1. The tally chart below shows a survey of students’ favorite pets. Each tally mark represents 1 student.

<table>
<thead>
<tr>
<th>Favorite Pets</th>
<th>Number of Students</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cats</td>
<td>#</td>
</tr>
<tr>
<td>Turtles</td>
<td>///</td>
</tr>
<tr>
<td>Fish</td>
<td>///</td>
</tr>
<tr>
<td>Dogs</td>
<td>#</td>
</tr>
<tr>
<td>Lizards</td>
<td>///</td>
</tr>
</tbody>
</table>

The chart shows a total of 22 students.

2. Use the tally chart in Problem 1 to complete the picture graph below. The first one has been done for you.

<table>
<thead>
<tr>
<th>Favorite Pets</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cats</td>
</tr>
<tr>
<td>Turtles</td>
</tr>
<tr>
<td>Fish</td>
</tr>
<tr>
<td>Dogs</td>
</tr>
<tr>
<td>Lizards</td>
</tr>
</tbody>
</table>

Each circle represents 1 student.

a. The same number of students picked Fish and Lizards as their favorite pet.

b. How many students picked dogs as their favorite pet? 8 students

c. How many more students chose cats than turtles as their favorite pet? 6 - 4 = 2 students
3. Use the tally chart in Problem 1 to complete the picture graph below.

<table>
<thead>
<tr>
<th>Favorite Pets</th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>🐱</td>
<td>🐢</td>
<td>🐟</td>
<td>🐕</td>
</tr>
<tr>
<td>Cats</td>
<td>🐱</td>
<td>🐢</td>
<td>🐟</td>
<td>🐕</td>
</tr>
<tr>
<td>Turtles</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Fish</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Dogs</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Lizards</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Each 🐱 represents 2 students.

a. What does each 🐱 represent?
   Each 🐱 represents 2 student votes for each of the pets.

b. How many does 🐱 🐱 🐱 🐱 🐱 represent? Write a number sentence to show how you know.
   \[2 + 2 + 2 + 2 + 2 = 10\]
   \[5 \times 2 = 10\]

c. How many more 🐕 did you draw for dogs than for fish? Write a number sentence to show how many more students chose dogs over fish.
   I drew 3 more 🐕 for dogs than for fish.
   \[8 - 2 = 6\]
   6 more students chose dogs than fish.
1. Adi surveys third-graders to find out what their favorite fruits are. The results are in the table below.

<table>
<thead>
<tr>
<th>Favorite Fruits of Third-Graders</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Fruit</td>
<td>Votes</td>
</tr>
<tr>
<td>Banana</td>
<td>8</td>
</tr>
<tr>
<td>Apple</td>
<td>16</td>
</tr>
<tr>
<td>Strawberry</td>
<td>12</td>
</tr>
<tr>
<td>Peach</td>
<td>4</td>
</tr>
</tbody>
</table>

Draw units of 2 to complete the tape diagrams to show the total votes for each fruit. The first one has been done for you.

- **Banana:**
  
  ![Tape Diagram for Banana]

- **Apple:**
  
  ![Tape Diagram for Apple]

- **Strawberry:**
  
  ![Tape Diagram for Strawberry]

- **Peach:**
  
  ![Tape Diagram for Peach]

2. Explain how you can create a vertical tape diagram to show this data.

   I can take the diagrams and turn them so they are standing straight up - it will look like a bar graph.
3. Complete the vertical tape diagrams below using the data from Problem 1.

a.

<p>| | | | | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>2</td>
<td>2</td>
<td>2</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Banana Apple Strawberry Peach

b.

<p>| | | | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>4</td>
<td>4</td>
<td>4</td>
<td>4</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Banana Apple Strawberry Peach

c. What is a good title for the vertical tape diagrams?

A good title would be "Favorite Fruits of Third-Graders."

d. Compare the number of units used in each vertical tape diagram. Why does the number of units change? One uses units of 2 and the others use units of 4.
The number of units in (b) looks less because you are skip counting by 4's instead of 2's.

e. Write a multiplication number sentence to show the total number of votes for strawberry in the vertical tape diagram in Problem 3(a).

6 \times 2 = 12  There are 12 votes for strawberry.

f. Write a multiplication number sentence to show the total number of votes for strawberry in the vertical tape diagram in Problem 3(b).

3 \times 4 = 12  There are 12 votes for strawberry.

g. What changes in your multiplication number sentences in (e) and (f)? Why?
The 1st factor changes in each problem because I changed the number of units by in each problem. The second factor changes because the unit I counted by changed.
This table shows the favorite subjects of third-graders at Cayuga Elementary.

<table>
<thead>
<tr>
<th>Favorite Subjects</th>
<th>Number of Student Votes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Math</td>
<td>18</td>
</tr>
<tr>
<td>ELA</td>
<td>13</td>
</tr>
<tr>
<td>History</td>
<td>17</td>
</tr>
<tr>
<td>Science</td>
<td>? (4)</td>
</tr>
</tbody>
</table>

Use the table to color the bar graph.

- a. How many students voted for science? 14 students voted for science.
- b. How many more students voted for math than for science? Write a number sentence to show your thinking. \( \frac{18}{4} \) more students voted for math than science.
- c. Which gets more votes, combining math and ELA, or combining social studies and science? Show your work. \( \frac{18}{13} \) and \( \frac{17}{4} \) are equal, so neither combination is greater.

engageNY 6.A.37
2. This bar graph shows the number of liters of water Skyler drinks this month.

<table>
<thead>
<tr>
<th>Week</th>
<th>Number of Liters</th>
</tr>
</thead>
<tbody>
<tr>
<td>Week 1</td>
<td>60</td>
</tr>
<tr>
<td>Week 2</td>
<td>60</td>
</tr>
<tr>
<td>Week 3</td>
<td>40</td>
</tr>
<tr>
<td>Week 4</td>
<td>45</td>
</tr>
</tbody>
</table>

Number of Liters

a. During which week does Skyler drink the most water? **Week 4**  
The least? **Week 3**

b. How many more liters does Skyler drink in Week 4 than Week 2?  
Skyler drinks 15 more liters of water.

\[
\frac{65 - 50}{15} = \frac{15}{15}
\]

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

\[
50 + 40 = 90 \text{ liters in those two weeks}
\]

(d. How many liters does Skyler drink in total?  
\[
\begin{align*}
\frac{55}{120} + \frac{60}{120} + \frac{90}{120} &= \frac{210}{120} \text{ liters of water.}
\end{align*}
\]

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

\[
60 \times 4 = 240
\]

Skyler will drink more next month than this month, 240 > 210 and next month she will drink 240 liters.
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.

<table>
<thead>
<tr>
<th>Coin</th>
<th>Tally</th>
<th>Total Number of Coins</th>
</tr>
</thead>
<tbody>
<tr>
<td>Penny</td>
<td>#</td>
<td>68</td>
</tr>
<tr>
<td>Nickel</td>
<td>#</td>
<td>62</td>
</tr>
<tr>
<td>Dime</td>
<td>#</td>
<td>52</td>
</tr>
<tr>
<td>Quarter</td>
<td>#</td>
<td>24</td>
</tr>
</tbody>
</table>

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

b. How many more pennies are there than dimes? There are \( \frac{68}{52} = \frac{16}{13} \) more pennies than dimes.

c. Maria donates 10 of each type of coin to charity. How many total coins does she have left? Show your work.

\[
\begin{align*}
68 - 10 &= 58 \\
52 - 10 &= 42 \\
42 - 10 &= 32
\end{align*}
\]

Maria has \( \frac{160}{166} \) coins left.
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.

<table>
<thead>
<tr>
<th>Students in Ms. Hollmann's Class</th>
<th>Students in Mr. Fiore's Class</th>
</tr>
</thead>
<tbody>
<tr>
<td>Boys</td>
<td></td>
</tr>
<tr>
<td>Girls</td>
<td></td>
</tr>
<tr>
<td>□ = 2 students</td>
<td>□ = 2 students</td>
</tr>
</tbody>
</table>

- **a.** How many fewer boys are on the trip than girls?
  - Boys: \( \frac{13}{14} \) or 9 boys
  - Girls: 17 girls
  - There are \( \frac{27}{2} \) or 13.5 fewer boys 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?
  - 27 boys: \( \frac{27 \times 2}{59} \) or $118
  - 32 girls: \( \frac{32 \times 2}{59} \) or $118
  - Total cost: \( \frac{59 \times 2}{59} \) or $118

- **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?
  - Total seats: 72
  - Students: 59
  - Teachers: 2
  - Empty seats: \( \frac{72 - 61}{11} \) or 11 seats will be empty.
2. Evelyn marks a 4-inch paper strip into equal parts as shown below.

   0 1 2 3 4
   \frac{1}{2} \frac{2}{4} \frac{3}{4} \frac{4}{4}
   1 \frac{1}{4} \frac{1}{2} \frac{1}{2} \frac{3}{4}
   \frac{1}{4} \frac{3}{4} \frac{5}{4} \frac{7}{4}
   \frac{1}{4} \frac{1}{4} \frac{1}{4} \frac{1}{4}
   \frac{1}{4} \frac{1}{4} \frac{1}{4} \frac{1}{4}
   \frac{1}{4} \frac{1}{4} \frac{1}{4} \frac{1}{4}
   \frac{1}{4} \frac{1}{4} \frac{1}{4} \frac{1}{4}

   a. Label the whole and half inches on the paper strip.

   b. Estimate to draw the \( \frac{1}{4} \) inch marks on the paper strip. Then fill in the blanks below.

   1 whole inch is equal to \( \frac{8}{4} \) half inches.

   1 whole inch is equal to \( \frac{16}{4} \) quarter inches.

   \( \frac{1}{2} \) inch is equal to \( \frac{2}{4} \) quarter inches.

   \( \frac{2}{4} \) inch is equal to \( \frac{1}{2} \) half inch.

3. Travis says his yellow pencil measures \( 5 \frac{1}{2} \) inches. Ralph says that's the same as 11 half inches. Explain how they are both correct.

   After drawing a \( 5 \frac{1}{2} \) inch drawing, I could see that I also drew 11 half inch sections, so they are the same. \( 5 \frac{1}{2} = \frac{11}{2} \) (11 half inches)
1. Ms. Leal measures the heights of the students in her kindergarten class. The heights are shown on the line plot below.

Heights of Students in Ms. Leal's Kindergarten Class

<table>
<thead>
<tr>
<th>X</th>
<th>X</th>
<th>X</th>
<th>X</th>
<th>X</th>
<th>X</th>
<th>X</th>
</tr>
</thead>
<tbody>
<tr>
<td>40</td>
<td>40(\frac{1}{2})</td>
<td>41</td>
<td>41(\frac{1}{2})</td>
<td>42</td>
<td>42(\frac{1}{2})</td>
<td>43</td>
</tr>
</tbody>
</table>

Inches

X = 1 student

a. How many students in Ms. Leal's class are 41 inches tall?

4 students are 41 inches tall.

b. How many students are in Ms. Leal's class? How do you know?

There are 20 students in Ms. Leal's class because there are 2 X's on the line plot.

c. How many students in Ms. Leal's class are more than 42 inches tall?

There are 9 students who are > than 42 inches tall.

d. Ms. Leal says that for the class picture students in the back row must be at least 42\(\frac{1}{2}\) inches tall. How many students will be in the back row?

Then 9 students could be in the back row.
2. Mr. Stein's class is studying plants. They plant seeds in clear plastic bags and measure the lengths of the roots. The lengths of the roots in centimeters are shown in the line plot below.

```
<table>
<thead>
<tr>
<th>Centimeters</th>
</tr>
</thead>
<tbody>
<tr>
<td>2</td>
</tr>
<tr>
<td>2 1/4</td>
</tr>
<tr>
<td>2 2/4</td>
</tr>
<tr>
<td>2 3/4</td>
</tr>
<tr>
<td>3</td>
</tr>
<tr>
<td>3 1/4</td>
</tr>
<tr>
<td>3 2/4</td>
</tr>
<tr>
<td>3 3/4</td>
</tr>
<tr>
<td>4</td>
</tr>
</tbody>
</table>
```

```
X = 1 plant
```

a. How many roots did Mr. Stein's class measure? How do you know?

There are 24 students in Mr. Stein's class because there are 24 x's on the line plot.

b. Teresa says that the 3 most frequent measurements in order from shortest to longest are 3 1/4 cm, 3 2/4 cm, and 3 3/4 cm. Do you agree? Explain your answer.

I don't agree because 4 students have roots that are 3 cm. I think the most frequent lengths are 3 1/4, 3 3/4, and 3 2/4. Only 3 students had 3 3/4 cm length for their roots.

c. Gerald says that the most common measurement is 14 quarter centimeters. Is he right? Why or why not?

On line plot 3 2/4 has 5 students with this root length, so Gerald is correct. 14/16 is the same as 3 2/4.
1. Mrs. Felter's class builds a model of their school's neighborhood out of blocks. The students measure the heights of the buildings to the nearest $\frac{1}{4}$ inch and record the measurements as shown below.

<table>
<thead>
<tr>
<th>Height of Buildings (in Inches)</th>
</tr>
</thead>
<tbody>
<tr>
<td>$\frac{3}{4}$ ✓</td>
</tr>
<tr>
<td>4 ✓</td>
</tr>
<tr>
<td>3 ✓</td>
</tr>
<tr>
<td>$\frac{3}{2}$ ✓</td>
</tr>
<tr>
<td>3 ✓</td>
</tr>
</tbody>
</table>

a. Use the data to complete the line plot below.

Title: **Height of Buildings (in inches)**

Label: **Inches**

x = 1 Block/Building
b. How many buildings are \(4\frac{1}{2}\) inches tall?

2 buildings are \(4\frac{1}{2}\) inches tall.

c. How many buildings are less than \(3\frac{1}{2}\) inches?

7 buildings are less than \(3\frac{1}{2}\) inches.

d. How many buildings are in the class model? How do you know?

There are 25 buildings in the class model.

I know this because there are 25 'x's in the line plot on the front page.

e. Brook says most buildings in the model are at least 4 inches tall. Is she correct? Explain your thinking.

There are 9 buildings 4 inches and greater. There are 16 buildings less than 4 inches. Brook is not correct because \(9 < 16\).
1. Mrs. Leah's class uses what they have learned about simple machines to build marshmallow launchers. They record the distances their marshmallows travel in the chart below.

<table>
<thead>
<tr>
<th>Distance Traveled (in Inches)</th>
<th>48 3/4</th>
<th>49 1/4</th>
<th>49</th>
<th>50</th>
<th>49 3/4</th>
</tr>
</thead>
<tbody>
<tr>
<td>49 1/2</td>
<td>✔️</td>
<td>48 1/4</td>
<td>✔️</td>
<td>49 1/2</td>
<td>✔️</td>
</tr>
<tr>
<td>49 1/4</td>
<td>✔️</td>
<td>49 3/4</td>
<td>✔️</td>
<td>48</td>
<td>✔️</td>
</tr>
<tr>
<td>49</td>
<td>✔️</td>
<td>48 3/4</td>
<td>✔️</td>
<td>49</td>
<td>✔️</td>
</tr>
</tbody>
</table>

a. Use the data to draw a line plot below.

```
Distance Traveled (in inches)

X X X X X X
48 48 1/4 48 3/4 49 49 1/4 49 3/4 50

Inches

X = 1 marshmallow
```
b. Explain the steps you took to create the line plot.

First I drew a line $\leftarrow\Rightarrow$ then I looked at the table and wrote numbers 48 to 50 on the line in the order with $\frac{3}{4}$ and $\frac{3}{2}$ inches added. Then I put an "X" on the plot and crossed off the number on the table. Last I labeled all the parts on the line plot.

c. How many more marshmallows traveled $48\frac{3}{4}$ inches than $48\frac{2}{4}$ inches?

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

2 more marshmallows traveled $48\frac{3}{4}$ inches.

d. Find the three most frequent measurements on the line plot. What does this tell you about the distance that most of the marshmallows traveled?

The 3 most frequent distances are $48\frac{3}{4}$, 49, and $49\frac{3}{4}$ inches. The distances show 12 of the 20 marshmallows landed in those 3 most frequent distances. That is more than half of the marshmallows launched.
1. The table below shows the amount of money Danielle saves for four months.

<table>
<thead>
<tr>
<th>Month</th>
<th>Money Saved</th>
</tr>
</thead>
<tbody>
<tr>
<td>January</td>
<td>$9</td>
</tr>
<tr>
<td>February</td>
<td>$18</td>
</tr>
<tr>
<td>March</td>
<td>$36</td>
</tr>
<tr>
<td>April</td>
<td>$27</td>
</tr>
</tbody>
</table>

Create a picture graph below using the data in the table.

Money Danielle Saves

[Diagram showing a bar graph with bars representing $9, $18, $36, and $27 for January, February, March, and April respectively. Each bar represents $3 in dollars.]
2. Use the table or graph to answer the following questions.

   a. How much money does Danielle save in four months?
      
      \[
      \begin{array}{c}
      \text{Jan.} \\
      \text{Feb.} \\
      \text{March} \\
      \text{April}
      \end{array}
      \begin{array}{c}
      \$27 \\
      + \$18 \\
      = \$63
      \end{array}
      
      \text{Danielle saves \$90 in four months.}
      
    b. How much more money does Danielle save in March and April than in January and February?
      
      \[
      \begin{array}{c}
      \text{Jan.} \\
      \text{Feb.} \\
      \text{March} \\
      \text{April}
      \end{array}
      \begin{array}{c}
      \$9 \\
      + 18 \\
      = 27
      \end{array}
      
      \text{Danielle saved \$36 more in March and April.}
      
    c. Danielle combines her savings from March and April to buy books for her friends. Each book costs \$9.
       How many books can she buy?
      
      \[
      \begin{array}{c}
      \text{March} \\
      \text{April}
      \end{array}
      \begin{array}{c}
      \$36 \\
      + 27
      \end{array}
      
      \text{Danielle can buy 7 books.}
      
    d. Danielle earns \$33 in January. She buys a necklace for \$8 and a birthday present for her brother. She saves the rest of her money. How much does the birthday present cost?
      
      \[
      \begin{array}{c}
      \text{Jan.} \\
      \text{Necklace} \\
      \text{Birthday present} \\
      \text{Savings}
      \end{array}
      \begin{array}{c}
      \$9 \\
      - 8
      \end{array}
      
      \text{Danielle earns \$33 in January. She buys a necklace for \$8 and a birthday present for her brother. She saves the rest of her money. How much does the birthday present cost?}