The photograph on the cover of the 7th grade book is of an improperly constructed bridge. Pieces of concrete broke off of the bridge. To remedy this problem, the engineers placed a net underneath the bridge to catch the pieces. Larger pieces of concrete then began to fall off of the bridge. The engineers built another bridge below the net to catch these larger pieces. Instead of building more safety nets, the engineers should focus on how to build a better bridge.

This bridge analogy represents failing math programs in public schools today. Schools initially buy resources to serve a purpose. Schools then buy PSSA coach books to "catch" the failing students. They subsequently buy software programs to "catch" the students that are failing even worse. Instead of creating more programs to "catch" failing students, companies would be better served by attempting to improve the original resources. We, the authors, do not suggest that we have created the perfect resources, but we have thoroughly analyzed how the original resources were written. Our changes have made the original resources better. This is symbolized by the photograph of the bridge on the cover of the 8th grade book. This bridge is clearly of a higher quality than that depicted on the cover of the 7th grade book. It may not be the best bridge ever built, but improvements have been made on past mistakes.

(cover by Trombetta Photography)

I would like to take this opportunity to thank all of the people that have made this project possible. However, this is an impossible task, as many people have assisted me in different and important ways. I apologize in advance for the fact that space precludes the inclusion of all who have assisted me. There are three groups in particular that I would like to thank by name. These are my family, professional influences, and co–authors.

My family has been instrumental in making me the person that I am today. Each member of my family has given me a great gift. I inherited my father's intelligence and his ability to work with and relate to children. My mother gave me patience. My sister Lisa taught me to have the perseverance to know that I can overcome any obstacle. My sister Dallas provided me with the creativity necessary to develop these resources.

My professional influences begin with my 7th grade math teacher, Mr. Popivchak. He was the first teacher who encouraged and enabled me to think analytically. He gave our class the time and attention required to truly analyze mathematics. Next, my high school calculus teacher, Mr. Jones, and college calculus teacher, Dr. Bush, demonstrated to me the qualities of great math teachers. Subsequently, I met Dr. Lias from Robert Morris University. He convinced me that I had the ability to do great things in the classroom. He went out of his way to help me pursue my dreams. I also had the privilege to student teach under perhaps the best math teacher that I have ever known, Dr. Holdan. He exemplified the qualities necessary to write and implement great lessons of mathematics and life. Finally, I met Mike Kozy. He is my friend and colleague at my current high school. He has not only shared his innovative teaching techniques, but more importantly, his positive attitude has helped me through those tough days experienced by every teacher.

Finally, I would like to thank my co–authors, Dr. Allen Lias, Mike Kozy, Michelle Weet, and Breanna Lantz. This project would not have been possible without them.

Thanks,

Jake Trombetta

The resources are designed to help improve the students' **understanding** and **retention** of mathematics through a comprehensive and innovative approach. The lessons start with high level objectives to increase understanding. The objectives are met through high level questioning that emphasizes reasoning ability and conceptual understanding as well as facts and algorithms. The lessons are cumulative and make connections between topics to help with retention. All of this is done by engaging the students with activities, applications, and games in a teacher friendly format. The resources cover every standard in a logical progression. Every standard comes with a thorough multiple day lesson plan, assignments, and activities. These resources are provided in Microsoft Word format. Also, PowerPoint presentations accompany all lessons. Teachers are able to access and modify all of these resources with the click of a mouse.

In order to get maximum results, you must keep the aforementioned things in mind. In summary, make sure that you state your objectives to the students and that they are high level. Also, be aware of the level of questions that you are asking while giving the students the opportunity to answer them. After the lesson is administered, give the students problems to do on their own while you assess them. During the activities and applications give the students the freedom to develop their own methods and solutions with your guidance. Finally, make as many connections between topics that you can.

While using these resources there are going to be growing pains for you and your students. STAY POSITIVE! Your students will surprise you. The combination of working hard and together will pay off for you and your students. The nature of the resources allows you to develop a great rapport with your students. Your students will be excited about math because you engage and involve them. You will see improvements in test results as well as forming great relationships with your students. The following two quotes help keep me focused on what I am trying to accomplish:

"Our lives are not determined by what happens to us, but by how we react to what happens; not by what life brings to us, but by the attitude we bring to life. A positive attitude causes a chain reaction of positive thoughts, events and outcomes. It is a catalyst...a spark that creates extraordinary results."

"Successful is the person who has lived well, laughed often and loved much, who has gained the respect of children, who leaves the world better than they found it, who has never lacked appreciation for the earth's beauty, who never fails to look for the best in others or give the best of themselves."

Course I

Unit 1* – *Problem Solving

1–1 Guess and Check
1–2 Eliminate Possibilities
1–3 Patterns
1–4 Word Problems
1–5 Estimate Solutions

Unit 2* – *Numbers and Operations

2–1 Number Systems
2–2 Fractions, Decimals, and Percents
2–3 Powers and Square Roots
2–4 Comparing/Ordering Rationals
2–5 Rational Operations
2–6 Converting Units

Unit 3* – *Analyzing Data/Probability

3–1 Measures of Central Tendencies
3–2 Stem and Leaf Plots
3–3 Box and Whisker Plots
3–4 Line Graphs
3–5 Bar Graphs/Histograms
3–6 Pie Graphs
3–7 Appropriate Displays
3–8 Probability

Unit 4* – *Pre Algebra Concepts

4–1 Order of Operations
4–2 One Step Equations
4–3 Inequalities
4–4 Unit Rates
4–5 Proportions
4–6 Solving Formulas
4–7 Writing Equations
4–8 Coordinate System

Unit 5* – *Geometry

5–1 Angles
5–2 Polygons
5–3 Triangles
5–4 Similar/Congruent Figures
5–5 Quadrilaterals
5–6 Area and Perimeter
5–7 Surface Area and Volume
5–8 Circles
5–9 Three Dimensional Figures

Unit 6* – *Rational Operations

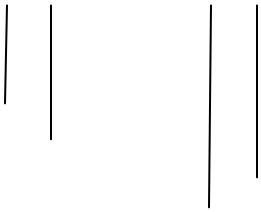
6–1 Decimal Operations
6–2 Fraction Operations
6–3 Integer Operations

FIRST DAY ACTIVITY

SWBAT see the affects of peer pressure on their decisions
SWBAT give some background information about themselves

The students need to have a positive attitude to start the year. They need to forget about their past struggles, frustrations, and failures. We are not going over the rules, passing our books, or giving seating assignments today. Instead, we are going to talk about peer pressure and making your own good decisions.

Activity: Draw ten sets of two lines on the board. In each set, one of the lines should be a little longer than the other.



Make eight more sets of two.

Tell two of your students to go to another classroom to get something for you. You should set something up with another teacher beforehand. While the two students are gone, you will set up the activity with the rest of the class. The activity will entail picking out the longer line from each set of lines. This is meant to be simple. Tell all of the students in the class to get the first three correct. Then tell about half of the class to get the next three wrong on purpose. Finally, tell the entire class to get the final four wrong on purpose. You will keep track of this by asking the students to raise their hand if they think the first line is longer. Then ask them to raise their hand if they think the second line is longer. The purpose of the activity is to see how the two students that you sent out of the room will "vote" when some of their peers start to give incorrect answers.

Discussion: Did the students start to change their votes when the others started to get them wrong?

Questions: Name one incident in your life when you did something because everyone else was doing it.

Name one incident when you made a good decision even though everyone else did something else.

Activity: Each student must name something about themselves that most people don't know. In order to be successful in this class, you will have to be comfortable asking a question when you might be a bit embarrassed. So, let's get used to talking in front of the class and sharing.

Unit 1* – *Problem–Solving

1–1 Guess and Check

1–2 Eliminate Possibilities

1–3 Patterns

1–4 Word Problems

1–5 Estimate Solutions

SWBAT set a goal for the school year

"If you don't know where you are going, any road will get you there"

Guidelines to Setting and Achieving Goals

Read the following story with the students. Have them answer the questions that follow. Lead a discussion on the importance of setting and achieving goals.

The car is packed and you're ready to go, your first ever cross–country trip. From the White Mountains of New Hampshire to the rolling hills of San Francisco, you're going to see it all. You put the car in gear and off you go. First stop, the Baseball Hall of Fame in Cooperstown, New York. A little while into the trip you need to check the map because you've reached an intersection you're not familiar with. You panic for a moment because you realize you've forgotten your map. But you say the heck with it because you know where you're going. You take a right, change the radio station and keep on going. Unfortunately, you never reach your destination. Too many of us treat goal setting the same way. We dream about where we want to go, but we don't have a map to get there. What is a map? It is the written word that helps you get to your destination. What is the difference between a dream and a goal? A dream is something that is in your head while a goal is something written down. Goal setting however is more than simply scribbling down some ideas on a piece of paper. Our goals need to be complete and focused, much like a road map. We need to check on our progress of reaching our goals frequently. Today in class we are going to write some goals and we will check on them throughout the year.

Here are some tips on setting goals:

1. Write down your goals. Writing down your goals creates the roadmap to your success. Although just the act of writing them down can set the process in motion, it is also extremely important to review your goals frequently. Remember, the more focused you are on your goals the more likely you are to accomplish them. Sometimes we realize we have to change a goal. If you need to change a goal do not consider it a failure, consider it a victory as you had the insight to realize something needed changed.

2. Make sure the goal you are working for is something <u>you</u> really want, not just something that sounds good. Do you really want to be an engineer or do your parents want you to be one?

3. **Write your goal out in complete detail.** Instead of writing "I want a nice house," write "I want a 4,000 square foot house with 4 bedrooms and 3 baths and a view of the mountain on 20 acres of land.

4. M**ake sure your goal is high enough.** Shoot for the moon; if you miss you'll still be in the stars. Does passing this class with a 'C' seem like a high enough goal?

Questions:

1. Name one goal that you would like to accomplish this school year. Keep in mind the things that we just talked about.

2. List a few things that you are going to have to do in order to accomplish this goal.

3. Name one obstacle that could stop you from accomplishing your goal. Then explain what you can do to overcome this obstacle.

Section 1–1: Guess and Check

Discussion

I am a number. Add 20 to me. Then subtract 12 from that total. Finally, divide by 2. Then you end up with 8. What is the number?

Guess: Result:
Guess: Result:
Guess: Result:

Notice that when we use guess and check, we must guess wisely. We have to adjust our next guess according to the result of our previous guess.

SWBAT answer questions that they do not know exactly how to do by using guess and check
SWBAT adjust their guess based on the results that they get by "checking"

Definitions

Guess and Check – helps us answer questions that we do not know exactly how to do

Things to remember:

1. **Must try a guess** – try to make a good guess by using your number sense
2. **Adjust your guess wisely** – if the result is too high; guess lower and vice versa
3. **Must use prior knowledge** – must have some prior knowledge

Example 1: $8x + 15 = 87$
Have the students try a guess and keep track of the results

Sample :	**First guess**: 6	**Result**: 63 (too low; guess higher)
	Second guess: 8	**Result**: 79 (still too low; guess higher)
	Third guess: 9	**Result**: 87 (correct answer)

Example 2: Two numbers add up to 97. Their difference is 21. What are the two numbers?

Sample :	**First guess**: 50, 71	**Result**: 121 (too high; guess lower)
	Second guess: 40, 61	**Result**: 101 (still too high; guess lower)
	Third guess: 38, 59	**Result**: 97 (correct answer)

What did we learn today?

Section 1–1: In–Class Assignment

Answer each of the following questions by using guess and check. Show your guesses and their results.

1. What value satisfies the equation: $8x + 3 = 75$?

2. The total fare for 2 adults and 3 children on the Tilt–N–Spew ride is $14.00. If a child's fare is $2, what is the adult fare?

3. I have $2.10 in quarters and nickels. How many of each do I have?

4. A farmer watched a herd of cattle run by his house. He counted 72 legs. How many cattle were there?

5. Two number multiplied together is 108. The difference of the two numbers is 3. What are the two numbers?

Section 1–1: Homework

Answer each of the following questions by using guess and check. Show your guesses and their results.

1. Why must you keep a good record of each of your guesses and their results?

2. You have the same number of quarters, dimes, and nickels. You have $2. How many of each coin do you have?

3. A do–it–yourself car wash charges $1.50 for the first 3 minutes and $1.25 for each additional minute. If you have $5, how long can you wash your car?

4. There are two types of envelopes. The smaller envelopes come in a pack of 5. The larger envelopes come in a pack of 3. If you have 19 envelopes, have many of each packs did you buy?

5. What is the largest even number that "goes into" 30?

Section 1–2: Eliminate Possibilities

Review Question
How can you use guess and check to help you answer a question?

Discussion
What do you want for lunch today?

a. Pizza b. Broccoli
c. Liver d. Cheeseburger

Notice that you arrive at your answer by first eliminating things that you do not want. Then you must decide between two desirable choices. This same method can be applied to math problems. Remember that you must have some knowledge of the question and answers.

SWBAT answer multiple choice questions by eliminating crazy answers, trying values, and using their prior knowledge

Definitions
Eliminate Possibilities – helps us answer multiple choice questions by making better guesses

Example 1: $20x + 15 = 95$

a. 1 b. 3 c. 4 d. 20

– Notice we can eliminate '20' because it will be too high
– Notice we can eliminate '1' because it will be too low
– Take a guess, if your guess is to low guess something higher (and vice versa) until you arrive at the correct answer
– Notice we needed to use our prior knowledge of multiplying and adding

Example 2: What movie made the most money in the last twenty years?

a. The Wizard of Oz b. Titanic c. Avatar d. American Idol

– eliminate 'a' because it is to old
– eliminate 'd' because it is not a movie
– make a good guess between 'b' and 'c'
– we can not always get the right answer but we can make a good guess

What did we learn today?

Section 1–2: In–Class Assignment

Cross out crazy answers. Circle the correct answer. Then write a sentence describing how you arrived at your answer.

1. 12.6734 + 43.15478 =

a. 45.2546 b. 50.25478 c. 55.82818 d. 95.124783

2. Find the volume of a cube whose sides are 5 cm each.
   a. 0 cm b. 5 cm c. –10 cm d. 125 cm^3

3. $8x + 15 = 87$
   a. 0 b. 8 c. 9 d. 25

4. Which two teams played in World Series in 1979?
   a. Pirates and Cardinals
   b. Pirates and Rockies
   c. Yankees and Red Sox
   d. Pirates and Orioles

5. The pop song "Take a Bow", that came out in 2008, was sung by
   a. The Beatles
   b. Britney Spears
   c. Rihanna
   d. Kenny Chesney

Section 1–2: Homework

Cross out crazy answers. Circle the correct answer. Then write a sentence describing how you arrived at your answer.

1. What value satisfies the equation $10x + 5 = 45$?
   a. 0 b. 1 c. 4 d. 5

2. What is the area of a square whose sides are 5 inches?
   a.. 1 sq in b. – 10 sq in c. 25 in^2 d. 25 in

3. What animated movie came out in 1995?
   a. Cars b. Toy Story c. Titanic d. High School Musical

4. What is the largest prime number that "goes into" 20?
   a. 2 b. 3 c. 5 d. 10

5. $2.9 \cdot 4.2 =$
   a. 4.1 b. 5.2 c. 12.11 d. 12.18

6. Make up a multiple choice problem that could be solved by eliminating possibilities.

Section 1–3: Patterns

Review Question
How can you use eliminate possibilities to help you answer a question?

Discussion
How do you know when the next bell is going to ring?
Does the pattern change during homeroom or lunch?
The pattern is a little more complicated than it appears. This is an example of a pattern we see in everyday life. Where else do you see patterns in everyday life?

SWBAT identify a pattern in order to solve a problem

Find the next three terms in the sequence.
Example 1: 1, 5, 9, 13, ___, ___, ___ (each term increases by 4)

Example 2: 6, 11, 8, 13, 10, 15, ___, ___, ___ (up 5, down 3)

Example 3: 2, 3, 5, 8, 12, ___, ___, ___ (up 1, up 2, up 3)

Example 4: 1, 2, 4, 8, ___, ___, ___, ___ (mult. 2)

What did we learn today?

Section 1–3: In–Class Assignment

Find the next three numbers in the pattern. Then write a sentence that describes the pattern.

1. 3, 9, 15, ___, ___, ___
2. 2, 8, 32, ___, ___, ___
3. 2, 7, 6, 11, 10, ___, ___, ___
4. 1, 3, 7, 13, ___, ___, ___
5. 0.1, 0.4, 0.7, ___, ___, ___
6. M, T, W, T, ___, ___, ___

7. Replace the question mark with the appropriate value.

1	2	3	4	5
2 ½	5	7 ½	10	**?**

8. It costs $1.50 to rent a movie plus $.75 for each additional day that you keep the movie. If you have $4.50, how long can you keep the movie?

Section 1–3: Homework

Find the next three numbers in the pattern. Then write a sentence that describes the pattern.

1. 1, 4, 7, 10, ___, ___, ___
2. 1.2, 1.5, 1.8, ___, ___, ___
3. 3, 6, 12, 24, ___, ___, ___
4. 1/4, 1/2, 3/4, ___, ___, ___
5. 18, 12, 6, ___, ___, ___
6. .2, .6, 1.8, ___, ___, ___
7. R, O, Y, G, ___, ___, ___
8. 10, 8, 9, 7, 8, ___, ___, ___

9. Replace the question marks with the appropriate value.

2	5	**?**	11	14
4	**?**	16	22	28

10. Jimmy has $100 in his bank account. He plans to put $5/week into the account. How many weeks will it take until he has $135?

Section 1-4: Word Problems (Day 1)

Review Question
What are the three problem solving strategies that we have talked about?

Discussion
What makes word problems so difficult?
Until you get use to writing out your solutions to word problems, you will use the four–step method to help.

SWBAT list the appropriate facts from a word problem
SWBAT write out a plan for solving a problem
SWBAT write a sentence summarizing their solution

Definitions
Four–Step Method

1. **Explore** – list the facts
2. **Plan** – write out a plan (using sentences)
3. **Solve** – do the math (using correct units)
4. **Explain** – write a sentence summarizing your solution

Example 1: The class is going on a field trip. You can pick the destination. How much is the entire trip going to cost if we are planning on taking the entire grade?

Questions that need answered:
How many students are in your grade?
How much does it cost per person for the activity?
How much does it cost per person for food?
How many buses are we going to need?
How much does each bus cost?
How do we calculate the total cost?

Traditional Approach: Your grade is planning a field trip to the local museum. There are 180 students in your grade. It costs $8/student to get in the museum. It costs $4/student for lunch. It costs $200 to rent the buses. How much will the entire field trip cost? (use the four–step method)

Sample Solution:

1. **Explore** – 180 total students, $8 for museum, $4 for lunch, $200 for buses

2. **Plan** - I will multiply 180 by $12. Then, I will add that to the $200.

3. **Solve** – 180 x $12 = $2160;
   $2160 + $200 = $2360

4. **Explain** – It will cost $2360.

What did we learn today?

Section 1–4: Homework (Day 1)

Use the four–step method to solve each of the following problems. Use complete sentences where necessary.

1. Johnny earns $7 per hour. He works 20 hours per week. He worked a total of 8 weeks in the summer. How much money did he make?

2. Ritchie receives one email every 20 minutes at work. How many emails will he receive between 9:00 AM and 11:00 AM?

Section 1–4: Word Problems (Day 2)

Review Question
What are the four steps to the four step method?

Discussion
Why do you hate the four step method so much?
Why do I make you do the four step method?

SWBAT make up their own word problems
SWBAT list the appropriate facts**,** write out a plan, and write a sentence summarizing their solution

Put up the solutions to the two homework problems on the board. Look at the positives and negatives to each solution. You can use these examples for the following activity.

Activity
Pass out a piece of poster board to each student or group. The students are to make up their own word problem. They must also come up with a correct solution using the four–step method.

Criteria:

1. Paragraph – must use complete sentences
   – must include all pertinent information including units

2. Solution – must use the four–step method
   – must use complete sentences where necessary

3. Picture – draw a picture that goes along with the problem

If you are having trouble coming up with an example: You go to the mall and buy two items with a certain amount of money. How much money do you have left?

What did we learn today?

Section 1–4: Word Problems (Day 3)

Review Question
What are the four steps to the four step method?

Discussion
Why do you hate the four step method so much?
Why do I make you do the four step method?

SWBAT work in a small group cooperatively
SWBAT find the solutions to word problems using the four–step method

Activity
Each group of students receives one dry erase board. Have the groups write the complete solutions on the dry erase boards. The solutions must be done using the four step method. Put the dry erase boards on the chalk ledge. Compare the positives and negatives of each solution.

Example 1: Brady works 15 hours per week. He earns $5 per hour. Does he have enough money to buy a $24 shirt and $55 pair of shoes after working for one week?

Example 2: Two numbers add up to 130. The difference between the two numbers is 14. What are the two numbers? (guess/check)

Example 3: Ritchie makes $5.50 per hour. He receives a raise of $.30 every two weeks. How long will it take him to earn $6.70 per hour? (pattern)

Example 4: The school ordered books for the eighth grade class. They ordered 62 Pre–Algebra books and 38 Algebra I books. Pre–Algebra books cost $55. Algebra I books cost $68. How much did the entire order cost?

What did we learn today?

Section 1–5: Estimate Solutions (Day 1)

Review Question
What are the three problem solving strategies that we have talked about?

Discussion
How do you know $5.8 \cdot 8.1 = 38.98$ is incorrect?

Estimate: $5.8 \rightarrow 6$

$\underline{\times\ 8.1 \rightarrow 8}$

48

By estimating each of the numbers, it should be obvious that the answer is too low. Estimating in math is otherwise known as number sense. Throughout the year, we are going to use and improve our number sense. In the next unit, we will be adding, subtracting, multiplying, and dividing fractions and decimals. It will be important that you use your number sense to check your answers.

SWBAT estimate in order to solve a problem

Example 1: $22.8 + 39.45 = ?$

$20 + 40 = 60$ OR

$23 + 40 = 63$

Example 2: $13\frac{7}{8} - 1\frac{1}{10} = ?$

$14 - 1 = 13$

Why is the first number is rounded up and the second one is rounded down?

Example 3: $2.75 \cdot 7.2 = ?$

$3 \cdot 7 = 21$

Example 4: $12.8 \div 4.3 = ?$

$12 \div 4 = 3$

Why is it important to choose a good estimate of the divisor?

You Try!

1. 23.9 – 8.72
2. $3\frac{2}{8}+1\frac{4}{5}=$
3. $9\frac{5}{7}\times 4\frac{2}{3}=$
4. 23.4 ÷ 5.8 =

What did we learn today?

Section 1–5: Homework (Day 1)

Estimate each number. Then estimate the answer.

1. 14.2 + 8.75 =
2. $11\frac{1}{8}-4\frac{5}{7}=$
3. 12.8 ÷ 2.8 =
4. 4.6 · 8.8
5. 2.7(10.4) =
6. $8\frac{5}{9}\div 2\frac{4}{5}=$
7. 28.4 – 10.1 =
8. 44.6 ÷ 8.2 =
9. $\left(7\frac{1}{6}\right)\left(5\frac{5}{8}\right)=$
10. 38.77 ÷ 4.6 =
11. 189 + 203 =
12. 25.25 – 8.1 =
13. 49 ÷ 5 =
14. $11\frac{3}{4}+8\frac{1}{9}=$
15. 18.6 · 8.9 =

16. Answer the following question the four–step method. Jimmy went to a fast–food restaurant. He ordered a 2–cheeseburger value meal for $3.29 and a Big Mac meal for $4.59, plus an extra double cheeseburger for $.99. If he gave the cashier a $20 bill, **ABOUT** how much change should he receive?

Section 1–5: Estimate Solutions (Day 2)

Review Question
How can we use estimating to check to see if our answer is correct?

Discussion
If you received a 16/30 on your quiz, is that good or bad? Why?
What percent did you get on your quiz?
Notice that we can make a good estimate by knowing that 15/30 is 50%.
Consider the following information:
16/30 = 53%
26/30 = 87%.
Could you make a good guess what 21/30 is? How?

SWBAT estimate in order to solve a problem
SWBAT use their number sense to solve a problem

Example 1: The information represents time worked and money made.

20 hrs → $200
30 hrs → $300

a. How much money would you earn for 25 hours? Why?
b. How much money would you earn for 22 hours? Why?
c. How many hours would you have to work to get $275?
d. How many hours would you have to work to get $420?

Example 2: The information represents time worked and money made.

32 hrs → $224
55 hrs → $385

a. How much money would you earn for 34 hours? Why?
b. How much money would you earn for 50 hours? Why?
c. How many hours would you have to work to get $275?
d. How many hours would you have to work to get $420?

Example 3: The information represents the amount of A's on your report card and your grade point average.

1 'A' → 2.2
6 'A's' → 3.7

a. What would your grade point average be is you received 3 'A's'? Why?
b. What would your grade point average be is you received 5 'A's'? Why?
c. What other factors would you have to consider when making a good estimate for questions a and b?

You Try!

1. The information represents time worked and money made.

   20 hrs → $100
   30 hrs → $150

a. How much money would you earn for 24 hours? Why?
b. How much money would you earn for 21 hours? Why?
c. How many hours would you have to work to get $145?
d. How many hours would you have to work to get $220?

2. The information represents time worked and money made.

   120 hrs → $360
   220 hrs → $660

a. How much money would you earn for 140 hours? Why?
b. How much money would you earn for 200 hours? Why?
c. How many hours would you have to work to get $500?
d. How many hours would you have to work to get $240?

3. The information represents time worked and money made.

   15 hrs → $225
   40 hrs → $600

a. How much money would you earn for 5 hours? Why?
b. How much money would you earn for 42 hours? Why?
c. How many hours would you have to work to get $255?
d. How many hours would you have to work to get $500?

What did we learn today?

Section 1–5: Homework (Day 2)

Estimate each answer.

1. 10 hrs → \$100
   20 hrs → \$200

a. How much money would you earn for 15 hours?
b. How much money would you earn for 12 hours?
c. How many hours would you have to work to get \$175?
d. How many hours would you have to work to get \$420?

2. 12 monthly payments → \$2400
   24 monthly payments → \$4800

a. How much money would you pay after 14 months?
b. How much money would you pay after 18 months?
c. How many months did you pay, if you paid a total of \$4400?
d. How long would it take to pay off a debt of \$6000?

3. 2 days of work → \$57.25
   12 days of work → \$343.50

a. How much money would you earn for 10 days of work?
b. How much money would you earn for 4 days of work?
c. How many days did you work, if you made \$200.38?
d. How many days did you work, if you made \$572.50?

4. 1.75 hours of work → \$9.63
   18.5 hours of work → \$101.75

a. How much money would you earn for 2.2 hours of work?
b. How much money would you earn for 14.5 hours of work?
c. How many hours did you work, if you made \$78.10?
d. How many hours did you work, if you made \$121.00?

Section 1–5: Estimate Solutions (Day 3)

Review Question
How can estimating help us solve a problem?

Discussion
Why is estimating so important?

SWBAT estimate in order to solve a problem
SWBAT use the four–step method to solve an "estimating" word problem

Activity
Put students into small groups. Each group receives one dry erase board. Have the groups write the complete solutions on the dry erase boards. The solutions must be done using the four step method. Put the dry erase boards on the chalk ledge. Compare the positives and negatives of each solution.

Example 1: Tommy made $4.75 and $9.50 at his lemonade stand in each of the past two weeks. **ABOUT** how much should he make in one month?

*There are two different ways to estimate. The first way is to round each value ($5 and $10). Then add and double to get $30. The second way is to add the two values ($14.25) then double ($28.50). Then round to $29 or $30. This information can be used in real life.

Example 2: Shirley bought 3 pieces of pizza for $3.75. **ABOUT** how much would 10 pieces cost?

*There are two different ways to estimate. First, estimate the unit price (3.75/3). Then multiply by 10. The other way is to say that you will buy about three times as many pieces at an estimated $4. Therefore, 3 · $4 = about $12. Discuss the importance of estimating as a consumer. It helps get an idea what you total bill should be. It helps you not to get ripped off at a store if the cashier makes a mistake.

Example 3: Student tickets to the football game are $2. Adult tickets are $5. The attendance at the first football game was 608 people. **ABOUT** how much money will the school collect?

*Discuss how to estimate the total number of people to 600. Then they will have to estimate how many were students and how many were adults.

Example 4: **ABOUT** how many students are in our school?

What did we learn today?

Unit 1 Review

Review Question
What are the four steps to the four step method?

SWBAT study for the Unit 1 test

Discussion
We have a unit test tomorrow. How do we study for a test?
How should you study for a test?

What topics are on the test?

How could you study these topics?

Activity
You will make up and answer the following problems:

2 – guess and check problems (use your notes as reference for making up the problems)

2– eliminate possibilities problems (use your notes as reference for making up the problems)

5 – patterns, make sure they include the answers

1 – word problem using estimating to solve (solution using the 4 step method)

1– word problem using patterns to solve (solution using the 4 step method)

What did we learn today?

UNIT 1 HAND–IN PROBLEMS

This problem set is intended to challenge the students and encourage students to apply a deep understanding of problem–solving skills.

1. Two other problem–solving strategies are *solving a simpler problem* and *make a table/chart*. Give an example how each one of these strategies could be used.

For problems 2–7, solve each problem, then state which method you used.

2. The total cost for 2 adults and 3 children at the movie theater is $28.00. If a child's ticket is one–half of an adult's, what is the adult ticket price?

3. I am a number. Add 10 to me. Multiply the sum times 3. Divide the product by 5. You end up with 9. What number am I?

4. Eight teams are in a basketball tournament. How many games do you need to win in order to be the champion?

5. There are 125 students in the seventh grade class. There are twenty–five more girls than boys. How many boys are in seventh grade??

6. For lunch, you can choose from pasta, chicken, or pizza. You can also choose from sides of French fries, green beans, and mashed potatoes. List all of the different lunch combinations you could choose.

7. What are the next two numbers in this sequence? 1, 1, 2, 3, 5, ___, ___

8. Use the four–step method to solve: You receive one penny on day one, two pennies on the day two, four pennies on day three, eight pennies on day four, and so on, (each day, you receive twice as many pennies as you did on the previous day), how much money would you have after one month?

UNIT 1 PROJECT

In this unit, we talked about problem solving skills. These are skills that you are going use for the entire year in this class. These skills can be used in other classes and in real life situations. One of the problem solving skills that we talked about was estimating.

The famous Italian physicist Enrico Fermi was famous for his estimating problems. He would give his college students estimating problems that have become so famous they have become known as "Fermi problems". An example of a Fermi estimating problem is, "How many piano tuners are there in the city of Chicago?" There isn't an easy way to do this problem. But if we use out estimating skills, we can come up with a good answer.

So let's think about how we could come up with a good estimation for this problem. First, we could find out how many piano tuners there are in a certain area. Then we could find out how many total areas of this size were located in Chicago. Finally, we could multiply these two values together.

Your project will be to answer the following Fermi problem: **How many pencils are there in our school?**

Your solution should include thorough explanations of your estimations. This solution should be written using the four step method.

Unit 2 – Numbers and Operations

2–1 Number Systems

2–2 Fractions, Decimals, and Percents

2–3 Powers and Square Roots

2–4 Comparing/Ordering Rationals

2–5 Rational Operations

2–6 Converting Units

SWBAT check on the progress of the goal they set during the first chapter

"If you don't know where you are going, any road will get you there"

Guidelines to Setting and Achieving Goals

Step 1 – Give them control: The students should choose their own goals. Personal choice and retaining control is important for children. As a teacher, you should give them ideas and suggestions. But in the end, the goals need to come from the students. They get motivated if they generate their own ideas.

Step 2 – Setting a time frame: The students must understand that goal setting is a logical process just like mathematics. The students need to choose an appropriate time frame in order to achieve their goal. Some goals can be simple and easy to achieve. Obviously, the time frame for these goals is going to be shorter than those of complicated goals. **Examples:** finishing homework before bedtime, write a five paragraph essay in under one hour

Step 3 – Write down the goal and start to implement it: You can teach your students to write their goals in their notebooks. Then have them write down possible steps in realizing their goals. Then make sure to take time to check on this written goal periodically.

Step 4 – Build their confidence and help them out: The students need encouragement and support in order to achieve their goal. The teacher needs to let the students know that they believe in them. This needs to be reinforced whenever the students check on their goals.

Step 5 – Revisit and reset: After your students have achieved their goals, don't let their passion die. The students should reflect on what they learned from achieving their goal. They should also think about how they can perform better the next time. Finally, the students should set a new goal.

So let's evaluate how we are doing so far.

1. Write down your goal again.

2. Did you set a time frame for your goal? If so, what is the time frame?

3. Did you write your goal down in a place where you see it all of the time?

4. Give yourself a letter grade on how well you are doing at accomplishing your goal. Explain some good and bad things that you have done thus far.

Section 2–1: Number Systems

Review Question

Explain how guess/check can be used to solve a problem.
Explain how eliminating possibilities can be used to solve a problem.
Explain how estimating can be used to solve a problem.

Discussion

Many years ago, people needed a way to keep track of some of their personal items such as sheep or crops. So they started to develop number systems that made sense for them. They started out with basic numbers and continued to develop new numbers, as they were needed. In today's lesson, we are going to talk about these number systems. The focus is going to be on how these number systems build on each other. We see this building process in nature:

Atoms → Cells → Organs → Body

SWBAT define whole numbers, integers, and rational numbers
SWBAT identify and give examples of whole numbers, integers, and rational numbers

Definitions

Counting Numbers – the numbers that you use to count (also known as natural numbers)

(1, 2, 3, 4, ..)

Give an example where counting numbers are used.

Whole Numbers – the set of counting numbers plus zero

(0, 1, 2, 3, 4, …)

Give an example where whole numbers are used.

Integers – the set of all positive and negative whole numbers including zero

(… –3, –2, –1, 0, 1, 2, 3 ,…)

Give an example where integers are used.

Rationals – any number that can be written as a fraction; positive and negative whole numbers, fractions, and decimals

2/3, –.56, –14, etc

Give an example of where rational numbers are used.
Can anyone give me an example of a number that isn't rational?

Notice that the number systems build just as the example of atoms building into a body. The set of whole numbers include all of the counting numbers. The set of integers include all of the whole numbers. The set of rationals include all of the integers.

Example 1: To which set(s) of numbers does '4' belong?

Example 2: To which set(s) of numbers does '2/7' belong?

Example 3: To which set(s) of numbers does '–8' belong?

What did we learn today?

Section 2-1 In-Class Assignment

To which number set(s) does each number belong?

1. 5	2. $\frac{1}{4}$	3. 0	4. –9
5. 7.29	6. $\frac{8}{4}$	7. 2.5	8. 100
9. π	10. $-\frac{3}{2}$	11. -4.2	12. $\sqrt{5}$

13. Why are integers important? (give an example of how/where integers are used)

14. Why are rational numbers important? (give an example of how/where rational numbers are used)

15. What would be an example of a number that *isn't* a rational number? What do think these numbers would be called?

Section 2–2: Fractions, Decimals, & Percents (Day 1)

Review Question
To which set(s) of numbers does '-6' belong?

Discussion
Today we will be talking about fractions, decimals, and percents. So let's discuss why all three are important. Notice that $\frac{9}{12}$, .75, 75% are all the same. Decimals, fractions, and percents are the same thing. We need to understand all three of them because we use them for different purposes.

Money:	Grades:
$\frac{9}{12}$ of a dollar (NO!)	$\frac{9}{12}$ (YES!)
75% of a dollar (NO!)	75% (YES!)
$.75 (YES!)	.75 (NO!)

SWBAT draw a visual representation of fractions, decimals, and percents

Example 1: ●——————●

a. Draw a line that is $\frac{1}{2}$ the length as the line above.

b. Draw a line that is $\frac{1}{3}$ the length as the line above.

c. Draw a line that is $\frac{4}{5}$ the length as the line above.

*It is good to base these estimations off of $\frac{1}{4}, \frac{1}{2}, \frac{3}{4}$

Example 2: ●——————●

a. Draw a line that is .4 the length as the line above.

b. Draw a line that is .8 the length as the line above.

c. Draw a line that is .12 the length as the line above

Is it easier to use decimals or fraction? Why?

*It is good to base these estimations off of .25, .5, .75.

Example 3: 

a. Draw a line that is 20% the length as the line above.

b. Draw a line that is 62% the length as the line above.

c. Draw a line that is 85% the length as the line above

Is it easier to use percents, decimals, or fractions? Why?

*It is good to base these estimations off of 25%, 50%, 75%.

Example 4:
Draw a picture to represent each of the following.

a. $\frac{1}{4}$

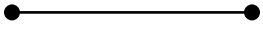
b. .35

c. 85%

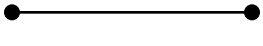
You Try!

1. 

Draw a line that is $\frac{3}{7}$ the length as the line above.

2. 

Draw a line that is .2 the length as the line above.

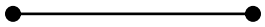
3. 

Draw a line that is 40% the length as the line above.

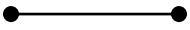
4. Draw a picture to represent 65%.

What did we learn today?

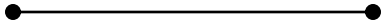
Section 2-2 Homework (Day 1)

1. 

Draw a line that is $\frac{5}{8}$ the length as the line above.

2. 

Draw a line that is 60% the length as the line above.

3. 

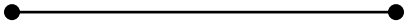
Draw a line that is .42 the length as the line above.

4. 

Draw a line that is 10% the length as the line above.

5. 

Draw a line that is $\frac{1}{8}$ the length as the line above.

6. 

Draw a line that is .85 the length as the line above.

7. Draw a picture to represent each of the following:

a. $\frac{1}{5}$ **b. .35** **c. 48%**

8. If you had to use decimals, fractions, or percents to describe your math grade, which one would you use? Why?

9. Give a real life example where you would use decimals.

10. Give a real life example where you would use fractions.

Section 2-2: Fractions, Decimals, & Percents (Day 2)

Review Question
Is it easier to use fractions, decimals, or percents?

Discussion
Yesterday, we discussed how fractions, decimals, and percents are used. Since all three are used, we need to be able to convert between them. That is what today's lesson is about.

What does a fraction represent?
What does a percent represent?

***Use calculators**

SWBAT convert fractions, decimals, and percents

Definitions
How would you change a decimal to a percent?
Decimal → Percent – move decimal two places to the right
Ex. .42 = 42 % **Ex.** .123 **=** 12.3 %

How would you change a percent to a decimal?
Percent → Decimal – move decimal two places to the left
Ex. 53 % = .53 **Ex.** 23.5 % **= .**235

How would you change a fraction to a decimal?
Fraction → Decimal – divide (fraction are just division problems)
Ex. $\frac{3}{20}$ = .15 **Ex.** $\frac{2}{3}$ = .6666

How would you change a fraction to a percent?
Fraction → Percent – divide, move decimal (use the rules from the previous examples)
Ex. $\frac{9}{12}$ = .75 **=** 75 % **Ex.** $\frac{1}{3}$ = .3333 = 33.33%

*Notice $\frac{9}{12}$, .75, 75% are all the same. Decimals, fractions, and percents are the same thing. We use them for different purposes.

Money: $\frac{9}{12}$ of a dollar (NO!) Lunch Meat: $\frac{9}{12}$ (NO!)… must simplify to $\frac{3}{4}$

75% of a dollar (NO!) 75% (NO!)

$.75 (YES!) .75 (NO!)

What did we learn today?

Section 2-2 In-Class Assignment (Day 2)

Change each decimal to a percent.

1. 0.75 **2.** 0.3 **3.** 2.47

4. 0.055 **5.** 0.326

Change each percent to a decimal.

6. 83% **7.** 92.9% **8.** 17%

9. 0.4% **10.** 0.01%

Change each fraction to a decimal.

11. $\frac{9}{10}$ **12.** $\frac{4}{5}$ **13.** $\frac{13}{15}$

14. $\frac{7}{9}$ **15.** $\frac{95}{100}$

Change each fraction to a percent.

16. $\frac{5}{6}$ **17.** $\frac{11}{15}$ **18.** $\frac{9}{20}$

19. $\frac{35}{100}$ **20.** $\frac{41}{96}$

Section 2–2: Fractions, Decimals, & Percents (Day 3)

Review Question
How do you convert a fraction to a percent?

Discussion
Yesterday, we did some converting of fractions, decimals, and percent. Today we are going to do a couple of more plus the ones from yesterday.

What does a fraction represent?
What does a percent represent?

***Use calculators**

SWBAT convert fractions, decimals, and percents

Definitions
How would you change a percent to a fraction?
Percent → Fraction – put number over 100, then simplify (percent is just a number out of 100)

Ex. $35\% = \frac{35}{100} = 7/20$ **Ex.** $72\% = \frac{72}{100} = 18/25$

How would you change a decimal to a fraction?
Decimal → Fraction – say it! (Read the fraction using place value)

Ex. $.52 = \frac{52}{100}$ (Point five two is not the proper name. The proper name is 52 hundredths)

Ex. $.315 = \frac{315}{1000}$ (Point three one five is not the proper name. The proper name is 315 thousandths)

What did we learn today?

Section 2-2 In-Class Assignment (Day 3)

Finish each sentence.

To change a decimal to a percent:

To change a percent to a decimal:

To change a decimal to a fraction:

To change a fraction to a decimal:

To change a fraction to a percent:

To change a percent to a fraction:

Change each decimal to a percent.

1. 0.8
2. 0.23
3. 1.29
4. 0.999

Change each percent to a decimal.

5. 45%
6. 26.7%
7. 82%
8. 0.5%

Change each decimal to a fraction.

9. 0.04
10. 0.002
11. 0.9
12. 0.25

Change each fraction to a decimal. Round to the nearest hundredth.

13. $\frac{4}{7}$
14. $\frac{3}{8}$
15. $\frac{10}{17}$
16. $\frac{3}{5}$

Change each fraction to a percent.

17. $\frac{4}{5}$
18. $\frac{13}{20}$
19. $\frac{68}{78}$
20. $\frac{95}{100}$

Change each percent to a fraction in simplest form.

21. 80%
22. 28%
23. 39%
24. 44.5%

25. Which of the following is in between 1/2 and 3/4 ?
    a. 1/4 b. 1/8 c. 6/10 d. 8/10

26. Which of the following is in between 1/5 and 1/4 ?
    a. .11 b. .22 c. .33 d. .44

Section 2–2: Fractions, Decimals, & Percents (Day 4)

Review Question
How do you convert a percent to a fraction?

Discussion
There are 120 students in your grade. Sixty of them passed the PSSAs last year. Twenty of them scored advanced.

What percent of the students passed?
How did you figure this out?

What percent of the students scored advance?
Why is this harder?

To figure out the percent that scored advanced you first must write it as a fraction. Then convert the fraction to a decimal. Finally, convert the decimal to a percent.

*** Use Calculators**

SWBAT apply their knowledge of converting fractions, decimals, and percents to word problems

Example 1: There are 50 M&M's in a bag. The breakdown of the colors is as follows: 20 Green, 15 Blue, 10 Red, and 5 Yellow.

What percent are green? 20/50 = .4 = 40%

What percent are blue? 15/50 = .3 = 30%

What percent are blue or red? 25/50 = .5 = 50%

What percent are not red? 40/50 = .8 = 80%

Example 2: The grades for your class are as follows: 3 A's, 8 B's, 6 C's, 5 D's.

What percent of the students received an 'A'? 3/22 = .13 = 13%

What percent of the students received a 'B' ? 8/22 = .36 = 36%

What percent of the students received a 'C' or 'D' ? = 11/22 = .5 = 50%

What percent of the students did not receive an 'A' ? 19/22 = .86 = 86%

What did we learn today?

Section 2–2 In–Class Assignment (Day 4)

For each problem, you are asked to find a percent. Please show the fraction and decimal used to find each percent.

1. 125 people were surveyed regarding their favorite car model. Here are the results: 42 chose the Chevy Corvette, 34 chose the Ford Mustang, 28 chose the VW Bug, and 21 chose the Honda Accord.
   a) What percent chose the Mustang?

   b) What percent chose the VW Bug?

   c) What percent chose the Chevy Corvette *or* the Honda Accord?

   d) What percent did *not* choose the Corvette?

2. ESPN surveyed 250 viewers regarding their favorite sport. The results were: 78 chose football, 63 chose baseball, 57 chose hockey, 37 chose soccer, and 15 chose tennis.
   a) What percent chose hockey?

   b) What percent chose tennis?

   c) What percent chose football, baseball, or soccer?

   d) What percent did *not* choose tennis or football?

3. The radio station surveyed 300 listeners to find the most popular musical artists. 81 listeners chose Lil Wayne, 74 chose T–Pain, 59 chose Chris Brown, 48 chose the Jonas Brothers, and 38 chose Hannah Montana.
   a) What percent chose Chris Brown?

   b) What percent chose Hannah Montana?

   c) What percent chose Jonas Brothers or Lil Wayne?

   d) What percent *did not* choose Lil Wayne, T–Pain, or Chris Brown?

4. Fast food patrons were asked to report their favorite fast food restaurant. 28 respondents chose McDonalds, 32 chose Wendy's, 51 chose Burger King, 22 chose Subway, and 42 chose Arby's.
   a) What percent chose Arby's?

   b) What percent chose Burger King?

   c) What percent chose Wendy's or Subway?

   d) What percent *did not* choose McDonald's, Wendy's, or Burger King?

Section 2–3 Powers and Square Roots (Day 1)

Review Question
How do you convert a percent to a fraction?

Discussion
What is $\sqrt{361}$? By the end of the period you will be able to calculate this square root in your head; no calculator required!

SWBAT raise integers to different powers
SWBAT find the square root of a number less than 400

Definitions
Power – how many times you multiply a number by itself

Example 1: $4^2 = 4 \cdot 4 = 16$ (not 8)

Example 2: $2^4 = 2 \cdot 2 \cdot 2 \cdot 2 = 16$ (not 8)

Example 3: $5^3 = 5 \cdot 5 \cdot 5 = 125$ (not 15)

What is a common mistake made with exponents?

Square Root – one of two equal factors; symbol $\sqrt{\ }$

Example 4: $\sqrt{16} = 4$ (not 8)

Example 5: $\sqrt{64} = 8$ (not 32)

Example 6: $\sqrt{169} = 13$

$10 \rightarrow 10^2 = 100$
$20 \rightarrow 20^2 = 400$

* Use your number sense. The answer has to be between 10^2 and 20^2 (100 and 400). Next, it either has to be 13 or 17 because they will end with a 9 when you square them. Finally, it has to 13 because 169 is closer to 100.

Example 7: $\sqrt{324} = 18$

$10 \rightarrow 10^2 = 100$
$20 \rightarrow 20^2 = 400$

* Use your number sense. The answer has to be between 10^2 and 20^2 (100 and 400). Next, it either has to be 12 or 18 because they will end with a 4 when you square them. Finally, it has to 18 because 324 is closer to 400.

What is a common mistake made with square roots?

You Try!

1. $2^3 = 8$
2. $6^2 = 36$
3. $\sqrt{49} = 7$
4. $\sqrt{81} = 9$
5. $\sqrt{144} = 12$
6. $\sqrt{225} = 15$
7. $\sqrt{361} = 19$
8. $\sqrt{256} = 16$

What did we learn today?

Section 2–3 Homework (Day 1)

Raise each of the following to the appropriate power.

1. $2^2 =$
2. $2^3 =$
3. $4^3 =$
4. $5^3 =$
5. $1^5 =$
6. $5^4 =$

Find the square root of each of the following numbers.

7. $\sqrt{64} =$
8. $\sqrt{36} =$
9. $\sqrt{121} =$
10. $\sqrt{169} =$
11. $\sqrt{400} =$
12. $\sqrt{289} =$
13. $\sqrt{324} =$
14. $\sqrt{100} =$
15. $\sqrt{256} =$

16. Explain why the following problem is incorrect: $\sqrt{9} = 4.5$

17. **Answer the following question using the four step method.** The auditorium has 361 seats. The amount of seats in a row is equal to the amount of total rows. How many rows are in the auditorium?

Section 2-3: Powers and Square Roots (Day 2)

Review Question

What is a common mistake made with square roots?
What is a common mistake made with exponents?

Discussion

$\sqrt{16}$ = ?

$\sqrt{18}$ = ?

What if the number does not have a perfect answer?

SWBAT approximate the square root of a number less than 100

Remember:
Powers – how many times you multiply a number by itself
Square Root – one of two equal factors

Approximating Square Roots

Example 1: $\sqrt{18} \approx 4$ $4 \rightarrow 4^2 = 16$ (2 away)
$5 \rightarrow 5^2 = 25$ (7 away)
Therefore, 4 is a better estimate.
*Notice not all number have an exact square root

Example 2: $\sqrt{45} \approx 7$ $6 \rightarrow 6^2 = 36$ (9 away)
$7 \rightarrow 7^2 = 49$ (4 away)
Therefore, 7 is a better estimate.
*Notice not all number have an exact square root

Example 3: $\sqrt{95} \approx 10$ $9 \rightarrow 81$ (14 away)
$10 \rightarrow 100$ (5 away)
Therefore, 10 is a better estimate
*Notice not all number have an exact square root

You Try!

1. $\sqrt{14} \approx 4$
2. $\sqrt{28} \approx 5$
3. $\sqrt{86} \approx 9$
4. $\sqrt{55} \approx 7$
5. $7^2 = 49$
6. $2^3 = 8$
7. $\sqrt{169} = 13$
8. $\sqrt{361} = 19$

What did we learn today?

Section 2–3 Homework (Day 2)

Raise each of the following to the appropriate power.

1. 2^2 =
2. 3^3 =
3. 5^3 =
4. 7^1 =
5. 1^3 =
6. 5^0 =

Estimate the square root of each of the following numbers.

7. $\sqrt{5}$ =
8. $\sqrt{31}$ =
9. $\sqrt{15}$ =
10. $\sqrt{84}$ =
11. $\sqrt{91}$ =
12. $\sqrt{53}$ =
13. $\sqrt{29}$ =
14. $\sqrt{71}$ =
15. $\sqrt{57}$ =
16. $\sqrt{12}$ =
17. $\sqrt{32}$ =
18. $\sqrt{48}$ =

Find the square root of each of the following numbers.

19. $\sqrt{4}$ =
20. $\sqrt{25}$ =
21. $\sqrt{144}$ =
22. $\sqrt{49}$ =
23. $\sqrt{196}$ =
24. $\sqrt{225}$ =

25. Why would 18 be a poor guess for the $\sqrt{361}$?

Change each of the following to a decimal then a percent.

26. $\frac{3}{4}$ =
27. $\frac{13}{20}$ =
28. $\frac{3}{7}$ =

Section 2–4: Comparing & Ordering Rational Numbers (Day 1)

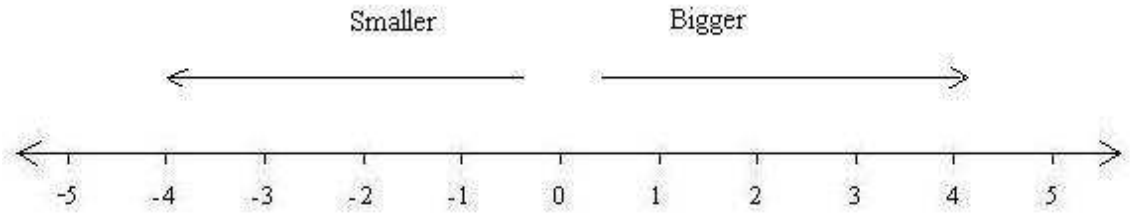
Review Question

Give an example of a number that doesn't have a perfect square root.
How do you know that it doesn't have a perfect square root?

Discussion

Rational Number – any number that can be written as a fraction
This includes the following:
integer (… –3, –2, –1, 0, 1, 2, 3, ..)
fraction (-3/2, 4 1/2)
decimal (–2.1, 4.22)

*** Numbers get larger as we move right on the number line**
*** Numbers get smaller as we move left on the number line**
*** When you are on the negative side of the number line, the number closer to zero is bigger**



SWBAT correctly place a rational number on a number line
SWBAT determine which rational number is bigger given two rational numbers

Example 1: Place the following numbers on a number line: 3, 3.2, $3\frac{2}{3}$

* It is easier to convert the fractions into decimals in order to place them on the number line.

Example 2: Place the following numbers on a number line: –1, –1.8, $-1\frac{1}{4}$

* It is easier to convert the fractions into decimals in order to place them on the number line.
* When you are on the negative side of the number line, the number closer to zero is bigger.

Example 3: Place the following numbers on a number line: 4.1, –.8, $\frac{3}{4}$, $-2\frac{1}{8}$

* It is easier to convert the fractions into decimals in order to place them on the number line.
* When you are on the negative side of the number line, the number closer to zero is bigger.

Example 4: Place a < or > symbol in the blank space.
* If you are not sure, place each number on the number line. The number that is furthest right is the greater number.

4 __ 8 –7 __ –1 –3.2 __ –3.4 –1 ¼ __ –1 ¾

You Try!

1. Place the following numbers on a number line: –1, 5, 7, –3.
2. Place the following numbers on a number line: 5, 5.35, $5\frac{6}{8}$.
3. Place the following numbers on a number line: –2, –2.8, $-2\frac{1}{3}$.
4. –5 __ –8 (draw a number line to confirm)
5. –1.6 __ –1.7 (draw a number line to confirm)
6. $-\frac{3}{4}$ __ $-\frac{1}{8}$ (draw a number line to confirm)

What did we learn today?

Section 2–4 Homework (Day 1)

Place the following numbers on a number line.

1. 1, 3, 4, 6, 8
2. –3, –6, –1, –5
3. 2.3, 3.4, 3.1, 2.8
4. –1.1, –1.6, –1.25, –1.7
5. $\frac{1}{2}, \frac{1}{8}, \frac{1}{4}, \frac{4}{5}$
6. $-\frac{1}{3}, -\frac{1}{2}, -\frac{8}{10}, -\frac{1}{10}$
7. $\sqrt{9}, \sqrt{144}, \sqrt{289}, \sqrt{26}$

Replace each __ with > or < to make a true sentence.

8. 5 __ 12
9. –4 __ –8
10. –12 __ –4
11. 0 __ –.3
12. .5 __ .8
13. –.4 __ –.8
14. –2.7 __ –2.9
15. $\frac{1}{3}$ __ $\frac{1}{2}$
16. $-\frac{1}{8}$ __ $-\frac{2}{6}$
17. $-2\frac{1}{3}$ __ $-2\frac{3}{8}$

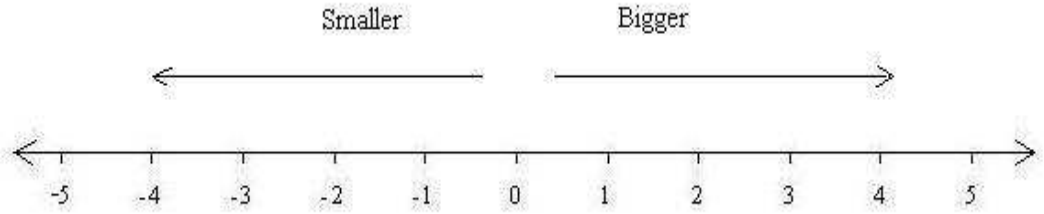
Section 2–4: Comparing & Ordering Rational Numbers (Day 2)

Review Question

What is the easiest way to compare two numbers?
How do you know which number is bigger?

Discussion

Rational Number – any number that can be written as a fraction
This includes the following:
integer (… –3, –2, –1, 0, 1, 2, 3, ..)
fraction (-3/2, 4 1/2)
decimal (–2.1, 4.22)



*** Numbers get larger as we move right on the number line**
*** Numbers get smaller as we move left on the number line**
*** When you are on the negative side of the number line, the number closer to zero is bigger**

SWBAT correctly place a rational number on a number line
SWBAT correctly order a list of rational numbers

Example 1: Place the following numbers in order from least to greatest. Then plot them on a number line: –9, 5, 4, –2, –1, 3.

Example 2: Place the following numbers in order from least to greatest. Then plot them on a number line: –1.2, 5, 4, –2.2, –1.6, 1.5.

Example 3: Place the following numbers in order from least to greatest. Then plot them on a number line: $\frac{1}{2}, \frac{3}{8}, -\frac{2}{3}, -\frac{5}{6}$. We are going to convert the fractions to decimals. Why does this make it easier?

Example 4: Place the following numbers in order from least to greatest. Then plot them on a number line: 22%, .3, $\frac{1}{5}$, .8. We are going to convert everything to decimals. Why does this make it easier?

You Try!

1. Place the following numbers in order from least to greatest. Then plot them on a number line:
–9, 5, 4, –2, –1, 3.

2. Place the following numbers in order from least to greatest. Then plot them on a number line:
–2.2, –3, 4, –3.1, –2.6, –2.1.

3. Place the following numbers in order from least to greatest. Then plot them on a number line:
$\frac{1}{6}, -\frac{1}{3}, -\frac{5}{7} - \frac{3}{6}$.

4. Place the following numbers in order from least to greatest. Then plot them on a number line:
32%, .2, $\frac{2}{5}$, 55%.

What did we learn today?

Section 2–4 Homework (Day 2)

Place the following numbers in order from least to greatest. Then plot them on a number line.

1. –8, 2, 1, –3, –1, 3

2. –1.2, –6, 4, –1.1, –2.2, –6.1

3. $\frac{1}{2}, \frac{1}{3}, \frac{1}{4}, \frac{1}{5}$

4. 32 %, .2, $\frac{2}{5}$, 55 %

5. –6, 5, 2, –7, –2, 3

6. –5.2, –5, 5, –4.1, –4.6, –5.8

7. $\frac{1}{8}, -\frac{1}{2}, -\frac{3}{5}, -\frac{3}{9}$

8. 42 %, .4, $\frac{3}{5}$, 58 %

Replace each __ with > or < to make a true sentence.

9. 7 __ 13

10. –1 __ –3

11. –10 __ –8

12. 0 __ –.5

13. .44 __ .45

14. –.2 __ –.6

15. –4.2 __ –4.9

16. $\frac{1}{6}$ __ $\frac{1}{4}$

17. $-\frac{2}{8}$ __ $-\frac{2}{5}$

Section 2–5: Rational Operations (Day 1)

Integers and Decimals (using calculators)

Review Question
In this section, we are going to use the calculators to do rational operations.
What are rational numbers?

Discussion
Why are we using calculators for everything?

SWBAT use a calculator to perform the four operations for integers and decimals

Remember
Counting Numbers – the numbers that you use to count (also known as natural numbers)
(1, 2, 3, 4, ..)

Whole Numbers – the set of counting numbers plus zero
(0, 1, 2, 3, 4, …)

Integers – the set of all positive and negative whole numbers including zero
(… –3, –2, –1, 0, 1, 2, 3 ,…)

Rationals – any number that can be written as a fraction
2/3, –.56, –14, etc

Four operations (using calculator)

1. -8 + 4 =
2. -5 – 3 =
3. (-4)(-12) =
4. 4.2 + 8.2 =
5. -5.5 – 8.7 =
6. 30.6 ÷ (-6.8) =
7. (-8.3)(2.45) =

What did we learn today?

Section 2–5 In-Class Assignment (Day 1)

To which number set(s) does each number belong?

1. 6
2. $\frac{1}{4}$
3. 0
4. –3.2
5. -9
6. $\frac{16}{4}$
7. -3.5
8. 11
9. π
10. $-\frac{5}{2}$
11. -.2
12. $\sqrt{16}$

Find the answer.

13. –18.76 ÷ 2.8 =
14. –4.5 + 13 =
15. 4 – 14 =
16. (–2.88)(4.6) =
17. –432 ÷ (–24) =
18. –4.3 – 8.6 =
19. –6.4 + (–12.7) =
20. 11 – (–15) =
21. –26.52 ÷ 3.4 =
22. (–5.5)(–5.5) =
23. –28 – 16 =
24. 12.68 + (– 4.3) =

25. **Answer the following question using the four step method.** It is -4° F outside. It drops 8° F for each of the next three hours. What is the current temperature?

Section 2–5: Rational Operations (Day 2)

Fractions (using calculators)

Review Question
To which set(s) of numbers does '-5.2' belong?

Discussion
Today we will be discussing fractions. Which set of number do fractions belong?
Are there any fractions that don't belong to the rationals?

SWBAT use a calculator to perform the four operations for fractions

In order to put mixed numbers into the calculator we have to convert them to improper fractions.

Ex 1: $2\frac{2}{3} =$

Ex 2: $-1\frac{1}{5} =$

SWBAT use a calculator to perform the four operations for fractions

Four operations (using calculator)

1. $\frac{1}{3} + \frac{3}{5} =$
2. $-\frac{3}{4} - \frac{2}{6} =$
3. $\left(\frac{1}{3}\right)\left(-1\frac{1}{4}\right) =$
4. $\left(-1\frac{1}{2}\right) \div \left(-\frac{1}{5}\right) =$

What did we learn today?
To use the four operations for fractions

Section 2–5 In-Class Assignment (Day 2)

To which number set(s) does each number belong?

1. 2	2. $1\frac{1}{3}$	3. 0	4. –5.2
5. -8	6. $\frac{12}{4}$	7. -2.8	8. 1
9. π	10. $-\frac{9}{2}$	11. -.2	12. $\sqrt{16}$

Find the answer.

13. $\frac{1}{2}+\frac{3}{5}=$

14. $-\frac{3}{5}-\frac{2}{4}=$

15. $\left(1\frac{1}{3}\right)\left(-\frac{1}{5}\right)=$

16. –15.12 ÷ 2.8 =

17. –4.8 + 15 =

18. 4 – 18 =

19. (–3.5)(3.56) =

20. –2170 ÷ (–62) =

21. $\left(2\frac{1}{3}\right)\div\left(-\frac{1}{6}\right)=$

22. $\frac{1}{8}+\frac{4}{10}=$

23. 18 – (–15) =

24. $\left(3\frac{1}{4}\right)-\left(-\frac{2}{3}\right)=$

25. (–15.5)(–.05) =

26. $\left(-\frac{3}{4}\right)\left(-\frac{1}{5}\right)=$

27. 26.88 ÷ (– 3.2) =

28. **Answer the following question using the four step method.** Ritchie wants to cut off $\frac{3}{4}$ of an inch off of each side of a piece of wood. He wants to take off the same amount from each side. How much should he cut from each side?

Section 2–6: Converting Units (Day 1)

Customary

Review Question
Whole, Integer, Rational?

1. 5
2. 2.6
3. 3/5
4. -6

Discussion
There are two different systems used to quantify units. They are the customary and metric systems. The customary system is used in the United States and the metric system is used everywhere else. During the next few days, we will be discussing the customary system.

Take a look at a gallon, quart, pint, and cup container. Have students develop the conversions based on observation.

1 gallon = ____ qts
1 qt = ____ pts
1 pt = ____ cups
1 cups = ____ fluid oz

In order to convert units, you will have to know how to multiply fractions. Specifically, you will have to know how to simplify before you multiply.

When you multiply $\frac{4}{1} \cdot \frac{3}{4}$, the fours cancel out.

When you multiply $\frac{hat}{4} \cdot \frac{5}{hat}$, the hats would cancel

SWBAT convert customary units of capacity

Example 1: 3 gal = ____ qts $\rightarrow 3gal \bullet \frac{4qts}{1gal}$ = 12 qts (notice the gallons cancel)

– since we are trying to cancel out the gallons , that unit must go on the bottom
– since we want quarts, that unit must go on the top
– once you set up the conversions, plug in the correct values
– finally multiply across the top, then the bottom

Example 2: 4 cups = ____ pts $\rightarrow 4cups \bullet \frac{1pts}{2cups}$ = 2 pts (notice the cups cancel)

– since we are trying to cancel out the cups , that unit must go on the bottom
– since we want pints, that unit must go on the top
– once you set up the conversions, plug in the correct values
– finally multiply across the top, then the bottom

Example 3: 3.2 cups = ____ oz $\rightarrow 3.2 cups \bullet \frac{8oz}{1cup} = 25.6$ oz (notice the cups cancel)

– since we are trying to cancel out the cups , that unit must go on the bottom
– since we want ouncess, that unit must go on the top
– once you set up the conversions, plug in the correct values
– finally multiply across the top, then the bottom

You Try!

1. 16 qt = ____ gal
2. 5 gal = ____ qts
3. 4 pts = ____ cups
4. 32 oz = _____ cups

What did we learn today?

Section 2-6 Homework (Day 1)

Convert.

1. 8 cups = _____ pt
2. 12 qt = _____ pints
3. 32 qt = ____ gal
4. 48 oz = ____ cups
5. 24 qt = _____ pt
6. 5.54 gal=_____ qts
7. 12 cups = _____ pt
8. 5 qt = _____ pints
9. 8 qt = ____ gal
10. 54 oz = ____ cups
11. 36 qt = _____ pt
12. 2.5 gal =_____ qts

13. What happens to a number when you convert from a big unit to a smaller unit? Why?

MATHEMATICS REFERENCE SHEET

Metric Conversions

Units of Length

1 kilometer (km) = 1,000 meters

1 meter (m) = 100 centimeters

1 centimeter (cm) = 10 millimeters (mm)

Units of Mass

1 kilogram (kg) = 1,000 grams

1 gram (g) = 1,000 milligrams (mg)

Units of Capacity

1 kiloliter (kL) = 1,000 liters

1 liter (L) = 1,000 milliliters (mL)

Customary Conversions

Units of Length

1 foot (ft) = 12 inches (in.)

1 yard (yd) = 3 feet

1 mile (mi) = 5,280 feet

Units of Weight

1 pound (lb) = 16 ounces (oz)

1 ton (T) = 2,000 pounds

Units of Capacity

1 cup (c) = 8 fluid ounces (fl oz)

1 pint (pt) = 2 cups

1 quart (qt) = 2 pints

1 gallon (gal) = 4 quarts

Time Conversions

1 day = 24 hours (hr)

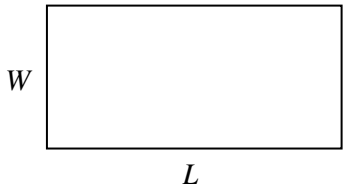
1 hour = 60 minutes (min)

1 minute = 60 seconds (sec)

Temperature Conversions

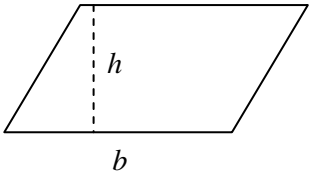
$°C = \frac{5}{9}(°F - 32)$

$°F = \left(\frac{9}{5}\right)°C + 32$

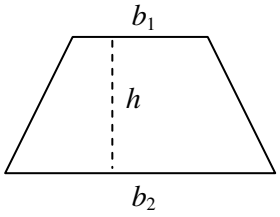


$P = 2L + 2W$

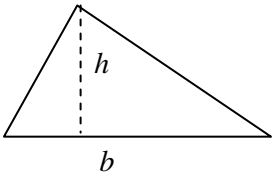
$A = L \cdot W$



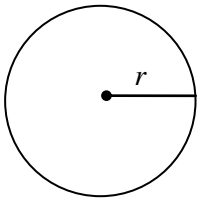
$A = b \cdot h$



$A = \frac{h(b_1 + b_2)}{2}$



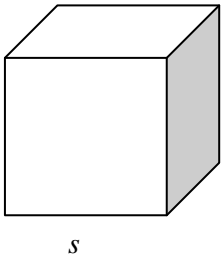
$A = \frac{bh}{2}$



$C = 2\pi r$

$A = \pi r^2$

$\pi = 3.14$



$SA = 6s^2$

$V = s \cdot s \cdot s$

$SA = 2LW + 2LH + 2WH$

$V = L \cdot W \cdot H$

Section 2–6: Converting Units (Day 2)

Customary

Review Question
What is the key to converting units?

Discussion
Yesterday, we only converted units of capacity. This includes cup, ounce, pint, quart, and gallon. Today, we are going to convert units of length and weight. Converting any unit of measure uses the same process as we used yesterday. We will setup the problems so the units that we don't want cancel out.

SWBAT convert customary units of distance, time, and capacity

Converting any unit of measure uses the same process as capacity. Therefore, the process that was used yesterday will work today.

Example 1: 10 ft = ____ in $\rightarrow 10\,ft \bullet \frac{12in}{1\,ft}$ = 120 in (notice the feet cancel)

– since we are trying to cancel out the feet, that unit must go on the bottom
– since we want inches, that unit must go on the top

Example 2: 15 ft = ____ yd $\rightarrow 15\,ft \bullet \frac{1yd}{3\,ft}$ = 5 ft (notice the feet cancel)

– since we are trying to cancel out the feet, that unit must go on the bottom
– since we want yards, that unit must go on the top

Example 3: 48 oz = ____ lb $\rightarrow 48oz \bullet \frac{1lb}{16oz}$ = 3 lb (notice the ounces cancel)

– since we are trying to cancel out the ounces, that unit must go on the bottom
– since we want pounds, that unit must go on the top

Example 4: 3.2 gal = ____ qt $\rightarrow 3.2gal \bullet \frac{4qt}{1gal}$ = 12.8 qt (notice the gallons cancel)

– since we are trying to cancel out the gallons, that unit must go on the bottom
– since we want quarts, that unit must go on the top

You Try!
1. 16 qt = ____ gal
2. 30 ft = ____ yds
3. 72 hours = ____ days
4. 240 min = ____ hr
5. 6 qt = ____ pts
6. 5 yd = ____ ft

What did we learn today?

Section 2-6 Homework (Day 2)

Convert.

1. 4 ft = ____ in
2. 6 lbs = ____ oz
3. 3 yards = _____ ft
4. 8 cups = _____ pt
5. 192 hr = ____ days
6. 12 qt = _____ pints
7. 128 oz = ____ lb
8. 12 yd = ____ ft
9. 48 ft = ____ yd
10. 32 qt = ____ gal
11. 48 fl oz = ____ cups
12. 12 qt = _____ pt
13. 4.2 ft = _____ in
14. 3 ¼ days = _____ hrs
15. 3.8 gal =_____ qts

16. **Answer the following question using the four step method**. A rope was 15 ***yards*** long. Tommy used 12 ***feet*** of it. How many ***yards*** of rope are left?

Section 2–6: Converting Units (Day 3)

Metric

Review Question
What is the key to converting units?

Discussion
Today we will be discussing the metric system. The first thing that you need to understand is the base units of the metric system. In the customary system, there are many different units used to quantify distance, volume, and weight. For example, when talking about distance we might use inches, feet, yard, or miles. In the metric system, there is one base unit for distance. It is meters. There is one base unit for volume. It is liters. The base unit for weight is grams. This is summarized below:

Distance: Meters
Volume: Liters
Weight: Grams

The following saying: King Henry Died By Drinking Chocolate Milk represents the first letter of each prefix in the metric system (**Kilo, Hecto, Deka, deci, Centi, Milli).** The "By" stands for base. The "m L g" box in the middle represents the base units for the metric system.

King Henry Died | m L g | drinking Chocolate Milk

Notice: To get to the next prefix you are multiplying by 10. Therefore, we can just move the decimal point that many places. It is just like scientific notation. The metric system is based on the base 10 number system. Notice how different this is from the customary system. Any other method of conversions is acceptable.

SWBAT convert metric units of distance, capacity, and mass.

Example 1: 12 km **= _____** m (move the decimal three places to get to meters from kilo)

*Why isn't 'm' milli?

Example 2: 935 cm **= _____** km (move the decimal five places to get to kilo from centi)

*Must count the "box" as a decimal place.

Example 3: 36 mg **= _____** g (move the decimal three places to get to grams from milli)

Example 4: .75 L **= _____** mL (move the decimal three places to get to milli from liters)

Why is the metric system so easy to use?
Why doesn't the United States switch?

You Try!

1. 400 g = ____ kg
2. 2.6 m = ____ cm
3. .085 L = ____ mL
4. .62 km = ____ m
5. 2 gal = ____ qt
6. 5 ft = ____ in

What did we learn today?

Section 2–6 Homework (Day 3)

Convert. (Metric System)

1. 42 cm = ____ m
2. 6200 mL = ____ L
3. 3 g = _____ mg
4. 5.23 kg = _____ mg
5. 145.2 g = ____ kg
6. 800 m = _____ km
7. 8.2 g = _____ mg
8. 95.2 L = ____ mL
9. 48 m = _____ km

Convert. (Metric System and Customary)

10. 5 yds = _____ ft
11. 13 pints = _____ qt
12. .64 km = ____ m
13. 368 mg = ____ g
14. 2.9 cups = ____ fl oz
15. 10 yd = ____ ft
16. 18 cm = _____ mm
17. 240 mm = ____ cm
18. 5.8 km = ____ m
19. 50 L = _____ mL
20. 4 ft = ____ in
21. 4 qt = _____ pts

22. Why is it easier to convert in the metric system compared to customary units?

23. **Answer the following question using the four step method.** Jimmy's truck traveled 5.6 ***km***. Tom's truck traveled 2300 ***m***. How many total meters did the trucks travel?

Section 2-6: Converting Units (Day 4)

Review Question

What is the saying to help you remember the prefixes for the metric system?
King **H**enry **D**ied **B**y **d**rinking **C**hocolate **M**ilk

King Henry Died | m / L / g | drinking Chocolate Milk

Kilo, Hecto, Deka, deci, Centi, Milli

Discussion

Today will be a day of practice. You will practice converting customary units and using the metric system. The skills we are practicing will be on the upcoming unit test. You will work on the problems during class. The correct solutions will be given at the end of the class.

SWBAT convert metric units of distance, capacity, and mass.
SWBAT convert customary units of distance, time, and capacity.

Example 1: 62 mg **= _____** g (move the decimal three places to get to grams from milli)

Example 2: 8 ft = ____ in $\rightarrow 8\,ft \bullet \frac{12\,in}{1\,ft} = 96$ in (notice the feet cancel)
– since we are trying to cancel out the feet, that unit must go on the bottom
– since we want inches, that unit must go on the top

What did we learn today?

Section 2-6 In-Class Assignment (Day 4)

Convert.

1. 55 cm = ____ m
2. 2 ft = ____ in
3. 42 g = _____ mg
4. 3 lbs = ____ oz
5. 18.4 g = ____ kg
6. 620 m = _____ km
7. 9 yds = _____ ft
8. 16 pints = _____ qt
9. .045 km = ____ m
10. 368 mg = ____ g
11. 2.9 cups = ____ fl oz
12. 10 yd = ____ ft
13. 15 ft = _____ yds
14. 240 mm = ____ cm
15. 5.8 km = ____ m
16. 30 L = _____ mL
17. 60 in = ____ ft
18. 4 qt = _____ pts

19. **Answer the following question using the four step method.** Johnny studied for 180 ***minutes.*** Tina studied for 2 ***hours.*** How many total hours did they study?

Unit 2 Review

Review Question
Is it easier to convert using the customary system or the metric system? Why?

SWBAT study for the Unit 2 test

Discussion
We have a unit test tomorrow. How do we study for a test?
How should you study for a test?

What topics are on the test?

How could you study these topics?

Practice Problems

1. $-18 + 12$
2. $4 - 13$
3. $-8 - 12$
4. $14.52 - 8.6$
5. $27.9 \div 4.5$
6. $2\frac{1}{3} \div \frac{2}{3}$
7. $\frac{2}{10}$ as a decimal
8. 123% as a decimal
9. 4^3
10. $\sqrt{484}$
11. 14 ft = ___ in
12. 1.8 km = ___ m
13. Place the following numbers in order from least to greatest: $-1.1, -1.6, -1.25, -1.7$.
14. Explain the difference between an integer and a rational number.
15. Johnny makes $8.25 per hour. He worked 23 hours last week. How much was his paycheck?

What did we learn today?

Unit 2 Cumulative Review

Things to Remember:
1. Reinforce test taking strategies: guess/check, eliminate possibilities, work backwards, and estimating.
2. Reinforce the importance of retaining information from previous units.
3. Reinforce connections being made among units.

---

1. What value satisfies the equation: $5x + 2 = 17$?
   a. 2 b. 3 c. 4 d. 5

2. What is the area of a square whose base is 3 cm and height is 3 cm?
   a. 1 cm^2 b. – 9 cm^2 c. 6 cm d. 9 cm^2

3. What was your teacher's favorite TV show as a child?
   a. Wonder Years b Survivor c. American Idol d. Family Guy

4. What is the largest two digit number divisible by 6?
   a. 90 b. 95 c. 96 d. 114

5. What is the largest prime number that "goes into" 30?
   a. 2 b. 3 c. 5 d. 10

6. Which number can be expressed as the sum of 2 consecutive integers?
   a. 20 b. 24 c. 26 d. 29

7. What is the next term: 1, 8, 16, 25, ___?
   a. 35 b. 36 c. 37 d. 38

8. What is the next term: 5, 8, 6, 9, 7, ___?
   a. 8 b. 10 c. 12 d. 14

9. What is the next term: 1, 3, 9, 27, ___?
   a. 91 b. 85 c. 81 d. 71

10. What is the next term: 3, 7, 15, 31, ___?
    a. 62 b. 63 c. 64 d. 73

11. Tommy had $50. He spent $4.75 at Wendy's and $13.99 on a t–shirt. **About** how much money does he have left?
    a. $20 b. $30 c. $38 d. $40

12. Kimmy bought a car for $17,000. She plans to pay it off in 5 years. **About** how much does she have to pay each month?
    a. $200 b. $300 c. $400 d. $500

13. Johnny works 20 hours per week. He makes $6.25/hour. How many weeks will it take for him to save $375?
    a. 2 b. 3 c. 4 d. 5

14. Shirley has 4 quarts of oil. Sammy has 2 gallons of oil. How many gallons of oil do they have together?
    a. 2 b. 3 c. 4 d. 5

15. Which of the following is not one of the four steps in the four–step method?
a. explore b. plan c. solve d. simplify

16. –8 + 13 =
a. 3 b. 4 c. –5 d. 5

17. –4 – 11 =
a. 7 b. –15 c. 15 d. –7

18. (21)(32) =
a. 672 b. 572 c. 472 d. 372

19. 23.52 ÷ 2.8 =
a. 8.1 b. 8.2 c. 8.4 d. 7.4

20. 12.8 – 4.22 =
a. 8.62 b. 8.58 c. 8.28 d. 8.18

21. $\frac{2}{6}+\left(\frac{4}{5}\right)=$
a. 14/15 b. 17/15 c. 17/30 d. 40/30

22. (4.11)(3.2) =
a. 13.152 b. 12.152 c. 11.152 d. 10.152

23. $\left(\frac{4}{5}\right)\div\left(\frac{8}{12}\right)=$
a. 12/20 b. 6/5 c. 1/5 d. 10/40

24. Which of the following is equal to 6/30?
a. 14% b. 15% c. 20% d. 630%

25. Which of the following is equal to 84%?
a. .84 b. 83% c. 8400 d. .84%

26. Which of the following is equal to 8/20?
a. .1 b. .2 c. .3 d. .4

27. Which of the following is equal to 5^3?
a. –125 b. 125 c. 25 d. 15

28. Which of the following is equal to $\sqrt{361}$?
a. 19 b. 11 c. 29 d. 12

29. 2 quarts = _____ pints
a. 3 b. 4 c. 5 d. 6

30. 20 cm = ____m
a. 2 b. .2 c. 20 d. 200

UNIT 2 HAND-IN PROBLEMS

This problem set is intended to challenge the students and encourage students to apply a deep understanding of problem–solving skills.

1. -11.2 + (-57.932) =

2. $5\frac{3}{12} - \left(-3\frac{2}{16}\right) =$

3. -9.276982 ÷ 3.586 =

4. -145 – (-286) =

5. (-14.82)(362.6) =

6. $12\frac{1}{2} \div 7\frac{1}{8} =$

7. The following is a list of the transactions that occurred on a particular bank account during a one month period. There was a $154 deposit, $945 deposit, $150 withdrawal, and a $225 check to the gas company. The balance of the account was $1234 at the end of the month. What was the balance at the beginning of the month?

8. Explain the difference between $\frac{2}{3}$ and $\frac{2}{5}$. Use diagrams to help explain

UNIT 2 PROJECT

Discussion

Think about the last birthday party you went to. Did you choose chocolate or vanilla ice cream to go with your cake? Did you reach for the bowl of chips or pretzels? The previous questions illustrate that different people prefer certain junk foods over others. We all have our favorites. Unfortunately, junk foods are unhealthy for us for a variety of reasons. Some snacks have too many calories or are too high in fat, sodium, or sugar content. Even though we know that junk foods are bad for us it is sometimes too difficult to resist our favorite treats. If we are going to eat junk food let's use our knowledge of percents to improve our nutritional choices. We can look at the nutrition information labels of the product and calculate the percentages of fat, sodium, etc. Then we can compare different brands and pick the "healthiest" choice.

Directions: You research the nutritional information for a category of junk food. Once you have selected your category you will choose five different brands within that category to research. For this project we will focus on fat content. The assignment will be to find the percent of fat for each product and determine which brand has the lowest fat content.

Steps:

1. Choose a junk food category.

2. Choose five brands within the category above.

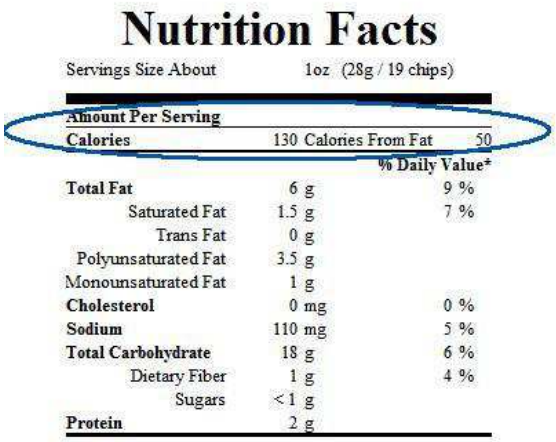
Below are a few tips about choosing your category and brands.

> Make sure that you choose products that are comparable. For example, it makes sense to compare five varieties of chocolate ice cream because they should be essentially the same ingredients. You would expect for the fat content to be similar. On the other hand, it would not make sense to compare chocolate chip cookie dough ice cream to regular chocolate because the ingredients are very different. You would expect that the fat content would be very different.
>
> Remember that you are comparing fat content in this project. Therefore, you should choose a junk food category that has fat calories in it. For example, candy bars would be a good choice because they have calories from fat. You would not want to choose fat free products or soda because those products do not have calories from fat.

3. Look up the nutritional information for each brand. You can look at the actual label on the product or go online to find the information. Make sure that you have a hard copy of the label. You will need it for your poster display.

4. Fill out the attached chart with your nutritional information and calculate all of the percentages.

   Note that we are not looking at the percent of daily value for the fat percentage. We will be calculating the percent of calories from fat per serving. This is an important distinction. Look at the example below.



Nutrition Facts

Servings Size About	1oz (28g / 19 chips)	
Amount Per Serving		
Calories	130 Calories From Fat	50
		% Daily Value*
Total Fat	6 g	9 %
Saturated Fat	1.5 g	7 %
Trans Fat	0 g	
Polyunsaturated Fat	3.5 g	
Monounsaturated Fat	1 g	
Cholesterol	0 mg	0 %
Sodium	110 mg	5 %
Total Carbohydrate	18 g	6 %
Dietary Fiber	1 g	4 %
Sugars	< 1 g	
Protein	2 g	

The percent of daily value for fat is 9%. That means that one serving of this product is 9% of much fat your body needs in one day.

To calculate the percent of calories from fat in one serving you need to use the numbers that have been circled. Answers have been rounded to the nearest hundredth.

$$\frac{Fat}{Total} = \frac{50}{130} = 0.38 = 38\%$$

5. Create a poster display of your nutrition labels and products. See the power point presentation for sample posters.

6. Write a one page paper summarizing your results.

7. Present your project to the class.

Percent of Fat Worksheet

Directions: List the five brands below. Use the nutrition label to fill out the information below. Then set up the ratio of fat calories over the total and convert it to a decimal and a percent. Round the answers to the nearest hundredth.

Junk Food Category: _____

Brands	Calories from Fat	Total Calories	Ratio (Fraction)	Decimal	Percent
1.					
2.					
3.					
4.					
5.					

Unit 3 – Analyzing Data/Probability

3-1 Measure of Central Tendencies

3-2 Stem and Leaf Plots

3-3 Box and Whisker Plots

3-4 Line Plots

3-5 Bar Graphs/Histograms

3-6 Circle Graphs

3-7 Appropriate Displays

3-8 Probability

SWBAT check on the progress of the goal they set during the first chapter
SWBAT write goals for beyond this school year

"If you don't know where you are going, any road will get you there"

Guidelines to Setting and Achieving Goals

In the previous two units, you have written/checked on a goal for this class. We would call this a short-term goal.

1. State that goal.

2. How close are you to achieving that goal?

Today, we would like to think about things that we would like to accomplish over the next few years. We will call them long-term goals.

Create a Vision Board

Whether you realize it or not, most of you are visual learners. So we are going to try to create a visual of what your dreams look like. A vision board is a pictorial demonstration of all of the goals and dreams a person wishes to accomplish. It can include photos of people and places that the person finds inspiring. Uplifting messages and personal words of wisdom can also adorn the board to personally capture the essence of the person. The vision board can simply be a poster or dry erase board but the most important thing is that it is visible in the person's home or room. There is power in having a constant reminder of desires of the heart. It is a powerful message if the teacher makes/displays their vision board with the students.

1. On a separate piece of paper, start to list things you want to accomplish.

2. List some phrases or quotes that inspire you.

3. List people and places that coincide with your dreams.

4. Start to create your vision board. You can draw picture, cut pictures, from magazines, or use actual photos.

Make sure you keep your vision board somewhere you see it everyday.

In the next unit we will be discussing statistics. The following article is meant to give the students an overview of what statistics are and how they are used.

What are Statistics?

Statistics is the collection, organization, and presentation of data. Data is simply pieces of information. Examples of data would be your eye color, your height, what percent of people voted for Barrack Obama, or your grade point average. Statistics are used to summarize large sets of data. Instead of looking at many different numbers, statistics can summarize an entire set of data with one number. Statistics give us a way to look at the big picture and get a much more accurate way of understanding what is going on. For example, your report card represents statistics. Instead of listing your grade for every assignment for every class, your report card just summarizes your overall grade for each class.

There are many different ways to collect and summarize data. Please be aware that the way you collect and present data is important. Statistics are often presented in a way to trick the person reading them. We need to understand how statistics are used as not to be fooled. For example, if you say that you spend 90% of your money on clothes, that might sound bad. But if you only have $30, that represents $27. In this unit, we are going to take a look at a couple of different ways to collect and present data. We are also going to discuss different ways that data is presented in order to mislead its readers.

Why Statistics are Valuable

While there are many ways to be fooled by statistics, we should be aware of how valuable they are. If we want to know whether a baseball player is good or not, we can look at his batting average. Notice how much easier this is compared to looking at all of his 500 at-bats for the entire season. If a researcher wants to know if one method for treating a disease is better than another, it is important that she has some statistics to show what percentage of the time each method worked on comparable groups of patients. If I want to know whether I should wear a seat belt, I'd like to know the percentage of people who survive crashes when wearing seat belts to the number who survive when they don't.

The alternative to statistics is to make guesses from the knowledge of individual cases, and this is likely to be very misleading. The trouble is that we are likely to only know of a few cases personally, and they might not be very representative of the overall situation. For example, we might go to a baseball game and watch one player get three hits. We might assume that he is very good. But if we look at his average for the entire year, it might show us something different.

A second problem is that individual cases we know about may represent a biased sampling of what actually happens. For example, a student might get an 'F' on a particular assignment for not turning it in. We might think that this student is bad. However, this could have been the first assignment that the student missed. This could lead us to a false conclusion about the student.

Questions:

1. In your own words, define statistics.
2. Give an example of a statistic and where you saw it.
3. Give an example of how a statistic could help you.
4. Have you ever been fooled by a statistic, advertisement, or sale? If so, explain.

The following set of problems is a review of rationals. These skills will be used in Unit 4. We are just trying to keep our skills sharp by reviewing once in awhile.

1. $\frac{1}{2}+\frac{3}{5}=$

2. $-\frac{3}{5}-\frac{2}{4}=$

3. $\left(1\frac{1}{3}\right)\left(-\frac{1}{5}\right)=$

4. $-15.12 \div 2.8 =$

5. $-4.8 + 15 =$

6. $4 - 18 =$

7. $(-3.5)(3.56) =$

8. $-2170 \div (-62) =$

9. $\left(2\frac{1}{3}\right)\div\left(-\frac{1}{6}\right)=$

10. $\frac{1}{8}+\frac{4}{10}=$

11. $18 - (-15) =$

12. $\left(3\frac{1}{4}\right)-\left(-\frac{2}{3}\right)=$

13. $(-15.5)(-.05) =$

14. $\left(-\frac{3}{4}\right)\left(-\frac{1}{5}\right)=$

15. $26.88 \div (-3.2) =$

Section 3-1: Measures of Central Tendency (Day 1)

Review Question

What are whole numbers?
What are integers?

Discussion

Consider the points that Kobe Bryant scored in each of his 82 games last year.
How would you summarize this data set?

*Notice how much easier it is to summarize a data set with one number.

SWBAT estimate the mean of a data set using their number sense

Definitions

Central Tendency – one value that describes the middle of a data set

What does average mean?
How do you find an average of a data set?

Example 1: Estimate the mean of the following data set: 1, 3, 5, 7, 9?
Explain your answer.

Example 2: Estimate the mean of the following data set: 10, 11, 75, 78, 95?
Explain your answer. Why is this problem more difficult?

Example 3: Estimate the mean of each of the following data sets? Explain your answer.

a. 1, 2, 3, 4, 5
b. 1, 2, 3, 4, 10
c. 1, 2, 3, 4, 50
d. 1, 2, 3, 4, 100
e. 1, 2, 3, 4, 500

Why did you increase your guess for each of the data sets?
How did you know how much to increase your guess by?

Example 4: Estimate the mean of each of the following data sets? Explain your answer.

a. 4, 10, 15, 30, 60, 72
b. 10, 50, 100, 180, 185
c. 2.3, 2.8, 3.1, 4.5, 4.6, 4.7
d. $\frac{1}{5}, \frac{1}{4}, \frac{1}{3}, \frac{1}{2}$

You Try!

Estimate the mean of each of the following data sets? Explain your answer.

1. 2, 5, 8, 10, 12

2. 7, 17, 47, 67, 87, 107

3. 14, 20, 22, 80, 86, 99

4. 1.1, 2.1, 3.1, 4.1, 5.1

What did we learn today?

Section 3-1 In-Class Assignment (Day 1)

Estimate the mean of each of the following data sets. Explain your answer.

1. 1, 2, 3, 4, 5, 6, 7

2. 20, 40, 60, 100, 150,

3. 1, 3, 5, 7, 9, 11

4. 2, 10, 25, 30, 40, 10000

5. 37, 37, 43, 43, 46

6. 2, 8, 16, 21, 23, 28, 29, 37, 46

7. 14, 6, 8, 10, 9, 5, 7, 13

8. 7.5, 7.1, 7.4, 7.6, 7.4, 9.0, 7.9, 7.1

9. 10.4, 15.6, 20.8, 40.7, 70.5

10. $\frac{1}{8}, \frac{1}{4}, \frac{1}{2}, \frac{3}{4}$

Section 3–1: Measures of Central Tendency (Day 2)

Review Question
Estimate the mean of the following data set: 1, 10, 20, 40, 60, 100
Explain your answer.

Discussion
Consider your last six grades on math tests: 42, 95, 98, 94, 99, 96
Would you use the mean (average) to describe your grade?
Would it be fair?
We need better ways to summarize data sets.

SWBAT define data
SWBAT define and calculate mean, median, mode, and range

Definitions
Data – pieces of information

Examples: ages, salaries, population

Mean – average; add up the numbers then divide by the total amount of numbers

Median – middle number when the data set is in order

Mode – appears most often; can be more than one mode

Range – the difference between the biggest number and the smallest number

Example 1: Siblings's ages – 8, 9, 12, 15, 16, 18, 20. Find mean, median, mode, and range.
* Each of those numbers is considered *data*. The group of numbers is a *data set*.

Example 2: Cousin's ages – 8, 12, 8, 17, 14, 18, 20, 32. Find the mean, median, mode, and range.
*** Notice the difference in finding the median when the data set has an even amount of numbers**

Example 3: Make up a data set with 7 numbers with the following characteristics
Mean: 8 Median: 6 Mode: 2 (2, 2, 4, 6, 7, 8, 27)

You Try!

Find the mean, median, mode, and range. Then write a sentence that describes what the data set could represent.

1. 4, 7, 9, 12, 2, 8, 7

2. 70, 88, 85, 78, 88, 70

3. Make up a data set with 6 numbers that has the following characteristics:
   Mean: 6 Median: 5 Mode: 1

What did we learn today?

Section 3-1 Homework (Day 2)

Write down a guess for the mean. Then calculate the exact value of the mean.

1. 1, 2, 3, 4, 5, 6, 7
Guess:
Actual:

2. 20, 40, 60, 100, 150,
Guess:
Actual:

3. 1, 3, 5, 7, 9, 11
Guess:
Actual:

4. 2, 10, 25, 30, 40, 10000
Guess:
Actual:

Find the mean, median, mode, and range for each of the following data sets. Then write a sentence that describes what the data set could represent.

5. 41, 37, 43, 43, 36

6. 2, 8, 16, 21, 3, 8, 9, 7, 6

7. 14, 6, 8, 10, 9, 5, 7, 13

8. 7.5, 7.1, 7.4, 7.6, 7.4, 9.0, 7.9, 7.1

9. Make up a data set with 7 numbers that has the following characteristics:
   Mean: 10, Median: 8, Mode: 4.

10. Make up a data set with 6 numbers that has the following characteristics:
    Mean: 5, Median: 3, Mode: 1.

Section 3–1: Measures of Central Tendency (Day 3)

Review Question
How do you find the mean?
How do you find the median?

Discussion
Yesterday, we defined and calculated the mean, median, and mode of data sets. These values are called measures of central tendencies. They are called this because they each describe the middle of a data set. Today, we are going to try to figure out which one best describes a data set.

What is the mean of each data set?
What is the median of each data set?

	Mean	**Median**
1, 2, 3, 4, 5		
1, 2, 3, 4, 10		
1, 2, 3, 4, 50		

What is happening to the mean and median?
*Notice by changing one number the mean is affected greatly while the median barely changes.

SWBAT choose the correct measure of central tendency to summarize a data set

Example 1: Number of books read – 1, 1, 2, 2, 3, 3, 4, 55, 65
What is the mean?
What is the median?
What number better summarizes the data set? Why?

*Use the mean when the numbers are close together.
*Use the median when the numbers are far apart.

Example 2: 1, 2, 3, 4, 5, 100
What is the mean?
What is the median?
What number better summarizes the data set? Why?

Example 3: 10, 16, 24, 26, 27, 29
What is the mean?
What is the median?
What number better summarizes the data set? Why?

You Try!

Find the mean, median, mode, and range. Then state whether the mean or median would best describe the data set.

1. 2, 4, 6, 8, 10, 18, 20

2. 5, 5, 10, 20, 50, 1000

What did we learn today?

Section 3–1 Homework (Day 3)

Find the mean, median, mode, and range for each of the following data sets. Then state whether the mean or median would best describe the data set.

1. 1, 2, 2, 4, 5, 6, 7, 100

2. 85, 86, 85, 96, 96, 97, 98

3. 3, 4, 8, 10, 14, 18

4. 5, 6, 12, 20, 25, 30, 35

5. 3.2, 3.5, 3.7, 3.2, 3.1 3.8

6. 10, 11, 11, 12, 13, 14, 150

7. What effect does a large number have on a data set's mean?

8. What effect does a large number have on a data set's median?

9. Make up a data set with 7 numbers that would be best described by the median.

10. Make up a data set with 7 numbers that would be best described by the mean.

11. Most teachers make between $30,000 and $40,000. Some teachers make $90,000. Would the mean or median be a better way to summarize the teacher's salaries? Why?

12. Consider the data set of the amount of children in 500 different families. The mean amount of children was 2.75 and the median amount of children was 2. Why isn't the mean a good representation of the amount of children that an "average" family has?

Section 3-2: Stem-and-Leaf Plots (Day 1)

Review Question
When should you use the mean to summarize a data set?
When should you use the median to summarize a data set?

Discussion
On average, the Steelers score 21 points per game.
What does this statistic tell us about the data set of all of the Steelers' scores?
What else do you need to know in order to tell if their offense is good?
In this case, we would like to see more of the data

SWBAT organize and interpret data in stem-and-leaf plots

Definitions
Stem-and-leaf plot - shows how often data values occur and how close/far apart they are

Why do we graph data sets?

Example 1: Making a stem and leaf plot:
Super Bowl winning scores from 1985-2002:

38, 46, 39, 42, 20, 55, 20, 37, 52, 30, 49, 27, 35, 31, 34, 23, 34, 20.

Organize the data into a stem-and-leaf plot.

Stems	Leaves
2	**0 0 0 3 7**
3	**0 1 4 4 5 7 8 9**
4	**2 6 9**
5	**2 5**

Key: 5|2 = 52

Example 2: Making a stem and leaf plot:
Number of songs on your ipod:
118, 166, 139, 185, 144, 164, 121, 137, 142, 147, 127, 137, 131, 134, 169, 147, 155, 160

Stems	Leaves
11	**8**
12	**1 7**
13	**1 4 7 7 9**
14	**2 4 7 7**
15	**5**
16	**0 4 6 9**
17	
18	**5**

Key: 18|1 = 181

Example 3: Reading a stem and leaf plot: The stem-and-leaf plot below shows a math class' test scores.

Stems	Leaves
6	**0 9 9**
7	**1 3 5 6 7 8 9**
8	**0 2 3 7 8 9 9 9**
9	**0 1 2 3 5 7**

Key: 7|1 = 71

1. What is the lowest score?
2. What is the greatest score?
3. How many numbers over 87?
4. Find the mode of the data.
5. Find the median of the data.
6. Find the mean of the data.
7. Find the range of the data.

You Try!

Draw a stem and leaf plot. Then find the mean, median, mode, and range.
Does the mean or median best describe the data set?

1. 10, 10, 12, 18, 22, 24, 41
2. 113, 114 , 121, 132, 162, 360

What did we learn today?

Section 3-2 Homework (Day 1)

Make a stem-and-leaf plot for each set of data.

1. 23, 36, 24, 13, 24, 25, 32, 33, 17, 26, 24

2. 347, 334, 346, 330, 348, 347, 359, 344

For problems 3-5, use the stem-and-leaf plot at the right that shows the number of hours per week certain students worked.

1	1 1 4 5
2	0 5 6
3	1 8 8 9

Key 2 | 0 = 20

3. How many students are represented on the stem-and-leaf plot?

4. Find the median of the data.

5. Find the mode of the data.

Determine the mean, median, mode, range of the data shown in each stem-and-leaf plot.

6.

0	1 2 2 3
1	3 4 5 5
2	0 0 0 1 3

Key 2 | 0 = 20

mean = median =

mode = range =

7.

2	0 0 0 2 3 5 7
3	1 2
4	0

Key 4 | 0 = 40

mean = median =

mode = range =

8.

22	1 1 2 7
23	3 3 9
24	0 6 8

Key 24 | 0 = 240

mean = median =

mode = range =

9.

0	1 3 3 4 7
1	2 2 2 4 5 6
2	0 0 0 1

Key 2 | 0 = 20

mean = median =

mode = range =

Section 3-2: Stem-and-Leaf Plots (Day 2)

Review Question
What does a stem and leaf plot show us?

Discussion
Why would we want to graph an entire set of data in a stem and leaf plot instead of summarizing by using the mean?
Can you give an example of a data set where this is the case?

SWBAT organize and interpret data in stem-and-leaf plots

***Use Calculators**

Example 1: Teacher's ages: 22, 24, 24, 32, 35, 41, 52, 52, 52, 55
Find the mean, median, mode, and range.
Draw a stem and leaf plot.

2	2 4 4
3	2 5
4	1
5	2 2 2 5

Key 2 | 2 = 22

You Try!
Draw a stem and leaf plot.
Find the mean, median, and mode.
Does the mean or median best describe the data set?
What could the data represent?

1. 8, 9, 21, 11, 18, 9, 14, 25, 26

2. 223, 225, 228, 245, 248, 252

Activity
Have the class create a human stem and leaf plot based on their height.
What stems are needed?
What other things do we need to consider?

What did we learn today?

Section 3–2 Homework (Day 2)

For each data set:
1. **Make a stem-and-leaf plot for each set of data.**
2. **Find the mean, median, mode and range.**
3. **Write a sentence that could describe what the data could represent.**

1. 18, 24, 24, 13, 12, 28, 31, 33, 34, 29, 24

2. 242, 245, 246, 230, 248, 247, 254, 244

3. 2, 5, 10, 12, 6, 6, 8, 11, 21, 15, 26, 28, 2, 16

4. 78, 64, 81, 85, 68, 91, 88, 94, 67, 76, 82

5. Write a sentence that describes a data set that has only one stem. Then make up numbers for the data set. Then draw a stem and leaf plot for the data set. Finally, find the mean, median, and mode of the data set.

Section 3-3: Box-and-Whisker Plots (Day 1)

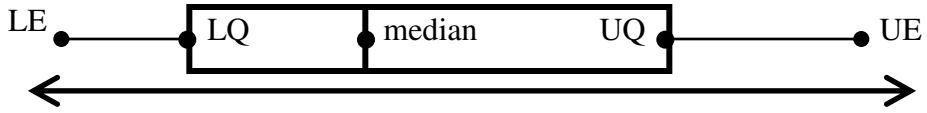
Review Question
What does a stem and leaf plot show us?

Discussion
The average score for your class on the last test was 80.
How well does that describe the class results?
Why doesn't this tell us the entire story?
What other information would be useful?

SWBAT display data in a box and whisker plot
SWBAT to read a box and whisker plot

Definitions
Box and Whisker plot - graph that uses five critical vales of a data set

Five critical points in a box and whisker plot:
Lower Extreme – smallest number
Upper Extreme – greatest number
Median – middle number
Lower Quartile – median of the lower half
Upper Quartile – median of the upper half



Example 1: Making a box and whisker plot:
2, 3, 4, 5, 6, 7, 8

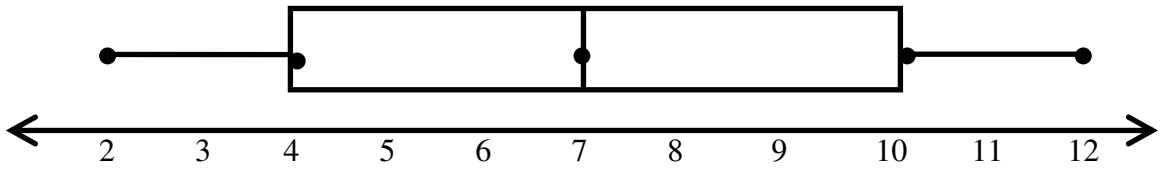
LE: 2 LQ: 3 Median: 5 UQ: 7 UE: 8

Example 2: Making a box and whisker plot
12, 8, 6, 8, 2, 20, 16, 10

Rewrite the data set in order: 2, 6, 8, 8, 10, 12, 16, 20
***Be careful when dealing with a data set that has an even amount of pieces.**

LE: 2 LQ: 7 Median: 9 UQ: 14 UE: 20

Example 3: Reading a box and whisker plot



Find the following values.

Lower Extreme: 2 Upper Extreme: 4 Median: 7 L ower Quartile: 10 Upper Quartile: 12

You Try!

Find the mean, median, and mode. Draw a stem and leaf plot. Draw a box and whisker plot.

1. 10, 12, 18, 20, 28, 34, 36, 37, 48
2. 35, 36, 44, 46, 50, 56, 58, 67, 71, 72

What did we learn today?

Section 3-3 Homework (Day 1)

For each data set do each of the following:

1. **Find the mean, median, and mode**
2. **Circle which one (mean or median) best summarizes the data set**
3. **Draw a stem and leaf plot**
4. **Draw a box and whisker plot**

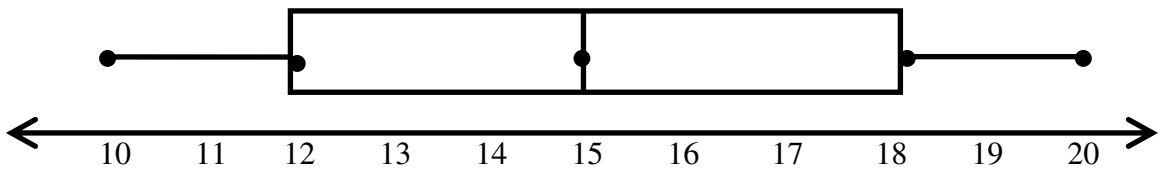
1. 2, 4, 6, 8, 10, 12, 60

2. 100, 140, 120 115, 180, 185, 120, 100

3. 80, 60, 90, 92, 86, 100, 45

4. 10, 12, 14, 18, 20, 90, 100

5. Find the following values. Lower Extreme, Upper Extreme, Median, Lower Quartile, and Upper Quartile.



Section 3–3: Box-and-Whisker Plots (Day 2)

Review Question
What does a box and whisker plot show us?

Discussion
Why would we want to graph an entire set of data in a box and whisker plot instead of summarizing by using the mean?
Can you give an example of a data set where this is the case?

SWBAT work in a small group cooperatively
SWBAT calculate the mean, median, mode, and range of a data set
SWBAT identify the measure of central tendency that best summarizes a data set
SWBAT draw a stem and leaf plot given a data set
SWBAT draw a box and whisker plot given a data set

Activity
Put students into small groups. Each group receives one dry erase board. Each person in the group can do part of the problem. Have the groups write the solutions on the dry erase board. Put the dry erase boards on the chalk ledge. Compare the positives and negatives of each solution.

For each data set do each of the following:
1. **Find the mean, median, mode, and range**
2. **Circle which one best summarizes the data set**
3. **Draw a stem and leaf plot**
4. **Draw a box and whisker plot**
5. **Write a sentence describing what the data set could represent**

Example 1: 2, 8, 8, 12, 13, 18, 20, 22, 23, 28

Example 2: 22, 22, 23, 25, 29, 32, 32, 36, 45, 46, 48

Example 3: 112, 121, 125, 127, 131, 134, 136, 137, 138, 138, 139, 550

Example 4: 10, 20, 30, 31, 32, 33, 34, 35, 36, 37, 38, 39, 40

What did we learn today?

Section 3–3 Homework (Day 2)

1. Jerome Bettis' Career Yards: Use the table below. (Use the "yards" column for your data.)

a. List the data in order from least to greatest.

b. What is the lower extreme?

c. What is the upper extreme?

d. What is the median?

e. What is the lower quartile?

f. What is the upper quartile?

g. Make a box-and-whisker plot of the data.

Year	Yards
1993	1429
1994	1025
1995	637
1996	1431
1997	1665
1998	1185
1999	1091
2000	1341
2001	1072
2002	666
2003	811
2004	941
2005	368

2. The following numbers represent the prices (in dollars) of mp3 players on an electronic store's website: 100, 125, 115, 119, 107, 110, 108, 127, 100, 102, 127, 115.

a. How many mp3 players are represented?

b. List the data in order from least to greatest.

c. Find the mean, median, mode, and range.

d. Make a stem-and-leaf plot of the data.

e. Find the five critical values for a box-and-whisker plot from the data set.

f. Make a box-and-whisker plot of the data.

Section 3-4: Line Plots

Review Question
What does a box and whisker plot show us?

Discussion
What are some ways to summarize a data set?
When was each one of these methods useful?
What previous method would be good if we were graphing all of the heights of the students and teachers in a 7th grade class room if the teacher is 6'6"?

*Notice this data set is unique. It contains many heights that are close to each other plus one that is far away from the others. A line plot would be great because it shows outliers and clusters.

SWBAT construct a line plot given a set of data
SWBAT interpret a line plot

Definitions
Line plot - shows how often data values occur and patterns within a data set

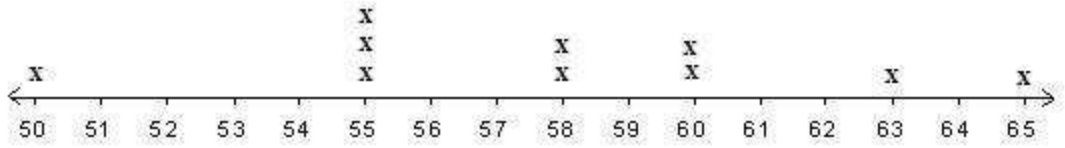
Cluster – group of data close together

Outlier – data that is far away from the rest of the data

*Discuss what "far away" means. If we are talking about test scores then a data point that is 30 points would be far away. But if we were talking about the weight of dinosaurs then 30 pounds would not be far away.

Example 1: Find the heights of all the students in inches. Construct a line plot.

Here is a sample class of 10 students.
Student's Height in inches: 50, 55, 55, 55, 58, 58, 60, 60, 63, 65



Sample Class: Height of Students (inches)

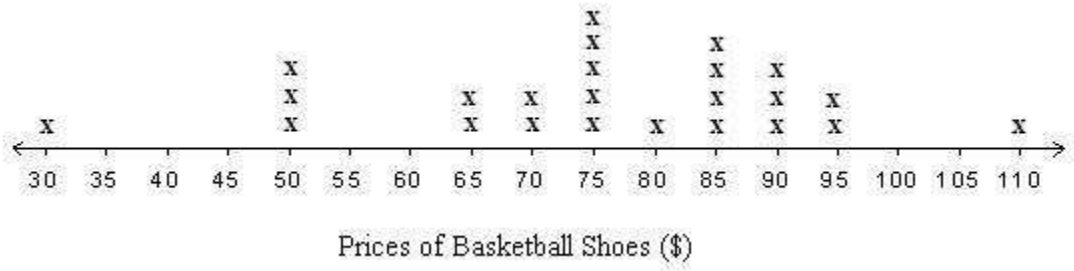
Are there any clusters or outliers?
Write one sentence that summarizes the data set.

Keys to constructing a line plot.
1. Picking a good starting and end point.
2. Pick a good scale.

- Both of these decisions need to be made based on the data set.

Example 2: Prices of Basketball Shoes

Prices of Basketball Shoes ($)							
50	30	65	70	90	90	90	85
75	65	70	50	85	95	75	85
85	50	95	110	75	75	80	75



Notice the starting and ending points. Also, we can use a scale of '5' because of the data.

Are there any clusters or outliers?
Write one sentence that summarizes the data set.

You Try!

1. Ages of Teachers

Ages of Teachers (years)							
30	34	58	26	22	40	46	33
31	29	26	34	39	41	34	29
38	42	40	32	46	43	42	33

Calculate the mean, median, mode, and range.
Construct a stem/leaf plot.
Construct a box and whisker plot.
Construct a line plot.
Are there any clusters or outliers?
Write one sentence that summarizes the data set.

What did we learn today?

Section 3–4 Homework

For the each of the following data sets do each of the following:
a. Make a line plot for each set of data.
b. Identify any outliers or clusters.
c. Write a sentence that summarizes the data set.

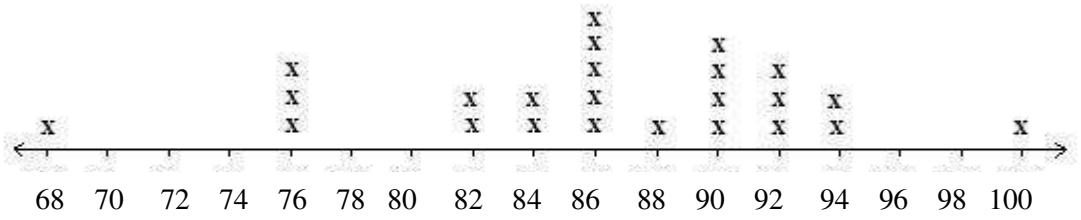
1. 23, 20, 23, 32, 35, 26, 35, 44, 23, 26, 32, 32

2. 133, 139, 133, 139, 132, 132, 132, 134, 132, 134, 138, 134, 132

For the following data set do each of the following:
a. Find the mean, median, mode, and range.
b. Draw a stem and leaf plot.
c. Draw a box and whisker plot.
d. Draw a line plot.
e. Write a sentence that summarizes the data set.

3. 100, 104, 100 102, 108, 109, 103, 102, 101, 100, 102, 104, 103

4. The line plot shows the quiz scores of students in a math class.



a. Identify any clusters or outliers.
b. What was the highest quiz score?
c. What was the lowest quiz score?
d. How many numbers are in the data set?
e. Find the mean, median, mode, and range of the data set?
f. What percent of the students received a 76?
g. Write one sentence that summarizes the data set.

Section 3–5: Bar Graphs & Histograms (Day 1)

Review Question
What are the different ways that we have been summarizing data?

Discussion
What type of graph would you use to show the number of wins each team in the Steelers' division had?
Why wouldn't a stem/leaf plot be good?
Why wouldn't a box/whisker plot be good?
Why wouldn't a line plot be good?

SWBAT read a bar graph
SWBAT construct a bar graph

Definitions
Bar graph – displays *quantities* of data that have been organized into *categories*

Why do we graph data sets?

Example 1:

Reading a bar graph:

The bar graph below shows the student enrollment for six different Pittsburgh districts.

1. Which school district has the greatest enrollment?

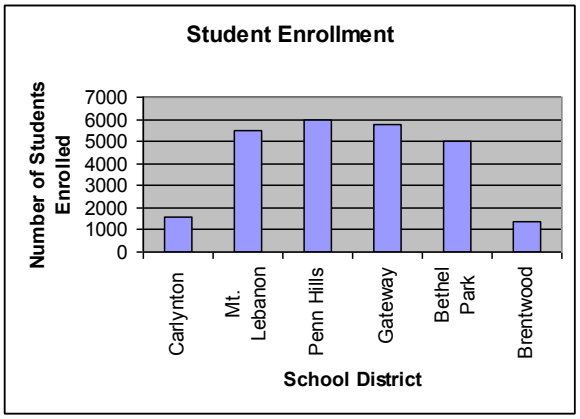
   Penn Hills

2. Which school district has the least enrollment?

   Brentwood

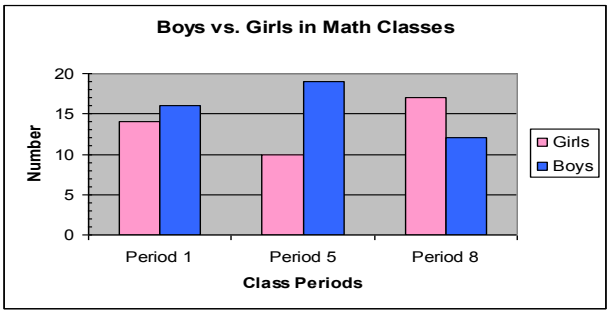
3. How many students are enrolled in the Bethel Park School District?

   5000



Example 2:

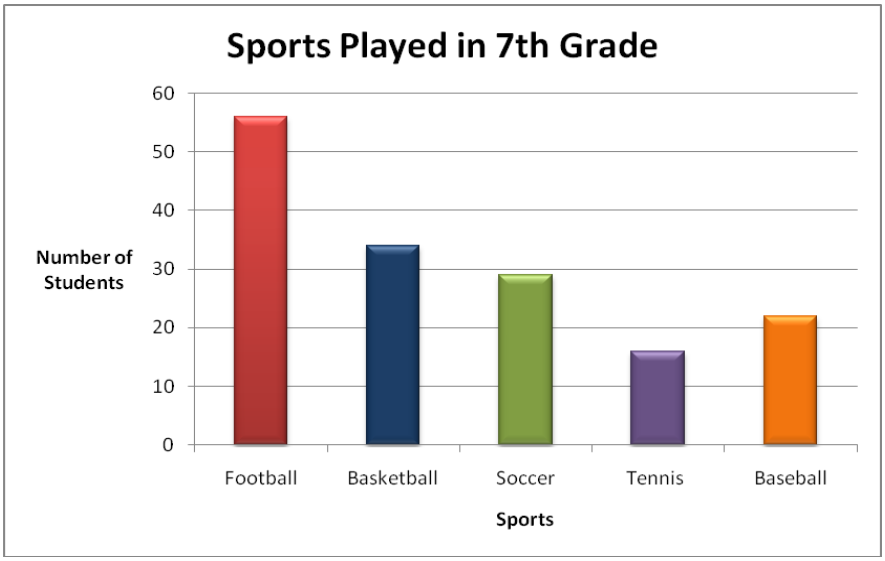
Reading Double-Bar Graphs



1. How many students are in each class period?
2. What percent of Period 1 is boys?
3. What percent of Period 5 is girls?

Example 3: Making a bar graph

Sports	Number of Students
Football	56
Basketball	34
Soccer	29
Tennis	16
Baseball	22



You Try!

1. Students were surveyed about their favorite color. The results are as follows:
   Blue: 26, Green: 12, Pink: 8 Yellow: 4, Red: 18. Make a bar graph of the results.

What did we learn today?

Section 3–5 Homework (Day 1)

1. Students were surveyed about their favorite sport. The table below displays the results.

Sport	Number of Students
Football	45
Basketball	65
Baseball	38
Hockey	32
Golf	20

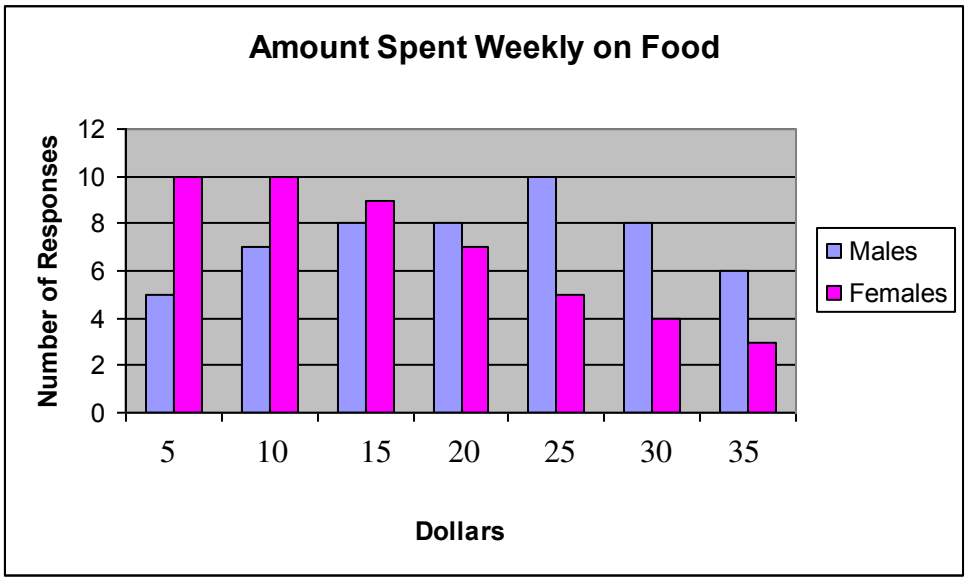
a. Draw a bar graph of the data.

b. How many students were surveyed?

c. How many more students chose basketball than hockey?

d. What *percent* of the students chose each sport?

2. The double bar graph below shows the amount of money spent weekly on food.



a. How many males were surveyed?

b. How many females were surveyed?

c. What percent of people surveyed were males?

d. What percent of people that spent $5 were females?

3. Does there appear to be a relationship between gender and amount of money spent weekly on food? Explain thoroughly.

Section 3–5: Bar Graphs & Histograms (Day 2)

Review Question
What does a bar graph show?

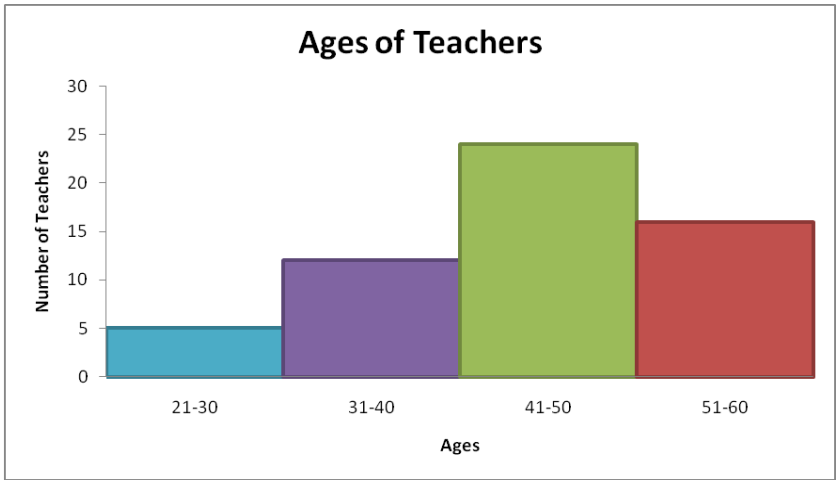
Discussion
Consider the following data set: the attendance at all 81 of the Pirates homes games.
What graph would you use? Why?
Why wouldn't a stem/leaf graph work?
Why wouldn't a box/whisker plot work?
Why wouldn't a bar graph work?
We need something else.

SWBAT read a histogram
SWBAT construct a histogram
SWBAT choose the correct graph to use given a data set

Definitions
Histogram – displays *frequency* of numerical data that have been organized into equal *intervals*

How is a histogram different from a bar graph?
Why do we graph data sets?

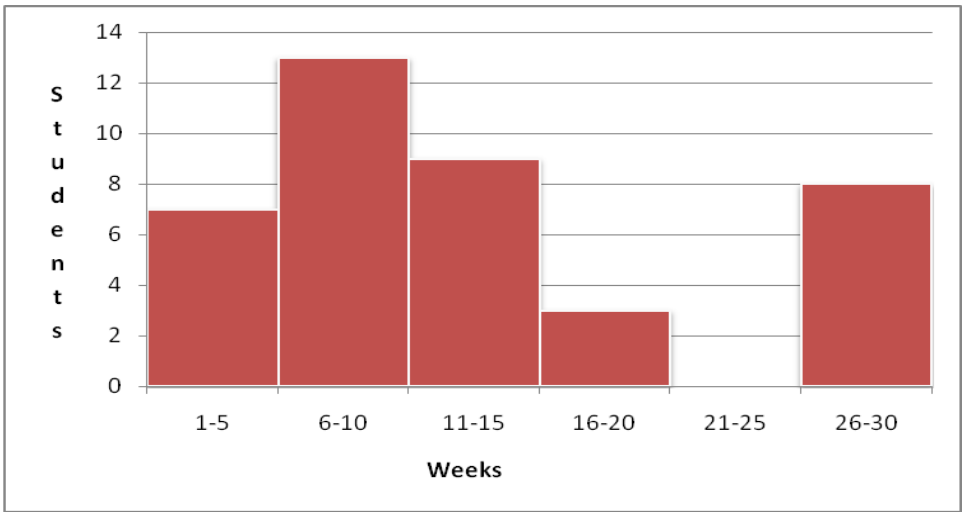
Example 1:



a. How many teachers are between the ages of 31-40?
b. How many teachers are over 41 years old?
c. How old is the oldest teacher?

Example 2: Create a histogram given a frequency table.

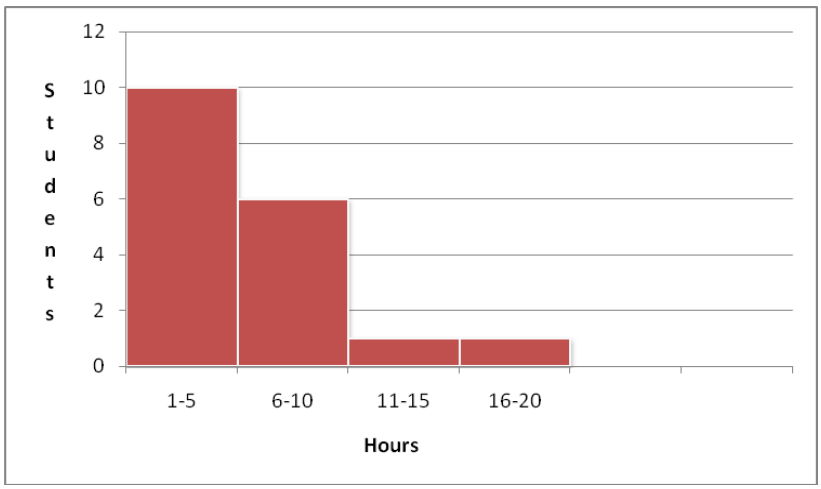
Weeks without a Detention	
Weeks	**Frequency**
1-5	7
6-10	13
11-15	9
16-20	3
21-25	0
26-30	8



Example 3: Create a histogram given a data set.
The data shows the number of hours students watch TV in one week:
5, 8, 10, 1, 3, 2, 4, 6, 2, 9, 12, 18, 9, 4, 5, 6, 2, 1

Organize the data into a frequency table.
What size should the intervals be?

Hours of TV	Frequency
1-5	10
6-10	6
11-15	1
16-20	1



Example 4: Should you use a bar graph or histogram to summarize each data set?

a. The number of students that chose certain colors as their favorite.

b. The age of the presidents when they were elected.

c. The grades of students in this class.

You Try!

1. The data shows the tests scores for Period 8
   75, 62, 92, 91, 68, 84, 85, 72, 88, 97, 87, 94, 72, 75, 77, 84, 81

a. Organize the data in a frequency table. (choose good intervals)
b. Make a histogram using the frequency table.

What did we learn today?

Section 3–5 Homework (Day 2)

1. Use the information in the table to the right.

a. Display the data in a histogram.

b. How many states had a voter turnout of 35%-39% more?

c. How many states had fewer than 40% voting?

Voter Participation by State	
Percent Voting	**Frequency**
30 – 34	4
35 – 39	9
40 – 44	10
45 – 49	16
50 – 54	9
55 – 59	1
60 – 64	1

2. Use the following quiz scores:
60, 89, 92, 58, 79, 78, 75, 95, 97, 75, 83, 80, 82, 91, 96, 55, 56, 76, 86, 90, 80, 72, 90, 64

a. Using intervals of 10, create a frequency table of the data.

b. Use your frequency table to make a histogram.

c. How many students scored more than 87 percent?

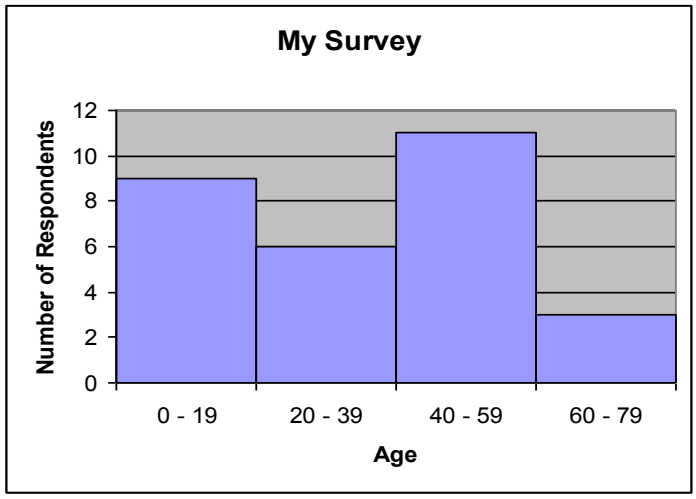
d. How many students scored at least 78 percent?

3. Use the histogram at the right.

a. What size are the intervals?

b. Which interval contains the median age?

c. How many respondents were 25 years old?



4. How are bar graphs and histograms similar?

5. How do bar graphs and histograms differ?

Section 3–5: Bar Graphs & Histograms (Day 3)

Review Question
What is the difference between a bar graph and histogram?

Discussion
Can someone give me an example of a data set where we would use a bar graph?
Can someone give me an example of a data set where we would use a histogram?

SWBAT read and create a bar graph and histogram

You Try!
1. Students were surveyed about their favorite brand of shoes. The results are as follows:
   Jordans: 86, Nike: 48, Adidas: 28, Converse: 4, Vans: 18

Make a bar graph

2. The data shows the ages of teachers.
   25, 22, 52, 61, 42, 38, 44, 45, 52, 28, 27, 47, 54, 62, 55, 27, 54, 31

Organize the data in a frequency table first.
Make sure to choose good intervals.
Then make a histogram using the frequency table.

Activity
1. Make up a data set with 5 data points that would be appropriate for a bar graph.
2. Make up a data set with 10 data points that would be appropriate for a histogram.

For each data set:
   a. Write a sentence describing your data set.
   b. List the data set.
   c. Draw the appropriate graph.

What did we learn today?

Section 3–6: Pie Graphs (Day 1)

Review Question
What is the difference between a bar graph and a histogram?

Discussion
What have we been talking about?
How do we summarize data?
Consider the following data set:
Favorite color percentages:
Red 22%, Blue 28%, Green 38, Pink 12%
What graph would you use to summarize this data set?

SWBAT read and create pie graphs

Definitions
Pie graph - graph that uses percents

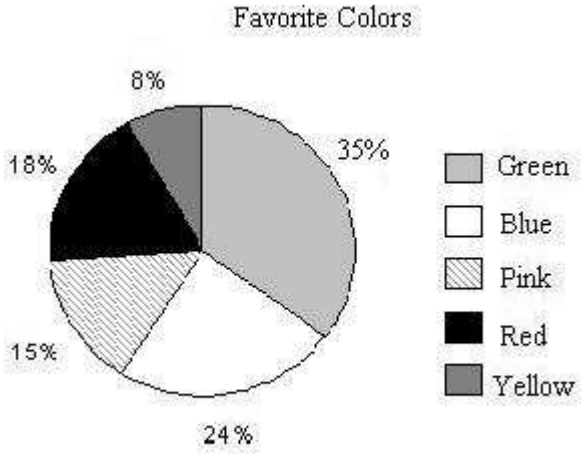
You should like pie graph because you understand percents. For example, you understand a 92% on a quiz better than a 49/53 on a quiz.

Where do you see them?
What do they represent?

Example 1: Using your number sense to draw a pie graph.
Listed below are the results to a survey of students on what their favorite color is:

35% Green
24% Blue
15% Pink
18% Red
8 % Yellow

Make a pie graph based on these results.
What color should we put in the chart first? Why?
What color should we put in next? Why?



Example 2: Making a Pie Graph
Students in 8th grade were asked to choose their favorite subject. The results are listed below

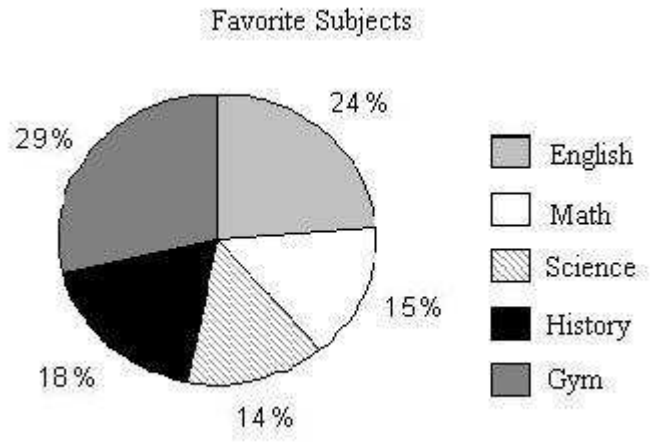
48 English
30 Math
28 Science
36 History
58 Gym

What do we need to make a pie graph?

English – 48/200 = .24 = 24%
Math – 30/200 = .15 = 15%

Have the students calculate the other subject's percents.

Draw the pie graph together. Show students how to estimate percents on the pie graph by using 50% and 25% to guide them.



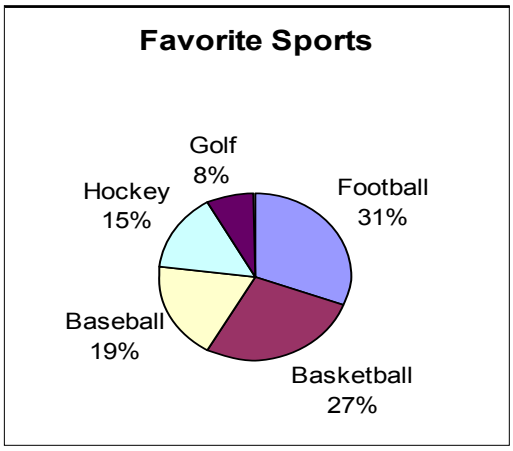
You Try!

1. Make a pie graph given the data set of favorite cars:
   Mustangs - 14, Escalade – 22, Ferrari - , Lamborghini - 4, Honda Accord - 10

What did we learn today?

Section 3–6 Homework (Day 1)

Students were surveyed about their favorite sport. The results are shown in the circle graph below.



1. Which sport was *most* popular?

2. Which sport was *least* popular?

3. What percent of the students chose hockey *or* baseball as their favorite?

4. What percent of the students chose football *or* golf as their favorite?

5. What percent of the students *did not* choose basketball as their favorite?

6. You make $1800 per month. Your monthly expenses are shown below.

Mortgage - $756

Entertainment - $180

Transportation - $468

Utilities - $396

Calculate what percent of money is spent on each expense then draw a pie graph.

Mortgage –

Entertainment -

Transportation –

Utilities –

Section 3–6: Pie Graphs (Day 2)

Review Question
When do we use pie graphs?

Discussion
What have we been talking about?
How do we summarize data?

SWBAT review the different ways to summarize a data set

You will work together to come up with thorough solutions to the following questions. The solutions will include calculation and sentences.

What did we learn today?

Section 3–6 In-Class Assignment (Day 2)

Find the mean, median, mode, and range for each of the following data sets. Then state whether the mean or median would best describe the data set.

1. 1, 2, 2, 4, 6, 8, 150

2. 61, 71, 63, 66, 84, 85, 86, 88

Make a stem-and-leaf plot for the following set of data.

3. 13, 26, 24, 11, 24, 21, 32, 35, 13, 26, 24

Make a box and whisker plot for the following sets of data. (list the 5 critical points)

4. 2, 5, 7, 13, 17, 21, 25

5. 23, 36, 24, 13, 24, 25, 32, 33

Make a line plot for the following set of data. Write one sentence that summarizes the data.

6. 13, 22, 24, 12, 22, 25, 23, 23, 24, 24, 41

7. Students were surveyed about their shoes. The table below displays the results. Draw a bar graph of the data.

Shoes	Number of Students
Nike	82
Jordan's	65
Adidas	23
Reebok	13
Etnie's	8

8. The following scores represent the total points earned for student's notebooks.
40, 38, 41, 48, 36, 50, 45, 38, 43, 46, 39, 47, 46, 41, 50, 41, 49, 48, 47, 31,

a. Using intervals of 5 to create a frequency table.

b. Use the frequency table to create a histogram.

c. How many students scored more than 41 points?

d. How many students scored less than 35 points?

9. The following is a summary of the amount of votes each grammy nominee received.

Ne-Yo: 44, Lil Wayne: 28, Jay-Z: 52, Kayne West: 16, TI: 25

a. Calculate what percent of votes each artist received.
b. Draw a pie graph.

10. Describe a data set where a bar graph should be used.

11. Describe a data set where a histogram should be used.

12. Describe a data set where a pie chart should be used.

13. Why do we use graphs to summarize data?

Section 3–7: Appropriate Displays (Day 1)

Review Question
What are the different ways that we have been summarizing data?

Discussion
Consider the data set of the test scores of twenty students.
What would be the best way to summarize this data set? Why?
What would be the worst way to summarize this data set? Why?

SWBAT choose an appropriate graph to use given a data set

Choosing the appropriate graph.

Definitions
Bar graph - categories
Ex: favorite sport

Histogram - intervals
Ex: people's salaries

Pie graph - percents
Ex: percent of money spent on clothes, car, gas, etc.

Stem/Leaf, Line Plot – need to see entire data set
Ex: class grades on a test

Box/Whisker Plot – display critical points of the data set; lowest/highest, median
Ex: standardized test results (AP results)

Example 1: Have the students come up with a data set for each of the previous examples.

Example 2: Which graph should we use?
a. Show how many games each baseball team won.
b. Show the amount of teams that won 71-80, 81-90, and 91-100 games.
c. Show the most wins, least wins, and median wins.
d. Show what percent of games were played at night and during the day.
e. Show the amount of games that the teams in the Pirates division won.

Activity
Each group will be assigned particular graph. (Bar graph, Histogram, Pie graph, Stem/Leaf, Line Plot, and Box/Whisker Plot) Your group must make up a data set that is appropriate for their assigned graph. The data set must contain at least ten points. They must write a sentence describing their data set. Then draw a graph of the data set.

What did we learn today?

Section 3–7 Homework (Day 1)

1. What graph would you use to summarize each of the following situations?

a. The percent of students who like math, gym, and English.

b. The number of students who like math, gym, and English.

c. The number of students who study between 0-2, 3-5, and 6-8 hours per week

d. Show the highest grade, lowest grade, and median grade.

e. Show all of the students' number grades in period 1.

2. a. Why wouldn't you use a pie graph to summarize the number of songs on 100 different students' ipods?

b. What type of graph would you use to summarize the data set in question #2a?

Section 3-7: Appropriate Displays (Day 2)

Review Question
What are the different ways that we have been summarizing data?

Discussion
When do we use each of the graphs?

Bar graph - ?

Histogram – ?

Pie graph – ?

Stem/Leaf, Line Plot – ?

Box/Whisker Plot – ?

SWBAT choose an appropriate graph to use given a data set

You Try!
1. Find the mean, median, mode, and range. Then circle which one describes the data set best.
   1, 2, 3, 5, 8, 10, 12, 15, 18

2. Find the mean, median, mode, and range. Then circle which one describes the data set best.
   2, 2, 5, 8, 13, 14, 15, 180

3. Make an appropriate graph of percent of students that like each teacher based on the following votes: Ms. Ward: 23, Mrs. Sirianni: 28, Mr. Kozy: 41, Mr. Pepe: 15.

4. Make an appropriate graph to show the grades of every student in period 5.
   72, 84, 65, 92, 93, 76, 86, 78, 91, 93, 72, 83, 91, 86, 83, 85, 79, 88

5. Make an appropriate graph to show how many students chose each teacher as their favorite based on the following votes: Ms. Ward: 23, Mrs. Sirianni: 28, Mr. Kozy: 41, Mr. Pepe: 15.

6. Make an appropriate graph to show how many students got between 70-79, 80-89, 90-99.
   72, 84, 65, 92, 93, 76, 86, 78, 91, 93, 72, 83, 91, 86, 83, 85, 79, 88

What did we learn today?

Section 3–7: Appropriate Displays (Day 3)

Review Question
Given a data set that contains the profits of a company for each of the last 12 months, what graph should we use?

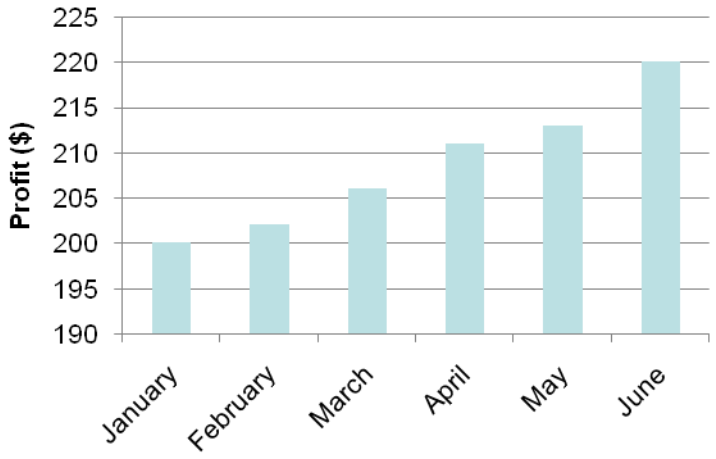
Discussion
What happened to the mean of a data set when we added a large number to it?
How could this be used to mislead someone?
The same thing can be done using graphs.

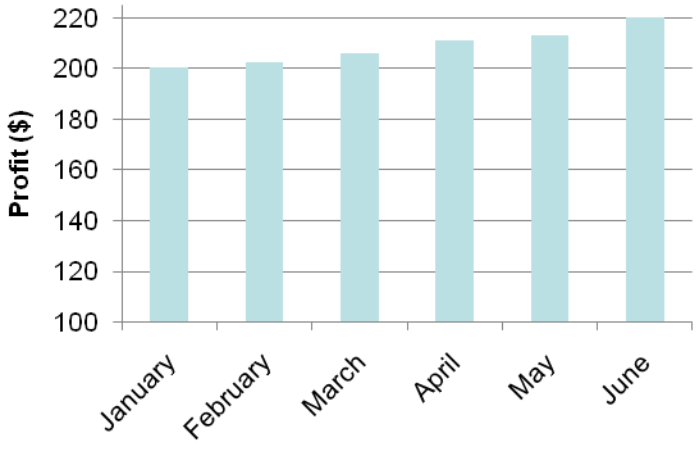
SWBAT to construct a graph that misrepresents a data set

Definitions
Ways to create a misleading graph

1. Use different intervals
2. Don't start the scale at zero
3. Don't label axes or scales

Example 1: The following two graphs display the same data set.





a. What is causing the data to look different?
b. How do we manipulate the scale to show a dramatic change?
c. What else could be misleading about the graphs?

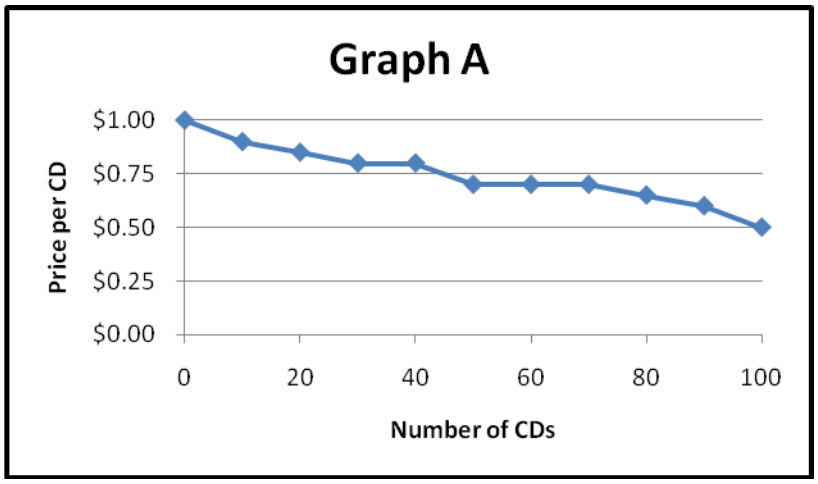
Example 2: The following is a list of Mr. Jones' weight after each week of his diet:
210, 208, 205, 198, 195, 194, 192

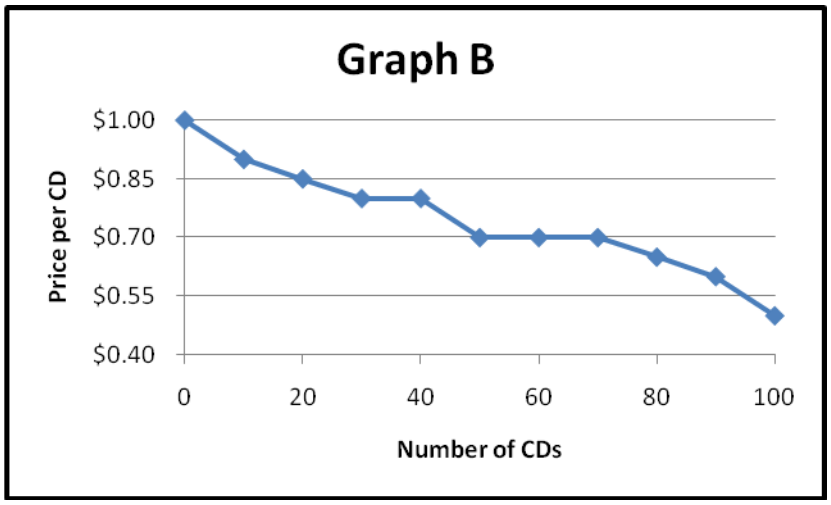
a. Draw a graph that makes his diet look good.
b. Draw a graph that makes his diet look bad.

What did we learn today?

Section 3–7 In Class Assignment (Day 3)

1. A company that sells CDs wants to encourage customers to buy more by showing how much the price drops as you buys more CDs.





a) Which graph would the company use to persuade the customers to buy more CDs?

b) Which graph is a more accurate representation of the data?

c) What is causing Graph B to be misleading?

2. Jimmy is trying to gain weight for football. His weight for each month over the past year is as follows:

175, 175, 177, 176, 177, 178, 180, 182, 185, 186, 188, 190

a) Draw a graph that starts at 0 and goes up to 200. Then make the scale go by every 50.

b) Draw a graph that starts at 175 and goes up to 190. Then make the scale go by every 5.

c) What conclusion would you draw from Graph A? Graph B?

d) Which graph is misleading? Why?

3. The following is a list of the amount of money Timmy made per hour each of the last six months:

$8.00, $8.15, $8.25, $8.30, $8.50, $8.60

a) Draw a graph that shows a dramatic increase in Timmy's wages.

b) Draw a graph that shows a minimal increase in Timmy's wages.

4. The students at Beaver Falls were surveyed. Nine out of ten students selected gym as their favorite class. Describe some of the factors that could cause this fact to be misleading.

Section 3–7: Appropriate Displays (Day 4)

Review Question
What are the three ways to create a misleading graph?

Discussion
You will work together to come up with thorough solutions to the following questions. The solutions will include calculations and sentences.

SWBAT choose an appropriate graph to use given a data set
SWBAT to construct a graph that misrepresents a data set

What did we learn today?

Section 3–7 In-Class Assignment (Day 4)

The table below shows how much money a teacher made during their first 6 years of teaching.

Year	Salary
1	$30,000
2	$31,500
3	$32,000
4	$35,000
5	$36,000
6	$37,500

1. What type of graph should you use to summarize the salaries? (explain your answer)

2. Calculate the mean, median, mode, and range of the salaries.

3. Which value best summarizes the data set? Why?

4. Draw a box and whisker plot of the salaries. (list the five critical points)

5. Draw a bar graph that makes it look like teachers get a large raise each year.

6. Draw a bar graph that makes it look like teachers get a small raise each year.

7. What type of graph would best summarize the following situations? (explain your answer)

a. Show how many teachers make between $30,000-$34,999 and between $35,000-$39,999.

b. Show how much 1st year teachers make at different schools.

c. Show the highest salary, lowest salary, and median salary.

d. Show the salary of every teacher.

8. The following is a list of salaries of 1st year teachers at schools in the area:
$30,000, $30,500, $30,750, $31,000, $31,000, $32,000, $32,500, $33,000, $34,500

a. Use intervals of $1000 to create frequency table.

b. Use the frequency table to create a histogram.

c. How many teachers make less than $31,000?

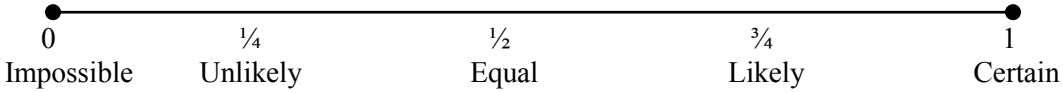
d. How many teachers make less than $33,000?

Section 3–8: Probability (Day 1)

Review Question
What are the three ways to create a misleading graph?

Discussion
What does probability mean?
Are the chances of the following events good or bad? Why?
1. You will get HW tonight.
2. That you will dunk a basketball today.
3. That you will be out of school by 5:00 PM.

How would you rate each of the previous events from 0 to 1 where 0 represents impossible and 1 represents certainty?



You said that the chances of you getting homework tonight are good.
Why did you say this?
How many nights a week do you get HW?
What does the 1st number represent?
What does the 2nd number represent?

SWBAT calculate simple probability

Definitions
Probability – chance something will happen

P(event) = what we want to happen (favorable outcomes)
total events

Example 1: One Six Sided Die
After you calculate each probability with the students, ask them if the chances of event happening is good or bad. Have the students explain their answers.
P(3) =
P(even) =
P(# < 4) =
P(2 or 5) =

Example 2: A bag of marbles contains 4 green, 5 yellow, and 3 blue marbles. Calculate the probability of each of the following events. Write each probability as a fraction, decimal, and percent.
P(green) =
P(blue) =
P(purple) =
P(green or blue) =

You Try!

A spinner has the numbers 1 through 12 on it. Numbers 1-4 are red, numbers 5-12 are yellow. Find the probability of each event.

1. P(8) =
2. P(red) =
3. P(even) =
4. P(greater than 2) =
5. P(less than 6) =
6. P(8 or 9) =

What did we learn today?

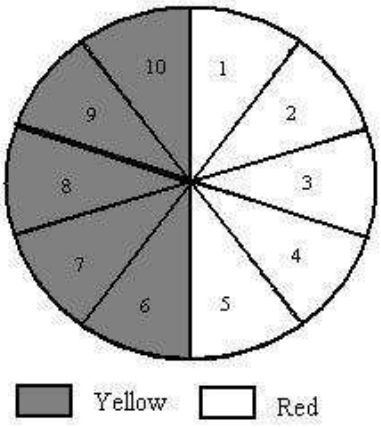
Section 3–8 Homework (Day 1)

1. There are 2 red marbles, 4 blue marbles, 7 green marbles, and 5 yellow marbles in a bag. Suppose one marble is selected at random. Find the probability of each event. Express each probability as a fraction then a decimal then a percent.

a. P(blue) =
b. P(yellow) =
c. P(not green) =
d. P(purple) =
e. P(red or blue) =
f. P(blue or yellow) =

2. A spinner has the numbers 1 through 10 on it. Numbers 1-5 are red, numbers 6-10 are yellow. Find the probability of each event. Express each probability as a fraction then a decimal then a percent.

a. P(8) =
b. P(red) =
c. P(even) =
d. P(greater than 2) =
e. P(less than 6) =
f. P(8 or 9) =



3. If you spun the spinner 10 times, about how many times should you get red?

4. If you rolled a six sided die, are your chances of getting a'1' good or bad? Why?

5. Bench press weight: 150, 145, 140, 160, 155, 150, 170, 145

a. Find the mean, median, and mode.

b. Draw a stem and leaf plot.

c. Find the lower extreme, lower quartile, median, upper quartile, and upper extreme. Then draw a box and whisker plot.

6. **Answer the following question using the four step method.** Ritchie rolled a die 12 times. He got the number 5 four times. Jimmy rolled a die 25 times. He got the number 5 nine times. Who got a higher percentage of 5's?

Section 3–8: Probability (Day 2)

Review Question

How do you find simple probability?

P(event) = $\frac{\text{Favorable Outcomes}}{\text{Total Outcomes}}$

Discussion

Let's go over the homework to make sure that we understand simple probability.

A game of chance was created at a local carnival. If you roll a 1-4, you win. If you roll a 5 or 6, you lose. Would you play this game? Why or why not?

SWBAT calculate simple probability as a fraction, decimal, and percent.

What did we learn today?

Section 3–8 In-Class Assignment (Day 2)

1. A spinner has the numbers 1 through 16 on it. Numbers 1-8 are shaded. Find the probability of each event. Express each probability as a fraction then a decimal then a percent.

a. P(15) =

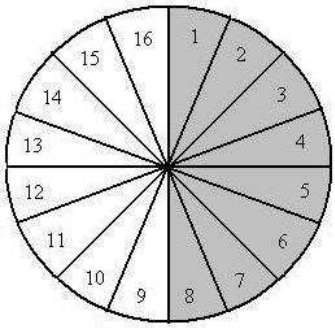
b. P(even) =

c. P(greater than ten) =

d. P(1 or 2) =

e. P(shaded) =

f. P(not shaded) =



2. Using the spinner above, a game of chance was created. If you spin a 1-6, you win. If you spin a 7-16, you lose.

a. What is the probability that you win?

b. What is the probability that you lose?

c. Should you play this game? Why or why not?

d. If they changed the rules so that you won double if you spin 1-6, should you play?

e. If you played 50 times, how many times should you win?

3. There are 52 cards in a standard deck of cards. There are four suits: hearts, diamonds, clubs, and spades. Each suit has 13 cards: 2,3,4,5,6,7,8,9,10,J,Q,K,A. Find the probability of each event. Express each probability as a fraction then a decimal then a percent.

a. P(2) =

b. P(3 clubs) =

c. P(spade) =

d. P(red card) =

e. P(9 or 10) =

f. P(card < 5) =

4. Answer the following question using the four step method. Do you have a better chance of rolling a number less than 3 with one die or picking out a heart from a standard deck of cards?

Section 3–8: Probability (Day 3)

Review Question
How do you find simple probability?

Discussion
A game of chance was created at a local carnival. If you roll a 1-3, you win. If you roll a 4-6, you lose. If you played the game 10 times, would you lose exactly 5 times?

SWBAT distinguish and compare between experimental and theoretical probability

Definitions
Theoretical Probability – what math says the answer is - "the math answer"
Experimental Probability – what real life says the answer is – "the real life answer"

We have been calculating theoretical probability for the last two days. Today we are going to compare these values to the experimental probabilities.

Example 1: One die

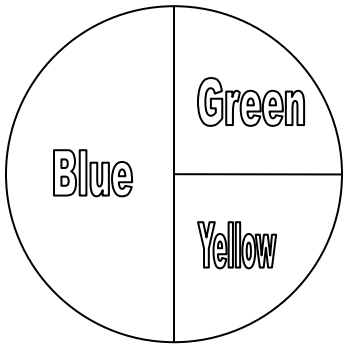
P(4) = 1/6 (theoretical)
Then have the students do the experiment six times using dice or the TI-83 calculators.
(Math – PRB – RandInt(1,6))
Have each student calculate their experimental probability.
For how many students did the experimental and theoretical probabilities match?
Why didn't the probabilities match for all of the students?

P(even) = 3/6 (theoretical)
Then have the students do the experiment six times using dice or the TI-83 calculators.
(Math – PRB – RandInt(1,6))
Have each student calculate their experimental probability.
For how many students did the experimental and theoretical probabilities match?
Why didn't the probabilities match for all of the students?

P(# > 4) = 2/6 (theoretical)
Then have the students do the experiment six times using dice or the TI-83 calculators.
(Math – PRB – RandInt(1,6))
Have each student calculate their experimental probability.
For how many students did the experimental and theoretical probabilities match?
Why didn't the probabilities match for all of the students?

Example 2: Given the spinner below, calculate the theoretical probability for each color. Fill in the table below.

Color	Experimental probability	Theoretical probability
Blue	5/10	5/10
Green	2/10	¼
Yellow	3/10	¼



You spin the spinner ten times. You get 5 blue, 2 green, and 3 yellow. Calculate the experimental probability for each color. Fill in the table above.

For which colors do experimental and theoretical probabilities match?
Why didn't the experimental and theoretical probabilities match for each color?

Example 3: One Six Sided Die Experiment
Have the students roll their die 6 times for each number using dice or the TI-83 calculators.
(TI-83 Instructions: Math – PRB – RandInt(1,6)). Then fill out the table.

Number	Theoretical Probability	Frequency	Experimental Probability	Group Totals
1				
2				
3				
4				
5				
6				

1. For what numbers did your experimental probabilities and theoretical probabilities match?

2. Why didn't it match for all six numbers?

3. Why were your group totals so close to theoretical probability?

Example 4: How can this information be used?

Gambling – calculating odds of games
Quality control – cars, tvs – they want items to eventually break
Advertising – companies want to claim that they have the best stuff

What did we learn today?

Section 3–8 Homework (Day 3)

1. A spinner has the numbers 1 through 16 on it. Numbers 1-6 are shaded. Find the probability of each event. Express each probability as a fraction then a decimal then a percent.

a. P(15) =

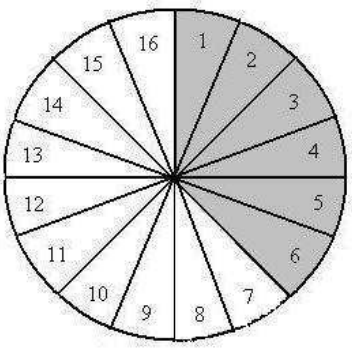
b. P(even) =

c. P(greater than ten) =

d. P(1 or 2) =

e. P(shaded) =

f. P(not shaded) =



2. What type of probability did you calculate in problem #1?

3. You spun the spinner in example one 16 times. It landed on the number 6 three times. Did the experimental and theoretical probabilities match?

4. A game at the local carnival consists of rolling one die and has the following rules. If you roll a 1 or 6, you lose. If you roll a 2, 3, 4 or 5, you win. You played the game 10 times. You won 6 times and lost 4 times.

a. Calculate the theoretical probability of winning and losing.

b. Calculate the experimental probability of winning and losing.

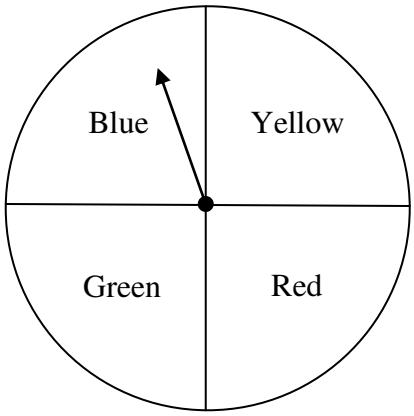
c. Did the experimental and theoretical probabilities match?

d. What can you attribute to your answer in part c?

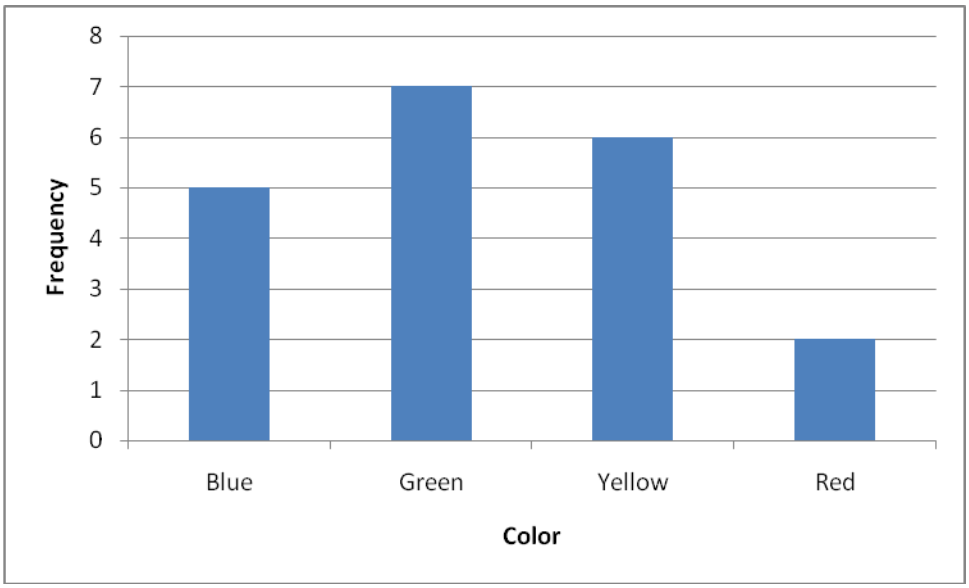
e. Using your math knowledge, should you play this game? Why or Why not?

f. If you play 100 times, are your guaranteed to win? Why or Why not?

5. The following spinner was used for an experiment.



The results are summarized in the bar graph below.



a. What is the theoretical probability of each color?

b. Calculate the experimental probability of each color.

c. For which color did the experimental and theoretical probabilities match?

Section 3–8: Probability (Day 4)

Review Question
What is the difference between experimental and theoretical probability?

SWBAT distinguish and compare between experimental and theoretical probability

Activity
Pass out a blank scantron sheet to each student. You are going to take a 20 question multiple choice quiz. The questions each have 4 answers (a, b, c, d). You must guess what the answers to the 20 questions would be. Notice you are not going to have any questions given to you.

How many questions should you get right? Why?
How many questions did you get right?

What is the theoretical probability that you guess correctly?
What was your experimental probability?
What was the classes' experimental probability?
Was your probability or the classes' closer to the theoretical probability?

Now let's try the experiment again with a little twist. This time you are going to take a quiz with 20 questions but there are only two answers (a,b). Now, you have to guess what the answers to the 20 questions would be. Notice you are not going to have any questions given to you.

Should you get more questions right this time? Why?
How many questions should you get right? Why?
How many questions did you get right?

What is the theoretical probability that you guess correctly?
What was your experimental probability?
What was the classes' experimental probability?
Was your probability or the classes' closer to the theoretical probability?

Let's tie this lesson back to Unit 1 Problem Solving. In that unit, we talked about problem solving strategies such as guess/check and eliminate possibilities.

If we can use these strategies to eliminate two choices, how does that help us?
How much would this improve our grade on the PSSA's or a science test?

What did we learn today?

Unit 3 Review

Review Question
What is the difference between experimental and theoretical probability?

SWBAT to study for the Unit 3 test

Discussion
We have a unit test tomorrow. How do we study for a test?
How should you study for a test?

What topics are on the test?

How could you study these topics?

Practice Problems
1. The following are the ages of students: 8, 8, 9, 9, 9, 10, 11, 12, 12, 13

   a. Find the mean, median, mode, and range
   b. Draw a stem and leaf plot
   c. Draw a box and whisker plot
   d. Draw a line plot

2. Make up a set of data then draw a bar graph of the data.

3. Make a pie graph for the following data:
   Students favorite subjects - Math: 10, Science: 12, English 8, Gym 18

4. A spinner has the numbers 1 through 12 on it. Numbers 1-4 are shaded. Find the probability of each event. Express each probability as a fraction then a decimal then a percent.

a. P(11) = b. P(odd) =
c. P(greater than ten) = d. P(1 or 2) =
e. P(shaded) = f. P(not shaded) =

What did we learn today?

Unit 3 Cumulative Review

Things to Remember

1. Reinforce test taking strategies: guess/check, eliminate possibilities, work backwards, and estimating.
2. Reinforce the importance of retaining information from previous units.
3. Reinforce connections being made among units.

---

1. What value satisfies the equation: $3x + 2 = 11$?
   a. 2 b. 3 c. 4 d. 5

2. What is the circumference of a circle with a radius of 3 cm?
   a. 18.84 cm b. – 9 cm c. 1 cm d. 9 cm^2

3. Who is Mr. Jones' favorite rapper?
   a. Jonas Brothers b Jay-Z c. Miley Cyrus d. Bon Jovi

4. What is the largest two digit number that adds up to 8?
   a. 44 b. 116 c. 53 d. 99

5. What is the largest integer?
   a. -5 b. -4 c. 19/4 d. 5.5

6. Which number isn't rational?
   a. $\sqrt{3}$ b. 2 c. 2.6 d. 3/4

7. What is the next term: 1, 5, 9, 13, ___?
   a. 16 b. 17 c. 18 d. 21

8. What is the next term: 2, 5, 9, 14, 20, ___?
   a. 25 b. 26 c. 27 d. 28

9. What is the next term: 1, 3, 9, 27, ___?
   a. 91 b. 85 c. 81 d. 71

10. What is the next term: 3, 7, 6, 10, 9, ___?
    a. 13 b. 15 c. 17 d. 19

11. DJ had $85. He spent $4.75 at Wendy's and $13.99 on a t-shirt. **About** how much money does he have left?
    a. $85 b. $80 c. $75 d. $65

12. BJ bought a car for $10,000. He plans to pay it off in 1 year. **About** how much does he have to pay each month?
    a. $200 b. $500 c. $600 d. $1000

13. Johnny makes $6.25/hour. He works 20 hours/week. How many weeks will it take for him to save $375?
    a. 2 b. 3 c. 4 d. 5

14. Shirley has 8 quarts of oil. Sammy has 2 gallons of oil. How many gallons of oil do they have together?

a. 2 b. 3 c. 4 d. 5

15. Tammy drove 50 km. Timmy drove 5000 m. How far did they drive total?

a. 55 km b. 100 km c. 150 km d. 1000 km

16. -8 + 12 =

a. 3 b. 4 c. -4 d. 20

17. -4 – 14 =

a. 10 b. -18 c. 18 d. -10

18. (42)(31) =

a. 1002 b. 1102 c. 1202 d. 1302

19. 10.35 ÷ 2.3 =

a. 4.5 b. 4.8 c. 8.4 d. 7.4

20. 13.8 – 4.22 =

a. 9.62 b. 9.58 c. 9.28 d. 9.18

21. $\frac{2}{6}+\left(\frac{4}{5}\right)=$

a. 14/15 b. 17/15 c. 8/30 d. 4/30

22. (4.7)(2.53) =

a. 13.152 b. 12.152 c. 11.891 d. 10.891

23. $\left(\frac{4}{5}\right)\div\left(\frac{8}{7}\right)=$

a. 12/20 b. 7/10 c. 8/10 d. 10/40

24. Which of the following is equal to 12/30?

a. 4% b. 10% c. 20% d. 40%

25. Which of the following is equal to 72%?

a. .72 b. 720% c. 7200 d. .72%

26. Which of the following is equal to 4/20?

a. .1 b. .2 c. .3 d. .4

27. Which of the following is equal to 6^3?

a. 6 b. 12 c. 18 d. 216

28. Which of the following is equal to $\sqrt{441}$?

a. 19 b. 21 c. 29 d. 31

29. 4 quarts = _____ pints

a. 4 b. 6 c. 8 d. 12

30. 200 cm = ____m

a. 2 b. .2 c. 20 d. 200

Use the following data set to answer questions 31-35.
12, 18, 18, 22, 40, 46, 60, 68, 70

31. What is the mean?

a. 39.3 b. 40 c. 45 d. 70

32. What is the median?

a. 12 b. 18 c. 40 d. 70

33. What is the mode?

a. 12 b. 18 c. 40 d. 70

34. What is the lower quartile?

a. 12 b. 22 c. 40 d. 18

35. What is the upper quartile?

a. 18 b. 40 c. 64 d. 70

36. There are 4 red marbles, 6 blue marbles, 8 green marbles, and 1 yellow marbles in a bag. What is the probability of picking a blue marble?

a. 4/19 b. 6/20 c. 6/19 d. 14/20

37. What type of probability did you calculate in problem 36?

a. experimental b. theoretical c. detrimental d. typical

38. Which of the following is not a way to create a misleading graph?

a. Use different intervals
b. Don't start the scale at zero
c. Don't label axes or scales
d. Using a pie graph for percentages

UNIT 3 HAND-IN PROBLEMS

This problem set is intended to challenge the students and encourage students to apply a deep understanding of problem–solving skills.

1. 10, 20, 30, 40, 50

a. What number can you add to the data set to make the mean 40?

b. What number can you add to the data set to make the median 32?

c. What number can you add to the data set to make the mode 10?

2. a. Make up a data set with seven numbers that has the following characteristics:
Mean: 30, Median: 25, Mode: 10

b. Draw a stem and leaf plot.

c. Draw a box and whisker plot.

3. The following is a list of the amount of money you made for fifteen consecutive days:
$23, $12, $14, $33, $18, $22, $12, $15, $35, $17, $33, $12, $16, $43, $15.

a. Draw a line plot.

b. Draw a histogram.

c. Why would a histogram be better than a bar graph for this data set.

4. Ryan wants to have an average grade of 95 in math class. His grades so far are 96, 87, 100, and 98. What score must he get on his next test to have exactly a 95 average?

5. a. In your own words, define experimental and theoretical probability. Write your response in paragraph form making sure to use examples.

b. If you got all of the questions wrong on a twenty question true/false quiz, why would your teacher be suspicious?

c. If your neighbor got all of them wrong too, why would your teacher be correct in accusing you of cheating?

UNIT 3 PROJECT

Stock Market Project

This project consists of two parts:

1. Company Research: (15 points) Pick a company to research. Then fill out the WS on the next page.

2. Poster Requirements: (35 points) You are to make a poster from your data set (your collection of stock prices). You will need to round your stock prices to the nearest cent. For example, if $45.957 is one of your prices, round it to $45.96.

The following items must be clearly and accurately displayed on your poster:

1. Your company's name and ticker symbol
2. Your data, listed in order
3. The mean, median, mode, and range of the data.
4. A line graph
5. A line plot
6. A stem-and-leaf plot
7. A box-and-whisker plot

Grading
Grading Rubric:

Item	Your score	Possible Points
1. Company Research		15
2. Poster		
Company name and ticker symbol		2
Data listed in order (by date)		3
Line graph		5
Line plot		5
Stem-and-leaf plot		5
Box-and-whisker plot		5
Mean, median, mode, and range		5
Neatness/organization/aesthetics		5
Total		50

STOCK MARKET PROJECT
COMPANY RESEARCH

Name: _____ Period: _____

- **General Information**

Company: _____

Ticker Symbol: _____

CEO: _____

Headquarters' Location: _____

- **Stock Prices**

Current Price Per Share: _____ 52-Week High: _____ 52-Week Low: _____

Describe the trend in stock prices over the last year.

_____

_____

_____

Are stock analysts saying that you should buy, sell, or hold the stock?

_____

- **Product Information and News**

Describe the products sold and/or services provided by this company.

_____

_____

Do you think these products and/or services will continue to be in demand? Why?

_____

_____

What is the latest news on this company? Give relevant dates and details.

_____

_____

DATE	PRICE

Summarizing your research:

Write a paragraph that summarizes your company. The paragraph should include each of the following:

1. Company's name
2. Location of company's headquarters
3. Describe what the company sells
4. Describe the trend of the stock over the last year
5. Explain why you think the company will do good or bad in the future.