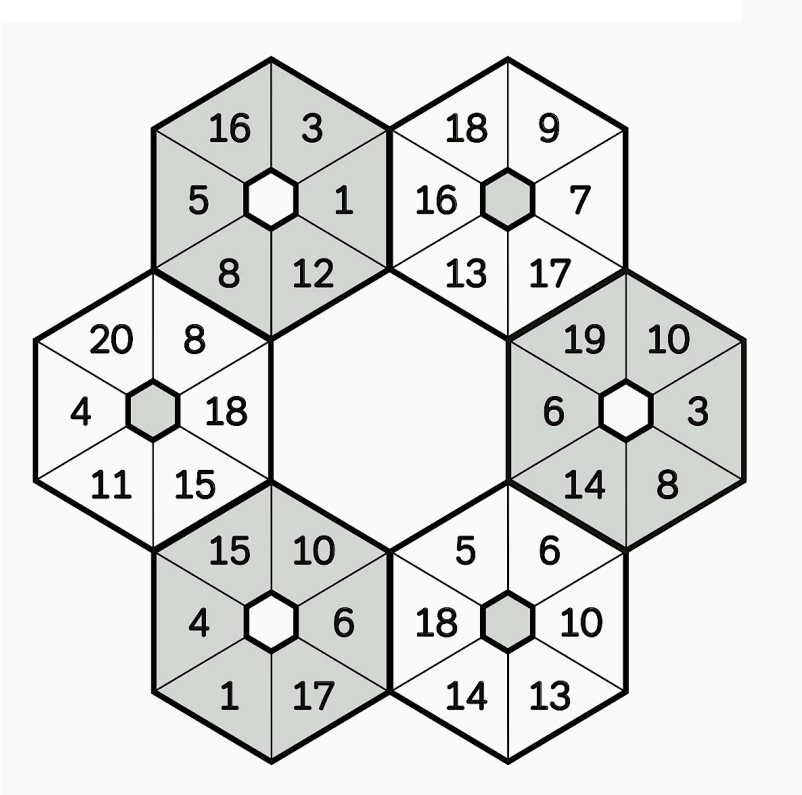
Virtual Grade 3-5 Workshop
Kansas City, MO
July 2020

Greg Tang's

Best Practices & Best Ways to Practice



GregTangMath.com
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Agenda July 2020

I. Addition/Subtraction Progressions

II. Multiplication Progressions

III. Division Progressions

IV. Place Value & Rounding

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Skill Development

I. Explore

- Problem solving
  NOT procedure following
- Efficiency does NOT matter
- Counting & low level strategies are fine
- See & use multiple strategies

II. Scaffold

- Use what's known to figure out what's unknown
- Use more efficient and generalizable strategies
- Compare & evaluate models, strategies, procedures
- Move toward algorithms when appropriate

III. Practice

- Repetition vs variation
- Explicit vs embedded
- Group vs independent
- Digital vs written
- Concrete, pictorial, abstract
- Goal: procedural fluency

IV. Mastery

- Add rigor (more reasoning)

* Multistep problems

* Non-standard situations

- Tricky situations
- Speed & efficiency
- Algebraic thinking

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VI. Solve using only mental math.

1. 265 + 378

___ ___ ___

2. 486 + 296

___ ___ ___

3. 841 - 673

___ ___ ___

4. 754 - 387

___ ___ ___

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VII. Solve working left to right.

1.

$$\begin{array}{r} 467 \\ +\ 358 \\ \hline \end{array}$$

2.

$$\begin{array}{r} 576 \\ +\ 387 \\ \hline \end{array}$$

3.

$$\begin{array}{r} 742 \\ -\ 263 \\ \hline \end{array}$$

4.

$$\begin{array}{r} 824 \\ -\ 476 \\ \hline \end{array}$$

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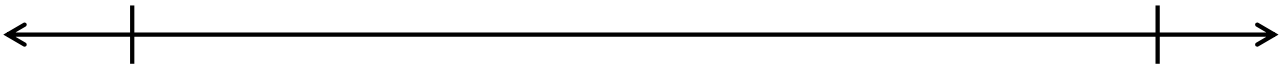
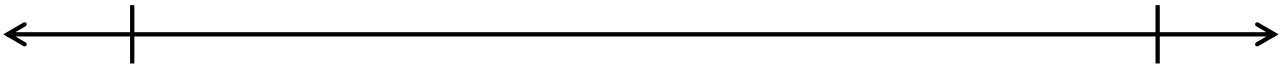
Grade 3 Elapsed Time

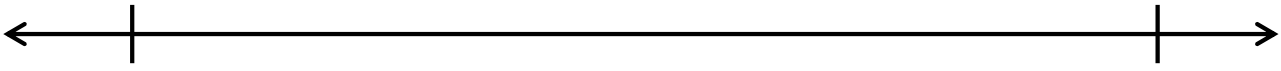
1. Knaya's bus leaves school at 3:35 p.m. and drops her at home 45 minutes later. What time does she arrive at home?



2. The express train leaves Grand Central at 6:45 p.m. and arrives in Sleepy Hollow at 7:23 p.m. How long is the trip?



3. It takes Bill 23 minutes to walk to his friend's house. He arrives at 4:10 p.m. What time did he start walking?



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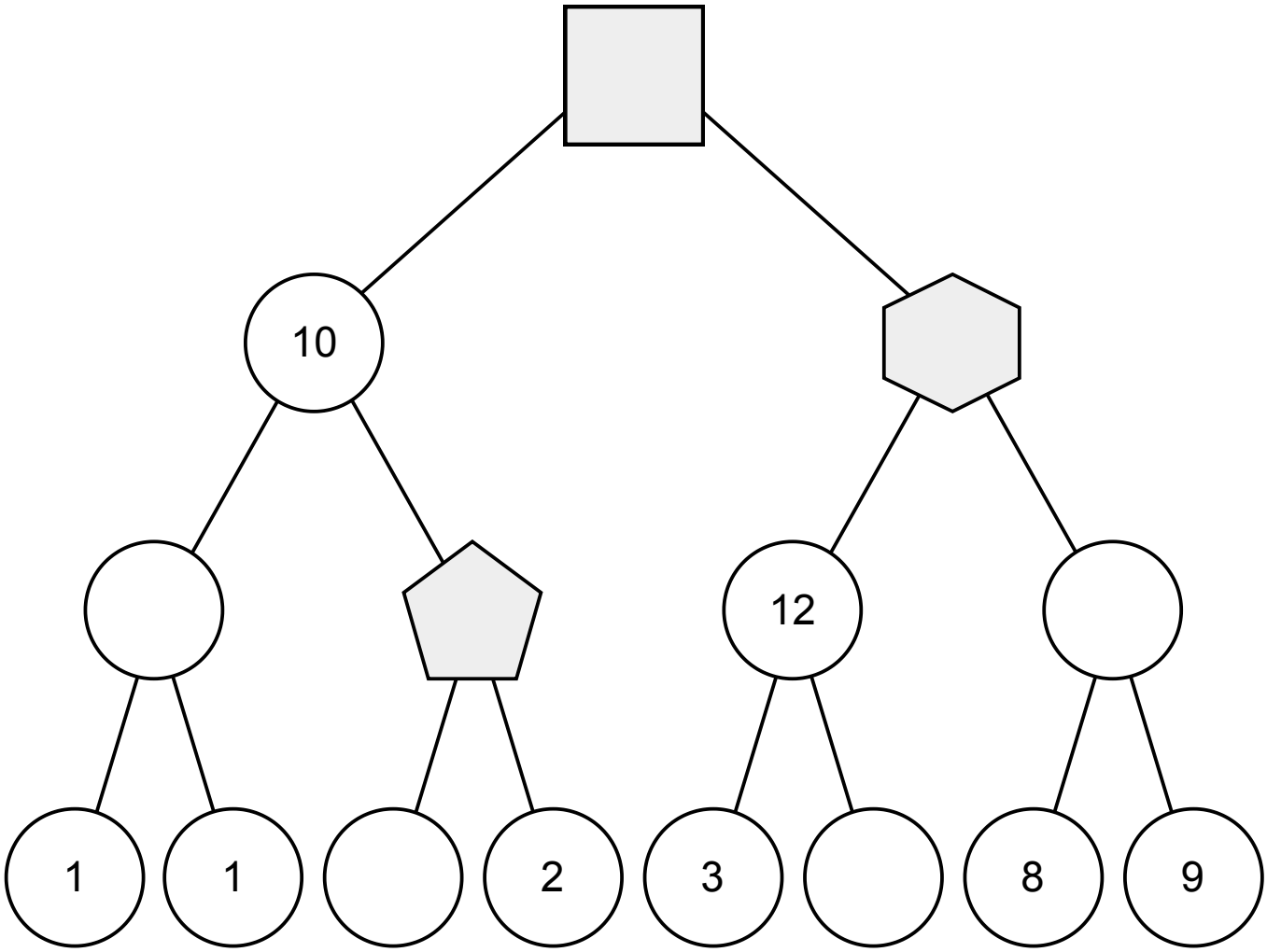
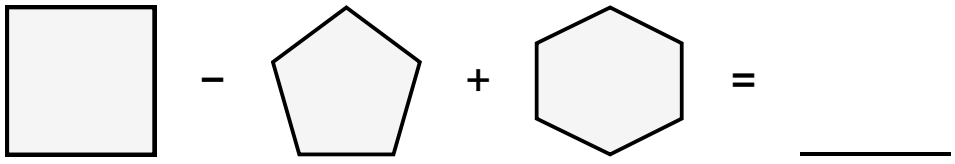
PICTARITHMS

Step-by-step examples at tangmath.com/tutorials

TANGY TUESDAY™		
PACK	LEVEL	WEEK
3	A	36

Figure out the value of each shape. Then complete the equation at the bottom.





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PICTARITHMS

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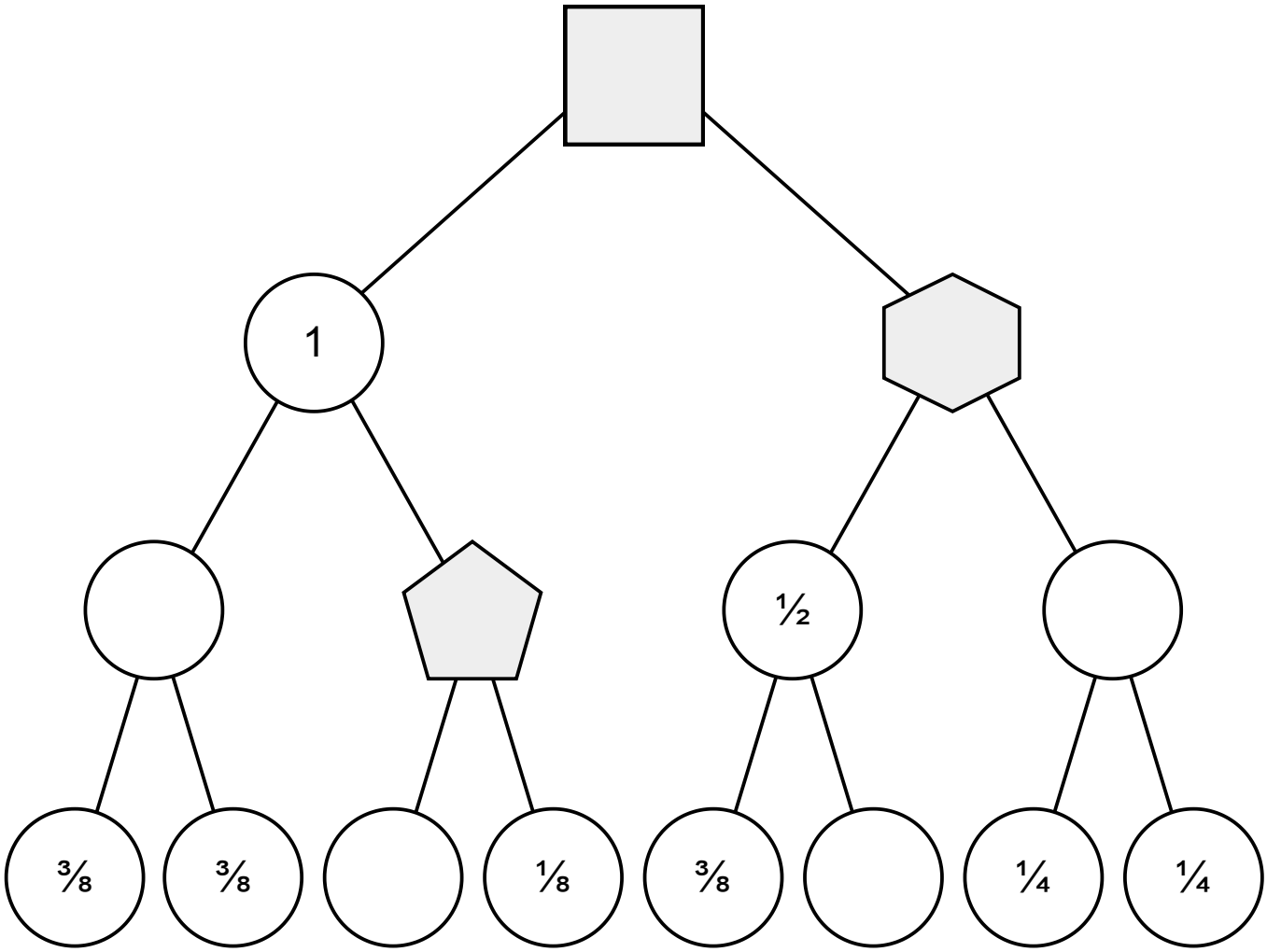
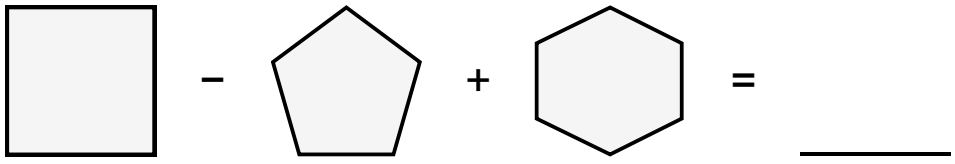
TANGY TUESDAY™		
PACK	LEVEL	WEEK
3	D	21

Figure out the value of each shape. Then complete the equation at the bottom.





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PICTARITHMS

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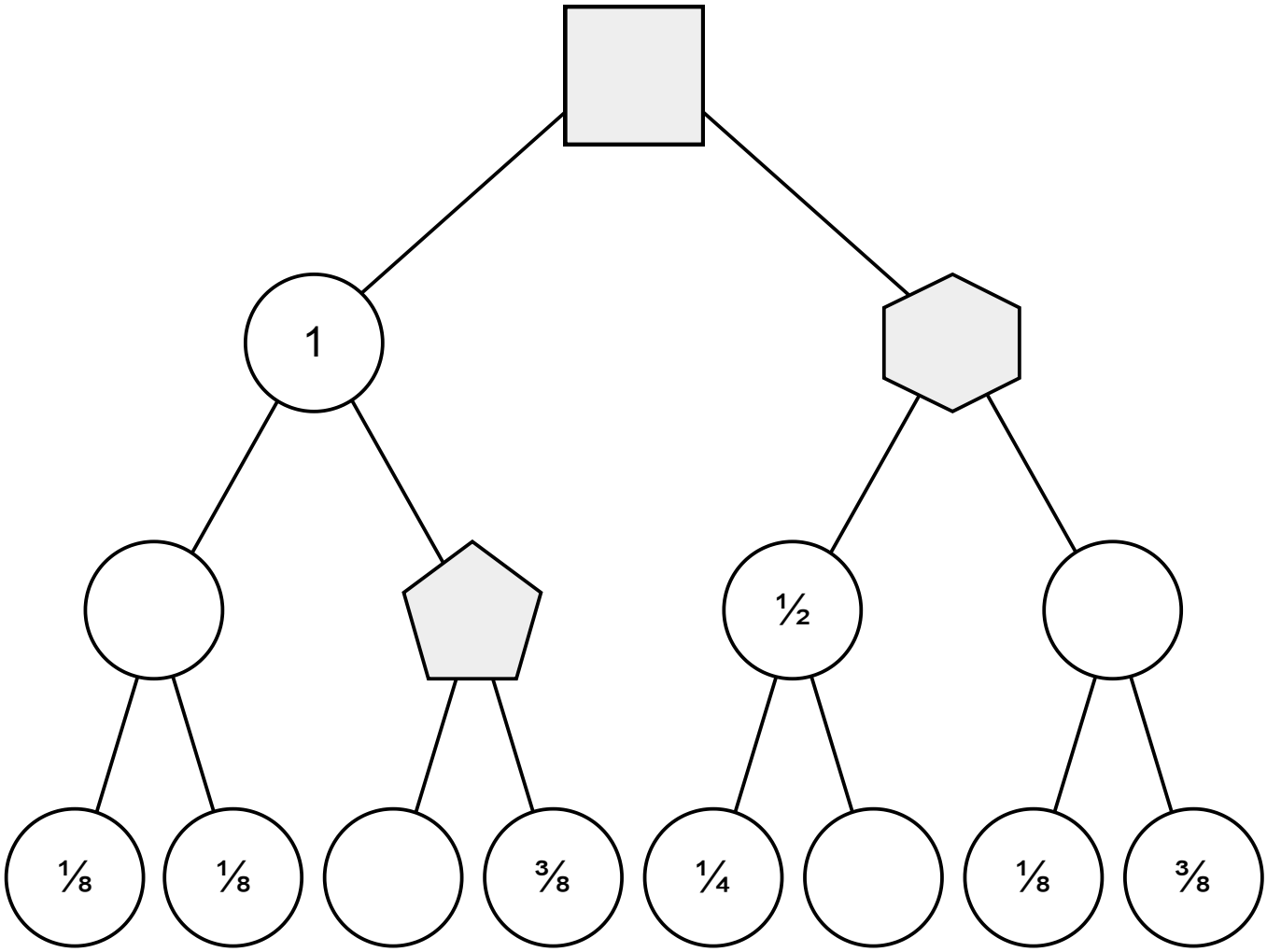
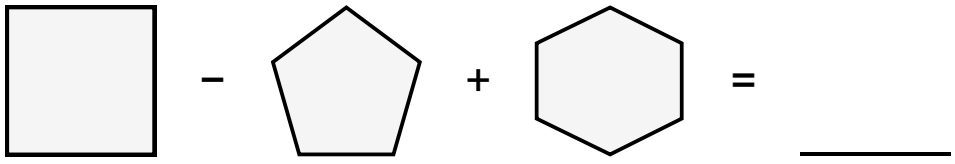
TANGY TUESDAY™		
PACK	LEVEL	WEEK
3	D	22

Figure out the value of each shape. Then complete the equation at the bottom.





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Name: _____

SQUARE

PACK	LEVEL	WEEK
2	A	31

Fill in the missing numbers so the gray squares show the sum of each row and column.

2		6
	3	4
		11
9	12	

		8
1		3
	6	10
8	13	

	4	6
		7
3		8
6	15	

	6	10
5		7
		4
10	11	

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Name: _____

SQUARE

PACK	LEVEL	WEEK
2	C	3

In each puzzle, fill in the missing numbers so the white squares contain the digits 1-9, and the gray squares show the sum of each row and column.

8			13
	4		20
		5	12
16	12	17	

		3	14
	9		15
7			16
17	15	13	

		3	11
1			10
	8		24
10	19	16	

2			8
		6	23
	3		14
17	13	15	

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TANG-A-ROW

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TANGY TUESDAY™		
PACK	LEVEL	WEEK
3	B	17

Make the equations true using each number from the number bank once.

DIGIT BANK

1 2 3 4 5 6 7 8 9

$__ + __ = 16$

$__ __ - __ = 75$

$__ __ - __ \square = 31$

What number am I? $\square$

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TANG-A-ROW

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TANGY TUESDAY™		
PACK	LEVEL	WEEK
1	B	18

Make the equations true using each number from the number bank once.

DIGIT BANK

1 2 3 4 5 6 7 8 9

$$__ \; __ + __ \; __ = 38$$

$$__ \; __ - __ = 79$$

$$__ - \square = 5$$

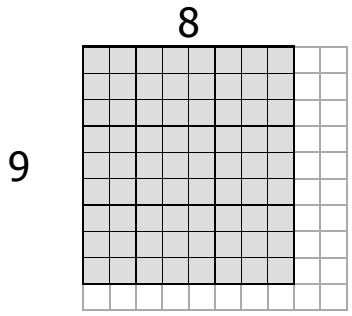
What number am I? $\square$

Name:

Multiply w/in 100 (C)
2-9 * 2-9

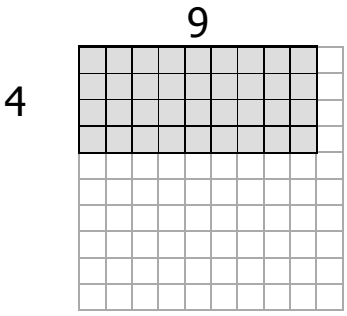
TANG MATH

$9 \times 8 = ____$



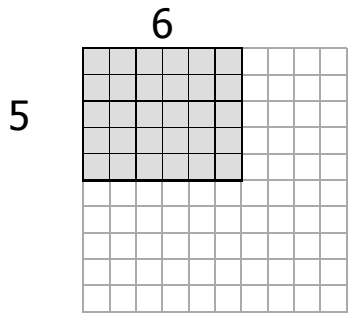
A group of 9 is nothing more, than smaller groups of 5 and 4.

$4 \times 9 = ____$



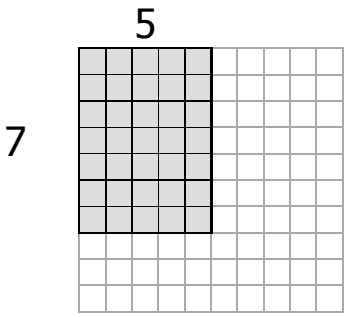
A group of 4 is fast to do, if you think in groups of 2.

$5 \times 6 = ____$



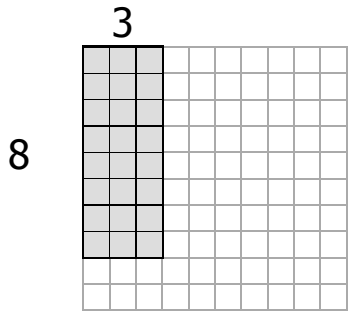
A group of 5 is fast to do. Start with 3. Then add 2.

$7 \times 5 = ____$



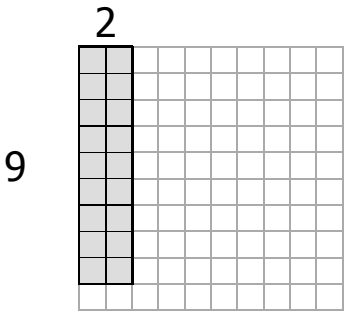
A group of 7 can be quick. 5 and 2 will do the trick.

$8 \times 3 = ____$



A group of 8 is nothing more, than equal groups of 4 and 4.

$9 \times 2 = ____$



A group of 9 is nothing more, than smaller groups of 5 and 4.

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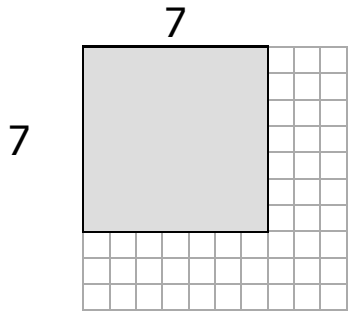
Name:

Multiply w/in 100 (P)
2-9 * 2-9

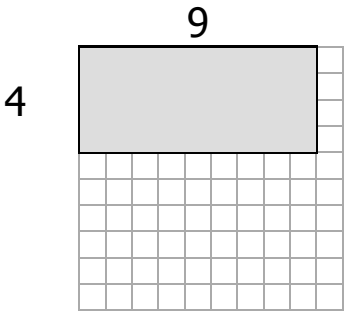
TANG MATH

$7 \times 7 = ____$



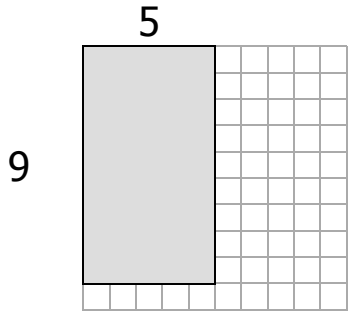
A group of 7 can be quick. 5 and 2 will do the trick.

$4 \times 9 = ____$



A group of 4 is fast to do, if you think in groups of 2.

$9 \times 5 = ____$



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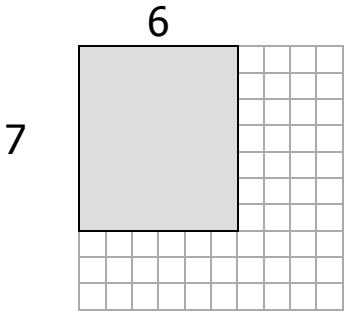
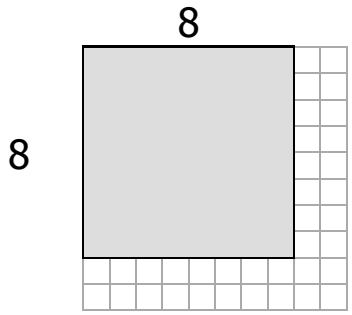
$7 \times 6 = ____$



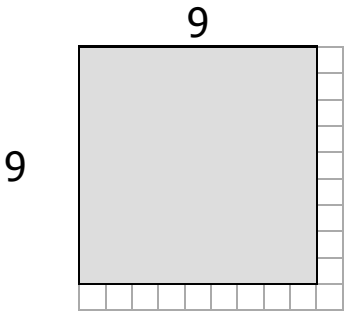
A group of 7 can be quick. 5 and 2 will do the trick.

$8 \times 8 = ____$



A group of 8 is nothing more, than equal groups of 4 and 4.

$9 \times 9 = ____$



A group of 9 is nothing more, than smaller groups of 5 and 4.

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Name:

Multiply w/in 100 (A)
2-9 * 2-9

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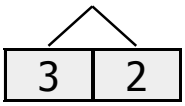
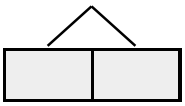
$5 \times 6 = 30$



$3 \times 6 = 18$
$2 \times 6 = 12$
30

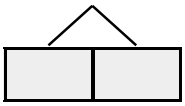
A group of 5 is fast to do. Start with 3. Then add 2.

$7 \times 2 =$ _____



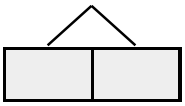
A group of 7 can be quick. 5 and 2 will do the trick.

$4 \times 7 =$ _____



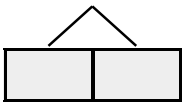
A group of 4 is fast to do, if you think in groups of 2.

$8 \times 6 =$ _____



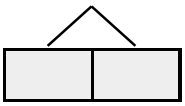
A group of 8 is nothing more, than equal groups of 4 and 4.

$9 \times 7 =$ _____



A group of 9 is nothing more, than smaller groups of 5 and 4.

$6 \times 3 =$ _____



A group of 6 is quick to see, if you think in groups of 3.

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Name:

Multiply w/in 100 (C)
Double Digit Factor

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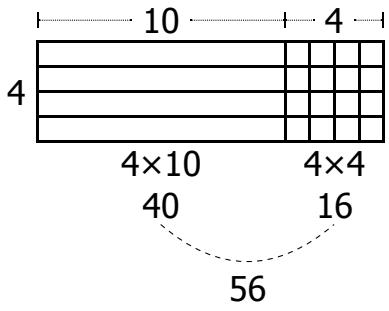
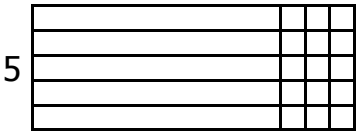
4×14

14



5×13

13

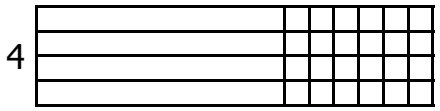


5×15

15

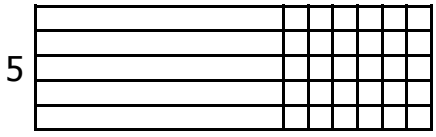
4×16

16



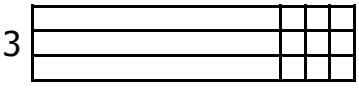
5×16

16



3×13

13



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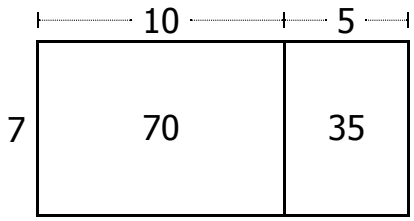
7×15

15



$70+35=105$

5×16

16

5×18

18

4×16

16

5×13

13

7×14

14

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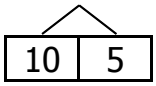
Name:

Multiply w/in 100 (A)
Double Digit Factor

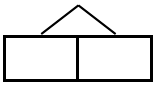
TANG MATH

5 × 15

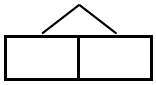


5 × 10 = 50
5 × 5 = 25
75

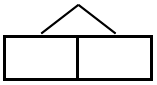
6 × 17



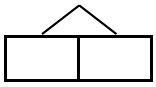
4 × 14



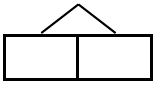
3 × 15



3 × 17



4 × 17



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Name:

TANG-A-ROW

Make the equations true, using each number from the digit bank once.

DIGIT BANK

1 2 3 4 5 6 7 8 9

$___ \times ___ = 72$

$___\ ___ \times ___ = 28$

$___\ ___ - ___ \square = 23$

What number am I? $\square$

Name:

Multiply w/in 1,000 (C)
*

TANG MATH

$7 \times 141 = 987$

141

7	100	40	1
	700	280	7

700+280+7=987

$2 \times 455 =$ _____

455

2

$2 \times 363 =$ _____

363

2

$2 \times 351 =$ _____

351

2

$4 \times 197 =$ _____

197

4

$8 \times 124 =$ _____

124

8

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Name:

Multiply w/in 1,000 (C)
*

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16 × 54 = 864

54

	50	4	
10	500	40	500 40
16			300
6	300	24	24 864

26 × 38 = _____

38

26

15 × 41 = _____

41

15

17 × 28 = _____

28

17

14 × 51 = _____

51

14

19 × 32 = _____

32

19

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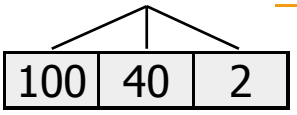
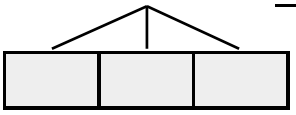
$3 \times 142 = 426$

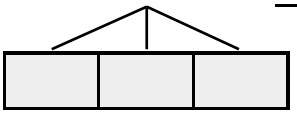


$3 \times 100 = 300$
$3 \times 40 = 120$
$3 \times 2 = 6$
426

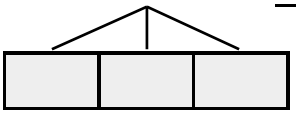
$6 \times 129 =$ _____



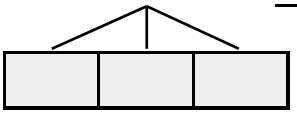
$9 \times 111 =$ _____



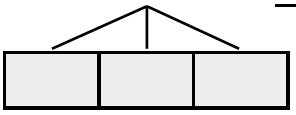
$5 \times 154 =$ _____



$2 \times 113 =$ _____



$4 \times 241 =$ _____



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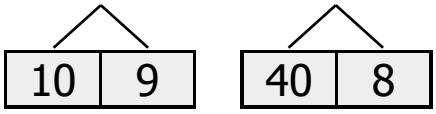
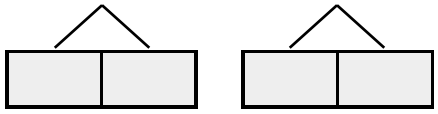
19 × 48 = 912

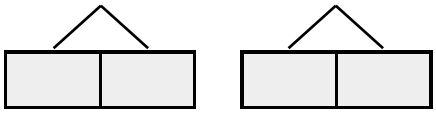


10 × 40 = 400
10 × 8 = 80
9 × 40 = 360
9 × 8 = 72
912

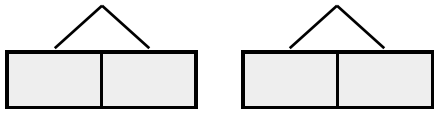
16 × 28 = _____



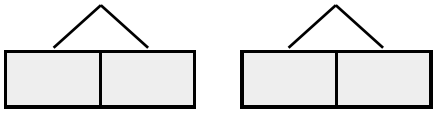
14 × 37 = _____



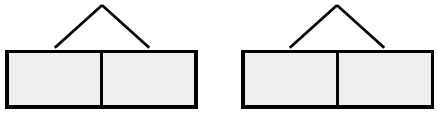
18 × 53 = _____



13 × 46 = _____



21 × 39 = _____



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Name:

Multiply w/in 1,000 (A)
*

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$$\begin{array}{r} 111 \\ \times\ 9 \\ \hline 900 \\ 90 \\ 9 \\ \hline 999 \end{array}$$

$$\begin{array}{r} 132 \\ \times\ 6 \end{array}$$

$$\begin{array}{r} 262 \\ \times\ 2 \end{array}$$

$$\begin{array}{r} 223 \\ \times\ 4 \end{array}$$

$$\begin{array}{r} 112 \\ \times\ 7 \end{array}$$

$$\begin{array}{r} 247 \\ \times\ 3 \end{array}$$

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Name:

Multiply w/in 1,000 (A)
*

TANG MATH

$$\begin{array}{r} 52 \\ \times\ 18 \\ \hline 500 \\ 20 \\ 400 \\ 16 \\ \hline 936 \end{array}$$

$$\begin{array}{r} 38 \\ \times\ 22 \end{array}$$

$$\begin{array}{r} 49 \\ \times\ 17 \end{array}$$

$$\begin{array}{r} 39 \\ \times\ 23 \end{array}$$

$$\begin{array}{r} 52 \\ \times\ 11 \end{array}$$

$$\begin{array}{r} 68 \\ \times\ 12 \end{array}$$

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$84 \div 6 = \square$

$6 \times \square = 84$

	10	4	= 14
6	60	24	

Area = $84 - 60 = 24$, $24 - 24 = 0$

$99 \div 9 = \square$

$60 \div 4 = \square$

$78 \div 6 = \square$

$88 \div 8 = \square$

$85 \div 5 = \square$

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$65 \div 5 = \square$

$5 \times \square = 65$

	10	3	= 13
5	50	15	

Area = $65 - 50 = 15$, $15 - 15 = 0$

$65 \div 5$

50	15

$50 \div 5 = 10$

$15 \div 5 = 3$

$10 + 3 = 13$

$48 \div 3 = \square$

$48 \div 3$

$90 \div 6 = \square$

$90 \div 6$

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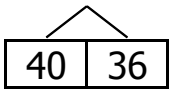
76 ÷ 4



40 ÷ 4 = 10
36 ÷ 4 = 9
19

98 ÷ 7

39 ÷ 3

68 ÷ 4

96 ÷ 6

42 ÷ 3

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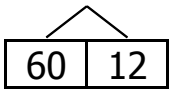
$72 \div 6$



$60 \div 6 = 10$
$12 \div 6 = 2$
12

$72 \div 6$

$$\begin{array}{r|l} 72 & \\ -60 & 10 \\ \hline 12 & \\ -12 & 2 \\ \hline 0 & 12 \end{array}$$

$76 \div 4$

$76 \div 4$

$$\begin{array}{r|l} 76 & \\ \hline & \\ \hline & \\ \hline & \end{array}$$

$91 \div 7$

$91 \div 7$

$$\begin{array}{r|l} 91 & \\ \hline & \\ \hline & \\ \hline & \\ \hline & \end{array}$$

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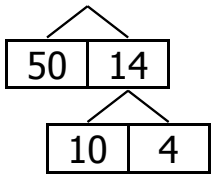
$64 \div 5 = \square$

$5 \times \square = 64$

	10	2	I don't know	=	12
5	50	10	4		R4

Area = $64 - 50 = 14$; $14 - 10 = 4$; $4 - 4 = 0$

$64 \div 5$



$50 \div 5 = 10$
$10 \div 5 = 2$
$4 \div 5 =$ I don't know
12 R4

$38 \div 4 = \square$

$38 \div 4$

$44 \div 5 = \square$

$44 \div 5$

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889 ÷ 7 = ☐

7 × ☐ = 889

	100	20	7	= 127
7	700	140	49	

Area = 889 − 700 = 189; 189 − 140 = 49; 49 − 49 = 0

975 ÷ 3 = ☐

480 ÷ 5 = ☐

138 ÷ 6 = ☐

604 ÷ 4 = ☐

158 ÷ 2 = ☐

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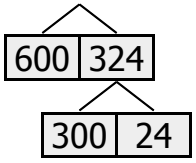
924 ÷ 6



600 ÷ 6 = 100
300 ÷ 6 = 50
24 ÷ 6 = 4
154

190 ÷ 5

384 ÷ 8

792 ÷ 9

356 ÷ 4

546 ÷ 2

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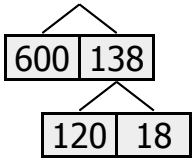
738 ÷ 2



600 ÷ 2 = 300
120 ÷ 2 = 60
18 ÷ 2 = 9
369

738 ÷ 2

2	738	
	−600	300
	138	
	−120	60
	18	
	−18	9
	0	369

492 ÷ 4

492 ÷ 4

4 | 492

224 ÷ 7

224 ÷ 7

7 | 224

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Name:

Divide w/in 1,000 (A)
Whole Numbers

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256 ÷ 8

$$\begin{array}{r|l} 8 & 256 \\ -240 & 30 \\ \hline 16 & \\ -16 & 2 \\ \hline 0 & 32 \end{array}$$

248 ÷ 2

$$2\overline{)248}$$

548 ÷ 4

$$4\overline{)548}$$

549 ÷ 9

$$9\overline{)549}$$

708 ÷ 3

$$3\overline{)708}$$

710 ÷ 5

$$5\overline{)710}$$

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266.8 ÷ 4

$$\begin{array}{r|l} 4\overline{)\ 266.8} & \\ -240 & 60 \\ \hline 26.8 & \\ -24 & 6 \\ \hline {\scriptstyle 28\ \text{tenths}}\quad 2.8 & \\ -2.8 & 0.7 \\ \hline 0 & 66.7 \end{array}$$

458.5 ÷ 7

$$7\overline{)\ 458.5}$$

532.8 ÷ 9

$$9\overline{)\ 532.8}$$

523.8 ÷ 6

$$6\overline{)\ 523.8}$$

168.6 ÷ 3

$$3\overline{)\ 168.6}$$

604.8 ÷ 7

$$7\overline{)\ 604.8}$$

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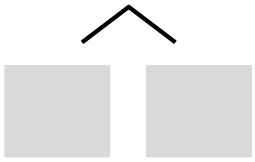
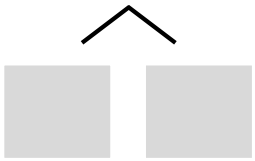
Partial Products & Quotients

More Number Bonds!

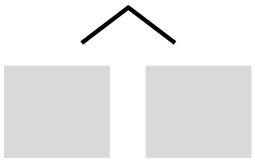
1. $6 \times 13 = \square$



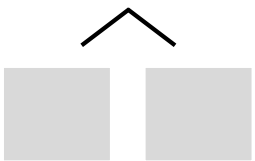
2. $7 \times 12 = \square$



3. $52 \div 4 = \square$



4. $98 \div 7 = \square$



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Use Number Bonds for ALL Operations

1. 6×857

2. $8 \times 6,753$

3. $846 \div 9$

4. $5,184 \div 12$

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Partial Quotients

1. $758.7 \div 9$

2. $596.8 \div 8$

3. $634.5 \div 15$

4. $41.04 \div 12$

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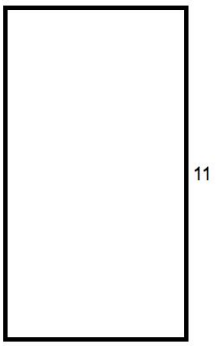
a.

Name: _____

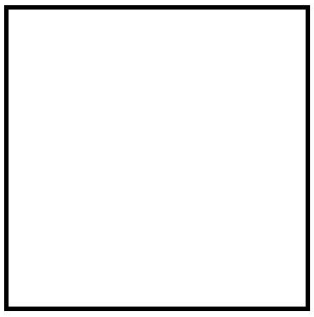
GO FIGURE!

Find the length of the sides, the area,
and the perimeter of each rectangle.

Area: _80_ sq. units Perimeter: _____ units



Area: _____ sq. units Perimeter: _34_ units



Area: _100_ sq. units Perimeter: _40_ units

Area: _48_ sq. units Perimeter: _32_ units

411.836.666.1010.812

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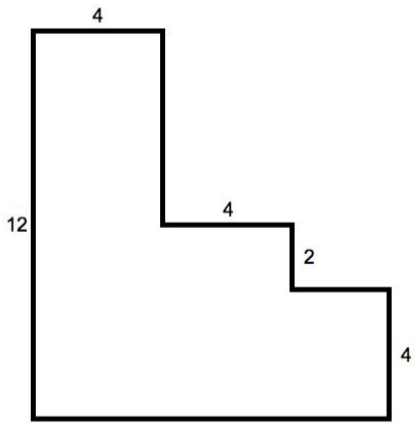
b.

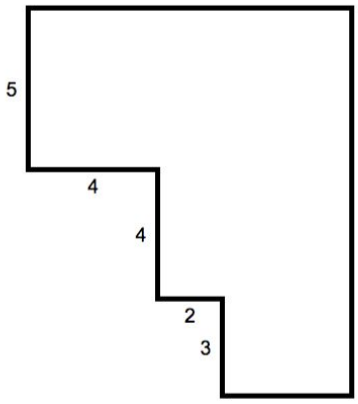
Name: _____

GO FIGURE!

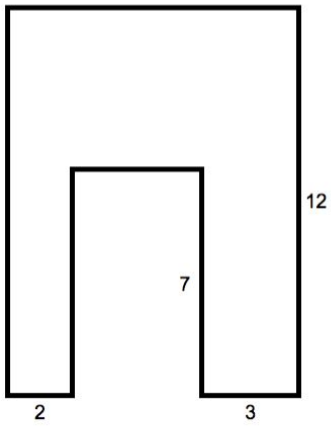
Find the length of the sides, the area,
and the perimeter of each rectilinear figure.



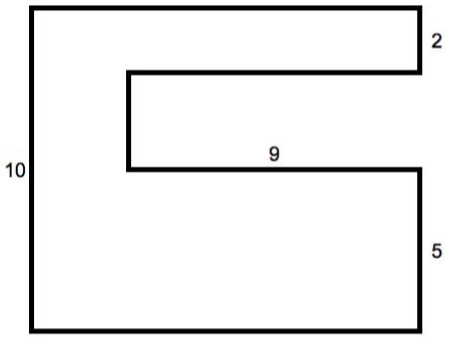
Area: _____ sq. units Perimeter: _46_ units



Area: _86_ sq. units Perimeter: _____ units



Area: _____ sq. units Perimeter: _56_ units



Area: _93_ sq. units Perimeter: _____ units

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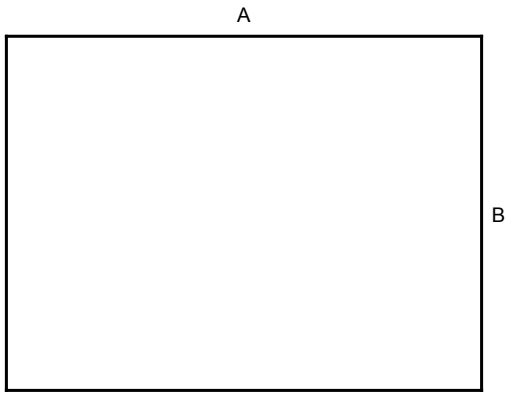
c.

Name: _____

GO FIGURE!

Use the clues to complete the table.



Rectangle not drawn to scale

Side A		units
Side B		units
Area		square units
Perimeter		units

Clues:

a. My perimeter is equal to 2 dozen.

b. Side A is 3 times as long as Side B.

411.932724

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Common Multiplication & Division Situations	**Product Unknown** ***3 x 6 = ?***	**Group Size Unknown** **"How many in each group?"** **partitive or sharing** ***3 x ? = 18, 18 ÷ 3 = ?***	**Group Number Unknown** **"How many groups?"** **quotative or grouping** ***? x 6 = 18, 18 ÷ 6 = ?***
3.OA.3 Equal Groups	1a.There are 3 bags with 6 plums in each bag. How many plums are there in all? *1b. Measurement example*. You need 3 lengths of string, each 6 inches long. How much string will you need altogether?	2a. If 18 plums are shared equally into 3 bags, then how many plums will be in each bag? *2b. Measurement example*. You have 18 inches of string, which you will cut into 3 equal pieces. How long will each piece of string be?	3a. If 18 plums are to be packed 6 to a bag, then how many bags are needed? *3b. Measurement example*. You have 18 inches of string, which you will cut into pieces that are 6 inches long. How many pieces of string will you have?
3.OA.3 Arrays Area	4a. There are 3 rows of apples with 6 apples in each row. How many apples are there? *4b. Area example*. What is the area of a 3 cm by 6 cm rectangle?	5a. If 18 apples are arranged into 3 equal rows, how many apples will be in each row? *5b. Area example*. A rectangle has area 18 square centimeters. If one side is 3 cm long, how long is a side next to it?	6a. If 18 apples are arranged into equal rows of 6 apples, how many rows will there be? *6b. Area example*. A rectangle has area 18 square centimeters. If one side is 6 cm long, how long is a side next to it?
4.OA.2. Compare	1a. A blue hat costs $6. A red hat costs 3 times as much as the blue hat. How much does the red hat cost? *1b. Measurement example*. A rubber band is 6 cm long. How long will the rubber band be when it is stretched to be 3 times as long?	2a. A red hat costs $18 and that is 3 times as much as a blue hat costs. How much does a blue hat cost? *2b. Measurement example*. A rubber band is stretched to be 18 cm long and that is 3 times as long as it was at first. How long was the rubber band at first?	3a. A red hat costs $18 and a blue hat costs $6. How many times as much does the red hat cost as the blue hat? *3b. Measurement example*. A rubber band was 6 cm long at first. Now it is stretched to be 18 cm long. How many times as long is the rubber band now as it was at first?
General	**a x b = ?**	**a x ? = p, p ÷ a = ?**	**? x b = p, p ÷ b = ?**

1Adapted from Box 2-4 of Mathematics Learning in Early Childhood, National Research Council (2009, pp. 32, 33)

Multiplication & Division Problems

1. There are 4 pens.
   There are 12 cattle in each pen.
   How many cattle are there all together?

2. There are 40 pens.
   There are 12 cattle in each pen.
   How many cattle are there all together?

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Multiplication & Division Problems

3. 63 students are going to the game.
   They divide themselves equally into 9 vans.
   How many students are in each van?

4. A farmer has 54 eggs.
   Each carton of eggs holds 6 eggs.
   How many cartons of eggs does the farmer have?

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Multiplication & Division Problems

5. 68 kids are going to lunch. Each table can seat 8 kids.
   What is the fewest number of tables they will need?

6. The 4th grade class raised $487.
   Movie tickets cost $7 each.
   How many tickets can they buy?

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7. In the music room, there are 4 rows of chairs with 6 chairs in each row. The chairs are rearranged so there is 1 fewer row than before. All the rows still have an equal number of chairs. How many chairs are now in each row?

8. In the music room, there are 12 chairs in each row. After the chairs are rearranged, there are 8 chairs in each row and 2 more rows than before. How many chairs are in the music room?

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