

#1706 - A Picture + Technology = Understanding x 10

NCSM - 2016 Annual Meeting & Exposition – Oakland



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TAPE DIAGRAM

A drawing that looks like a segment of tape, used to illustrate number relationships. Also known as a *strip diagram*, *bar model*, *fraction strip*, or *length model*.



PROGRESSIONS DOCUMENTS FOR THE COMMON CORE MATH STANDARDS

<http://ime.math.arizona.edu/progressions/>

TECHNOLOGY – Drawing Models

Thinking Blocks: MathPlayground.com and iPad

Conceptua Math: ConceptuaMath.com/bar-models-tool

The Singapore Maths Teacher: thesingaporemaths.com

Ultimath Modeler: ultimath.com

Houghton-Mifflin: Proprietary with curriculum and iPad

TECHNOLOGY – Assessing Models

Khan Academy

Essential Discussions & Questions:

What is the word problem about? What is happening? Can you restate the word problem without any numbers?

What are the important facts? Are there any irrelevant facts?

What will the answer look like? (Units of measurement, multiple answers, level of accuracy, etc)

What information do we need in order to answer the question?

How can we draw a picture to solve this problem?

What do the bars represent?

What information do we know? What do we need to find?

Are we given the total? Parts?

How do you find a missing part?

Is the problem asking for the difference between two numbers or are we given the difference?

Are we comparing two amounts?

Is there a more efficient strategy to solve this problem? Are there other approaches that would work?

Word Problems

There were 48 chocolates in a box. After eating some of them, Tara found that she had $\frac{5}{8}$ of the chocolates left. How many chocolates did she eat?

Tom and Ann collect toy cars. Tom has 39 more toy cars than Ann. Ann has 38 blue cars and 58 red cars. How many toy cars does Tom have?

A scooter costs \$1739. A bike costs \$950 less than the scooter. Mr. Turner bought both the scooter and the bike. How much did he spend?

A wading pool is half filled with water. When 12 more gallons of water are added, the pool is $\frac{7}{8}$ full. How many gallons of water can the wading pool hold?

James bought a bag of jellybeans. $\frac{1}{4}$ of the jellybeans were cherry, $\frac{1}{8}$ were apple and $\frac{1}{5}$ of the remainder were blueberry. If there were 24 blueberry jellybeans, how many jellybeans did he buy?

Running errands, Mr. Turner spends $\frac{1}{3}$ of his money at the thrift store. He then spends $\frac{1}{3}$ of the money he has left at the dollar store. Finally, he spends his remaining \$40 on Powerball tickets. How much money did Mr. Turner have at first?

A shopkeeper had 150 lb. of rice in his bag. He sold $\frac{2}{5}$ of it and packed the remainder equally into 5 bags. Find the weight of rice in each bag.

Addition & Subtraction Situations

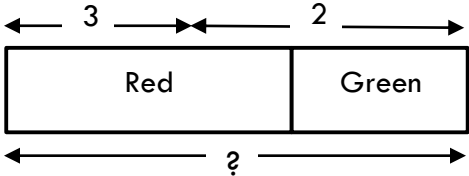
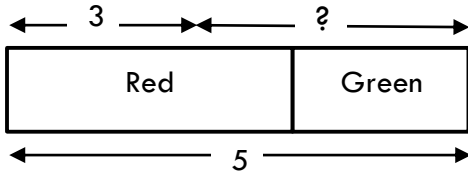
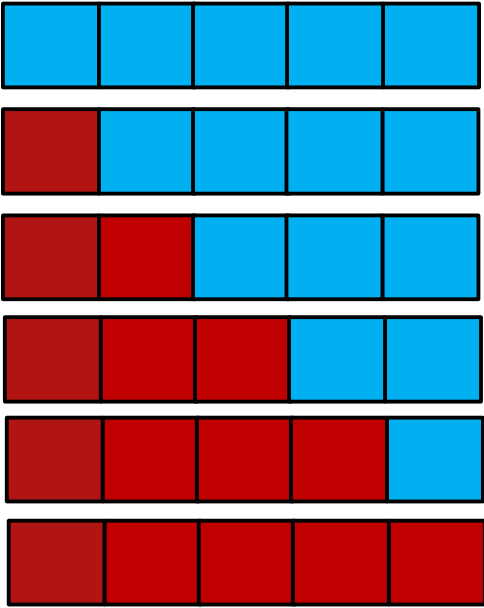
ADD TO:

<p>Result Unknown</p>	<p>Two bunnies sat on the grass. Three more bunnies hopped there. How many bunnies are on the grass now?</p>	
<p>Change Unknown</p>	<p>Two bunnies were sitting on the grass. Some more bunnies hopped there. Then there were five bunnies. How many bunnies hopped over to the first two?</p>	
<p>Start Unknown</p>	<p>Some bunnies were sitting on the grass. Three more bunnies hopped there. Then there were five bunnies. How many bunnies were on the grass before?</p>	

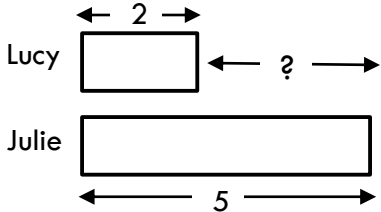
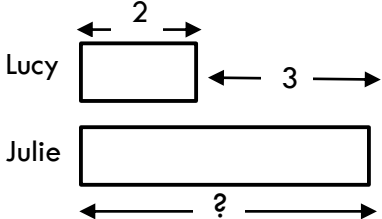
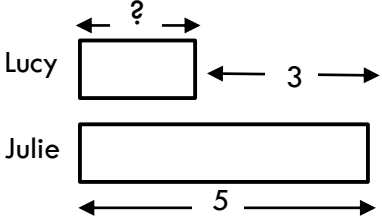
TAKE FROM:

<p>Result Unknown</p>	<p>Five apples were on the table. I ate two apples. How many apples are on the table now?</p>	
<p>Change Unknown</p>	<p>Five apples were on the table. I ate some apples. Then there were three apples. How many apples did I eat?</p>	
<p>Start Unknown</p>	<p>Some apples were on the table. I ate two apples. Then there were three apples. How many apples were on the table before??</p>	

PUT TOGETHER/TAKE APART

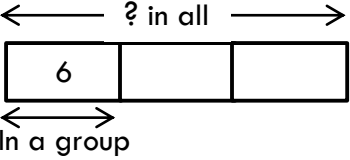
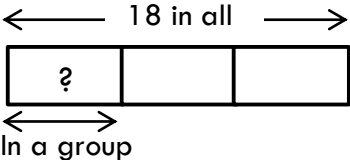
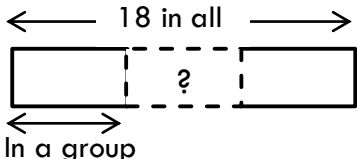
<p>Total Unknown</p>	<p>Three red apples and two green apples are on the table. How many apples are on the table?</p>	
<p>Addend Unknown</p>	<p>Five apples are on the table. Three are red and the rest are green. How many apples are green?</p>	
<p>Both Addends Unknown</p>	<p>Grandma has five flowers. How many can she put in the red vase and how many in her blue vase?</p>	

COMPARE

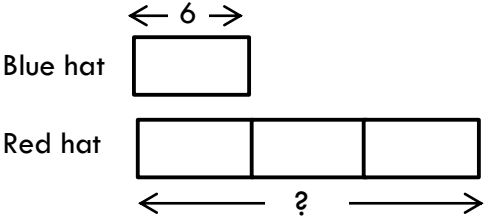
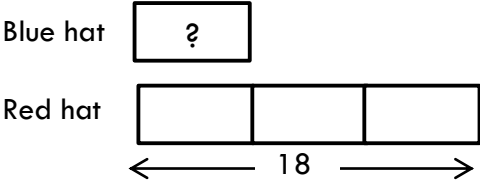
<p>Difference Unknown</p>	<p>Lucy has two apples. Julie has five apples. How many more apples does Julie have than Lucy?</p> <p>OR: Lucy has two apples. Julie has five apples. How many fewer apples does Lucy have than Julie?</p>	 <p>The diagram shows two horizontal bars. The top bar is labeled 'Lucy' and has a double-headed arrow above it labeled '2'. To its right is a longer bar labeled 'Julie' with a double-headed arrow below it labeled '5'. A double-headed arrow between the right end of the Lucy bar and the right end of the Julie bar is labeled with a question mark '?'.</p>
<p>Bigger Unknown</p>	<p>Julie has three more apples than Lucy. Lucy has two apples. How many apples does Julie have?</p> <p>OR: Lucy has 3 fewer apples than Julie. Julie has five apples. How many apples does Lucy have?</p>	 <p>The diagram shows two horizontal bars. The top bar is labeled 'Lucy' and has a double-headed arrow above it labeled '2'. To its right is a longer bar labeled 'Julie' with a double-headed arrow below it labeled with a question mark '?'. A double-headed arrow between the right end of the Lucy bar and the right end of the Julie bar is labeled '3'.</p>
<p>Smaller Unknown</p>	<p>Julie has three more apples than Lucy. Julie has five apples. How many apples does Lucy have?</p> <p>OR: Lucy has 3 fewer apples than Julie. Julie has five apples. How many apples does Lucy have?</p>	 <p>The diagram shows two horizontal bars. The top bar is labeled 'Lucy' and has a double-headed arrow above it labeled with a question mark '?'. To its right is a longer bar labeled 'Julie' with a double-headed arrow below it labeled '5'. A double-headed arrow between the right end of the Lucy bar and the right end of the Julie bar is labeled '3'.</p>

Multiplication & Division Situations

EQUAL GROUPS:

<p>Unknown Product</p>	<p>There are 3 bags with 6 plums in each bag. How many plums are there in all?</p> <p>Measurement example: You need 3 lengths of string, each 6 inches long. How much string will you need altogether?</p>	
<p>Group Size Unknown</p>	<p>If 18 plums are shared equally into 3 bags, then how many plums will be in each bag?</p> <p>Measurement example: You have 18 inches of string, which you will cut into 3 equal pieces. How long will each piece of string be?</p>	
<p>Number of Groups Unknown</p>	<p>If 18 plums are to be packed 6 to a bag, then how many bags are needed?</p> <p>Measurement example: You have 18 inches of string, which you will cut into pieces that are 6 inches long. How many pieces of string will you have?</p>	

COMPARE:

<p>Unknown Product</p>	<p>A blue hat costs \$6. A red hat costs 3 times as much as the blue hat. How much does the red hat cost?</p> <p>Measurement example: A rubber band is 6 cm long. How long will the rubber band be when it is stretched to be 3 times as long?</p>	
<p>Group Size Unknown</p>	<p>A red hat costs \$18 and that is 3 times as much as a blue hat costs. How much does a blue hat cost?</p> <p>Measurement example: A rubber band is stretched to be 18 cm long and that is 3 times as long as it was at first. How long was the rubber band at first?</p>	
<p>Number of Groups Unknown</p>	<p>A red hat costs \$18 and a blue hat costs \$6. How many times as much does the red hat cost as the blue hat?</p> <p>Measurement example: A rubber band was 6 cm long at first. Now it is stretched to be 18 cm long. How many times as long is the rubber band now as it was at first?</p>	