Solving Multi-step Problems
(Grades 2-3)

There will be times that you will encounter word problems that require multiple steps to solve. A bar model can be used as a visual representation of the problem. Bar models allow one to break the problem in simpler parts. They can also help to create fewer steps to solve. The following lesson is designed for use with grades 2 and 3.

NOTE: Calculations and bar models may vary. Students should be encouraged to create a variety of bar models. They do not all need to look the same after they have learned how to create them.

Today, we're going to use a strategy of drawing bar models to solve our word problems that require more than one step to find a solution. These are called multi-step word problems. Here is our first problem.

Example #1

A teacher buys 55 pencils and 55 erasers for his class. Later, the teacher returns 14 items. How many items does the teacher keep?

Let's draw a bar that will represent the pencils and erasers.

pencils	erasers
55	55
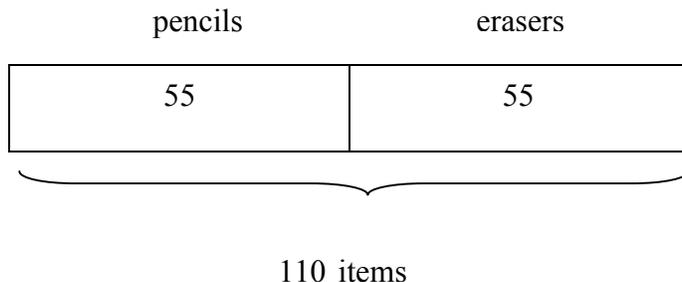
110 items

Both the pencils and erasers total 110 items.

Is the answer to our problem 110? [No]

Why not? [because we need to subtract the items that the teacher returned]

Yes, the teacher returned 14 items so that must be subtracted from the total.

$$\begin{array}{r} 110 \\ -14 \\ \hline 96 \end{array}$$

Write the answer as a complete sentence using the symbol for "therefore" at the beginning.

$\therefore$ The teacher kept 96 items.

The next example can be a "we try". The teacher scribes the students' ideas (with guidance). Students need to copy the example in their math notebooks.

Example #2

Janice bought 3 bags of 223 peanuts and 4 bags of 375 pretzels for a party. How many total pretzels and peanuts did Janice buy?

What two items is this problem about? [peanuts and pretzels]

So that is how we will label our bars. How many bags of peanuts are there? [3] I'll give the peanut part of our bar 3 sections. How many bags of pretzels are there? [4] So I'll divide the pretzel part into 4 sections. We have two bars……one labeled peanuts and the other labeled pretzels. Our peanut bar is divided into 3 sections because there are 3 bags. Our pretzel bar is divided into 4 sections because there are 4 bags. Now we need to decide what numbers go in each section.

How many peanuts are in each bag? [223] Let's add that information to our bar model. How many pretzels are in each bag? [375] Let's add that information as well.

There are several ways to arrive at the answer which is displayed below.

peanuts	223	223	223		669		
pretzels	375	375	375	375	1,500		2,169
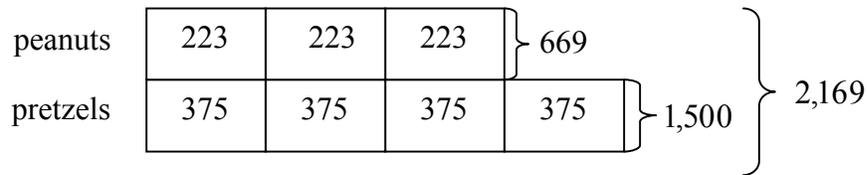
Using repeated addition   OR   Multiplication

$$
\begin{array}{r}
223 \\
223 \\
+\,223 \\
\hline
669
\end{array}
\qquad\qquad
\begin{array}{r}
223 \\
\times\,3 \\
\hline
669
\end{array}
$$

$$
\begin{array}{r}
375 \\
375 \\
375 \\
+\,375 \\
\hline
1,500
\end{array}
\qquad\qquad
\begin{array}{r}
375 \\
\times\,4 \\
\hline
1,500
\end{array}
$$

Then the amount of peanuts and pretzels must be added together.

$$\begin{array}{r} 669 \\ +1{,}500 \\ \hline 2{,}169 \end{array}$$

∴Janice bought a total of 2,169 peanuts and pretzels.

The first you try should be done in pairs. As the students are working, scan the room to find students who have drawn different bar models. After the allotted amount of time, have students share their bar model and explain how they solved.

You Try #1

Each star stamp book has 100 stamps. Jerome has 6 stamp books. Henry has 2 stamp books. How many stamps do they have in all?
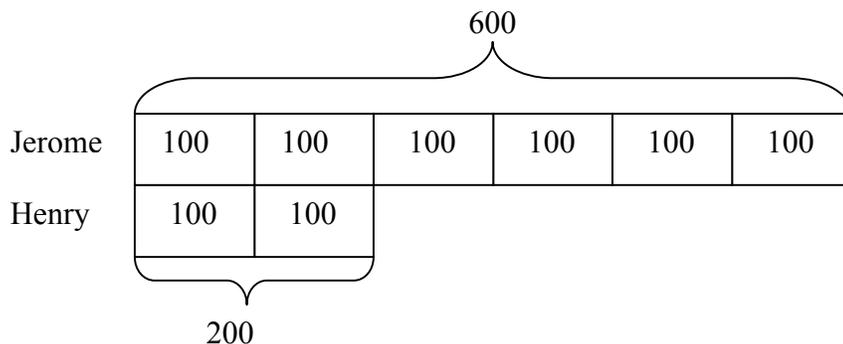
This can be calculated in several ways.

$$
\begin{array}{r}
100 \\
100 \\
100 \\
100 \\
100 \\
100 \\
100 \\
+100 \\
\hline
800
\end{array}
\qquad \text{OR} \qquad
\begin{array}{r}
600 \\
+200 \\
\hline
800
\end{array}
$$

$\therefore$ They have 800 stamps in all.

The second you try can be done in pairs again or it can be used as an exit card (3rd grade). For 2nd, you might want to pick one of the problems from the independent practice sheet.

You Try #2

There are 24 students in a classroom. If $\frac{1}{4}$ of the students have glasses, how many students do not have glasses?

24			
6	6	6	6

$\frac{1}{4}$ $\quad$ $\frac{1}{4}$ $\quad$ $\frac{1}{4}$ $\quad$ $\frac{1}{4}$

| Students with glasses | | Students without glasses |
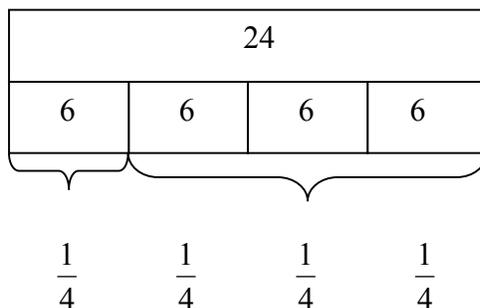
Break 24 into 4 equal parts.

Add together three of the four sections or $\frac{3}{4}$ of the bar.

$$\begin{array}{r} 6 \\ 6 \\ +\,6 \\ \hline 18 \end{array}$$

∴ Eighteen of the students do not have glasses.

The following problems can be used as independent practice. They can also be used as group work. Write each problem on chart paper. Divide your class in groups and assign each group a different problem. They need to solve by creating a bar model. Students can share solutions when finished. They can also be displayed, and students can do a "gallery walk".

Grade 2 Group/Independent Practice Problems

1. At the water park, there are 6 water slides, a wave pool, and some rides. There are a total of 26 attractions. How many rides are there?

2. Steve collected 109 stamps. Katie collected 96 fewer stamps than Steve. How many stamps did they collect altogether?

3. The animal park has 12 zebras, 25 monkeys, and some giraffes. If the total number of zebras, monkeys, and giraffes at the park is 50, how many giraffes are there?

4. John and Jim were on team 1. Susie and Sally were on team 2. John scored 8 points and Jim scored 9 points. Susie scored 12 points and Sally scored 6. Which team scored more points?

5. Apple stickers have 150 in a pack. Sam has 3 packs. Tracy has 2 packs. How many apple stickers do they have altogether?

Grade 3 Group/Independent Practice Problems

1. There are 18 jellybeans in a bag. If Kelly takes out $\frac{1}{3}$ of the jellybeans, how many jellybeans will be left?

2. Jonah and his friends picked 900 strawberries. They ate 72 of the strawberries and placed the strawberries that were left equally into 4 containers. How many strawberries did they put in each container?

3. Mr. Martinez had $50.00. He paid $24.78 for steak and $3.19 for milk. How much change did he get back?

4. Susan bought 24 cupcakes and made another 3 batches of 16 cupcakes each. She packaged the cupcakes in 4 boxes. How many cupcakes did she put in each box?

5. Jamila wants to see all 1,200 paintings in the museum. She saw 616 of them on Monday. On Tuesday, she visited 6 rooms that each had 37 paintings in them. How many paintings does Jamila still need to see?

Grade 2 Group/Independent Practice Problems
ANSWER KEY
(bar models may vary)

1. At the water park, there are 6 water slides, a wave pool, and some rides. There are a total of 26 attractions. How many rides are there?

slides	pool	rides
6	1	?

26
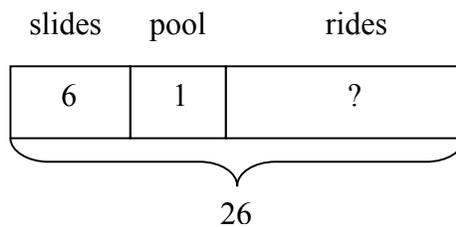
∴ There are 19 rides.

2. Steve collected 109 stamps. Katie collected 96 fewer stamps than Steve. How many stamps did they collect altogether?

Steve	Katie
109	13

?
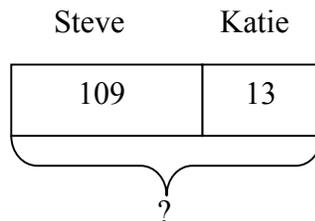
∴ They collected 122 stamps altogether.

3. The animal park has 12 zebras, 25 monkeys, and some giraffes. If the total number of zebras, monkeys, and giraffes at the park is 50, how many giraffes are there?

zebras	monkeys	giraffes
12	25	?

50

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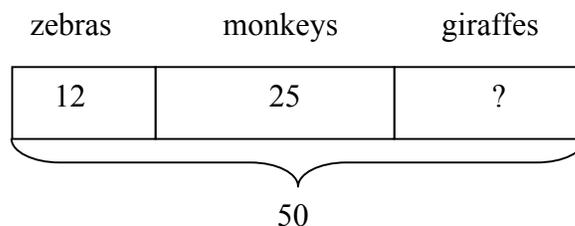
∴ There are 13 giraffes.

4. John and Jim were on team 1. Susie and Sally were on team 2. John scored 8 points and Jim scored 9 points. Susie scored 12 points and Sally scored 6. Which team scored more points?

?

John	8	9	Jim
Susie	12	6	Sally

?

∴ Team 2 (Susie and Sally) scored more points.

5. Apple stickers have 150 in a pack. Sam has 3 packs. Tracy has 2 packs. How many apple stickers do they have altogether?

Sam	150	150	150
Tracy	150	150	

?

∴ Sam and Tracy have 750 apple stickers altogether.

Grade 3 Group/Independent Practice Problems
ANSWER KEY

1. There are 18 jellybeans in a bag. If Kelly takes out $\frac{1}{3}$ of the jellybeans, how many jellybeans will be left?

18		
6	6	6

$$\frac{1}{3} \qquad \frac{1}{3} \qquad \frac{1}{3}$$

?
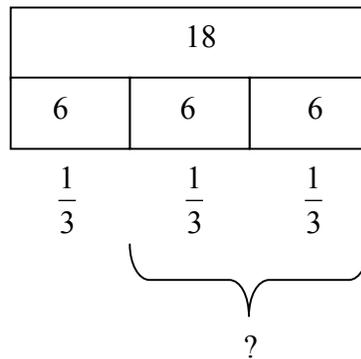
∴ There will be 12 jellybeans left.

2. Jonah and his friends picked 900 strawberries. They ate 72 of the strawberries and placed the strawberries that were left equally into 4 containers. How many strawberries did they put in each container?

828			
?	?	?	?
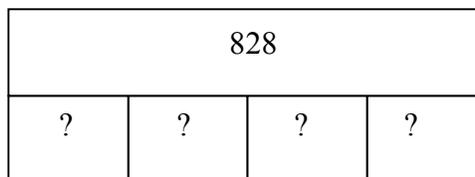
∴ There are 207 strawberries in each container.

3. Mr. Martinez had $50.00. He paid $24.78 for steak and $3.19 for milk. How much change did he get back?

$50.00		
$24.78	$3.19	?
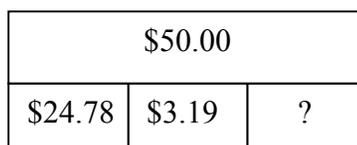
∴ Mr. Martinez got back $22.03.

4. Susan bought 24 cupcakes and made another 3 batches of 16 cupcakes each. She packaged the cupcakes in 4 boxes. How many cupcakes did she put in each box?

24	16	16	16
cupcakes ?			
?	?	?	?

∴ There were 18 cupcakes in each box.

5. Jamila wants to see all 1,200 paintings in the museum. She saw 616 of them on Monday. On Tuesday, she visited 6 rooms that each had 37 paintings in them. How many paintings does Jamila still need to see?

	Monday			Tuesday				
paintings	616	37	37	37	37	37	37	?

1,200

∴ Jamila still needs to see 362 paintings.

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