GAP CLOSING

Relating Situations to Mathematical Operations

Junior / Intermediate

Student Book

Module 6

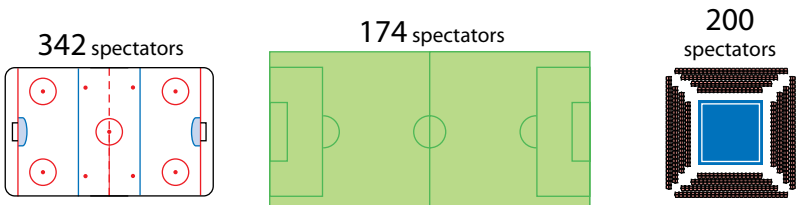
Relating Situations to Mathematical Operations

Diagnostic

Tell what addition, subtraction, multiplication, or division (or combination of them) you would do to solve the problem. Write the numbers and the operation signs you would perform.

You do not have to solve the problem.

There are 342 people at a hockey game. There are 174 people at a soccer game. There are 200 people at a gymnastics competition.



1. **How many more people are at the hockey game than the soccer game?**

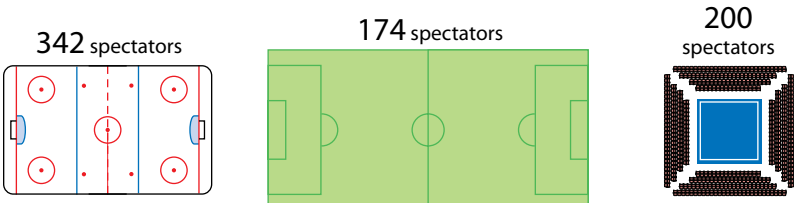
2. **How many more than 400 people are there at all the events?**

3. **There are twice as many people at a speed skating event as at the soccer game. How many people are at speed skating?**

4. **The people at the hockey game are sitting in rows of 9 seats. How many rows would that number of people fill?**

5. **The hockey arena can hold 400 people. How many more people could be seated at the hockey game?**

6. **43 people left the hockey game right before it ended. How many people were still watching the game?**



7. People left the gymnastics competition in groups of 5. How many groups left?

8. If the 200 people at the gymnastics competition each paid $2.50 for a snack, how much money was collected?

9. If all tickets cost the same and $2,394 were collected from the hockey fans, how much did each ticket cost?

10. The soccer field is 95 m by 60 m. What is the area of the field?

11. Another soccer field was 7500 m^2 in area. If it was 100 m long, how wide was it?

12. At the soccer game, they were selling 3 kinds of snacks and 4 kinds of drinks. How many combinations of snacks and drinks were available?

13. At a soccer game, there were 8 junior teams playing, each with 9 players on them. How many players were there?

14. If there were 8 junior teams with 9 players each and 6 senior teams with 11 players each. How many players were there?

15. All the people at the hockey, soccer, and gymnastics events got together. They each gave $2 to the sports league. The league divided the money up equally among the three sports. How much would each sport get?

Recognizing Subtraction Situations

Learning Goal

- **connecting the various meanings of subtraction to real-life situations.**

Open Question

Create 3 problems where you would subtract 1000 – 389.

Only one of the problems can ask how much is left.

What makes each one a subtraction problem?

Think Sheet

We can use subtraction in different situations.

Take away: Sometimes we take something away and want to know what's left.

For example, if there are 503 students in a school and 12 of them are absent, 503 – 12 tells how many are present.

We write 503 – 12 to tell how much is left, NOT 12 – 503.

We might know how many are present and have to figure out how many are absent.

For example, if 503 students are in the school, and we know that 478 are present, 503 – 478 tells how many are absent.

Comparison: Sometimes we want to know how much more one thing is than another; we call that a difference.

For example, if there are 503 students in one school and 412 in another, then 503 – 412 tells how many more students there are in the first school.

How much more is needed: Sometimes we have a certain amount, but need more and we want to know how much more.

For example, if a school can hold 503 students, but there are only 475, then 503 – 475 tell how many more students the school can hold.

If we are going on a 300 km trip and we've gone 189 km, 300 – 189 tells how much farther we have to go.

How big the other part is: Sometimes we know how many are in an entire group and in part of the group and we want to figure out the size of the other part of the group.

For example, if there are 503 students in a school and 302 students are boys, 503 – 302 tells how many are girls.

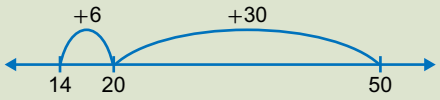
Every subtraction question can also be solved by adding.

For example, suppose there are 50 students in a tournament and 14 of them left. We want to know how many students are still there.

We could calculate 50 – 14 by figuring out how much to add to 14 to get to 50. The amount we add tells how many students could still play.

If 14 + ☐ = 50, then ☐ = 50 – 14.

We could figure it out by adding 6 to get to 20 and then another 30 to get to 50.



So a subtraction problem could be thought of as an addition problem, too.

1. Circle the letters for the problems that can be solved by subtracting. Which numbers would you subtract from which?

   a) If a container holds 325 pennies and you have 400 pennies how many pennies won't fit in the container?

   b) How much farther do you have to go if you have gone 325 km, but want to go 400 km?

   c) Andrea's book has 150 pages. She has 70 pages left to read. How many pages has she read?

   d) How many groups of 325 are in 400?

   e) It takes 2.5 hours to cook a turkey. It's been cooking for 1.2 hours. How much longer does it have to cook?

   f) How many groups of 42 are there in 210?

2. What makes each of these problems a subtraction problem?

   a) Two schools together raised $1500 for a charity. One of the schools raised $925. How much did the other school raise?

   b) A store was selling shirts for $8.99. It reduced the price by $2.50. How much is it charging for a shirt now?

   c) Amy watched 200 more minutes of TV than Leah. If Amy watched 350 minutes, how many minutes did Leah watch?

3. Write a subtraction equation or number sentence and an addition equation or number sentence you could use to solve each problem in Question 2.

4. There are two packages of buttons. One package has 320 buttons. The other package has 35 buttons fewer. How many buttons are there altogether?

   Is this as a subtraction problem or an adding problem? Tell your reasons.

5. Jack had 212 hockey cards. Ian had 130 cards.

   Finish the problem so that it is a subtraction problem.

6. Sharina was playing a video game. She had 142 points. Then she made a move and gained 17 points. She lost 12 points on her next move. Then she lost 18 points on her next move. You want to figure how many points she has now.

   How would you use subtraction to help you solve this problem? How many subtractions would you do?

7. What hints can you use to decide if a problem requires subtraction to solve it?

Recognizing Multiplication Situations

Learning Goal

- connecting the various meanings of multiplication to real-life situations.

Open Question

Create 3 problems where you would multiply 3 × 40.

Only one of the problems can say that there are 3 groups of 40.

What makes each one a multiplication problem?

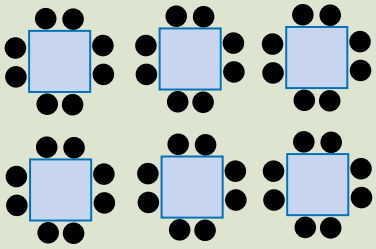
Think Sheet

We can use multiplication in different situations.

Counting equal groups: Sometimes we want to know how many there are in all when there are a lot of groups that are the same size.

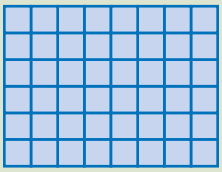
The groups could be arranged in many different ways.

For example, if there are 6 tables with 8 people at a table, there are 6 × 8 people.



If the groups are different sizes, we might need to use addition, too. For example, if there are 4 tables with 8 people and 2 tables with 6 people, we would add 4 × 8 + 2 × 6.

Area: Sometimes we want to calculate the area of a rectangle. If it has a length of 8 units and a width of 6 units, we can multiply 6 × 8. That's because there are 6 groups of 8 squares



Combinations: Sometimes we want to know how many ways there are to combine items in one group with items in another group.

For example, if there are 3 kinds of ice cream cones and 6 flavours of ice cream, 3 × 6 different treats can be created. That's because there are 3 groups of 6, one group for each kind of cone.

Rates: If we know how much one item costs or the measurement of one item, we can multiply to find the cost or the measurement of several of those items.

For example:
If a stamp costs 57¢, then 6 stamps cost 6 × 57¢. That is because there are 6 groups of 57¢.

If Aiden has 200 mL of juice and Kelly has 3 times as much, then 3 × 200 tells how many millilitres Kelly has. It is like having 3 groups of 200 mL.

1. Circle the letters for the problems that can be solved by multiplying.

   a) There were 200 students in Anne's school and 423 students in Mai's. How many students were there in both schools?

   b) There were 28 students in each class in Miguel's school. How many students are there in 6 classes?

   c) Andrea's book has 150 pages. She reads 25 pages each night. How long will it take her to finish the book?

   d) One brand of juice costs twice as much as another brand. If the more expensive juice is $2.40, how much does the less expensive juice cost?

   e) How many days are there in 25 weeks?

   f) A soccer field is 90 m long and 45 m wide. What is the area of the field?

2. What makes each of these problems a multiplication problem?

   a) Tara knits 35 minutes a day. How many minutes does she knit in a month?

   b) Rebecca has 3 shirts and 2 skirts. How many outfits can she make?

   c) Aaron saves $25 a week. He decides to start saving twice as much a week? How much will he save in a year at the new rate?

3. Write a multiplication equation or number sentence you could use to solve each question in Question 2.

4. How could you change Question 2a so that it isn't a multiplication problem anymore?

5. 5 cans of tuna each cost $1.17. Two loaves of bread each cost $2.12. How much was the bill?

   Would you call this problem a multiplication problem or an addition one? Tell your reasons.

6. Amelia's pattern calls for 2 metres of fabric.

   Finish this problem so that it is a multiplication problem.

7. What hints can you use to decide if a problem requires multiplication to solve it?

Recognizing Division Situations

Learning Goal

- connecting the various meanings of division to real-life situations.

Open Question

Create 3 problems you could solve by calculating 120 ÷ 6.

Use different types of problems.

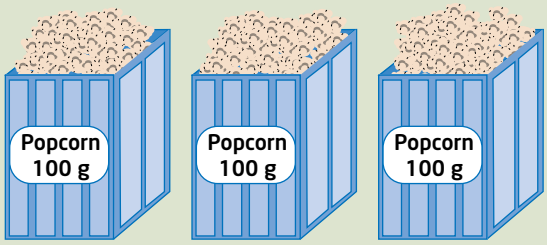
What makes them division problems?

Think Sheet

We can use division in different situations. In every situation, there are always equal groups.

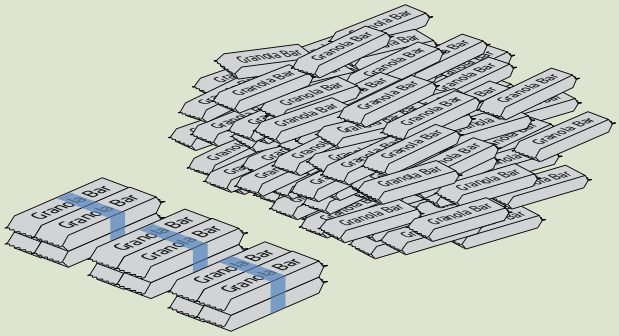
Sharing: If 3 people share 300 g of popcorn, each one gets 300 ÷ 3 grams.

We divide the whole 300 g into 3 equal groups to get each person's share.



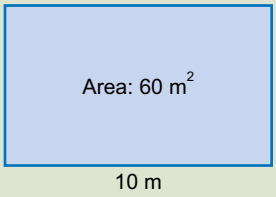
Creating equal groups: If we want to know how many packages of 4 granola bars we can make with 300 granola bars, we can calculate 300 ÷ 4.

We divide the whole 300 into equal groups, with 4 in each.



Area: If we know the area of a rectangle and its length, we can divide to find the width.

For example, if the area is 60 m^2 and the length is 10 m, the width is 60 ÷ 10 m.



Rates: Sometimes we know a total cost, but we want to know how much one item costs.

For example, if 4 boxes of raisins cost $2.60, we divide $2.60 ÷ 4 to get the price of one box. We are "sharing" the price among the four boxes.

We can solve any division problem by multiplying.

For example, if 3 people share 120 g of yogurt, we could solve 120 ÷ 3 or we could solve 3 × ☐ = 120.

There are 3 groups that together make 120.

1. Circle the letters for the problems that can be solved by dividing.
   a) There are 8 bags of apples. Each has 8 or 9 apples in it.
   b) The students who came out for soccer have to be assigned to one of 12 teams. The teams need to be equal in size.
   c) Andrea's book has 150 pages. She reads 25 pages each night. How many nights will it take her to finish?
   d) The cost of 3 jars of spaghetti sauce is $8.20. How much does each jar cost?
   e) Jake and his sister are sharing 120 newspapers. Jake will get twice as many as his sister. How many will each get?
   f) A room has an area of 12 m^2. It is 3 m long. How wide is it?

2. What makes each a division problem?
   a) 153 people were transported from the airport in 17 small buses. The buses all held the same number of people. How many did each bus hold?

   b) Each box holds 20 books. How many boxes are needed to ship 220 books?

   c) Kevin divided 444 g of meat into 6 hamburgers. How much meat was in each burger?

3. Write a division question and a multiplication question you could use to solve each problem in Question 2.

4. Change one part of Question 2b so that it is not a division problem.

5. A heart beats 360 beats in 5 minutes. How many beats does it beat in 2 minutes?

   Is this a division problem? Tell your reasons.

6. There were 300 pencils …
   Finish the problem so that it is a division problem.

7. What hints can you use to decide if a problem requires division to solve it?