

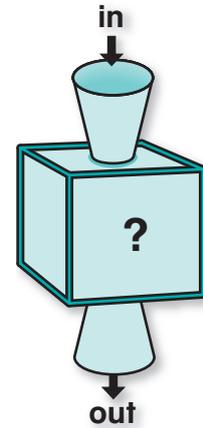
Exploring Rules and Patterns

What is the Rule? 

STEP 1 Completing the Table

What numbers are missing?

in	1	2	3		5		7
out	3	4	5	6		8	



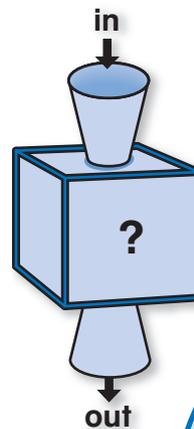
STEP 2 Describing the Rule

What is the rule for the machine? _____

Explain how you know.

STEP 3 Creating a New Rule

Think of a rule for this machine.



Complete the table.

in	1	2	3	4	5		
out							





School-Home Connection

Dear Family,

Today we started Chapter 15 in *Think Math!* In this chapter, I will use patterns to identify rules for rule machines. I will also use rules to explore how to convert different kinds of measurement units. There are NOTES on the Lesson Activity Book pages to explain what I am learning every day.

Here are some activities for us to do together at home. These activities will help me learn to recognize patterns and figure out rules to describe them.

Love,

Family Fun

What's My Number?

Play this game with your child. Your child will also play this game in class.

- The first player picks a secret number smaller than 30.
- The second player tries to guess the number. For each guess, the first player responds with "too big," "too small," or "that's right" and records the number in a table like the one shown below.

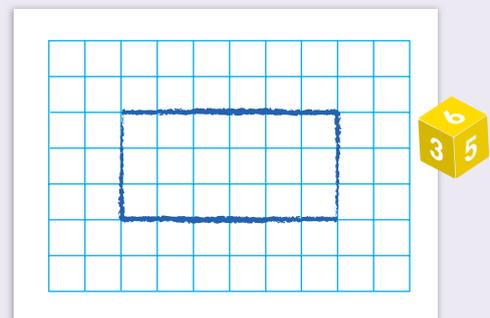
Too big	Too small	That's it!
25	10	15
20	13	

- When the second player guesses the secret number, players switch roles and play a new game.

Making Rectangles

Work with your child to practice making rectangular arrays.

- You will need grid paper and a number cube.
- Take turns tossing the number cube two times to determine the number of rows and the number of columns in a rectangular array. Draw the array on the grid paper.

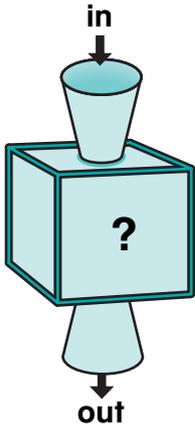


Identifying Rules

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

What is missing?
What is the rule?

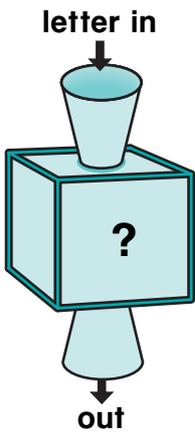
1.



in	23	57	54	79		
out	20	54	51		63	37

The rule is _____.

2.



in	A	F	Q	W		
out	C	H	S		V	L

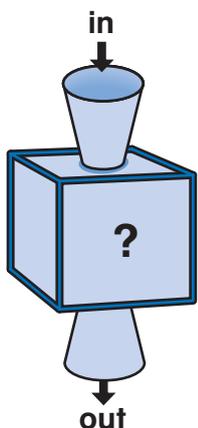
The rule is _____.



NOTE: Your child is learning to identify rules for rule machines by looking at inputs and outputs. Ask your child to explain how he or she found the rule for Problem 2.

What is missing?
What is the rule?

3.



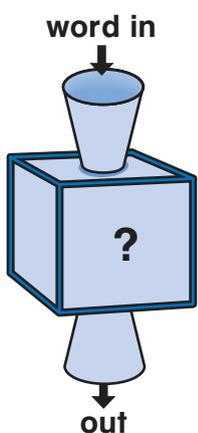
in	40	12	31	27		
out	63	35	54		84	23

Use a calculator to help.



The rule is _____.

4.



in	clown	foot	rule	three	plus	
out	c	f				a

The rule is _____.

Challenge

5. Use the rule machine in Problem 4.
What words give **w** as an output?

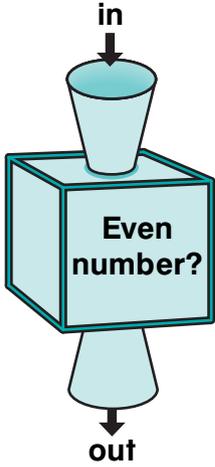
four wood add flew
west if saw
then swim why six with

Sorting Rules

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

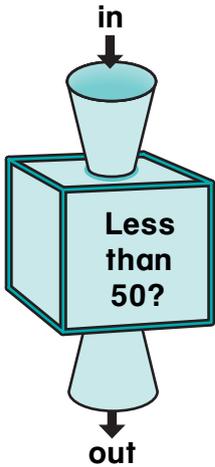
What is missing?

1.



in	2	53	31	99	20	
out	yes	no	no			no

2.



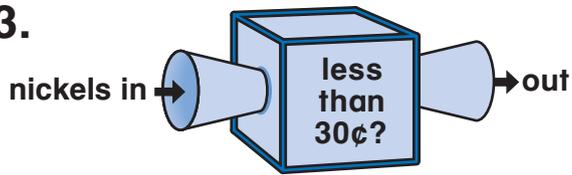
in	31	78	3	49	53	
out	yes	no	yes			yes



NOTE: Your child is learning that rules can be used for sorting. Ask your child to explain how the machine in Problem 1 sorts numbers.

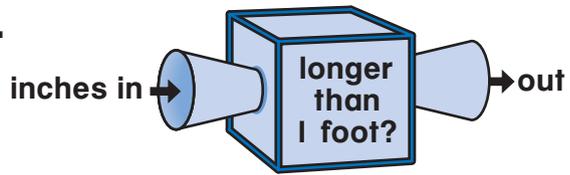
What is missing?

3.



in	out
1	yes
2	yes
6	no
3	
7	
	no

4.



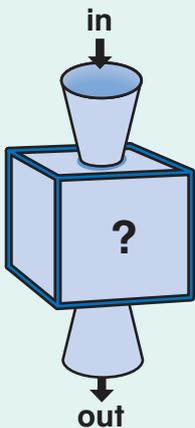
in	out
6 in.	no
14 in.	yes
9 in.	no
11 in.	
24 in.	
	yes

12 inches = 1 foot



Challenge

5. What is missing?
What is the rule?



in	5	2	10	4	
out	11	5			7

The rule is _____.

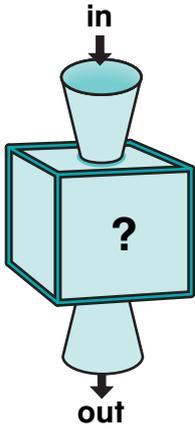


Undoing Rules

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

Write the missing numbers.
What is the rule?

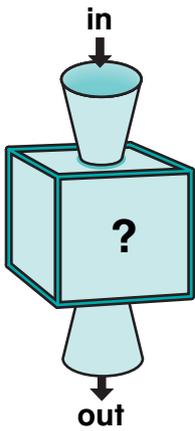
1.



in	20	15	40	33		
out	30	25	50		60	13

The rule is _____.

2.



in	67	40	25	80		
out	57	30			50	31

The rule is _____.

3. What do you notice about the rules for Problems 1 and 2?

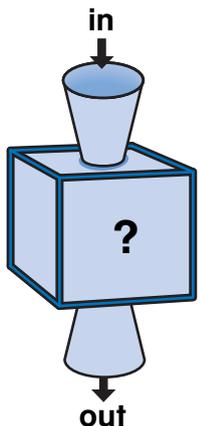


NOTE: Your child is exploring rules that undo each other.

Ask your child to explain how the rules in Problems 1 and 2 are alike and how they are different.

Write the missing numbers.
Use a calculator if you like.
What is the rule?

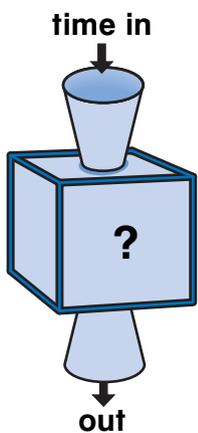
4.



in	2	10	9			12
out	20	28		38	18	

The rule is _____.

5.



in	12:00	1:30	4:00	:	:	7:00
out	12:30	2:00	:	1:30	5:00	:

The rule is _____.

Challenge

6. Write rules to undo the rules in Problem 4 and Problem 5.

Problem 4 _____

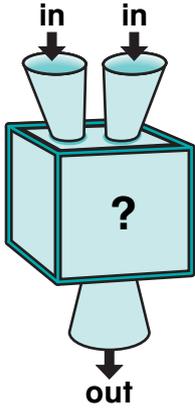
Problem 5 _____

Rules with More Than One Input

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

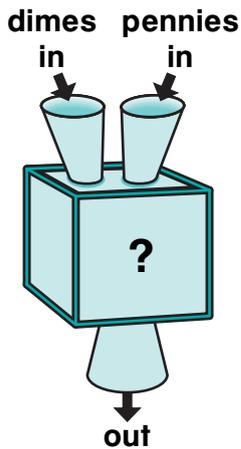
What is missing?

1.



in	6	10	15	20	17	48
in	2	8	5	15		
out	4	2	10		13	18

2.



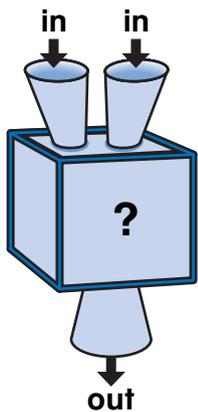
D	1	2	5	3	4	
P	1	3	0	9	8	
¢	11¢	23¢	50¢	¢	¢	99¢



NOTE: Your child is learning to apply rules with more than one input. Ask your child to explain the rule in Problem 2.

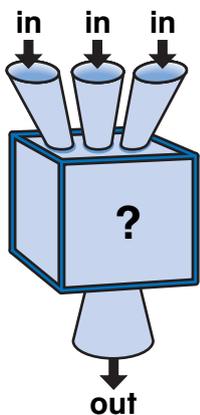
Write the missing numbers.

3.



in	1	5		33	67	
in	3	7	51	35	69	
out	2	6				55

4.



in	5	14	79	40	25	10
in	8	23	76	12	15	6
in	20	6	70	18	5	
out	20	23	79			10

Challenge

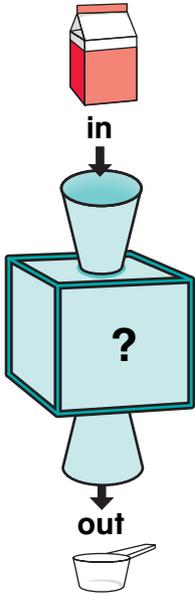
5. If I know an output for Problem 3, then I know both inputs because

Conversion Rules

NCTM Standards 1, 2, 3, 4, 6, 7, 8, 9, 10

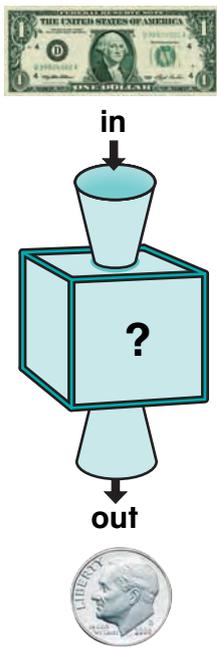
Write the missing numbers.

1.



Number of pints	1	2	3	4	7	
Number of cups	2	4	6			20

2.



\$1	1	2	3	4		10
D	10	20	30		80	



NOTE: Your child is learning to convert from one unit to another. Ask your child to explain how he or she solved each of the problems.

Write the missing numbers.
Use a calculator if you like.

3.

Number of quarters	1	2	3	6	10	4	
Number of nickels	5	10	15				25

4.

Number of gallons	1	3	10	2	5	6	
Number of quarts	4	12	40				16

Challenge

5.

Number of yards	1	2	3	5	7	
Number of feet	3	6	9			18

6. What is the rule? _____

 7. Explain how you found the missing numbers.

Skip-Counting with Money

NCTM Standards 1, 2, 4, 6, 7, 8, 9, 10

Pattern Block Prices					
					
1¢	2¢	3¢	4¢	5¢	6¢

Use the prices above.
How much will the blocks cost?

- | | | |
|--|--|--|
| <p>1. 
8
_____¢</p> | <p>2. 

_____¢</p> | <p>3. 

_____¢</p> |
| <p>4. 

_____¢</p> | <p>5. 

_____¢</p> | <p>6. 

_____¢</p> |
| <p>7.  and 

_____¢</p> | | |
| <p>8.  and 

_____¢</p> | | |

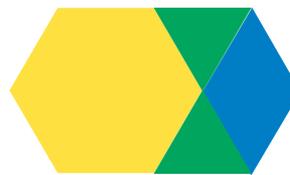


NOTE: Your child is skip-counting to find the prices for groups of pattern blocks. Ask your child to explain how he or she found the value of the blocks in Problem 7.

Use the Pattern Block Prices from page 317.

9. Kyra bought 4 blocks.
They cost 20¢.
What color blocks did Kyra buy? _____

10. Jamal bought these blocks.
He paid with a dollar bill.



How much did the blocks cost? _____¢

How much was his change? _____¢

11. Sue bought twice as many  as .
She spent 16¢.
What did she buy?

_____  and _____ 

12. Dex bought one kind of block.
He paid 18¢.
What color could his blocks be?

_____ or _____

Problem Solving

13. Tamara spent 12¢. She got 3 blocks.
They were **not** all the same.
What color could her blocks be?

_____, _____, and _____

Creating Figures and Patterns

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

Complete each table.

1. I am making fish.



Number of fish	1	2	3	4	5	6
Cost of 	3¢	6¢	9¢			
Cost of 	2¢	4¢	6¢			
Total cost	5¢	10¢				

2. I am making computers.



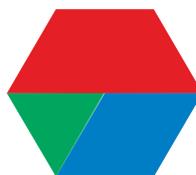
Number of computers	1	2	3	4	5	6
Cost of 	4¢					
Cost of 	1¢					
Total cost	5¢					



NOTE: Your child is learning to look for patterns to help find sums. Ask your child to describe a pattern in Problem 1.

Complete each table.

3. I am making fancy hexagons.



Number of hexagons	1	2	3	4	5	6
Cost of 						30¢
Cost of 				12¢		
Cost of 			6¢			
Total cost						

4. I am making houses.



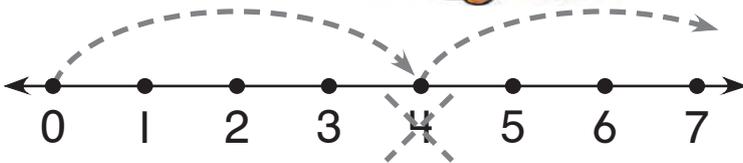
Number of houses	1	2	3	5	7	10
Cost of 	5¢					
Cost of 	4¢					
Total cost	9¢					

Patterns with Skip-Counting

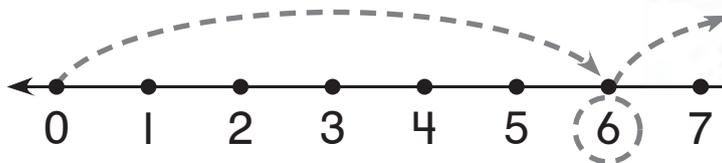
NCTM Standards 1, 2, 6, 7, 8, 9, 10

I. Skip-count on the grid below.
Mark jumps of 4 and 6.

Mark jumps of 4 with an X.



Mark jumps of 6 with an O.



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

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NOTE: Your child is looking for patterns while skip-counting. Ask your child to describe any patterns in the grid above.

2. Skip-count on the grid below.
 Mark jumps of 8 with an X.
 Mark jumps of 7 with an O.

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

3. Look at the grid in Problem 2.
 Where do the jumps meet?

Find .

Problem Solving

4. What numbers are missing?

I start at 0.

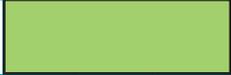
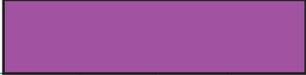
I make _____ jumps of 6 or _____ jumps of 7

to get to _____.

Relating One-Color Trains

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

Write the missing numbers.

1.			
	is as long as		
2.			
	is as long as		
3.		are as long as	
			
4.		are as long as	
5.		are as long as	



NOTE: Your child is exploring multiples by building Cuisenaire® Rod trains using the same color blocks. Ask your child to explain how he or she solved Problem 3.

Write the missing numbers.

6.

1 is as long as _____.

2 are as long as _____.

are as long as 6 _____.

7.

3 _____

are as long as _____

or _____

 8. What pattern do you notice in Problem 7?

Challenge

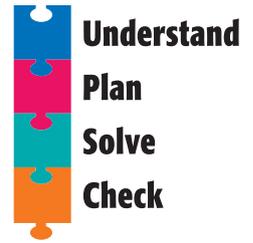
9. Build matching trains. Write the missing numbers.

		6	9	12		30	
	2				12		10

Problem Solving Strategy

Work Backward

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



1. Joe had some money.
He got 27¢ more.
He spent 15¢.
Now he has 27¢.
How much money did Joe start with?

_____¢

2. Wilbur collects stuffed toy bears.
He got 2 new bears every year.
When he was 10 years old, he had 20 bears.
How many bears did he have
when he was 4 years old?

_____ bears

3. Paula makes quilts.
Each year she makes 1 less quilt
than she did the previous year.
This year she made 3 quilts.
How many quilts did she make 4 years ago?

_____ quilts



NOTE: Your child is using the strategy, *work backward*, to solve problems. Ask your child to explain how he or she solved the problems on this page.



Problem Solving Test Prep

1. Lin puts 12 red and white flowers in a vase. There are 4 more red flowers than white flowers. How many red flowers are there?

(A) 4 (C) 8
(B) 6 (D) 12

2. Ethan makes items for the craft fair. He makes 3 bookmarks and 4 cards each day. How many items will he make in 3 days?

(A) 3 (C) 7
(B) 4 (D) 21



Show What You Know

3. Hannah has 12 square tiles. How many different rectangles can she make?

_____ rectangles

Use words, numbers, or pictures to explain.

4. Kate skip-counts by twos. Dan skip-counts by threes. They both start at 0. What is the first number both Kate and Dan will say?

Explain how you found the answer.

Chapter 15

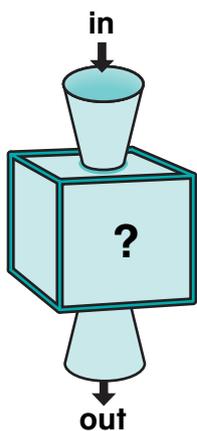
Review/Assessment

NCTM Standards 1, 2, 3, 4, 6, 7, 8, 9, 10

Write the missing numbers.

What is the rule? Lessons 1, 2, 3, and 4

1.



in	4	12	10		2	21
out	8	16	14	5		

The rule is _____.

Write the missing numbers. Lesson 5

2.

Number of quarts	1	2	3	5		7	
Number of cups	4	8	12		40		16

What is the cost? Lessons 6 and 7

3. One of these costs _____¢.

4. Three of these cost _____¢.



Skip-count on the grid below. Lesson 8

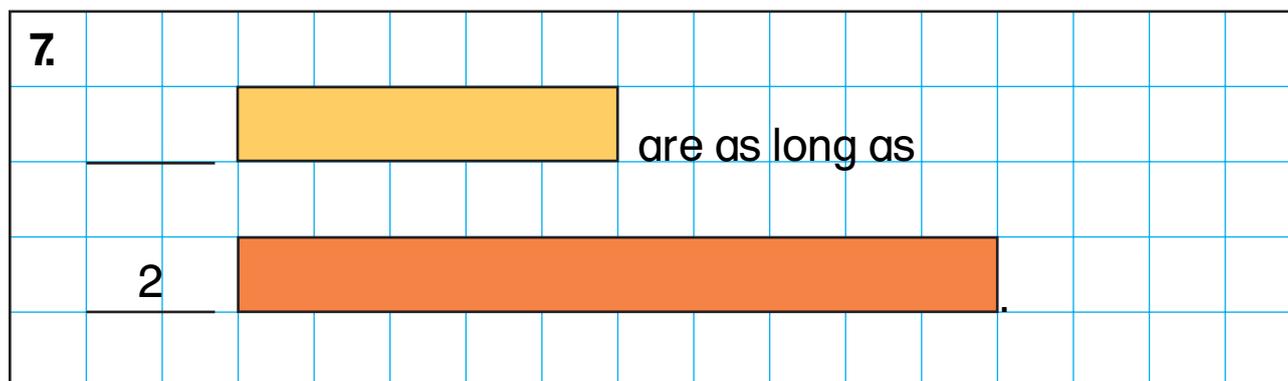
5. Mark jumps of 3 with an X.
Mark jumps of 4 with an O.

1	2	3	4	5	6	7	8	9	10
11	12	13	14	15	16	17	18	19	20
21	22	23	24	25	26	27	28	29	30

6. Where do the jumps above meet? Lesson 8

Find .

Write the missing number. Lesson 9



Problem Solving Lesson 10

8. Carla had some coins.
She found 23¢ more.
Then she spent 12¢.
Now Carla has 26¢.
How much did Carla start with?

_____¢