visitors in June than July. _____
4. Which collection had fewer visitors in July than in August? _____
5. Most collections had (more, less) visitors in August than in July. _____
6. How many collections had fewer visitors in August than in May? _____
7. Which collection had the least interest from visitors over the summer? _____
8. Which collection seems to have had the most visitors over the summer? _____
9. How many collections had more visitors in July than the shoe collection did? _____
10. How many collections had less visitors in May than the marble collection did? _____
11. Which collection had about 2,000 more visitors in August than it did in May? _____
12. How many more visitors saw the safety pin exhibit in June than in August? _____

Use with page 276.

SWATTING TO SET A RECORD

Yes, there really is a World Championship Mosquito-Killing Championship. It is held every year in Finland. Henri Pellonpää holds the record for the most of the pesky insects killed in five minutes. His record is 21 mosquitoes.

Follow the directions below to locate Henri's mosquitoes on the coordinate grid.



Remember that coordinates of a location are written (x, y). X is the location on the horizontal line. Y is the location on the vertical line.

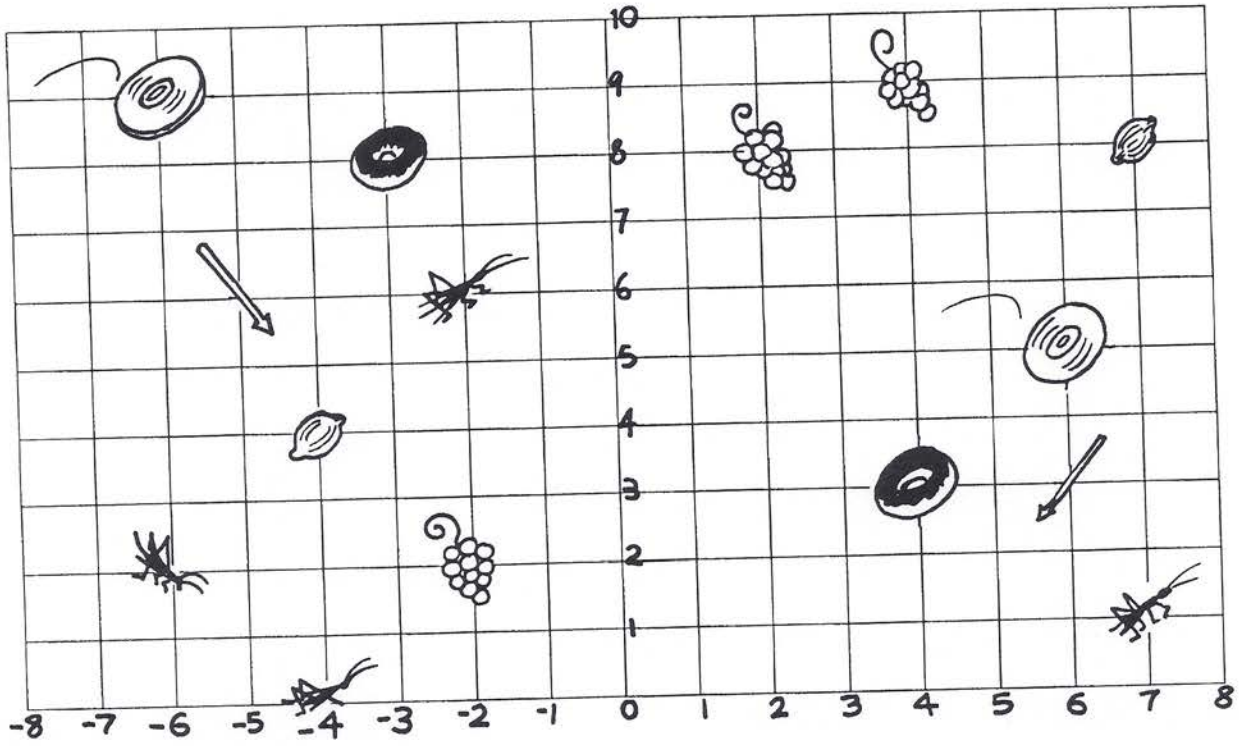
1. Is there a mosquito at (8, 6)? _____
2. Is there a mosquito at (2, 10)? _____
3. Is there a mosquito at (9, 4)? _____
4. Is there a mosquito at (10, 8)? _____
5. Is there a mosquito at (12, 0)? _____
6. Is there a mosquito at (9, 7)? _____
7. Is there a mosquito at (8, 7)? _____
8. Is there a mosquito at (3, 6)? _____
9. Is there a mosquito at (6, 3)? _____
10. Where is the largest mosquito? _____
11. Draw a mosquito at (12, 3).
12. Draw a mosquito at (3, 6).
13. Draw a mosquito at (9, 4).
14. Draw a mosquito at (8, 0).

Answer key page 15, unit 284

THE THINGS PEOPLE THROW

It's amazing what things get thrown, tossed, and spit in an effort to set a record! Some of the world records include spitting cherry pits and crickets, tossing pancakes and cow pies, and catching tossed grapes in the mouth.

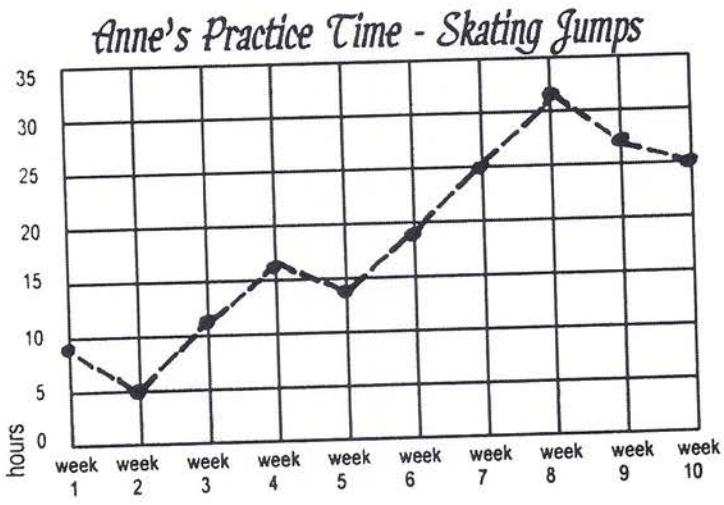
Find the tossed items on the coordinate grid below. Answer the questions about their locations.



Write the locations where these are found. Write the coordinates like this: (x, y).

1. The  are found at _____ , _____ , and _____ .
2. The  are found at _____ and _____ .
3. The  are found at _____ and _____ .
4. The  are found at _____ and _____ .
5. The  are found at _____ and _____ .
6. The  are found at _____ , _____ , _____ , and _____ .

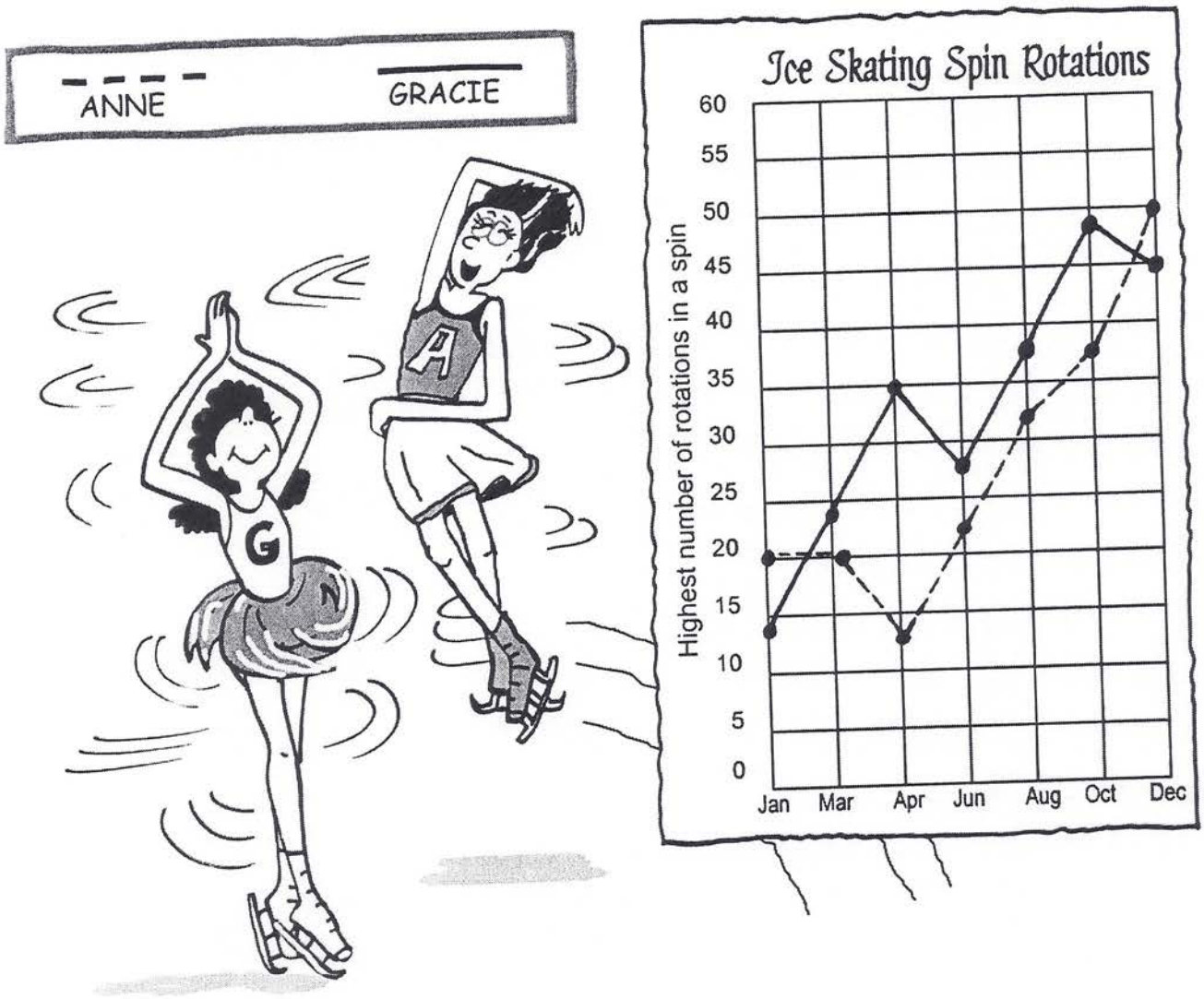
Line Graphs



A **line graph** uses a line on a grid to show data over time. A line graph has a special talent that other kinds of graphs don't have: it is able to show **changes** in data over a period of time.

This graph shows the number of hours Anne practiced her ice skating jumps over a period of ten weeks.

The graph below uses two different lines to compare the data on spins for two skaters. The line shows changes in number of rotations in their spins over a 12-month period.



Tree Diagrams

A **tree diagram** is an interesting and helpful visual tool for figuring probability.
All the possible outcomes for independent events can be shown on a tree diagram.

Get Sharp Tip #29
A tree diagram is a good tool to use to show outcomes for two independent events.

Angie got to lunch late.

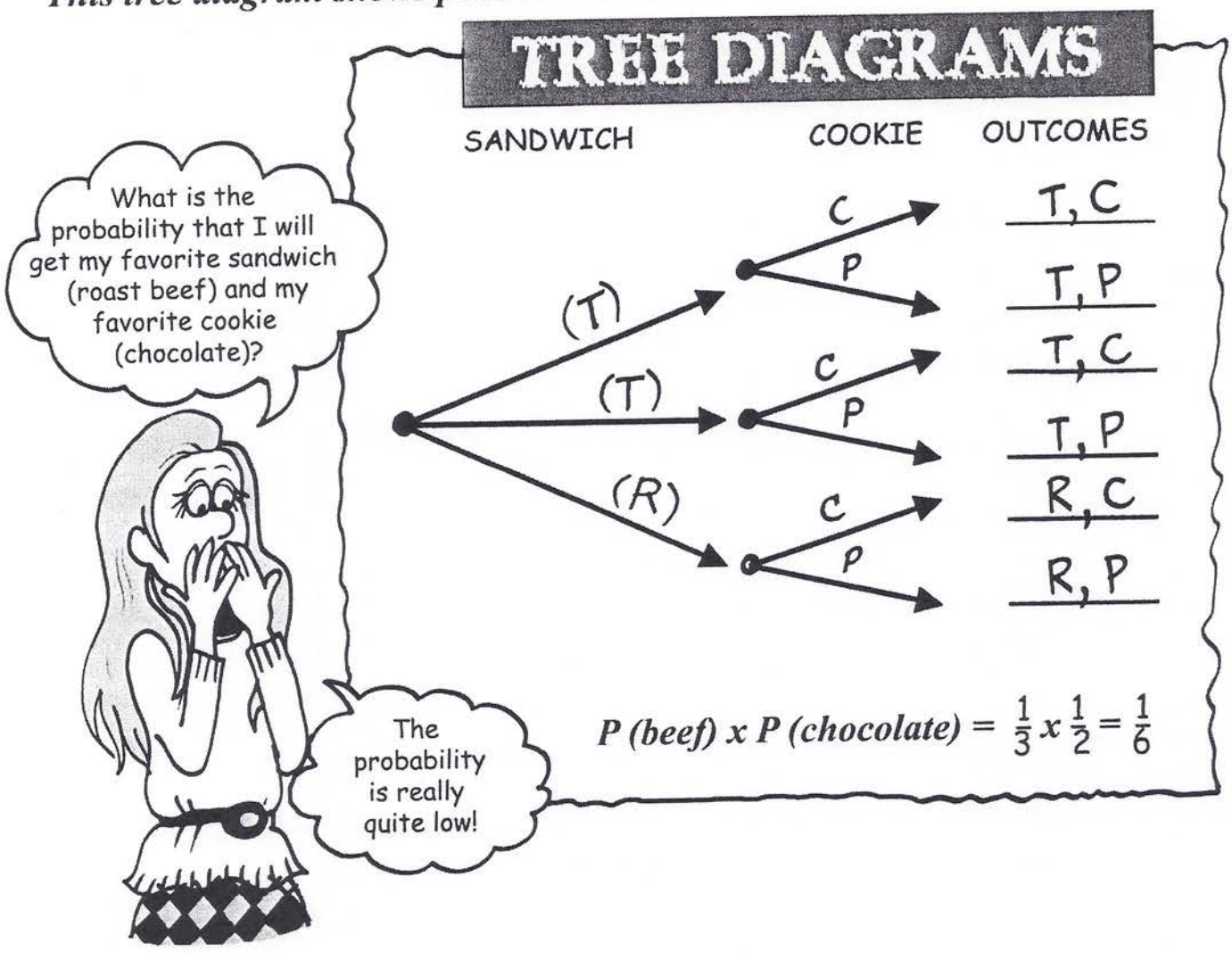
There were 3 sandwiches left: *2 turkey and 1 roast beef.*
There were 2 cookies left: *1 chocolate and 1 peanut butter.*

All cookies and sandwiches were wrapped, but had no labels. Angie took one sandwich and one cookie.

The tree diagram shows the possible outcomes for Angie's choices.

T = turkey sandwich ***C = chocolate cookie***
R = roast beef sandwich ***P = peanut butter cookie***

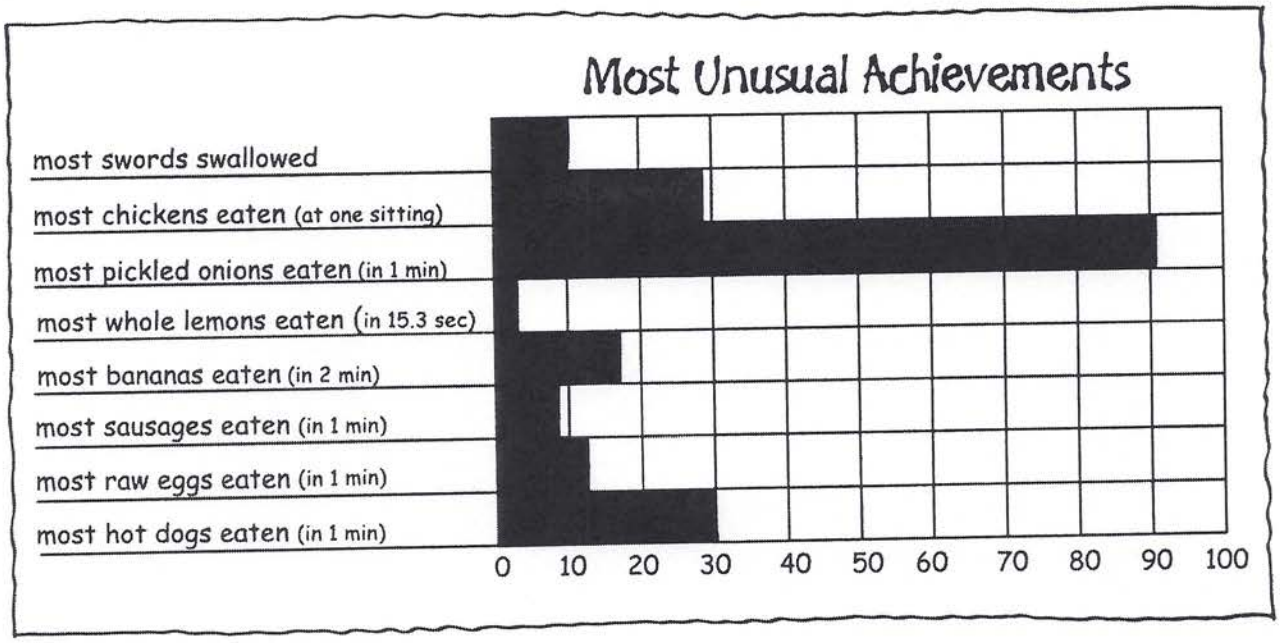
This tree diagram shows possible outcomes:



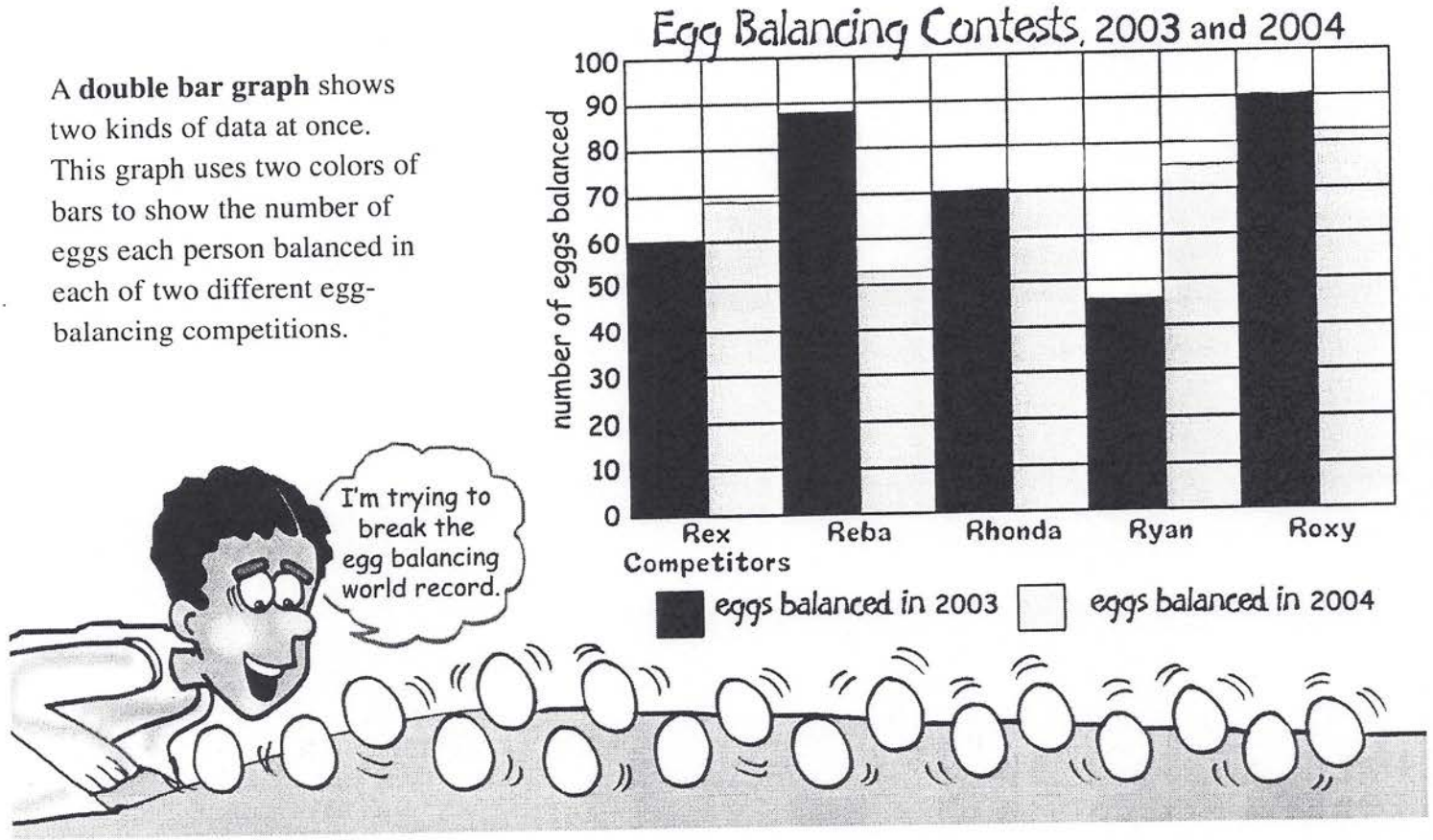
Bar Graphs

A **bar graph** uses bars of different lengths to show and compare data.

A **single bar graph** shows one kind of data. This single bar graph shows the number of things accomplished in different kinds of contests.



A **double bar graph** shows two kinds of data at once. This graph uses two colors of bars to show the number of eggs each person balanced in each of two different egg-balancing competitions.



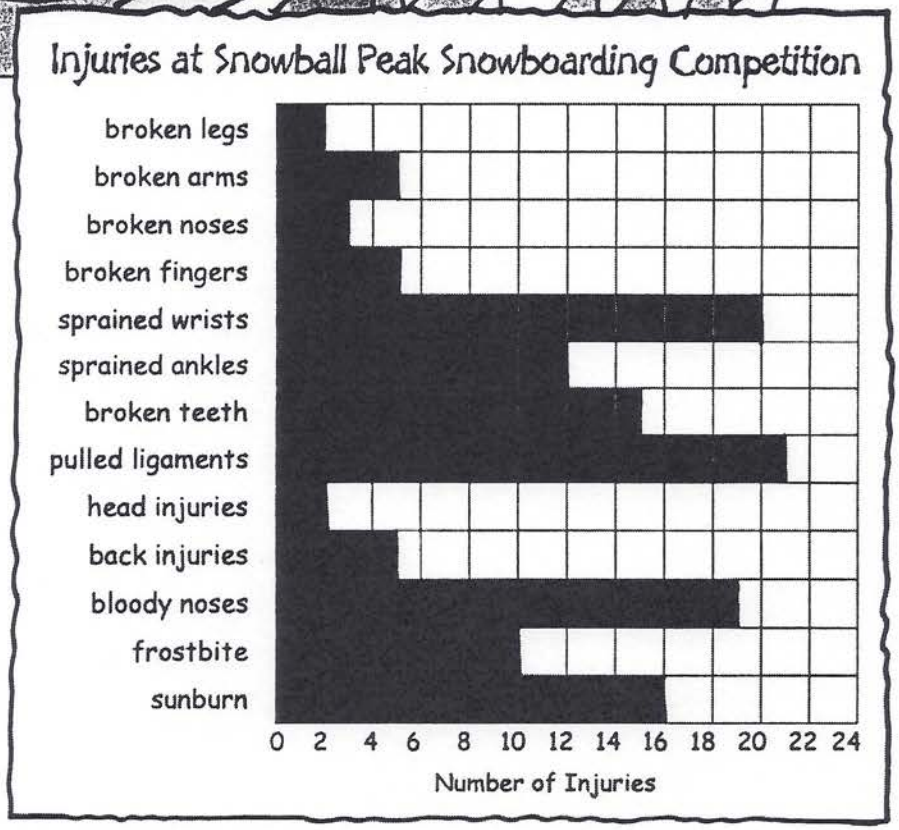
Histograms

A **histogram** is a bar graph that shows frequency data (or, how often something happens). This data is about the number of injuries at a week-long snowboard competition. Data on the different kinds of injuries has been collected and organized on the table.

This same data is displayed below in graph form. From reading the graph, you can see the frequency with which each type of injury occurred.

INJURIES
Snowball Peak Competition

Kind of Injury	Frequency
broken legs	2
broken arms	5
broken noses	3
broken fingers	5
sprained wrists	20
sprained ankles	12
broken teeth	15
pulled ligaments	21
head injuries	2
back injuries	5
bloody noses	19
frostbite	10
sunburn	16



After watching the 2002 Olympic snowboard competitions, 18.6 million people said they would like to try the sport.

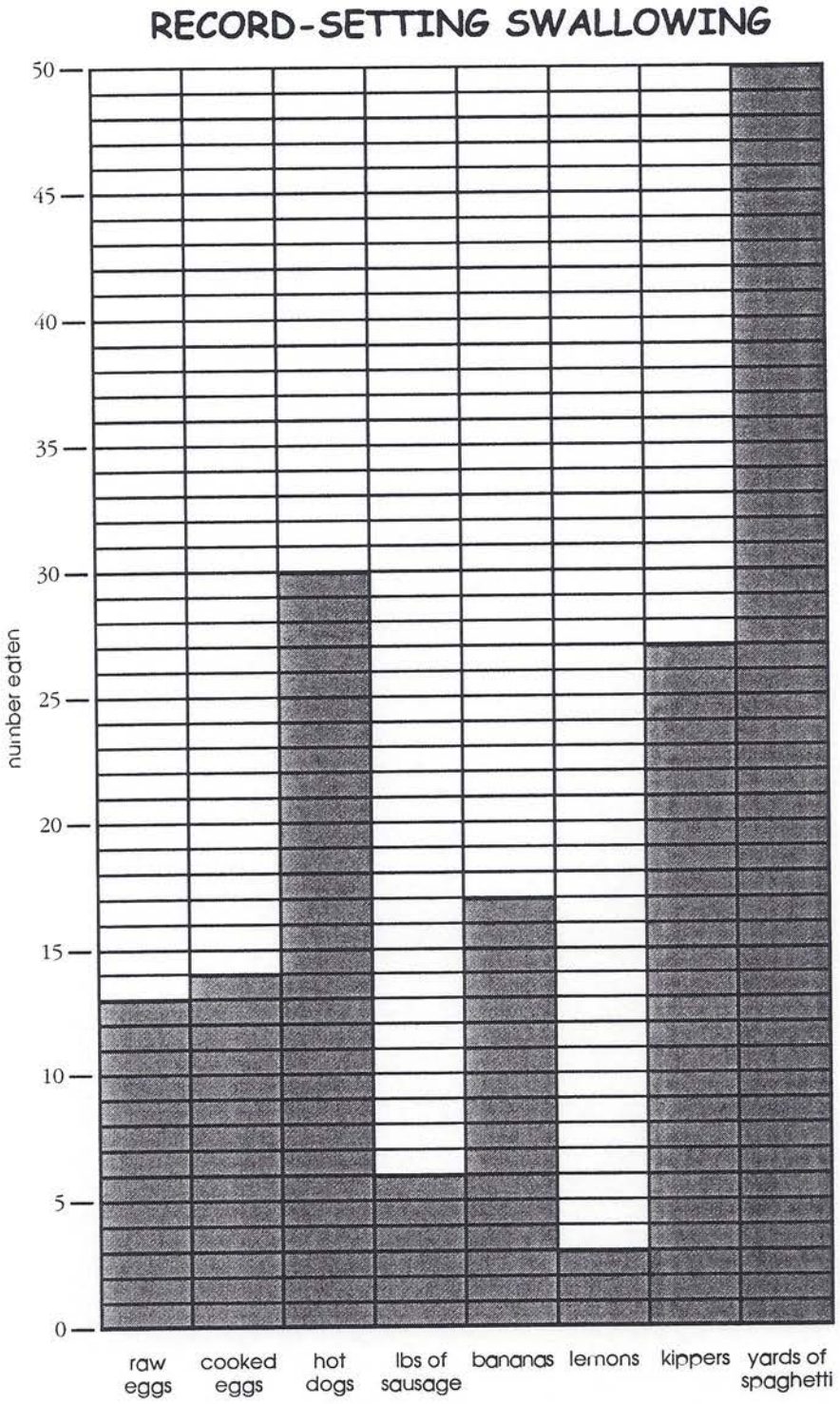
15,000 spectators watched Kelly Clark win the women's snowboarding halfpipe competition at the 2002 Winter Olympics.

Read & Interpret a Bar Graph
Use Information on Graph to Solve Problems

RECORD-SETTING SWALLOWING

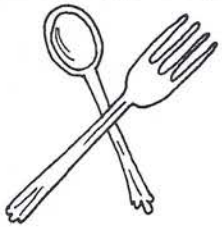
Large amounts of food items are swallowed in extremely fast times to set food-eating records. Pancakes, spaghetti, raw eggs, whole lemons, pickled onions and other interesting foods are gobbled up for the sake of competition.

The graph shows the number of food items that were eaten to set some speed-eating records. Use the graph to solve the problems on the next page.



Use with page 283.

RECORD-SETTING SWALLOWING, CONTINUED



1. How many eggs were eaten to set the two egg records?

2. How many less bananas than kippers were eaten to set the record?

3. The raw eggs were eaten in 1 second. The cooked eggs took 14.42 seconds. How much longer did the cooked eggs take?

4. How many more bananas were eaten for the banana record than lemons were eaten for the lemon-eating record?

5. It took 2 minutes to set the banana record. At this rate, how many bananas could be eaten in 10 minutes?

6. It took 3 minutes and 10 seconds to eat the amount of sausage shown on the graph. At the same rate, how long would it take to eat 30 pounds?

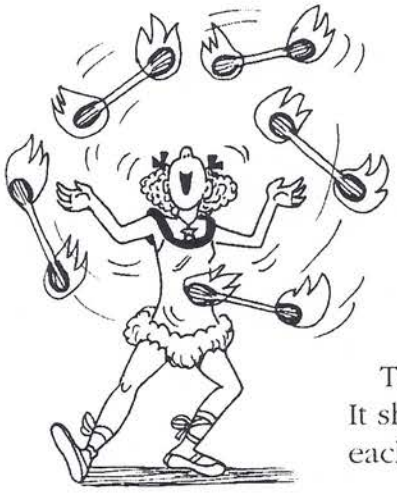
7. It took 64 seconds to eat the hot dogs for the record. About how much time did it take per hot dog?

8. It took one second to set the raw egg record. At this rate, how many raw eggs could be eaten in a minute?

9. The actual spaghetti-eating record was set by eating 100 yards of spaghetti. If the amount on the chart took 6.01 seconds, how long did the actual record take?

10. The lemons were eaten whole—skins, seeds, and all—in 15.3 seconds. At the same rate, how long would it take to eat 9 lemons? _____

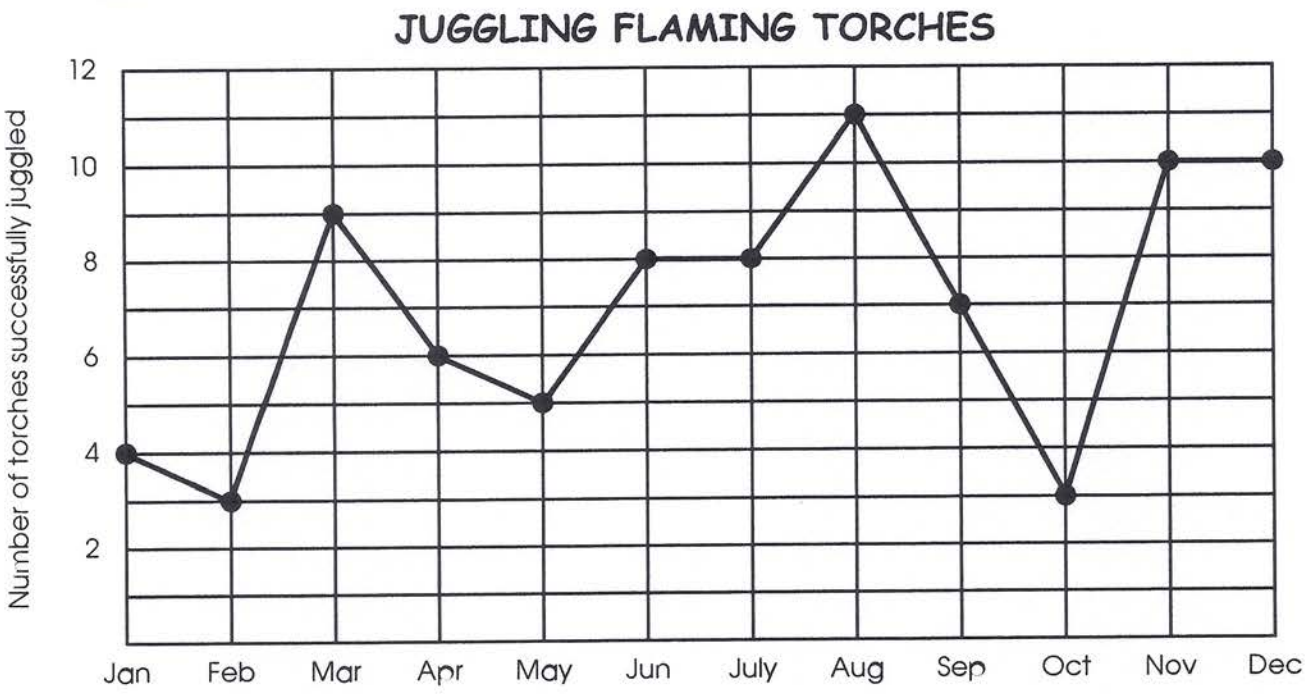
Use with page 282.



PLAYING WITH FIRE

Anthony Gatto, of the United States, set the record for flaming torch juggling by keeping seven flaming torches moving in the air at once. This is a record you should not try practicing in your home or back yard!

The line graph shows the results of one juggler's practice for a year. It shows the most torches she successfully juggled at any time during each month. Use the graph to find information about Jasmine's juggles.



Write . . .

1. Number juggled in March _____
2. Number juggled in November _____
3. Number juggled in May _____
4. Best month _____
5. Worst month _____
6. Difference between August and September _____
7. Difference between November and December _____
8. Greatest drop between which 2 months?

   _____

   _____
9. Greatest increase between which 2 months?

   _____

   _____
10. Difference between least and greatest numbers?

    _____
11. Difference between March and April?

    _____
12. Difference between January and December?

    _____

Answer key page 15, unit 281

Pictographs

A **pictograph** uses pictures, symbols, or icons to display and compare data. Each picture represents a specific data number. Fractions of the picture are used to represent fractions of the data amount. A key shows what the picture represents.

I'm the clean-up member of the milkshake-drinking team. I'm responsible for drinking all the leftover half-shakes!

Annual Milkshake-Drinking Contest

Team A *The Strawberry Slurpers*	
Team B *The Big Gulp*	
Team C *The Last Straw*	
Team D *No Leftovers*	
Team E *Five Guzzling Guys*	

The world's biggest milkshake contained 4,333 gallons of milk, ice cream, and strawberries. YUM!

LOTS & LOTS OF LOOPS

Eddy McDonald of Canada spent three hours performing loops with his yo-yo. Someone was counting as he was doing loops, and they counted 21,663 complete loops. He must have had a tired arm!

The **pictograph** uses pictures to show numbers of yo-yo loops done by some less expert yo-yo spinners. Use the graph to tell whether each statement is true or false.

COUNT THE YO-YO LOOPS KEY: = 500 YoYo Loops

COMPETITORS	LOOPS IN TWO HOURS
Yolanda	
Yang-Lei	
Yvette	
Yazzi	
Yacko	
Yuri	
Yanni	

Write T or F for each statement.

_____ 1. Yacko did 4500 loops.

_____ 2. All seven did over 30,000 loops.

_____ 3. Yanni did half the loops of Yazzi.

_____ 4. Yang-Lei did twice the loops as Yacko.

_____ 5. Yolanda did 1000 less loops than Yvette.

_____ 6. Yolana and Yazzi together did 6750 loops.

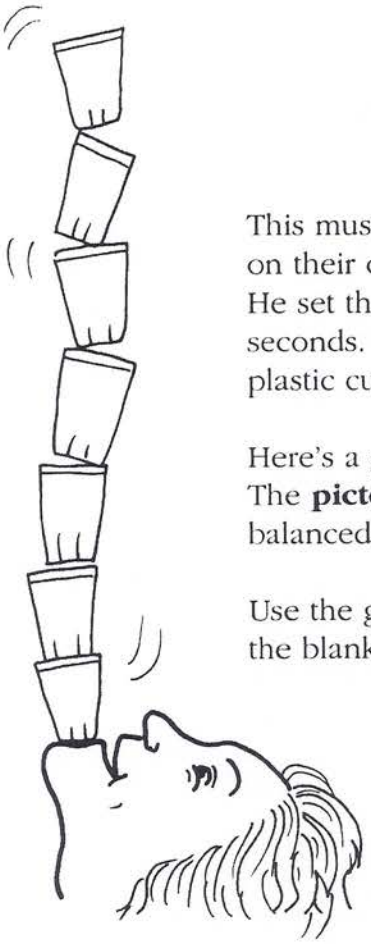
_____ 7. Yacko and Yvette together did 7000 loops.

_____ 8. Yvette did three times as many loops as Yanni.

_____ 9. Yuri did more than three times as many as Yanni.

_____ 10. All seven put together did less than Eddy McDonald when he set his record.

Answer key page 15, unit 278

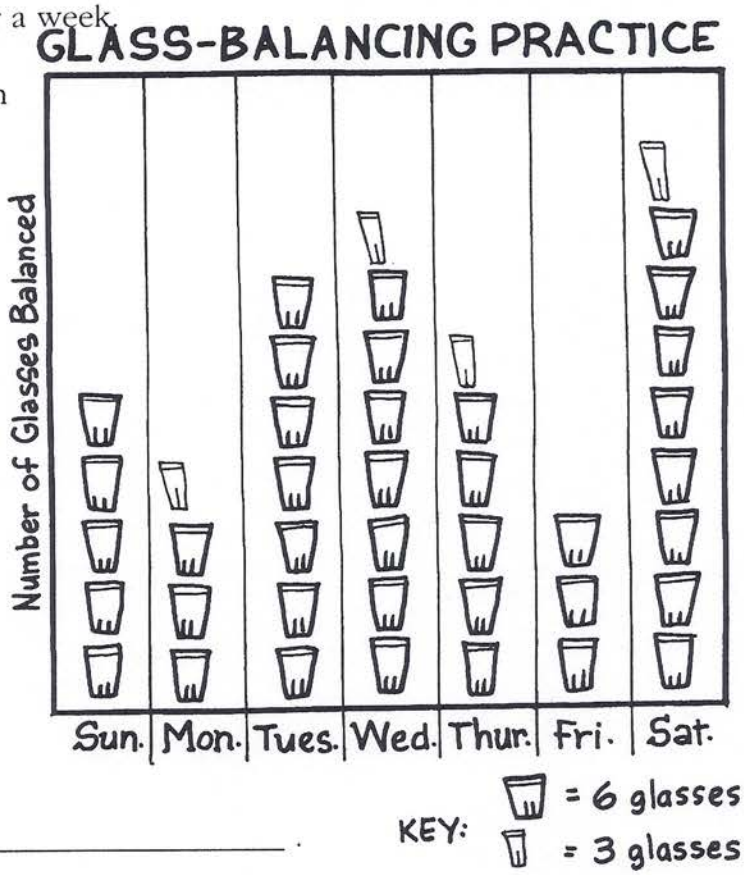


BODACIOUS BALANCING

This must take years of practice. People actually balance stacks of glasses on their chins! Ashrita Furman is the record-holder for this amazing trick. He set the record by balancing a stack of 62 glasses on his chin for ten seconds. DON'T try this at home with real glasses! Only practice with plastic cups!

Here's a graph that another glass-balancer kept as she practiced her skill. The **pictograph** uses pictures to show the amounts of glasses successfully balanced each day for a week.

Use the graph to fill in the blanks below.



1. On Friday, she balanced _____ glasses.
2. On Thursday, she balanced _____ glasses.
3. On Tuesday, she balanced _____ glasses.
4. The best day for balancing was _____ .
5. The worst practice day was _____ .
6. She balanced 12 more on Tuesday than on _____ .
7. She balanced 18 less on Thursday than on _____ .
8. Gladys balanced fewer glasses on _____ than on Monday.
9. _____ glasses were successfully balanced on Wednesday.
10. The best 3 days in a row for practice were _____ through _____ .
11. The average number of glasses balanced over the week was _____ .
12. Her best practice was _____ less glasses than Ashrita Furman's record.

Answer key page 15, unit 279

Frequency

Get Sharp Tip #27

Relative frequency is:

$$\frac{\text{frequency of an item}}{\text{total of frequencies}}$$

The relative frequency of riders over 75 years old is 2:50 or $\frac{2}{50}$.

The **frequency** of a number means how often it appears in a set of data. Sometimes it is useful or necessary to find out how often a number (or group of numbers) shows up in a set of data.

This set of data shows the ages of all the competitors who registered for a bullriding event in a rodeo. As each rider registered, his or her age was written on a list.

To find out how many of the riders fell into certain age groups, the data was organized into a frequency table.

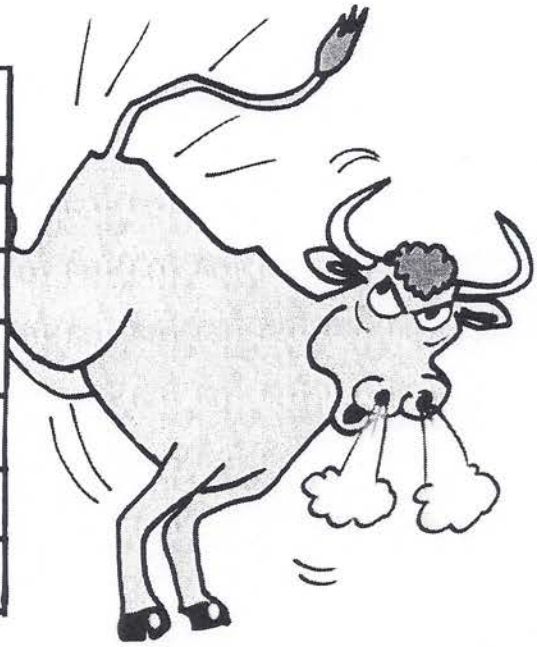
Ages of Bull-Riding Competitors

22	26	16	56	40	36
68	20	17	20	41	47
15	18	23	18	26	19
32	46	29	60	17	56
51	66	35	28	29	24
40	76	49	33	68	34
30	77	50	66	31	30
16	16	20	26	31	23
20	40				

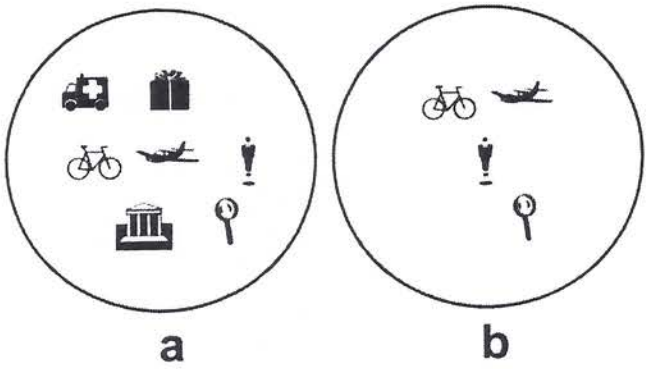
1. First, the ages were grouped into intervals (15–24, 25–34, and so on).
2. Next, a tally mark was placed into the correct tally column each time an age was recorded.
3. Finally, the tally marks were counted.
4. The frequency of ages in each group was written as a number in the ***frequency*** column.

Ages of Bull-Riding Competitors

Ages	Tally	Frequency
15-24	𝍸 𝍸 𝍸 ||	17
25-39	𝍸 𝍸 𝍸	15
40-54	𝍸 ||||	9
55-64	|||	3
65-75	||||	4
over 75	||	2



Subsets are sets made of any member of a set or any combination of members of a set.

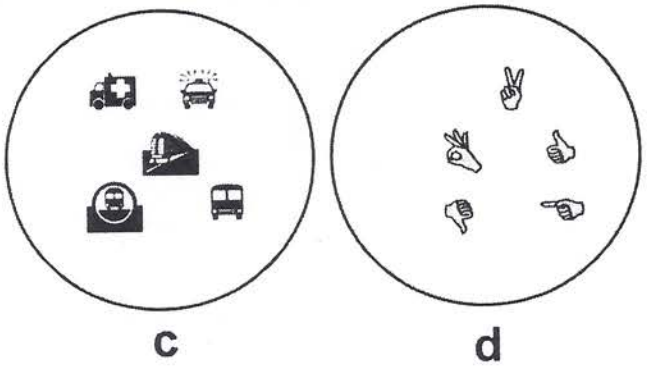


B is a subset of **A**.

The symbol $\subset$ means ***is a proper subset of***.

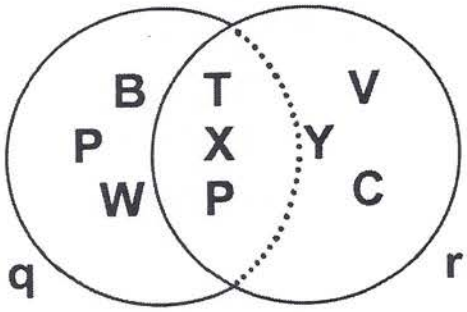
$\mathbf{B} \subset \mathbf{A}$.

Equivalent sets are sets having the same number of members.



C and **D** are equivalent sets.

An **intersection of sets** is the set of members common to each of two or more sets.

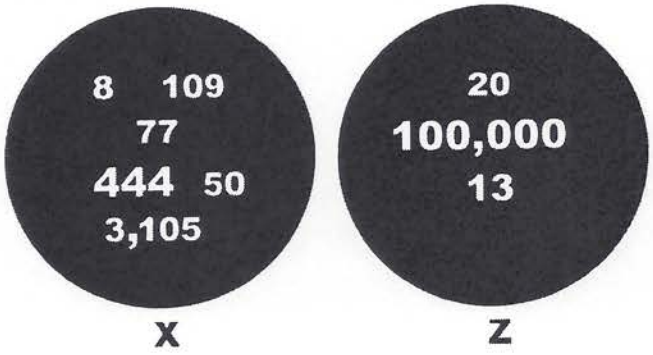


The symbol $\cap$ represents the intersection of sets.

$\mathbf{Q} \cap \mathbf{R}$.

The intersection of sets **Q** and **R** is T, X, and P.

A **union of sets** is a set containing the combined members of two or more sets.



The symbol $\cup$ represents the union of sets.

$\mathbf{X} \cup \mathbf{Z}$.

The union of sets **X** and **Z** is $\{8; 13; 20; 50; 77; 109; 444; 3{,}105; 100{,}000\}$.

Statistics

Statistics is a branch of mathematics that deals with numerical information (called **data**).
Statistics involves collecting, organizing, interpreting, presenting, and using data.

Collecting data allows you to compare data.

One good way to show data is to organize it into a table.

Ski-Jumping Distances
(Sky High County Ski Club)

Jumper	First Jump (distance in feet)	Second Jump (distance in feet)
Sam	568	500
Pam	310	308
Stan	610	478
Dan	540	603
Fran	344	319
Jan	311	298
Van	462	591
Graham	603	624
Nan	285	333

Get Sharp Tip #25

Make sure any table of data you create has a clear title and clear labels for all rows and columns.

CURIOUS RECORDS
(Distances rounded to the nearest kilometer)

Event	Record Distances
run holding a raw egg on a spoon	42 km
sailing in a bathtub	146 km
pushing a baby carriage (in 24 hours)	437 km
pushing a bathtub (in 24 hours)	514 km
racing downhill on skis (in one race)	15.8 km
crawling	1,399 km
travel in a lifeboat	1,287 km
travel in a wheelchair	40,076 km
travel on a lawnmower	23,488.5 km

Range, Mean, Median, & Mode

To understand statistics, you need to know about **range, median, mode** ***and*** **mean.**
These are some of the most important words in statistics, because they help to describe sets of data.

Number of Minor Injuries During Ski Jumping Competition

Competitor's Name	A.J. Snow	J.R. Crash	Todd Rayce	Gabe McTrick	Abby deWheel	Z.Z. Tubes	Flip Slykes	D.D. Wynn	C. C. Cross
Number of scrapes, cuts, bruises, sprains	10	6	16	14	20	6	13	8	6

Range is the difference between the least and the greatest numbers in the set of data.

The range here is 6 – 20 injuries.

Get Sharp Tip #26
To find the median, first arrange all the data items into numerical order.

Mean is the average of the data. To find the mean, divide the sum of all the data by the number of items.

For this data, the mean =

$$\frac{10+6+16+14+20+6+13+8+6}{9} = \frac{99}{9}$$

The mean is 11.

Median is the number in the middle of a set of data.

The numbers in this set are:
6 – 6 – 6 – 8 – 10 – 13 – 14 – 16 – 20

The median is 10.

Mode is the number that appears most often in a set of data.

The mode is 6.

Sometimes there is no mode.

Sometimes there are two or more modes.