

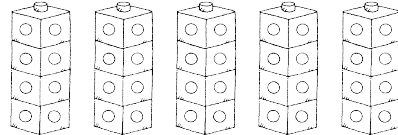
Investigating Equal Groups



Quick Review

Equal groups have the same number of things in each group.

Here are 5 towers of Snap Cubes.
There are 4 cubes in each tower.



Skip count to find how many cubes.
There are 20 cubes in all.

4 ... 8 ... 12 ... 16 ... 20

We write 5 groups of 4 as a **multiplication sentence**.

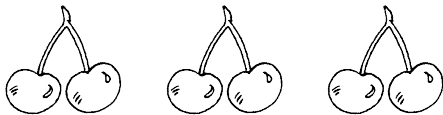
$$\begin{array}{ccccccc}
 5 & \times & 4 & = & 20 \\
 \uparrow & & \uparrow & & \uparrow \\
 \text{Number of} & & \text{Number of} & & \text{Total number} \\
 \text{groups} & & \text{cubes in each} & & \text{of cubes} \\
 & & \text{group} & &
 \end{array}$$

We say: 5 **times** 4 equals 20.

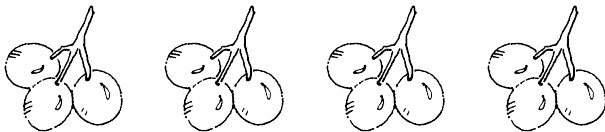
Try These

Write a multiplication sentence for each picture.

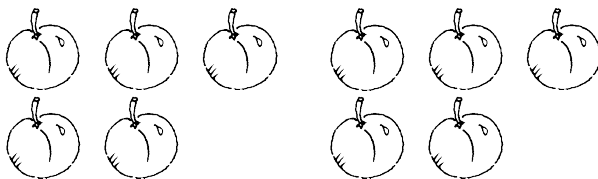
1.



2.



3.



Practice

1. Find each product.

a) $1 \times 1 =$ _____ b) $2 \times 4 =$ _____ c) $1 \times 3 =$ _____

d) $4 \times 3 =$ _____ e) $2 \times 5 =$ _____ f) $5 \times 1 =$ _____

2. Multiply.

a) $2 \times 3 =$ _____ b) $3 \times 3 =$ _____ c) $4 \times 4 =$ _____

d) $5 \times 5 =$ _____ e) $2 \times 1 =$ _____ f) $2 \times 2 =$ _____

3. Draw a picture for each multiplication sentence.

a) $3 \times 4 = 12$	b) $2 \times 5 = 10$	c) $4 \times 5 = 20$
----------------------	----------------------	----------------------

Stretch Your Thinking

Golf balls come in tubes of 3.

Each box has 4 tubes.

Draw a picture and write a multiplication sentence to find how many golf balls in a box.

Relating Multiplication and Repeated Addition



Quick Review

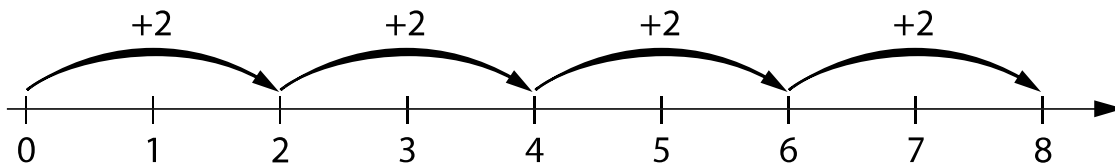
You can use **repeated addition** to think about multiplication.



$$2 + 2 + 2 + 2 = 8$$

$$4 \times 2 = 8$$

You can use a **number line** to show multiplication as repeated addition.



Add 2 each time.
4 times 2 equals 8.

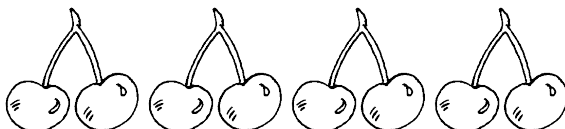
Try These

Write an addition sentence and a multiplication sentence for each picture.

1.



2.



3.



Practice

1. Write an addition sentence for each multiplication sentence.

a) $3 \times 2 = 6$ _____ b) $4 \times 5 = 20$ _____

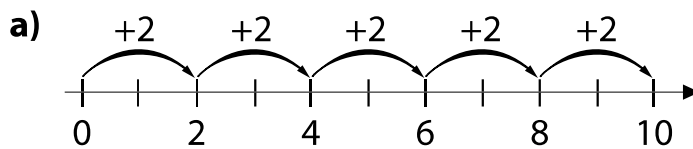
c) $2 \times 4 = 8$ _____ d) $3 \times 1 = 3$ _____

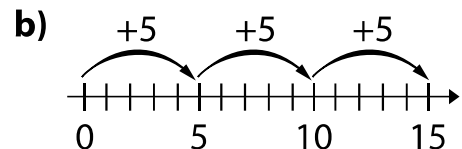
2. Write a multiplication sentence for each addition sentence.

a) $1 + 1 + 1 + 1 + 1 = 5$ _____ b) $4 + 4 + 4 = 12$ _____

c) $3 + 3 + 3 + 3 = 12$ _____ d) $3 + 3 = 6$ _____

3. Write an addition sentence and a multiplication sentence for each number line.





4. Draw a picture for each multiplication sentence.
Then write an addition sentence.

a) $4 \times 4 = 16$

b) $5 \times 3 = 15$

Stretch Your Thinking

Write an addition sentence and a multiplication sentence to find the number of school days in 5 weeks.

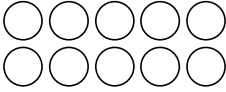
Using Arrays to Multiply

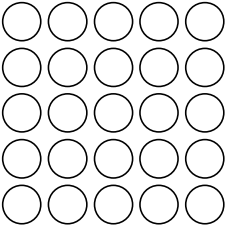



Quick Review

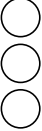
An **array** shows objects arranged in equal rows.

- This is a 2-by-5 array.
There are 2 rows of 5 counters.
 $2 \times 5 = 10$


- This is a 5-by-5 array.
There are 5 rows of 5 counters.
 $5 \times 5 = 25$

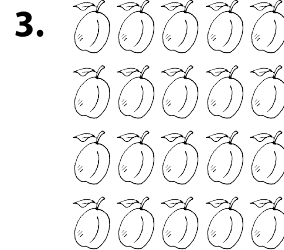
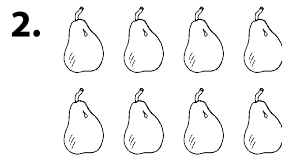
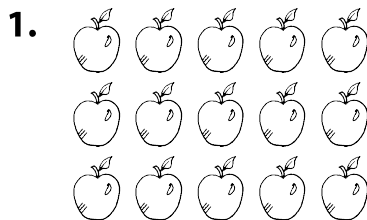

- This is a 1-by-4 array.
There is 1 row of 4 counters.
 $1 \times 4 = 4$


- This is a 3-by-1 array.
There are 3 rows of 1 counter.
 $3 \times 1 = 3$



Try These

Write a multiplication sentence for each array.



Practice

1. Draw an array to find each product.

a) $4 \times 4 =$ _____	b) $3 \times 4 =$ _____	c) $5 \times 2 =$ _____
d) $3 \times 5 =$ _____	e) $2 \times 5 =$ _____	f) $5 \times 3 =$ _____

2. Use counters. Make an array to find each product.

- a)** $1 \times 2 =$ _____ **b)** $4 \times 1 =$ _____ **c)** $2 \times 3 =$ _____
d) $3 \times 3 =$ _____ **e)** $5 \times 4 =$ _____ **f)** $5 \times 5 =$ _____

3. There are 4 rows of marchers in the band.

There are 5 marchers in each row.

How many marchers are there in all? _____

Stretch Your Thinking

Find different ways of arranging 24 counters in equal rows.

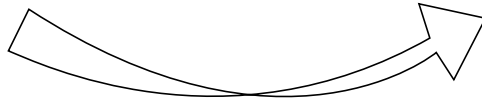
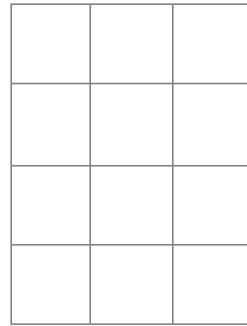
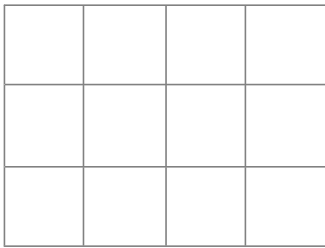
Draw a picture to show each way.

Relating Multiplication Sentences



Quick Review

When you multiply 2 numbers, you can switch the order of the numbers without changing the product.

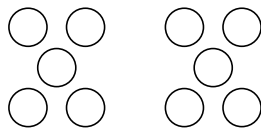


3 rows of 4
 $3 \times 4 = 12$

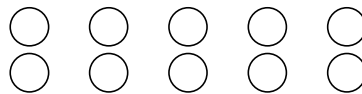
Turn the array on
 its side.

4 rows of 3
 $4 \times 3 = 12$

We can show the same idea using equal groups.



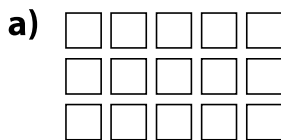
2 groups of 5
 $2 \times 5 = 10$

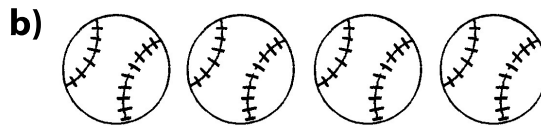


5 groups of 2
 $5 \times 2 = 10$

Try These

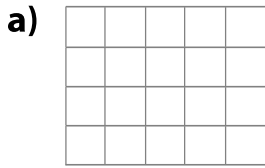
1. Write 2 multiplication sentences for each array.

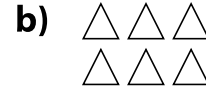


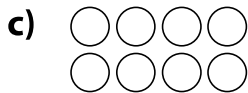


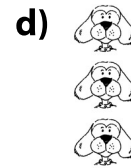
Practice

1. Write 2 multiplication sentences and 2 repeated addition sentences for each array, when you can.









2. Draw an array for each multiplication sentence.
Then write another multiplication sentence for each array.

a) $2 \times 1 = 2$

b) $2 \times 5 = 10$

Stretch Your Thinking

Draw 20 cookies in an array. Write 2 multiplication sentences for the array.

Division as Grouping

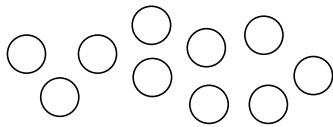


Quick Review

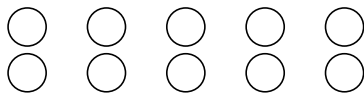
Division can be used to find how many equal groups there are when you know the size of the groups.

How many equal groups of 2 are there in 10?

- Start with 10 counters.



- Divide the 10 counters into groups of 2. Count the number of groups.



- Write the **division sentence**.

$$\begin{array}{ccccccc}
 10 & \div & 2 & = & 5 & & \\
 \uparrow & & \uparrow & & \uparrow & & \\
 \text{Number of} & & \text{Number in} & & \text{Number} & & \\
 \text{counters} & & \text{each group} & & \text{of groups} & &
 \end{array}$$

We say: 10 divided by 2 equals 5.

Try These

- Use counters. Find the number of groups.

Write a division sentence.

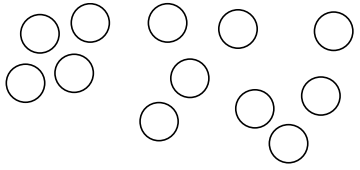
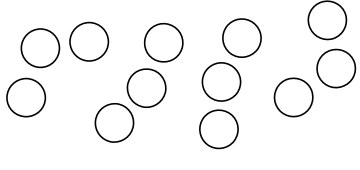
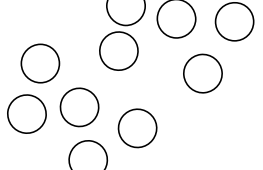
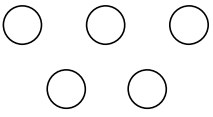
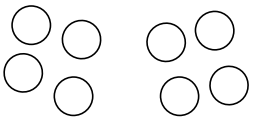
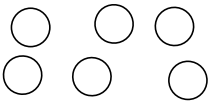
- Divide 12 counters into groups of 3. _____
- Divide 8 counters into groups of 1. _____
- Divide 10 counters into groups of 5. _____

- Use counters. Make equal groups to divide.

- $15 \div 5 =$ _____
- $12 \div 4 =$ _____
- $8 \div 2 =$ _____
- $2 \div 1 =$ _____
- $6 \div 2 =$ _____
- $4 \div 4 =$ _____

Practice

1. Find the number of groups. Then write a division sentence.

<p>a) Make groups of 4.</p> 	<p>b) Make groups of 3.</p> 	<p>c) Make groups of 5.</p> 
<p>d) Make groups of 1.</p> 	<p>e) Make groups of 4.</p> 	<p>f) Make groups of 2.</p> 

2. Write a division sentence to solve each problem.

a) Ira has 12 plums. He gives 4 plums to each of his friends.

How many people get plums? _____

b) Suri has 15 photos. She puts 5 photos on each page.

How many pages does Suri use? _____

c) Sahib baked 10 tarts. He put 2 tarts into each bag.

How many bags did Sahib use? _____

Stretch Your Thinking

The answer is $20 \div 4 = 5$.

What might the problem be?

Division as Sharing

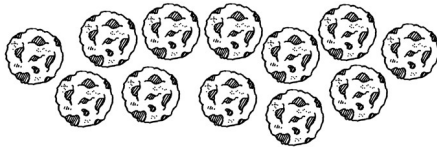


Quick Review

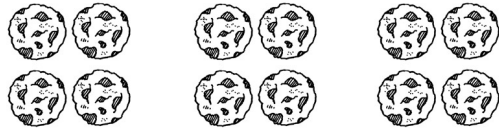
Division can be used to find how many are in each group when you know the number of groups.

12 cookies are shared equally among 3 friends.
How many cookies does each person get?

- Start with 12 cookies.



- Divide the 12 cookies into 3 groups.
Count the number of cookies in each group.



- Write the division sentence.

$$\begin{array}{ccccccc}
 12 & \div & 3 & = & 4 & & \\
 \uparrow & & \uparrow & & \uparrow & & \\
 \text{Number of} & & \text{Number of} & & \text{Number of} & & \\
 \text{cookies} & & \text{groups} & & \text{cookies in} & & \\
 & & & & \text{each group} & &
 \end{array}$$

We say: 12 divided by 3 equals 4.

Try These

- Use counters. Find the number in each group.

Write a division sentence.

- Divide 20 counters into 4 groups. _____
- Divide 16 counters into 4 groups. _____
- Divide 3 counters into 3 groups. _____
- Divide 12 counters into 4 groups. _____

Practice

1. Find the number of things in each group.

a) $8 \div 4 =$ _____ b) $20 \div 5 =$ _____ c) $2 \div 2 =$ _____

d) $10 \div 2 =$ _____ e) $8 \div 2 =$ _____ f) $3 \div 1 =$ _____

g) $10 \div 5 =$ _____ h) $4 \div 4 =$ _____ i) $15 \div 3 =$ _____

2. Write a division sentence to solve each problem.

a) There are 20 people on 4 equal teams. How many people are on each team? _____

b) There are 16 muffins in 4 equal-sized tins. How many muffins are in each tin? _____

c) There are 25 chairs in 5 equal rows. How many chairs are in each row?

d) There are 4 buttons in 2 equal rows. How many buttons are in each row?

3. Write an equal sharing problem for $6 \div 2 = 3$.

Show how to solve the problem using a picture.

Stretch Your Thinking

There are 12 members in the Boy Scout troop.

They will march in the parade in equal rows.

How many Boy Scouts could be in each row?

Relating Division and Repeated Subtraction

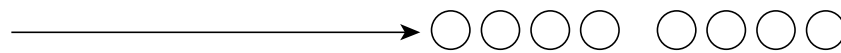
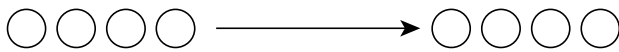


Quick Review

You can use repeated subtraction to find $8 \div 4$.

Start with 8 counters.

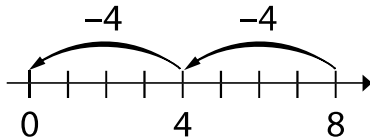
- Count how many groups of 4 you subtract until no counters remain.



8 subtract 4 is 4,
subtract 4 more
is 0.

That's 2 groups.
So, $8 \div 4 = 2$

- You can use a number line to show how division is like repeated subtraction.



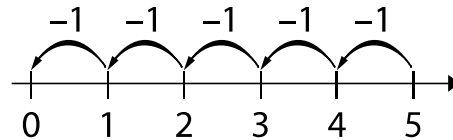
$$8 - 4 - 4 = 0$$

So, $8 \div 4 = 2$

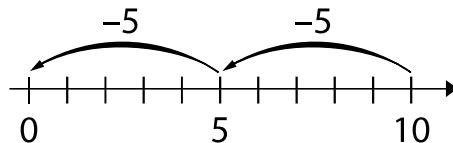
Try These

1. Write a division sentence for each repeated subtraction sentence.

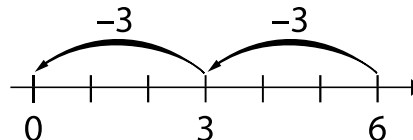
a) $5 - 1 - 1 - 1 - 1 - 1 = 0$



b) $10 - 5 - 5 = 0$



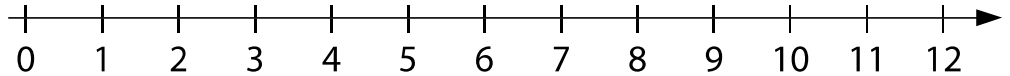
c) $6 - 3 - 3 = 0$



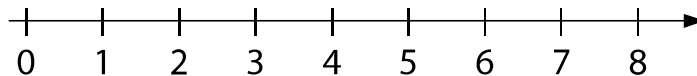
Practice

1. Show each division sentence as repeated subtraction on the number line.

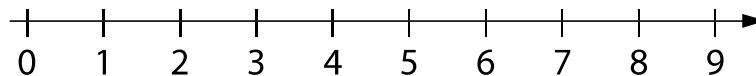
a) $12 \div 3 = 4$



b) $8 \div 2 = 4$



c) $9 \div 3 = 3$



2. Write each division sentence as repeated subtraction.

a) $15 \div 5 = 3$ _____ b) $4 \div 1 = 4$ _____

c) $20 \div 4 = 5$ _____ d) $12 \div 4 = 3$ _____

e) $25 \div 5 = 5$ _____ f) $5 \div 5 = 1$ _____

3. Write a division sentence to solve this problem:

Karl has 20 gerbils. He puts 4 gerbils into each cage.
How many cages does Karl use?

Stretch Your Thinking

Find as many ways to put 20 counters into equal groups as you can. Write a repeated subtraction sentence and a division sentence for each way you find.

Relating Multiplication and Division Using Arrays

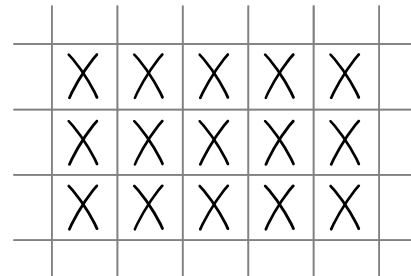


Quick Review

This array has 3 rows of 5.

The multiplication sentence is: $3 \times 5 = 15$

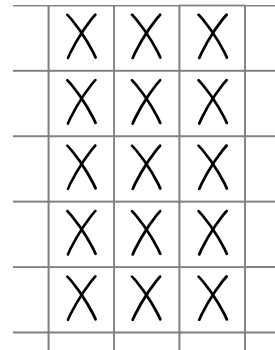
The division sentence is: $15 \div 3 = 5$




Turn the array to show 5 rows of 3.

The multiplication sentence is: $5 \times 3 = 15$

The division sentence is: $15 \div 5 = 3$

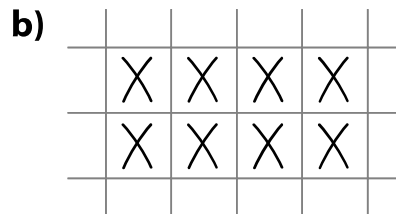
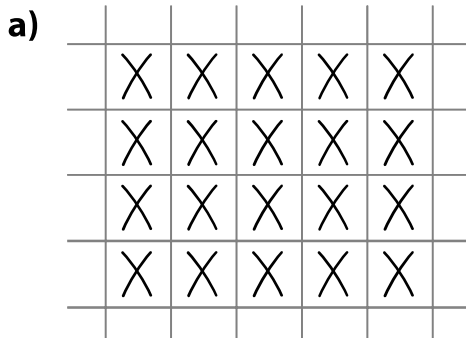


These four number sentences are **related sentences**.

-  $3 \times 5 = 15$
- $5 \times 3 = 15$
- $15 \div 3 = 5$
- $15 \div 5 = 3$

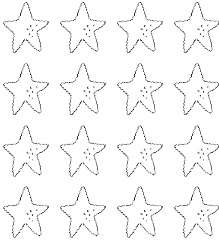
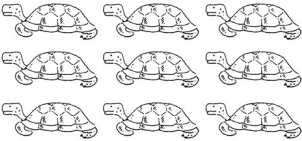

Try These

1. Write a multiplication sentence and a division sentence for each picture.



Practice

1. Write a multiplication sentence and a division sentence for each picture.

<p>a)</p>  <p>_____</p> <p>_____</p>	<p>b)</p>  <p>_____</p> <p>_____</p>	<p>c)</p>  <p>_____</p> <p>_____</p>
--	---	--

2. Write the related sentences for each set of numbers.

a) 1, 5, 5 _____

b) 2, 3, 6 _____

c) 3, 5, 15 _____

d) 4, 4, 16 _____

e) 5, 2, 10 _____

3. Divide. Use multiplication facts to help you.

a) $12 \div 4 =$ _____ b) $10 \div 5 =$ _____ c) $15 \div 3 =$ _____

d) $10 \div 2 =$ _____ e) $16 \div 4 =$ _____ f) $4 \div 4 =$ _____

Stretch Your Thinking

Berta has a collection of antique dolls.
If Berta puts her dolls into groups of 3 or 4, she has 2 dolls left over.
How many dolls might Berta have?

Relating Multiplication and Division Using Groups



Quick Review

Multiplication and division are related.



Multiplication: $4 \times 3 = 12$

Multiplication: $3 \times 4 = 12$

Division as grouping: $12 \div 3 = 4$

Division as sharing: $12 \div 4 = 3$

Multiplication can help you think about division.

What is $16 \div 4$?

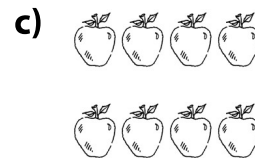
$4 \times \square = 16$

$4 \times 4 = 16$

So, $16 \div 4 = 4$

Try These

1. Write a multiplication sentence and a division sentence for each picture.



2. Write the related number sentences for each set of numbers.

a) 2, 5, 10 _____

b) 5, 3, 15 _____

Practice

1. Multiply or divide to solve the riddle.

Match each letter to its answer. Some letters are not used.

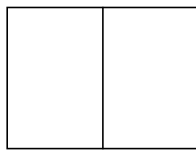
Riddle: What goes up a chimney down, but can't go down a chimney up?

$3 \times 3 = \underline{\hspace{2cm}} \text{ (C)} \quad 1 \times 4 = \underline{\hspace{2cm}} \text{ (B)} \quad 5 \times 2 = \underline{\hspace{2cm}} \text{ (Q)}$

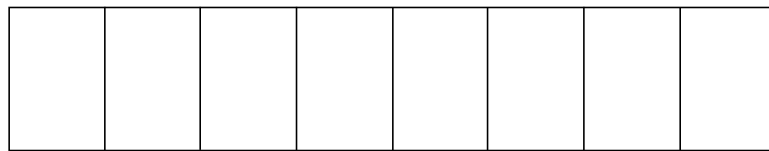
$3 \times 5 = \underline{\hspace{2cm}} \text{ (R)} \quad 20 \div 4 = \underline{\hspace{2cm}} \text{ (A)} \quad 9 \div 3 = \underline{\hspace{2cm}} \text{ (M)}$

$4 \times 2 = \underline{\hspace{2cm}} \text{ (Z)} \quad 3 \times 4 = \underline{\hspace{2cm}} \text{ (P)} \quad 5 \times 4 = \underline{\hspace{2cm}} \text{ (E)}$

$4 \div 2 = \underline{\hspace{2cm}} \text{ (U)} \quad 4 \times 4 = \underline{\hspace{2cm}} \text{ (L)} \quad 1 \div 1 = \underline{\hspace{2cm}} \text{ (N)}$



5 1



2 3 4 15 20 16 16 5

2. Write the related number sentences for each set of numbers.

a) 5, 5, 25 _____

b) 2, 2, 4 _____

c) 3, 3, 1 _____

d) 4, 3, 12 _____

3. Pono bought some packages of tennis balls.

Each package holds 3 balls. There are 15 balls altogether.

How many packages did Pono buy?

Stretch Your Thinking

Write as many division sentences as you can that have an answer of 3.
