Index of Multi-Step Addition Problems

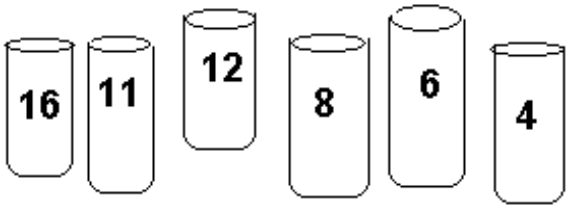
Title of Problem	Page
Brian & Ryan Photo Contest	16
Brother's Ages	14
Convention of Bankers	4
Doubling Grubbles	22
Kelly & Kelsey Dart Game	18
Patty & Sean Garage Sale	26
Ring of Fire Ride	28
School Bus Stops	10
Ted & Lucas	1
Teresa's Snacks	8
Three Addends Equaling 400	6
Three Addends Equaling 500	24
Tom's Temp	12

Ted & Lucas

Name _____ Date _____

The Problem

Ted and Lucas played a bottle game at the fair. Ted knocked down 4 bottles and scored 33 points. The bottles were set back up and it was Lucas's turn. He knocked down 4 bottles and scored 47 points. Looking at the diagram below, which bottles did Ted knock down? Which bottles did Lucas knock down?



Solution Strategy: Guess and Check

Both boys knocked over 4 bottles so we will select 4 numbers (randomly selected) and add them together to see if they work:

16 + 11 + 12 + 4 = 43	No, this is not one of the totals we are looking for.
	Let's try changing one of the numbers:
11 + 12 + 4 + 8 = 35	No, this is not one of the totals we are looking for. It is, however, quite close to Ted's score. It is just 2 points off.
	Let's continue trying:
11 + 12 + 4 + **6** = 33	Yes. This is Ted's score. Notice that we found a number that was 2 points different from our last guess. Now to find Lucas's score. It is 45 so we may want to try bigger numbers.
16 + 12 + 4 + 6 = 38	No. This is not one of the totals we are looking for.
16 + 12 + 11 + 8 = 47	Yes, that's it. This is the point total for Lucas.

ANSWER: Lucas knocked over the bottles 16, 12, 11, and 8. Ted knocked over the bottles 12, 11, 6, and 4.

Solution Strategy: Make an Organized List

The 6 bottles are numbered 16, 12, 11, 8, 6, 4.

Each of the boys knocked over 4 of the 6 bottles. Let's take a look at the possible 4-number combinations within the set of numbers given.

Bottle 1 Points	Bottle 2 Points	Bottle 3 Points	Bottle 4 Points	Total	
16	12	11	8	47	←
16	12	11	6	45	
16	12	11	4	43	
16	12	8	6	42	
16	12	8	4	40	
16	11	8	6	41	
16	11	8	4	39	
16	8	6	4	34	
12	11	8	6	37	
12	11	8	4	35	
12	11	6	4	33	←
11	8	6	4	29	

After examining all the possible 4-number combinations, it is apparent which combinations produced the 2 boys' scores.

ANSWER: Lucas knocked over the bottles 16, 12, 11, and 8. Ted knocked over the bottles 12, 11, 6, and 4.

Convention of Bankers

Name _____ Date _____

The Problem

There was a convention of bankers in the large meeting room at a convention center. The first 3 bankers arrived, entered the room, shut the door, and began discussing banking business. There was a knock at the door and 2 more bankers entered. On each of the following knocks, a group of bankers entered that had 2 more bankers than the group that entered on the previous knock. On the 10^{th} knock, all the bankers had entered the room. How many bankers were there in all at the convention?

Convention of Bankers (continued)

Solution Strategy: Make a Chart

Let's make a chart that shows the number of bankers at the convention at each step of the way. We'll keep track of the number of knocks at the door, the number of bankers who enter the room at each knock, and a running total.

Number of Knocks at the Door	Number of Bankers Now Entering	Running Total of Bankers at the Convention
0	3	3
1	2	5
2	4	9
3	6	15
4	8	23
5	10	33
6	12	45
7	14	59
8	16	75
9	18	93
10	20	113

Solution Strategy: Look For a Pattern

We know that we need to start counting at 3. Let's look for a pattern after that. Looking carefully, we see that we are adding consecutive multiples of 2 each time, e.g., 2, 4, 6, 8… up to 20. Why 20? We are told that there are 10 knocks on the door, so we go to the 10^{th} multiple of 2 which is 20. Our number model looks like this:

$$3 + 2 + 4 + 6 + 8 + 10 + 12 + 14 + 16 + 18 + 20 = \underline{\quad 113 \quad}$$

ANSWER: There were 113 bankers at the convention.

Three Addends Equaling 400

Name _____ Date _____

The Problem

Choose one number from each of the rows in the diagram below so that the sum of the numbers you've chosen is 400.

Row 1	222	342	106
Row 2	195	96	381
Row 3	234	99	376

Solution Strategy: Guess and Check

Let's start with the first number in each row just as a random starting point.

222 + 195 + 234 = 639	No. That's too big. Now that I look more carefully at my numbers, I see that just two of the numbers added up to more than 400. I'll examine my choices more carefully next time.

With this in mind, let's try the following numbers. Why these numbers? They are about 200, 100, and 100. That's 400. Let's try them.

222 + 96 + 99 = 417	No. But that's much closer. It was helpful to use estimation to select my numbers.

This time, I'm going to be looking for a number that's a little bit smaller. Let's try the following:

106 + 96 + 99 = 301	No. Now it's too small.

I need something that is about 100 more than one of my numbers. Let's try this:

106 + **195** + 99 = 400	That's it!

ANSWER: I need to select 106 from the first row, 195 from the second row, and 99 from the third row to get a sum that's equal to 400.

Teresa's Snacks

Name _____ Date _____

The Problem

Teresa wants to buy a snack in a snack machine that only takes quarters, dimes, and nickels. If each snack costs 50 cents, and if she must use exact change, how many different combinations of coins can Teresa use to buy a snack?

Solution Strategy: Make an Organized List

Let's start with the largest coin, the quarter. What is the greatest number of quarters she can use? 2 (2 quarters = 50 cents). With that as our starting point, let's examine all the possibilities with 2 quarters.

Quarters	Dimes	Nickels	Total Amount
2	0	0	25 + 25 = 50 cents

There's only 1 combination that works with 2 quarters. Now let's examine all the possibilities using 1 quarter.

Quarters	Dimes	Nickels	Total Amount
1	2	1	25 + 10 + 10 + 5 = 50 cents
1	1	3	25 + 10 + 5 + 5 + 5 = 50 cents
1	0	5	25 + 5 + 5 + 5 + 5 + 5 = 50 cents

There are 3 combinations that work with 1 quarter. That brings us to a total of 4 combinations so far. Now let's try the possibilities using 0 quarters.

Quarters	Dimes	Nickels	Total Amount
0	5	0	10 + 10 + 10 + 10 + 10 = 50 cents
0	4	2	10 + 10 + 10 + 10 + 5 + 5 = 50 cents
0	3	4	10 + 10 + 10 + 5 + 5 + 5 + 5 = 50 cents
0	2	6	10 + 10 + 5 + 5 + 5 + 5 + 5 + 5 = 50 cents
0	1	8	10 + 5 + 5 + 5 + 5 + 5 + 5 + 5 + 5 = 50 cents

There are 5 combinations that work with 0 quarters. That brings us to a total of 9 combinations so far. We have finished all the possibilities for quarters (2, 1, or 0). Now let's look at dimes. We've tried almost every combination for dimes, EXCEPT the combination of 0 quarters and 0 dimes. Let's try that.

Quarters	Dimes	Nickels	Total Amount
0	0	10	5 + 5 + 5 + 5 + 5 + 5 + 5 + 5 + 5 + 5 = 50 cents

There! We have found all the possible combinations. There are 10 combinations.

ANSWER: There are 10 different combinations of quarters, dimes, and nickels that Teresa can use to make exactly 50 cents.

School Bus Stops

Name _____ Date _____

The Problem

There were 20 students on the school bus. At the first stop, some of the students got off the bus. At the second stop, 5 students got off the bus. At the third stop, 7 students got off. There are now 3 students left on the bus. How many students got off the bus at the first stop?

School Bus Stops (continued)

Solution Strategy: Work Backwards

The ending piece of information is a good place to start in a "working backwards" scenario. In this problem, the final piece of information is that there are ***3 students left on the bus.***

Working backwards, we move to the previous sentence that states that ***7 students got off the bus***. We need to add the 7 students who got off at the third stop to the 3 students left on the bus.

3 + 7 = 10

Now we move to the previous sentence, which states that ***5 students got off.*** We add the 5 to our running total.

10 + 5 = 15

This brings us to the piece of information that is unknown to us. We need to know how many students got off at the first stop. To do this, we must take the number we have computed thus far by working backwards, and compare it to the beginning piece of data. We are told in the first sentence that ***there are 20 students on the bus***. We have computed that there are 15 students who got off the bus at stops 2 and 3. We need to subtract to find the difference, which gives us the number of students who got off at the first stop.

15 - 10 = 5

ANSWER: There were 5 students who got off the bus at the first stop.

Tom's Temp

Name _____ Date _____

The Problem

Tom turned on the radio at 6:00 a.m. and heard that the temperature was 32 degrees F. That night he heard that the temperature had risen 3 degrees each hour until 3:00 p.m. when it was at its highest for the day. What was the high temperature for the day?

Tom's Temp (continued)

Solution Strategy: Make a Chart

We know that every hour the temperature rises by 3 degrees and we are starting at 32 degrees F. Let's make a chart that shows the temperature for each hour between 6:00 a.m. and 3:00 p.m.

Time of Day	Temperature (in F)
6:00 a.m.	32 degrees
7:00 a.m.	35 degrees
8:00 a.m.	38 degrees
9:00 a.m.	41 degrees
10:00 a.m.	44 degrees
11:00 a.m.	47 degrees
12:00 noon	50 degrees
1:00 p.m.	53 degrees
2:00 p.m.	56 degrees
3:00 p.m.	59 degrees

ANSWER: The temperature at 3:00, the high temperature for the day, was 59 degrees F.

Brother's Ages

Name _____ Date _____

The Problem

Mark is the youngest in his family. He has 2 brothers. The difference in age between his brother, Jim, and his oldest brother, John, is 2 years. The difference in age between Mark and Jim is also 2 years. If Mark is 12, how old are the other two boys?

Brother's Ages (continued)

Solution Strategy: Work Backwards

Note to Tutor/Teacher: Even though the problem uses the word "difference" to describe the data in the problem, we need to help students recognize that this is actually an addition problem.

The ending piece of information is a good place to start in a "working backwards" scenario. In this problem, the final piece of information is that ***Mark is 12.***

Working backwards, we move to the next piece of information. That is, Mark and Jim are ***2 years apart*** in age. We know Jim is 2 years older (we know he is older because we are told that Mark is the youngest) so we add that to Mark's age.

12 + 2 = 14 = Jim's age

We now can solve for John's age. We are told that John and Jim's age difference is also ***2 years and that John is the "oldest brother".***

14 + 2 = 16 = John's age

ANSWER: Jim is 14 and John is 16.

Brian & Ryan's School Photo Contest

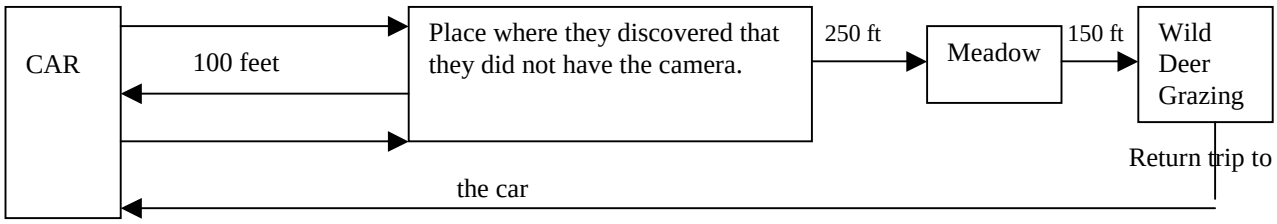
Name _____ Date _____

The Problem

Brian and Ryan went to the mountains to take pictures for a school photography contest. They started out on their journey and after walking 100 feet, they realized they forgot the camera in the car. Brian decided to wait there while Ryan went back to the car to get the camera. When Ryan got back with the camera, the 2 boys continued on their journey. They walked 250 feet and reached a meadow of wild flowers and stopped to take pictures. They walked another 150 feet and stopped to take pictures of 2 wild deer grazing. Then they decided to walk back to the car. How far did each boy walk on the journey?

Brian & Ryan's School Photo Contest (continued)

Solution Strategy: Draw a Picture



How far did Brian walk?

Brian walked 100 feet, stopped and waited for Ryan, then walked 250 feet, and then walked 150 feet, one-way. Double that to get the round-trip total.

100 + 250 + 150 = 500 feet

500 * 2 = 1,000 feet

How far did Ryan walk?

We can look at Brian's total and then add the extra trip back to the car for Ryan's total. It was 100 feet back to the car, and then 100 feet back to where Brian was waiting, so a total of 200 feet in addition to the round-trip total we computed for Brian.

1,000 feet + 200 feet = 1,200 feet

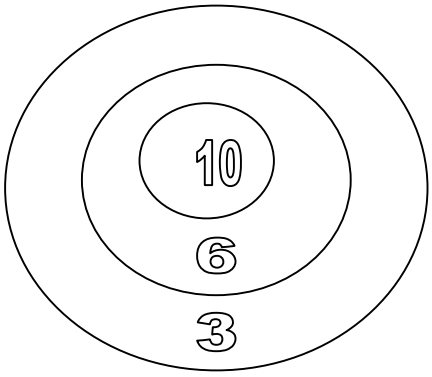
ANSWER: Brian walked a total of 1,000 feet and Ryan walked a total of 1,200 feet.

Kelly & Kelsey's Dart Game

Name _____ Date _____

The Problem

Kelly and Kelsey were playing darts using a dartboard that looks like the one in the diagram below. They threw 6 darts each on their turn. Kelly scored 39 points on her turn and Kelsey scored 38 points on her turn. Where did each of Kelly's darts land? Where did each of Kelsey's darts land? (NOTE: there may be more than one possibility for each girl.)



Solution Strategy: Guess and Check

Let's look at some possible combinations and total scores for the 6 darts for each of the players. First of all, we need to think about all the places that the darts can land. They can land in the inside circle, the middle circle, and the outside circle. Is there any other possibility? Ah, yes! They can miss the dartboard altogether.

Kelly's total score was 39. Let's try some combinations for Kelly.

1. Let's say that all 6 of Kelly's darts landed in the inside circle worth 10 points each.

   That would be → 10 + 10 + 10 + 10 + 10 + 10 = 60 points.

   No, that's too high.

2. Let's try something a little smaller. Let's say that 2 of Kelly's darts landed in the inside circle, and the other 4 landed in the middle circle.

   That would be → 10 + 10 + 6 + 6 + 6 + 6 = 44 points.

   That's better, but still too high. Let's try something a little smaller in point value.

3. Let's say that 1 of Kelly's darts landed in the inside circle, 2 landed in the middle circle and 1 landed in the outside circle.

   That would be → 10 + 6 + 6 + 3 + 3 = 28 points.

   No. Now it is too low. Let's make another adjustment.

4. Let's say that 3 of Kelly's darts landed in the inside circle, 1 landed in the middle circle, 1 landed in the outside circle, and one dart missed the dartboard.

   That would be → 10 + 10 + 10 + 6 + 3 + 0 = 39 points. That's it!

Kelly & Kelsey's Dart Game (continued)

Now let's take a look at Kelsey's score. Her total score was 38. Let's try some combinations for Kelsey.

1. Let's say that 3 darts landed in the inside circle and 3 darts landed in the outside circle.

   That would be → 10 + 10 + 10 + 3 + 3 + 3 = 39.

That's another possible combination for Kelly's score, but it is 1 point greater than Kelsey's score. Let's try making an adjustment.

2. Let's say that 2 darts landed in each of the circles, the inside, the middle, and the outside.

   That would be → 10 + 10 + 6 + 6 + 3 + 3 = 38 points.

That's it!

ANSWER: Kelly's darts may have landed as follows: 3 darts in the inside, 1 dart in the middle, 1 dart in the outside, and 1 dart missed the dartboard. Kelsey's darts may have landed as follows: 2 darts in the middle, 2 darts in the inside, and 2 darts in the outside.

Solution Strategy: Make an Organized List

This strategy is a little more formal way of looking at all possibilities in a very organized and structured manner.

Let's look first at Kelly's score of 39 points. Let's look at all the possibilities for Kelly in an organized list until we find a combination that adds up to 39.

Inside (10 pts)	Middle (6 pts)	Outside (3 pts)	Missed (0 pts)	Total Points	Comments
6	--	--	--	10 + 10 + 10 + 10 + 10 + 10 = 60	Too high
5	1	--	--	10 + 10 + 10 + 10 + 10 + 6 = 56	Too high
5	--	1	--	10 + 10 + 10 + 10 + 10 + 3 = 53	Too high
5	--	--	1	10 + 10 + 10 + 10 + 10 + 0 = 50	Too high
4	2	--	--	10 + 10 + 10 + 10 + 6 + 6 = 52	Too high
4	1	1	--	10 + 10 + 10 + 10 + 6 + 3 = 49	Too high
4	--	2	--	10 + 10 + 10 + 10 + 3 + 3 = 46	Too high
4	--	1	1	10 + 10 + 10 + 10 + 3 + 0 = 43	Too high
4	--	--	2	10 + 10 + 10 + 10 + 0 + 0 = 40	Too high
3	3	--	--	10 + 10 + 10 + 6 + 6 + 6= 48	Too high
3	2	1	--	10 + 10 + 10 + 6 + 6 + 3 = 45	Too high
3	1	2	--	10 + 10 + 10 + 6 + 3 + 3 = 42	Too High
3	0	3	--	10 + 10 + 10 + 3 + 3 + 3 = 39	That's it!

We have found a possible combination for Kelly. It is 3 darts in the inside circle and 3 darts in the outside circle.

Kelly & Kelsey's Dart Game (continued)

Now let's look at Kelsey's score of 38 points. Let's look at all the possibilities for Kelsey in an organized list until we find a combination that adds up to 38.

Inside (10 pts)	Middle (6 pts)	Outside (3 pts)	Missed (0 pts)	Total Points	Comments
6	--	--	--	10 + 10 + 10 + 10 + 10 + 10 = 60	Too high
5	1	--	--	10 + 10 + 10 + 10 + 10 + 6 = 56	Too high
5	--	1	--	10 + 10 + 10 + 10 + 10 + 3 = 53	Too high
5	--	--	1	10 + 10 + 10 + 10 + 10 + 0 = 50	Too high
4	2	--	--	10 + 10 + 10 + 10 + 6 + 6 = 52	Too high
4	1	1	--	10 + 10 + 10 + 10 + 6 + 3 = 49	Too high
4	--	2	--	10 + 10 + 10 + 10 + 3 + 3 = 46	Too high
4	--	1	1	10 + 10 + 10 + 10 + 3 + 0 = 43	Too high
4	--	--	2	10 + 10 + 10 + 10 + 0 + 0 = 40	Too high
3	3	--	--	10 + 10 + 10 + 6 + 6 + 6= 48	Too high
3	2	1	--	10 + 10 + 10 + 6 + 6 + 3 = 45	Too high
3	1	2	--	10 + 10 + 10 + 6 + 3 + 3 = 42	Too High
3	--	3	--	10 + 10 + 10 + 3 + 3 + 3 = 39	Too High
3	--	2	1	10 + 10 + 10 + 3 + 3 + 0 = 36	Too Low
3	--	1	2	10 + 10 + 10 + 3 + 0 + 0 = 33	Too Low
3	--	--	3	10 + 10 + 10 + 0 + 0 + 0 = 30	Too Low
2	4	--	--	10 + 10 + 6 + 6 + 6 + 6 = 44	Too High
2	3	1	--	10 + 10 + 6 + 6 + 6 + 3 = 41	Too High
2	2	2	--	10 + 10 + 6 + 6 + 3 + 3 = 38	That's It!

We have found a possible combination for Kelsey. It is 2 darts in the inside circle, 2 darts in the middle circle, and 2 darts in the outside circle.

ANSWER: A possible combination for Kelly's score of 39 is 3 darts in the inside circle and 3 darts in the outside circle. A possible combination for Kelsey's score of 38 is 2 darts in the inside circle, 2 darts in the middle circle, and 2 darts in the outside circle.

Doubling Grubbles

Name _____ Date _____

The Problem

There was a meeting of the minds amongst the high-level Grubbles one day. They were trying to determine how to stop the doubling problem. You see, each time a Grubble eats a meal, the Grubble doubles. The high-level officials are worried that there are too many Grubbles on the planet Grubblewood. The maximum number of Grubbles that can live on the planet is 10,000. There are currently 128 Grubbles on the planet. They have just finished their last meal for today. If the Grubbles eat 3 meals per day, how many days until they reach the maximum?

Solution Strategy: Make a Chart

Let's make a chart that shows the number of Grubbles there are after each meal on each day. We will stop at 10,000.

Current Number of Grubbles	Day Number/ Meal Number	New Number of Grubbles
128	day 1, meal 1	128 + 128 = 256
256	day 1, meal 2	256 + 256 = 512
512	day 1, meal 3	512 + 512 = 1,024
1,024	day 2, meal 1	1,024 + 1,024 = 2,048
2,048	day 2, meal 2	2,048 + 2,048 = 4,096
4,096	day 2, meal 3	4,096 + 4,096 = 8,192
8,192	day 3, meal 1	8,192 + 8,192 = 16,384

We have found that on day 3 after their first meal, the Grubbles will have reached a total of 16,384. This is larger than the maximum of 10,000. So we reach our maximum on the third day.

ANSWER: The Grubbles will reach the maximum on day 3.

Three Addends (Plus 100) Equaling 500

Name _____ Date _____

The Problem

Choose one number from each of the rows in the diagram below so that the sum of the numbers you've chosen **plus 100** is 500.

Row 1	150	342	106
Row 2	195	129	381
Row 3	234	99	121

Three Addends (Plus 100) Equaling 500 (continued)

Solution Strategy: Guess and Check

Let's start with the first number in each row just as a random starting point.

150 + 195 + 234 = 579	No. That's too big. We're already over the total and we haven't added the 100 yet.

Let's look for some smaller numbers this time. Let's try the smallest number in each row.

150 + 129 + 99 = 378	
378 + 100 = 478	No. It's now too small, but it's much closer. Let's make an adjustment.

This time, we're going to be looking for a number that's a little bit smaller. Let's try the following:

150 + 129 + 121 = 400	
400 + 100 = 500	That's it!

ANSWER: I need to select 150 from the first row, 129 from the second row, and 121 from the third row plus 100 to get a sum that's equal to 500.

Patty & Sean's Garage Sale

Name _____ Date _____

The Problem

Patty and Sean are having a garage sale. They have 12 children's books for sale and they will accept only ***one coin*** for each book. They are asking for a dime for each book, but if a particularly good bargainer comes along, they will accept a nickel. At the end of the day, they have sold all 12 books and have collected a grand total of 95 cents from the sale of the books. How many dimes and how many nickels do they have?

Solution Strategy: Make an Organized List

First of all, it is important to realize that they are only accepting one coin for each item. That is, they will accept a dime or a nickel for each sale but not a combination of coins, such as 2 nickels or 10 pennies, etc.

With that in mind, we will begin by examining combinations of dimes and nickels to determine how many of each they have. Let's start with the largest coin, the dime. What is the greatest number of dimes we can have?

Dimes	Nickels	Total Amount	No. of Coins
9	1	90 + 5 = 95 cents	9 + 1 = 10 coins

When we use 9 dimes and 1 nickel, we reach the total of 95 cents, but that is only a total of 10 coins. Let's try another combination.

Dimes	Nickels	Total Amount	No. of Coins
8	3	80 + 15 = 95 cents	8 + 3 = 11 coins

Again, this combination gets us to the correct money value, 95 cents, but we are still one coin short. Let's try another combination.

Dimes	Nickels	Total Amount	No. of Coins
7	5	70 + 25 = 95	7 + 5 = 12

That's it! We have found the correct money value, 95 cents, and the correct number of coins, 12.

ANSWER: Patty and Sean have 7 dimes and 5 nickels from the sale of the children's books at the garage sale.

Ring of Fire Ride

Name _____ Date _____

The Problem

There were some children riding on the Ring of Fire, a ride at the fair. It was a slow day and there were no lines, so it was possible for children to stay on the ride at the end of each turn if they would like. After the first turn, 5 children got off and 7 got on the ride. After the second turn, 10 children got off the ride and 2 children got on the ride. After the third time, 4 children got off the ride and no children got on the ride. There are currently 10 children on the ride. How many children were on the ride before the first turn?

Solution Strategy: Work Backwards

The ending piece of information is a good place to start in a "working backwards" scenario. In this problem, the final piece of information is that there are ***10 children left on the ride.*** Let's start a running total starting with 10.

Running Total = 10 children

Working backwards, we move to the previous sentence that states that ***4 children got off the ride and no children got on the ride***. We need to add 4 children to our running total. Since no children got on the ride, we don't have anything to subtract.

Running Total = 10 + 4 = 14 children

Now we move to the previous sentence, which states that ***10 children got off the ride and 2 children got on the ride.*** We need to add 10 children to our running total and subtract 2 children.

Running Total = 14 + 10 – 2 = 22 children

Now we move to the previous sentence, which states that ***5 children got off the ride and 7 children got on the ride.*** We need to add 5 children to our running total and subtract 7 children.

Running Total = 22 + 5 – 7 = 20 children

This brings us to the piece of information that is unknown to us. How many children were on the ride before the first turn? We have found that there were ***20 children on the ride before the first turn.***

Let's check our work by going through the problem from start to finish, testing out our answer of 20 children.

There were 20 children on the ride before the first turn. After the first turn, 5 children got off the ride and 7 children got on the ride. 20 – 5 = 15 + 7 = 22. There are 22 children on the ride for the second turn. After the second turn, 10 children got off the ride and 2 got on. 22 – 10 = 12 + 2 = 14 children. There are 14 children on the ride for the third turn. After the third turn, 4 children got off the ride and no children got on the ride. 14 – 4 = 10 + 0 = 10. There are 10 children on the ride after the third turn. It checks out.

ANSWER: There were 20 children on the ride before the first turn.

Index of Multi-Step Subtraction Problems

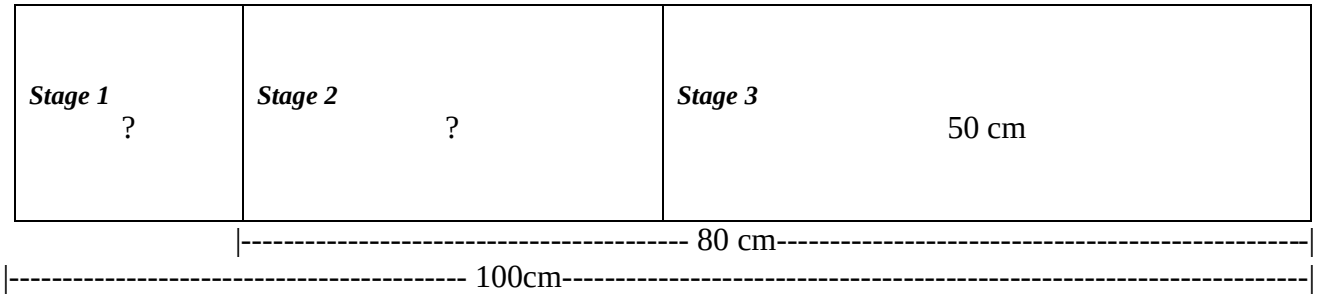
Title of Problem	Page
6 What Number Am I?	19
76 What Number Am I?	9
Dismissal to Lunch Room	5
Dismissal to Vision & Hearing Test	15
Eric's Science Fair Rocket	1
Jillian's Math Test	13
Meeting of Doctors	7
Mrs. Connor's History Test	3
Set for School Play	11
Student Council Meeting	17

Name _____ Date _____

The Problem

Eric is building a rocket for his science fair project. It is 100 cm long. When he removes the first stage, the rocket is 80 cm long. When he removes the second stage, the last stage is 50 cm long. Which of the 3 stages is the longest?

Solution Strategy: Draw a Picture



Step 1: We need to determine the length of the first stage. We take the total length of the rocket and subtract the combined length of Stage 2 and Stage 3 (this is given in the problem, 80 cm):

100 – 80 = 20 cm

Step 2: How many stages are left? 2 How long are these stages together (given in the problem)? 80 cm Do we know the length of one of these stages? Yes, we know the length of the final stage – it's given in the problem – 50 cm. Subtract the final stage from the combined length of Stage 2 and Stage 3 to get the length of Stage 2:

80 – 50 = 30 cm

Step 3: Evaluate the information you have just discovered.

Stage 1 = 20 cm
Stage 2 = 30 cm
Stage 3 = 50 cm ←

Stage 3 is the largest. Let's check the answers to make sure they make sense:

20 + 30 + 50 = 100 cm

Which stage is the largest? Stage 3

ANSWER: Stage 3 of Eric's model rocket is the largest stage.

Mrs. Connor's History Test

Name _____ Date _____

The Problem

Mrs. Connor's class got their history test back. Thomas compared his score with Trista's score. His score was 10 points lower than her score. Trista's score was 27 points lower than Tanya's score. Tanya got a 99 on the test. The grading scale for the test was as follows:

90 - 100	A
80 - 89	B
70 - 79	C
60 - 69	D
59 and below	F

What was Thomas's letter grade on the test?

Mrs. Connor's History Test (continued)

Solution Strategy: Work Backwards

When we use a work backwards strategy, we start with the ending piece of information given in the problem. In this problem, we are given that Tanya got a 99 on the test.

99 is Tanya's score.

We are told that Trista's score is 27 points lower than Tanya's score. So we subtract:

99 – 27 = 72 is Trista's score

We are told that Thomas's score is 10 points lower than Trista's score. So we subtract:

72 – 10 = 62 is Thomas's score

Now we look up the scores in the grading scale. Thomas's score of 62 is a D.

ANSWER: Thomas got a D on the test.

Dismissal to Lunch Room

Name _____ Date _____

The Problem

A class of 25 students is divided up into 5 teams with 5 students in each team. The class is dismissed by teams to go to the lunch room. The first team is dismissed and then the remaining teams go every 5 minutes after that. How long does it take for the entire class to be dismissed?

Dismissal to Lunch Room (continued)

Solution Strategy: Make a Chart

Let's make a chart that shows what happens each time a group of students is dismissed. Notice that we don't start counting the elapsed time until ***the second group*** of students is dismissed.

Number of Students Still in the Classroom	Number of Students Dismissed	Number Model	Elapsed Time
25	5	25 –5 = 20	--
20	5	20 – 5 = 15	5 min.
15	5	15 – 5 = 10	10 min.
10	5	10 – 5 = 5	15 min.
5	5	5 – 5 = 0	20 min.
0	---	---	---

Solution Strategy: Find a Pattern

Notice that there is a pattern after the first group goes to lunch — counting by 5s — which indicates the elapsed time before the next group is dismissed.

Action	Group 1 is Dismissed	Group 2 is Dismissed	Group 3 is Dismissed	Group 4 is Dismissed	Group 5 is Dismissed
Elapsed Time	0	5	10	15	20

ANSWER: It takes 20 minutes for the entire class to be dismissed.

Meeting of Doctors

Name _____ Date _____

The Problem

There were 55 doctors at the hospital staff meeting. As soon as the meeting was over, 5 doctors left the room. After 5 minutes, 2 more doctors left the room. Every 5 minutes after that, the number of doctors leaving the room was 2 more than the last group that left the room. How many doctors were remaining in the room after 30 minutes?

Meeting of Doctors (continued)

Solution Strategy: Make a Table

Let's make a table that shows elapsed time and the number of doctors in the room after each 5-minute interval.

Elapsed Time	Number of Doctors in the Room	Number of Doctors Leaving the Room	Number of Doctors Remaining in the Room
0	55	5	55 –5 = **50**
5 min	50	2	50 – 2 = **48**
10 min	48	4	48 – 4 = **44**
15 min	46	6	44 – 6 = **38**
20 min	44	8	38 – 8 = **30**
25 min	42	10	30 – 10 = **20**
30 min	40	12	20 – 12 = **8**

Solution Strategy: Look For a Pattern

We start with 55 doctors in the room. We know we need to start counting backwards from 50 since 5 doctors leave the room right away. After that, we can see a pattern. We need to subtract consecutive multiples of 2 each time, i.e. 2, 4, 6, 8, 10, 12. How do we know to stop at 12? We are told to find the total after 30 minutes, and we are talking about 5-minute intervals. There are 6 five-minute intervals in 30 minutes, therefore we take the first 6 multiples of 2. Our number model will look like this:

$50 - 2 - 4 - 6 - 8 - 10 - 12 =$ 8 doctors

ANSWER: There were 8 doctors remaining in the room.

76 What Number Am I?

Name _____ Date _____

The Problem

I am a number between 1 and 100. I am an even number and when you subtract me from 100 and then subtract 10, I am equal to 76. What number am I?

76 What Number Am I? (continued)

Solution Strategy: Guess and Check

Let's choose an even number between 1 and 100 to start checking. Let's try something in the middle like **50**:

100 – **50** = 50
50 – 10 = 40

No. We're looking for 76. Our original number needs to be smaller so that when it is subtracted from 100, we get a larger number.

Let's try **20**. It's even and it's smaller.

100 – **20** = 80
80 – 10 = 70

No. That's still not it, but it is much closer. We need a number even smaller than 20. Let's try **10**. It's even and it's smaller.

100 – **10** = 90
90 – 10 = 80

No. 10 was too small. Let's try something in between 10 and 20. Let's try **14.**

100 – **14** = 86
86 – 10 = 76

That's it!

ANSWER: The number is 14.

Set for School Play

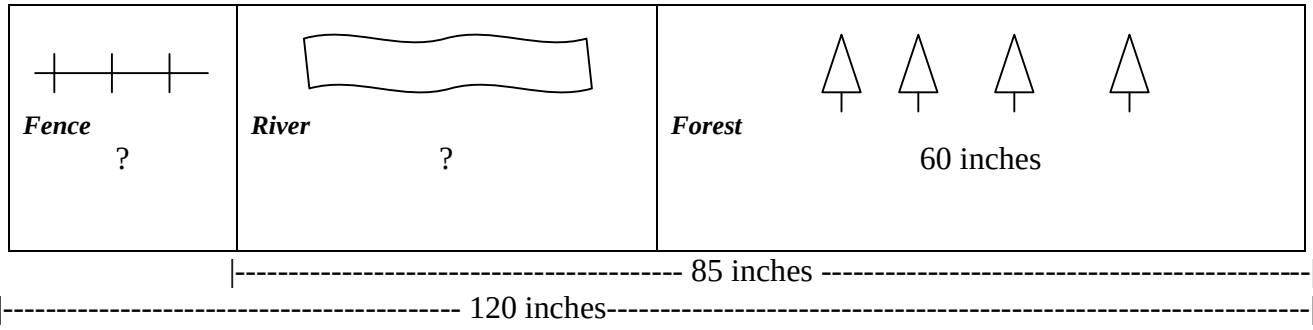
Name _____ Date _____

The Problem

The stage crew for the school play is building a set for a scene that takes place in the forest, by a river, next to a fence. The entire length of the set needs to be 120 inches. The portion of the set that is the forest needs to be 60 inches long. The forest and the river together need to measure 85 inches long. The stage manager wants the crew to mark off the length of each section so the artists know where to draw the fence, the river, and the forest. How long is each section of the set?

Set for School Play (continued)

Solution Strategy: Draw a Picture



Step 1: We are told that the river and the forest have a combined length of 85 inches. We are given the length of the forest, so all we need to do is subtract that number from 85 to get the length of the river.

85 – 60 = 25 inches

Step 2: We are told that the length of the entire set is 120 inches. We already know that the combined length of the river and forest is 85 inches, so all we need to do is subtract that from the total in order to find the length of the fence.

120 – 85 = 35 inches

Step 3: Now we evaluate the information we have found.

Fence = 35 inches
River = 25 inches
Forest = 60 inches

Step 4: Let's check our answers to be sure that they add up.

35 + 25 + 60 = 120 inches

That's it! They add up.

ANSWER: The sections of the set for the school play need to be the following lengths: the fence needs to be 35 inches, the river needs to be 25 inches, and the forest needs to be 60 inches.

Jillian's Math Test

Name _____ Date _____

The Problem

Jillian got her math test back. She had 10 points less than Joey. Joey's score was lower than Terri's score but 1 point more than Tommy's score. Terri's score was the highest in the class and it was 2 more than Tommy's. Terri got a 95. What was Jillian's score and letter grade? Use the chart below to determine the letter grade.

90 - 100	A
80 - 89	B
70 - 79	C
60 - 69	D
59 and below	F

Jillian's Math Test (continued)

Solution Strategy: Work Backwards

When we use a work backwards strategy, we start with the ending piece of information given in the problem. In this problem, we are given that Terri got a 95 on the test.

95 is Terri's score.

Moving backwards through the problem, we see that Terri's score is 2 more than Tommy's score, so we subtract 2 from 95 to get Tommy's score.

95 – 2 = 93 is Tommy's score.

Continuing backwards through the problem, we are told that Joey's score is lower than Terri's score but 1 more than Tommy's score. We add 1 to Tommy's score to get Joey's score.

93 + 1 = 94 is Joey's score.

We are told that Joey's score is lower than Terri's score so we check to see if that's true. It is true. Terri's score is one more than Joey's. Continuing backwards through the problem, we are told that Jillian had 10 points less than Joey. So we subtract 10 from Joey's score to get Jillian's score.

94 – 10 = 84 is Jillian's score.

That's it! We are looking for Jillian's score. We have determined that it is 84. We look in the chart and see that an 84 is a B.

Now, let's go "forward" through the problem to check our answer. If Jillian's score is 84, we are told that's 10 less than Joey's score, so Joey's score is 94 (84 + 10). Joey's score is 1 more than Tommy's score, so Tommy's score is 93 (94 – 1), and Terri's score is 2 more than Tommy's score, so Terri's score is 95 (93 + 2). That's it! Our answer checks out.

ANSWER: Jillian got a B on the test with a score of 84 points.

Dismissal to Vision & Hearing Test

Name _____ Date _____

The Problem

There are 20 students in Mrs. Adam's class, and they are going to be dismissed from class one at a time to go for a vision and hearing test. The test takes approximately 3 minutes per student and the next student is dismissed as soon as the last student returns. How many students will have been tested after 30 minutes?

Dismissal to Vision & Hearing Test (continued)

Solution Strategy: Make a Chart

Let's make a chart that counts backwards from 30 minutes. This way, when we get to 0, we will be able to easily look up the number of students who have been tested.

Student Being Dismissed for Vision/Hearing Test	Subtract the Testing Time (3 minutes per student)	Time Left until 30-Minute Mark
Student 1	30 minutes – 3 minutes	27 minutes
Student 2	27 minutes – 3 minutes	24 minutes
Student 3	24 minutes – 3 minutes	21 minutes
Student 4	21 minutes – 3 minutes	18 minutes
Student 5	18 minutes – 3 minutes	16 minutes
Student 6	16 minutes – 3 minutes	13 minutes
Student 7	13 minutes – 3 minutes	10 minutes
Student 8	10 minutes – 3 minutes	7 minutes
Student 9	7 minutes – 3 minutes	4 minutes
Student 10	4 minutes – 3 minutes	1 minute
Student 11	That's it!	

Using our chart, we have discovered that after 30 minutes, 10 students have been dismissed and tested and the 11th is currently being tested.

Solution Strategy: Find a Pattern

We know that it takes 3 minutes to test each student. We can use a pattern of counting by 3s to get to the 30-minute mark.

STUDENT	**ELAPSED TIME**
Student 1	3 minutes
Student 2	6 minutes
Student 3	9 minutes
Student 4	12 minutes
Student 5	15 minutes
Student 6	18 minutes
Student 7	21 minutes
Student 8	24 minutes
Student 9	27 minutes
Student 10	30 minutes

ANSWER: After 30 minutes, 10 students have completed the vision and hearing test.

Student Council Meeting

Name _____ Date _____

The Problem

There were 24 student representatives at the student council meeting, plus the 4 officers of the student council. The meeting started right after school (3:30) and was to go until 5:00. Five of the students had to leave at 4:00 to go to soccer practice. After that, 3 students left every 10 minutes until the end of the meeting. How many students were still remaining at the meeting at 5:00?

Student Council Meeting (continued)

Solution Strategy: Make a Table

Let's make a table that shows the number of students at the meeting at various times.

Time	Number of Students at the Meeting	Number of Students Leaving the Room	New Number of Students at the Meeting
3:30	24 + 4 = 28	0	28
4:00	28	28 – 5 = 23	23
4:10	23	23 – 3 = 20	20
4:20	20	20 – 3 = 17	17
4:30	17	17 – 3 = 14	14
4:40	14	14 – 3 = 11	11
4:50	11	11 – 3 = 8	8
5:00	8		

We see that there were 8 students remaining at the meeting at 5:00.

Solution Strategy: Look For a Pattern

We see that we are counting backward by 3s after we subtract the initial 5 students from our total of 28. So, we start at 23 (28 – 5). We know that there are 6 ten-minute intervals between 4:00 and 5:00 (10 minutes * 6 = 60 minutes = 1 hour). So, let's count backward by 3s, starting at 23, 6 times:

23, 20, 17, 14, 11, **8**

ANSWER: There were 8 students remaining at the meeting at 5:00.

6 What Number Am I?

Name _____ Date _____

The Problem

I am an even number between 2 and 50. When you take ½ of me and then subtract 14, you get 6. What number am I?

6 What Number Am I? (continued)

Solution Strategy: Guess and Check

Let's choose an even number between 2 and 50 to start checking. Let's try something in the middle like **24**:

½ of **24** is 12.
12 – 14 = □ 2

That's not it. We are looking for 6. Let's try something a little bigger.
Let's try **30**. It's even and it's a little bit bigger.

½ of **30** is 15.
15 – 14 = 1

That's not it. We are looking for 6. Our guess is still too small. Let's try **40**.

½ of **40** is 20.
20 – 14 = 6

That's it!

ANSWER: The number is 40.