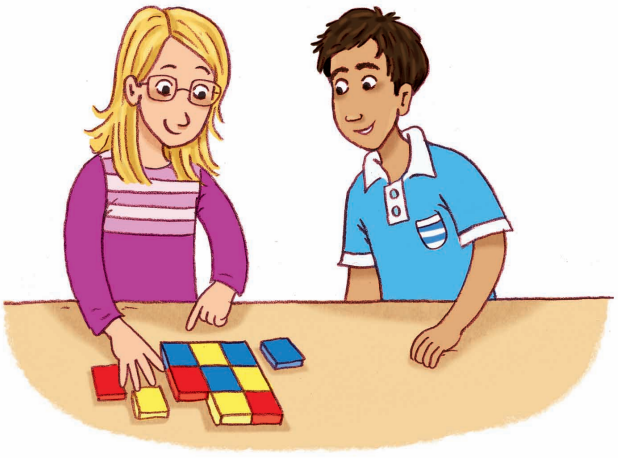
LETTER HOME

Products and Factors

Dear Family Member:

We are beginning a new unit in math called *Products and Factors.* We will explore multiplication and division by looking at ways objects can be put into arrays. An array is a collection of objects arranged in equal rows. Things that come in arrays can be counted by multiplication. For example, an auditorium that has 20 rows with 10 seats in each row has 20 × 10 seats.

We will investigate the different sizes of arrays that are possible with certain numbers of objects. For example, we can arrange 20 objects into four equal rows, but not into three equal rows. This will naturally lead us to explore the relationship between multiplication and division, as well as to practice the multiplication facts.



Students arrange tiles in rows as they learn about multiplication and division.

You can help your child with multiplication using the following ideas:

Play Floor Tiler. This game will help your child learn the multiplication facts and learn the relationships between factors and multiples. Directions are in the *Student Guide.*

Play Product Bingo. This is another game that will help your child learn the multiplication facts and learn the relationships between factors and multiples. Directions are in the *Student Guide*.

Words. In this unit, your child will learn words such as factor and multiple. Ask your child what these words mean. He or she will also learn about some special numbers such as prime numbers and square numbers. Ask about these. You might also ask your child to explain why the square numbers (4, 9, 16, etc.) are called "square."

Math Facts and Mental Math

This unit begins the systematic review and assessment of the multiplication facts.

Multiplication Facts. Students review the 5s, 10s, and square numbers to maintain and increase fluency and to learn to apply multiplication strategies to larger numbers.

You can help your child review these facts using the flash cards that are sent home or by making a set of flash cards from index cards or scrap paper. Study facts in small groups each night. As your child goes through the flash cards, put the cards in three stacks: Facts I Know Quickly, Facts I Can Figure Out, and Facts I Need to Learn.

For Facts I Need to Learn, work on strategies for figuring them out. Good strategies include:

Skip counting. To solve 5 × 6, skip count: 5, 10, 15, 20, 25, 30

Reasoning from known facts. To solve 5 × 6, I know 5 × 3 = 15 and 15 + 15 = 30

Turn-around facts or fact families. 20 ÷ 4 = 5 because I know 4 × 5 = 20.

For Facts I Can Figure Out, use the flash cards to practice the facts for fluency.

For Facts I Know Quickly, help your child use mental math strategies to multiply 10s and 100s:

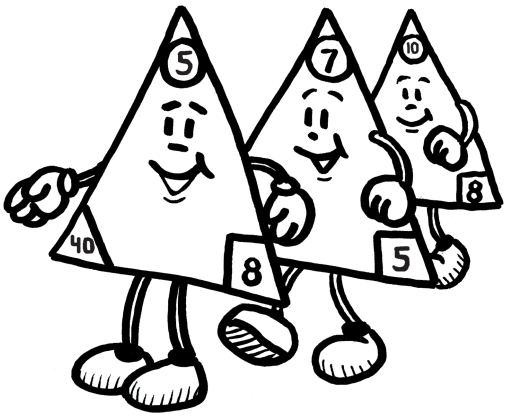
50 × 30 = 150, 100 × 60 = 6000, 40 × 40 = 1600

Grade 4 Math Facts Overview

The goal of the math facts development in *Math Trailblazers* is for students to learn the basic facts efficiently, gain fluency with their use, and retain that fluency over time. A large body of research supports an approach in which students develop strategies for figuring out the facts rather than relying on rote memorization. This not only leads to more effective learning and better retention, but also to the development of mental math skills. In fact, too much drill before conceptual understanding may interfere with a child's ability to understand concepts at a later date. Therefore, the teaching of the basic facts in *Math Trailblazers* is characterized by the following elements:

Use of Strategies. Students first approach the basic facts as problems to be solved rather than as facts to be memorized. In all grades, students are encouraged to use strategies to find facts, so they become confident that they can find answers to facts problems that they do not immediately recall. In this way, students learn that math is more than memorizing facts and rules which "you either get or you don't."

Distributed Facts Practice. Students study small groups of facts that can be found using similar strategies. In fourth grade, they review multiplication facts to maintain or gain fluency. See Figure 1. Students also work on division facts (fact families) starting in Unit 6.



Unit	Multiplication Facts Group
3	5s, 10s, and Square Numbers
4	2s, 3s, and 9s
5	Last Six Facts (4×6, 4×7, 4×8, 6×7, 6×8, 7×8)

Figure 1: *Development of Multiplication Facts in Grade 4*

Practice in Context. Students continue to practice the facts as they use them to solve problems, investigate math concepts, and play math games.

Appropriate Assessment. Students are regularly assessed to see if they can find answers to facts problems quickly and accurately and retain this skill over time. They take a short quiz on each group of facts. Students record their progress on *Facts I Know* charts and determine which facts they need to study.

A Multiyear Approach. In Grades 1 and 2, the curriculum emphasizes the use of strategies that enable students to develop proficient strategies for the addition and subtraction facts by the end of second grade. In Grade 3, students review the subtraction facts and develop proficiency with the multiplication facts. In Grade 4, the addition and subtraction facts are checked, the multiplication facts are reviewed, and students develop fluency with the division facts. In Grade 5, students review the multiplication and division facts.

Facts Will Not Act as Gatekeepers. Use of strategies and calculators allows students to continue to work on interesting problems and experiments while learning the facts. They are not prevented from learning more complex mathematics because they do not have quick recall of the facts.

Thank you for taking time to talk with your child about what he or she is doing in math.

Sincerely,

Name _____ Date _____

Unit 3: Home Practice

Part 1 Triangle Flash Cards: 5s, 10s, and Square Numbers

Study for the quiz on the multiplication facts for the 5s, 10s, and square numbers. Take home your Triangle Flash Cards: 5s, 10s, and Square Numbers and your list of facts you need to study.

To use the flash cards, ask a family member to choose one flash card at a time. He or she should cover the corner containing the highest number, the shaded number. This number will be the answer to a multiplication fact. Multiply the two uncovered numbers.

Study the math facts in small groups. Choose eight to ten facts to study each night. Your teacher will tell you when the quiz on the 5s and 10s and the quiz on the square numbers will be.

Part 2 Fact Families

For each fact given, write the other number sentences of the same fact family.

A. $90 \div 10 = 9$ _____

_____

_____

B. $15 \div 5 = 3$ _____

_____

_____

C. $9 \times 9 = 81$ _____

_____

_____

D. $5 \times 9 = 45$ _____

_____

_____

Name _____ Date _____

Part 3 Solving Multiplication Stories

1. Grace bought a bag of sour candies with her allowance. There are 35 candies in the bag. Grace wants to eat the same number of candies each day and she wants the candy to last all week. How many candies can Grace eat each day? Write a number sentence.

2. Michael's brother works at Tony's Pizza Place making pizza. He makes $10 per hour. On Friday night, he worked 5 hours. On Saturday, he worked 8 hours. How much money did he earn on each day?

How much did he earn both days together? Show how you know.

3. There are 6 children in Jackie's family. Jackie's mother bought each child 6 pairs of socks at the start of the school year. How many pairs of socks did Jackie's mother buy? Write a number sentence.

4. Jacob and John started a club. There are 8 boys in the club. Each boy paid a membership fee of 8 dimes to be in the club. How many dimes did the boys pay altogether? How much money was this? Show how you know.

5. Find a number to make each sentence true.

A. $5 \times \square = 30$

B. $20 = \square \times 4$

C. $\square = 5 \times 8$

D. $10 \times 1 = 2 \times \square$

Name _____ Date _____

Part 4 Multiplication: Factors, Multiples, Primes, and Squares

To solve the following problems, you may use your *Student Guide* as a reference. See Unit 3 Lessons 1, 3, and 7.

1. Is 34 a multiple of 2? Explain why or why not.

2. Is 3 a factor of 35? Explain why or why not.

3. Name 10 numbers that are multiples of 2.

4. Name 10 numbers that have 3 as a factor.

5. Is 7 a prime number? Why or why not?

6. A. $5^2 =$ **B.** $10^2 =$

C. $2^2 =$ **D.** $3^2 =$

Name _____ Date _____

Part 5 Working at the Grocery Store

Choose an appropriate tool to help you solve each of the problems. Use a picture, paper and pencil, or a calculator. Use pictures, number sentences, or words to show how you solve each problem.

1. Keenya's sister, Shenika, works at a grocery store. Today she is stocking shelves. She stacks soup cans three cans high. If she makes 6 stacks, how many soup cans will she shelve?

2. Shenika brings in some shopping carts from the parking lot. She makes 4 rows of carts. She wants to place the same number of carts in each row. If she brings in 17 carts, how many carts can she place in each row?

3. Shenika gets paid six dollars an hour. Last week she worked 15 hours. How much did she earn?

4. When Shenika works the cash register on a Saturday, she works nonstop. In the express line, customers may purchase only 10 items or less. When working the express line, she can ring up about 5 customers in 15 minutes. If she works a 6-hour day, about how many customers can she serve?

Name _____ Date _____

5. The grocery bill for one of Shenika's customers was $15.52. The customer gave Shenika $20.02. How much change did the customer receive?

6. Grapes are on sale for 69¢ a pound. How much do 3 pounds of grapes cost?

7. For every $3 a customer spends at the grocery store, he or she gets a stamp that can be used for purchasing dishes. One customer bought groceries for herself and an elderly neighbor. The two separate bills were $43 and $28. How many stamps should this customer receive for herself and her neighbor?

8. Keenya went to the store to get groceries for her mom. She had $10 and wasn't sure if she had enough money so she used mental math to make an estimate before she went to the cash register. Keenya had these items in her cart: dish soap for $3.19, carrots for $1.59, bread for $1.89, milk for $3.89, and a can of beans for $.49.

A. Estimate the total cost of these groceries to tell Keenya whether she will have enough money before she gets in the check-out line. Do not calculate the exact total. Show how you estimated below.

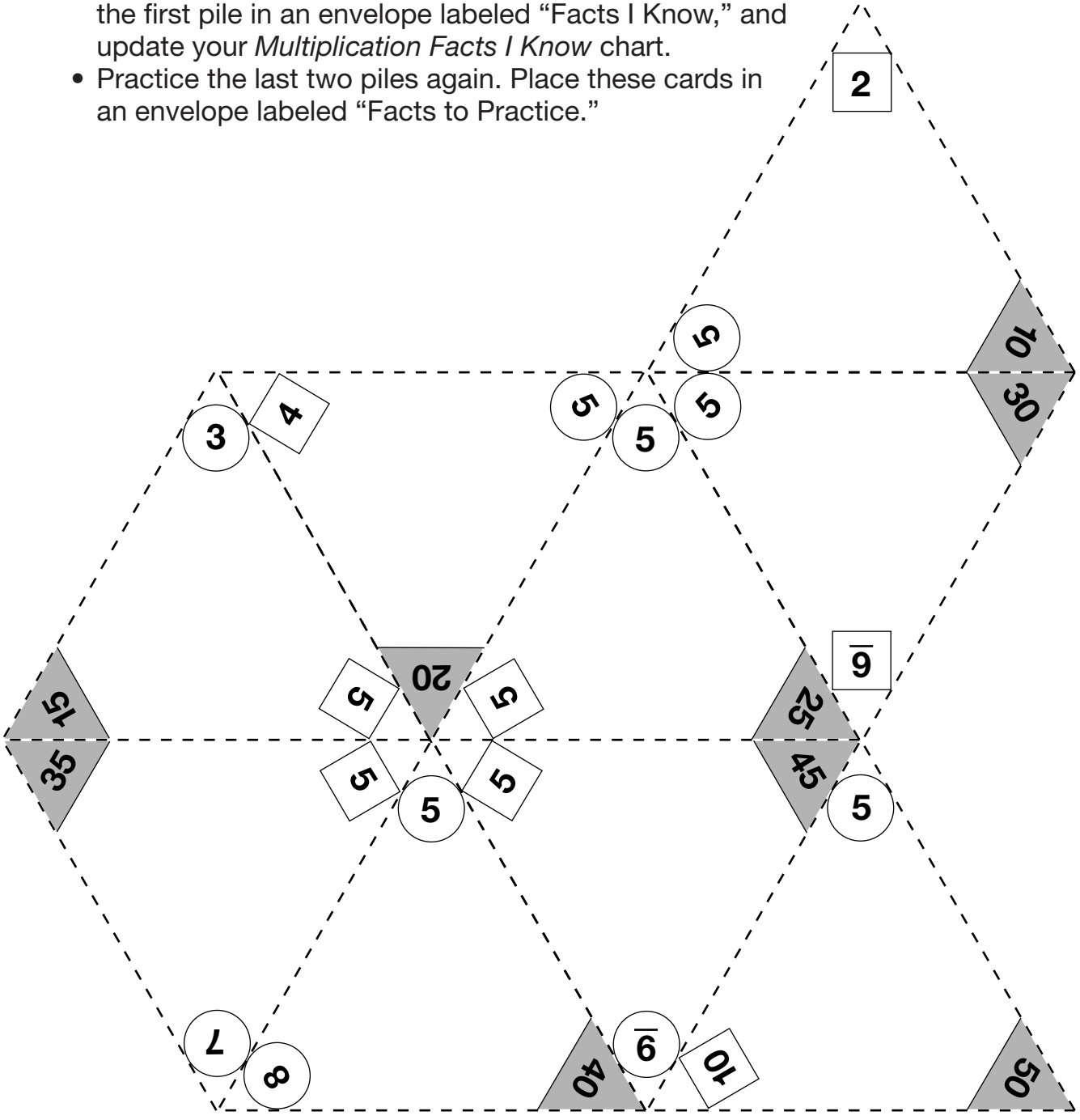
B. If Keenya will have enough money, do you think she will have enough left over to buy a candy bar that costs $.79?

C. If Keenya will not have enough money, what item or items would you tell her to put back to get her bill under $10.00? Explain your choices.

Name _____ Date _____

Triangle Flash Cards: 5s

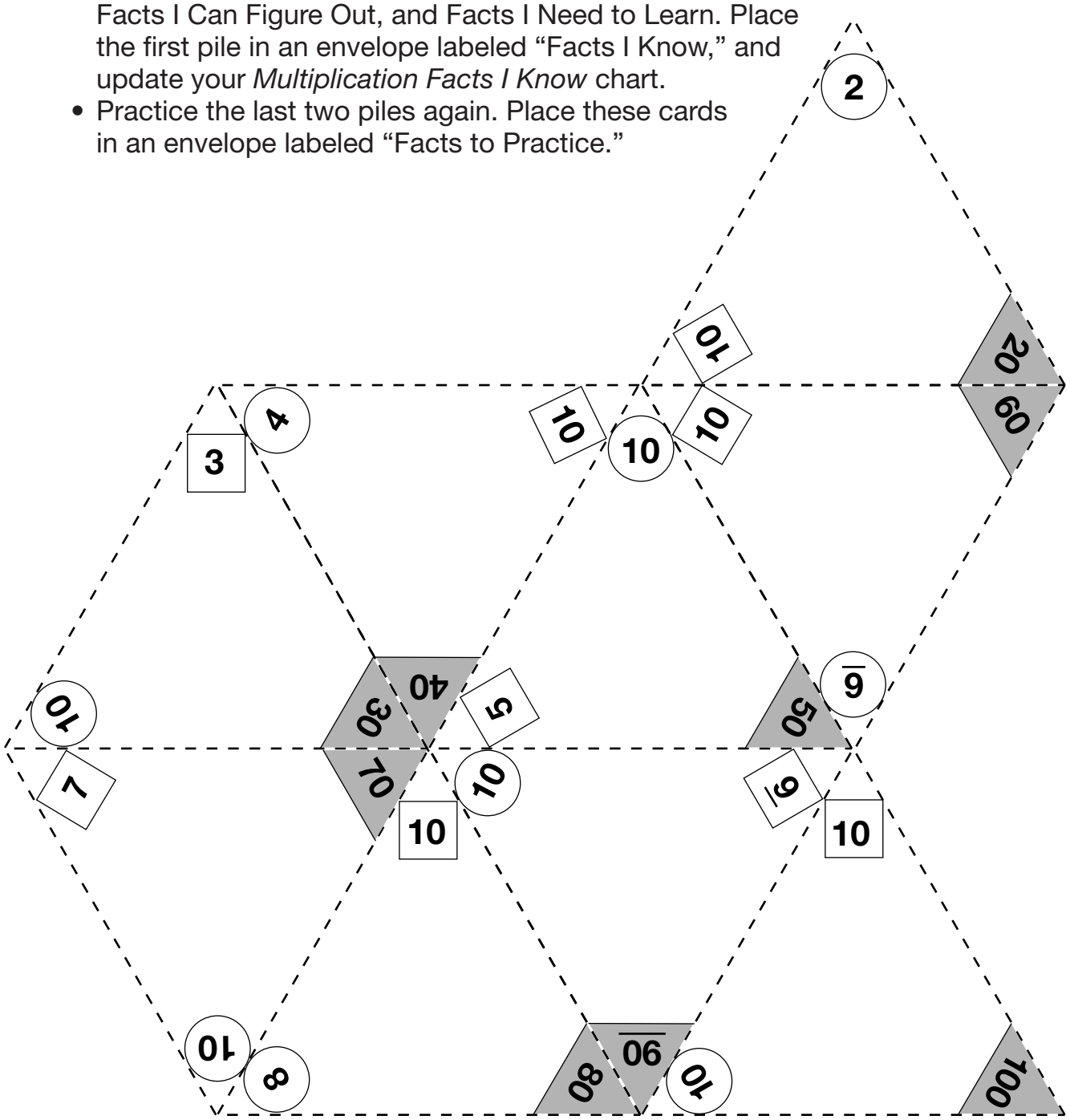
- Work with a partner. Each partner cuts out the flash cards.
- To quiz you on a multiplication fact, your partner covers the shaded number. Multiply the two uncovered numbers.
- Divide the used cards into three piles: Facts I Know Quickly, Facts I Can Figure Out, and Facts I Need to Learn. Place the first pile in an envelope labeled "Facts I Know," and update your *Multiplication Facts I Know* chart.
- Practice the last two piles again. Place these cards in an envelope labeled "Facts to Practice."



Name _____ Date _____

Triangle Flash Cards: 10s

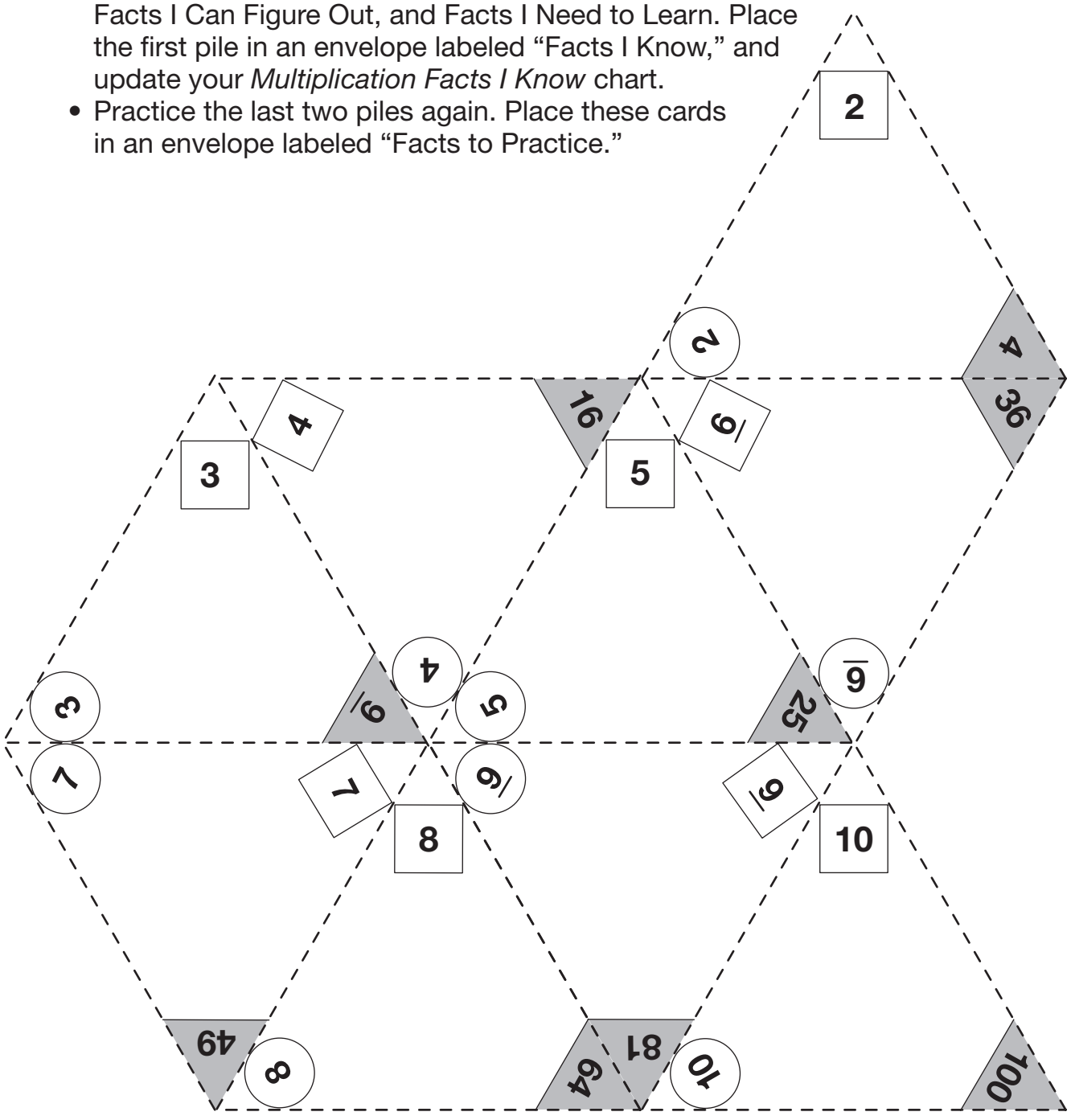
- Work with a partner. Each partner cuts out the flash cards.
- To quiz you on a multiplication fact, your partner covers the shaded number. Multiply the two uncovered numbers.
- Divide the used cards into three piles: Facts I Know Quickly, Facts I Can Figure Out, and Facts I Need to Learn. Place the first pile in an envelope labeled "Facts I Know," and update your *Multiplication Facts I Know* chart.
- Practice the last two piles again. Place these cards in an envelope labeled "Facts to Practice."



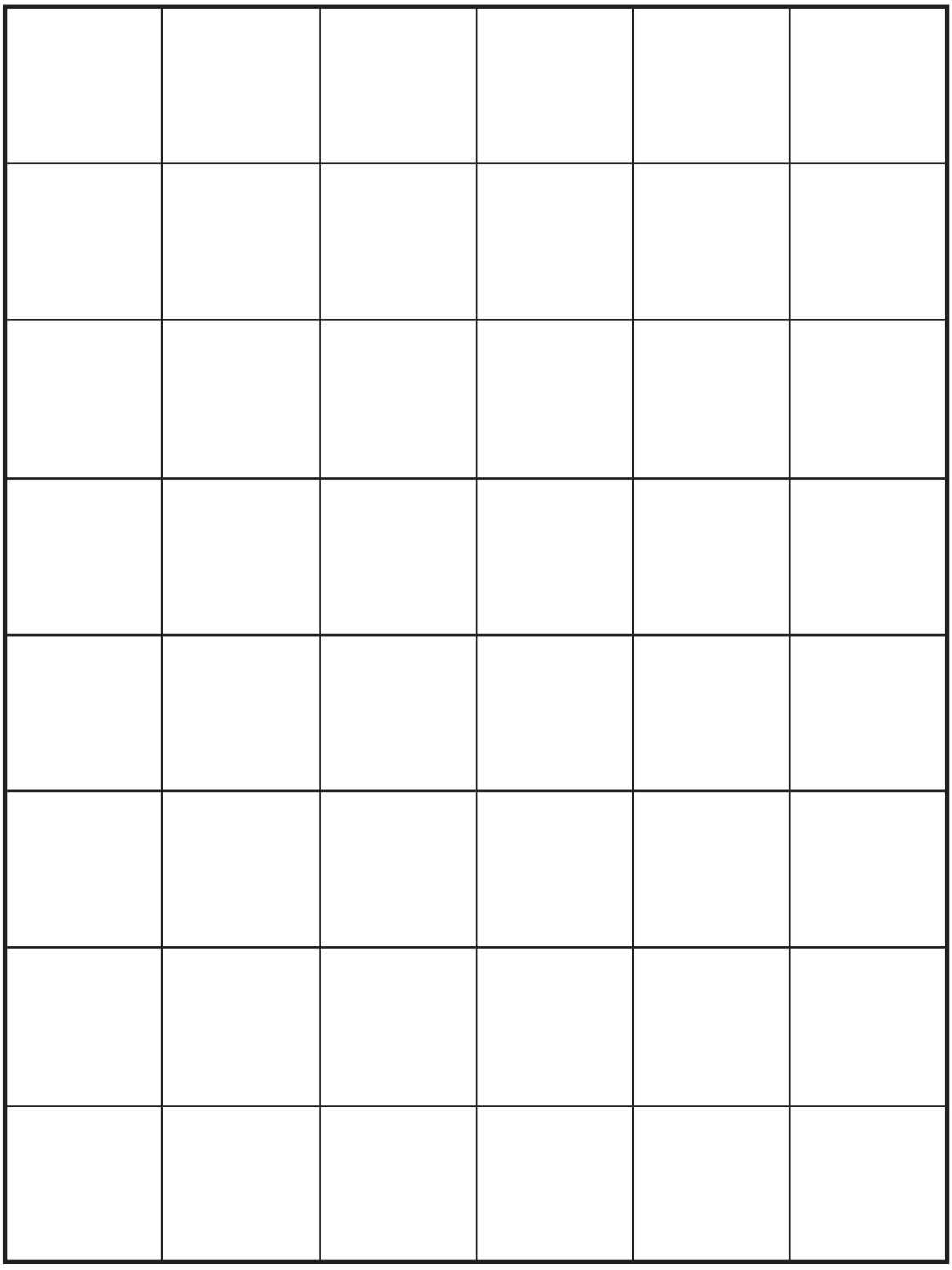
Name _____ Date _____

Triangle Flash Cards: Square Numbers

- Work with a partner. Each partner cuts out the flash cards.
- To quiz you on a multiplication fact, your partner covers the shaded number. Multiply the two uncovered numbers.
- Divide the used cards into three piles: Facts I Know Quickly, Facts I Can Figure Out, and Facts I Need to Learn. Place the first pile in an envelope labeled "Facts I Know," and update your *Multiplication Facts I Know* chart.
- Practice the last two piles again. Place these cards in an envelope labeled "Facts to Practice."



Square-Inch Grid Paper



Small Multiplication Tables

×	0	1	2	3	4	5	6	7	8	9	10
0	0	0	0	0	0	0	0	0	0	0	0
1	0	1	2	3	4	5	6	7	8	9	10
2	0	2	4	6	8	10	12	14	16	18	20
3	0	3	6	9	12	15	18	21	24	27	30
4	0	4	8	12	16	20	24	28	32	36	40
5	0	5	10	15	20	25	30	35	40	45	50
6	0	6	12	18	24	30	36	42	48	54	60
7	0	7	14	21	28	35	42	49	56	63	70
8	0	8	16	24	32	40	48	56	64	72	80
9	0	9	18	27	36	45	54	63	72	81	90
10	0	10	20	30	40	50	60	70	80	90	100

×	0	1	2	3	4	5	6	7	8	9	10
0	0	0	0	0	0	0	0	0	0	0	0
1	0	1	2	3	4	5	6	7	8	9	10
2	0	2	4	6	8	10	12	14	16	18	20
3	0	3	6	9	12	15	18	21	24	27	30
4	0	4	8	12	16	20	24	28	32	36	40
5	0	5	10	15	20	25	30	35	40	45	50
6	0	6	12	18	24	30	36	42	48	54	60
7	0	7	14	21	28	35	42	49	56	63	70
8	0	8	16	24	32	40	48	56	64	72	80
9	0	9	18	27	36	45	54	63	72	81	90
10	0	10	20	30	40	50	60	70	80	90	100

×	0	1	2	3	4	5	6	7	8	9	10
0	0	0	0	0	0	0	0	0	0	0	0
1	0	1	2	3	4	5	6	7	8	9	10
2	0	2	4	6	8	10	12	14	16	18	20
3	0	3	6	9	12	15	18	21	24	27	30
4	0	4	8	12	16	20	24	28	32	36	40
5	0	5	10	15	20	25	30	35	40	45	50
6	0	6	12	18	24	30	36	42	48	54	60
7	0	7	14	21	28	35	42	49	56	63	70
8	0	8	16	24	32	40	48	56	64	72	80
9	0	9	18	27	36	45	54	63	72	81	90
10	0	10	20	30	40	50	60	70	80	90	100

×	0	1	2	3	4	5	6	7	8	9	10
0	0	0	0	0	0	0	0	0	0	0	0
1	0	1	2	3	4	5	6	7	8	9	10
2	0	2	4	6	8	10	12	14	16	18	20
3	0	3	6	9	12	15	18	21	24	27	30
4	0	4	8	12	16	20	24	28	32	36	40
5	0	5	10	15	20	25	30	35	40	45	50
6	0	6	12	18	24	30	36	42	48	54	60
7	0	7	14	21	28	35	42	49	56	63	70
8	0	8	16	24	32	40	48	56	64	72	80
9	0	9	18	27	36	45	54	63	72	81	90
10	0	10	20	30	40	50	60	70	80	90	100

Name _____ Date _____

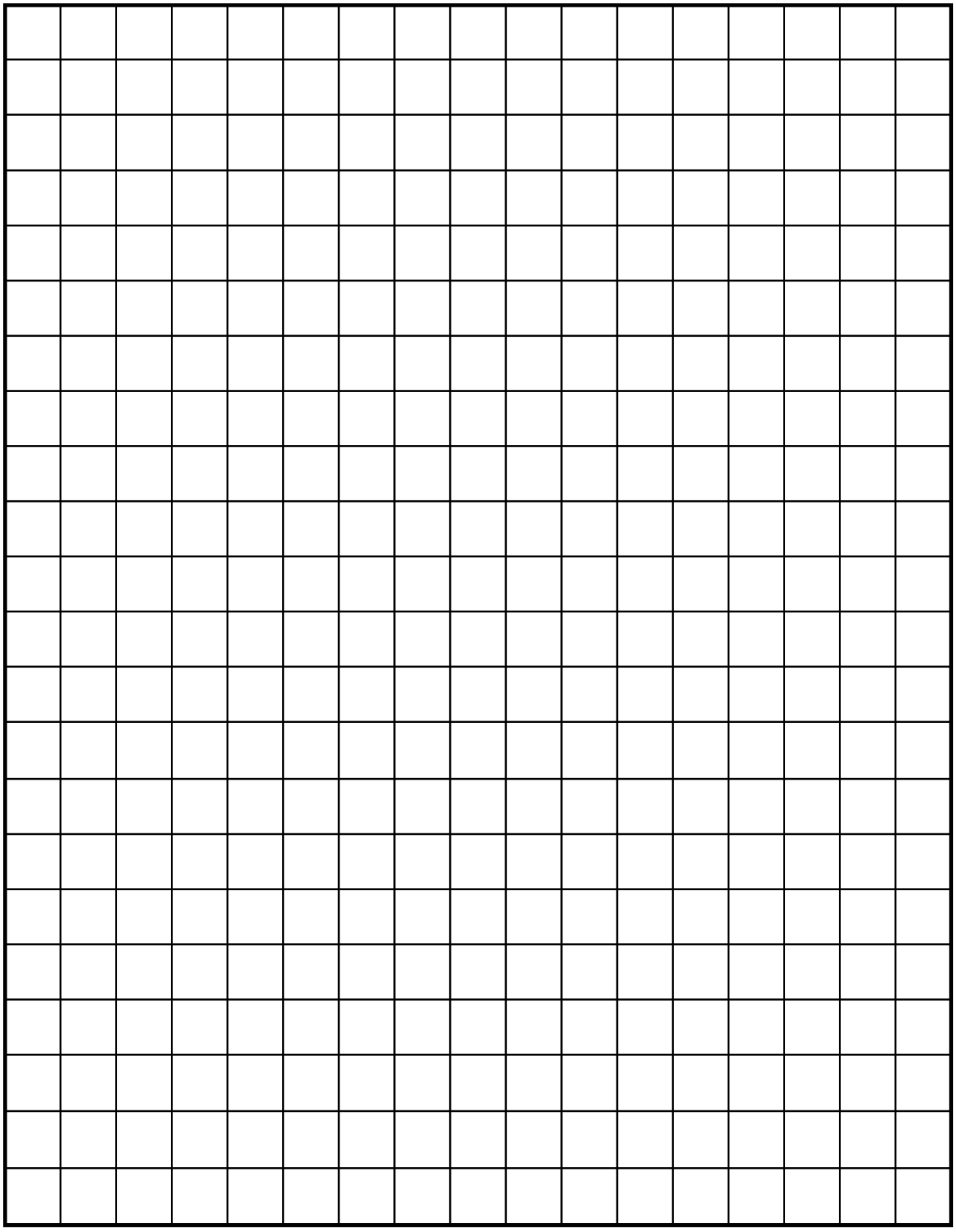
How Many Rectangles with 20 Tiles?

Number of Rows	Number in Each Row	Division Sentence	Factors

1. Fill in this table and list all the rectangles possible with 20 tiles. You may use square-inch tiles to help you.
2. List all the factors of 20.
3. Is 20 a multiple of 2? How do you know?
4. Is 20 a multiple of 6? How do you know?

How Many Rectangles with 20 Tiles? Feedback Box

	Expectation	Check In	Comments
Represent and solve multiplication and division problems using rectangular arrays. [Q#1]	E1		
Determine whether one number is a multiple of another number. [Q# 3–4]	E2		
Find the factors of a number. [Q# 1–2]	E3		



Name _____ Date _____

Factors, Multiples, and Primes

You may use calculators, multiplication tables, or square-inch tiles to solve the following problems.

1. Danny made a rectangle with 40 tiles. If there were 5 rows, how many tiles were in each row? Draw a picture of this rectangle.

2. A. Is it possible to make a rectangle with 6 rows using 30 tiles? Why or why not?

B. Is it possible to make a rectangle with 4 rows using 30 tiles? Why or why not?

3. A. Is 28 a multiple of 4? Show or tell how you know.

B. Is 28 a multiple of 5? Show or tell how you know.

Name _____ Date _____

4. Is 28 a prime number? Show or tell how you know.

5. Is 31 a multiple of 5? Show or tell how you know.

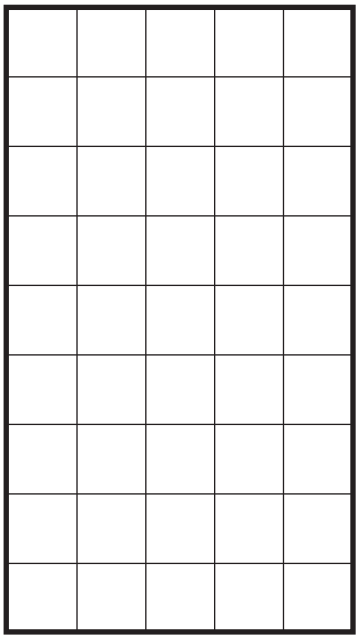
6. Is 31 a prime number? Show or tell how you know.

7. Joe Smart is having trouble remembering 9×5. Show Joe how to solve 9×5 using the break-apart method.

A. Break the rectangle into parts to make it easier to multiply.

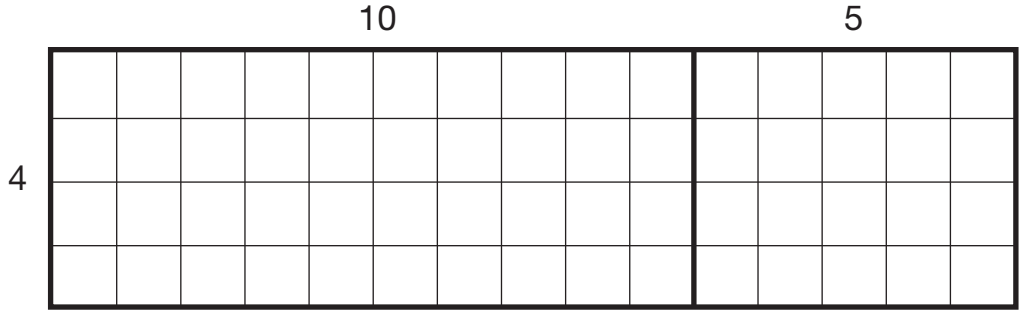
B. Write number sentences on each part to show the number of squares in each.

C. Write a number sentence to show the total number of squares in the large rectangle.



Name _____ Date _____

8. Jacob drew the rectangle below and broke it into parts.



A. What multiplication problem does Jacob's rectangle represent?

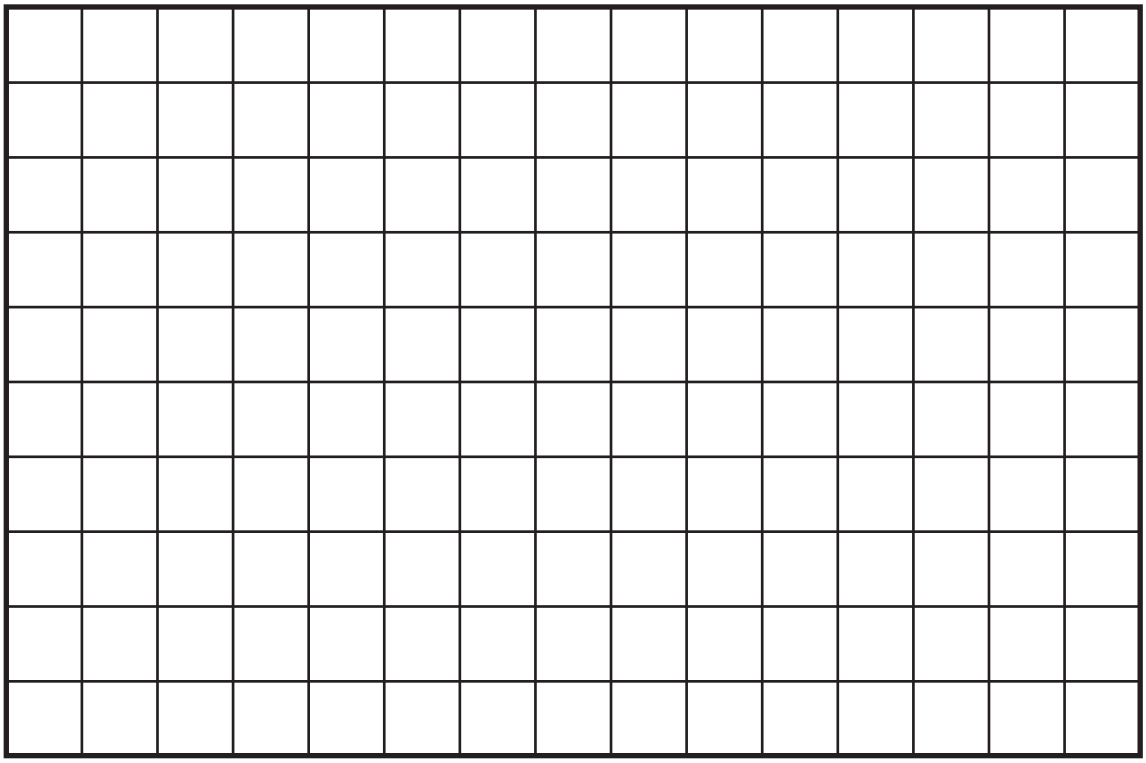
_____

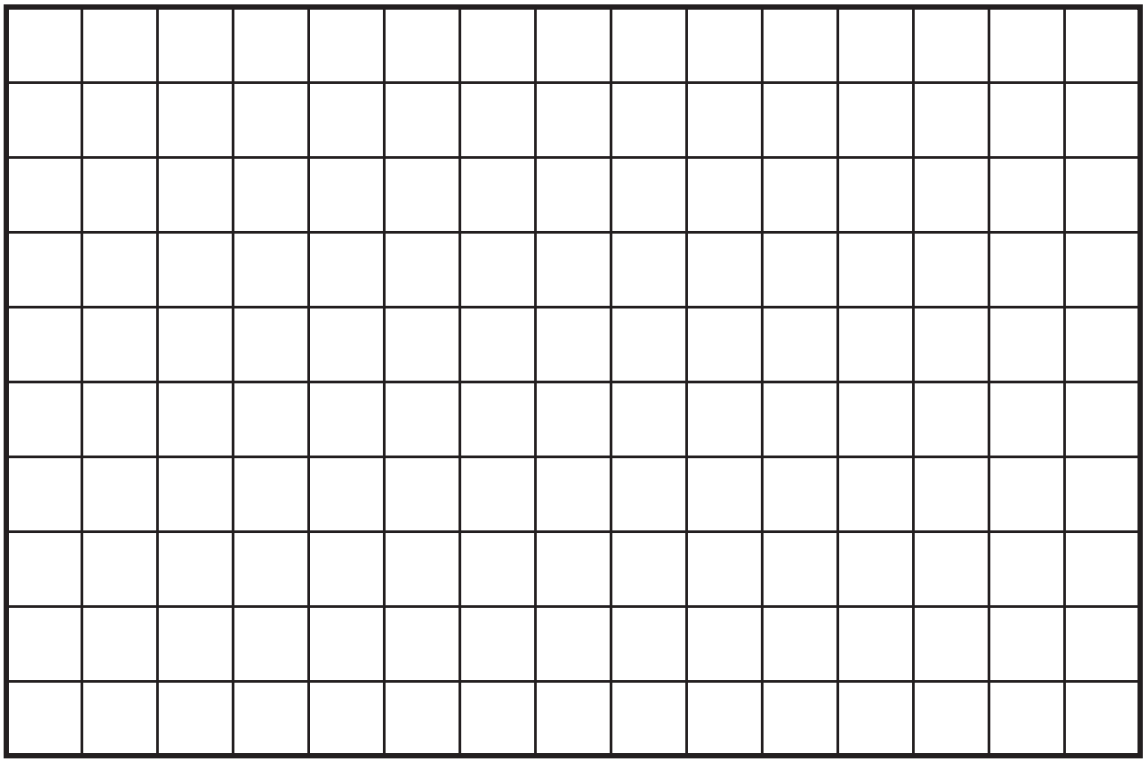
B. Complete Jacob's problem using the break-apart method. Write number sentences to show your work.

Factors, Multiples, and Primes Feedback Box	Expectation	Check In	Comments
Use arrays to solve multiplication and division problems. [Q# 1–2]	E1		
Decide whether one number is a multiple of another. [Q# 3 and 5]	E2		
Find the factors of a number. [Q# 2–6]	E3		
Decide whether a number is prime. [Q# 4 and 6]	E4		
Use break-apart products to solve a math facts problem. [Q# 7]	E9		
Use break-apart products to solve multiplication problems with larger numbers. [Q# 8]	E9		

Name _____ Date _____

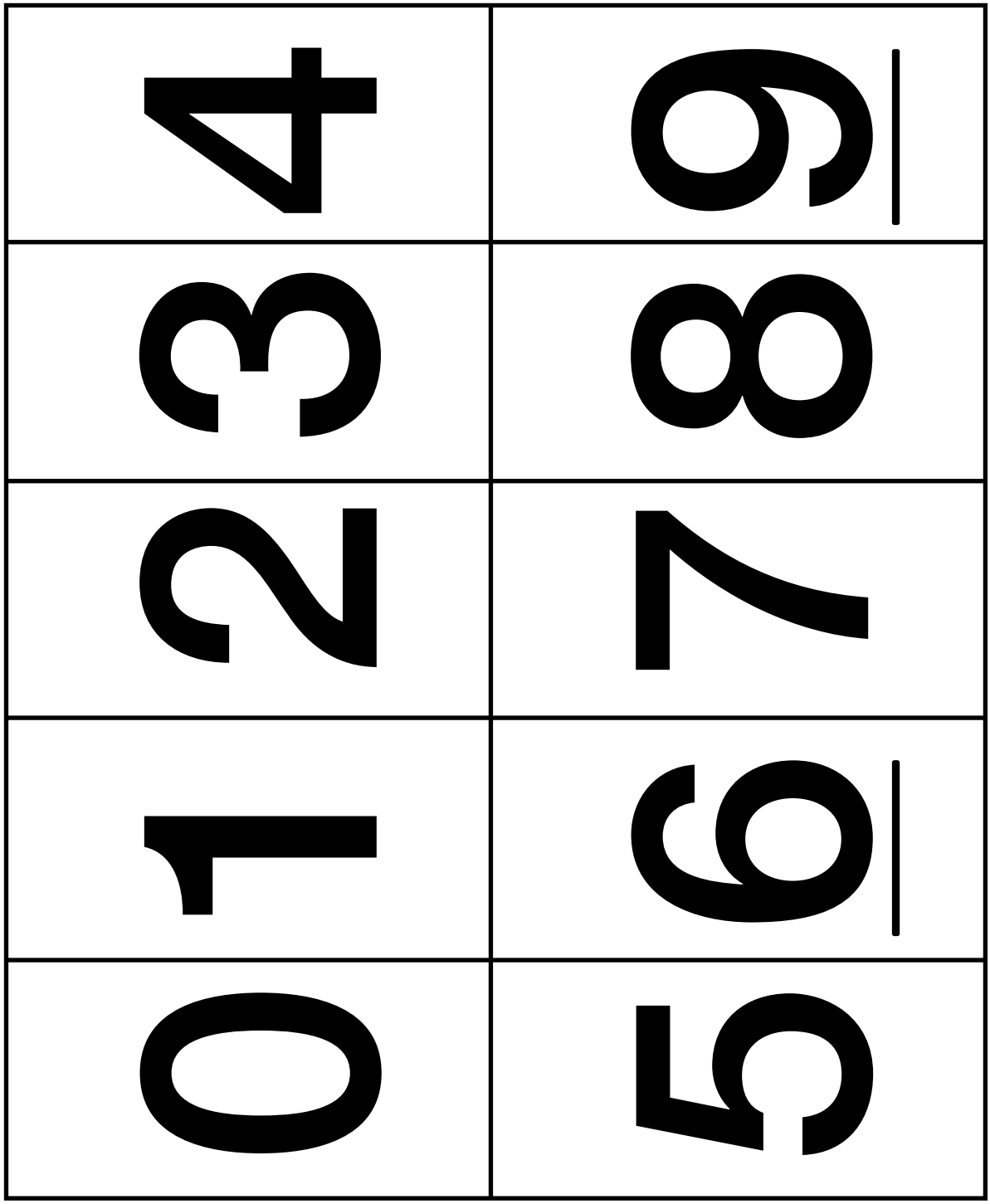
Floor Tiler Grid Paper





Name _____ Date _____

Digit Cards 0–9



Name _____ Date _____

Master

John's Work

2. Describe how you chose numbers for the "Best" game board. Use terms such as "factors," "multiples," and "prime" in your description.

I used all even numbers and no prime numbers. I also made sure the factors on the board are on the spinner.

3. Describe how you chose numbers for the "Worst" game board. Use terms such as "factors," "multiples," and "prime" in your description.

I made a board that was horrible because it has mostly prime numbers and 1 isn't even on the spinner.

4. Play Product Bingo using the game boards you designed. Did your "Best" game board win or not? Explain why.

Yes it did.

	Yes . . .	Yes, but . . .	No, but . . .	No . . .
MPE5. Show my work. I show or tell how I arrived at my answer so someone else can understand my thinking.				

Name _____ Date _____

Tanya's Work

2. Describe how you chose numbers for the "Best" game board. Use terms such as "factors," "multiples," and "prime" in your description.

First, I thought about which numbers can happen on the spinner. It was the numbers with both factors on the spinner like 10, 12, and 20. Then I thought some numbers have more factors on the spinner, like 12 could be 3 × 4 or 6 × 2. I put a lot of those numbers I could think of on my board.

3. Describe how you chose numbers for the "Worst" game board. Use terms such as "factors," "multiples," and "prime" in your description.

Just the opposite of the best board. I picked numbers that don't have factors on the board. Like 22 is 2 × 11, but 11 isn't on the board so it's bad. Or primes don't work either since 1 isn't there, so I picked them a lot.

4. Play Product Bingo using the game boards you designed. Did your "Best" game board win or not? Explain why.

My best board won twice and lost some too. It had a lot of good numbers with factors on the spinner. My worst board lost all the time. It hardly got any beans at all.

	Yes . . .	Yes, but . . .	No, but . . .	No . . .
MPE5. Show my work. I show or tell how I arrived at my answer so someone else can understand my thinking.				

Name _____ Date _____

Unit 3 Test

You may use calculators, multiplication tables, or square-inch tiles to solve the following problems.

1. Tom made a rectangle with 16 tiles. If there were 4 rows, how many tiles were in each row? Sketch a picture of this rectangle.

2. List all the factors of 16. Show how you found your answer.

3. Is 16 a multiple of 4? Show or tell how you know.

4. Is 16 a multiple of 5? Show or tell how you know.

5. Is 16 a prime number? Show or tell how you know.

Name _____ Date _____

6. Is 16 a square number? Show or tell how you know.

7. Is 17 a prime number? Tell how you know.

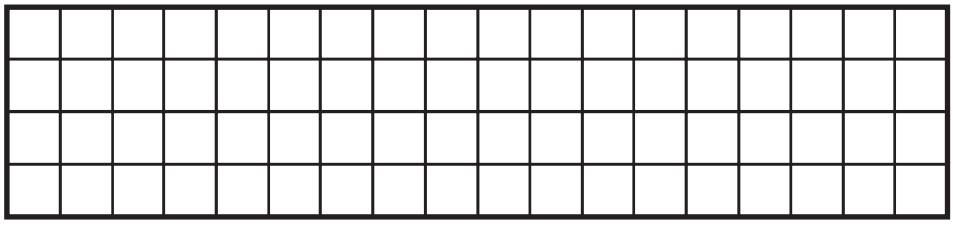
8. Design a box for the TIMS Candy Company that will hold 36 pieces of candy and that has more than two layers. Tell how many layers are in your box. Also, tell how many pieces of candy are in each layer. Each layer must hold the same number of pieces.

9. Use a factor tree to find the prime factors of 60. Write 60 as a product of its prime factors.

Name _____ Date _____

10. Find the number of squares in the rectangle below using the break-apart method.

- Break the rectangle into parts to make it easier to multiply. Write number sentences to show the number of squares in each part.
- Write a number sentence to show how you found the total number of squares in the large rectangle.



Unit 3 Test Feedback Box

	Expectation	Check In	Comments
Use arrays to solve multiplication and division problems. [Q# 1, 8, 10]	E1		
Decide if one number is a multiple of another. [Q# 3, 4, 11]	E2		
Find the factors of a number. [Q# 2]	E3		
Decide if a number is prime. [Q# 5, 7, 11]	E4		
Decide if a number is a square number. [Q# 6, 11]	E5		
Find the prime factorization of a number. [Q# 9]	E6		
Use break-apart products to solve multiplication problems with larger numbers. [Q# 10]	E9		

Name _____ Date _____

11. Solve the following number riddle. Write a paragraph about how you found your answer. Use Math Practices Expectation 5 to help organize your thinking.

I am a multiple of 3.
2 is not one of my factors.
I am not prime and I am not square.
I am less than 20.
What number am I?

Unit 3 Test Q#11 Feedback Box

	Yes . . .	Yes, but . . .	No, but . . .	No . . .
MPE5. Show my work. I show or tell how I arrived at my answer so someone else can understand my thinking.				

Name _____ Date _____

Question 11 Number Riddle

Nicholas's Work

15

	Yes . . .	Yes, but . . .	No, but . . .	No . . .
MPE5. Show my work. I show or tell how I arrived at my answer so someone else can understand my thinking.				

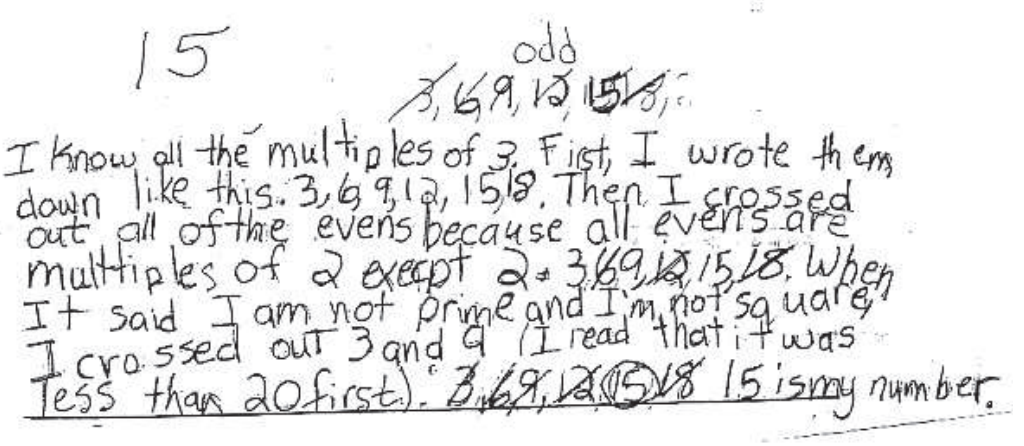
Shannon's Work

	Yes . . .	Yes, but . . .	No, but . . .	No . . .
MPE5. Show my work. I show or tell how I arrived at my answer so someone else can understand my thinking.				

Name _____ Date _____

Question 11 Number Riddle

Jackie's Work



	Yes . . .	Yes, but . . .	No, but . . .	No . . .
MPE5. Show my work. I show or tell how I arrived at my answer so someone else can understand my thinking.				