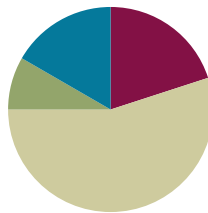# Lesson 3

Objective: Create scaled bar graphs.

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

Suggested Lesson Structure

■ Fluency Practice	(12 minutes)	
■ Application Problem	(5 minutes)	
■ Concept Development	(33 minutes)	
■ Student Debrief	(10 minutes)	
Total Time	**(60 minutes)**	

Fluency Practice (12 minutes)

- How Many Units of 6 **3.OA.1** (3 minutes)
- Sprint: Dividing by 6 **3.OA.4** (9 minutes)

How Many Units of 6 (3 minutes)

Note: This fluency activity reviews multiplication and division with units of 6.

Direct students to count forward and backward by sixes to 60, occasionally changing the direction of the count.

T: How many units of 6 are in 12?

S: 2 units of 6.

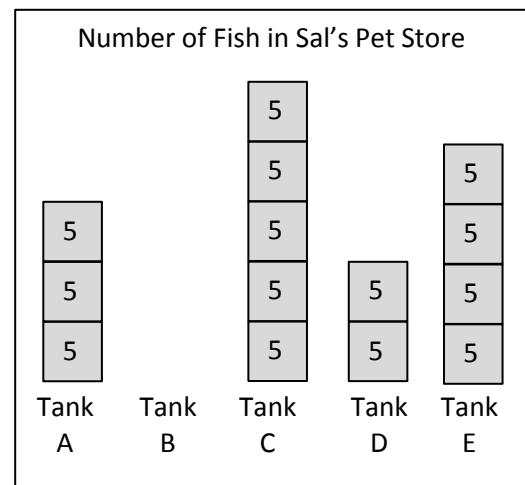T: Give me the division sentence with the number of sixes as the quotient.

S: 12 ÷ 6 = 2.

Continue the process with 24, 36, and 48.

Sprint: Multiply or Divide by 6 (9 minutes)

Materials: (S) Multiply or Divide by 6 Sprint

Application Problem (5 minutes)

The vertical tape diagram shows the number of fish in Sal's Pet Store.

Number of Fish in Sal's Pet Store

		5		
		5		5
		5		5
5		5		5
5		5	5	5
5		5	5	5
Tank A	Tank B	Tank C	Tank D	Tank E

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a. Find the total number of fish in Tank C. Show your work.

b. Tank B has a total of 30 fish. Draw the tape for Tank B.

c. How many more fish are in Tank B than in Tanks A and D combined?

a) 5×5=25
There are 25 fish
in Tank C.

b) I drew 6 units
of 5 to show
a total of
30 fish in Tank B.

c) Tank A+D: 5×5 =25 fish
30-25=5 fish
There are 5 more fish
in Tank B than Tanks
A and D combined.

Note: This problem reviews reading a vertical tape diagram with a unit size larger than 1. It also anticipates the Concept Development, where students construct a scaled bar graph from the data in this problem.

Concept Development (33 minutes)

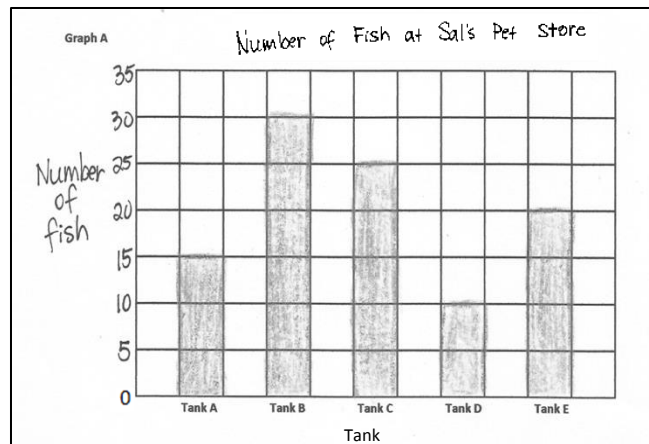Materials: (S) Graph A template, Graph B template, colored pencils, straightedge

Problem 1: Construct a scaled bar graph.

T: (Pass out Graph A template.) Draw the vertical tape diagram from the Application Problem on the grid. (Allow students time to work.) Outline the bar for Tank A with your colored pencil. (Model.) Erase the unit labels inside the bar and shade the entire bar with your colored pencil. (Model.)

Repeat the process with the bars for Tanks B–E.

MP.6

T: What does each square on the grid represent?

S: 5 fish!

T: We can show that by creating a scale on our bar graph. (Write 5 near the first line on the vertical axis. Point to the next line up on the grid.) Turn and talk to a partner. What number should I write here? How do you know?

S: Ten, because you're counting by fives. → Ten, because each square has a value of 5, and 2 fives is 10.

T: Count by fives to complete the rest of the scale on the graph.

S: (Count and write.)

T: What do the numbers on the scale tell you?

S: The number of fish!

T: Label the scale, *Number of fish*. (Model.) What do the labels under each bar tell you?

S: The tank!

Graph A

Number of Fish at Sal's Pet Store

Number of fish

35
30
25
20
15
10
5
0

Tank A   Tank B   Tank C   Tank D   Tank E

Tank

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T: Write the label, *Tank*. (Model.) What's a good title for this graph?

S: Number of Fish at Sal's Pet Store.

T: Write the title, *Number of Fish at Sal's Pet Store*. (Model.)

T: Turn and talk to a partner. How is this bar graph similar to the vertical tape diagram in the Application Problem? How is it different?

S: They both show the number of fish in Sal's pet store. → The value of the bars and the tapes is the same. → The way we show the value of the bars changed. In the Application Problem, we labeled each unit. In this graph, we made a scale to show the value.

T: You're right. This scaled bar graph doesn't have labeled units, but it has a scale we can read to find the values of the bars. (Pass out Graph B template.) Let's create a second bar graph from the data. What do you notice about the labels on this graph?

S: They are switched! → Yeah, the tank labels are on the side and the *Number of fish* label is now at the bottom.

T: Count by fives to label your scale along the horizontal edge. Then shade in the correct number of squares for each tank. Will your bars be horizontal or vertical?

S: Horizontal. (Label and shade.)

T: Take Graph A and turn it so the paper is horizontal. Compare it with Graph B. What do you notice?

S: They're the same!

T: A bar graph can be drawn vertically or horizontally, depending on where you decide to put the labels, but the information stays the same as long as the scales are the same.

T: Marcy buys 3 fish from Tank C. Write a subtraction number sentence to show how many fish are left in Tank C.

S: (Write 25 − 3 = 22.)

T: How many fish are left in Tank C?

S: 22 fish!

T: Discuss with a partner how I can show 22 fish on the bar graph.

S: (Discuss.)

T: I'm going to erase some of the Tank C bar. Tell me to stop when you think it shows 22 fish. (Erase until students say to stop.) Even though our scale counts by fives, we can show other values for the bars by drawing the bars in between the numbers on the scale.
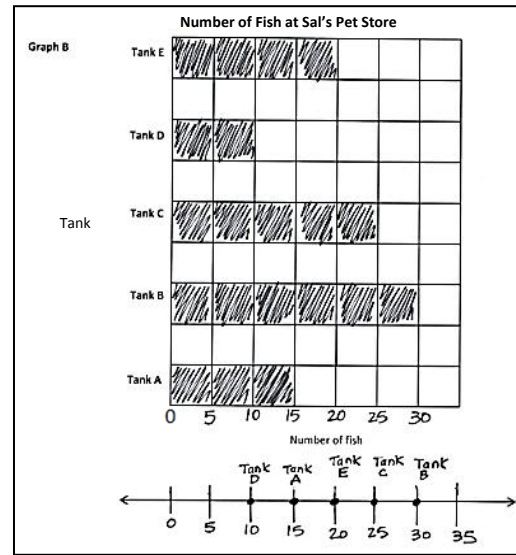
Problem 2: Plot data from a bar graph on a number line.

T: Let's use Graph B to create a number line to show the same information. There is an empty number line below the graph. Line up a straightedge with each of the bar graph's columns to draw tick marks to make intervals on your number line. (Model.)

S: (Draw intervals.)

> **NOTES ON MULTIPLE MEANS OF ACTION AND EXPRESSION:**
>
> Assist students with perceptual difficulties, low vision, and others with plotting corresponding points on the number line. To make tick marks, show students how to hold and align the straightedge with the scale at the bottom of the graph, *not the bar.* Precise alignment is desired, but comfort, confidence, accurate presentation of data, and a frustration-free experience is more valuable.

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T: Will the tick marks be labeled with the number of fish or with the tanks? Discuss with your partner.

S: The number of fish.

T: Why? Talk to your partner.

S: The number of fish, because the number line shows the scale. → The number of fish, because the tanks aren't numbers, they are just tanks. → The graph is showing the number of fish, not the number of tanks.

T: Label the intervals. (Allow students time to work.) Now work with a partner to plot and label the number of fish in each tank on the number line.

S: (Plot and label.)

T: Talk to a partner. Compare how the information is shown on the bar graph and on the number line.

S: The tick marks on the number line are in the same places as the graph's scale. → The spaces in between the tick marks on the number line are like the unit squares on the bar graph. → The tanks are just dots not whole bars, so the labels look a little different too.

T: Compare the representations again, and this time, talk about the difference between reading data displayed in the bar graph and reading data on the number line.

S: With a bar graph it's easy to see the order from least to most fish just by looking at the size of the bars. → The number line shows you how much too, but you know which is the most by looking for the biggest number on the line, not by looking for the biggest bar.

T: Yes. A bar graph allows us to easily compare. A number line plots the information.

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

NOTES ON MULTIPLE MEANS OF REPRESENTATION:

Students working below grade level and others may benefit from the following scaffolds for reading graphs on the Problem Set:

▪ Prior to the lesson, facilitate a guided practice of estimating and accurately determining challenging bar values. Start with smaller numbers and labeled increments, gradually increasing the challenge.

▪ Draw or have students draw a line (in a color other than black) aligning the top of the bar with its corresponding measure on the scale.

▪ Allow students to record the value inside of the bar—in increments as a tape diagram, or as a whole—until they become proficient.

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RDW approach used for Application Problems.

For this Problem Set, the third page can be used as an extension for students who finish early.

Student Debrief (10 minutes)

Lesson Objective: Create scaled bar 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.

- Discuss your mental math strategy for Problem 1(b).
- Share number sentences for Problem 1(c).
- How did the straightedge help you read the bar graph in Problem 2? How was it different from reading the bar graph in Problem 1?
- Share your number line for Problem 5. How did the scale on the bar graph help you draw the intervals on the number line? What does each interval on the number line represent?
- Did you use the bar graph or the number line to answer the questions in Problem 6? Explain your choice.
- Compare a vertical tape diagram to a **scaled** bar graph. What is different? What is the same?
- Does the information change when a bar graph is drawn horizontally or vertically with the same scale? Why or why not?
- What is the purpose of a label on a bar graph?
- How is a bar graph's scale more precise than a picture graph?
- How does the fluency with reading a vertical number line relate to reading a bar graph?

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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.

A

Multiply or divide.

Correct _____

1	2 x 6 =		23	__ x 6 = 60	
2	3 x 6 =		24	__ x 6 =12	
3	4 x 6 =		25	__x 6 = 18	
4	5 x 6 =		26	60 ÷ 6 =	
5	1 x 6 =		27	30 ÷ 6 =	
6	12 ÷ 6 =		28	6 ÷ 6 =	
7	18 ÷ 6 =		29	12 ÷ 6 =	
8	30 ÷ 6 =		30	18 ÷ 6 =	
9	6 ÷ 6 =		31	__ x 6 = 36	
10	24 ÷ 6 =		32	__ x 6 = 42	
11	6 x 6 =		33	__ x 6 = 54	
12	7 x 6 =		34	__ x 6 = 48	
13	8 x 6 =		35	42 ÷ 6 =	
14	9 x 6 =		36	54 ÷ 6 =	
15	10 x 6 =		37	36 ÷ 6 =	
16	48 ÷ 6 =		38	48 ÷ 6 =	
17	42 ÷ 6 =		39	11 x 6 =	
18	54 ÷ 6 =		40	66 ÷ 6 =	
19	36 ÷ 6 =		41	12 x 6 =	
20	60 ÷ 6 =		42	72 ÷ 6 =	
21	__x 6 = 30		43	14 x 6 =	
22	__x6 = 6		44	84 ÷ 6 =	

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B

Improvement _____   # Correct _____

Multiply or divide.

1	1 x 6 =		23	__ x 6 = 12	
2	2 x 6 =		24	__ x 6 = 60	
3	3 x 6 =		25	__ x 6 = 18	
4	4 x 6 =		26	12 ÷ 6 =	
5	5 x 6 =		27	6 ÷ 6 =	
6	18 ÷ 6 =		28	60 ÷ 6 =	
7	12 ÷ 6 =		29	30 ÷ 6 =	
8	24 ÷ 6 =		30	18 ÷ 6 =	
9	6 ÷ 6 =		31	__ x 6 = 18	
10	30 ÷ 6 =		32	__ x 6 = 24	
11	10 x 6 =		33	__ x 6 = 54	
12	6 x 6 =		34	__ x 6 = 42	
13	7 x 6 =		35	48 ÷ 6 =	
14	8 x 6 =		36	54 ÷ 6 =	
15	9 x 6 =		37	36 ÷ 6 =	
16	42 ÷ 6 =		38	42 ÷ 6 =	
17	36 ÷ 6 =		39	11 x 6 =	
18	48 ÷ 6 =		40	66 ÷ 6 =	
19	60 ÷ 6 =		41	12 x 6 =	
20	54 ÷ 6 =		42	72 ÷ 6 =	
21	__ x 6 = 6		43	13 x 6 =	
22	__ x 6 = 30		44	78 ÷ 6 =	

COMMON CORE

Lesson 3:   Create scaled bar graphs.
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engage^ny

6.A.32

Name _____   Date _____

1. This table shows the number of students in each class.

Number of Students in Each Class	
Class	Number of Students
Baking	9
Sports	16
Chorus	13
Drama	18

Use the table to color the bar graph. The first one has been done for you.

Number of Students in Each Class
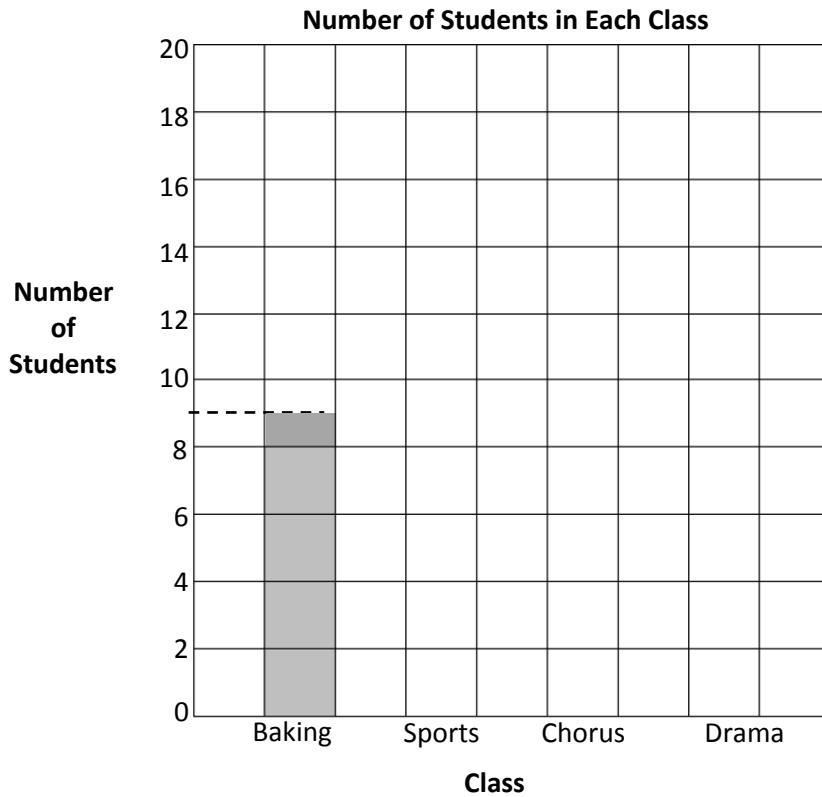
a. What is the value of each square in the bar graph?

b. Write a number sentence to find how many total students are enrolled in classes.

c. How many fewer students are in sports than in chorus and baking combined? Write a number sentence to show your thinking.

2. This bar graph shows Kyle's savings from February to June. Use a straightedge to help you read the graph.

Kyle's Savings
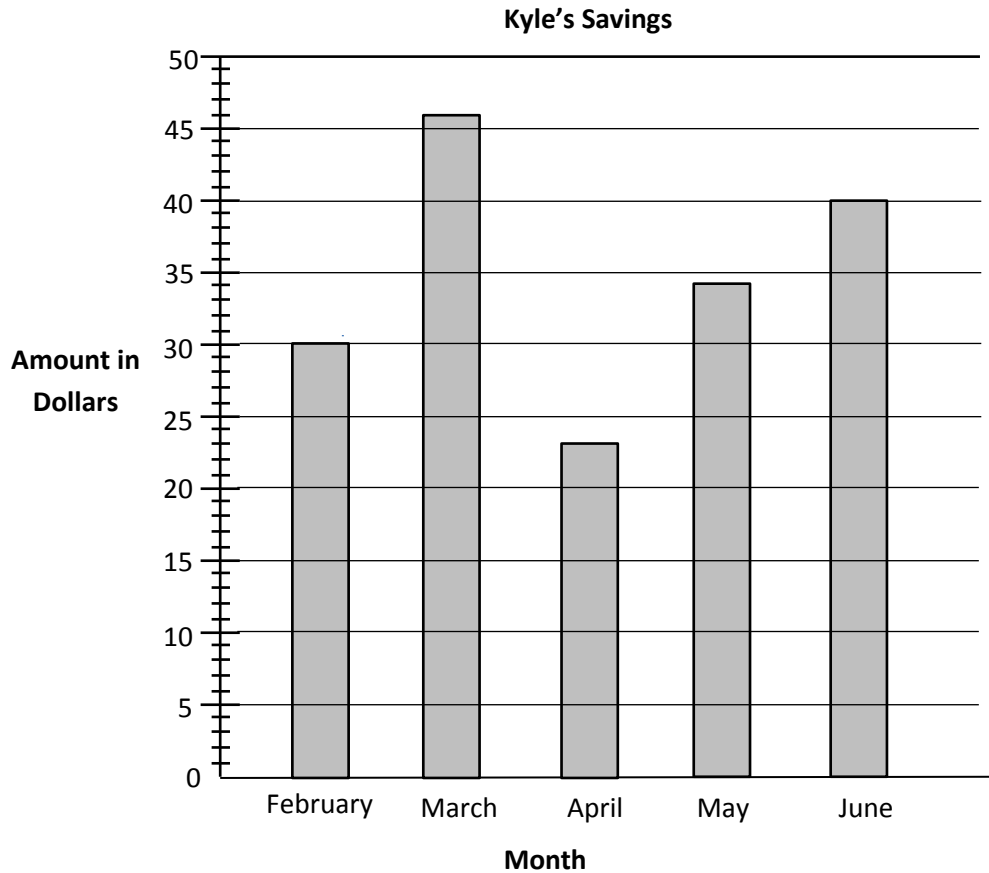
a. How much did Kyle save in May?

b. In which months did Kyle save less than $35?

c. How much more did Kyle save in June than April? Write a number sentence to show your thinking.

d. The money Kyle saved in _____ was half the money he saved in _____.

3. Complete the table below to show the same data given in the bar graph in Problem 2.

Months	February				
Amount in Dollars Saved					

COMMON CORE

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6.A.34

4. This bar graph shows the number of minutes Charlotte read from Monday through Friday.

Charlotte's Reading Minutes
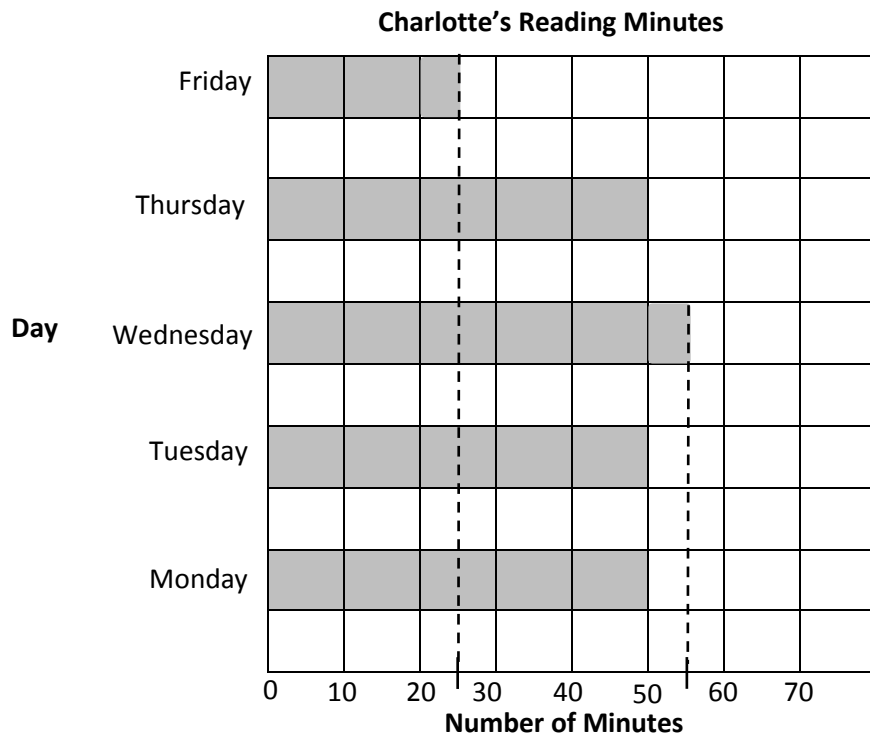
5. Use the graph's lines as a ruler to draw in the intervals on the number line shown above. Then plot and label a point for each day on the number line.

6. Use the graph or number line to answer the following questions.
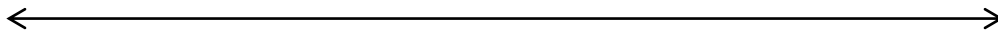
   a. On what days did Charlotte read for the same number of minutes? How many minutes did Charlotte read on these days?

   b. How many more minutes did Charlotte read on Wednesday than on Friday?

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Name _____   Date _____

The bar graph below shows the students' favorite ice cream flavors.
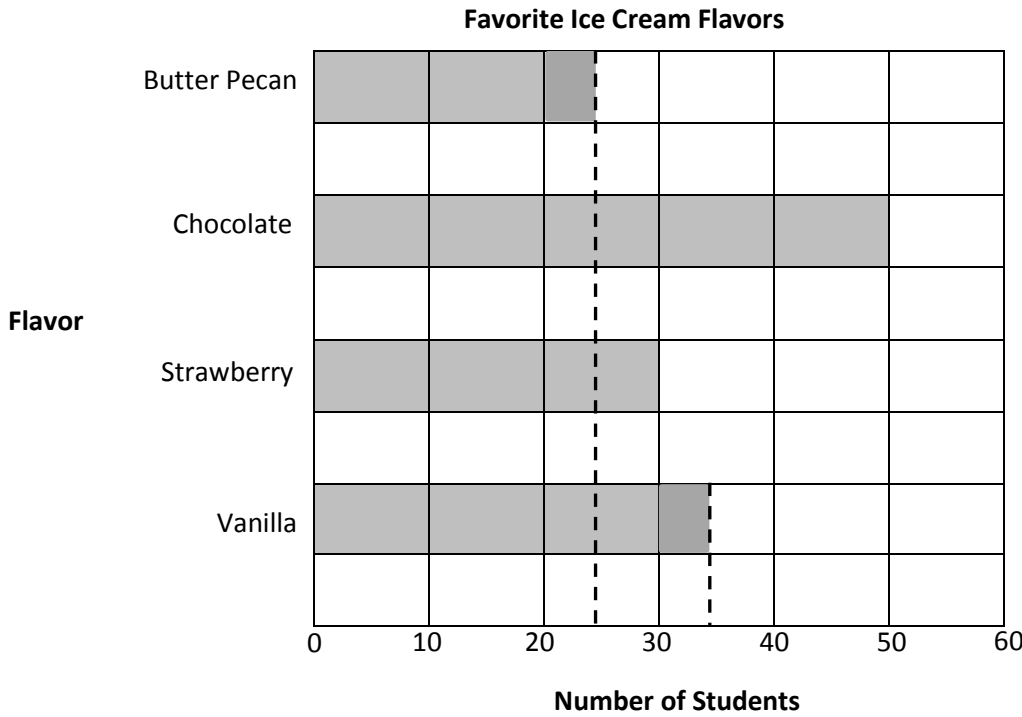
Favorite Ice Cream Flavors

Flavor

Butter Pecan

Chocolate

Strawberry

Vanilla

0   10   20   30   40   50   60

Number of Students

←———————————————————————————→

a. Use the graph's lines as a ruler to draw in the intervals on the number line shown above. Then plot and label a point for each flavor on the number line.

b. Write a number sentence to show the total number of students who voted for butter pecan, vanilla, and chocolate.

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Name _____   Date _____

1. This table shows the favorite subjects of third-graders at Cayuga Elementary.

Favorite Subjects	
Subjects	Number of Student Votes
Math	18
ELA	13
History	17
Science	?

Use the table to color the bar graph.

Favorite Subjects
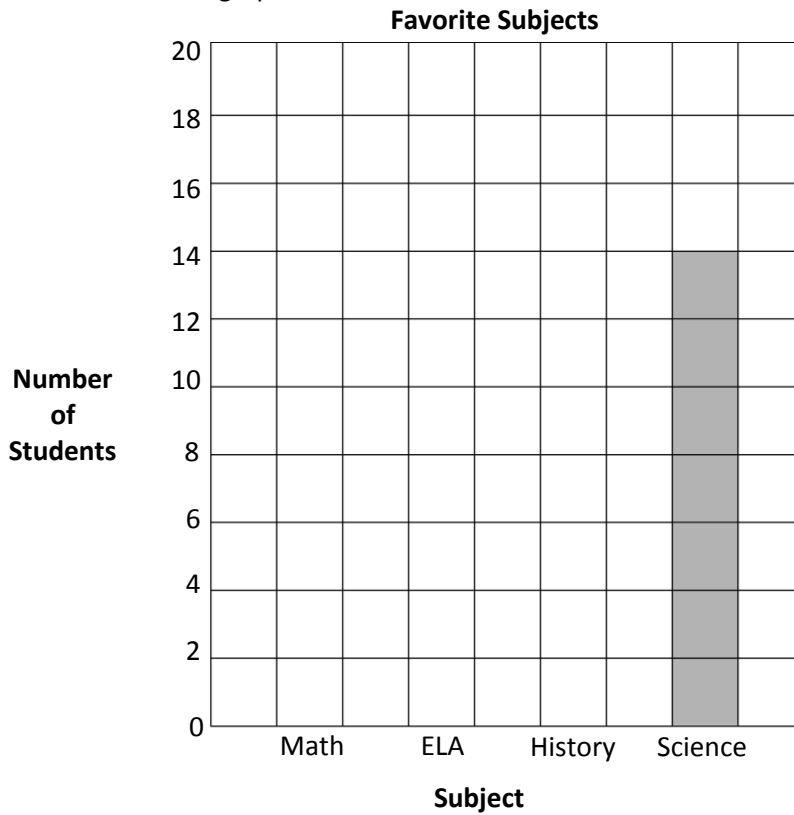
a. How many students voted for science?

b. How many more students voted for math than for science? Write a number sentence to show your thinking.

c. Which gets more votes, combining math and ELA, or combining social studies and science? Show your work.

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2. This bar graph shows the number of liters of water Skyler drinks this month.

Liters of Water Skyler Drinks

Week

Week 1
Week 2
Week 3
Week 4

0 10 20 30 40 50 60 70

Number of Liters
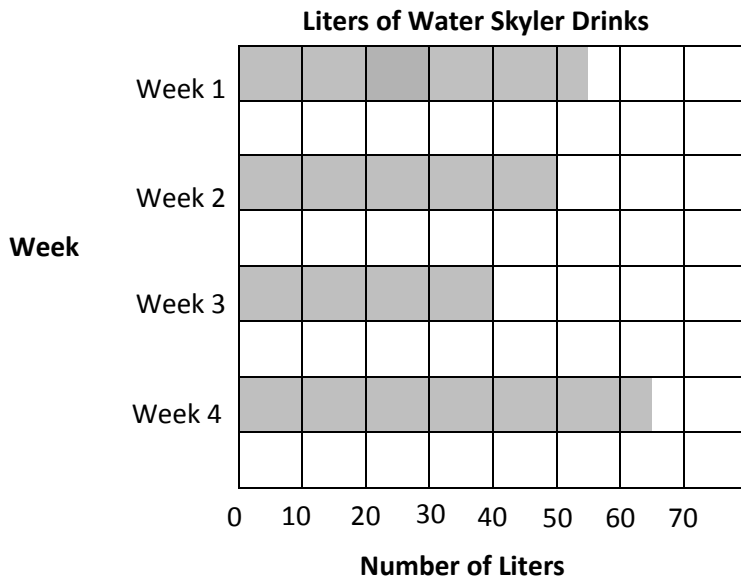
a. During which week does Skyler drink the most water? _____
   The least? _____

b. How many more liters does Skyler drink in Week 4 than Week 2?

c. Write a number sentence to show how many liters of water Skyler drinks during Weeks 2 and 3 combined.

d. How many liters does Skyler drink in total?

e. If Skyler drinks 60 liters each week next month, will she drink more or less than she drinks this month? Show your work.

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3. Complete the table below to show the data given in the bar graph in Problem 2.

Liters of Water Skyler Drinks	
Week	Liters of Water

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Graph A

Tank A   Tank B   Tank C   Tank D   Tank E

Tank

Graph B

Number of Fish at Sal's Pet Store

Tank E

Tank D

Tank

Tank C

Tank B

Tank A

Number of Fish