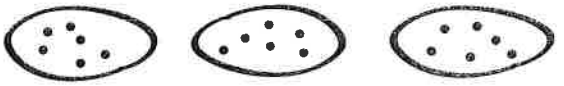
Quick Counting

These early multiplication activities are teacher-directed but interactive. They help you demonstrate to students that multiplication is an easier way of adding and thus an easier way of counting.

ACTIVITY 1 Counting Sets

For this activity, draw sets of circles, ovals, or boxes on the board. Fill in each set with the same number of dots. Have students write the number of objects they see in each set and then in all the sets. Alternate by having students draw the number of sets you dictate. You may wish to have the class work independently at their desks with one volunteer working on the board.

Example: On the board, draw three ovals filled with six dots. Have the class copy the models on their paper.

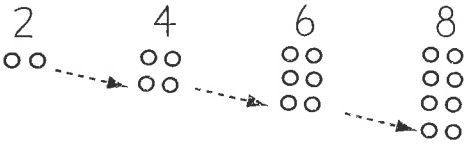


Ask students how many dots there are all together. Follow up with other possible answers. For example, ask: *How many dots are there in all? How did you figure it out?* Possible answers: *I counted them all and found there were 18. I added 6 plus 6 plus 6 and got 18. I multiplied 3 times 6 and knew it was 18.*

ACTIVITY 2 Counting by Multiples

MATERIALS
Counters

Have students skip count, or count by multiples, and then have them represent that counting with counters. Begin by having students count by twos to 18. Then have them count aloud again using counters every time they say a multiple. When students say "two," they should display two counters. When they say "four," they should add two more counters to the previous two. Continue in this mode until students have counted to 18. See the example below.



Next, repeat with counting by multiples of five. Have students display five more counters each time they say a multiple of five. Continue this activity by counting by multiples of other numbers. Select a counter that reflects the value of the number being counted to reinforce the concept. Consider using a heart die cut for two or a nickel for five.

Draw, Add, and Multiply

Demonstrate the meaning of multiplication by teaching students how they can write a multiplication combination as a shortcut for addition of repeated numbers.

ACTIVITY 1 Repeated Adding Becomes Multiplying

On the board, show 3 x 5 = 15 as an array.

* * * * *
* * * * *
* * * * *

Explain that as repeated addition, you would write the information as 5 + 5 + 5 = 15. As a multiplication shortcut, you would write the equation as: 3 x 5 = 15.

Have students make their own drawings on the board. Have them explain and write:

1. How the information can be written as repeated addition
2. How the repeated addition example can be written as a multiplication fact

ACTIVITY 2 Writing Multiplication Facts for Addition Problems

Have students write a multiplication story problem. Then have them write an addition sentence for that story problem. Next, have them write the matching multiplication sentence.

Examples:

A. James has two sandwiches for lunch. Each sandwich is cut into four pieces. How many pieces does James have?

4 + 4 = 8 2 x 4 = 8

B. There are five flowers in each of three vases. How many flowers are there?

5 + 5 + 5 = 15 3 x 5 = 15

C. There are six cows in the field. How many legs would you see?

4 + 4 + 4 + 4 + 4 + 4 = 24 6 x 4 = 24

Tactile Multiplying

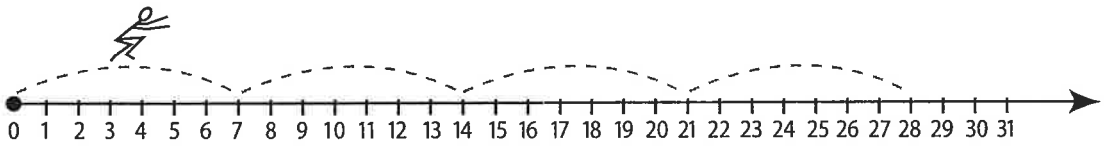
The purpose of these activities is to help students relate two familiar counting tools—the number line and coins—to multiplication.

ACTIVITY 1 Get the Facts on the Number Line

Give students problems that they can demonstrate on the number line.

Example: Jane is very athletic. She can broad jump 7 feet. How far would she be if she took 4 jumps?

MATERIALS
Large number line for modeling, individual student number lines



ACTIVITY 2 Counting, Adding, and Multiplying by 10

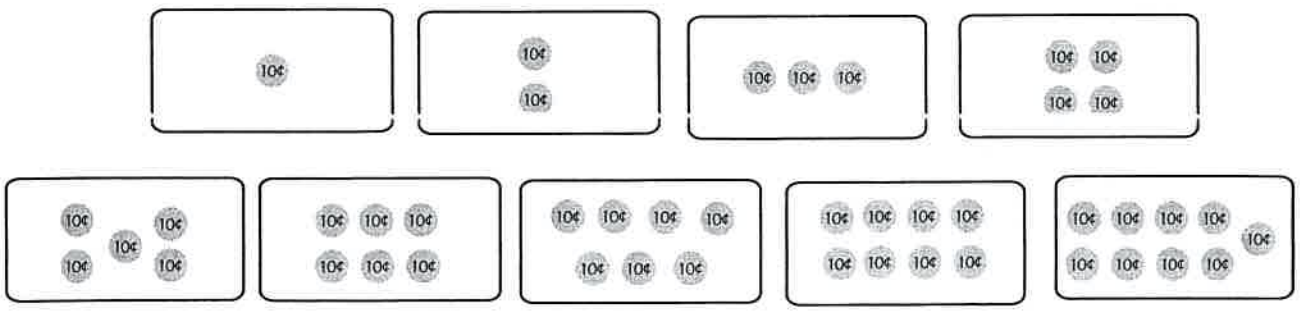
Demonstrate that when we count by tens to determine the value of a number of dimes, we are multiplying by 10. For example, show students three dimes and say: *We can explain what we see as three dimes or 30 cents—10, 20, 30. We are actually saying that 3 times 10 cents is 30 cents.*

MATERIALS
9 dimes per student and 9 prepared index cards (paste or draw between one and nine pictures of dimes on each card)

Have students use dimes to demonstrate other examples. Then use the cards you've made to have students practice multiples of 10. Begin by having students identify the number of dimes on each card in sequence. When finished, have students count by tens. Ask how much money is shown on each card, in sequence.

Alternately, mix up the cards and ask how many dimes and how much money are on each card. Then give students practice multiplying by 10 without the cards. Ask questions such as: *How much is 3 dimes? How much is 5 dimes? How much is 3 times 10? How much is 5 times 10?* Write the number sentences on the board as you discuss.

Variation: Using nickels, model for students the meaning of multiplication by 5. For example, show that seven nickels is the same as 7 x 5 = 35.



Calculating Number Sentences

Help students understand multiplication as repeated addition by using a calculator and writing story problems.

ACTIVITY 1 A Calculator with a Broken Key

MATERIALS
Calculator for each student or pair of students

Begin with a teacher-directed activity so that the students get the routine of how to use a calculator with an imaginary broken key. Begin by saying: *First, let's pretend that our calculators have a broken key. The multiplication key* [x] *doesn't work. Let's find out how much 5 x 4 is without using this key.*

Have students predict how they will be able to multiply on a calculator with a broken key. After your discussion, lead into the following calculator activity. Lead students through the exercise using the following cues:

1. Clear your calculator.
2. Enter 4. Then press the addition key [+] .
3. A 4 has been entered into your calculator and it should now appear on your screen.
4. Press the equals key [=] .
5. What number is shown on your screen? (4)
6. Now, press the equals key [=] again.
7. What number appears on your screen? (8)
8. How many times did we press the equals key [=] ? (2)
9. What number is on your calculator? (8)
10. Hmm! How much is two sets of four? (8) So, we pressed the equals key [=] two times and we get two fours added together or an 8.
11. So, what happens if we press the equals key [=] for the third time? (We get 12, or three fours added together.)

Using this approach, remind students that the number of times they press the equals key [=] is the same as the *multiplier*, or the number of times a number is added to itself. As work continues, emphasize that multiplication is repeated addition.

ACTIVITY 2 Number-Sentence Story Problems

Have students write a story problem for multiplication facts so that they begin to associate the meaning of the numbers with real events.

Example: 4 x 6 = 24

How many bananas would you have if you had four bunches with six bananas in each bunch?

Try these: 2 x 5 = 10 6 x 3 = 18 8 x 5 = 40 4 x 7 = 28 9 x 5 = 45 4 x 8 = 32

Variation: Have students create booklets with illustrations of multiplication facts.

Picturing the Facts

Teach students to relate arrays to multiplication facts. The goal is to have students visualize groups and multiple groups and learn to see patterns. Students should become more familiar with the function of the multiplier and the multiplicand.

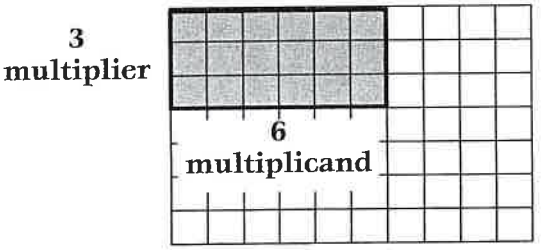
MATERIALS
Student copies of Centimeter Squares (page 156) or graph paper

ACTIVITY 1 Meaning of the Multiplier and Multiplicand

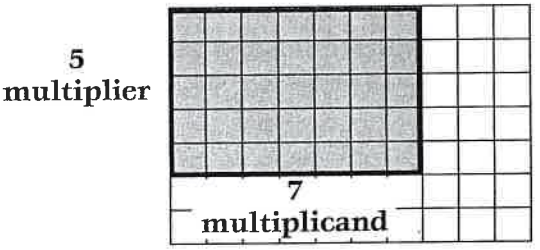
To begin, prepare arrays on the board or on chart paper. As students look at each one, ask them to give the multiplication fact that the array represents. Have students point out the multiplier, or the number of sets. Also, have them identify the size of the set, or the multiplicand. Ask: *Which number is the multiplier? Which number is the multiplicand?* See the examples below.

Examples:

3 × 6 = 18



5 × 7 = 35

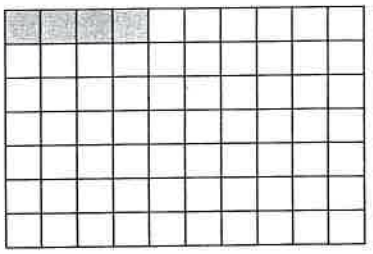


ACTIVITY 2 Multiplication Tables in Patterns

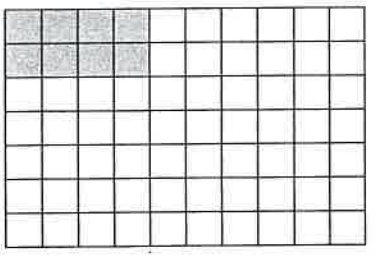
Demonstrate the meaning of multiplication and the progressive pattern of the sets as the multiplier is increased. Model each table (1–9) on graph paper.

Example: The 4s Table

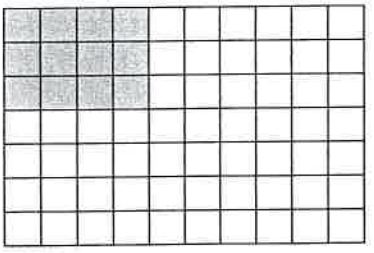
1 × 4



2 × 4



3 × 4



Extension: Have students make a set of drawings for each multiplication table. When all are completed and colored, the collection can be used for a bulletin board.

Commutative Property of Multiplication

The purpose of these activities is to demonstrate the commutative property of multiplication. Students will see that different arrays for the same product result in the same amount. They will learn that a product is a function of the number and the size of groups.

ACTIVITY 1 Two Groups of Three Versus Three Groups of Two

Ask: *Which is more: two groups of three or three groups of two?* After students have discussed the question, have them use counters to make an array for each grouping.

MATERIALS
Counters

Example

2 groups of 3
or 2 × 3

3 groups of 2
or 3 × 2

Give students practice. Assign the following for students to demonstrate with counters:

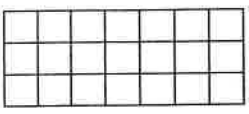
1. 5 groups of 4 and 4 groups of 5
2. 6 groups of 8 and 8 groups of 6
3. 7 x 4 and 4 x 7
4. 3 x 6 and 6 x 3
5. 9 x 4 and 4 x 9
6. 2 x 7 and 7 x 2

ACTIVITY 2 Hurray for Arrays

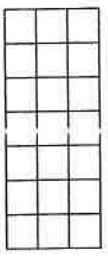
Have students prepare arrays for a number of multiplication facts. Students may color them and then cut them out. These arrays may later be mounted on posterboard to hang around the room. Ask students to turn their arrays so that they show a different number of rows, which proves that the total amount remains the same.

MATERIALS
Student copies of Centimeter Squares (page 156) or graph paper, colored pencils, scissors, posterboard (optional)

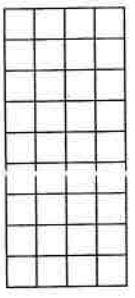
Examples



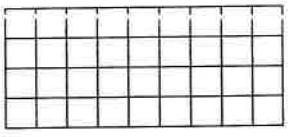
3 × 7



7 × 3



9 × 4



4 × 9

Turnarounds

These activities further reinforce the commutative property. Students internalize the strategy of reversing the multiplier and multiplicand. Teach students that if they know one multiplication fact, then they also know the reverse, or the turnaround.

ACTIVITY 1 Pickle in the Middle

The game requires four players. One player is the dealer. The dealer shuffles the flash cards and then selects an unseen card, which will be known as the Pickle in the Middle, and places it facedown in the middle of the players. The dealer deals the rest of the cards.

The object of the game is to collect pairs of matching facts. Point out that all the cards they are holding, except one, have mates. The player at the end of the game who is holding the mate to the Pickle in the Middle loses the game.

MATERIALS
Set of 40 multiplication flash cards, which includes 20 multiplication facts and their reversals with their answers. Make the flash cards on index cards as shown below.

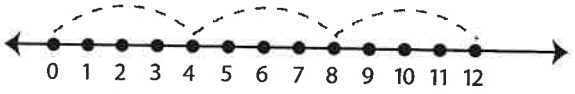
4 × 5 = 20	5 × 4 = 20	8 × 6 = 48	6 × 8 = 48	5 × 3 = 15	3 × 5 = 15	9 × 4 = 36	4 × 9 = 36	6 × 7 = 42	7 × 6 = 42	8 × 5 = 40	5 × 8 = 40

After the cards are dealt, each player lays out all his or her matches and keeps the rest of his or her cards hidden in hand. Starting with the player to the dealer's left, students get to pick a card from the hand of the player to the left in the hopes of making a match. If a match is made, the pair is placed on the table. The game continues in this manner until one player ends up with only the mate of the Pickle in the Middle in hand. He or she takes a bow, announcing "I am the Pickle in the Middle!" That player shows the flash card and turns over the Pickle in the Middle for all to see.

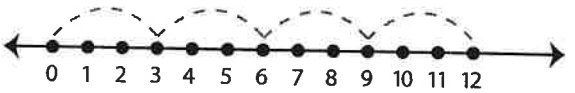
ACTIVITY 2 All Is Fine on the Number Line

Use the number line to help students experience the commutative property, which you can call the Turnaround Strategy. Demonstrate on the number line that the following pairs are equivalent:

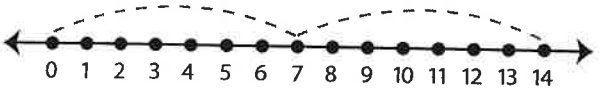
MATERIALS
Number lines for all students



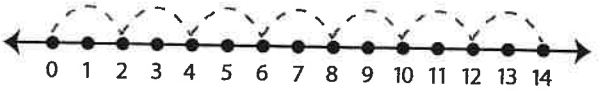
$3 \times 4 = 12$



$4 \times 3 = 12$



$2 \times 7 = 14$



$7 \times 2 = 14$

Practicing the Distributive Property

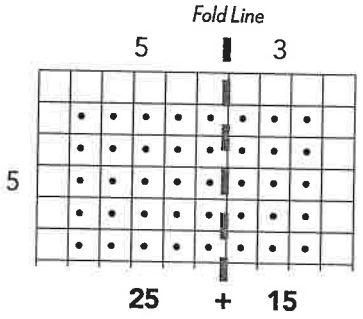
By coloring and folding grid paper, students can make a simple model that shows how larger multiplication facts can be broken down into a variety of smaller ones.

ACTIVITY Breaking Down the Equation

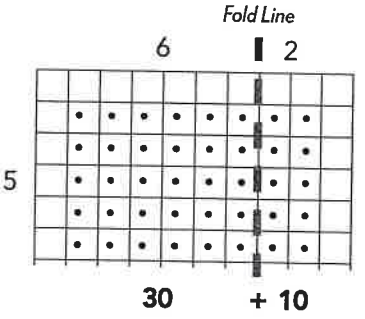
Part 1: Distribute sheets of grid paper and have the class make an array of 5 x 8 as shown in the drawings below. Direct students to fold their array to demonstrate at least three different ways the distributive property can be applied to 5 x 8. For example, the array can be folded to show

MATERIALS
1-inch grid paper

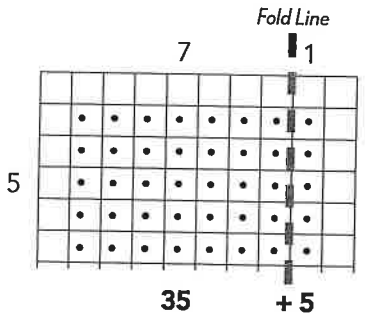
A. 5 x (5 + 3) or (5 x 5) + (5 x 3) = 25 + 15



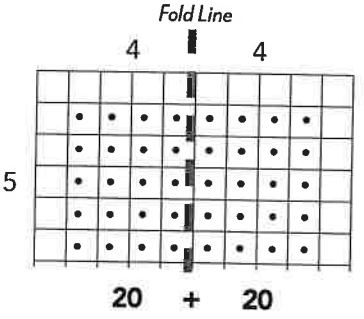
B. 5 x (6 + 2) or (5 x 6) + (5 x 2) = 30 + 10



C. 5 x (7 + 1) or (5 x 7) + (5 x 1) = 35 + 5



D. 5 x (4 + 4) or (5 x 4) + (5 x 4) = 20 + 20



Part 2: When the arrays are complete, illustrate or have students model the distributive property with a drawing for each example below. Be sure to discuss how each can be broken down and expressed as a set of smaller multiplication facts, and finally as an addition equation.

Examples

1. 6 x 8 The 8 can be broken into 5 + 3 to create the equation (6 x 5) + (6 x 3) or 30 + 18. To add this mentally, think: *Break down 18 into 10 + 8. Then add 30 + 10 + 8 or 48.*
2. 3 x 5 3 x (2 + 3) = (3 x 2) + (3 x 3) = 6 + 9
3. 8 x 7 8 x (3 + 4) = (8 x 3) + (8 x 4) = 24 + 32
4. 3 x 7 3 x (4 + 3) = (3 x 4) + (3 x 3) = 12 + 9
5. 7 x 6 7 x (5 + 1) = (7 x 5) + (7 x 1) = 35 + 7

Multiplication Concentration

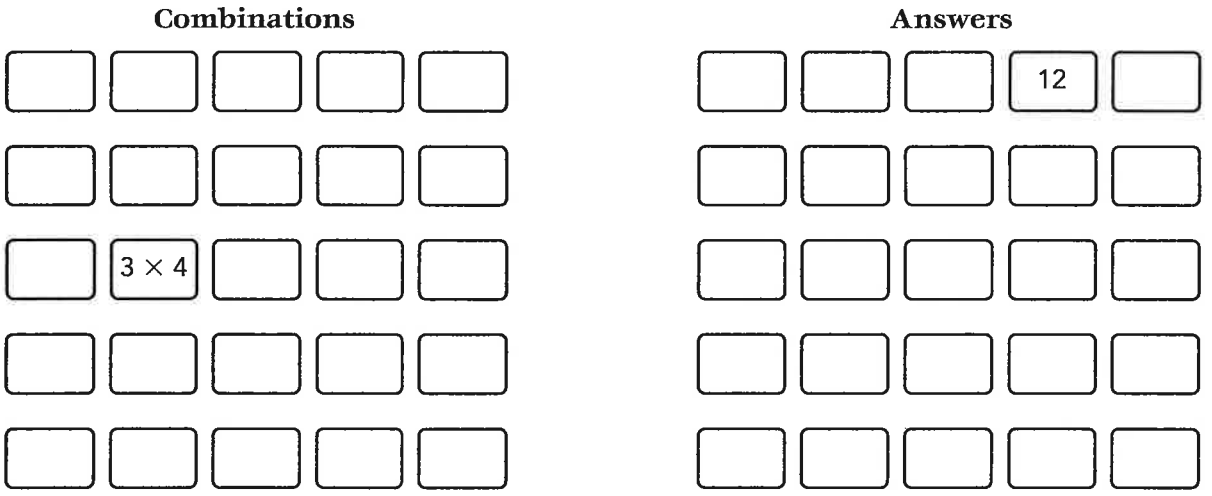
Give students a chance to practice their multiplication facts in a game. You can lead it as a whole-group or small-group activity.

ACTIVITY Matching Your Facts

MATERIALS
25 sticky notes with multiplication combinations written on each note's sticky side, 25 sticky notes with corresponding answers also written on the sticky side

On the left-hand side of the board, place 25 sticky notes with multiplication combinations, facedown. Place the 25 sticky notes with answers on the right-hand side of the board, facedown. Lead students in a game.

The object is for players to match the answer on the right side of the board with the corresponding multiplication combination on the left side. Students take turns turning over first a combination note and then an answer note. If the two notes match, then the student keeps the pair and tries again. If they don't match, the notes are turned over and put back in place. Another student takes a turn. Play continues until all the notes are paired up. The winner is the player with the most matches.



Variation: Play Jeopardy-style Concentration. On the right side of the board, all of the answers are exposed. Students must find the combination that matches the answer.

Multiplication Games

These games make it fun for students to practice their multiplication facts together and build automatic recall.

ACTIVITY 1 Fishing for Facts

MATERIALS
Multiplication number combinations written on slips of paper, fish bowl or container

The fish bowl becomes the source of random selection of combinations to be used in many games presented in other drill activities that rely on number facts. Depending on the activity, the teacher, student, or team fishes for a fact by pulling out a multiplication number combination. The "fisherman" reads the combination to the class and calls on a student to give the product. You can also use the fish-bowl facts by walking around the room and stopping randomly at desks to challenge students with a problem when you have a few spare minutes and want to give students a quick quiz.

ACTIVITY 2 Shout Out!

MATERIALS
Deck of playing cards (tens and face cards removed)

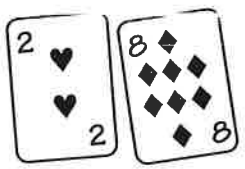
The object of the game is to be the first player to shout out the correct product. A dealer turns over two cards from a prepared deck of playing cards. The first player to shout out the correct product keeps the two cards. In case of ties, the cards return to the bottom of the deck and the game continues. The winner is the player with the most cards at the end of the game.

ACTIVITY 3 I've Got More!

MATERIALS
Deck of playing cards (tens and face cards removed)

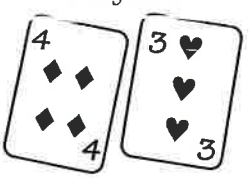
The object of this two-player game is to have the higher product and to win as many playing cards as possible. Each player gets half a prepared deck of playing cards. On each turn, players turn over two cards from their deck. Players all announce the product of the combinations they've turned over. The player with the highest product wins the other players' cards. In case of ties, the cards are returned to the bottom of the deck and the game continues. If either player gives a wrong answer, all four cards are returned to the bottom of the deck.

Player 1



Winning Hand

Player 2



Fun and Fast Math Facts

These games are designed to motivate students and help them develop speed with multiplication facts.

ACTIVITY 1 Tag-Team Multiplication

MATERIALS
Multiplication flash cards

The object of the game is to be the first team to give correct answers to the multiplication combinations. To begin, divide the class into two teams. (If there is an unequal number, let the team with fewer players select a player to take an extra turn after the rest of the team has played.) The two teams line up so that there is enough distance between the team and the board. Put two piles of flash cards facedown on a desk in front of the board—one for each team. One player from each team rushes to pick up a flash card, shows it to his or her team, gives the answer, places the card in an "answered" pile, and then hurries back to tag the next person in line. If an incorrect answer is given, the player has to choose the next flash card and the missed flash card is returned to the bottom of the deck. The game continues until everyone on the team has had a chance to answer. The first team to finish wins. As many as four teams can play at once.

ACTIVITY 2 B-I-N-G-O

MATERIALS
Teacher-made 25-space bingo game boards for each student, markers (counters, coins, buttons, or objects can be used as bingo markers), flash cards

Distribute blank bingo boards and ask students to fill in 24 of the 25 spaces with different multiplication products. Have them leave the center as a FREE space. Turn over the multiplication flash cards, announcing one multiplication combination at a time. Tell students to put a marker on their bingo card when they find the number that is the product of the flash card you show. A winning card has 5 marked squares across, down, or diagonally. Give small prizes as rewards for winning cards.

B	I	N	G	O
45	36	20	81	32
54	10	14	12	6
8	2	Free	63	30
72	56	9	40	24
16	21	30	15	29

Variations: These alternative rules provide more ways to use the bingo boards students have created.

Four Corners: The first one to fill in each of the four corners must call out, "Four Corners!"

X-MO: The first to fill in the two diagonal lines, making a large X, must call out, "X-MO!"

Small-Group and Independent Drills

These quick activities can serve as a warm-up or review activity or you can use them as a motivational multiplication drill at any time of the day when you have a few minutes.

ACTIVITY 1 Show and Tell

Distribute strips to students or have students fold and cut or tear a piece of paper into eight pieces. Start the drill by showing a flash card or holding up two playing cards to show a multiplication combination. Students write the correct product on a paper strip. When you give a signal, students hold up their answers. When appropriate, have students tell what strategies they used. You may vary the game by having students write a number sentence to include the factors and product.

MATERIALS
8 strips of paper for each student or one 8½- by 11-inch scrap paper for each student, pens, flash cards or playing cards (tens and face cards removed)

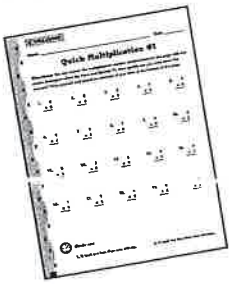
ACTIVITY 2 Put Out Your Hands

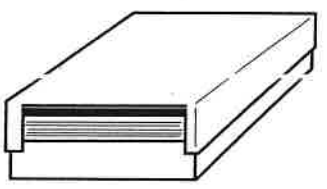
Assign two players and a judge to each group of students. Players score points by giving the answer to a multiplication combination. The combinations are made by the two players. The players put their hands behind their backs. The judge says "Go!" The players hold out their hands with one to nine fingers showing. The number of fingers shown by each player becomes a factor. Each player must quickly multiply the two factors and call out the product. The first player to answer correctly, as decided by the judge, scores a point.

ACTIVITY 3 Free-Time Box

Give students with extra time the opportunity to practice their multiplication facts independently. Try closing the box and cutting an opening just large enough for students to reach in and take a page without seeing it. Students must reach into the box and select the top sheet to complete as a free-time activity. Have students work on the reproducible page and leave it in a specific place to be corrected or returned.

MATERIALS
Box large enough for holding 8½- by 11-inch pages, past practice and drill reproducible pages





Clap, Rap, and Card Review

Setting drills to a rhythm and creating a personal challenge are both great ways to motivate students to practice for mastery.

ACTIVITY 1 Clap, Clap, Snap, Snap

This activity uses a simple rhythm: Clap, clap, snap (right hand), snap (left hand). Practice this four-beat rhythm with your class. When they catch on, begin the drill.

Model the rhythm: clap, clap, snap, snap. Clap twice and say "Six sevens" as you snap. (Do a right-hand snap when you say "six" and a left-hand snap when you say "sevens.") Have students respond with the answer. They should clap twice and say "forty-two" as they snap. (They say "forty" as they snap their right hands and "two" while snapping their left hands.) Continue by giving other multiplication factors and having students clap and snap the products.

Variation: Have the class stand and form a circle with you. Begin the rhythm with the group. The student to the left of you must answer the multiplication combination given in rhythm. If the student answers correctly, he or she claps and snaps a different multiplication combination to give to the next student, who responds in rhythm. The drill continues. Students who give a wrong answer or who do not keep up the rhythm must sit down and serve as judges. The winner is the last student standing.

ACTIVITY 2 Run Through the Deck

MATERIALS
Multiplication flash cards

This activity encourages quick and accurate recall of designated number facts. Put together a deck of specific flash cards (such as the most challenging facts, a table of facts, or facts that employ a certain strategy). Assign the deck to a pair of players. The goal is to have the players go through the entire deck free of errors. One partner flips the cards while the other answers. Should a player make a mistake, the partner tells him or her the correct answer and all the cards are returned to the deck. The other player shuffles and starts flipping the cards again for his or her partner. Players continue in the same manner until both have gone through the deck without one error.

ACTIVITY 3 Fix-It Tips

The purpose of this activity is to provide individual students or groups of students a way of fixing troublesome multiplication facts and committing them to memory. Choose from activities in this book, including

1. Mastering Troublesome Facts (page 94)
2. Rhymes and Riddles (page 95)
3. You Can Beat the Facts (page 95)

Pairs and Teams Drill Facts

These activities make a game of recalling multiplication facts, as well as encourage teamwork.

ACTIVITY 1 Card Shark

All the cards are dealt to the two players, facedown. Each player turns over one card. The players must multiply the two numbers that appear on the cards. The first player to give the correct answer collects the opponent's card. The joker has the value of zero and the aces equal one. At the end of the match, the winner is the player with the most cards. You may wish to assign a judge to decide the winner in each match.

MATERIALS
Deck of playing cards, including jokers, with tens and face cards removed

ACTIVITY 2 Champion Traveler

Have students line up around the room. Pair the first student with the second student. Present a flash card to the pair. The first person to give the correct answer wins. The winner moves down the line to the next student. Quiz this pair with a new flash card. The game continues in this way. Meanwhile, a scorekeeper keep tracks of how many students each traveler has passed. The Champion Traveler is the one who passes the most students.

MATERIALS
Multiplication flash cards

ACTIVITY 3 Take Over

The object of the game is for one team to take over the other team. Divide the class in half and form two lines. The first person in each line is presented with a flash card. The first person to respond with the correct answer wins. When that player wins, he captures the opposing player, who must join the winner's team. Both the winner and loser go to the end of the winner's line. The game continues in the same way as the line moves forward. The team that takes over the most players at the end of play (about 10 minutes) is the winner.

MATERIALS
Multiplication flash cards

Mastering Troublesome Facts

Work with students individually and in small groups to review facts they haven't mastered, based on your assessments.

ACTIVITY 1 Multisensory Recall

MATERIALS
Paper, pencil, flash cards for the troublesome facts

The following technique encourages students to take the lead in remembering the facts they haven't yet mastered. It also helps them use several senses as they closely study each fact. Have students follow this procedure:

1. See and Say: Look at the flash card that has the answer on it and say the fact. For example, say, "Three times four equals twelve."
2. Cover up the entire flash card.
3. Write the fact from memory.
4. Compare what you wrote to the fact shown on the flash card.
5. If you wrote the fact correctly, move on to the next card and repeat steps 1–4. If not, make corrections to match the flash card and repeat steps 1–4 with the same flash card until you can do it from memory.

ACTIVITY 2 Remedial Flash Cards

MATERIALS
Index cards or copies of Multiplication Flash Cards (page 159)

Have students create their own set of flash cards for the facts they need to work on. On one side, write the combination and on the other, write the combination and answer. Cut 3 x 5 cards in half, making two 3 x 2.5" flash cards or use the reproducible on page 159. Either students can take the set of cards home or you can keep the cards in class for volunteers, aides, and peers to review with students. Set a time frame for students to study and learn these facts. Do several quick checks along the way to assess students' progress.

ACTIVITY 3 Writing and Illustrating Number-Fact Problems

Have students write story problems using number facts that are difficult for them. Then ask them to illustrate the facts. For example: If a difficult number fact is 7 x 8 = 56, the story problem may be: *For our class picnic, we needed seven packs of hamburger rolls. If there are eight in a package, how many hamburger rolls do we have?* The illustration can show seven packages of rolls with eight in each pack.

Rhythm for Review

For students who have difficulty with fact mastery, using rhyme and rhythm can be very helpful.

ACTIVITY 1 Rhymes and Riddles

Use the examples as springboards to make up rhymes and riddles for facts that are tough for students to remember. Encourage students to make their own mnemonic aids for their target facts. These rhymes and riddles can be used for studying division facts as well.

5, 6, 7, 8—
56 is 7 times 8!

6 met 8 on a date.
When they returned it was
4 minutes to 8.
6 times 8 is 48.

6 and 4
Walked through the door,
Very best friends forevermore.
6 times 4 is 24.

8 sent 9 a funny clue—
It said, "I'm standing in front of you!"
8 times 9 is 72.

4 and 7 got to heaven late
And waited at the gate.
4 times 7 is 28.

7 and 7 got out of line
And swung on a vine.
7 times 7 is 49.

ACTIVITY 2 You Can Beat the Facts

Use a musical beat to teach difficult facts! Focus on a set of facts, such as 7s:

7 and Friends
3 x 7 could barely hum, 3 x 7 is 21
4 x 7 were very late, 4 x 7 is 28
5 x 7 saw bees in a hive, 5 x 7 is 35
6 x 7 said, "I do!" 6 x 7 is 42
8 x 7 danced to a mix, 8 x 7 is 56
9 x 7 screamed, "E-e-e-e-e-e!" 9 x 7 is 63

TIP
For reteaching materials, go back to Chapters 2 to 4 to find the appropriate activities or reproducibles to meet the needs of your students who have facts that have yet to be mastered.

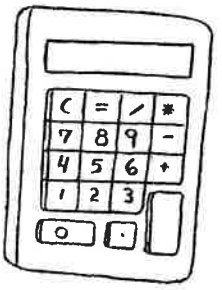
Connecting Subtraction to Division

This activity enables students to see division as successive subtractions of the same number. Students will see how many times a number is contained in the dividend.

ACTIVITY Let's Get to Zero

Demonstrate the activity first, and then pair students to continue the activity as a game. Announce that you are trying to get to zero by finding out how many times a number can be subtracted from another number. Model with the example below. You may wish to continue modeling, using another division combination.

MATERIALS
Calculators and flash cards with division combinations



Example: 12 – 3

Step 1: Clear the calculator.

Step 2: Enter 12.

Step 3: Enter [−].

Step 4: Enter 3.

Step 5: Say: *How many times do you think we need to press* [=] *to subtract 3 from 12 to get to zero?* Have students guess.

Step 6: Say: *Let's try it out.* Press [=] once. Ask: *What number appears on the calculator?* (9) Press [=] again. Ask: *What number appears on the calculator now?* (6) Press [=] for the third time. Ask: *What number appears now?* (3) Press [=] a final time. Say: Look at what number we have now. (0) Ask: *Did you guess correctly how many times you can subtract 3 from 12?*

Step 7: Ask: *How many sets of 3 are in the number 12?* (4) *How did we prove that?* (We used the calculator to subtract again and again.)

Step 8: Ask: *How is subtracting 3 from 12 like dividing 12 by 3?* (In both operations, we are counting how many sets of 3 are in a set of 12.)

Continue in the same manner with another division combination. Have students guess the answer and then test to find out if they are correct. Then have students work in pairs.

Variation: Assign the Test Your Guess reproducible page (page 104) to give further practice with the calculator and reinforce the meaning of division as equal subtractions.

Division With Visual Aids

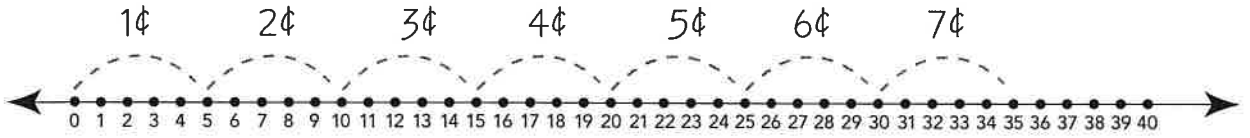
These activities give students more ways of looking at division. The first activity demonstrates how to use a number line to model a division problem. The second activity calls on students to dissect a division equation.

ACTIVITY 1 Division on the Number Line

Demonstrate story problems by showing division on the number line.

MATERIALS
Number lines for individual students or a large display number line

Example:
Darius's father wanted him to save money. He made Darius a deal. He said, "For every five cents you save, I will give you a penny." Darius had already saved 35 cents. How many pennies from his dad has Darius earned so far?



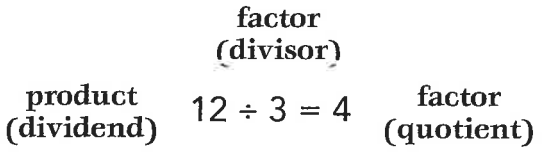
ACTIVITY 2 Number Sentences Speak to Me

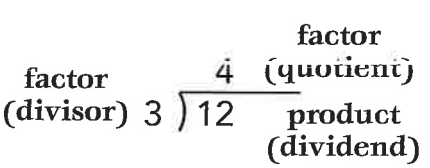
Create the following posters to remind students what the elements of a division sentence stand for. Review the posters with students, making sure that they understand the number of sets presented, the size of the set presented, and the total amount. They should also see how the equation relates to multiplication.

MATERIALS
Posterboard, markers

Have students make up a story problem that goes along with the numbers used in the poster. Then ask the following questions.

1. Which number tells how many there are in the total? (The dividend shows the total.)
2. Which number tells you the number of groups? (Either the divisor or quotient can tell the number or size of the group. It depends on the problem.)
3. Which number tells you the size of the group? (See the answer for number 2.)





Picturing Division

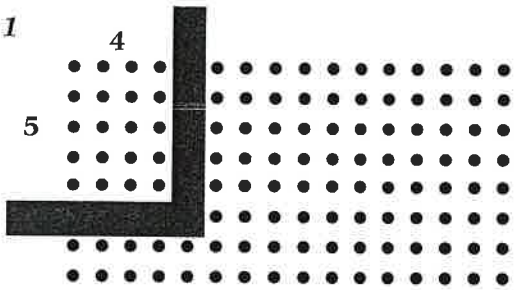
This activity breaks down division equations to help students better understand the concepts of sets and sizes.

ACTIVITY The Big L

Show the grid and use (or have students use) "The Big L" manipulative to select an array. Two different ways to guide the activity are shown below.

MATERIALS
Centimeter Squares (page 156) scanned or made into a transparency; L-shaped cut-out or on-screen manipulative

Example 1



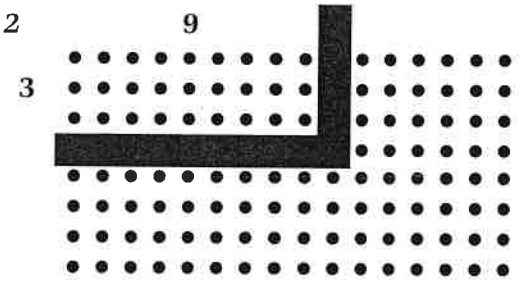
Isolate a given array for students and have them:

A. Identify the number of rows, sets, or groups (5)

B. Identify the size of the set or group (4)

C. Identify the total in the array (20)

Example 2



Have students make an array that shows:

A. A given number of sets or groups or rows (3)

B. A given size of each set (9)

C. A given total (27)

Ask questions to ensure that students understand the meaning of division with arrays. For example, in the first example, you might ask: *In what ways can 20 items be divided evenly?* (5 sets of 4; 4 sets of 5; 2 sets of 10; 10 sets of 2)

Division by Zero

Now that students have gained a basic understanding of division, demonstrate why there is no division by zero.

ACTIVITY Why No Zero?

Students may want to know why there are only 90 division facts when there are 100 addition, subtraction, and multiplication facts. Give students examples to explain that while it is possible to divide into zero (use zero as a dividend), it doesn't make sense to divide by zero (use zero as a divisor). Begin with a problem to put the situation into context.

Example: Compare these two problems and consider a third situation.

A. Our team scored 8 points for the 2 games we played. How many points did we score at each game if we scored the same number of points in each game? (To find the answer, we use $8 \div 2 = 4$. The total number of points divided by the games played is 4.)

B. Our team scored 0 points for the 2 games played. How many points did we score at each game if we scored the same number of points in each game? (To find the answer, we use $0 \div 2 = 0$. It is the total number of points divided by the games played. Conclusion: It is possible to divide into zero, or use it as a dividend.)

C. Could you have a situation in which you have 8 points but played 0 games? (We can't do this. Conclusion: Using zero as a divisor, as in $8 \div 0$, is not done because it doesn't make sense.)

Give students more problems to consider, such as the following:

1. If there are 10 students and they need to join 5 teams, how many students are on each team? (The equation is $10 \div 5 = 2$. That means there are 2 students per team.) Now, take 10 students and put them into 0 teams. (That doesn't make sense since you have students but no teams. So, you cannot use $10 \div 0$.)
2. You have 15 flowers and you put 5 of them into each vase. How many vases would you need? (You set up the equation as $15 \div 5 = 3$. There are 3 vases needed.) Now, take 15 flowers and put 0 of them into each vase. How many vases would be needed? (That doesn't make sense since you don't need any vases and you don't really have a problem here. So, you cannot use $15 \div 0$.)

Using 2s and 9s for Dividing

These activities show students how to work quickly when dividing by 2 and by 9.

ACTIVITY 1 Give Me Half!

Help students understand that splitting a number in half is the same as dividing that number by two. Ask students to give you half of the following numbers:

4 10 2 6 12 0 16 8 18 14

Have students divide each of the above numbers by 2. Ask what they noticed about taking half of a number and dividing a number by two. (They are the same operation.)

ACTIVITY 2 Creating a Speedy 9s Strategy

Review the Speedy 9s strategy from multiplication (Chapter 2) and introduce a Speedy 9s strategy for division. Guide a discussion with these prompts.

Say: *Think about 6 x 9 = 54. How do we use the Speedy 9s strategy?* (The tens digit in the answer, 5, is one less than 6, the other factor multiplied by 9.)

Say: *Look at these division facts that involve 9s. See if you can make up a rule using Speedy 9s for division.*

36 ÷ 9 = 4 63 ÷ 9 = 7 27 ÷ 9 = 3 54 ÷ 9 = 6 72 ÷ 9 = 8

Help students to see that in division, Speedy 9s is the opposite of multiplication. The tens digit in the dividend (product) is one number less than the missing quotient (other factor).

Ask: *Who can make up a rule for when 9 is one factor and you are looking for the missing factor?*

Give students the Speedy 9s strategy for division: When 9 is a divisor, the missing quotient is one more than the tens digit in the dividend.

Thinking Games for Division

These activities give students the opportunity to practice division facts in interactive ways. Each activity reinforces multiplication as it encourages division-fact mastery.

ACTIVITY 1 What Number Am I Thinking of?

Give two numbers. One is a factor and the other is the product. Have students generate the missing factor.

Examples:

Say: *What number am I thinking of? 48, 8* (6)
What number am I thinking of? 14, 2 (7)
What number am I thinking about? 20, 4 (5)

ACTIVITY 2 What's My Number?

Two players each select a number card from a facedown pile, but may not look at their own card. At the same time, they hold their own card on their forehead for their partner to see. You (or a classmate) then give the product of the two numbers. The first player to figure out his or her number wins a point. The game winner is the first to score 10 points.

MATERIALS
Two sets of number cards (labeled 1–9)

ACTIVITY 3 Putting Things in Order

Have a student or pair of students sort a set of flash cards in order by answer. Ask them to arrange the cards from the combination with the smallest answer to that with the largest. For example, students begin with a card with a combination that equals 0, followed by a card with a combination that equals 1, and so on.

MATERIALS
Ten flash cards with division combinations (no answers)

Example

$5\overline{)0}$	$3\overline{)3}$	$3\overline{)6}$	$4\overline{)12}$	$6\overline{)30}$	$6\overline{)36}$