



National Center and State Collaborative

NCSC Math Activities with Scripted Systematic Instruction (MASSI): Elementary Data Analysis

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National Center and State Collaborative

The National Center and State Collaborative (NCSC) is applying the lessons learned from the past decade of research on alternate assessments based on alternate achievement standards (AA-AAS) to develop a multi-state comprehensive assessment system for students with significant cognitive disabilities. The project draws on a strong research base to develop an AA-AAS that is built from the ground up on powerful validity arguments linked to clear learning outcomes and defensible assessment results, to complement the work of the Race to the Top Common State Assessment Program (RTTA) consortia.

Our long-term goal is to ensure that students with significant cognitive disabilities achieve increasingly higher academic outcomes and leave high school ready for post-secondary options. A well-designed summative assessment alone is insufficient to achieve that goal. Thus, NCSC is developing a full system intended to support educators, which includes formative assessment tools and strategies, professional development on appropriate interim uses of data for progress monitoring, and management systems to ease the burdens of administration and documentation. All partners share a commitment to the research-to-practice focus of the project and the development of a comprehensive model of curriculum, instruction, assessment, and supportive professional development. These supports will improve the alignment of the entire system and strengthen the validity of inferences of the system of assessments.



The contents of this lesson were developed as part of the National Center and State Collaborative by Keri Bethune, Alicia Saunders, and Diane Browder at University of North Carolina at Charlotte and verified by Amy Lehew, math content expert, under a grant from the Department of Education (PR/Award #: H373X100002, Project Officer, Susan.Weigert@Ed.gov). However, the contents do not necessarily represent the policy of the U.S. Department of Education and no assumption of endorsement by the Federal government should be made. Some images were obtained from www.pdclipart.org and www.school-clip-art.com.

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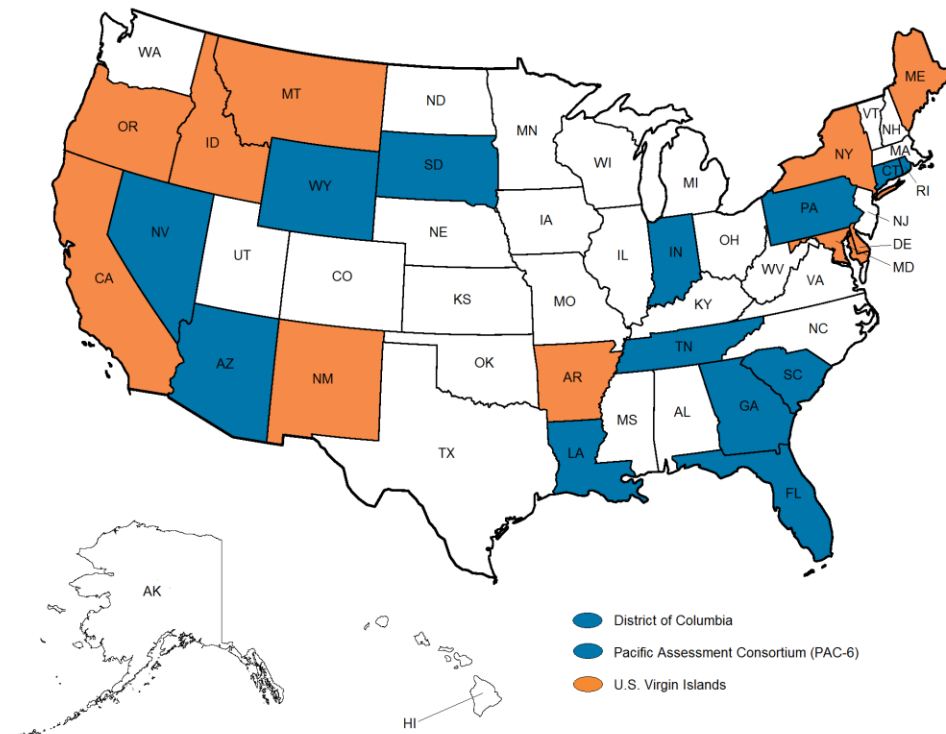


National Center and State Collaborative

NCSC is a collaborative of 15 states and five organizations.

The states include (shown in blue on map): Arizona, Connecticut, District of Columbia, Florida, Georgia, Indiana, Louisiana, Nevada, Pacific Assessment Consortium (PAC-6)¹, Pennsylvania, Rhode Island, South Carolina, South Dakota, Tennessee, and Wyoming.

Tier II states are partners in curriculum, instruction, and professional development implementation but are not part of the assessment development work. They are (shown in orange on map): Arkansas, California, Delaware, Idaho, Maine, Maryland, Montana, New Mexico, New York, Oregon, and U.S. Virgin Islands.



*Core partner states are blue in color and Tier II states are orange in color.

¹ The Pacific Assessment Consortium (including the entities of American Samoa, Commonwealth of the Northern Mariana Islands, Federated States of Micronesia, Guam, Republic of Palau, and Republic of the Marshall Islands) partner with NCSC as one state, led by the University of Guam Center for Excellence in Developmental Disabilities Education, Research, and Service (CEDDERS).



National Center and State Collaborative

The five partner organizations include: The National Center on Educational Outcomes (NCEO) at the University of Minnesota, The National Center for the Improvement of Educational Assessment (Center for Assessment), The University of North Carolina at Charlotte, The University of Kentucky, and edCount, LLC.



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NCSC Math Activities with Scripted Systematic Instruction (MASSI): Elementary Data Analysis

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MASSI: Math Activities with Scripted Systematic Instruction

Activity: Analyzing How Students Get to School

Grade Band: Grades 3-5

Concept: Data Analysis

Common Core State Standard	Core Content Connectors	MASSI OBJECTIVES
3.MD.3 Draw a scaled picture graph and a scaled bar graph to represent a data set with several categories. Solve one- and two-step “how many more” and “how many less” problems using information presented in scaled bar graphs.	3 rd 3.DPS.1g1 Collect data, organize into picture or bar graph	Reading a table and filling in a bar graph
3.MD.3 Draw a scaled picture graph and a scaled bar graph to represent a data set with several categories. Solve one- and two-step “how many more” and “how many less” problems using information presented in scaled bar graphs.	4 th 4.DPS.1g3 Collect data, organize in graph (e.g., picture graph, line plot, bar graph)	Collecting data and organizing it in a bar graph
5.G.2 Represent real world and mathematical problems by graphing points in the first quadrant of the coordinate plane, and interpret coordinate values of points in the context of the situation.	5 th 6.GM.1c6 Find coordinate values of points in the context of a situation	Creating a line graph

Be sure to provide specific practice to students on the skills that correspond to their grade level.

Teaching Materials: Cutouts of Ms. Smith’s class, blank sorting page, blank table for recording Ms. Smith’s class data, blank coordinate grids and graphs (cut apart to use as response cards), cut apart symbols to use on tables/graphs, blank graphs (for picture and bar graph – can laminate to reuse), data set for Ms. Carter’s class (not cut up), blank line graph (can be laminated for reuse), data tables for car riders

Other Materials: Blank sorting page, blank table for recording Mr. Whatley’s class data, Mr. Whatley’s class cut out cards, cut apart symbols to use on tables/graphs (laminated if needed), blank graphs (for picture and bar graph – can laminate to reuse), data set for Mrs. Bishop’s class (not cut up), blank line graph (can be laminated for reuse), data tables for bus riders, writing utensil (pen, pencil, marker, etc.)

Worksheets: There are student worksheets to review each component of the lesson.

Assessments: Progress Monitoring for taking data during the lesson; Skills Test

TEACHING OVERVIEW: The first section of the MASSI provides remedial practice on identifying and counting data sets, identifying the x and y axes, and making a picture graph. 3rd graders will learn to read a table and fill in a bar graph. This is a good review for your 4th and 5th graders. The 4th graders will be collecting data and organizing it in a bar graph. This is useful for your 3rd and 5th graders to gain fluency with these concepts and practicing numeracy skills. The 5th graders have to create a line graph. While the 5th graders work on line graphs, you can let the 3rd and 4th graders practice creating picture and bar graphs.

SCRIPT FOR LESSON

BUILDING ESSENTIAL UNDERSTANDING: CONCEPT AND SYMBOLS: Identifying Data Sets, Counting Data Sets, X Axis, and Y Axis *(Skip this section for students who understand these relationships and can identify these concepts).*

INTRODUCE THE ACTIVITY: Today we are going to work on collecting, organizing, and interpreting data or information. We will look at ways to show our data. Today we are going to use a picture graph and a bar graph. A picture graph uses pictures to represent and organize data. A bar graph uses bars to represent and organize the data to make it easier to read. The data we are going to look at is how students get to school. What are some different ways you get to school? Wait for students to respond. Encourage plausible answers (i.e., not by “space ship”), provide response options as needed. **Great, those are all ways we could get to school.**

INTRODUCE PROBLEM: Before we get started making graphs, we need to practice with our data sets.

MODEL THE PROCESS: Need cutouts of Ms. Smith’s class. The first thing we need to do is identify our different data sets. First we will look at Ms. Smith’s class. Here are pictures of students in Ms. Smith’s class. Each student is holding up a sign that shows if they are a bus rider, walker, or car rider.

Show students the cutouts. **I need to sort the different types of data.** Show the students the page to sort onto. **I will put the car riders here, the bus riders here, and the walkers here. Watch me.** Sort each picture of a student into the proper data set, saying each aloud as you go.



STUDENT PRACTICE: Give each student their own sorting page and cards for Mr. Whatley’s class. **Now it’s your turn. I want you to sort the car riders, bus riders, and walkers into the correct category.** Use the CONSTANT TIME DELAY script to teach students to sort the items into the correct column.

****Note:** Students sort by placing cards into the correct column. If this is too small for some students, you can use one piece of paper or a paper plate for each category with the picture attached to sort onto. For students who are physically unable to sort the pictures, they can respond by saying the name of the correct column (e.g., “car rider”), using an augmentative communication device, or responding yes/no if the teacher presents “Does this picture go with car riders?”

CHECK AND SCORE

Step	Teacher Says/Does	Student Response
1.	Hand student a picture of a student in Mr. Whatley's class and say " Where does this student go? Or How does this student get to school? "	Student places the picture in the corresponding column (e.g., car rider, bus rider, or walker).
2.	Hand student a picture of a student in Mr. Whatley's class and say " Where does this student go? Or How does this student get to school? "	Student places the picture in the corresponding column (e.g., car rider, bus rider, or walker).
3.	Hand student a picture of a student in Mr. Whatley's class and say " Where does this student go? Or How does this student get to school? "	Student places the picture in the corresponding column (e.g., car rider, bus rider, or walker).
4.	Hand student a picture of a student in Mr. Whatley's class and say " Where does this student go? Or How does this student get to school? "	Student places the picture in the corresponding column (e.g., car rider, bus rider, or walker).
5.	Hand student a picture of a student in Mr. Whatley's class and say " Where does this student go? Or How does this student get to school? "	Student places the picture in the corresponding column (e.g., car rider, bus rider, or walker).
6.	Hand student a picture of a student in Mr. Whatley's class and say " Where does this student go? Or How does this student get to school? "	Student places the picture in the corresponding column (e.g., car rider, bus rider, or walker).
7.	Hand student a picture of a student in Mr. Whatley's class and say " Where does this student go? Or How does this student get to school? "	Student places the picture in the corresponding column (e.g., car rider, bus rider, or walker).
8.	Hand student a picture of a student in Mr. Whatley's class and say " Where does this student go? Or How does this student get to school? "	Student places the picture in the corresponding column (e.g., car rider, bus rider, or walker).
9.	Hand student a picture of a student in Mr. Whatley's class and say " Where does this student go? Or How does this student get to school? "	Student places the picture in the corresponding column (e.g., car rider, bus rider, or walker).

INTRODUCE PROBLEM: "Now we need to count the data in each set."

MODEL THE PROCESS: Watch me as I count the data in each set from Ms. Smith's class. I will start with the car riders. Model pointing to each card in the car rider column as you count aloud. **One, two, three. There are three car riders in Ms. Smith's class, so I will write 3 here.** Write the number 3 in the appropriate place in the table. **Now I will count bus riders.** Model pointing to each card in the bus rider column as you count aloud. **One, two, three, four. There are four bus riders in Ms. Smith's class, so I will write 4 here.** Write the number 4 in the appropriate place in the table. **Last, I will count the walkers.** Model pointing to each card in the walker column as you count aloud. **One, two. There are two walkers in Ms. Smith's class, so I will write 2 here.** Write the number 2 in the appropriate place in the table.



STUDENT PRACTICE: Show students the sorting page they completed for Mr. Whatley's class (with the cards already sorted from above) and a blank table. **Now it's your turn. I want you to count the number of car riders, bus riders, and walkers in each correct category.** Use LEAST INTRUSIVE PROMPTS script as needed to help students with each step. Give each student a table to write the total numbers in.

****Note:** When students are counting: If the student is nonverbal, counting may be done using an assistive technology device or with a response board (containing the numbers 1-10 or higher when appropriate). The student should "count" by pointing to the item/picture, then pointing to the corresponding number. For example, the student points to the first car rider and points to the number one, then points to the second car rider and points to the number two, etc. Student may also tap as teacher counts or move hands/AT scanner from number to number as teacher counts.

Look for an action that the student can perform independently and encourage this action as the pictures are counted. Some examples are: a tap, a head nod, blink, leg movement, finger movement.

**Note: Have the students write the numbers in the table, but do not score writing ability. If students are unable to write the number, they can use number stamps, Velcro numbers, direct the teacher to write it for them, etc.

CHECK AND SCORE

Step	Teacher Says/Does	Student Response
10.	“How many car riders are in Mr. Whatley’s class?”	Student counts the number of car riders (stopping at the appropriate number).
11.	“Good, write it in the table.”	Student writes/stamps/uses Velcro numbers/points to/eye gazes the number into the appropriate place in the table.
12.	“How many bus riders are in Mr. Whatley’s class?”	Student counts the number of bus riders (stopping at the appropriate number).
13.	“Good, write it in the table.”	Student writes/stamps/uses Velcro numbers/points to/eye gazes the number into the appropriate place in the table.
14.	“How many walkers are in Mr. Whatley’s class?”	Student counts the number of walkers (stopping at the appropriate number).
15.	“Good, write it in the table.”	Student writes/stamps/uses Velcro numbers/points to/eye gazes the number into the appropriate place in the table.

INTRODUCE PROBLEM: “Now that we know how many car riders, bus riders, and walkers are in each class, let’s review some vocabulary before we put them on a graph. First thing we need to know is how to find the x axis.”

MODEL THE PROCESS: The horizontal line on the graph is the x axis. The x axis goes across the page and looks like a number line. It goes through zero. Watch me as I point to the x axis on this graph. Point to the entire length of the x axis on a coordinate grid or graph (provided in materials).



STUDENT PRACTICE: Now it’s your turn. Use the CONSTANT TIME DELAY script to teach students to identify the x axis.

CHECK AND SCORE

Step	Teacher Says/Does	Student Response
16.	Give each student their own graph or coordinate plane and say “Run your finger along the x axis.”	Student points to or otherwise identifies the x axis.
17.	Give each student a different graph or coordinate plane and say “Run your finger along the x axis.”	Student points to or otherwise identifies the x axis.

INTRODUCE PROBLEM: “Now we will learn about the y axis.”

MODEL THE PROCESS: The y axis is the line on a graph that goes up and down (vertically) and goes through zero. It looks like a number line that goes up and down. Point to the entire length of the y axis on a coordinate grid or graph (provided in materials).



STUDENT PRACTICE: Now it’s your turn. Use the CONSTANT TIME DELAY script to teach students to identify the y axis.

CHECK AND SCORE

Step	Teacher Says/Does	Student Response
18.	Give each student their own graph or coordinate plane and say “Run your finger along the y axis.”	Student points to or otherwise identifies the y axis.
19.	Give each student a different graph or coordinate plane and say “Run your finger along the y axis.”	Student points to or otherwise identifies the y axis.

BUILDING ESSENTIAL UNDERSTANDING: SYMBOLS: Creating a Picture Graph *(Skip this section for students who understand these relationships and can identify these concepts).*

INTRODUCE PROBLEM: Now that we know how to sort our data and about the parts of a graph, we are going to graph the way students get to school in each class on a picture graph. A picture graph uses pictures to show the data.

MODEL THE PROCESS: Watch me as I make a picture graph to show how the students in Ms. Smith’s class get to school. First, I look at my table and see that there are three car riders in Ms. Smith’s class. So I count out three car pictures: one, two, three. Now I line them up on the graph above the label for car riders. Then I do the same for bus riders. I see there are four bus riders, so I count out four bus pictures: one, two, three, four. I line them up on the graph above the label for car riders. Last, I need to graph the walkers. There are two walkers, so I count out two pictures of walkers: one, two. Now I line them up on the bar graph above the label for walkers.




STUDENT PRACTICE: Make sure each student has their completed table for Mr. Whatley’s class and a blank picture graph. **Now it’s your turn. Make a picture graph showing how the students in Mr. Whatley’s class get to school.** Use LEAST INTRUSIVE PROMPTS script as needed to help students with each step.

CHECK AND SCORE

Step	Teacher Says/Does	Student Response
20.	“How many car riders are in Mr. Whatley’s class?”	Student states, points to, or otherwise identifies the correct number.
21.	Give each student more than enough car pictures and say “ Count out that number of car riders. ”	Student uses one to one correspondence counting to count out the correct number of pictures.
22.	“ Now put them in on the picture graph. ”	Student places the correct amount of pictures of cars on the picture graph above the car rider label, with the pictures lined up correctly.
23.	“How many bus riders are in Mr. Whatley’s class?”	Student states, points to, or otherwise identifies the correct number.
24.	Give each student more than enough bus pictures and say “ Count out that number of bus riders. ”	Student uses one to one correspondence counting to count out the correct number of pictures.
25.	“ Now put them in on the picture graph. ”	Student places the correct amount of pictures of buses on the picture graph above the bus rider label, with the pictures lined up correctly.
26.	“How many walkers are in Mr. Whatley’s class?”	Student states, points to, or otherwise identifies the correct number.
27.	Give each student more than enough walker pictures and say “ Count out that number of walkers. ”	Student uses one to one correspondence counting to count out the correct number of walkers.
28.	“ Now put them in on the picture graph. ”	Student places the correct amount of pictures of walkers on the picture graph above the walker label, with the pictures lined up correctly.



This may be a good stopping point. Have the student take a poll of how the student’s in their class get to school. Students can raise hands when asked “Who comes to school on a bus?” and so on. Students can also use the symbols to identify how they get to school and put them on a class wide picture graph. There is a generalization worksheet with this level. You can use this for additional guided practice or to send home as homework.

INDEPENDENT PRACTICE: Data Analysis Skills Test	Teacher Says/Does	
	Give each student the <i>Data Analysis Skills Test: Concepts and Symbols</i> . Read directions for each problem and have student select response. Record whether response is correct or incorrect.	Only provide praise for completing assessment (if student needs encouragement). Do not provide specific praise for correct answers while student is testing.
	<p><i>NOW</i> Stop the lesson here and repeat tomorrow if student is not yet getting at least 14 independent correct responses. Score responses 1-28 on the <i>Data Analysis Progress Monitoring Sheet</i> if you did not do so while teaching.</p>	<p><i>NEXT</i> Remember the goal is for students to be able to use a table to complete a bar graph, move into the second half of the lesson to hit the target CCC for this grade level. You can skip this <i>Conceptual Foundation</i> section to move on.</p>

3rd BUILD A GRADE ALIGNED COMPONENT: Reading a Table and Filling in a Bar Graph

4th and 5th GRADE BUILD ESSENTIAL UNDERSTANDING: SYMBOLS: Reading a Table and Filling in a Bar Graph

INTRODUCE THE ACTIVITY/PROBLEM: Present students with the tables from the previous sections showing how students in both Ms. Smith’s class and Mr. Whatley’s class get to school. **Remember before when we looked at how students in Ms. Smith and Mr. Whatley’s class get to school? Now we are going to learn a different way to graph the same information. A bar graph is like a picture graph, except that it uses bars to show the data instead of pictures.**

MODEL THE PROCESS: Watch me as I make a bar graph to show the data for how the students in Ms. Smith’s class get to school. Here’s the table showing the data for Ms. Smith’s class. Show students the completed table for Ms. Smith’s class (3 car riders, 4 bus riders, 2 walkers). **First, I look at my table and see that there are three car riders in Ms. Smith’s class. So I find the car rider column on the graph and draw a line across from the 3. After I draw a line at the number 3, I draw two lines straight down finishing the bar and color it in. Now I do the same for bus riders. I see there are four bus riders. I find the bus rider column on the graph and draw a line across from the 4. After I draw a line at the number 4, I draw two lines straight down finishing the bar and color it in. Last, I need to graph the walkers. There are two walkers. I find the walker column on the graph and draw a line across from the 2. After I draw a line at the number 2, I draw two lines straight down finishing the bar and color it in.**



STUDENT PRACTICE: Give each student a completed table for Mr. Whatley’s class (3 car riders, 5 bus riders, and 1 walker) and a blank graph. **Now it’s your turn. Look at the table and use it to create a bar graph that shows the data for how students in Mr. Whatley’s class get to school.** Use LEAST INTRUSIVE PROMPTS script as needed to help students with each step.

****Note:** Students who are unable to draw a line to create the bar graph can point to the correct placement on the graph and have the teacher fill it in or the teacher can ask “Do I draw the line here?” and students can respond yes/no using assistive technology. Also, drawing the vertical lines and coloring in the bar are not scored.


CHECK AND SCORE

STEP	Teacher Says/Does	Student Response
29.	“Create a bar graph showing how the students in Mr. Whatley’s class get to school.” or “How many car riders are in Mr. Whatley’s class?”	Student states, points to, or otherwise identifies the correct number.
30.	Wait for students to independently initiate this step or say “Find the column for car riders on the graph.”	Student identifies the corresponding column on the graph.
31.	Wait for students to independently initiate this step or say “Draw a line showing the number of car riders.” After students draw the line, they can draw the two vertical lines and color the bar in (not scored).	Student draws a line at the correct number in the correct location on the graph.

32.	Wait for students to independently initiate this step or say “ How many bus riders are in Mr. Whatley’s class? ”	Student states, points to, or otherwise identifies the correct number.
33.	Wait for students to independently initiate this step or say “ Find the column for bus riders on the graph. ”	Student identifies the corresponding column on the graph.
34.	Wait for students to independently initiate this step or say “ Draw a line showing the number of bus riders. ” <i>After students draw the line, they can draw the two vertical lines and color the bar in (not scored).</i>	Student draws a line at the correct number in the correct location on the graph.
35.	Wait for students to independently initiate this step or say “ How many walkers are in Mr. Whatley’s class? ”	Student states, points to, or otherwise identifies the correct number.
36.	Wait for students to independently initiate this step or say “ Find the column for walkers on the graph. ”	Student identifies the corresponding column on the graph.
37.	Wait for students to independently initiate this step or say “ Draw a line showing the number of walkers. ” <i>After students draw the line, they can draw the two vertical lines and color the bar in (not scored).</i>	Student draws a line at the correct number in the correct location on the graph.



This may be a good stopping point. Have the student take a poll of how the student’s in their class get to school. Students can raise hands when asked “Who comes to school on a bus?” and so on. Students can also use the symbols to identify how they get to school and put them on a class wide bar graph. There is a generalization worksheet with this level. You can use this for additional guided practice or to send home as homework.

INDEPENDENT PRACTICE: Data Analysis Skills Test	Teacher Says/Does	
	Give each student the <i>Data Analysis Skills Test: 3rd Grade Aligned Component</i> . Read directions for each problem and have student select response. Record whether response is correct or incorrect.	Only provide praise for completing assessment (if student needs encouragement). Do not provide specific praise for correct answers while student is testing.
	<p><i>NOW</i> <i>Stop the lesson here and repeat tomorrow if student is not yet getting at least 4 independent correct responses. Score responses 29-37 on the Data Analysis Progress Monitoring Sheet if you did not do so while teaching.</i></p>	<p><i>NEXT</i> <i>Remember the goal is for students to be able to collect data and graph it as soon as possible, move into the next portion of the lesson to hit the target CCC for the 4th grade level.</i></p>

4th BUILD A GRADE ALIGNED COMPONENT: Collecting Data and Organizing it in a Bar Graph

5th GRADE BUILD ESSENTIAL UNDERSTANDING: SYMBOLS: Collecting Data and Organizing it in a Bar Graph

INTRODUCE THE ACTIVITY/PROBLEM: Now students are going to graph information they collect from a new set of data (Mrs. Bishop's class). Remember before when we looked at how students in Ms. Smith and Mr. Whatley's class get to school? We have two new sets of data for two other teachers' classes, Mrs. Bishop and Ms. Carter. We are going to collect the data by counting the number of students that get to school by car, bus, or walking and put that on a bar graph.

MODEL THE PROCESS: Watch me as I make a bar graph to show the data for how the students in Ms. Carter's class get to school. Show students the data set for Ms. Carter's class (do not cut out the individual student pictures, instead you will count them on the sheet as provided).

First, I count how many car riders are in Ms. Carter's class: one, two, three, four. So I find the car rider column on the graph and draw a line across from the 4. The teacher can demonstrate either by counting up the number of lines or finding the four on the y axis and following that line across to the correct place, whichever is more appropriate for their students. I draw two lines straight down finishing the bar and color it in. Now I do the same for bus riders. I count the bus riders, one, two, three, four. I find the bus rider column on the graph and draw a line across from the 4. After I draw a line at the number 4, I draw two lines straight down finishing the bar and color it in. Last, I need to graph the walkers. There are zero walkers, so I leave the column blank.



STUDENT PRACTICE: Give each student the picture data set for Mrs. Bishop's class and a blank graph. Now it's your turn. Look at the data and create a bar graph that shows the data for how students in Mrs. Bishop's class get to school. Use LEAST INTRUSIVE PROMPTS script as needed to help students with each step.


CHECK AND SCORE

STEP	Teacher Says/Does	Student Response
38.	"Make a bar graph showing how the students in Mrs. Bishop's class get to school." or "How many car riders are in Mrs. Bishop's class?"	Student counts the number of car riders (stopping at the appropriate number).
39.	Wait for students to independently initiate this step or say "Find the column for car riders on the graph."	Student identifies the corresponding column on the graph.
40.	Wait for students to independently initiate this step or say "Draw a line showing the number of car riders." After students draw the line, they can draw the two vertical lines and color the bar in (not scored).	Student draws a line at the correct number in the correct location on the graph. **Students can either count up the correct number of lines or find the appropriate number on the y axis and following it over to the correct column.

41.	Wait for students to independently initiate this step or say “ How many bus riders are in Mrs. Bishop’s class? ”	Student counts the number of bus riders (stopping at the appropriate number).
42.	Wait for students to independently initiate this step or say “ Find the column for bus riders on the graph. ”	Student identifies the corresponding column on the graph.
43.	Wait for students to independently initiate this step or say “ Draw a line showing the number of bus riders. ” <i>After students draw the line, they can draw the two vertical lines and color the bar in (not scored).</i>	Student draws a line at the correct number in the correct location on the graph.
44.	Wait for students to independently initiate this step or say “ How many walkers are in Mr. Whatley’s class? ”	Student counts the number of walkers (stopping at the appropriate number).
45.	Wait for students to independently initiate this step or say “ Find the column for walkers on the graph. ”	Student identifies the corresponding column on the graph.
46.	Wait for students to independently initiate this step or say “ Draw a line showing the number of walkers. ” <i>After students draw the line, they can draw the two vertical lines and color the bar in (not scored).</i>	Student draws a line at the correct number in the correct location on the graph.



This may be a good stopping point. Have the student take a poll of how the student’s in their class get to school. Students can raise hands when asked “Who comes to school on a bus?” and so on. Students can also use the symbols to identify how they get to school and put them on a class wide bar graph. There is a generalization worksheet with this level. You can use this for additional guided practice or to send home as homework.

INDEPENDENT PRACTICE: Data Analysis Skills Test	Teacher Says/Does	
	Give each student the <i>Data Analysis Skills Test: 4th Grade Aligned Component</i> . Read directions for each problem and have student select response. Record whether response is correct or incorrect.	Only provide praise for completing assessment (if student needs encouragement). Do not provide specific praise for correct answers while student is testing.
	<i>NOW</i> Stop the lesson here and repeat tomorrow if student is not yet getting at least 4 independent correct responses. Score responses 38-46 on the Data Analysis Progress Monitoring Sheet if you did not do so while teaching.	<i>NEXT</i> Remember the goal is for students to be able to complete a line graph it as soon as possible, move into the next portion of the lesson to hit the target CCC for the 5 th grade level.

5th BUILD A GRADE ALIGNED COMPONENT: Creating a Line Graph

INTRODUCE ACTIVITY/PROBLEM: Remember when we made picture and bar graphs to show how students in different classrooms came to school? Now we are going to use a line graph to see how data can change over time. A line graph is a graph that shows a series of data points that are connected by a data path. A data path is a line that connects all the data points. We are going to see how the data for car riders in Mrs. Green’s class changes over time.

MODEL THE PROCESS: Show students the blank line graph and the table with data for car riders. **Watch me as I graph the data for car riders. First I will graph the data for Monday. There were four car riders Monday, so I find Monday and draw a point/dot at four where the lines cross.** The teacher can demonstrate either by counting up the number of lines or finding the four on the y axis and following that line across to the correct place, whichever is more appropriate for their students. **On Tuesday there were three car riders, so I find Tuesday and draw a point/dot at three where the lines cross. On Wednesday there were five car riders, so I find Wednesday and draw a point/dot at five where the lines cross. On Thursday there were six car riders, so I find Thursday and draw a point/dot at six where the lines cross. On Friday there were six car riders, so I find Friday and draw a point/dot at six where the lines cross. The last thing I do is draw a line connecting all the data points.**



STUDENT PRACTICE: Give each student the table data set for bus riders and a blank line graph. **Now it’s your turn. Look at the data and create a line graph that shows the data for how bus riders change throughout the week.** Use LEAST INTRUSIVE PROMPTS script as needed to help students with each step.

CHECK AND SCORE

Step	Teacher Says/Does	Student Response
47.	“How many bus riders were there Monday?”	Student states, points to, or otherwise identifies the correct number. **Students can either count up the correct number of lines or find the appropriate number on the y axis and following it over to the correct column.
48.	Wait for students to independently initiate this step or say “ Find the column for Monday on the graph. ”	Student identifies the corresponding column on the graph.
49.	Wait for students to independently initiate this step or say “ Draw a point/dot showing the number of bus riders on Monday. ”	Student draws a point/dot at the correct number in the correct location on the graph.
50.	“How many bus riders where there Tuesday?”	Student states, points to, or otherwise identifies the correct number.
51.	Wait for students to independently initiate this step or say “ Find the column for Tuesday on the graph. ”	Student identifies the corresponding column on the graph.
52.	Wait for students to independently initiate this step or say “ Draw a point/dot showing the number of bus riders on Tuesday. ”	Student draws a point/dot at the correct number in the correct location on the graph.

53.	“How many bus riders where there Wednesday?”	Student states, points to, or otherwise identifies the correct number.
54.	Wait for students to independently initiate this step or say “ Find the column for Wednesday on the graph. ”	Student identifies the corresponding column on the graph.
55.	Wait for students to independently initiate this step or say “ Draw a point/dot showing the number of bus riders on Wednesday. ”	Student draws a point/dot at the correct number in the correct location on the graph.
56.	“How many bus riders where there Thursday?”	Student states, points to, or otherwise identifies the correct number.
57.	Wait for students to independently initiate this step or say “ Find the column for Thursday on the graph. ”	Student identifies the corresponding column on the graph.
58.	Wait for students to independently initiate this step or say “ Draw a point/dot showing the number of bus riders on Thursday. ”	Student draws a point/dot at the correct number in the correct location on the graph.
59.	“How many bus riders where there Friday?”	Student states, points to, or otherwise identifies the correct number.
60.	Wait for students to independently initiate this step or say “ Find the column for Friday on the graph. ”	Student identifies the corresponding column on the graph.
61.	Wait for students to independently initiate this step or say “ Draw a point/dot showing the number of bus riders on Friday. ”	Student draws a point/dot at the correct number in the correct location on the graph.
62.	Wait for students to independently initiate this step or say “ Draw a line to connect the data points. ”	Student draws a line from Monday’s data point to Tuesday’s data point.
63.	Wait for students to independently initiate this step or say “ Keep going. ”	Student draws a line from Tuesday’s data point to Wednesday’s data point.
64.	Wait for students to independently initiate this step or say “ Keep going. ”	Student draws a line from Wednesday’s data point to Thursday’s data point.
65.	Wait for students to independently initiate this step or say “ Keep going. ”	Student draws a line from Thursday’s data point to Friday’s data point.



This is the end of the lesson. Have the student take a poll of tracking how different types of data change across the week. Students can raise hands when asked “Who comes to school on a bus?” and so on. Students can also use the symbols to identify how they get to school and put them on a class wide line graph. There is a generalization worksheet with this level. You can use this for additional guided practice or to send home as homework.

INDEPENDENT PRACTICE: Data Analysis Skills Test	Teacher Says/Does	
	Give student the <i>Data Analysis Skills Test: Conversion of Units of measure and area</i> . Read directions for each problem and have student select response. Record whether response is correct or incorrect.	Only provide praise for completing assessment (if student needs encouragement). Do not provide specific praise for correct answers while student is testing.

Troubleshooting and Data-Based Decision Making for Data Analysis Skills Test:

If student is unable to complete any items on the measurement/geometry test independently and correctly, go back and teach one problem step-by-step.

MASSI CULMINATING ACTIVITY: Have the student take a poll of tracking how different types of data change across the week or how students came to school on different days. Students can raise hands when asked “Who comes to school on a bus?” and so on. Students can also use the symbols to identify how they get to school and put them on a class wide picture, bar, or line graph. Teachers can even compare the different types of graphs to see how they show the data similarly or differently. Students may also go ask another class and graph their results.

BUILD TOWARDS FULL GRADE LEVEL COMPETENCE

Here are ideas to build competence towards the full grade level competence using this same activity. See the unit plan and talk with the general education teacher for more ideas.

Component	Activity	What Student Does	Generalization/ Fluency
Using a picture or bar graph to answer one and two step problems.	Show students a bar graph representing data with several categories; ask students “which has more” and “which has less...” questions.	Analyzes the bar graph and responds by answering the question (e.g., naming the appropriate category).	Vary the types of graphs, numbers of categories, and types of questions.
Using a picture or bar graph to answer one and two step problems.	Show students a bar graph representing data with several categories, ask “how many more...” and “how many less...” questions.	Analyzes the bar graph and responds by answering the question (e.g., stating the correct numerical answer, such as 4).	Vary the types of graphs, numbers of categories, and types of questions.
Identifying the first quadrant of a coordinate plane	Introduce the coordinate plane and teach quadrants.	Identifies different quadrants and the differences between those quadrants.	Present a range of different coordinate planes.
Graphing points in the first quadrant of a coordinate plane and interpret values of the points in context	Teach students to plot points in the first quadrant of a coordinate plane, then have students identify trends, patterns, and outliers.	Plotting points in the first quadrant of the coordinate plane. Analyzing the data for trends, patterns, and outliers	Students plot points on a range of different coordinate planes, show a range of patterns (increasing, decreasing, no trend, etc.) and outliers.

Worksheet 1 Generalization: Concepts and Symbols

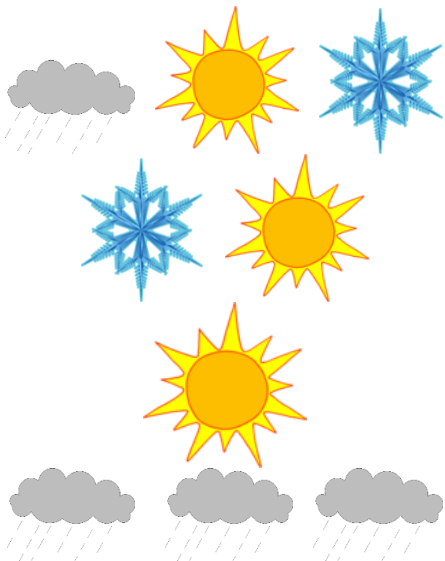
Circle all the dogs.






How many buses are there? _____



Fill in the table about the data below

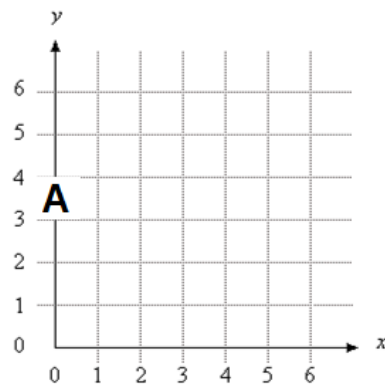
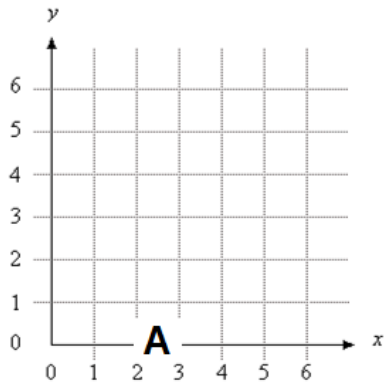


Weather	Number of Days
 Sunny	3
 Rainy	
 Snowy	

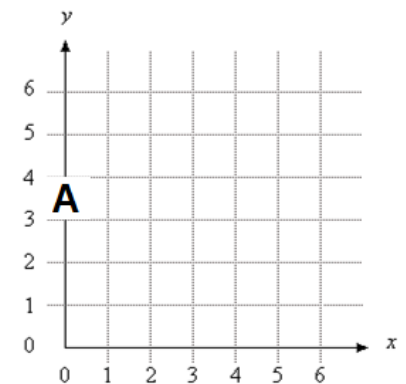
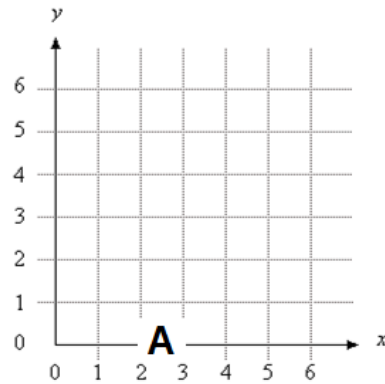
How many pencils are there? _____



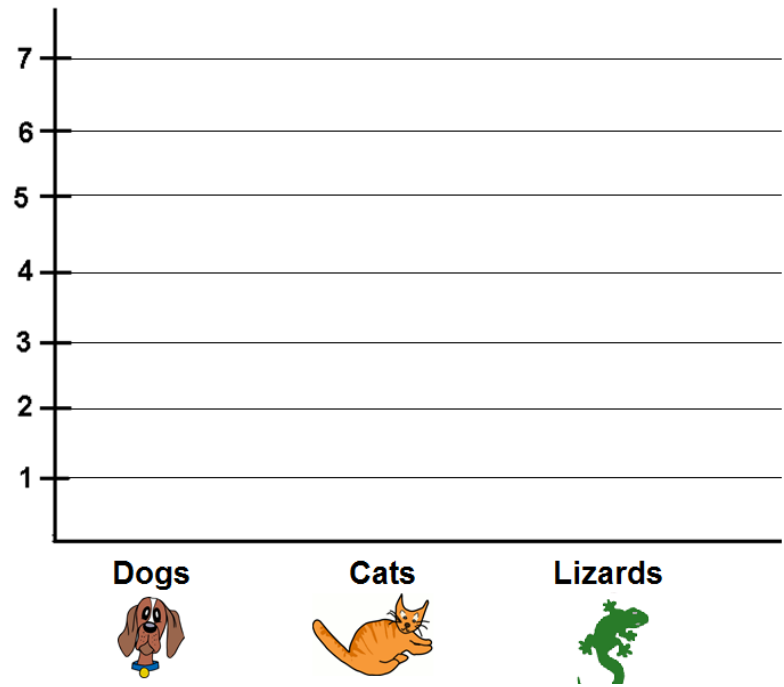
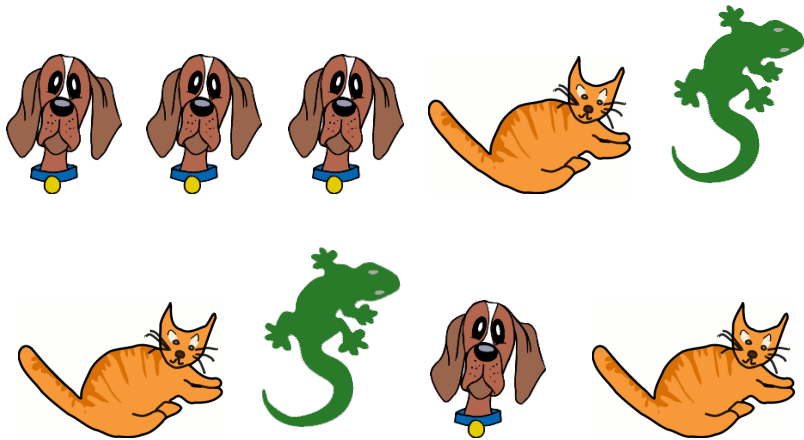
Which one shows the A on the y axis?



Which one shows the A on the x axis?






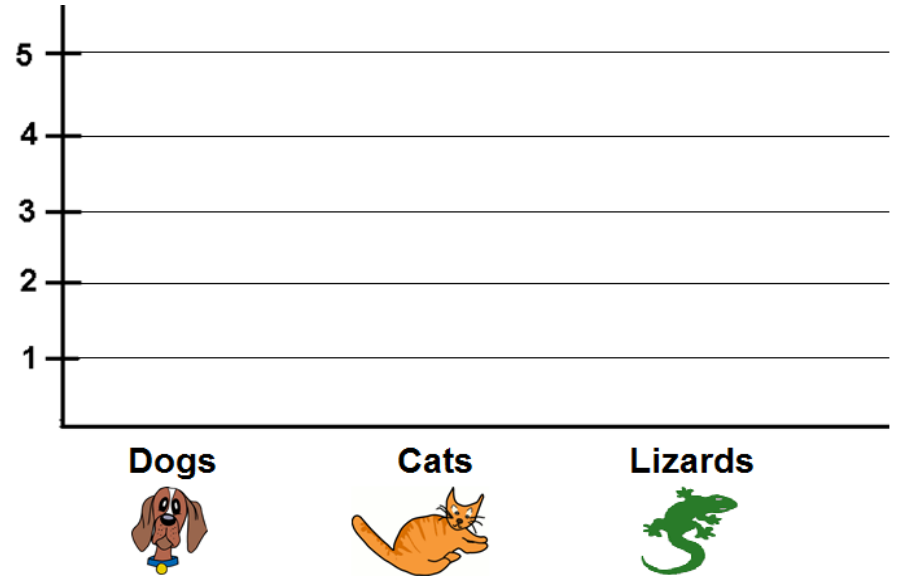
Draw a picture graph to represent the following data.






Worksheet 2 Generalization: 3rd Grade Aligned Component

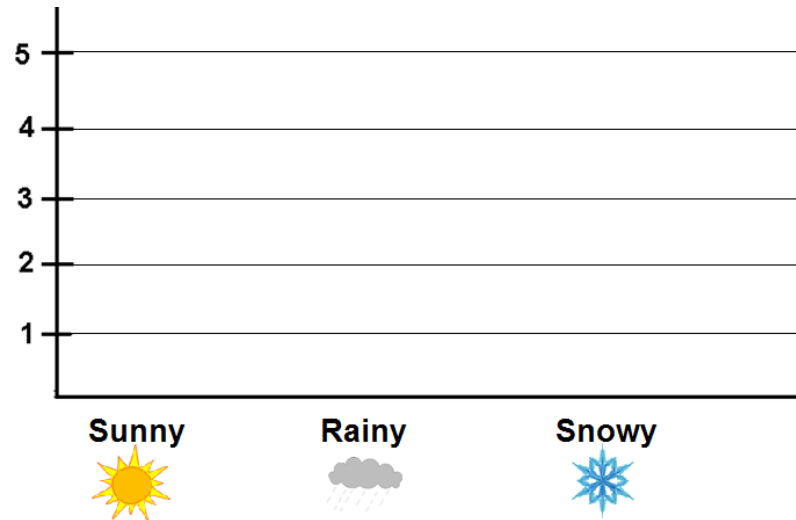
Draw a bar graph to represent the following data.

Pets	Number
 Dogs	4
 Cats	2
 Lizards	3



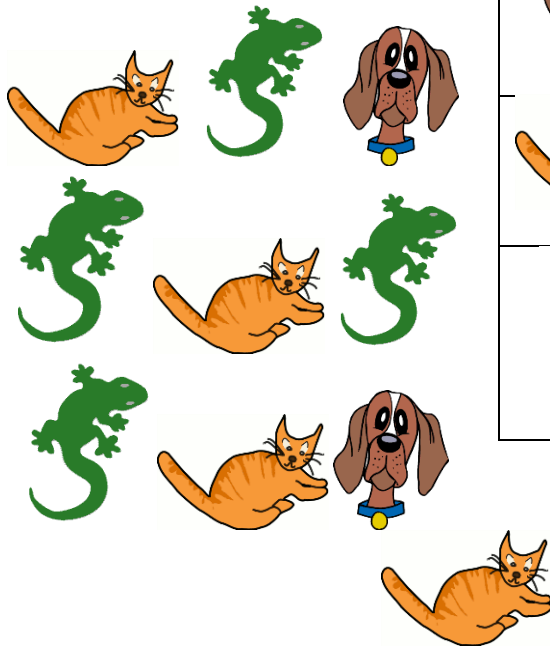
Draw a bar graph to represent the following data.




Weather	Number of Days
 Sunny	3
 Rainy	4
 Snowy	1

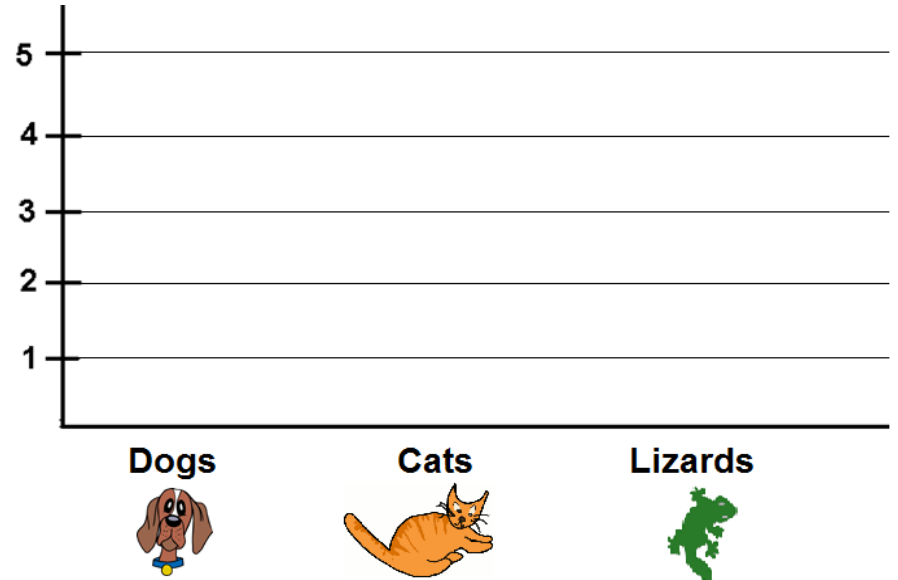


Worksheet 3 Generalization: 4th Grade Aligned Component

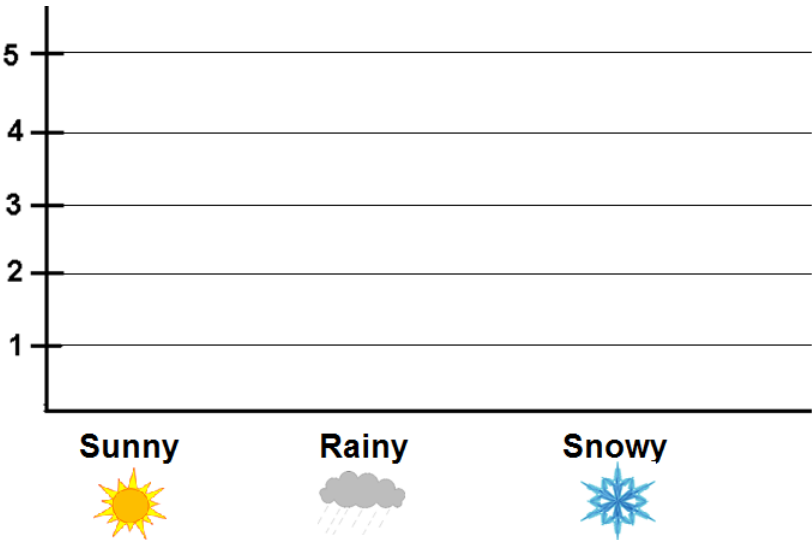
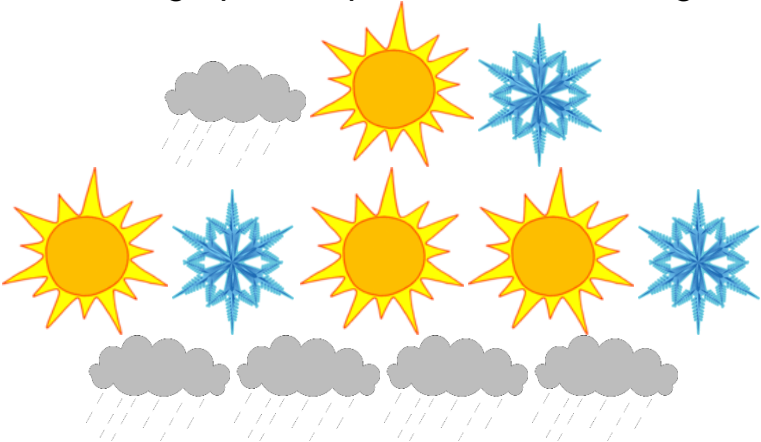
Fill in the table and draw a bar graph to represent the following data.



Pets	Number
 Dogs	
 Cats	
 Lizards	



Draw a bar graph to represent the following data.

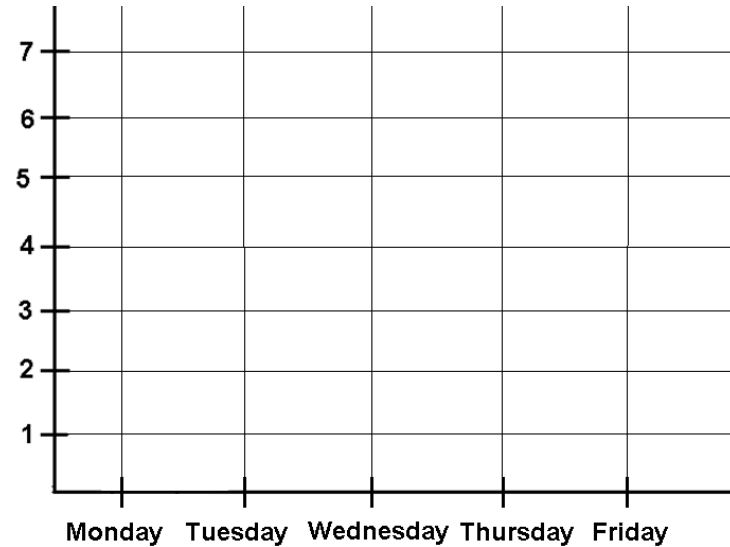


Worksheet 4 Generalization: 5th Grade Aligned Component

Use the table and draw a line graph to represent the data in the table.

Ben walks dogs after school to earn money. The table below shows how many dogs he walks every day.

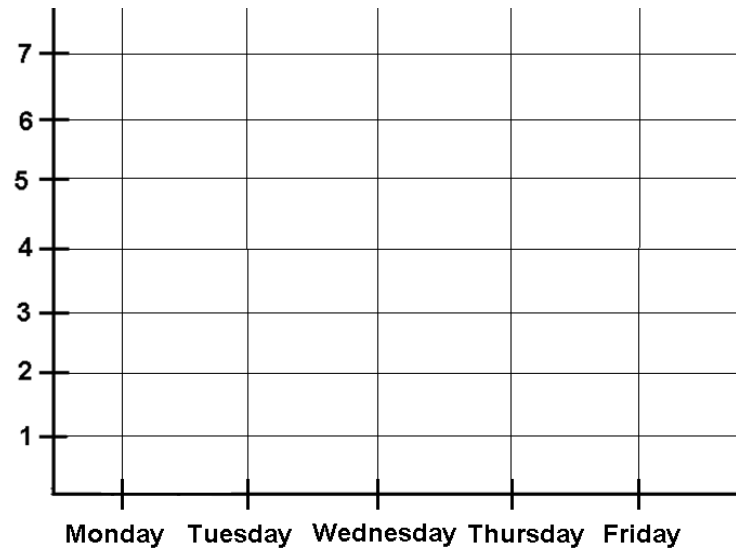
Monday	Tuesday	Wednesday	Thursday	Friday
4	3	5	6	2



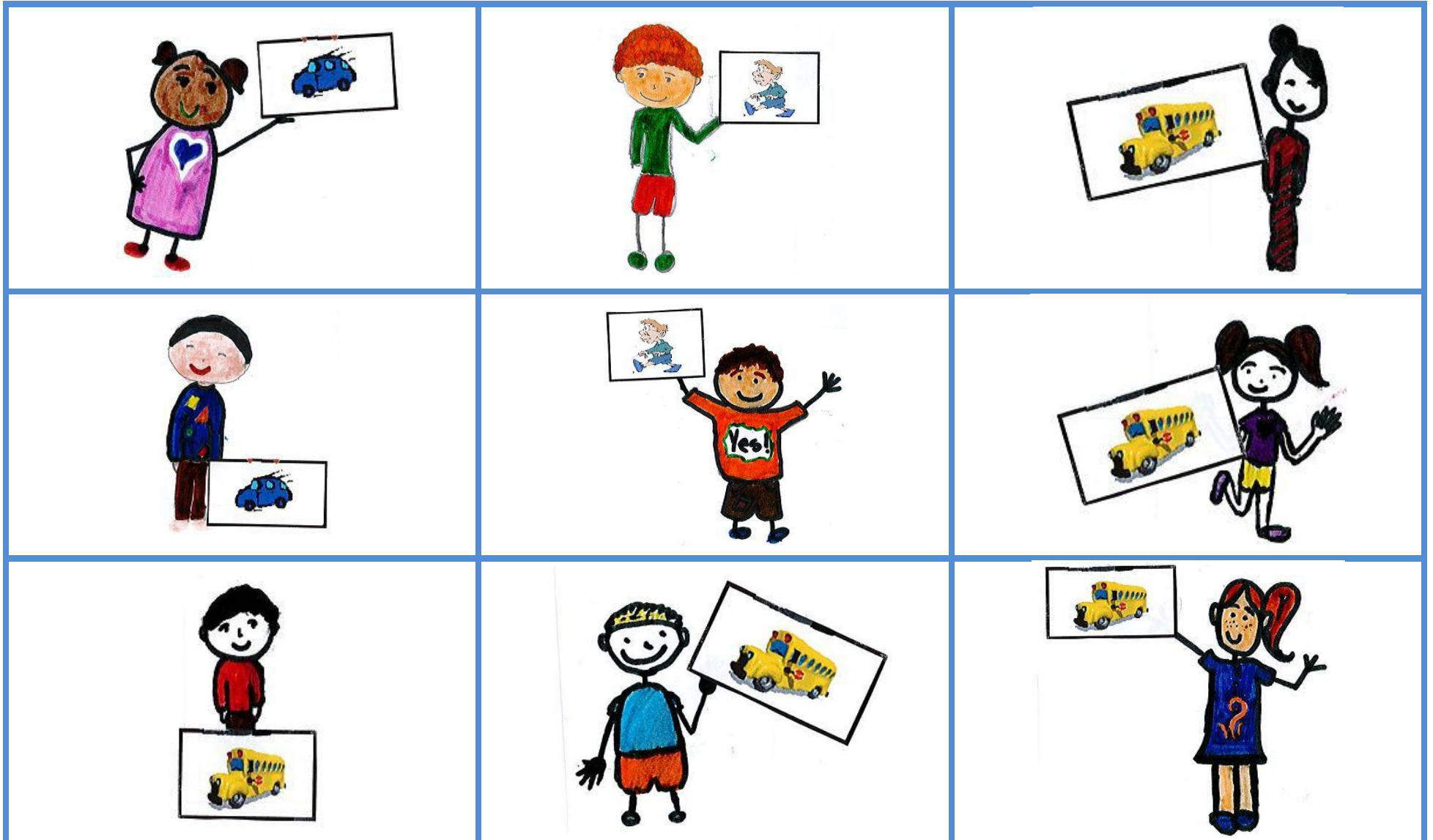
Use the table and draw a line graph to represent the data in the table.

Mr. Sloop counted the number of students that were late for school every day for one week. The table below shows how many students were late on each day of the week.

Monday	Tuesday	Wednesday	Thursday	Friday
1	0	3	7	5



Materials: Ms. Smith's Class (cut out cards)



Sorting Page

Car Riders






Bus Riders






Walkers

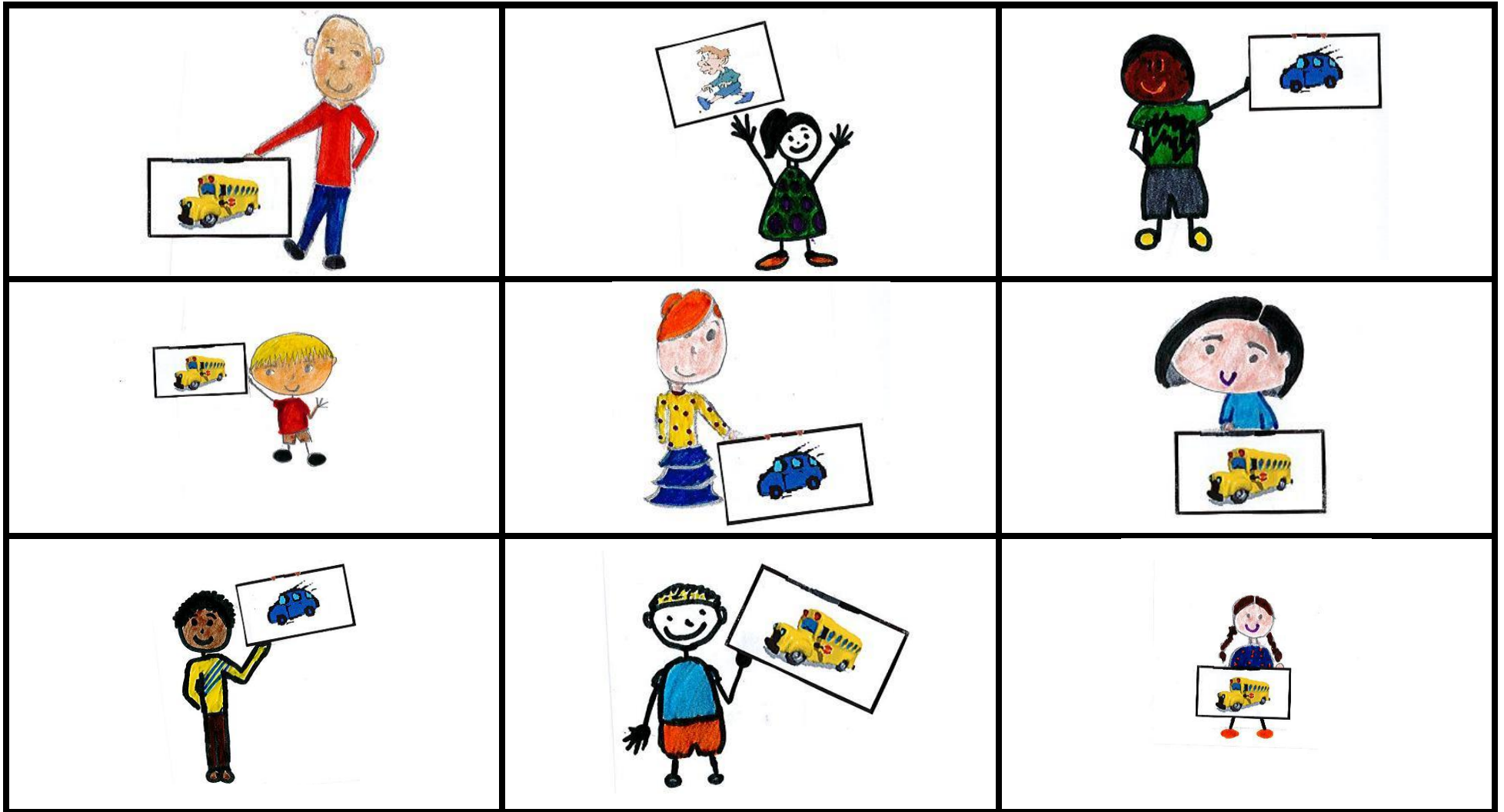


Tables for recording data

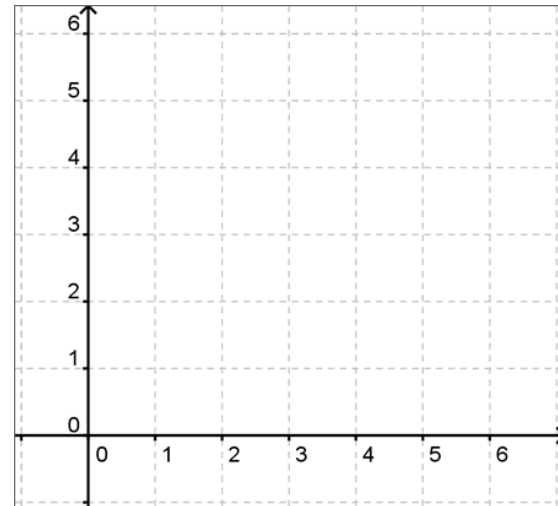
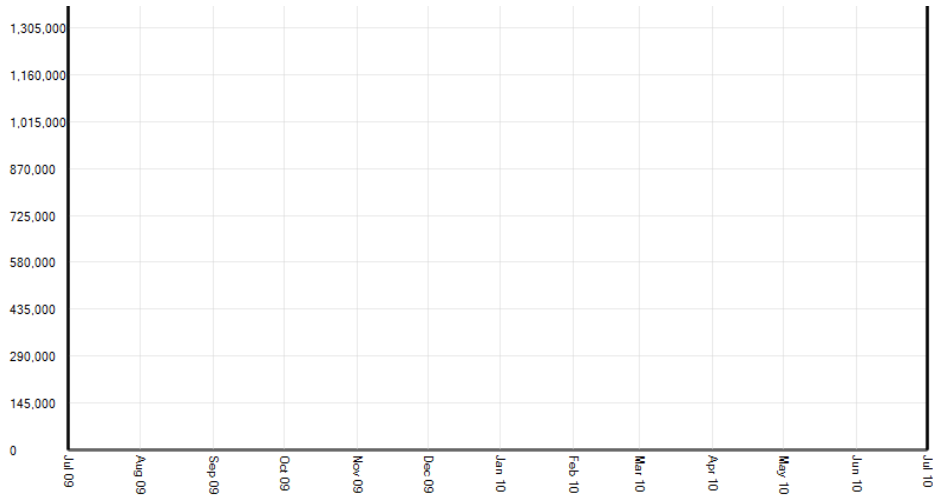
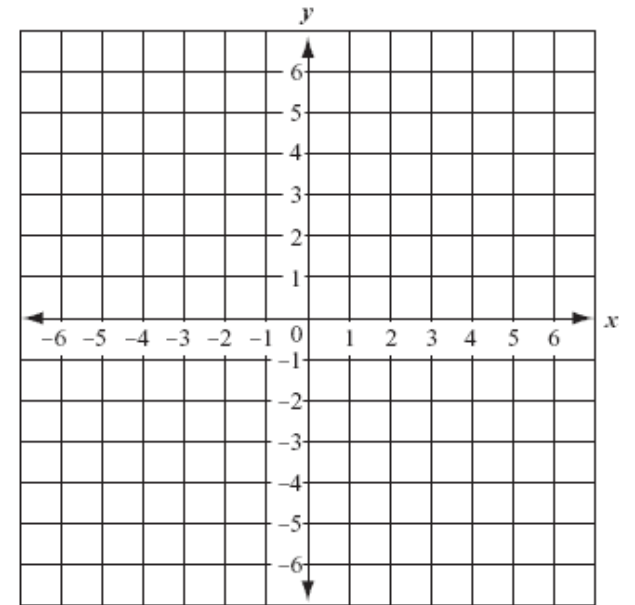
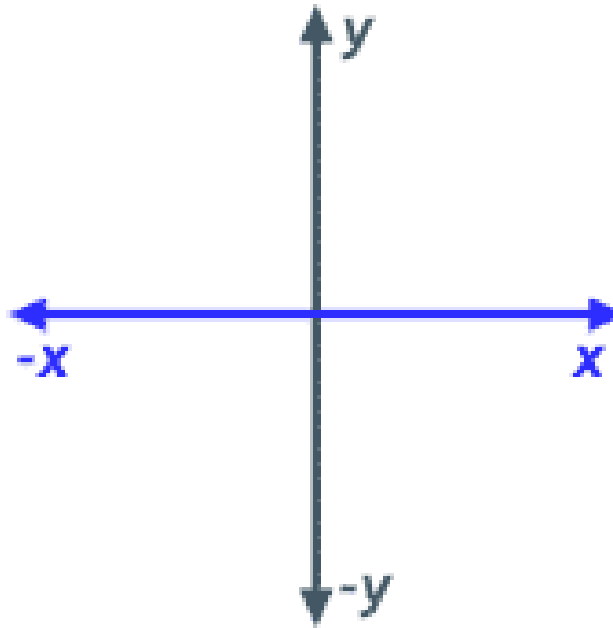
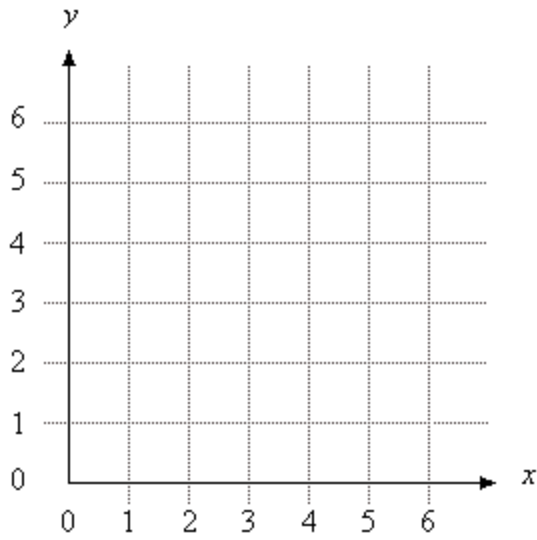
Ms. Smith's Class	
 Car Riders	
 Bus Riders	
 Walkers	

Mr. Whatley's Class	
 Car Riders	
 Bus Riders	
 Walkers	

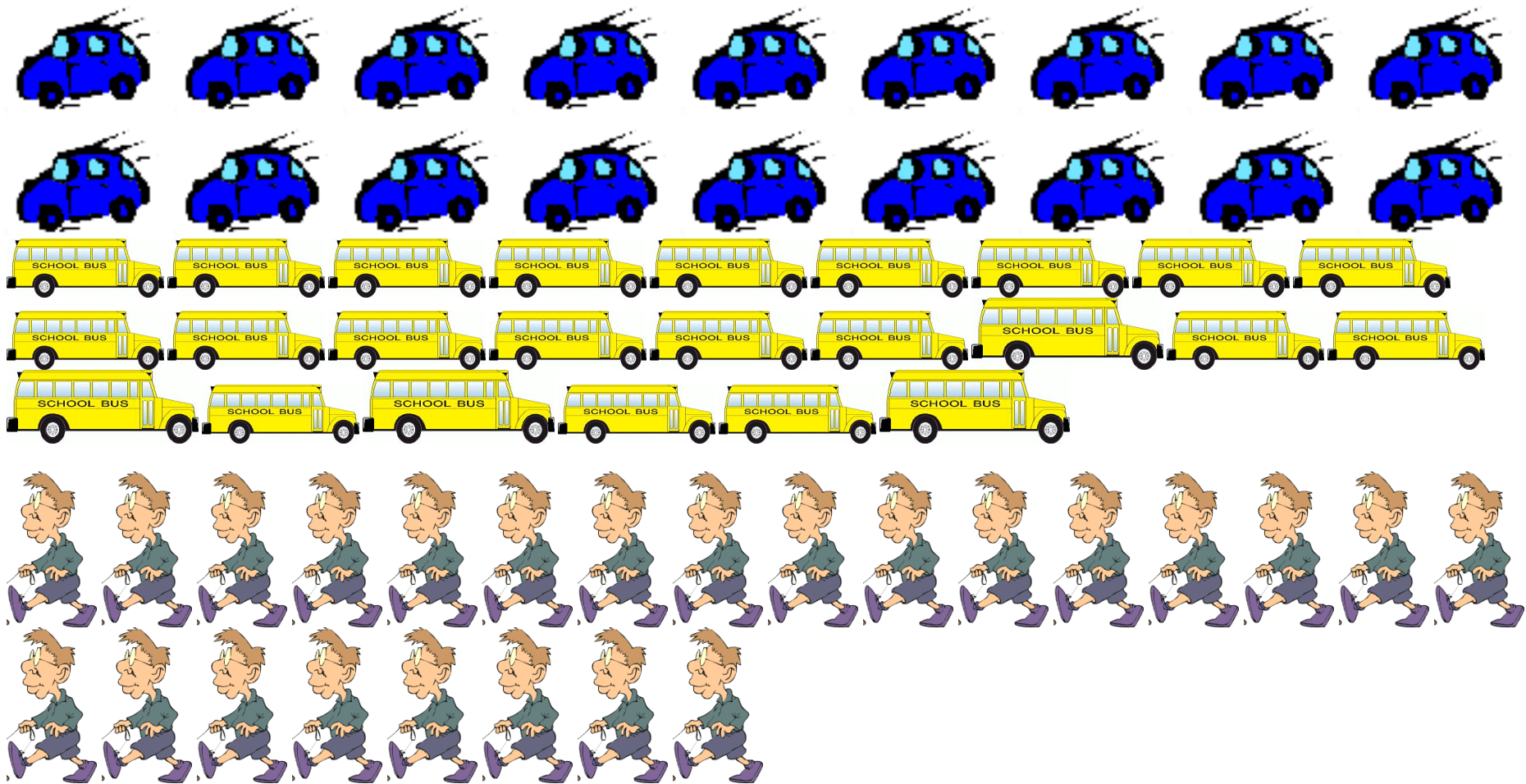
Mr. Whatley's Class (cut out cards)



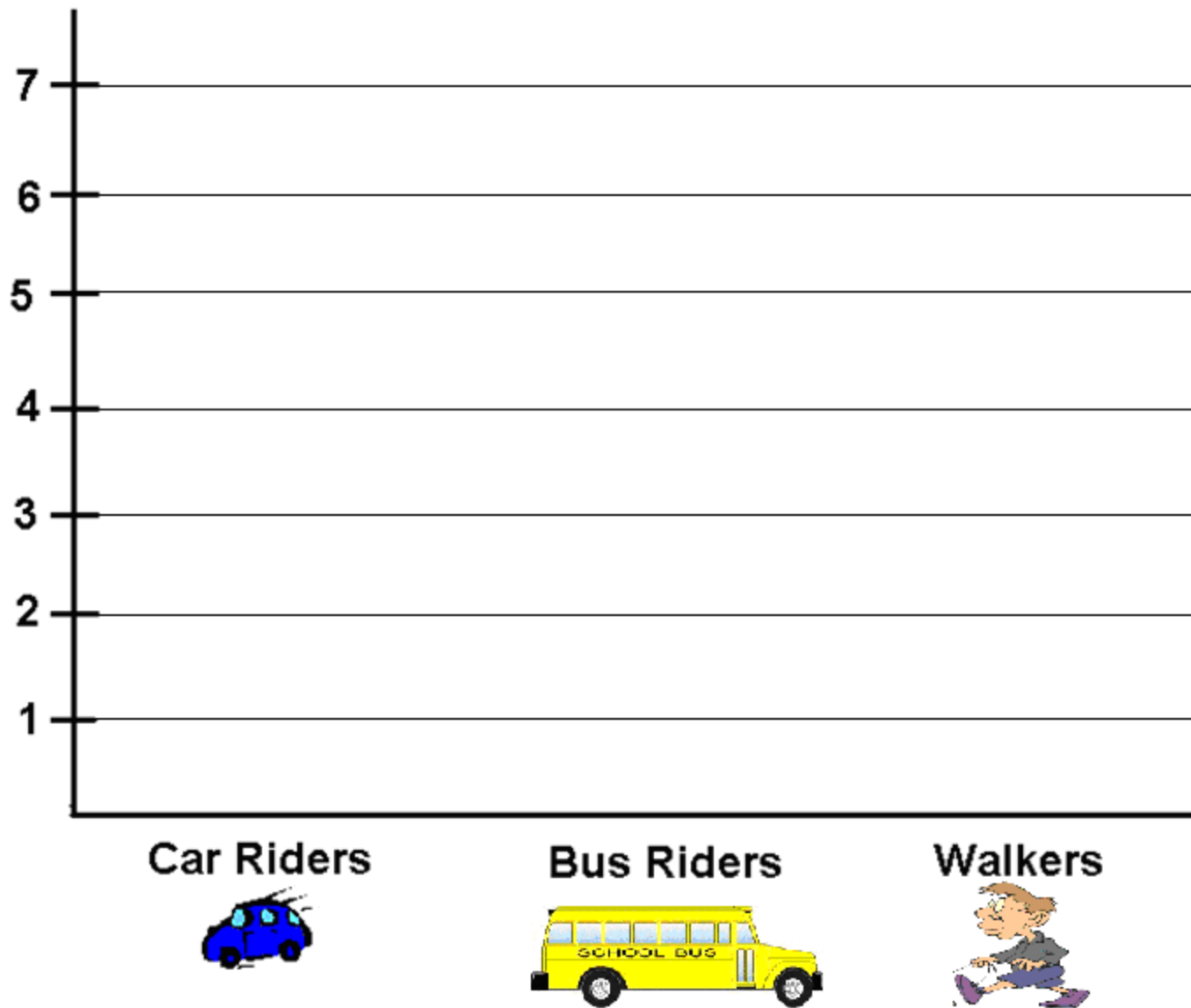
Blank Coordinate Grids and Graphs



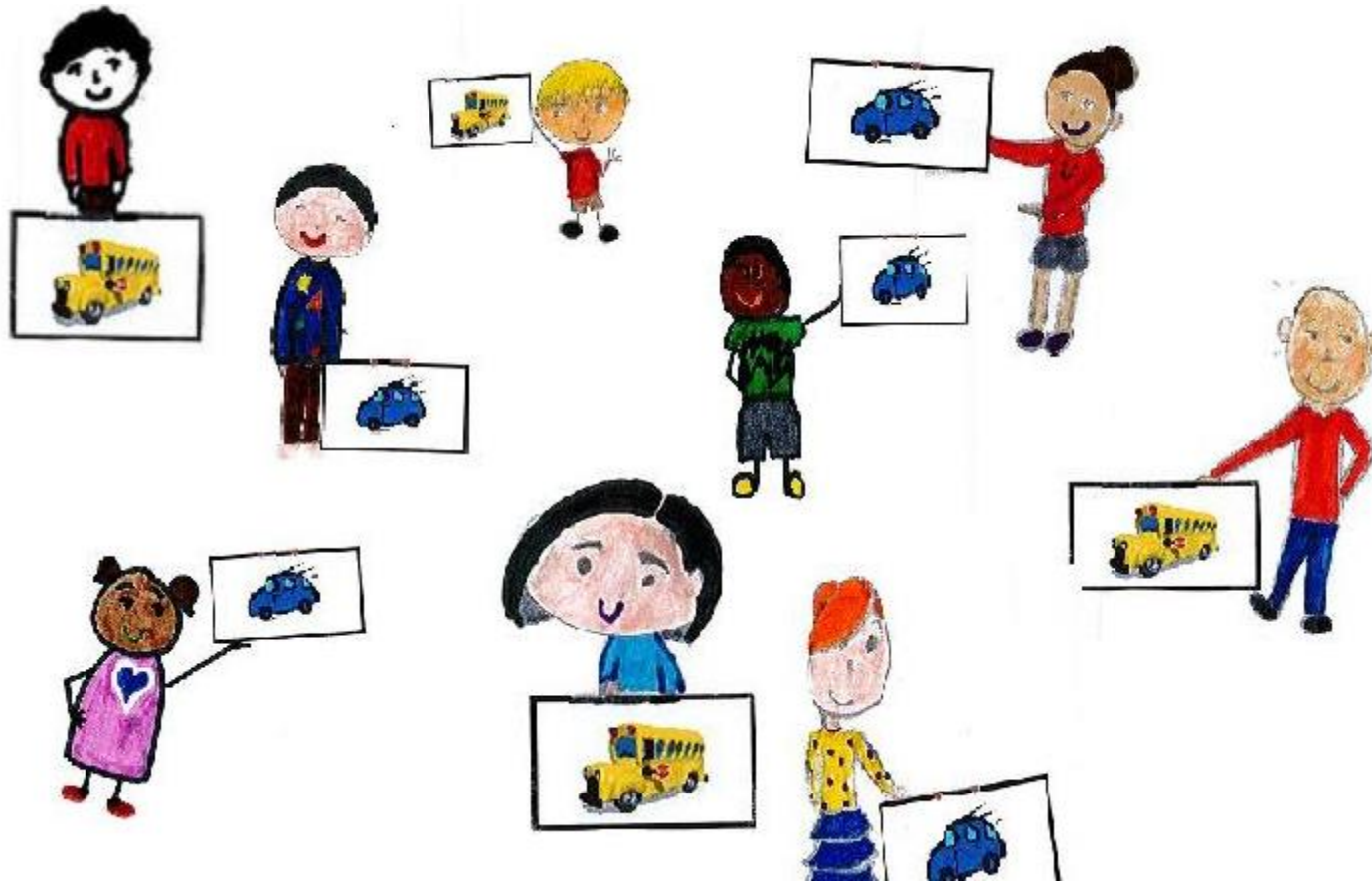
Symbols to use on picture graph (cut out, can laminate if needed)



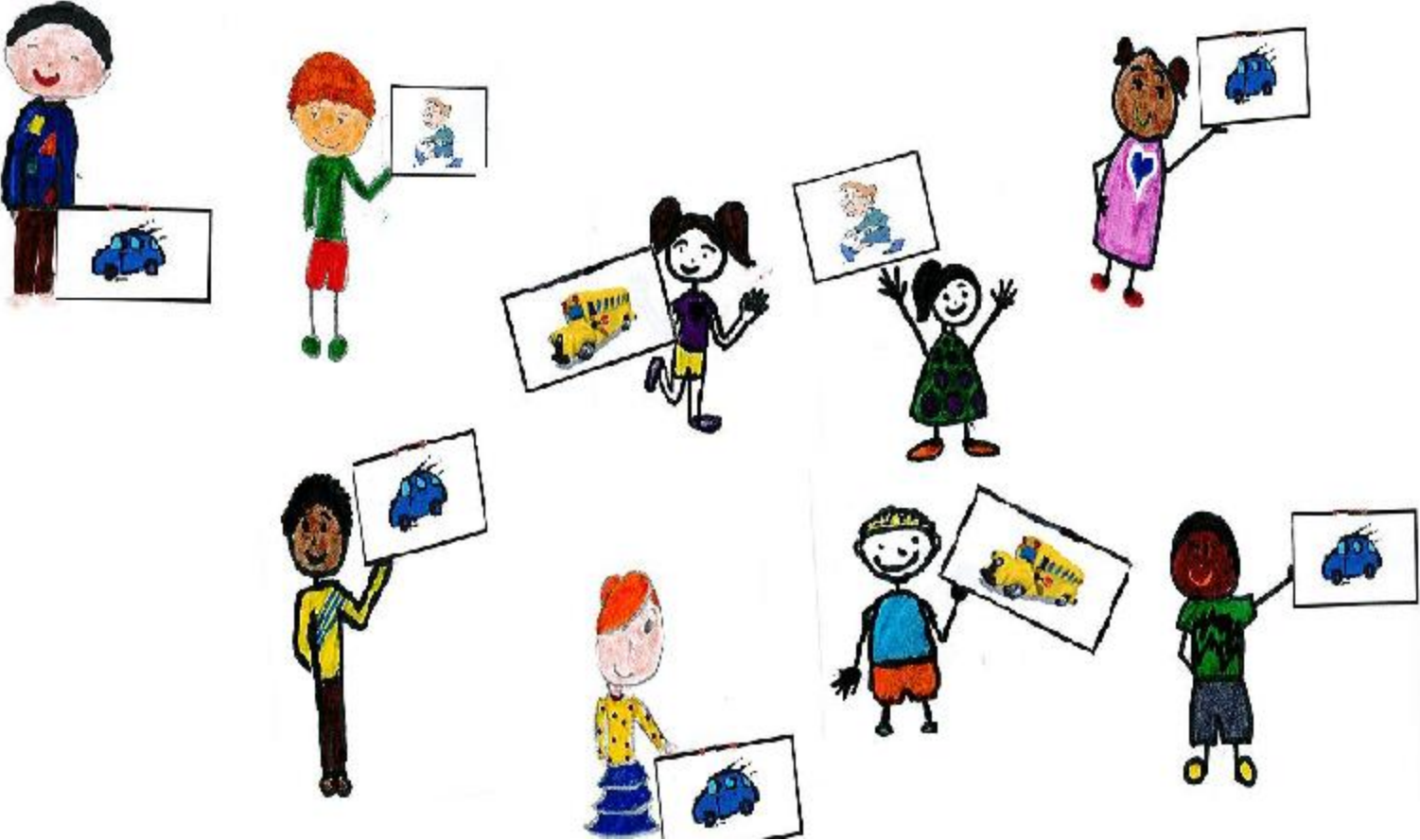
Graph to use for Picture Graphs and Bar Graphs



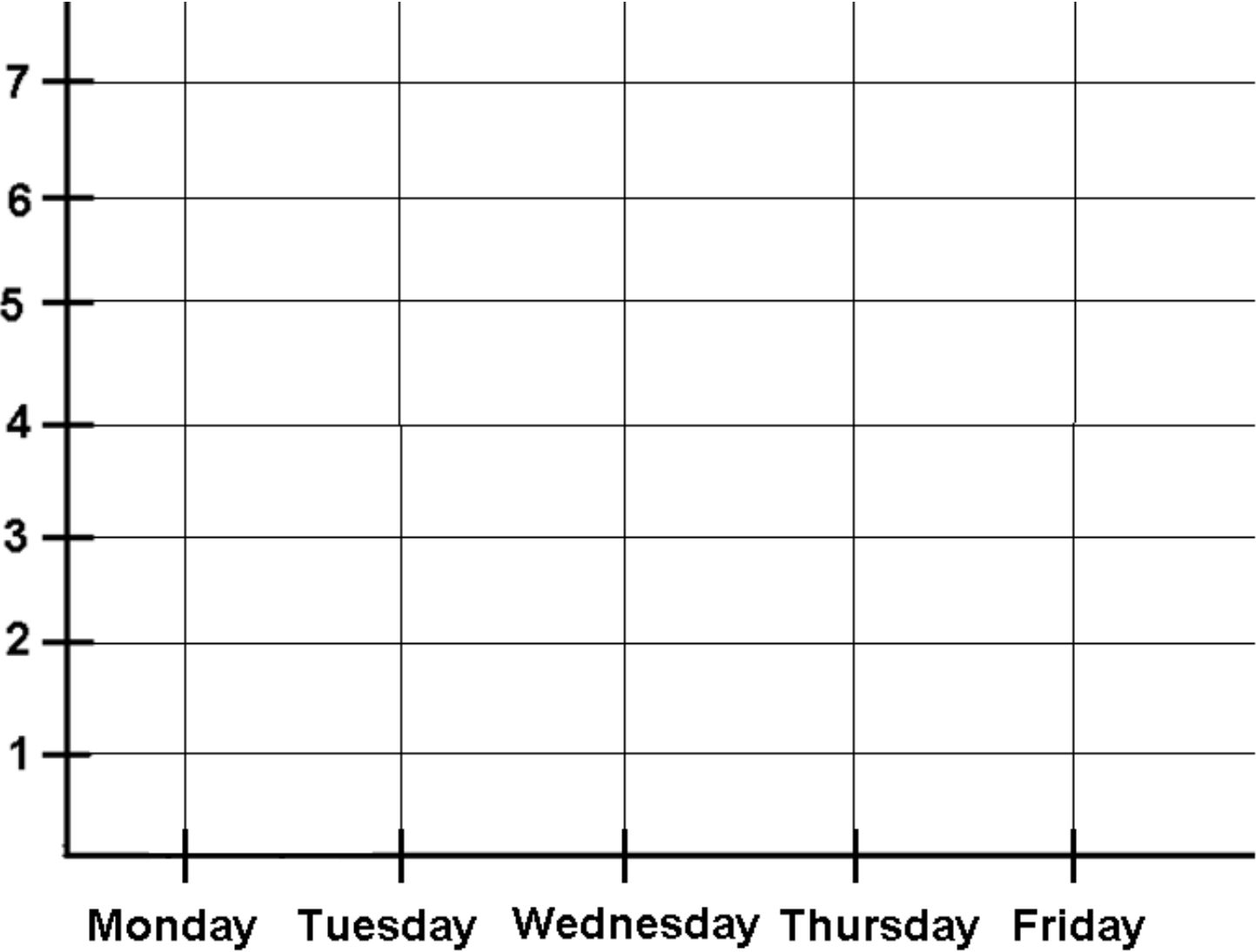
Data Set for Ms. Carter's Class (*do not cut up*)



Data Set for Mrs. Bishop's Class (do not cut up)



Graph to use for Creating a Line Graph



Tables for data on Car (teacher) & Bus Riders (student) across a week



Car Riders

Monday	4
Tuesday	3
Wednesday	5
Thursday	6
Friday	6



Bus Riders

Monday	6
Tuesday	4
Wednesday	5
Thursday	2
Friday	1