Chapter 13

Lesson 1

Name _____ Date _____

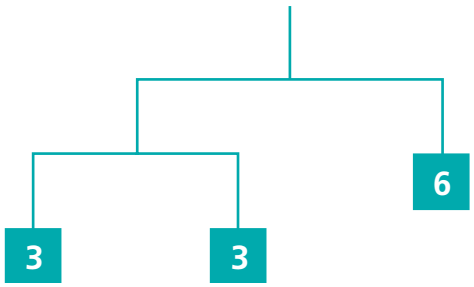
Introducing Mobiles

NCTM Standards 1, 2, 7, 9, 10

1 Rubin balanced some, but not all of the arms of a mobile. Write the letter of the diagram for Rubin's unbalanced mobile. _____

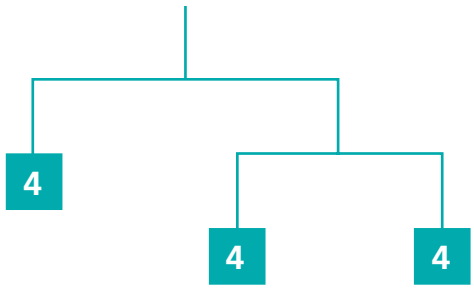
Mobile A

Total Weight: 12



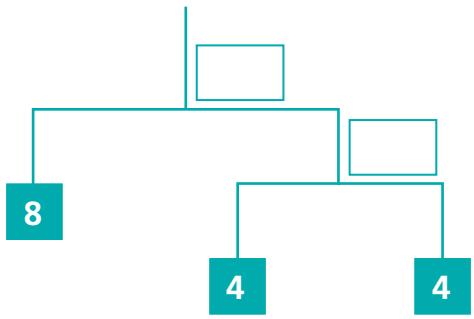
Mobile B

Total Weight: 12

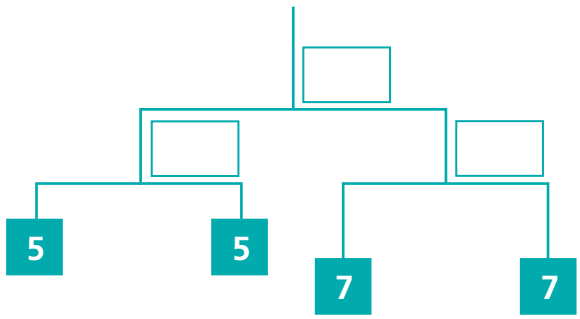


Write *yes* or *no* at each arm to show if it is balanced. Write the total weights.

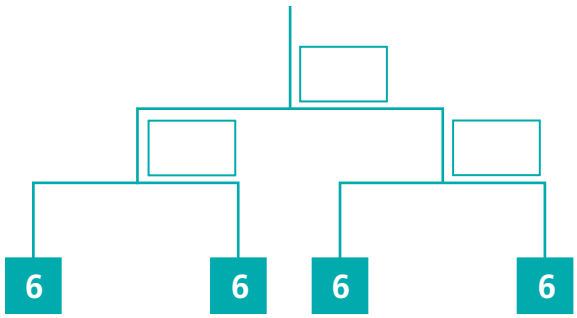
2 Total Weight: _____



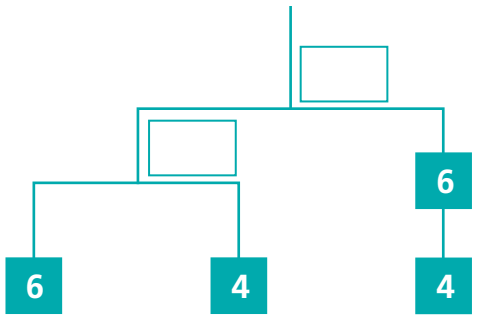
3 Total Weight: _____



4 Total Weight: _____

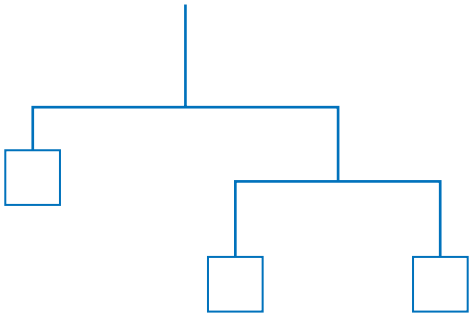


5 Total Weight: _____

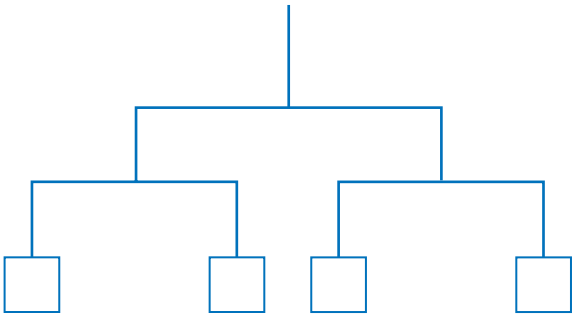


Complete the mobiles so that they are balanced.

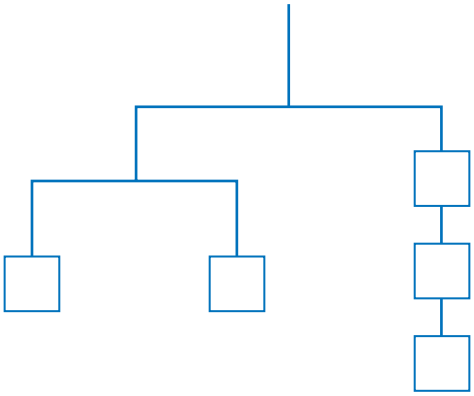
7 Total Weight: 28



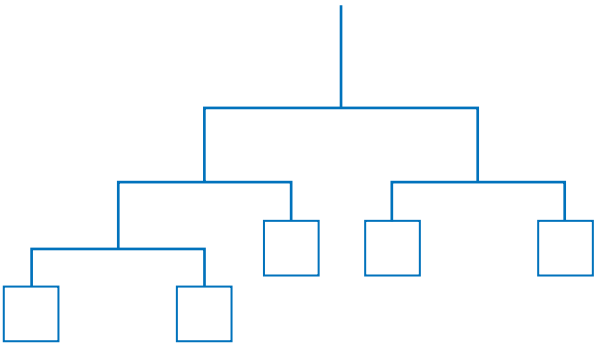
8 Total Weight: 48



9 Total Weight: 32

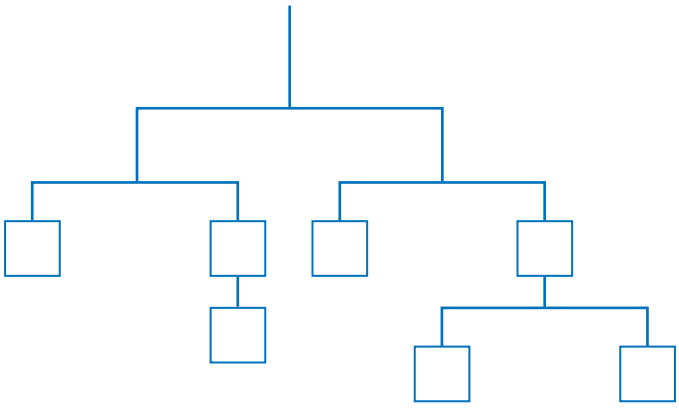


10 Total Weight: 72



11 Challenge Make up your own balanced mobile for any number that is a multiple of 4.

Total Weight: _____



Chapter 13

Lesson 2

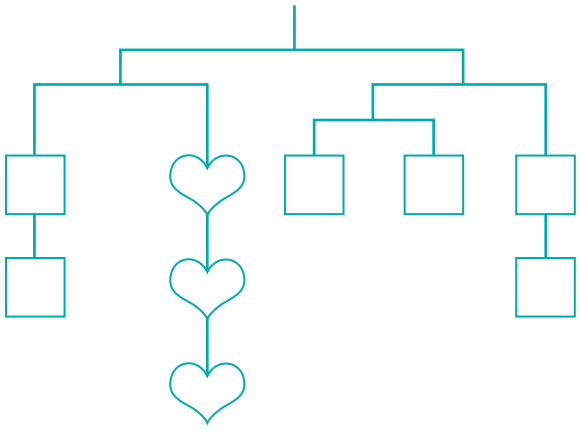
Name _____ Date _____

Balancing Mobiles

NCTM Standards 1, 2, 7, 8, 9

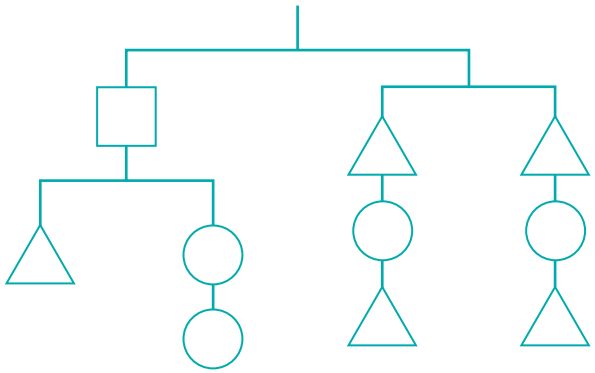
Solve these mobile puzzles.

1 Total Weight: 48



□ = ____ ♡ = ____

2 Total Weight: 60



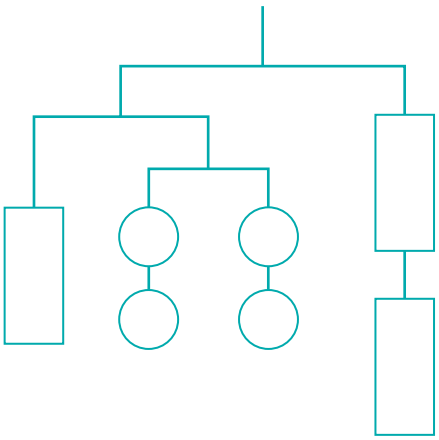
□ = 18

○ = ____

△ = ____

3 Solve this mobile puzzle and explain how you solved it.

Total Weight: 16



▯ = ____ ○ = ____

Explanation:

_____

_____

_____

_____

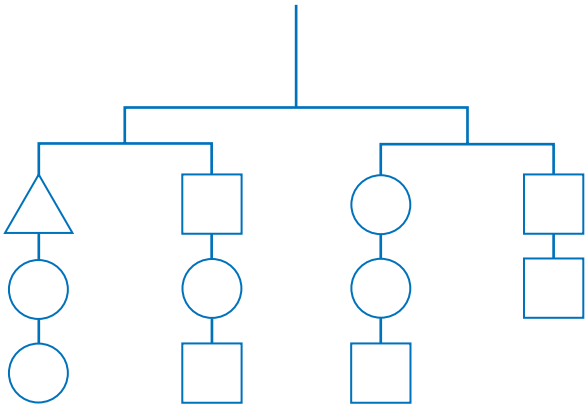
_____

4 Martina made a balanced mobile with a total weight of 40.

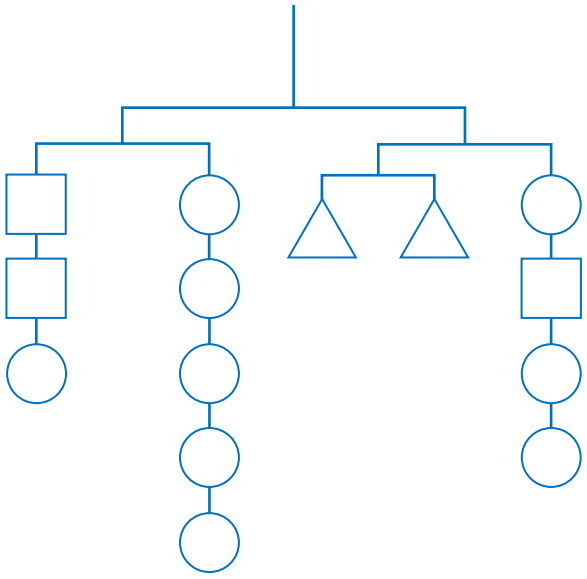
Each □ = 4, each ○ = 2, and each △ = 5.

Write the letter of the correct diagram of Martina's mobile. _____

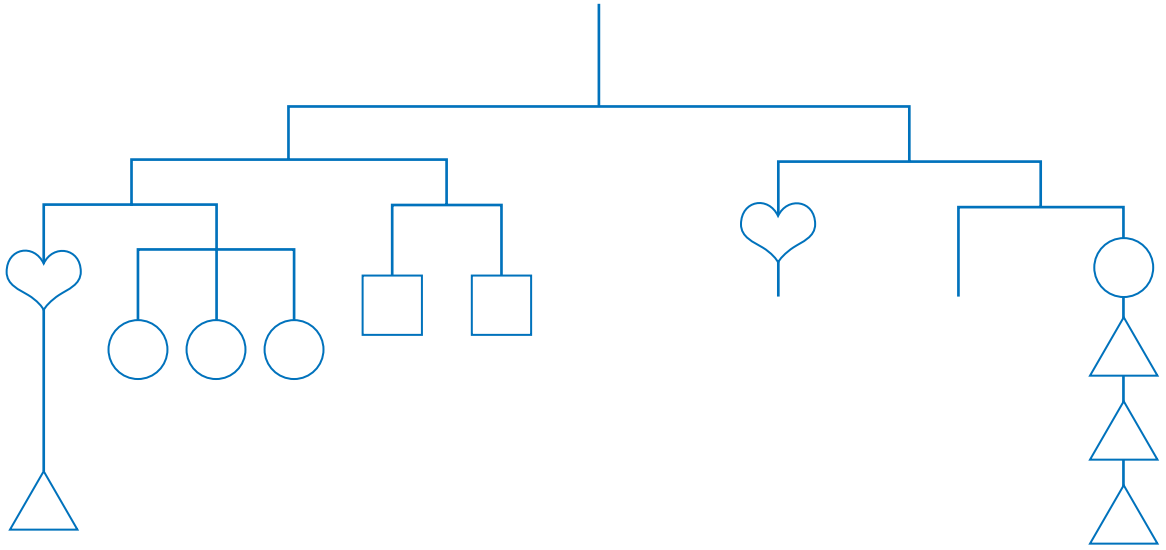
Mobile A



Mobile B



5 **Challenge** Complete this mobile so that it balances and its total weight is 72.



□ = _____ ○ = _____ ♡ = _____ △ = _____

Chapter 13

Lesson 3

Name _____ Date _____

Equations for Mobiles

NCTM Standards 1, 2, 7, 8, 9

Write an equation to describe each mobile.

△ weight = t

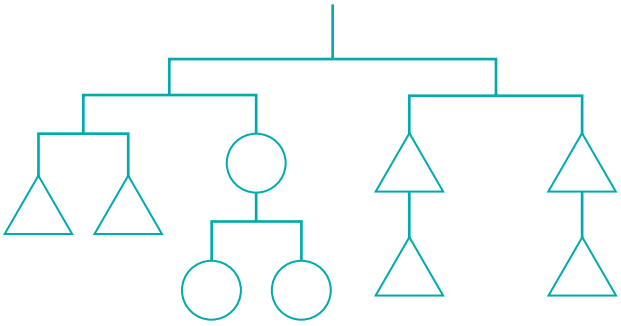
○ weight = c

▭ weight = r

⬠ weight = p

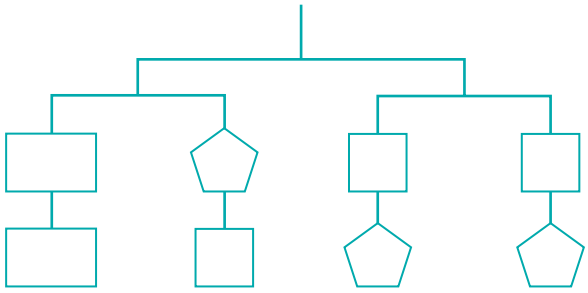
□ weight = s

1 Total Weight: 48



Equation: _____

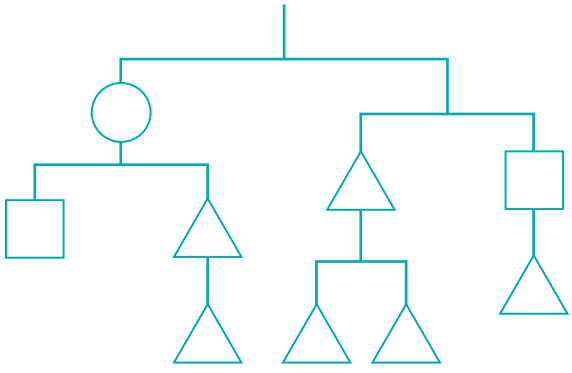
2 Total Weight: 24



Equation: _____

3 Write three equations that describe the mobile and find the weight of each shape.

Total Weight: 48



Equations:

_____

_____

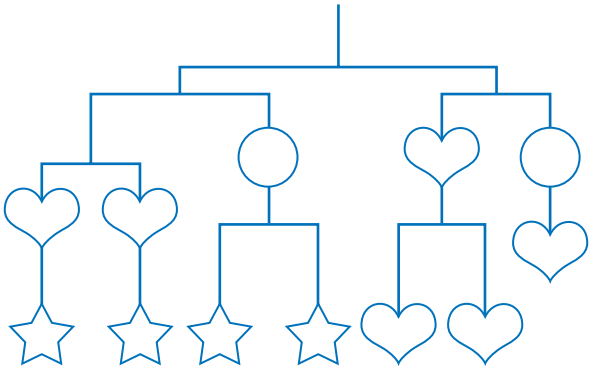
_____

□ = ____ ○ = ____

△ = ____

Find the weight of each shape.

4 Total Weight: 48

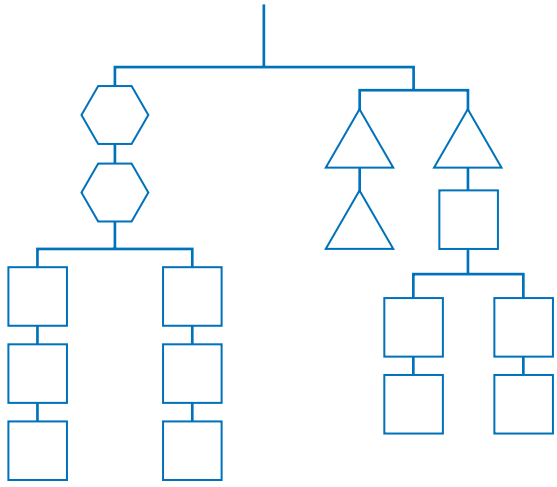


= ____

= ____

= ____

5 Total Weight: 40

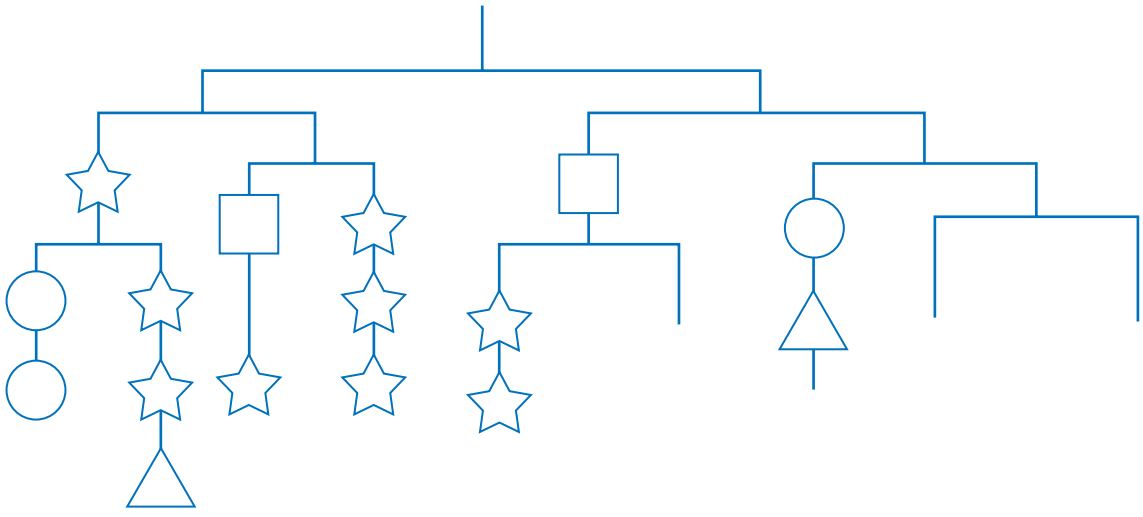


= ____

= ____

= ____

6 Challenge Find the weight of each shape, and then complete this mobile so it balances and its total weight is 96.



= ____

= ____

= ____

= ____

Chapter 13

Lesson 4

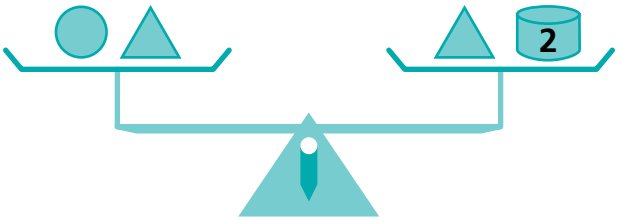
Name _____ Date _____

Balance Puzzles

NCTM Standards 1, 2, 7, 9, 10

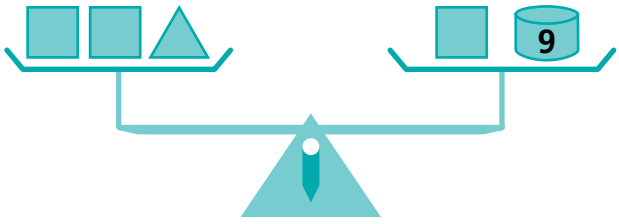
Solve these balance puzzles.

1



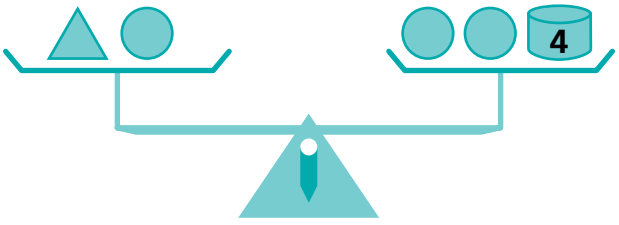
△ = 1 ○ = ____

2



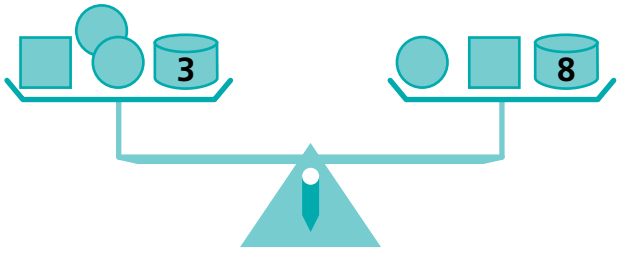
△ = 3 □ = ____

3



△ = ____ ○ = $3\frac{1}{2}$

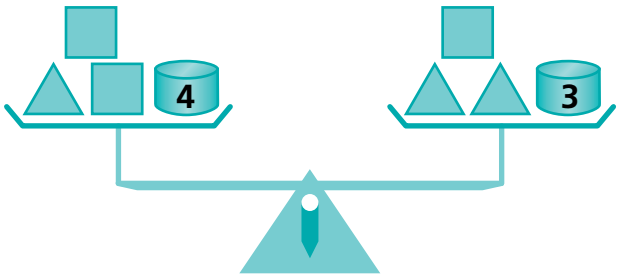
4

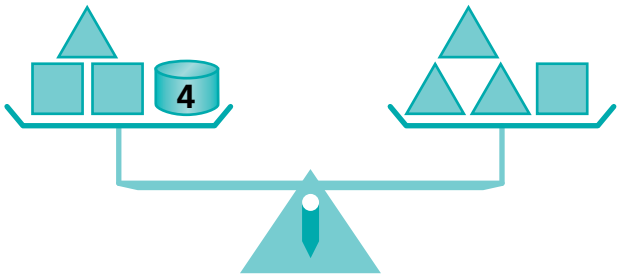


○ = ____

5 Laurel wrote the following equation: 3△ + □ = △ + 2□ + 4

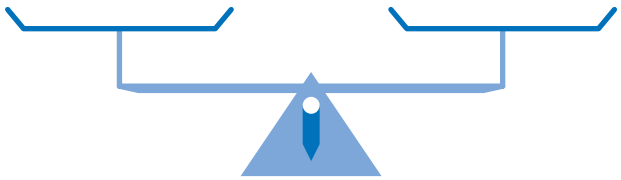
She sketched two diagrams of balance puzzles. Select and circle the diagram that matches the equation.



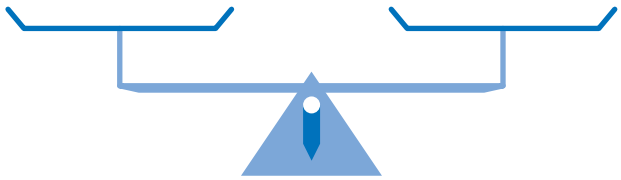


Draw shapes in the balances to represent these equations.

6 $2s + c = c + 8$

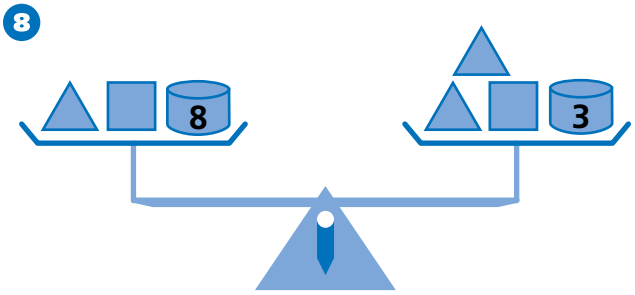


7 $c + s + 2t = t + 2s + 3$



Write equations for these balance puzzles. Can you find the weights of any of the shapes (triangle or square)?

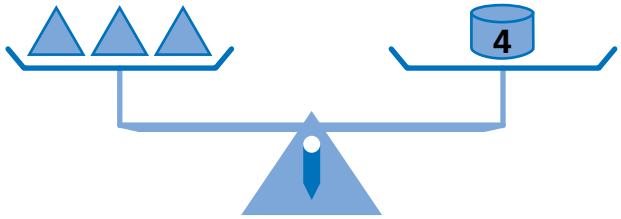
8



Equation: _____

Shape weights: _____

9

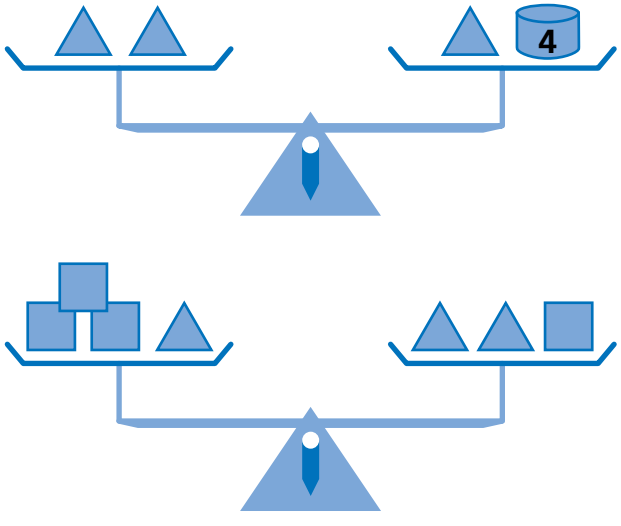


Equation: _____

Shape weights: _____

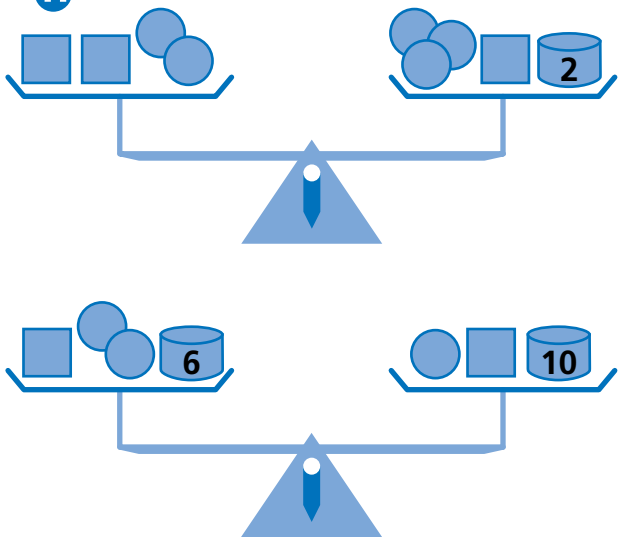
Challenge Each pair of puzzles has enough information for you to find the weights of both kinds of blocks. Find the weights!

10



▲ = ____ ■ = ____

11



● = ____ ■ = ____

Chapter 13

Lesson 5

Name _____ Date _____

Number Tricks

NCTM Standards 1, 2, 6, 7, 9

Seon Hwa and Se Ri drew diagrams for some steps of different number tricks. As you can see, they did not agree. Select and circle the correct diagram for each step.

	Words	Seon Hwa's Diagram	Se Ri's Diagram
1	Multiply a number by 3		
2	Multiply a number by 2 and add 6		
3	Add 2 to a number and multiply the sum by 3		

Here's another number trick.

4 Complete the table, first by choosing any number. Then, figure out the starting number if the result is 59.

Words	Diagram	Shorthand	Number	
1. Pick a whole number.		*N*		
2. Multiply the number by 2.				
3. Add 3.				
4. Multiply by 5.				
5. Subtract 6.				59

5 When using this trick, what can you do to the final result to find the original number?

_____

6 For a fundraiser, Grades 3, 4, and 5 at Michael's school sold pool and beach toys. Together they raised $934! The fifth graders raised $52 more than the third graders, and the fourth graders raised $30 more than the third graders.

Fill in this table to find how much each grade raised.

Grade	Picture	Shorthand	Amount Raised
3		x	$
4	 $30		$
5			$
All three grades			$934

7 **Challenge** For another fundraiser, the third graders raised $23 more than the fifth graders, and the fourth graders raised $71 more than the fifth graders. Together, they raised $1,054. How much did each grade raise? Explain.

Grade 3: ☐ **Grade 4:** ☐ **Grade 5:** ☐

Chapter 13

Lesson 6

Name _____ Date _____

Making Diagrams

NCTM Standards 2, 8, 10

Draw a diagram to illustrate each situation.

1. There were ***P*** people standing in line to buy movie tickets.

2. There were ***P*** people standing in line and then my friend and I got in line, too.

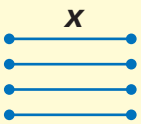
3. John put on a puppet show for his family. He set out a row of 5 chairs for them to sit in.

4. John decided to invite some friends, too, so he added some rows. Every row had 5 chairs.

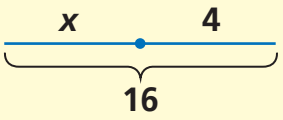
5. John's mother invited a few of her friends. She added 2 chairs to each row.

6 Fill in the table below to match the diagrams with the shorthand.

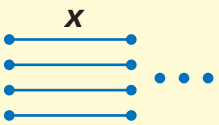
A



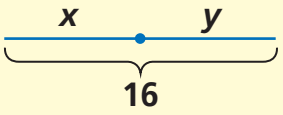
B



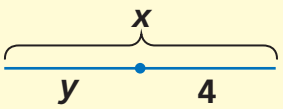
C



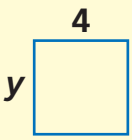
D



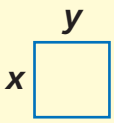
E



F



G



M $x + y = 16$

N $4x$

O $x + 4 = 16$

P $y + 4 = x$

Q $4x + 3$

R xy

S $4y$

Diagram	A	B	C	D	E	F	G
Shorthand							

Pick a diagram from above that represents the situation.

7 Jennifer arranged some chairs into 4 rows. Each row had the same number of chairs.

Diagram _____

8 Misao laid two boards together, end-to-end. One of the boards was 4 feet long. How long were they together?

Diagram _____

9 Challenge Write a situation that fits Diagram C.

_____

_____

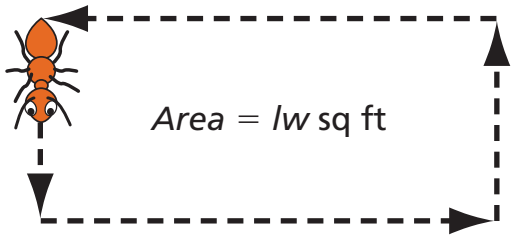
Chapter 13
Lesson 7

Name _____ Date _____

Equations for Stories

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

An ant crawled from one corner of a rectangular room, along all four walls, and ended back where it started. One dimension was *l* feet, one dimension was *w* feet, and it took *lw* square-foot tiles to cover the floor.



1 Complete the table.

l	10		20	15			17	
w	15	9				8		
Area (*lw*)		108	340	225	77			143
Perimeter (2*l* + 2*w*)						34	60	

2 The ant crawled along 3 walls and had 11 feet to go before reaching its starting place. The trip around the three walls had been 25 feet. What are the room's dimensions? Explain your answer.

_____

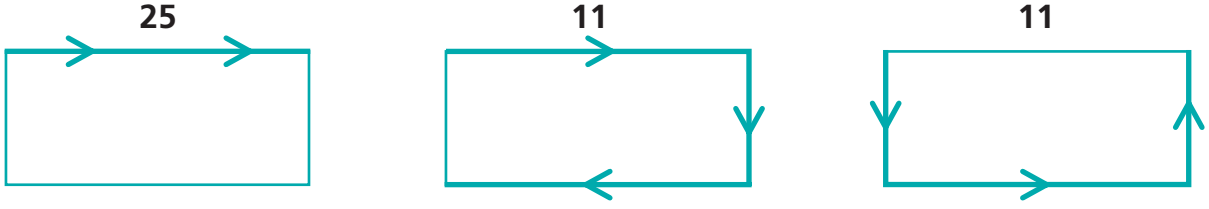
_____

_____

_____

_____

3 Select and circle a diagram that correctly represents Problem 2.



At the science museum, adult tickets cost $10, and child tickets cost $7.

4 Mrs. Nikula took some fourth graders to the museum. Circle the number sentence that best describes the total cost of the tickets. *T* stands for the total cost; *C* stands for the number of children in the group. Remember, Mrs. Nikula bought herself a ticket, too!

$T = 10C + 7$ $T = 7C + 10K$

$K = 7C$ $T = 7C + 10$

5 Several families visited the museum together. Write an equation to describe the total cost of tickets. Use *T* to stand for the total cost, *A* to stand for the number of adults in the group, and *C* to stand for the number of children.

_____

6 Two different groups visited the museum. Each group paid $121 for their tickets. The two groups did not have the same number of children. How many adults and children were in each group?

	Group 1	Group 2
Adults		
Children		

7 Challenge The museum changed its ticket prices. Now, three child tickets cost the same as two adult tickets. A group of 5 adults and 6 children paid $108.

One adult ticket costs $_____, one child ticket

costs $_____. Explain how you found your answer.

_____

_____

_____

_____

_____

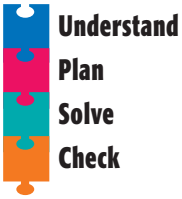
Chapter 13
Lesson 8

Name _____ Date _____

Problem Solving Strategy and Test Prep

Work Backward

NCTM Standards 1, 2, 5, 6, 7, 8, 9, 10



1 Vlad enjoyed inventing number tricks for his friends. He gave this one to Lecia.

- Pick a whole number.
- Add 10.
- Multiply by 3.
- Subtract 12.
- Divide by 3.
- Tell me your result, and I'll tell you your starting number

Lecia's result was 14. What was her starting number? _____

---

2 Vlad has a younger brother, Sergi. Sergi is half the age of their sister, Katya. Katya is two years older than their sister, Sonya. Sonya is half Vlad's age. Vlad is 16. How old is Sergi?

_____

---

3 Abby, Belinda, Charles, and Ernie each brought some cars to Dante's house. They decided to make teams of their cars and have races. When they put the cars together, they noticed that Abby had one more car than Charles, Belinda had one more than Abby, Dante had one more than Belinda, and Ernie had one more than Dante! When they shared their cars, each friend had 5 cars for their team. How many cars did each of the friends have at first?

Abby: _____ cars Belinda: _____ cars Charles: _____ cars

Dante: _____ cars Ernie: _____ cars

Problem Solving Test Prep

Choose the correct answer.

1 Kara had $\frac{1}{8}$ pound of sugar left after making a cake. She used $\frac{1}{4}$ pound of sugar for the batter and $\frac{1}{8}$ pound of sugar for the icing. How much sugar did Kara start with?

A. 1 pound **C.** $\frac{1}{2}$ pound

B. $\frac{3}{4}$ pound **D.** $\frac{3}{8}$ pound

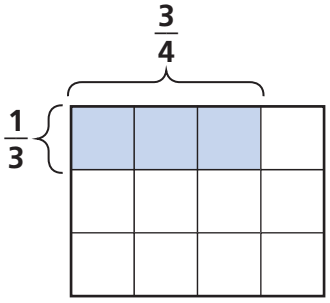
2 Which is the only measure that is **not** one of the numbers in the set?

2, 2, 4, 4, 4, 5, 6, 7, 8

A. mean **C.** mode

B. range **D.** median

3 Which product is shown by the model?



A. $\frac{1}{12}$ **B.** $\frac{1}{4}$ **C.** $\frac{1}{3}$ **D.** $\frac{3}{4}$

4 Marco's dog weighs 34 pounds. Since its birth, it has gained 33 pounds and lost 1 pound. How much did Marco's dog weigh when it was born?

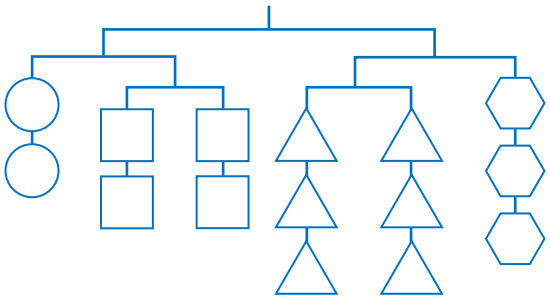
A. 1 pound **C.** 3 pounds

B. 2 pounds **D.** 4 pounds

Show What You Know

Solve each problem. Explain your answer.

5 The total weight of the mobile is 48 pounds. Write the shapes in order from lightest to heaviest.



6 An amusement park charges $16 admission. Special rides are *S* dollars each. Write an equation to find the total cost, *T*, including *W* special rides. If you spent $30 in all and special rides cost $2 each, how could you use your equation to find the number of special rides you went on?

Chapter 13

Name _____ Date _____

Review/Assessment

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

1 Circle the equations that agree with the mobile. Lessons 1–3

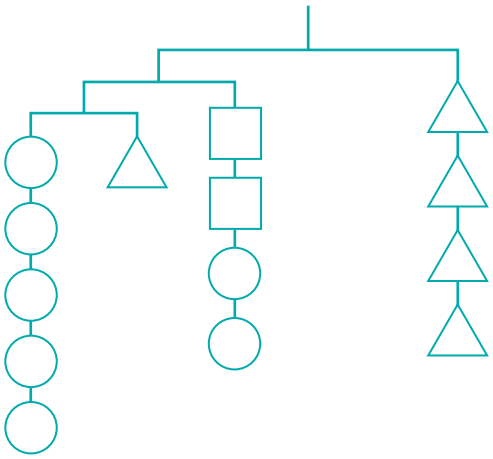
$2C = S$

$3T = 2S + 7C$

$3C + T = 2S$

△ weight = T
○ weight = C
□ weight = S

Total Weight: 40



2 Find the weight of each shape. Lessons 1–3

△ = _____ ○ = _____ □ = _____

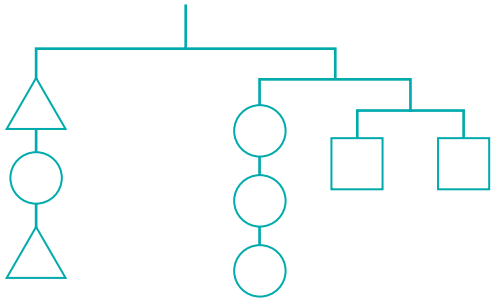
3 Write two equations that describe the mobile. Lessons 1–3

_____ = _____

_____ = _____

△ weight = T
○ weight = C
□ weight = S

Total Weight: 24

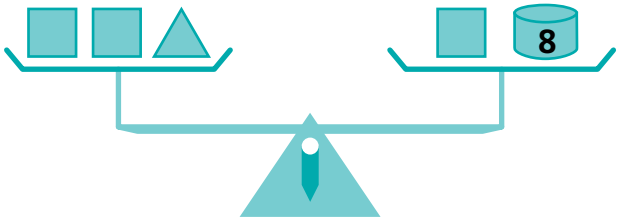


4 Find the weight of each shape. Lessons 1–3

△ = ____ ○ = ____ □ = ____

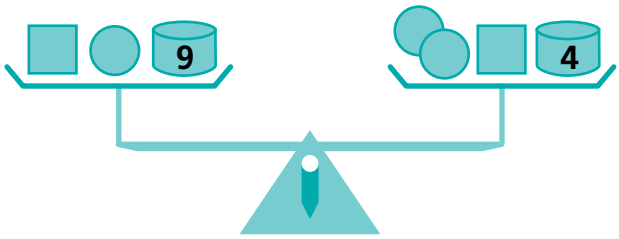
Solve these balance puzzles. Lesson 4

5



△ = 5 □ = ____

6



○ = ____

7 Nimit wrote this number trick for his friend Catherine.

Catherine's resulting number was 3.

What was Catherine's starting number? Lesson 5

_____

Number Trick

1. Pick a number.
2. Add 5 to it.
3. Multiply the result by 2.
4. Subtract 10 from that.
5. Divide by 2

8 Draw a diagram to describe this situation. Lesson 6

The theater had four rows of chairs and two extra chairs set up for the play.

9 Randy has to pay the same for each of his four overdue library books. He also has to pay five dollars for a book he lost.

Circle the equation that best describes the total amount he owes. T stands for the total amount; F stands for the overdue fine for each book. Lesson 7

$T = F + 5$

$T = F - 5$

$T = 5 + 2F$

$T = 4F + 5$

10 Grayson is 5 years older than his sister, Greta. Greta is half as old as Greg. If Greg is 16, how old is Grayson? Lesson 8

_____

Show how you solved the problem.