Using Tape Diagrams to Solve Ratio Problems
Learning Goal:

I can solve real-world ratio problems using a tape diagram.
The ratio of boys to girls in the sixth grade is 3:5. If there are 20 more girls than boys, how many total students are in the sixth grade?
The ratio of boys to girls in the sixth grade is 3:5.
If there are 20 more girls than boys, how many total students are in the sixth grade?

The ratio we’re working with is 3:5.
Draw a tape diagram that represents that ratio.

Boys

Girls
The ratio of boys to girls in the sixth grade is 3:5. **If there are 20 more girls than boys,** how many total students are in the sixth grade?

What part of our tape diagram represents **20 more girls?**
The ratio of boys to girls in the sixth grade is 3:5. **If there are 20 more girls than boys,** how many total students are in the sixth grade?

“20 more girls” is represented by 2 boxes on our tape diagram. What value should be written in each box?

<table>
<thead>
<tr>
<th>Boys</th>
<th></th>
<th></th>
<th>10</th>
</tr>
</thead>
<tbody>
<tr>
<td>Girls</td>
<td></td>
<td></td>
<td>10</td>
</tr>
</tbody>
</table>

20 MORE
The ratio of boys to girls in the sixth grade is 3:5. If there are 20 more girls than boys, **how many total students are in the sixth grade?**

Now we can find out how many total students are in sixth grade. **REMEMBER,** each box represents the same value. What value should be written in each box?

<table>
<thead>
<tr>
<th></th>
<th>Boys</th>
<th>Girls</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>10</td>
<td>10</td>
</tr>
<tr>
<td></td>
<td>10</td>
<td>10</td>
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<td>10</td>
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<td></td>
<td>10</td>
<td>10</td>
</tr>
</tbody>
</table>


The ratio of boys to girls in the sixth grade is 3:5. If there are 20 more girls than boys, **how many total students are in the sixth grade?**

Add up all the boxes to determine the total number of students.

<table>
<thead>
<tr>
<th>Boys</th>
<th>10</th>
<th>10</th>
<th>10</th>
</tr>
</thead>
<tbody>
<tr>
<td>Girls</td>
<td>10</td>
<td>10</td>
<td>10</td>
</tr>
</tbody>
</table>

8 boxes of 10 = 80 students
There ratio of small dogs to large dogs at the dog show is 4:3. If there are 60 dogs in the show, how many are large dogs?
There **ratio of small dogs to large dogs at the dog show is 4:3**. If there are 60 dogs in the show, how many are large dogs?

The ratio we’re working with is 4:3. Draw a tape diagram that represents that ratio.

```
Small Dogs

Large Dogs
```
There ratio of small dogs to large dogs at the dog show is 4:3. **If there are 56 dogs in the show**, how many are large dogs?

What part of the tape diagram represents all 60 dogs in the show?

![Tape diagram]

All the tape diagram represents the 60 dogs in the show.
There ratio of small dogs to large dogs at the dog show is 4:3. **If there are 56 dogs in the show**, how many are large dogs?

There are 7 boxes on the tape diagram. REMEMBER, each box represents the same value.

56 total dogs ÷ 7 boxes = 8

Each box on the tape diagram represents 8 dogs.

<table>
<thead>
<tr>
<th>Small Dogs</th>
<th>8</th>
<th>8</th>
<th>8</th>
<th>8</th>
</tr>
</thead>
<tbody>
<tr>
<td>Large Dogs</td>
<td>8</td>
<td>8</td>
<td>8</td>
<td></td>
</tr>
</tbody>
</table>

All the tape diagram represents the 56 dogs in the show.
There ratio of small dogs to large dogs at the dog show is 4:3. If there are 56 dogs in the show, **how many are large dogs?**

Now we can find out how many dogs are large dogs.

\[3 \times 8 = 24\]

<table>
<thead>
<tr>
<th>Small Dogs</th>
<th>8</th>
<th>8</th>
<th>8</th>
<th>8</th>
</tr>
</thead>
<tbody>
<tr>
<td>Large Dogs</td>
<td>8</td>
<td>8</td>
<td>8</td>
<td></td>
</tr>
</tbody>
</table>

There are 24 large dogs in the dog show.
The ratio of red pens to blue pens in a package is 2:5. If there are 35 blue pens in the package, how many red pens are in the package?
The **ratio of red pens to blue pens in a package is 2:5.** If there are 35 blue pens in the package, how many red pens are in the package?

The ratio we’re working with is 2:5. Draw a tape diagram that represents that ratio.

Red

Blue
The ratio of red pens to blue pens in a package is 2:5. **If there are 35 blue pens in the package,** how many red pens are in the package?

What part of our tape diagram represents the **35 blue pens?**
The ratio of red pens to blue pens in a package is 2:5. **If there are 35 blue pens in the package,** how many red pens are in the package?

**35 blue pens** is represented by 5 boxes on our tape diagram. What value should be written in each box?

\[35 \div 5 = 7\]

<table>
<thead>
<tr>
<th>Red</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Blue</td>
<td>7</td>
<td>7</td>
</tr>
</tbody>
</table>

35 blue pens
The ratio of red pens to blue pens in a package is 2:5. If there are 35 blue pens in the package, how many red pens are in the package?

Now we can find out how many red pens are in the package. REMEMBER, each box represents the same value.

What value should be written in each box?

\[
\begin{array}{ccc}
\text{Red} & 7 & 7 \\
\text{Blue} & 7 & 7 & 7 & 7 & 7 & 7 \\
\end{array}
\]

\[2 \times 7 = 14\]

There are 14 red pens in the package.
Let’s try some more problems!
The ratio of red pens to blue pens in a package is 2:5. If there are 35 blue pens in the package, how many red pens are in the package?
Step #1
Look for the ratio in the problem and make a tape diagram.

2:5
Step #2
Look in the problem for information that will help you determine the value of each box.

35 blue pens in the package

Red

Blue

35 blue pens
Step #3
Determine the value of each box. Remember all boxes have an equal value.

\[35 \div 5 = 7\]
Step #4
Use the value of the boxes to answer the question in the problem.

How many red pens are in the package?

\[ 2 \times 7 = 14 \]

<table>
<thead>
<tr>
<th>Red</th>
<th>7</th>
<th>7</th>
</tr>
</thead>
<tbody>
<tr>
<td>Blue</td>
<td>7</td>
<td>7</td>
</tr>
</tbody>
</table>

14 red pens
The ratio of red roses to pink roses in a bouquet is 4:1. If there are 12 red roses, how many pink roses are in the bouquet?
Step #1
Look for the ratio in the problem and make a tape diagram.

4:1
Step #2
Look in the problem for information that will help you determine the value of each box.

12 red roses

Red

Pink
Step #3
Determine the value of each box. Remember all boxes have an equal value.

12 red roses

\[ 12 \div 4 = 3 \]

<table>
<thead>
<tr>
<th>Red</th>
<th>3</th>
<th>3</th>
<th>3</th>
<th>3</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pink</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Step #4
Use the value of the boxes to answer the question in the problem.

How many pink roses are in the bouquet?

<table>
<thead>
<tr>
<th>Red</th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>3</td>
<td>3</td>
<td>3</td>
<td>3</td>
</tr>
</tbody>
</table>

12 red roses

There are 3 pink roses in the bouquet.
Mr. Jakers bought some apples to make applesauce. He bought red apples and green apples in a ratio of 7:9. If he bought 8 more green apples, than red apples, how many total apples did he buy?
Step #1
Look for the ratio in the problem and make a tape diagram.

7:9
Step #2
Look in the problem for information that will help you determine the value of each box.

He bought 8 more green apples

Red

Green

8 more
Step #3
Determine the value of each box. Remember all boxes have an equal value.

He bought 8 more green apples

\[ 8 \div 2 = 4 \]
Step #4
Use the value of the boxes to answer the question in the problem.

How many total apples did he buy?

Red

\[
\begin{array}{cccccccc}
4 & 4 & 4 & 4 & 4 & 4 & 4 & 4 \\
\end{array}
\]

Green

\[
\begin{array}{cccccccc}
4 & 4 & 4 & 4 & 4 & 4 & 4 & 4 \\
\end{array}
\]

\[4 \times 16 = 64\]

He bought 64 apples.
To make Purple Plum paint, the paint store mixes blue and red paint in a ratio of 8:5. If a customer needs 65 gallons of paint, how many gallons of each color needs to go into the mix?
Step #1
Look for the ratio in the problem and make a tape diagram.

8:5
Step #2
Look in the problem for information that will help you determine the value of each box.

Customer needs 65 gallons of paint

<table>
<thead>
<tr>
<th>Blue</th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Red</td>
<td></td>
<td></td>
<td></td>
<td></td>
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<td></td>
</tr>
</tbody>
</table>

All the boxes together represent the value of 65
Step #3
Determine the value of each box. Remember all boxes have an equal value.

Customer needs 65 gallons of paint

Blue

Red

All the boxes together represent the value of 65

65 gallons \( \div \) 13 boxes = 5
Step #4
Use the value of the boxes to answer the question in the problem.

How many gallons of each color needs to go into the mix?

Blue

Red

8 x 5 = 40

5 x 5 = 25

40 gallons of blue paint and 25 gallons of red paint
Now try some problems on your own!
I bought bags of chocolate and bags of nuts in a ratio of 3:4. If I bought 6 more nuts than oranges, how many total bags did I buy?
7 x 6 = 42

42 total bags
The ratio of the number of cars to SUVs in a parking lot is 4:1. If there are 30 total cars in the parking lot, how many SUVs are there?
There are 6 SUVs in the parking lot.
Dylan and Sam share a group of baseball cards in a ratio of 8:3. If Sam has 15 baseball cards, how many does Dylan have?
Dylan

Sam

15 cards

8 \times 5 = 40

\begin{array}{ccc}
5 & 5 & 5 \\
\end{array}

15 \div 3 = 5

Dylan has 40 baseball cards.
How about a challenge?
Courtney, Carson, and Cassie share a sum of money in the ratio 6:4:3. Carson used ½ of his money to buy a remote-controlled car that cost $60, and Courtney gave \( \frac{1}{3} \) of her money to charity. How much money do they have left altogether?
$60

Carson spent ½ of his money

$60

60 ÷ 2 = 30

Each box represents 30

Courtney gave 1/3 of her money to charity

Mark off the boxes of spent money.

There are 9 boxes left.

9 x 30 = 270

They have $270 left.
Great Work!