

Exploring Rules

NCTM Standards 1, 2, 6, 7, 8, 9

1 Complete the Find a Rule (FAR) card set.

A	FRONT	BACK
	5	10

B	FRONT	BACK
	6	11

C	FRONT	BACK
	1	6

D	FRONT	BACK
	20	

E	FRONT	BACK
		55

F	FRONT	BACK
	0	

2 Complete the FAR card set.

A	FRONT	BACK
	△△ △△	1

B	FRONT	BACK
	△△△ △△△ △△	5

C	FRONT	BACK
	△△△ △△△	2

D	FRONT	BACK
	△△ △△ △△	

E	FRONT	BACK
		0

F	FRONT	BACK
	△△△ △△△ △△△	


 3 Look at the FAR cards from either Problem 1 or Problem 2. Write a rule for the cards.

- 4 These FAR cards show the number of tricycles and wheels. Complete the card with missing number.

A

FRONT	BACK
1	3

B

FRONT	BACK
5	15

C

FRONT	BACK
3	9

D

FRONT	BACK
2	6

E

FRONT	BACK
4	

F

FRONT	BACK
6	18

- 5 Make a table to show the data on the cards.

- 6 Complete the sentence.

The front shows the number of _____.

The back shows the number of _____.

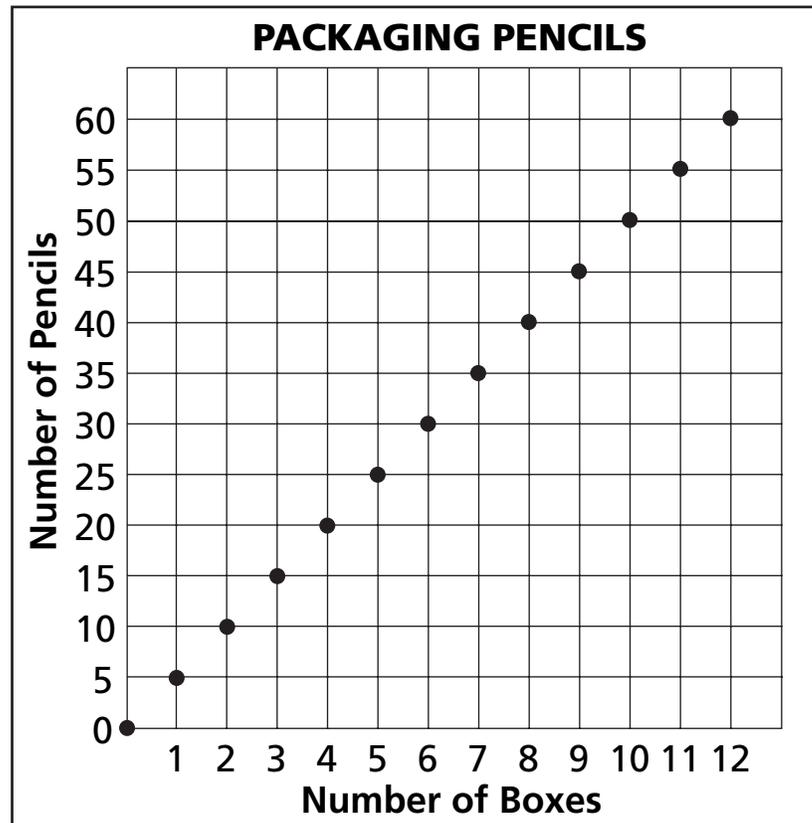


- 7 **Challenge** If you know the number of tricycles, how can you find the number of wheels?

Using Graphs to Find a Rule

NCTM Standards 1, 5, 6, 8, 9, 10

The graph shows how many pencils are in different numbers of boxes. Each box contains the same number of pencils. Use the graph to complete the Find a Rule cards below.



1

BOXES	PENCILS
1	

2

BOXES	PENCILS
2	

3

BOXES	PENCILS
3	

4

BOXES	PENCILS
0	

5

BOXES	PENCILS
11	

6

BOXES	PENCILS
7	

7

BOXES	PENCILS
10	

8

BOXES	PENCILS
	40

9

BOXES	PENCILS
12	

The FAR cards show the costs of different numbers of erasers. Complete the set of cards and then use the cards to complete the graph. Use a dot to mark a point on the graph for each card.

10

ERASERS	COST
3	6¢

11

ERASERS	COST
2	4¢

12

ERASERS	COST
6	12¢

13

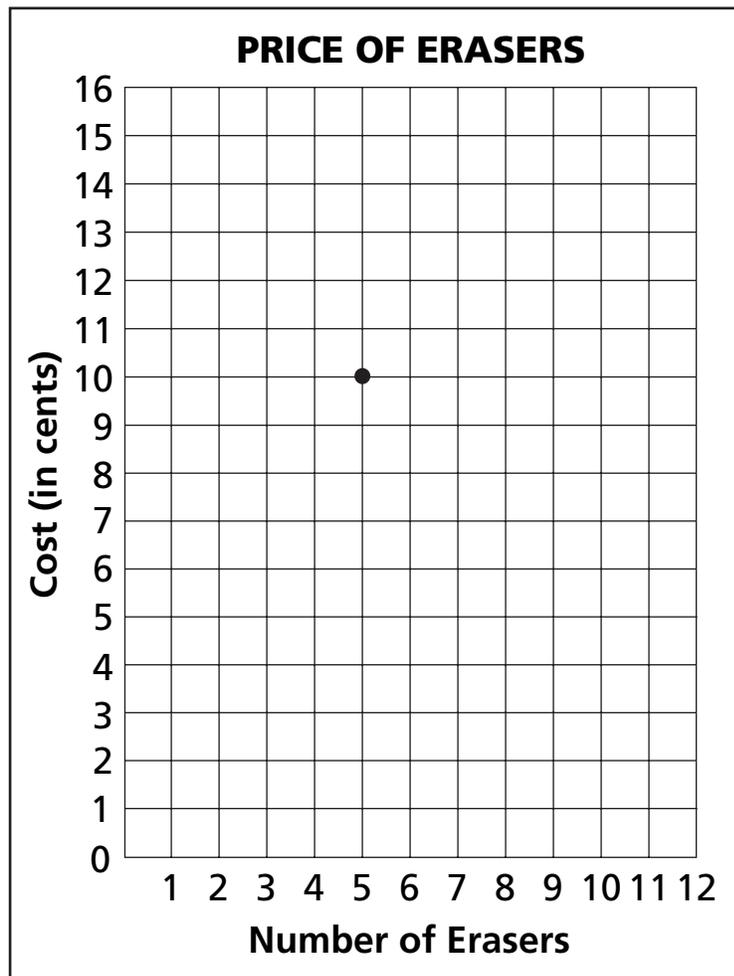
ERASERS	COST
8	

14

ERASERS	COST
7	

15

ERASERS	COST
4	



16 Challenge Erasers now cost twice as much. Mark the prices for 1, 2, 3, and 4 erasers on the graph above with an "x."

Rules That Use More Than One Input

NCTM Standards 1, 2, 6, 7, 8, 9, 10

1 Complete this set of Find a Rule cards.

A

FRONT	BACK
4, 3	1

B

FRONT	BACK
7, 2	5

C

FRONT	BACK
10, 4	6

D

FRONT	BACK
20, 5	

E

FRONT	BACK
17, 3	

F

FRONT	BACK
16, ___	9

G

FRONT	BACK
___, 3	16

H

FRONT	BACK
___, 8	37

I

FRONT	BACK
5, ___	0

2 Complete this set of Find a Rule cards.

A

FRONT	BACK
4, 3	7

B

FRONT	BACK
6, 7	

C

FRONT	BACK
5, 9	14

D

FRONT	BACK
7, 7	14

E

FRONT	BACK
21, 11	

F

FRONT	BACK
___, 5	23

 3 Compare how you found the missing numbers on the back of the cards in Problem 1 to how you found the missing numbers on the back of the cards in Problem 2.

4 Complete this set of Find a Rule cards.

A

FRONT	BACK
8, 2	16

B

FRONT	BACK
10, 2	

C

FRONT	BACK
6, 3	

D

FRONT	BACK
10, 5	50

E

FRONT	BACK
9, 3	27

F

FRONT	BACK
5, 1	

G

FRONT	BACK
9, 9	

H

FRONT	BACK
8, ___	32

I

FRONT	BACK
7, ___	49

5 Sonia collects spiders. Make a table to show the number of spider legs she might have in her collection.

If there are 48 legs, how many spiders are there? _____ spiders

6 **Challenge** Complete this set of Find a Rule cards.

A

FRONT	BACK
7, 3	14

B

FRONT	BACK
4, 8	16

C

FRONT	BACK
1, 12	17

D

FRONT	BACK
6, 4	14

E

FRONT	BACK
9, 12	

F

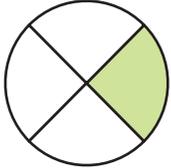
FRONT	BACK
___, 5	19

Finding Rules with Parts and Wholes

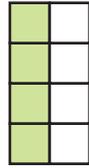
NCTM Standards 1, 2, 6, 7, 8, 9, 10

1 Complete the Find a Rule cards.

A

FRONT	BACK
	Rule A <u>1</u> Rule B <u>4</u>

B

FRONT	BACK
	Rule A <u>4</u> Rule B <u>8</u>

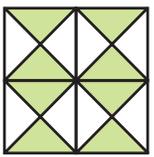
C

FRONT	BACK
	Rule A <u>1</u> Rule B <u>4</u>

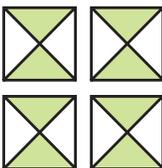
D

FRONT	BACK
	Rule A _____ Rule B _____

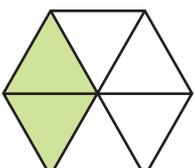
E

FRONT	BACK
	Rule A _____ Rule B _____

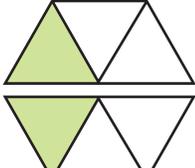
F

FRONT	BACK
	Rule A _____ Rule B <u>16</u>

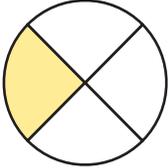
G

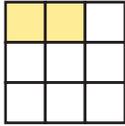
FRONT	BACK
	Rule A _____ Rule B _____

H

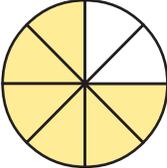
FRONT	BACK
	Rule A _____ Rule B _____

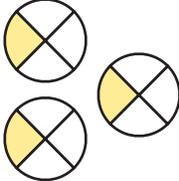
2 Complete the Find a Rule cards.

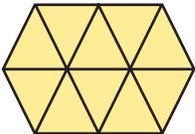
FRONT	BACK	
	Rule C $\frac{1}{4}$	Rule D $\frac{3}{4}$

FRONT	BACK	
	Rule C $\frac{2}{9}$	Rule D $\frac{7}{9}$

FRONT	BACK	
	Rule C $\frac{3}{8}$	Rule D $\frac{5}{8}$

FRONT	BACK	
	Rule C _____	Rule D _____

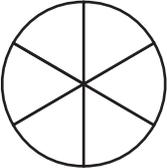
FRONT	BACK	
	Rule C _____	Rule D _____

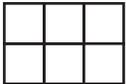
FRONT	BACK	
	Rule C _____	Rule D _____



3 Use pictures, numbers, or words to describe Rule C and Rule D.

4 **Challenge** Use the rules to shade the front of the FAR card.

FRONT	BACK	
	Rule C $\frac{2}{6}$	Rule D $\frac{4}{6}$

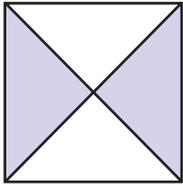
FRONT	BACK	
	Rule C $\frac{5}{6}$	Rule D $\frac{1}{6}$

Recording Rules with Fractions

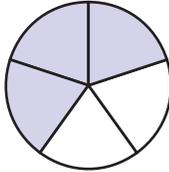
NCTM Standards 1, 2, 6, 7, 8, 9, 10

1 Complete this set of Find a Rule cards.

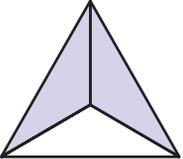
A

FRONT	BACK	
	Rule A $\frac{2}{4}$	Rule B $\frac{2}{4}$

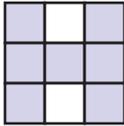
B

FRONT	BACK	
	Rule A _____	Rule B $\frac{2}{5}$

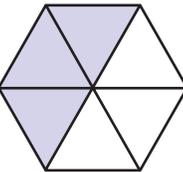
C

FRONT	BACK	
	$\frac{2}{3}$	_____

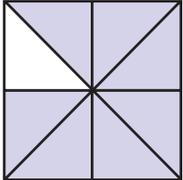
D

FRONT	BACK	
	_____	_____

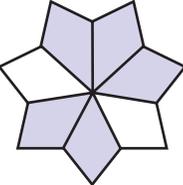
E

FRONT	BACK	
	_____	_____

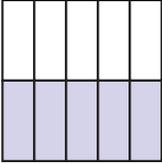
F

FRONT	BACK	
	$\frac{4}{8}$	$\frac{1}{2}$

G

FRONT	BACK	
	$\frac{3}{5}$	$\frac{3}{5}$

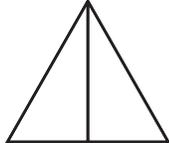
H

FRONT	BACK	
	_____	_____

I

FRONT	BACK	
	$\frac{1}{3}$	$\frac{2}{3}$

J

FRONT	BACK	
	$\frac{1}{2}$	$\frac{1}{2}$

2 Complete this set of Find a Rule cards.

A

FRONT	BACK	
	Rule C $\frac{3}{10}$	Rule D $\frac{5}{10}$

B

FRONT	BACK	
	Rule C $\frac{5}{9}$	Rule D $\frac{3}{9}$

C

FRONT	BACK	
	$\frac{1}{6}$	$\frac{5}{6}$

D

FRONT	BACK	
	$\frac{2}{4}$	_____

E

FRONT	BACK	
	_____	$\frac{2}{5}$

F

FRONT	BACK	
	$\frac{3}{5}$	$\frac{2}{5}$



3 How are the sets of FAR cards on pages 117 and 118 different?

4 **Challenge** Complete this set of Find a Rule cards.

FRONT	BACK
$\frac{1}{3}$	$\frac{2}{3}$

FRONT	BACK
$\frac{1}{4}$	$\frac{3}{4}$

FRONT	BACK
$\frac{3}{5}$	$\frac{2}{5}$

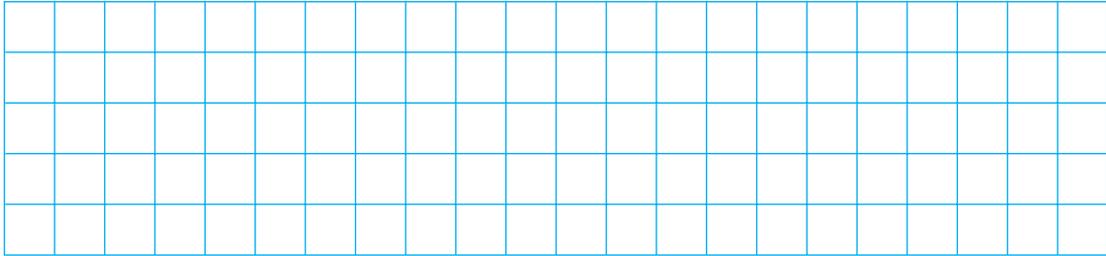
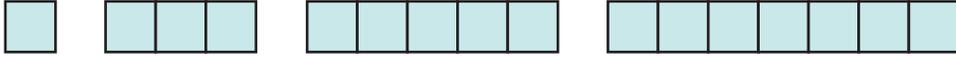
FRONT	BACK
$\frac{4}{6}$	

Patterns in Geometry

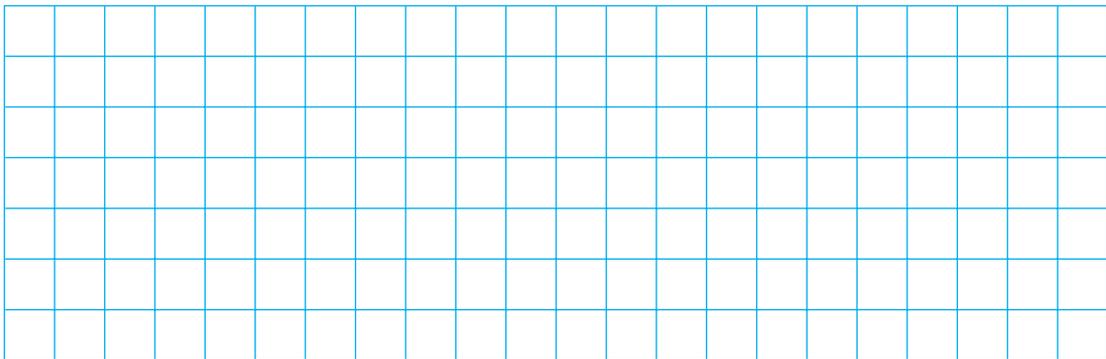
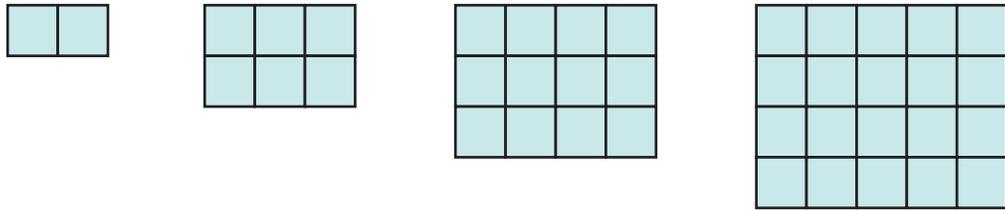
NCTM Standards 2, 3, 6, 7, 8, 9, 10

Draw the next figure following the pattern.
Use the grid below.

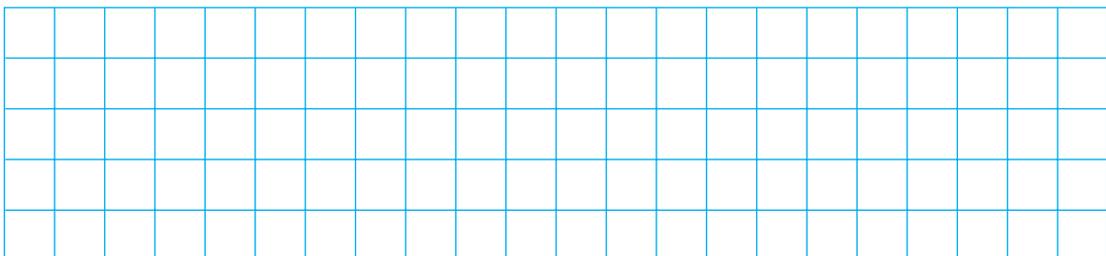
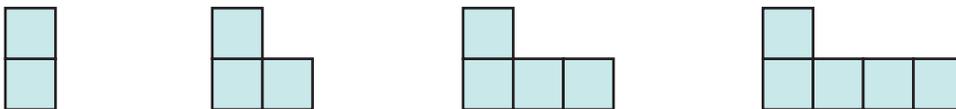
1



2

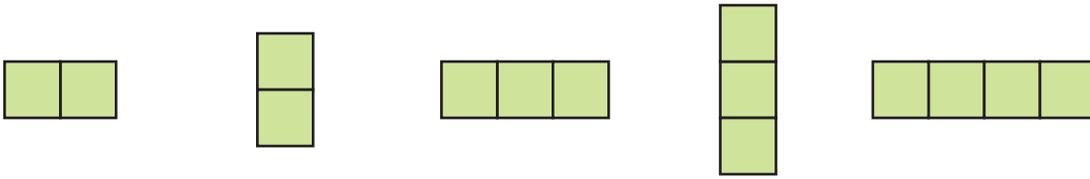


3



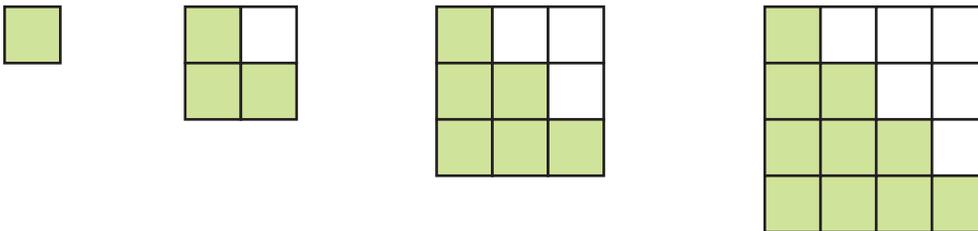
Complete the table to describe the next three figures following the pattern.

4



Total tiles	2	2	3	3	4			
Rows	1	2	1			4		
Columns	2	1	3					

5



Total tiles	1	4	9	16			
Green tiles	1	3	6		15		
White tiles	0	1	3	6			

6 Challenge Lune was watching a kind of cell that splits into 2 new cells every hour. She started watching one cell under a microscope. After 4 hours, how many cells were there? _____ cells

Complete the tables to show how the number of cells increases each hour.

Hours passed	0	1	2	3			
Cells	1	2	4				

Patterns on the Number Line Hotel

NCTM Standards 1, 2, 7, 8, 9, 10

The numbers in the grid are arranged to match the Number Line Hotel. Shade the landing numbers and then find a rule.

1 Start at 0.

60	61	62	63	64	65	66	67	68	69
50	51	52	53	54	55	56	57	58	59
40	41	42	43	44	45	46	47	48	49
30	31	32	33	34	35	36	37	38	39
20	21	22	23	24	25	26	27	28	29
10	11	12	13	14	15	16	17	18	19
0	1	2	3	4	5	6	7	8	9

Find a rule.

2 Start at 99.

90	91	92	93	94	95	96	97	98	99
80	81	82	83	84	85	86	87	88	89
70	71	72	73	74	75	76	77	78	79
60	61	62	63	64	65	66	67	68	69
50	51	52	53	54	55	56	57	58	59
40	41	42	43	44	45	46	47	48	49
30	31	32	33	34	35	36	37	38	39

Find a rule.

The grids are like the Number Line Hotel.
Describe the pattern of shaded squares with
at least 2 different rules.

3

40	41	42	43	44	45	46	47	48	49
30	31	32	33	34	35	36	37	38	39
20	21	22	23	24	25	26	27	28	29
10	11	12	13	14	15	16	17	18	19
0	1	2	3	4	5	6	7	8	9

1. _____

2. _____

4

60	61	62	63	64	65	66	67	68	69
50	51	52	53	54	55	56	57	58	59
40	41	42	43	44	45	46	47	48	49
30	31	32	33	34	35	36	37	38	39
20	21	22	23	24	25	26	27	28	29

1. _____

2. _____

5 Challenge Make your own pattern and write your rule.

20	21	22	23	24	25	26	27	28	29
10	11	12	13	14	15	16	17	18	19
0	1	2	3	4	5	6	7	8	9

Finding Rules for Sharing Machines

NCTM Standards 1, 2, 6, 7, 9, 10

Sharing Machine A shares objects equally between two people. Complete the table.

	Contents of Each Input Package	Number of Packages That Come Out	Contents of Each Output Package
1	12 cookies	2	6 cookies
2	8 dimes	2	
3	_____erasers		11 erasers
4			9 carrots
5	14 plums		

- 6 Write a division sentence to show what the machine will do with 14 plums.

$$\square \div \square = \square$$

Sharing Machine B shares objects equally among three people. Complete the table.

	Contents of Each Input Package	Number of Packages That Come Out	Contents of Each Output Package
7	_____ cookies	3	6 cookies
8	33 bananas	3	
9			8 crayons
10	27 toy trucks		

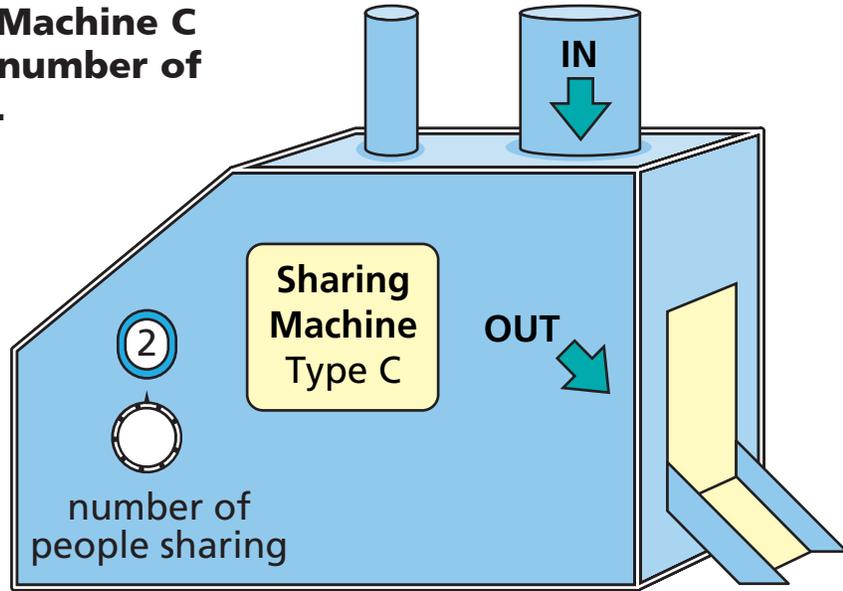
- 11 Write a division sentence to show what the machine will do with 27 toy trucks.

$$\square \div \square = \square$$

Numa opened a package and there were 7 marbles inside.

- 12 If the package came from machine A, how many marbles had been put in? _____ marbles
- 13 If the package came from machine B, how many marbles had been put in? _____ marbles

The setting for Sharing Machine C can be changed for the number of people who are sharing. Complete the table.



	Contents of Each Input Package	Number of Packages That Come Out	Contents of Each Output Package
14	12 prizes	2	6 prizes
15	_____ marbles	3	6 marbles
16	16 apples		8 apples
17	_____ video games	4	4 video games
18	_____ pickles	25	3 pickles
19	88 stickers	8	
20	Challenge 42 toys		2 toys

More Rules with Sharing Machines

NCTM Standards 1, 2, 6, 7, 8, 9, 10

Complete the price chart for items at the class store.

		NUMBER PURCHASED				
		1	2	3	4	5
1	Erasers at _____ ¢ each	2¢	4¢	6¢	¢	¢
2	Pencils at _____ ¢ each	¢	6¢	9¢		
3	Pads at _____ ¢ each	5¢		15¢		
4	Notebooks at _____ ¢ each			24¢	32¢	
5	Paper clips at _____ ¢ each		14¢	21¢		
6	Markers at _____ ¢ each				40¢	
7	Pens at _____ ¢ each		30¢		60¢	
8	Rulers at _____ ¢ each	¢	\$1.00	\$	\$2.00	\$



- 9 Which two items cost the same as one notebook? Use pictures, numbers, or words to explain how you can use this information to find the cost of different numbers of notebooks.

Solve.

- 10 Shauna bought 42 tickets for the fair. Each ride costs 6 tickets. How many rides can she go on?

_____ rides

- 11 Ken bought 50 tickets for the fair. Each ride costs 6 tickets. How many rides can he go on?

_____ rides

- 12 Marina is baking cupcakes for a party. She wants to make as many cupcakes as possible. The recipe calls for 2 eggs for every 3 cups of flour. If Marina uses a whole bag of flour that contains 9 cups, how many eggs will she need?

_____ eggs

- 13 Pete finished a 42-page book in 6 days by reading the same number of pages every day. Next, he will read a book that is 35 pages long. If Pete keeps reading the same number of pages every day, how many days will it take Pete to finish this book?

_____ days

- 14 **Challenge** A certain card game, with its own special deck, requires that all players start with an equal number of cards. Players must share all the cards in the deck. This game can be played by 2, 4, or 5 players. There are fewer than 30 cards in this special deck. How many cards are there?

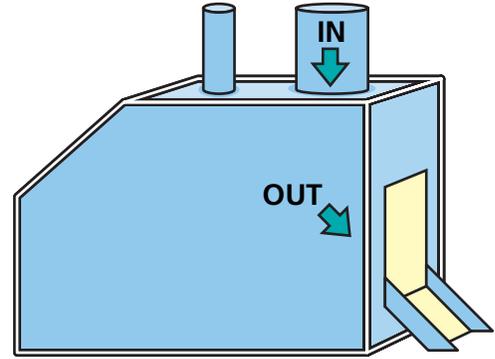
_____ cards

Finding a Rule for an Unusual Machine

NCTM Standards 1, 2, 3, 6, 7, 8, 9, 10

1 Find a rule for this unusual machine and complete the table.

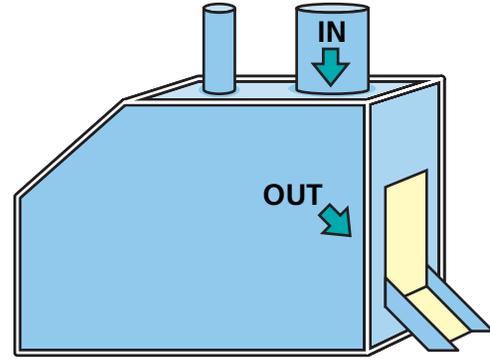
INPUT	OUTPUT
	8
	3
	4
	6
	11



2 Write a rule for the machine.

- 3 Find a rule for this new machine and complete the table.

INPUT	OUTPUT
30¢	two apples and 10¢
37¢	two apples and 17¢
68¢	two apples and 48¢
45¢	two apples and _____ ¢
	one apple and 6¢
	two apples and 37¢
10¢	
23¢	
77¢	
	two apples and 84¢



- 4 **Challenge** Tory had 78¢, and then she spent 59¢ at the store. She found a nickel on the way out of the store. Does she have enough money to buy an orange for 23¢? Explain.

Problem Solving Strategy

Look for a Pattern

NCTM Standards 1, 2, 6, 7, 8, 9, 10



Solve each problem.

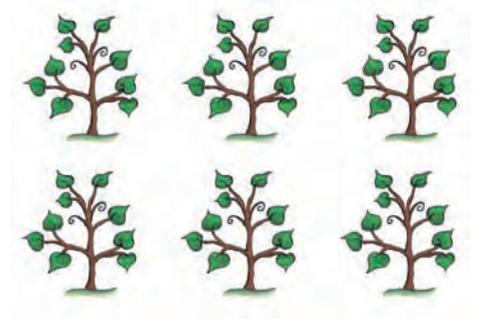
- 1 Shivani's parents use a pattern to decide the weekly allowance that she will be paid during a year. The table shows the weekly allowance she has been paid at each age since she was 5 years old. How much allowance will Shivani receive each week when she is 10 years old? _____

Age	5	6	7	8	9	10
Allowance	\$1	\$3	\$6	\$10	\$15	

- 2 Cindy adds to her garden each year. The first year, her garden had 2 rows of 3 plants and looked like the garden on the right.

Each year, she adds another row. How many plants will she have the fourth year?

_____ plants



- 3 Timothy and his friends went on a week-long biking trip. They biked 15 miles on the first day. On each of the remaining 6 days, they biked 20 miles. The table shows the total number of miles the friends biked by the end of each day. How many miles long was their trip? Complete the table. _____ miles

Day	1	2	3	4	5	6	7
Total number of miles biked	15	35		75			

Problem Solving Test Prep

Choose the correct answer.

1 The flower shop sold 396 red roses and 229 pink roses this month. Which is the best estimate for the number of roses the flower shop sold this month?

- A. 200 C. 600
B. 400 D. 700

2 Donald buys a snack and receives the coins shown below in change. What is the total value of the coins?



- A. 72¢ C. 87¢
B. 82¢ D. 95¢

3 Bianca has 7 equal rows of stamps. She has 42 stamps in all. Which number sentence can be used to find the number of stamps in each row?

- A. $7 \times \square = 42$
B. $7 \div \square = 42$
C. $42 \div 7 = \square$
D. $42 \times 7 = \square$

4 Tina buys 5 puzzles. Lorenzo buys 6 puzzles. How much do they pay?

Puzzles	2	3	4	5	6
Cost	\$12	\$18	\$24		

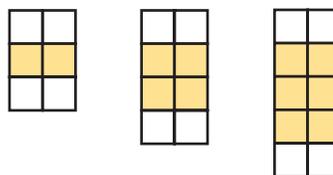
- A. \$30, \$36
B. \$28, \$32
C. \$26, \$28
D. \$25, \$26

Show What You Know

Solve the problem. Explain your answer.

5 Jamal made this pattern with square tiles.

Draw the next figure in Jamal's pattern.



Review/Assessment

NCTM Standards 1, 2, 3, 6, 7, 9, 10

The table describes a set of Find a Rule cards.
Find a rule and complete the table. *Lessons 1 and 3*

1

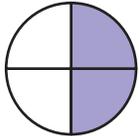
FRONT	BACK
1	5
2	10
3	15
4	
5	

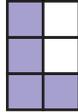
2

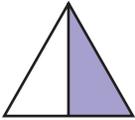
FRONT	BACK
8, 5	3
15, 8	
11, 5	6
23, 19	4
12, ____	

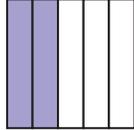
Complete the set of Find a Rule cards. *Lesson 4*

3

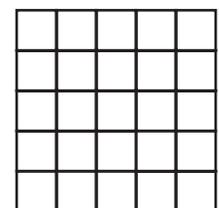
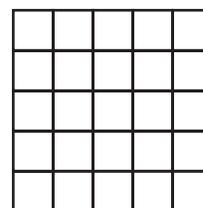
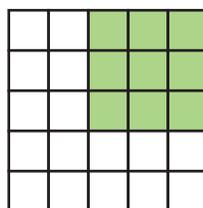
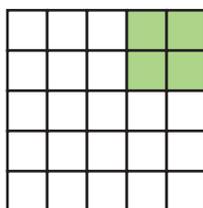
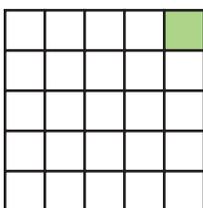
FRONT	BACK
	Rule A 2 _____
	Rule B 4

FRONT	BACK
	Rule A 4 _____
	Rule B 6

FRONT	BACK
	Rule A 1 _____
	Rule B 2

FRONT	BACK
	Rule A _____
	Rule B 5

4 Continue the pattern by shading the fourth and fifth grids. *Lesson 6*



- 5 The numbers in the grid are arranged to match the Number Line Hotel. Find a rule and shade the landing numbers. [Lesson 7](#)

30	31	32	33	34	35	36	37	38	39
20	21	22	23	24	25	26	27	28	29
10	11	12	13	14	15	16	17	18	19
0	1	2	3	4	5	6	7	8	9

Find a rule.

- 6 Sharing Machine A shares objects equally between 2 people. Complete the table.

Write a division sentence to show what Sharing Machine A will do with 18 apples. [Lesson 8](#)

$$\square \div \square = \square$$

SHARING MACHINE A	
INPUT	OUTPUT
6 quarters	3 quarters
20 cookies	10 cookies
	12 raisins
	15 pretzels
14 marbles	

Solve.

- 7 Todd has 24 trading cards. The cards are in packs of 8. How many packs of cards does Todd have? [Lesson 9](#)
-

- 8 Amy gave her sister 2 pennies on Monday. On Tuesday, she gave her sister 4 pennies. On Wednesday, she gave her sister 8 pennies. If the pattern continues, on which day of the week will Amy give her sister 64 pennies? [Lesson 11](#)
-