Bar Graphing with Weather

Brief Overview:

This unit should be used to review tally charts and bar graphs with second and third grade students. Students will collect data in order to make tally charts of data, identify the parts of a bar graph, and be able to create and analyze their bar graph data. Teaching methods include: teacher modeling, guided practice, collaborative groupings, and hands on activities that will lead students to independent application of the skills.

NCTM Content Standard/National Science Education Standard**:**

NCTM:

- **Collect data using observations, surveys, and experiments.**
- **Represent data using tables and graphs such as line plots, bar graphs, and line graphs**

Grade/Level:

> **Grade 2-3**

Duration/Length:

> **Three 60-minute lessons**

Student Outcomes:

> **Students will:**

- **Be able to collect data in order to make a tally chart.**
- **Be able to create a bar graph using data from a tally chart.**
- **Be able to identify, create, and interpret a bar graph.**

Materials and Resources:

- **Student Resources 1-13**
- **Teacher Resources 1-3**
- **Student Assessment 1**
- **Computers (if available)**
- **Markers and or crayons**
- **Overhead projector**
- **Chart paper**
- **Highlighters**
- **Masking Tape**

- **Cotton Balls**
- **Drinking straws (1 per student)**
- **Fable: The North Wind and the Sun by Gregory McNamee (ISBN-10: 3856306366).**
- **Blank spinners divided into quarters from www.webeans.net/hutt/gamespinners.htm**
- **Paper clip for each spinner**
- **Word wall**
- **Poster or student copies of Teacher Resource 1**
- **Make a TAILS poster- Student Resource 11, to help kids remember the parts of a Bar Graph --optional**
  (T-title, A-axis, I-increments are even, L-labels, S-starts at 0)

Development/Procedures:

Lesson 1—Season Selections

Pre-Assessment – Students should be familiar with reading a bar graph and creating a tally chart. Students should also be proficient in identifying and completing patterns.

Launch- Students recognize the benefits of bar graphs
- **Distribute Student Resource 1 by placing it face down (descriptive paragraph) to half of the students in the class.**
- **All of the other students will receive Student Resource 2 face down (displaying the data on a bar graph).**
- **The teacher will inform the students of the survey and then let them quickly read the data and be ready for questions. Give them about 30 seconds only. Let them know they can call out the answers.**
- **Ask the students the following questions and do not give them much wait time.**
- **Q: Which season do students like the most?**
- **A: Summer**
- **Q: How many students chose spring as their favorite season?**
- **A: 7**
- **Students with the Student Resource 2 should be able to respond to the questions faster than the other team. Make a comment to encourage the other group to answer and participate. This should invoke some frustration as most have not had enough time to read or because it is hard for them to find the answer due to lack of organization of the data set.**
- **Ask one more question: Which season did the least amount of students choose? (A: Winter)**

- **Tell students to find a classmate who has a different paper than they do, and to sit next to them and compare papers. Listen to student discussions.**
- **Discuss what made this activity easier for some students and harder for others.**
- **Discuss how a bar graph helps organize information and how it gives a quick snapshot of information.**
- **Add bar graph to the word wall using Teacher Resource 1.**
- **Collect Student Resource 1 (paragraph) and make sure each student has Student Resource 2 (graph).**

Teacher Facilitation –

- **Tell students that they are going to make a similar graph using their own opinions about seasons.**
- **Define the word survey. A survey is when someone collects data based on people's opinions.**
- **Ask students to describe types of surveys they have seen.**
- **Put the word, survey, on the word wall.**
- **List the seasons and students names on an overhead or chart paper with the students responses. Do not organize the data for them.**
- **Ask students if this is easy to read. Guide students to recognize that the data could be better organized with a tally chart.**
- **Create a tally chart of the student data on the overhead, organizing the data.**
- **Give each student an index card and have him or her write his or her name on it.**
- **Let them post their card above their favorite season creating a large bar graph on the chalkboard.**
- **Assess students' knowledge of bar graphs throughout the creation of the bar graph.**
- **Guide them to add each part by asking questions like, "Does this graph make sense? or "Is it easy to read?"**
- **Another way to guide their thinking is to compare the class graph with the bar graph given to them earlier, Student Resource 2.**
- **Review the parts of a bar graph and their functions as you add them to a t-chart on Teacher Resource 3. Use Teacher Resource 5 for examples of definitions.**

Student Application –

- **Inform the students that they are going to create their own bar graph of favorite seasons now with a partner.**

- **Remove the bar graph made as a group. Students use the tally table to make their own bar graph of the data collected. If necessary, work with a small group to provide extra guidance.**
- **Encourage students to check their graphs for TAILS (Student Resource 11) and label each part.**

Embedded Assessment –

- **Collect the bar graph completed by the students and then use the information to influence the next day's lesson.**
- **Student observation throughout lesson.**

Extension (or if there's extra time) –

- **As students finish, distribute Student Resource 4. Add a scale going up the side moving up 10 degrees each interval.**
- **Use computers to look up www.weather.com to see what the temperature is for the day or call a Weather Hotline (301-936-1212 or 410-936-1212) and put a phone on speakerphone for the students to hear.**
- **If computers or other technology are not available, provide the temperature for the students, or have a thermometer outside for them to observe.**
- **At the end of each succeeding day's lesson, give students the opportunity to graph the temperature for that day.**

Reteach-
- **If needed, teacher should pull small group on day 2 using their graphs as a resource for instruction.**

Lesson 2--- Spinning Around with Weather

Pre-Assessment –
- **Choose an example of a common student error on the graph that they completed from day 1.**
- **Create a model of student work, adding errors that many students had.**
- **The students will identify and correct the errors, and explain why they are incorrect. Students can work in pairs for this activity.**
- **Review the answers with the students and ask for questions.**

- **Ask students to review why it is important to include all parts of the graph. Refer to Student Resource 2, and the T-Chart that the class created together on Teacher Resource 3.**

Launch –

- **Students will be divided into groups of three.**
- **Each group of students will receive a blank spinner from** http://www.webeans.net/hutt/educ/spinner4_bw_blank.pdf
This will be Student Resource 6.

- **Students will have a choice of creating their own season symbols or cut out the pictures from Student Resource 7 to glue onto their spinner.**
- **After decorating their spinners with season symbols, label the pictures with sunny, cloudy, stormy, snowy (the teacher may write these words on the board to help students).**

Teacher Facilitation –

- **Explain to the class that they will be creating a bar graph based on data that they will be gathering in groups.**
- **Ask students to recall how they found information for their data yesterday. (Answer: Student Survey)**
- **Today they will be gathering data based on an experiment.**
- **Introduce the game "Spinning Around With Weather" and distribute Student Resources 5 and 8.**
- **Explain the job chart on Student Resource 5 and distribute role cards.**
- **Distribute Student Resource 8, and explain to students that they are to take turns spinning the spinner. Each time someone in the group spins, they are to tally their data in the chart provided at the top of Student Resource 8.**
- **Clarify the directions as necessary.**

Student Application –

- **In groups of 3, students will take turns following the roles on Student Resource 5. Each student will spin the spinner 10 times.**
- **The students will tally their data after each spin until they are finished all 30 spins.**

- **When all of the students have finished the game, have students share their results with the class.**
- **After sharing the results, students should independently create bar graphs with their group's data.**

Embedded Assessment (independent) –

- **After all the data is collected, students will graph the tally chart data on the bottom of Student Resource 8.**
- **Remind students to use the checklist to make sure they label their bar graphs correctly. Students can refer to Student Resource 11 as a reference.**

Extension (or if there's extra time) –

- **After all group members have finished their independent assessment, they will be given the opportunity to get back together with their group members.**
- **Together as a group, students will make their graphs on a piece of chart paper.**
- **Students will be given the opportunity to present their graphs to the class explaining their data and how they made their graph.**

Lesson 3--- Windy Clouds

Pre-Assessment –

Warm Up—Have students take out their Student Resource 4 graph. Post the projected forecast for the rest of the week for them and have them graph the temperatures on their graph. They should now have temperatures for Monday through Friday. With a partner, have them answer the questions on Student Resource 12. Then go over the answers on the overhead.

Launch –
- **Ask the students if they have ever heard a weather report, or seen one on T.V.**
- **Ask students whose job it is to give these reports and to research and make predictions of the weather (meteorologists).**

- **Post a weather report and let the students discuss with a partner what it means.**
- **Example: Today will be partly cloudy with a high of 73 degrees Fahrenheit. Winds are SW at 10 miles per hour. Chance of rain is 40%**

Be sure you have prepared the start and finish lines for the game using masking tape strips. You may choose to do this activity in the classroom or hallway.

Teacher Facilitation –

- **Read the fable <u>The North Wind and the Sun</u> by Gregory McNamee (ISBN-10: 3856306366). See <u>http://www.storyarts.org/library/aesops/stories/north.html</u> for a copy of the story.**
- **Reflect on the fable and ask them how the sun or wind affect the clothing they wear. (Make connections)**
- **Introduce the game, "Cloud Racers" and distribute Student Resource 10.**
- **Model the game for the students and distribute materials.**
- **Students will play in groups of 4. Each group will need one cotton ball and four straws.**

Student Application –

- **Each student will have two turns to blow his or her group's cotton ball from the start line to the finish line. The distance should be approximately one meter, but is up to teacher discretion.**
- **Collect the data from each group and display it on an overhead by creating a tally chart, Teacher Resource 2. Be sure each student contributes two pieces of data.**
- **Students will copy the tally chart from the class and use it to create a bar graph independently. Be sure to post the TAILS poster and student checklist made earlier.**
- **Students should be able to do this independently using their checklists but if necessary, a teacher can pull a small group.**
- **Go over the graph as a class having the students trade papers and grade another student's paper. They can do this by highlighting the parts of their partner's graph that are missing or incorrect.**

- **If there is time, give students Student Resource 13 to complete as an exit card. If there isn't enough time, have students complete it for homework.**

Embedded Assessment –

- **Assess student completion of the bar graph.**
- **Student will complete Student Resource 12 as they analyze the data that they graphed which should affect instruction before students complete Student Resource 13.**

Reteaching-

- **For students who need reteaching, provide scaffolding on the topics they need the most help with.**

Extension –

- **Give students a 5-day projected forecast and then create a double bar graph with the projected and actual forecasts. Discuss the reasons meteorologists make projections and compare how accurate the projections really were with the real data.**
- **Students can also make connections to times when they thought the weather was supposed to be a certain way and it turned out completely different.**
- **Have a list of categorical topics that students can use to create a survey. Let them collect their own data, tally it on a tally chart, and graph their results on a bar graph.**
- **For students who are mastering the bar graphs, let them go to the Bar Graph Machine website to create their own using gathered data. http://nces.ed.gov/nceskids/createagraph/default.aspx**

Summative Assessment:

Students will complete Student Summative Assessment on Student Resource 14 to show they are able to analyze and create a bar graph using a tally chart. Answers can be found on Teacher Resource 6.

Authors**:**
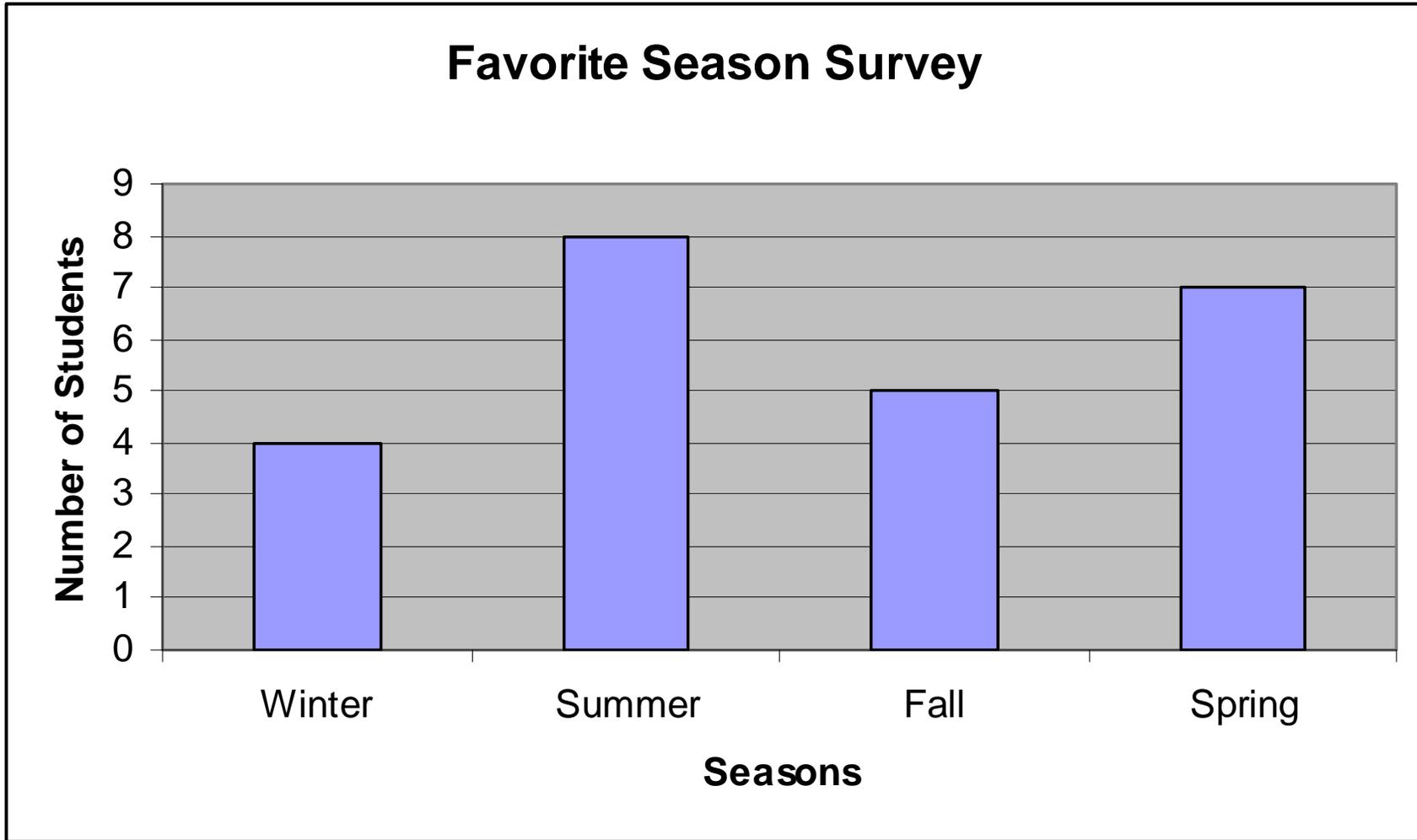**Rebecca Gerken**   **Sara Kafka**
Cromwell Valley Elementary   **Twinbrook Elementary School**
Baltimore County Public Schools, MD   **Montgomery County Public Schools, MD**

Favorite Season Survey

Joe, Billy, Marsha, and Brian all like the season of winter because they like cold weather. Summer is a favorite season of Becky, Sara, Casey, Elizabeth, Noah, Julie, James, and Juan because they like to go on vacation with their families. People who like fall enjoy playing in piles of leaves. Those students are Keisha, Jay, Jordan, Will, and Erin. The rest of the students in the class like the spring season the best.

Favorite Season Survey

Bar graph titled "Favorite Season Survey" showing Number of Students (y-axis, 0–9) versus Seasons (x-axis). Winter: 4, Summer: 8, Fall: 5, Spring: 7.

Creating a Bar Graph

Directions: Using the data that was collected from the class, create a bar graph below. You may use any resource in the classroom to help you. Remember to label ALL parts of the bar graph.

_____

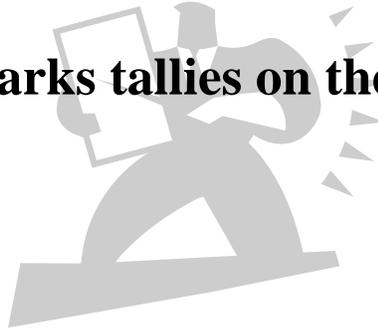|									
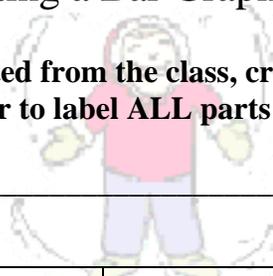
Job Chart

Here is a list of jobs and their responsibilities. Remember, you will switch jobs every 10 turns**. As a group, do not spin more than 30 times total.**

Super Spinner--- Puts the pencil on the spinner dot and flicks the paper clip around

Data Dude—Marks tallies on the tally chart

Turn Police—Makes sure that each person only takes 10 turns and that there are 30 spins taken at the end.

Clipart for Spinners

Spinner Data

Directions: **With your group, spin your spinner 30 times. Make sure you are taking turns! For each spin, place a tally in the correct space.**

Type of Weather	Tally Marks	Total
Sunny		
Cloudy		
Stormy		
Snowy		

Now graph your data on the Bar Graph below!

_____

_____   _____   _____   _____

Super Spinner

Data Dude

Turn Police

Cloud Racers

Materials:
-One drinking straw per group member
-One cotton ball (cloud) per group member

Directions:
1. **Get into a group of 4.**
2. **Stand by one of the masking tape start lines with your group.**
3. **Put the cloud on the starting line one at a time.**
4. **When it is your turn, blow air as hard as you can through your straw to get your cloud to the finish line.**
5. **Count the number of blows that it took for your cloud to cross the finish line.**
6. **Write your number of blows on the lines below for each turn.**
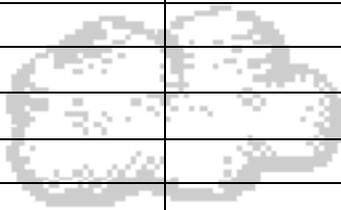7. **Repeat directions over again so that each group member has 2 turns.**

It took my cloud _____ blows to cross the finish line the first time.

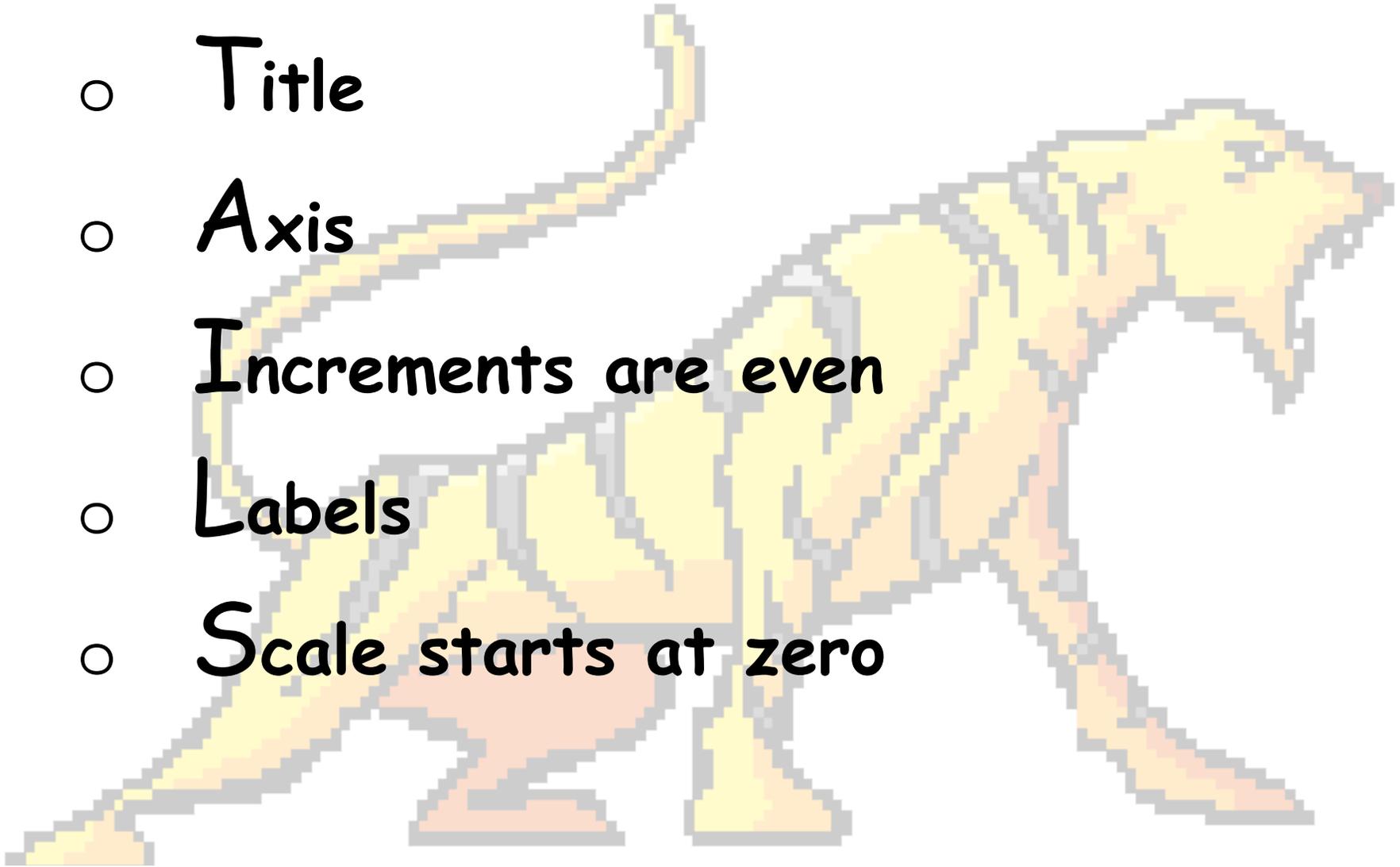It took my cloud _____ blows to cross the finish line the second time.

Now you will record the rest of the classes' data. We will do this TOGETHER**.**

Number of Blows	Tally
0	
1	
2	
3	
4	
5	
6	
7 or more	

o Title

o Axis

o Increments are even

o Labels

o Scale starts at zero

Analyzing Temperature Data

1. Which day shows the highest temperature?
Ⓐ **Monday**
Ⓑ **Tuesday**
Ⓒ **Wednesday**
Ⓓ **Thursday**
Ⓔ **Friday**

2. Which day shows the lowest temperature?
Ⓐ **Monday**
Ⓑ **Tuesday**
Ⓒ **Wednesday**
Ⓓ **Thursday**
Ⓔ **Friday**

3. What is the difference between the temperature on Monday and Tuesday?

4. List 2 parts of the bar graph, and explain why they are important in order to understand the graph.

A._____
_____
_____

B._____
_____
_____
___

Analyzing Cloud Racer Data

1. How many times did students take more than 4 blows **for their cloud to cross the finish line?**

2. How many times did students take 4 blows or less **for their cloud to cross the finish line?**

**3. How many students participated in the race? *Remember, each student took** 2 **turns!**

4. List 2 parts of the bar graph, and explain why they are important in order to understand the graph.
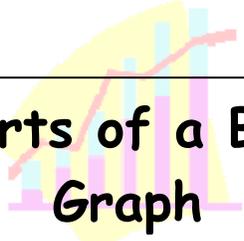
A._____
_____
_____

B._____
_____
_____

Bar Graphs

✓ **A type of graph that uses parallel bars to display data.**

✓ **It is used to help you compare information.**

✓ **The bars can be vertical or horizontal.**

Favorite Seasons in Our Class

Favorite Seasons in Our Class
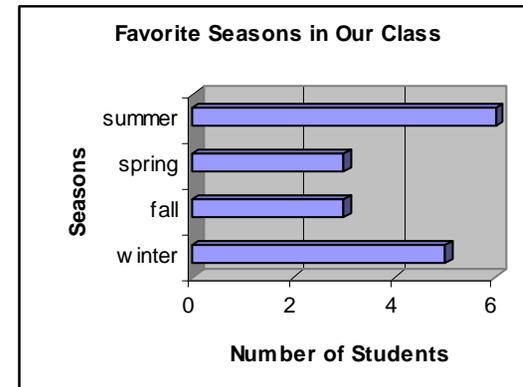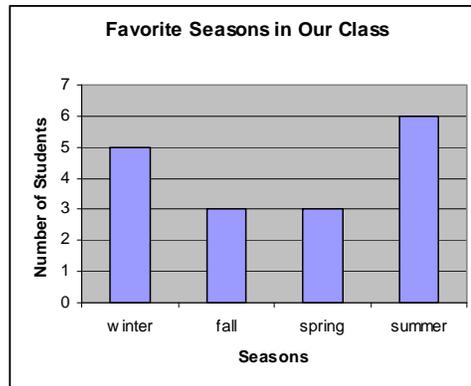
Number of Blows	Tally
0	
1	
2	
3	
4	
5	
6	
7 or more	

Parts of a Bar Graph	How it helps us understand the

Favorite Season Survey

| Season	Tally	Total
Winter		
Summer		
Fall		
Spring		
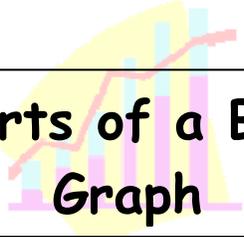
Parts of a Bar Graph	How it helps us understand the
Title about	Tells you what the graph is
Axis axis	There are two lines. The X and the Y-axis. They tell you about the data.
Increments	The numbers increase the same amount in a pattern
Labels	Describes the axis.
Starts at Zero lowest	The data needs to begin at the point
Bars	Shows the total amount of data that was collected

Bar Graphs- Student Assessment 1
Section 1

Inches of Snow Fall in 2006
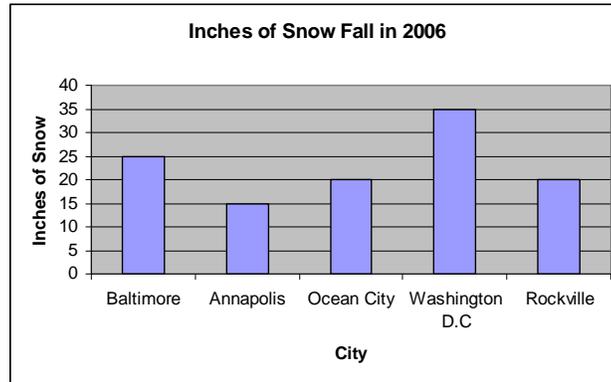
Part A
    How many more inches of snow did Washington D.C have than Annapolis in 2006?

_____

Part B
Use what you know about bar graphs to explain why your answer is correct. Use number

and/or words in your explanation.

_____

_____

_____

_____

_____

Section 2:

Directions- Using the chart below, create a bar graph with the data provided. Make sure you include all parts of a bar graph.

Total Amount of Rainfall for 2006

City	Inches
Baltimore	60
Annapolis	40
Ocean City	70
Washington D.C	40
Rockville	50

Summative Assessment Answer Key

Section 1, Part A:
20 more inches

Section 1, Part B:
A two-point answer should include:
- **An explanation of how many inches of snow Washington D.C. and Annapolis accumulated in 2006**
- **A description or a number sentence showing the subtraction problem to find the difference of snow inches in a year**
- **Bar graph vocabulary while students are explaining their answer**

Section 2:

Give students 5 points if they have included:
- **A title**
- **A correct number scale**
- **Axis labels**
- **Axis beginning at zero**
- **Bars graphed to the correct number on the scale**

_____