Multiplication

☑ Content Goals

- Students will multiply two two-digit numbers.
- Students will use partial products to find whole product answers.

Manipulatives

- base-ten magnetic manipulatives (teacher only)
- yellow unit cubes (19 per student)
- green rods (12 per student)
- blue flats (7 per student)

Materials

- paper bag
- sticky notes
- copy of the *Nocturnal or Not?* cards (page 82)
- copies of the *Area Model Activity Board* (page 83)
- copies of the *Awesome Animals* activity sheet (page 84)
- copies of the *Nighttime Bandits* assessment (page 85)

🗨 Let's Talk!

Step 1: Before starting the lesson, cut out the *Nocturnal or Not?* cards (page 82). Place the cards in a paper bag. Have one student draw a card from the bag. Have students name the animal on the card. Repeat this process until all cards have been selected.

Step 2: Ask students to think about what the animals on the cards have in common. *(They are wild animals.)* Allow time for students to share their ideas. Then ask students how the animals could be separated into two categories. Have students share their ideas and categorize the cards in various ways. If students do not come up with the idea on their own, lead them to the idea that some of the animals are nocturnal and others are not. Ask, "What does it mean if an animal is *nocturnal*?" *(They sleep during the day and are active at night.)* Then work together to separate the cards into two categories based on which animals are nocturnal and which are not.

Nocturnal	Not Nocturnal
raccoon	squirrel
owl	sparrow
skunk	
possum	
rabbit	
coyote	

Step 3: Say, "There are many nocturnal animals that live in parks and nature preserves. Let's imagine that there are 100 families of nocturnal animals and each family has 4 animals in it. What are some ways that we can find out how many animals there are in all?" *(Multiply 100 × 4 or add 100 four times)* Point out that it is faster to multiply the numbers rather than add four times. On the board, write *100 × 4 = 400*.

Step 4: Ask students the essential question. Write it on the board. Tell the class they are going to use their tools to multiply two two-digit numbers.
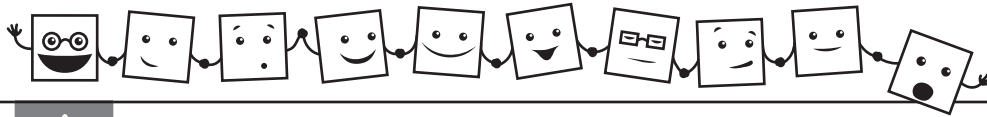
❓ Essential Question

How are multiplication and addition related?

✋ Rules Reminder

Remind students that they must follow the rules when working with manipulatives. Read the rules aloud before distributing the manipulatives.
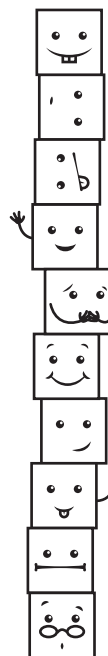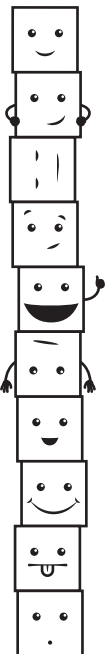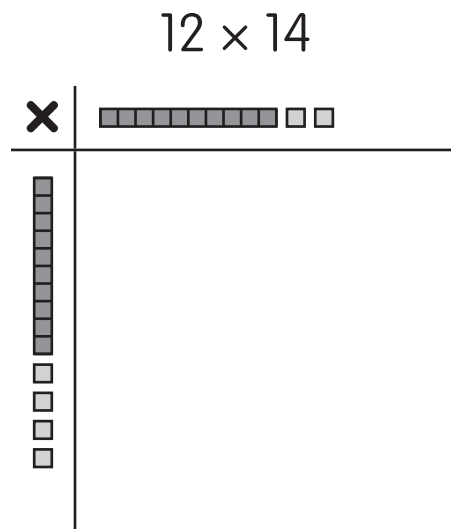
All Together Now!

Step 1: Distribute copies of the *Area Model Activity Board* (page 83) to students. Give each student 19 yellow cubes, 12 green rods, and 7 blue flats. Also give each student four sticky notes. Have students place their tools above their activity boards. Tell students not to touch them again until you say that they can.

Step 2: Recreate the activity board on the classroom board. Point out the multiplication sign on the activity board. Tell students that this activity board will help them multiply larger numbers.

Step 3: Say, "We are going to use our tools to build a multiplication problem. Let's multiply 12 × 14." Write the problem at the top of the area model. Say to students, "First, we have to set up the problem on the area model. I'm going to use 1 green rod and 2 yellow cubes to show the number 12." Using the magnetic manipulatives, place 1 green rod and 2 yellow cubes horizontally along the top of the activity board. Have students do the same on their activity boards. Ask them, "What number does this show?" Point to the 12 in the multiplication problem.

$$12 \times 14$$
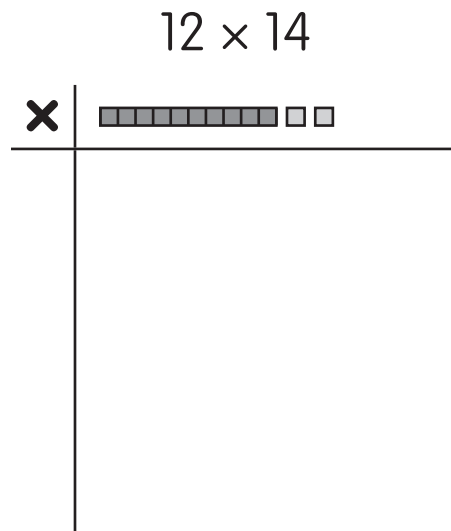
Step 4: Say, "Now let's use tools to show the number 14. How can I show this number?" *(1 green rod and 4 yellow cubes)* Use the magnetic manipulatives to place 1 green rod and 4 yellow cubes on the other side of the area model. Have students do the same thing with their manipulatives.
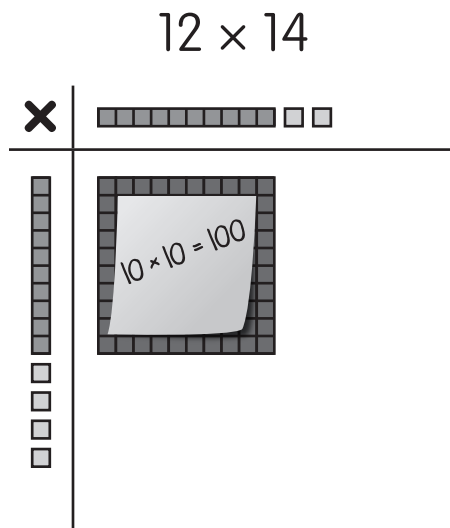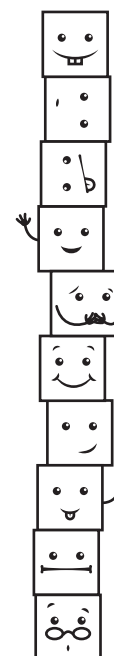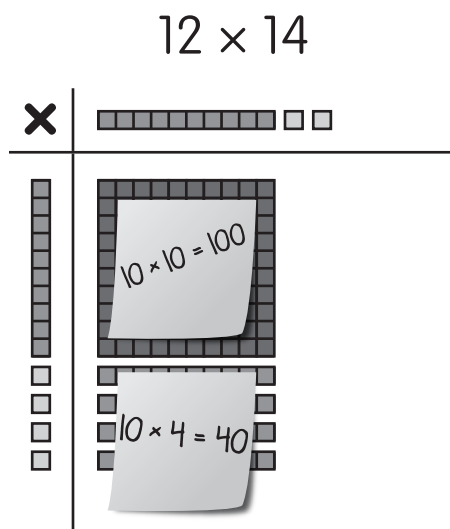
$$12 \times 14$$
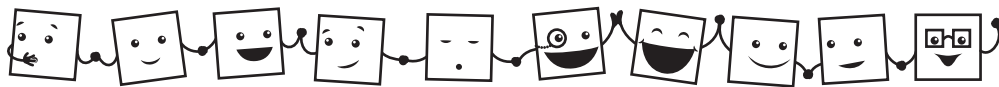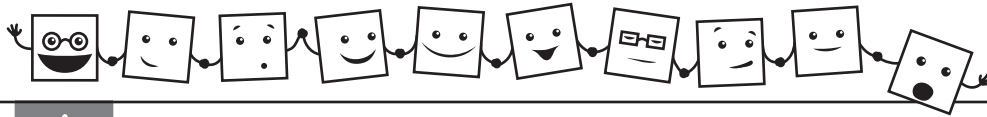
All Together Now! *(cont.)*

Step 5: Say, "Now we have set up our problem. We are going to decompose the problem into smaller problems. We will find the partial products and add them together to find the total product." Write the following equations on the board: *12 × 14*; *10 × 10*. "First we will show the product of 10 × 10." Be sure that students understand that by multiplying 10 × 10 you are finding the partial product of the 1 ten in the number 12 and the 1 ten in the number 14. Ask, "What is 10 x 10?" *(100)* "I'm going to use a blue flat to show 100 on my area model." Have students do the same thing with their tools. Use a sticky note to write *10 × 10 = 100*. Stick the note in the center of the blue flat. Have students do the same.
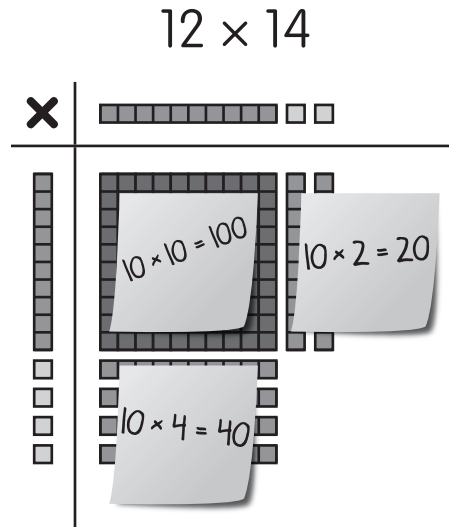
12 × 14

Step 6: Say, "Now we will multiply 10 × 4." Write the following equations on the board: *12 × 14*; *10 × 4*. "We are multiplying the 1 ten in the number 12 by the 4 ones in the number 14. What is 10 × 4? *(40)* How will I show 40 on my area model?" (*4 green rods*) Place 4 green rods horizontally under the blue flat. Write *10 × 4 = 40* on another sticky note. Place the note on the 4 green rods. Have students do the same with their tools.
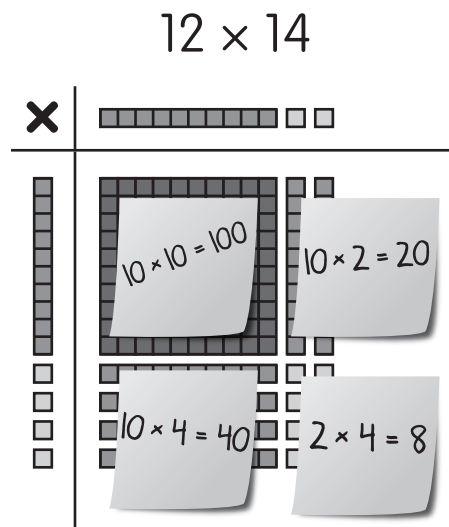
12 × 14

All Together Now! *(cont.)*

Step 7: Point out that you have now multiplied 10 × 10 and 10 × 4. Ask students, "What part of 12 × 14 have we not yet multiplied?" Explain that you still need to multiply 2 × 10 and 2 × 4. On the board, write *12 × 14; 2 × 10*. Say, "Now we will multiply 2 × 10. We are multiplying the 2 ones in the number 12 by the 1 ten in the number 14. What is 2 × 10?" *(20)* Place 2 green rods vertically next to the blue flat. Write *2 × 10 = 20* on another sticky note. Place the note on the 2 green rods. Have students do the same with their tools.

$$12 \times 14$$

Step 8: Say, "Lastly, we need to multiply 2 × 4." On the board, write *12 × 14; 2 × 4*. Say, "We are multiplying the 2 ones in the number 12 by the 4 ones in the number 14. What is 2 × 4?" *(8)* Place 8 yellow cubes on the activity board. Write *2 × 4 = 8* on another sticky note. Place the note on the 8 ones. Have students do the same with their tools.

$$12 \times 14$$

Step 9: Say, "Now we have partial products for each part of the problem. When we add together the partial products, we will find the total product of 12 × 14. Look at your sticky notes to find the partial products." Write the following equation on the board: *100 + 40 + 20 + 8 = _____*. Solve the equation as a class. Then say, "12 × 14 = 168." Review with students how finding partial products broke the problem into simpler steps.

Step 10: Repeat this process with another two-digit times two-digit problem.
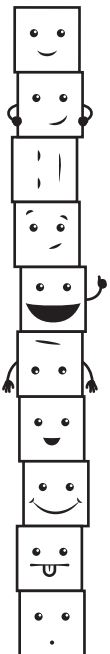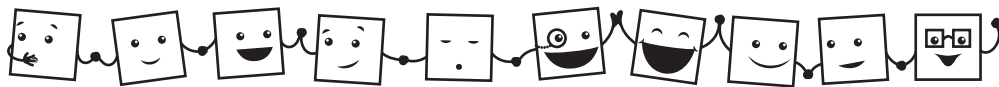
Teamwork Time!

Step 1: Review the *Working as a Team* rules sheet (page 153) with students. Place students into small groups. Have students place their tools above their activity boards.

Step 2: Tell students, "Work with your groups to find the partial products of 13 × 15. Use your model activity board and tools to help you." Allow groups time to find the partial products. Ask one group to come to the board and use the magnetic manipulatives to show and explain how they found the partial products. Then have a group add the partial products to find the total product of 13 × 15. *(195)*

Step 3: Tell the groups to clear their activity boards. Then ask students, "What is 21 × 13?" *(273)* Write *21 × 13 =* on the board. Allow groups time to find the answer. Ask one group to come to the board and use the magnetic manipulatives to show and explain how they found the answer. Write the answer on the board.

You Can Do It!

Step 1: Distribute copies of the *Awesome Animals* activity sheet (page 84) to students. Tell students they can use their manipulatives and activity boards to help them solve the problems. Have students complete the activity sheet independently.

Step 2: When students have finished, go over the answers as a class. Ask students if they were able to find the answers without using manipulatives. If so, how did they do it? Discuss as a class how visualization and drawings can help students if they do not have manipulatives to use.

Show What You Know!

Distribute copies of the *Nighttime Bandits* assessment (page 85) to students. Tell students that they can use manipulatives with this sheet, visualize, or draw on scratch paper if necessary.
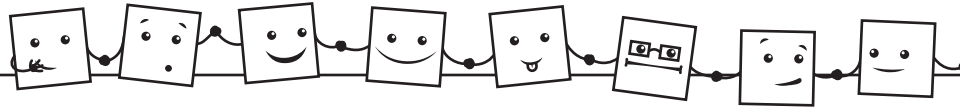
### Put It in Words!

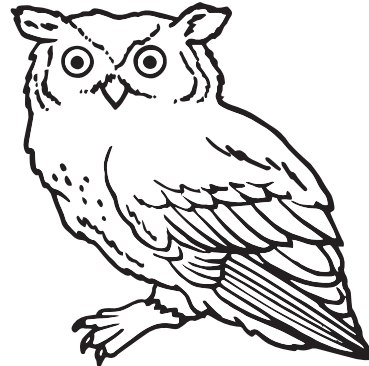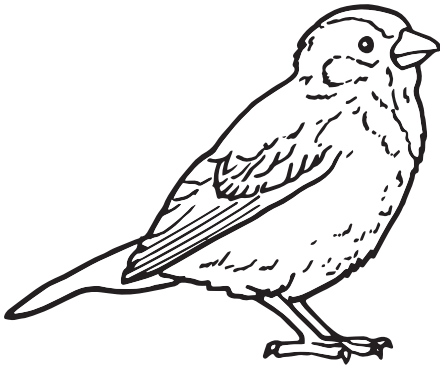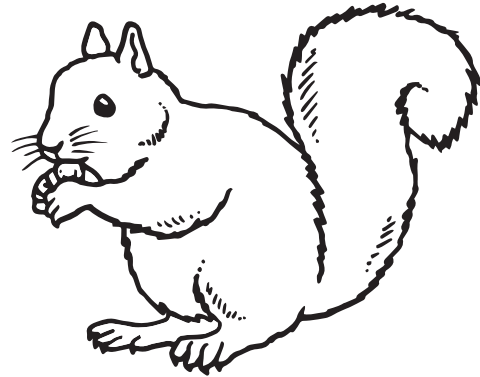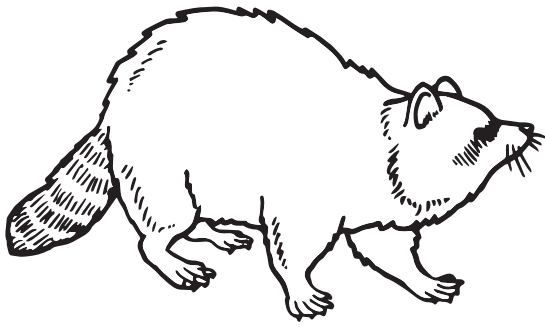Write the prompt on the board.

There are 18 raccoon families that live in the forest. Each family has 12 raccoons. How many raccoons live in the forest? How do you know?
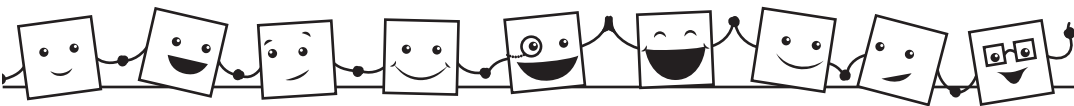
Have a class discussion about how to find partial products to find the total product. Have students find the answer and explain how they used partial products in their journals.
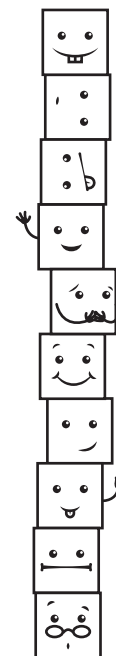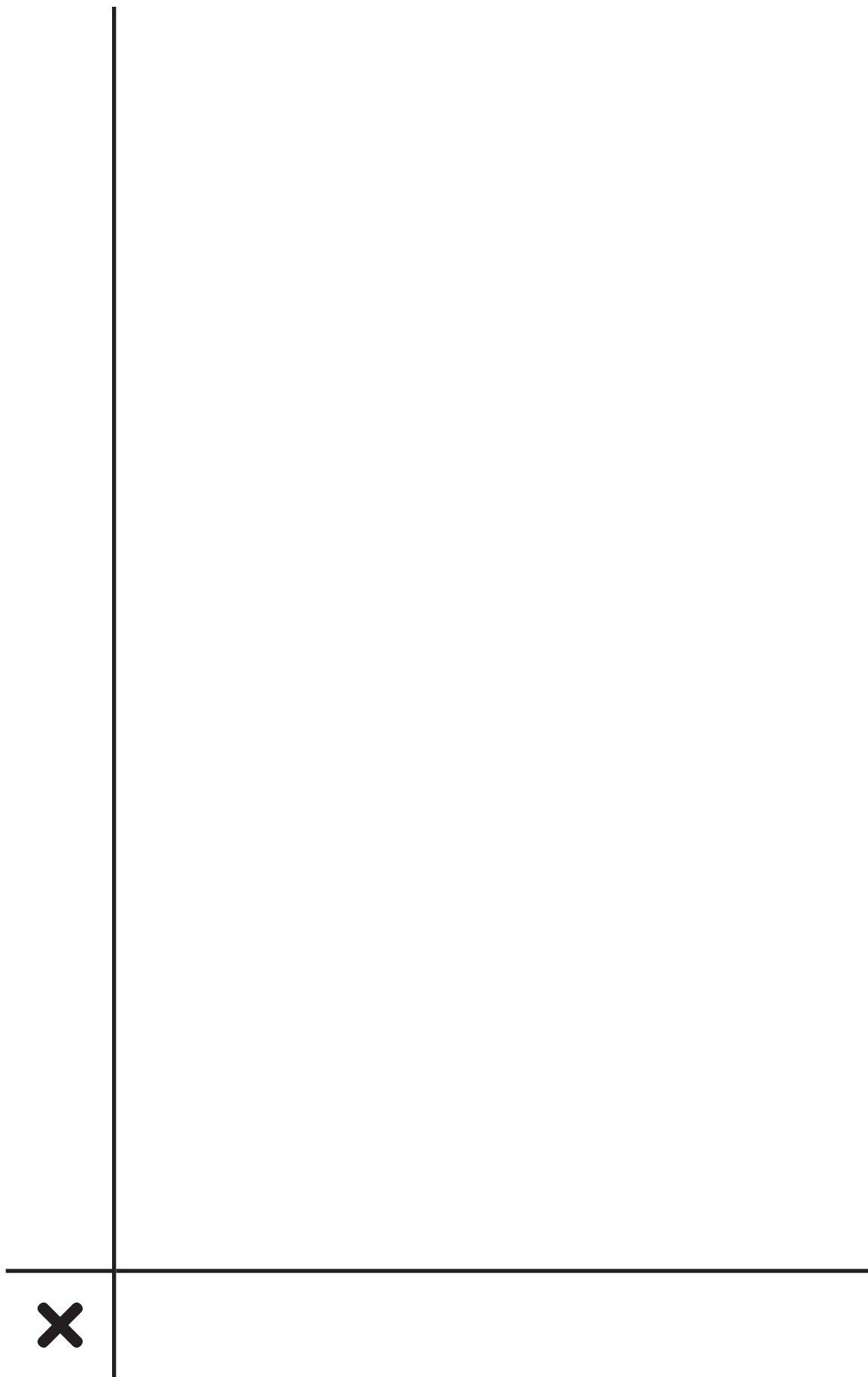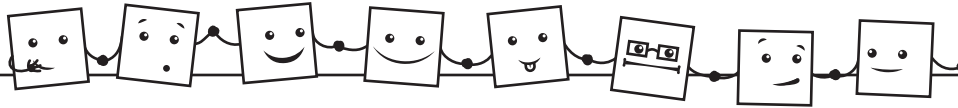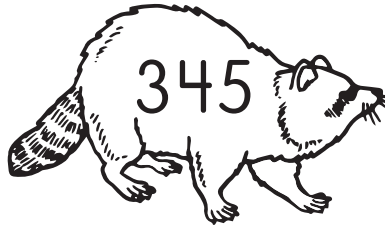
Nocturnal or Not?
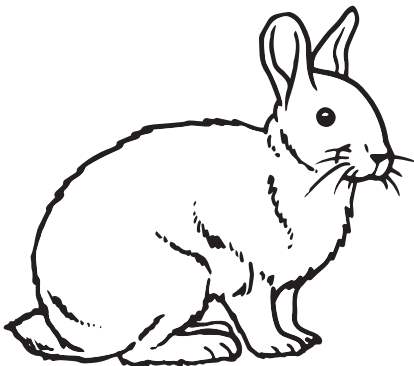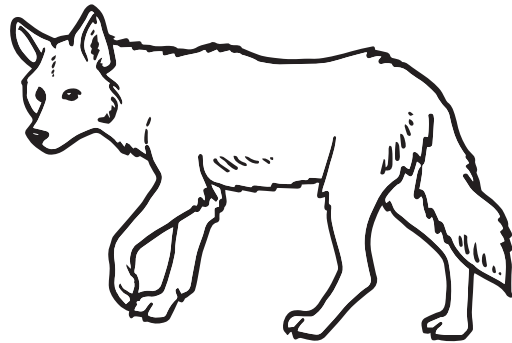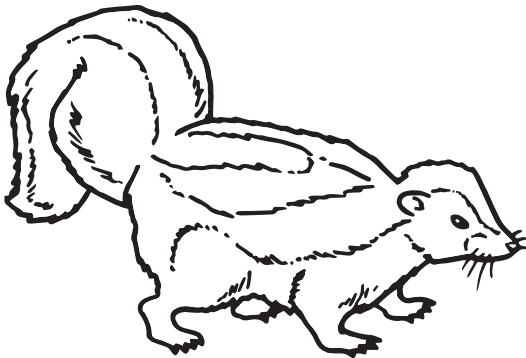
Area Model Activity Board

Name: _____

✗

Name: _____

Awesome Animals

Directions: Solve each problem. Circle the animal with the correct answer.

1   17
     ×22

345   374

2   31
     ×12

372   273

3   15
     ×11

165   155

4   24
     ×21

514   504

5   15
     ×18

270   263
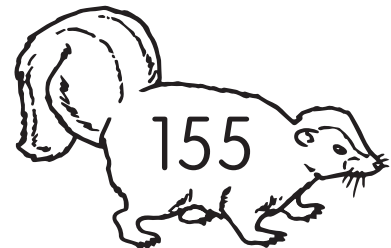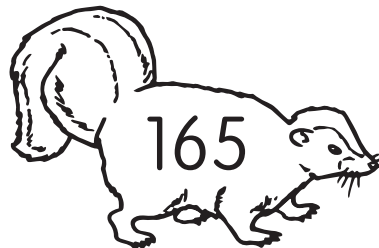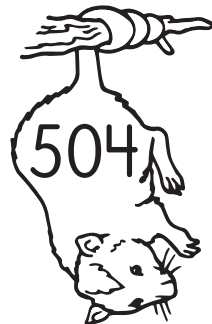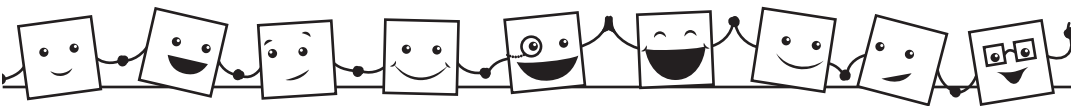
Name: _____

Nighttime Bandits

Directions: What nocturnal animals love to steal food from trash cans? Solve each problem to find out. Write the letter of the problem that shows the correct answer on the line.

C
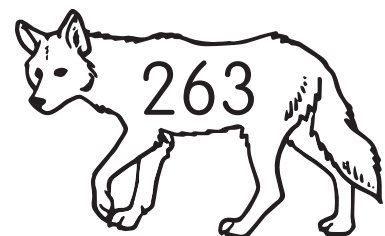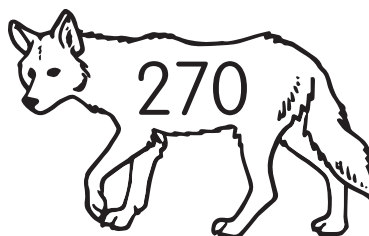$$\begin{array}{r} 22 \\ \times\ 15 \\ \hline \end{array}$$

O
$$\begin{array}{r} 18 \\ \times\ 34 \\ \hline \end{array}$$

A
$$\begin{array}{r} 29 \\ \times\ 17 \\ \hline \end{array}$$

O
$$\begin{array}{r} 41 \\ \times\ 13 \\ \hline \end{array}$$

R
$$\begin{array}{r} 42 \\ \times\ 18 \\ \hline \end{array}$$

S
$$\begin{array}{r} 35 \\ \times\ 22 \\ \hline \end{array}$$

N
$$\begin{array}{r} 32 \\ \times\ 12 \\ \hline \end{array}$$

C
$$\begin{array}{r} 15 \\ \times\ 27 \\ \hline \end{array}$$

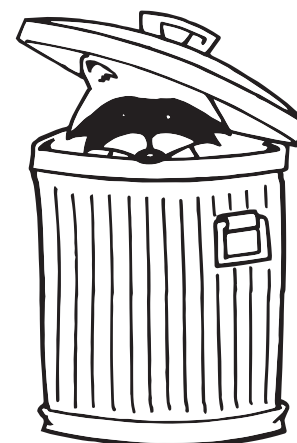____ ____ ____ ____ ____ ____ ____ ____
756   493   330   405   533   612   384   770

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