

# Are You Lost? A Road Map to Problem Solving



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TABLE 1. Common addition and subtraction situations.<sup>6</sup>

	Result Unknown	Change Unknown	Start Unknown
Add to	Two bunnies sat on the grass. Three more bunnies hopped there. How many bunnies are on the grass now? $2 + 3 = ?$	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? $2 + ? = 5$	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? $? + 3 = 5$
	Five apples were on the table. I ate two apples. How many apples are on the table now? $5 - 2 = ?$	Five apples were on the table. I ate some apples. Then there were three apples. How many apples did I eat? $5 - ? = 3$	Some apples were on the table. I ate two apples. Then there were three apples. How many apples were on the table before? $? - 2 = 3$
Take from	Three red apples and two green apples are on the table. How many apples are on the table? $3 + 2 = ?$	Five apples are on the table. Three are red and the rest are green. How many apples are green? $3 + ? = 5, 5 - 3 = ?$	Grandma has five flowers. How many can she put in her red vase and how many in her blue vase? $5 = 0 + 5, 5 = 5 + 0$ $5 = 1 + 4, 5 = 4 + 1$ $5 = 2 + 3, 5 = 3 + 2$
	Put Together/ Take Apart	Total Unknown	Both Addends Unknown <sup>1</sup>
Compare <sup>2</sup>	("How many more?" version): Lucy has two apples. Julie has five apples. How many more apples does Julie have than Lucy?	Bigger Unknown	Smaller Unknown
	("How many fewer?" version): Lucy has two apples. Julie has five apples. How many fewer apples does Lucy have than Julie?	Bigger Unknown	Smaller Unknown

<sup>1</sup>These take apart situations can be used to show all the decompositions of a given number. The associated equations, which have the total on the left of the equal sign, help children understand that the = sign does not always mean makes or results in but always does mean is the same number as.

<sup>2</sup>Either addend can be unknown, so there are three variations of these problem situations. Both Addends Unknown is a productive extension of this basic situation, especially for small numbers less than or equal to 10.

<sup>3</sup>For the Bigger Unknown or Smaller Unknown situations, one version directs the correct operation (the version using more for the bigger unknown and using less for the smaller unknown). The other versions are more difficult.

LITERATURE BOOK/Theme/Situation \_\_\_\_\_

Common addition and subtraction situations

Result Unknown

Change Unknown

Start Unknown

Add to

Take from

TABLE 1. Common addition and subtraction situations.<sup>6</sup>

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Take from	Five apples were on the table. I ate two apples. How many apples are on the table now? $5 - 2 = ?$	Five apples were on the table. I ate some apples. Then there were three apples. How many apples did I eat? $5 - ? = 3$	Some apples were on the table. I ate two apples. Then there were three apples. How many apples were on the table before? $? - 2 = 3$
Put Together/ Take Apart	Total Unknown Three red apples and two green apples are on the table. How many apples are on the table? $3 + 2 = ?$	Addend Unknown Five apples are on the table. Three are red and the rest are green. How many apples are green? $3 + ? = 5, 5 - 3 = ?$	Both Addends Unknown Grandma has five flowers. How many can she put in her red vase and how many in her blue vase? $5 = 0 + 5, 5 = 5 + 0$ $5 = 1 + 4, 5 = 4 + 1$ $5 = 2 + 3, 5 = 3 + 2$
Compare <sup>1</sup>	Difference Unknown ("How many more?" version): Lucy has two apples. Julie has five apples. How many more apples does Julie have than Lucy? ("How many fewer?" version): Lucy has two apples. Julie has five apples. How many fewer apples does Lucy have than Julie? $2 + ? = 5, 5 - 2 = ?$	Bigger Unknown ("Version with "more""): Julie has three more apples than Lucy. Lucy has two apples. How many apples does Julie have? ("Version with "fewer""): Lucy has 3 fewer apples than Julie. Lucy has two apples. How many apples does Julie have? $2 + 3 = ?, 3 + 2 = ?$	Smaller Unknown ("Version with "more""): Julie has three more apples than Lucy. Julie has five apples. How many apples does Lucy have? ("Version with "fewer""): Lucy has 3 fewer apples than Julie. Julie has five apples. How many apples does Lucy have? $5 - 3 = ?, ? + 3 = 5$

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**LITERATURE BOOK/Theme/Situation**

**Common addition and subtraction situations**

	Total Unknown	Addend Unknown	Both Addends Unknown <sup>2</sup>
Put Together/ Take Apart			
Compare	Difference Unknown	Bigger Unknown	Smaller Unknown

TABLE 2. Common multiplication and division situations.<sup>7</sup>

	Unknown Product $3 \times 6 = ?$	Group Size Unknown $3 \times ? = 18$ , and $18 \div 3 = ?$	Number of Groups Unknown $? \times 6 = 18$ , and $18 \div 6 = ?$
Equal Groups	There are 3 bags with 6 plums in each bag. How many plums are there in all? <i>Measurement example.</i> You need 3 lengths of string, each 6 inches long. How much string will you need altogether?	If 18 plums are shared equally into 3 bags, then how many plums will be in each bag? <i>Measurement example.</i> You have 18 inches of string, which you will cut into 3 equal pieces. How long will each piece of string be?	If 18 plums are to be packed 6 to a bag, then how many bags are needed? <i>Measurement example.</i> 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?
Arrays, Area	There are 3 rows of apples with 6 apples in each row. How many apples are there? <i>Area example.</i> What is the area of a 3 cm by 6 cm rectangle?	If 18 apples are arranged into 3 equal rows, how many apples will be in each row? <i>Area example.</i> A rectangle has area 18 square centimeters. If one side is 3 cm long, how long is a side next to it?	If 18 apples are arranged into equal rows of 6 apples, how many rows will there be? <i>Area example.</i> A rectangle has area 18 square centimeters. If one side is 6 cm long, how long is a side next to it?
Compare	A blue hat costs \$6. A red hat costs 3 times as much as the blue hat. How much does the red hat cost? <i>Measurement example.</i> A rubber band is 6 cm long. How long will the rubber band be when it is stretched to be 3 times as long?	A red hat costs \$18 and that is 3 times as much as a blue hat costs. How much does a blue hat cost? <i>Measurement example.</i> 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?	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? <i>Measurement example.</i> 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?
General	$a \times b = ?$	$a \times ? = p$ , and $p \div a = ?$	$? \times b = p$ , and $p \div b = ?$

<sup>4</sup>The language in the array examples shows the easiest form of array problems. A harder form is to use the terms rows and columns: The apples in the grocery window are in 3 rows and 6 columns. How many apples are in there? Both forms are valuable.

<sup>5</sup>Area involves arrays of squares that have been pushed together so that there are no gaps or overlaps, so array problems include these especially important measurement situations.

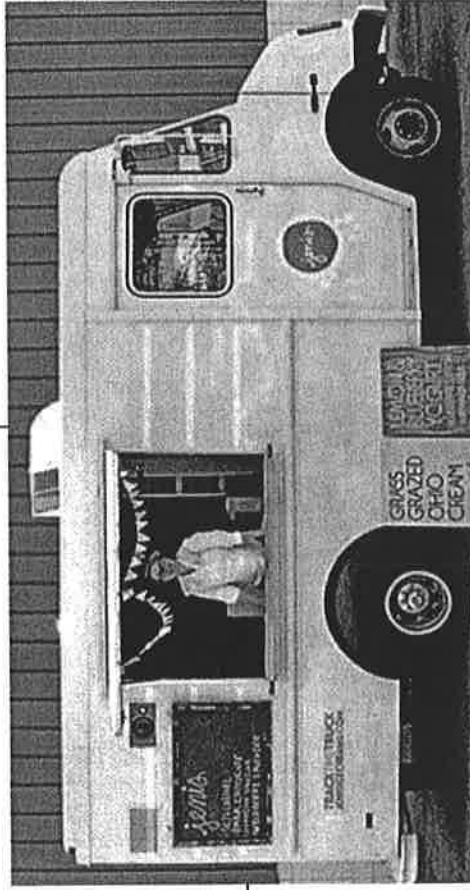
Literature Connection/Theme/Situation

Common multiplication and division situations

	Unknown $3 \times 6 = ?$	Group Size Unknown $3x = 18$ , and $18/3 = ?$	Number of Groups Unknown $? \times 6 = 18$ , $18/6 = ?$
Equal Groups			
Arrays, Area			
Compare			
General			

# What Are You Wondering?

## Question Planning Sheet





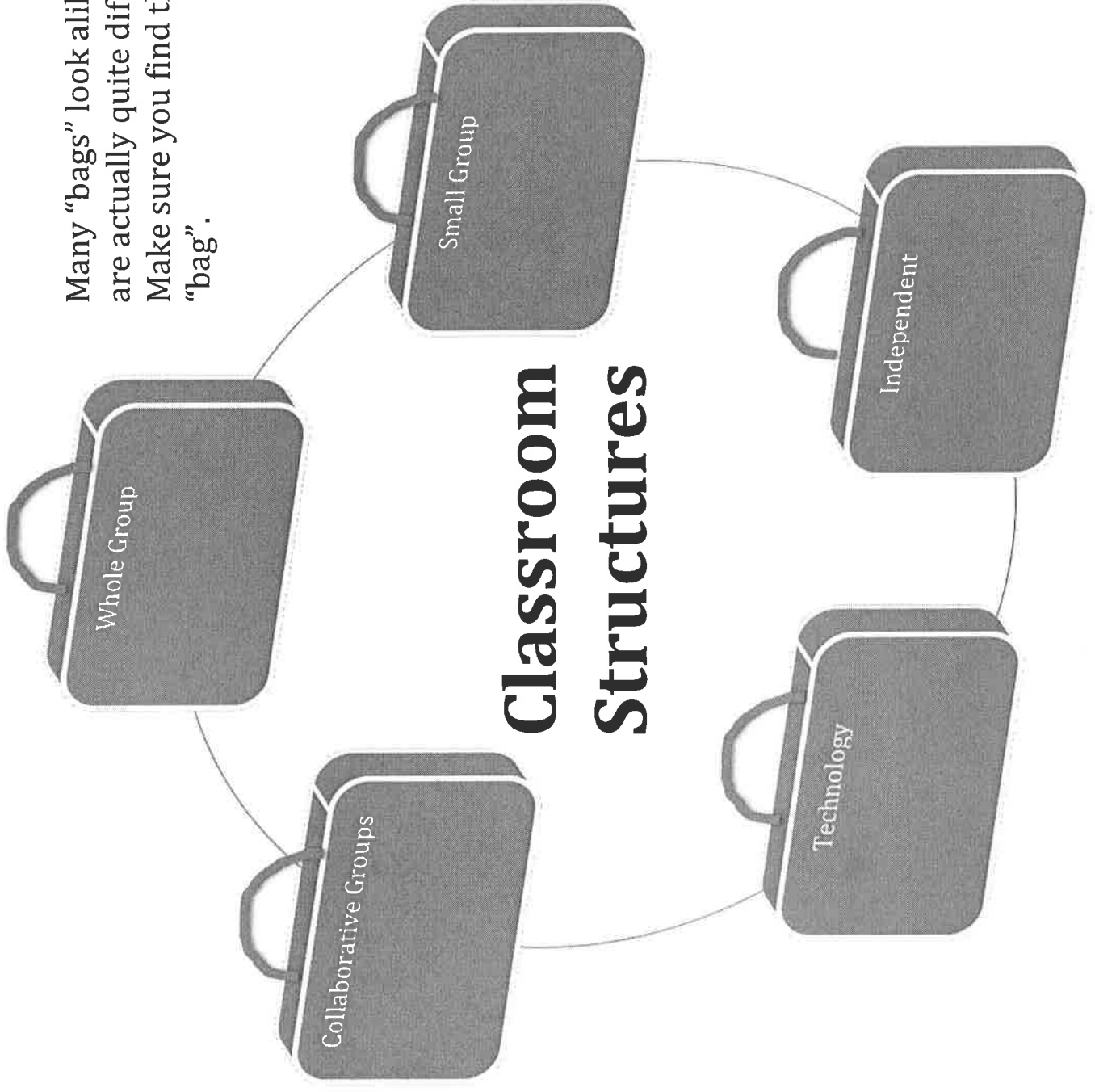
# What Are You Wondering?

Question Planning Sheet

The diagram consists of a large outer rounded rectangle with a thin black border. A vertical line and a horizontal line intersect at the center, dividing the space into four equal quadrants. In the center of this intersection is a smaller rounded rectangle filled with a grey stippled pattern, which overlaps the center of all four quadrants.



Many "bags" look alike but they are actually quite different. Make sure you find the right "bag".



# Classroom Structures



**STARKAS**

# What Are You Wondering?

## Question Planning Sheet

At Gigi's cupcake shop they sell the delicious treats individually or in packs of 6. A customer came in to buy 4 packs of cupcakes. How many cupcakes did they buy? If each pack costs \$7.50 how much money did the customer spend?

Individual cupcakes cost \$1.50 each. A pack of cupcakes costs \$7.50. If a customer needs 5 cupcakes would it be better to purchase individual cupcakes or a pack? Why?



Sweet Tooth cupcake shop baked a tray of 24 cupcakes this morning. Each row had 6 cupcakes. How many rows were on the tray?

Sweetie's Cupcakes bakes their cupcakes in large trays of 48. Each tray has 4 equal rows. How many cupcakes are in each row?

# What Are You Wondering?

## Question Planning Sheet

Asia got an iTunes card from her mom for her 9th birthday. Her mom put \$5.00 on the card for each year since she was born. How much money was on the iTunes card?

Bradley bought 8 things in the iTunes store. Some were songs and some were apps. How many of each could he have bought? How many songs? How many apps?



April has \$24 left on her iTunes card. That is 4 times as much as her brother has on his card. How much money does her brother have on his card?

Jackson bought some apps for his iPad. 6 of them did not work well so he deleted them. Now he has 17 apps. How many did he start with?

LITERATURE BOOK Pancakes for Breakfast by Tomie DePaola  
Common addition and subtraction situations

	Result Unknown	Change Unknown	Start Unknown
Add to	The little old lady made _____ fluffy pancakes. Then she decided she to make _____ more. How many pancakes did the little old lady make?	The little old lady had two sneaky pets. Her cat ate _____ snacks from the kitchen. Her dog ate the rest of the snacks. The little old lady started with _____ snacks in her kitchen. How many snacks did her sneaky pets eat?	The little old lady collected some brown eggs for her recipe. Then she collected _____ more white eggs. She had _____ eggs all together. How many brown eggs did she collect?
Take from	After a long morning of chores the little old lady decided to visit her neighbors for breakfast. They gave her _____ pancakes. After eating _____ pancakes she was very full. How many pancakes were left on her plate?	The sneaky cat spilled _____ cups of flour on the floor. The silly dog cleaned up some of the flour off of the floor. Now there are _____ cups of flour covering the floor. How many cups of flour still need to be cleaned up?	Some butter was sitting on the table. The greedy dog spilled _____ tablespoons of butter while trying to sneak a snack. Then there were _____ tablespoons. How much butter was on the table originally?
Put Together/ Take Apart	The neighbors made _____ blueberry pancakes and _____ chocolate chip pancakes for breakfast. How many pancakes did they make for breakfast?	The neighbors make _____ delicious pancakes for breakfast each day. On Thursday _____ of them were pumpkin spice and the rest were buttermilk. How many of the pancakes were buttermilk?	The friendly neighbors made _____ pancakes for breakfast. The pancakes were lemon or cinnamon. How many of each could there have been? How many lemon? How many cinnamon? (Find all possibilities.)
Compare	The cat ate _____ snacks in the kitchen. The dog ate _____ snacks. How many more treats did the dog eat than the cat?	The little old lady brought home her leftover pancakes. Her cat ate _____ more pancakes than her dog. Her dog ate _____ pancakes. How many pancakes did her cat eat?	The little old lady collected _____ more brown eggs than white eggs. She collected _____ brown eggs. How many white eggs did she collect?
	The little old lady ate _____ pancakes. Her neighbor ate _____ pancakes. How much less did the little old lady eat than her neighbor?	The little old lady had pancakes leftover from breakfast with her neighbors. Her dog ate _____ fewer pancakes than her cat. Her dog ate _____ pancakes. How many pancakes did her cat eat?	The little old lady collected _____ fewer brown eggs than white eggs. There are _____ white eggs. How many brown eggs were collected?



LITERATURE BOOK Curious George Feeds the Animals  
Common addition and subtraction situations

	Result Unknown	Change Unknown	Start Unknown
Add to	The zookeeper tossed _____ fish to the seals. Then they barked for more so he gave them _____ more fish. How many fish did the zookeeper feed the seals?	George is a silly monkey. He fed an alligator _____ peanuts. Then he threw some peanuts to the koalas. He shared _____ peanuts all together. How many did he feed to the koalas?	George shared some treats with an elephant. Then he shared _____ with a kangaroo. He shared _____ treats with the animals. How many treats did he share with the elephant?
	The man with the yellow hat saw _____ birds flying around the hippo cage. Then _____ flew away. How many are still flying by the cage?	The silly monkey dropped _____ peanuts on the floor of the ostrich cage. The big birds picked some up. Now there are _____ peanuts left on the floor. How many peanuts did the birds pick up?	George the monkey saw 2 giraffes. The first giraffe had some brown spots. The second giraffe had _____ spots. He saw _____ spots all together. How many spots were on the first giraffe?
Take from	The zoo snack hut has _____ pink cotton candy treats and _____ blue cotton candy treats to sell. How much cotton candy do they need to sell at the snack hut?	The zoo sells colorful balloons to its guests. On Tuesday _____ of them were yellow and the rest were green. How many of the balloons were green?	Sammy the seal loves when the zookeeper comes to feed him delicious fish. Today the zookeeper fed him _____ fish. Some were blue and some were orange. How many of each did he eat? How many blue? How many orange? (Find all possibilities.)
	The hippo ate _____ treats. The kangaroo ate _____ treats. How many more treats did the kangaroo eat than the hippo?	George and the man in the yellow hat went to the zoo. George saw _____ more animals than the man in the yellow hat. The man in the yellow hat saw _____ animals. How many animals did George see?	George saw _____ more mammals at the zoo than reptiles. George saw _____ mammals. How many reptiles did he see?
Put Together/ Take Apart	The elephant ate _____ peanuts. The ostrich ate _____ peanuts. How much less did the ostrich eat than the elephant?	The new rain forest exhibit has _____ fewer mammals than birds. The exhibit has _____ birds. How many mammals are in the rain forest exhibit?	The quiet koalas snacked on _____ fewer treats than the crafty crocodiles. The crocodiles caught _____ treats. How many treats did the koalas eat?
Compare			

