

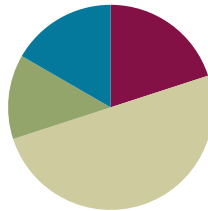
Lesson 4

Objective: Solve one- and two-step problems involving graphs.

Related Topics: [More Lesson Plans for the Common Core Math](#)

Suggested Lesson Structure

■ Fluency Practice	(10 minutes)
■ Application Problem	(8 minutes)
■ Concept Development	(32 minutes)
■ Student Debrief	(10 minutes)
Total Time	(60 minutes)



Fluency Practice (10 minutes)

- Read Line Plots **2.MD.9** (5 minutes)
- Read Bar Graphs **3.MD.3** (5 minutes)

Read Line Plots (5 minutes)

Materials: (T) Line plot template (S) Personal white boards

Note: This activity reviews Grade 2 concepts about line plots in preparation for G3–M6–Topic B.

T: (Project line plot.) This line plot shows how many children are in the families of students in a third-grade class. How many students only have one child in their family? Let’s count to find the answer. (Point to the X’s as students count.)

S: 1, 2, 3, 4, 5, 6, 7, 8.

Continue the process for 2 children, 3 children, and 4 children.

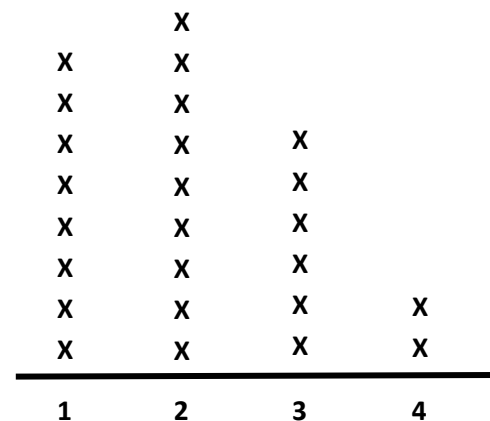
T: Most students have how many children in their family?

S: 2.

T: On your boards, write a number sentence to show how many more third-graders have 2 children in their family than 3 children.

S: (Write $9 - 6 = 3$.)

Number of Children in Third-Grade Families



Number of Children x = 1 Child

Continue the process to find how many fewer third-graders have 4 children in their family than 2 children and how many more third-graders have 1 child in their family than 3 children.

T: On your boards, write a number sentence to show how many third-graders have 3 or 4 children in their family.

S: (Write $3 + 4 = 7$.)

Continue the process to find how many third-graders have 1 or 2 children in their family and how many third-graders have a sibling.

Read Bar Graphs (5 minutes)

Materials: (T) Bar graph template (S) Personal white boards

Notes: This activity reviews G3–M6–Lesson 3.

T: (Project the bar graph template.) This bar graph shows how many minutes 4 children spent practicing piano.

T: Did Ryan spend more or less than 30 minutes?

S: More.

T: Did he spend more or less than 40 minutes?

S: Less.

T: What fraction of the time between 30 and 40 minutes did Ryan spend practicing piano?

S: 1 half of the time.

T: What’s halfway between 30 minutes and 40 minutes?

S: 35.

T: The dotted line is there to help you read 35, since 35 is between two numbers on the graph. How long did Kari spend practicing piano?

S: 40 minutes.

Continue the process for Brian and Liz.

T: Who practiced the longest?

S: Brian.

T: Who practiced the least amount of time?

S: Liz.

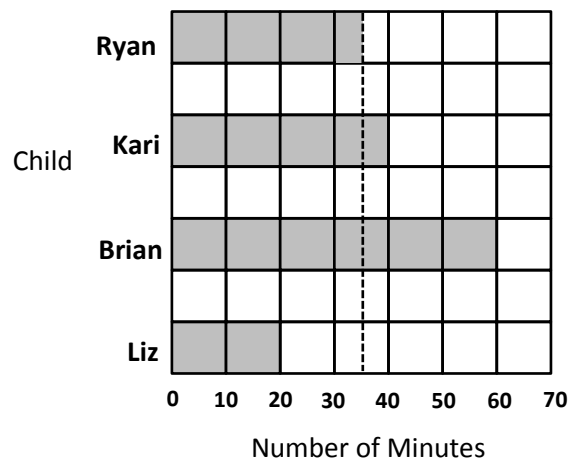
T: On your boards, write a number sentence to show how much longer Brian practiced than Kari.



NOTES ON MULTIPLE MEANS OF REPRESENTATION:

Scaffold for English language learners and others how to solve for *how many more*. Ask, “How many third-graders have 2 children in their family? How many have 3 children? Which is more—6 or 9? How many more? (Count up from 6 to 9).”

Number of Minutes Spent Practicing Piano



S: (Write $60 - 40 = 20$ minutes.)

Continue the process to find how many fewer minutes Ryan practiced than Brian.

T: On your boards, write a number sentence to show how many total minutes Kari and Liz spent practicing piano.

S: (Write $40 + 20 = 60$ minutes.)

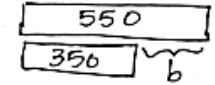
Continue the process to find how many total minutes Ryan and Brian spent practicing piano and how many total minutes all the children practiced.

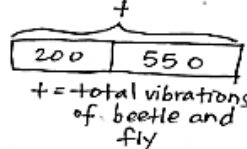
Application Problem (8 minutes)

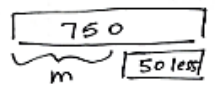
The following chart shows the number of times an insect’s wings vibrate each second. Use the following clues to complete the unknowns in the chart.

- a. The beetle’s number of wing vibrations is the same as the difference between the fly and honeybee’s.
- b. The mosquito’s number of wing vibrations is the same as 50 less than the beetle and fly’s combined.

Insect	Number of Wing Vibrations Each Second
Honeybee	350
Beetle	b
Fly	550
Mosquito	m

a)  $550 - 350 = b$
 $b = 200$
 A beetle's wings vibrate 200 times each second.

b)  $t = 200 + 550$
 $t = 750$

 $750 - 50 = m$
 $m = 700$
 A mosquito's wings vibrate 700 times each second.

Note: The data from the chart will be used in the upcoming Concept Development, where students will first create a bar graph and then answer one- and two-step questions from the graph.

Concept Development (32 minutes)

Materials: (S) Graph template, personal white boards

T: (Pass out graph template.) Let’s create a bar graph from the data in the Application Problem. We need to choose a scale that works for the data the graph represents. Talk to a partner: What scale would be best for this data? Why?

S: We could count by fives or tens. → The numbers are pretty big, so that would be a lot of tick marks to draw. → We could do it by hundreds since all of the numbers end in zero.

T: In this case, using hundreds is a strong choice since the numbers are between 200 and 700. Decide if you will show the scale for your graph vertically or horizontally. Then label it starting at zero.

S: (Label.)

T: The number of wing vibrations for the honeybee is 350 each second. Discuss the bar you will make for the honeybee with your partner. How many units will you shade in?

S: Maybe 4 units. We can round up. → But to show the exact number we just need to shade in 3 and one-half units.

T: Many of you noticed that you'll need to shade a half unit to show this data precisely. Do you need to do the same for other insects?

S: We will also have to do this for the fly since it's 550.

T: Go ahead and shade your bars.

S: (Shade bars.)

T: On your boards, write a number sentence to find the total number of vibrations 2 beetles and a honeybee can produce each second.

S: $(350 + 200 + 200 = 750.)$

T: Use a tape diagram to compare how many more vibrations a fly and honeybee combined produce than a mosquito.

S: (Work should resemble sample student work below.)

T: Work with your partner to think of another question that can be solved using the data on this graph. Solve your question, then trade questions with the pair of students next to you. Solve the new question, and check your work with their work.

MP.3

$V = 550 + 350$
 $V = 900$
 V = total vibrations of a honeybee and fly

$d = 900 - 700$
 $d = 200$
 A fly and a honeybee combined can produce 200 more vibrations each second than a mosquito.



NOTES ON MULTIPLE MEANS FOR ACTION AND EXPRESSION:

Scaffold partner talk with sentence frames such as the ones listed below.

- I notice _____.
- The _____'s wings are faster than the _____'s.
- When I compare the _____ and _____, I see that....
- I didn't know that....
- This data is interesting because....

Problem Set (10 minutes)

Students should do their personal best to complete the Problem Set within the allotted 10 minutes. For some classes, it may be appropriate to modify the assignment by specifying which problems they work on first. Some problems do not specify a method for solving. Students solve these problems using the RDW approach used for Application Problems.

Student Debrief (10 minutes)

Lesson Objective: Solve one- and two-step problems involving graphs.

The Student Debrief is intended to invite reflection and active processing of the total lesson experience.

Invite students to review their solutions for the Problem Set. They should check work by comparing answers with a partner before going over answers as a class. Look for misconceptions or misunderstandings that can be addressed in the Debrief. Guide students in a conversation to debrief the Problem Set and process the lesson.

You may choose to use any combination of the questions below to lead the discussion.

- What scale did you choose for your graph in Problem 1 and why?
- How did you solve Problem 1(c)? What did you do first?
- What is the value of each tick mark in the bar graph in Problem 2? How do you know?
- How did you find the number of visitors in Problem 2(a)?
- Explain to your partner what you needed to do first before answering Problem 2(b).
- Compare the chart from the Application Problem with the bar graph you made. How is each representation a useful tool? When might you choose to use each representation?
- How did the fluency activity Read Bar Graphs help you get ready for today's lesson?

NYS COMMON CORE MATHEMATICS CURRICULUM Lesson 4 Problem Set 3•6

Name: Gina Date: _____

1. The chart below shows the number of magazines sold by each student.

Student	Ben	Rachel	Jeff	Stanley	Debbie
Magazines Sold	300	250	100	450	600

a. Use the chart to draw a bar graph below. Create an appropriate scale for the graph.

Number of Magazines Sold by 3rd Grade Students

b. Explain why you chose the scale for the graph.
 I chose to have the scale go by hundreds because all the numbers go by hundreds or halfway between hundreds.

c. How many fewer magazines did Debbie sell than Ben and Stanley combined?
 Ben and Stanley: $300 + 450 = 750$
 $750 - 600 = 150$
 Debbie sold 150 fewer magazines than Ben and Stanley combined.

COMMON CORE Lesson 4: Solve one- and two-step problems involving graphs. Date: 10/9/13 engage^{ny} 6.A.7

NYS COMMON CORE MATHEMATICS CURRICULUM Lesson 4 Problem Set 3•6

d. How many more magazines did Debbie and Jeff sell than Ben and Rachel?
 $D + J: 600 + 100 = 700$
 $B + R: 300 + 250 = 550$
 $700 - 550 = 150$
 Debbie and Jeff sold 150 more magazines than Ben and Rachel.

2. The bar graph shows the number of visitors to a carnival from Monday through Friday.

Carnival Visitors

a. How many fewer visitors were there on the least busy day than on the busiest day?
 least busy: 190 visitors
 busiest: 430 visitors
 $430 - 190 = 240$
 There were 240 fewer visitors.

b. How many more people attended the fair on Monday and Tuesday combined than on Thursday and Friday combined?
 Monday + Tuesday: $340 + 300 = 640$
 Thursday + Friday: $190 + 370 = 560$
 $640 - 560 = 80$
 The difference is 80 people.

COMMON CORE Lesson 4: Solve one- and two-step problems involving graphs. Date: 11/7/13 engage^{ny} 6.A.49

Exit Ticket (3 minutes)

After the Student Debrief, instruct students to complete the Exit Ticket. A review of their work will help you assess the students' understanding of the concepts that were presented in the lesson today and plan more effectively for future lessons. You may read the questions aloud to the students.

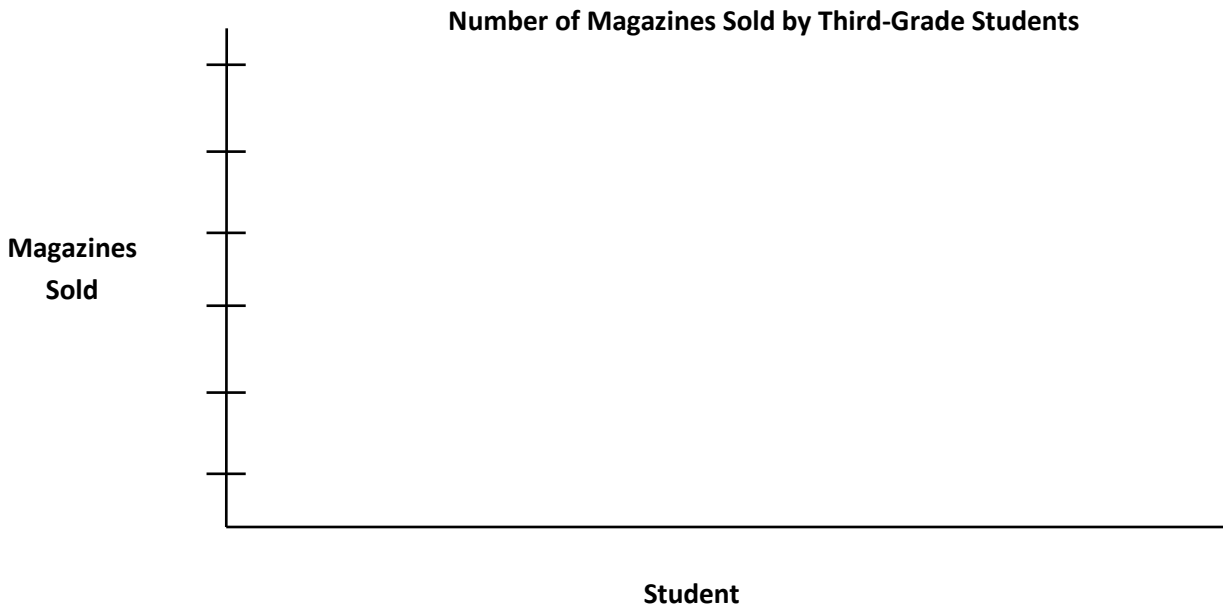
Name _____

Date _____

1. The chart below shows the number of magazines sold by each student.

Student	Ben	Rachel	Jeff	Stanley	Debbie
Magazines Sold	300	250	100	450	600

a. Use the chart to draw a bar graph below. Create an appropriate scale for the graph.

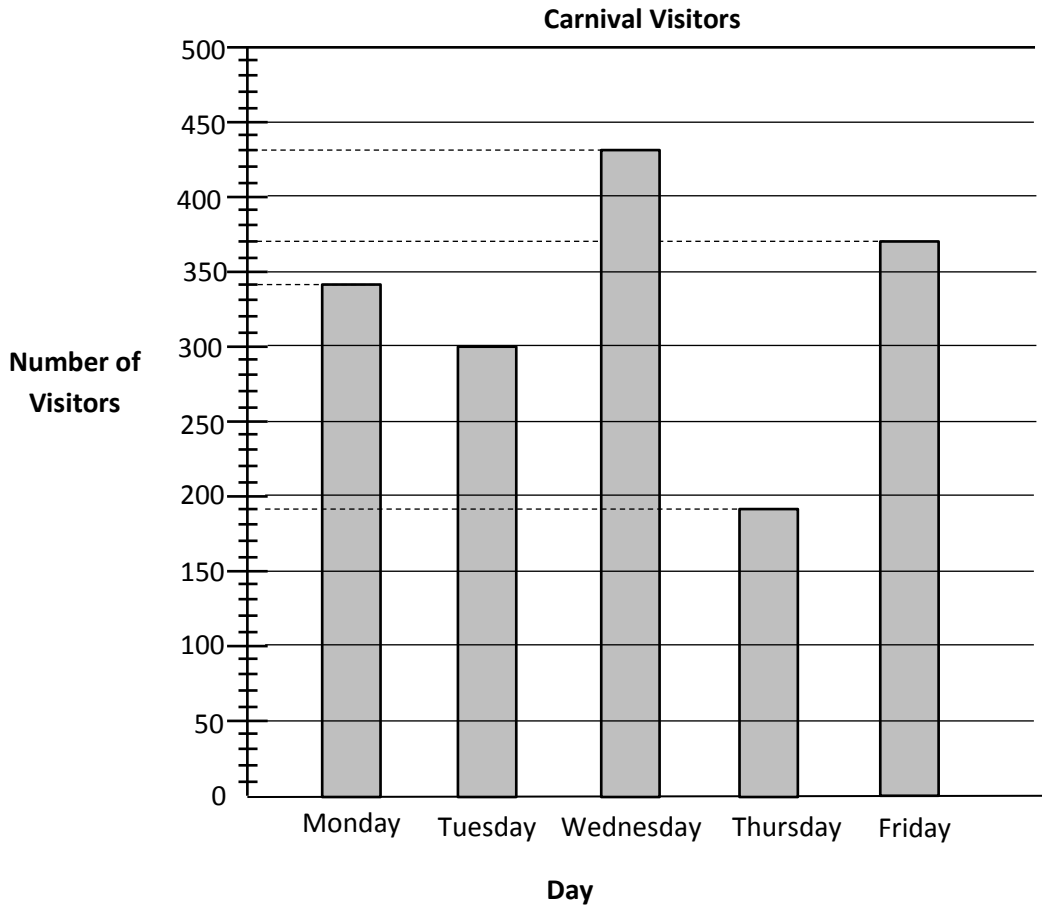


b. Explain why you chose the scale for the graph.

c. How many fewer magazines did Debbie sell than Ben and Stanley combined?

d. How many more magazines did Debbie and Jeff sell than Ben and Rachel?

2. The bar graph shows the number of visitors to a carnival from Monday through Friday.



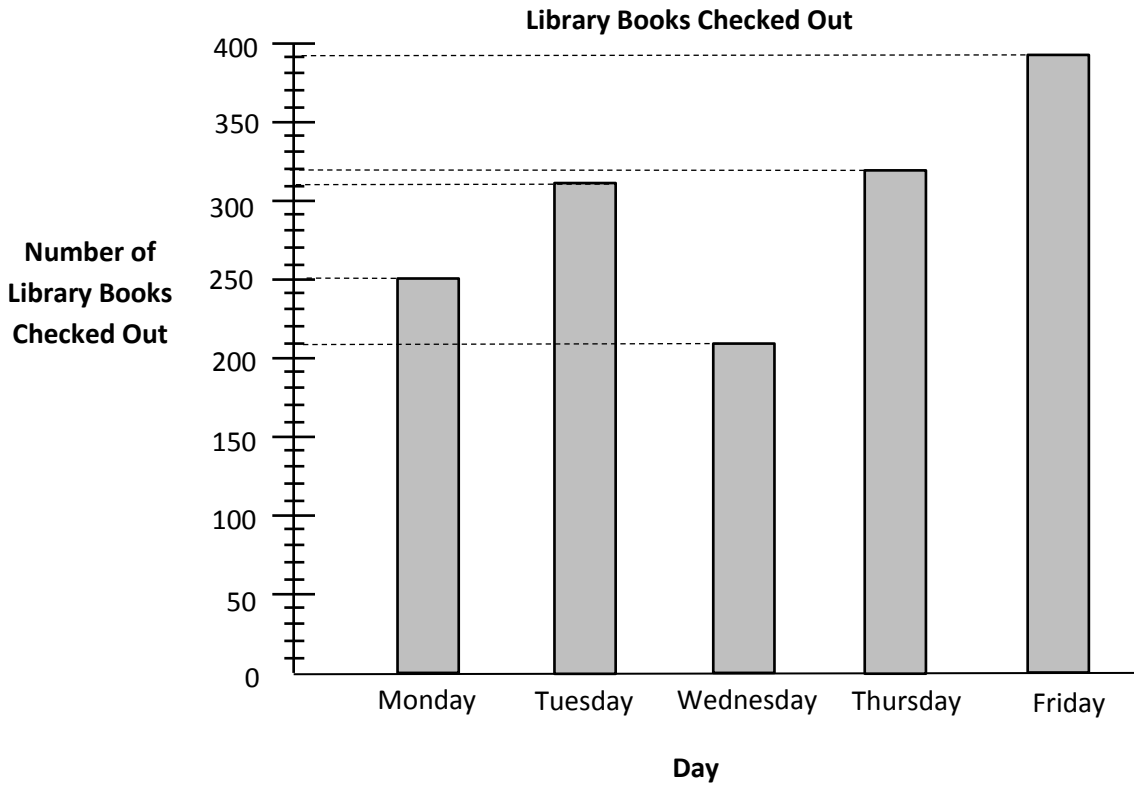
a. How many fewer visitors were there on the least busy day than on the busiest day?

b. How many more people attended the fair on Monday and Tuesday combined than on Thursday and Friday combined?

Name _____

Date _____

The graph below shows the number of library books checked out in five days.



- a. How many books in total were checked out on Wednesday and Thursday?

- b. How many more books were checked out on Thursday and Friday than on Monday and Tuesday?

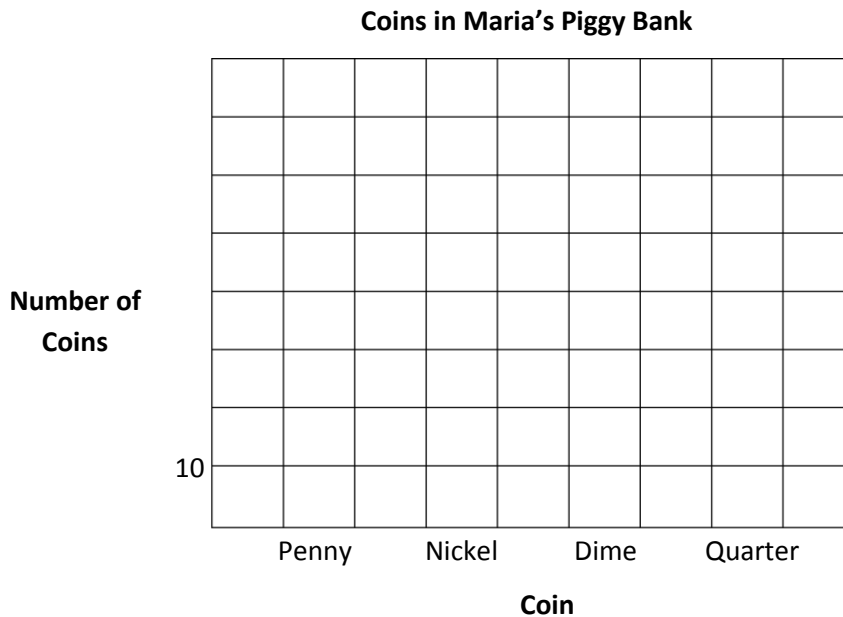
Name _____

Date _____

1. Maria counts the coins in her piggy bank and records the results in tally chart below. Use the tally marks to find the total number of each coin.

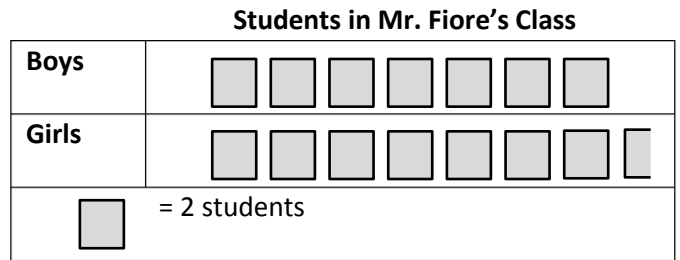
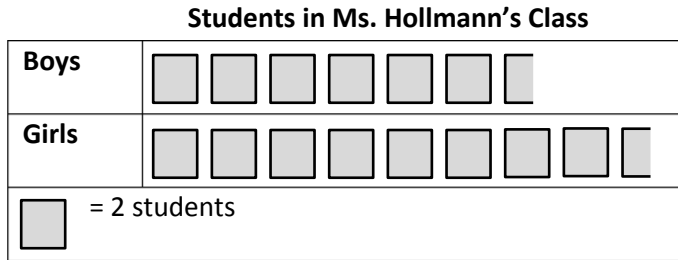
Coins in Maria's Piggy Bank		
Coin	Tally	Total Number of Coins
Penny	### ### ### ### ### ### ### ### ### ### ### ### ###	
Nickel	### ### ### ### ### ### ### ### ### ### ### ###	
Dime	### ### ### ### ### ### ### ### ### ### ###	
Quarter	### ### ### ###	

- a. Use the tally chart to draw a bar graph below. The unit is given.



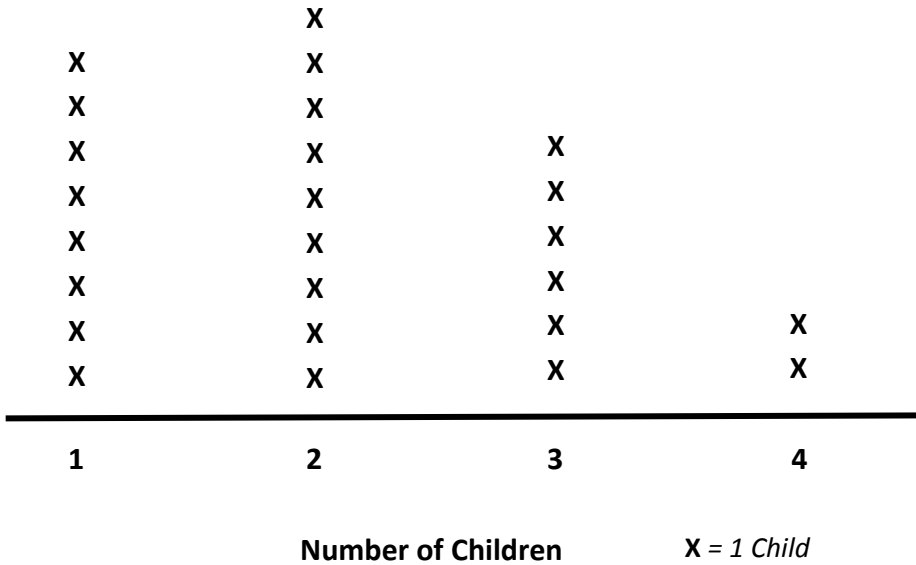
- b. How many more pennies are there than dimes?
- c. Maria donates 10 of each type of coin to charity. How many total coins does she have left? Show your work.

2. Ms. Hollmann’s class goes on a field trip to the planetarium with Mr. Fiore’s class. The number of students in each class is shown in the picture graphs below.



- a. How many fewer boys are on the trip than girls?
- b. It costs \$2 for each student to attend the field trip. How much money will it cost for all students to attend?
- c. The cafeteria in the planetarium has 9 tables with 8 seats at each table. Counting students and teachers, how many empty seats will there be when the 2 classes eat lunch?

Number of Children in Third-Grade Families



Number of Minutes Spent Practicing Piano

