

Multiplication: Bugs Can Multiply, So Can I!

Brief Overview:

This lesson focuses on the development of the concept of multiplication. Students will understand the concept of multiplication through pictures, drawings, repeated addition, and number sentences. Students will also write word problems based on multiplication sentences. This unit is also modified to meet the needs of students with learning disabilities. Information regarding this will be found in a separate box.

NCTM Content Standard/National Science Education Standard:

Understand meanings of operations and how they relate to one another

- understand various meanings of multiplication and division
- understand the effects of multiplying and dividing whole numbers
- identify and use relationships between operations, such as division as the inverse of multiplication, to solve problems;
- understand and use properties of operations, such as the distributivity of multiplication over addition.

Grade/Level

Grade 3 with modifications for Special Education students.

Duration/Length:

Three days (60 minutes each day)

Student Outcomes:

Students will:

- investigate groups of objects in the world around them
- create an array to organize objects
- write addition and multiplication sentences to represent pictures
- apply knowledge of repeated addition to multiplication
- represent multiplication and division basic facts using number sentences, pictures, and drawings

Materials and Resources:

- [illegible]

Development/Procedures:

Lesson 1 Groups Of

Note to Teacher: Prior to teaching this lesson send Multiplication Letter (RS 1- T) to parents. Also assemble “Things that Come in Groups” book for each individual student.

Preassessment – Pass out RS 2 –S for students to complete individually in order to assess their prior knowledge of multiplication. Then pass out the KWL Chart (RS 3- S). Model 2 Know statements on the chart using an overhead transparency. One should be exemplary and the other should not. Discuss the examples and explain why it is exemplary. Then have students copy the exemplary response.

Repeat this activity with the What Do You Want to Know? column. Leave the L section of the chart blank. Collect the charts and have students add to them at the end of the 3 lessons.

Read the assessment to students and use the modified version of the assessment. Construct a class KWL chart and record student responses on the chart.

Launch- Ask all the boys to come to the front of the room. Then ask all the girls. Ask the students what they noticed about how they were called to the floor. They were called in groups. Explain to the students they will now meet a friend named Amanda Bean who also likes to put things into groups. Read and discuss the story, Amanda Bean's Amazing Dream with the students. Focus the discussion on her journey through multiplication. Ask, "What has changed for Amanda".

Teacher Facilitation – Ask students what type of utensil they might use when eating Chinese food. Remind them that they use 2 chopsticks when eating. Then ask the class the following question – "How many chopsticks are needed for four people?" (2×4). Ask students how they got their answer. Ask students another problem, "How many chopsticks are needed if everyone in the class eats together?" Have them determine how many students are in the class and post this information on the board. Record the problem on chart paper and have students work in groups to solve the problem. Display and discuss student's methods for solving the chopstick problem.

Have the class brainstorm other things that come in groups of 2s (eyes, legs, wheels on a bike). Record the information on a "Groups of 2" chart. Tell the students that they will be working in groups to determine items that are in groups of 3s, 4s, 5s, 6s, 7s, 8s, 9s, 10s, 11s, and 12s.

Pair groups heterogeneously.

Student Application - Have students record their information in a student made book titled "Things that Come in Groups". Use SR 4a-c - S (The teacher should construct the books prior to the class). Then, have students work in groups to complete their individual book. Allow as much time as needed. Students may present their ideas in different modes. For example, illustrations with labels, words, phrases, pictures from magazines. Students will add more to their book for homework, having family members help them add new ideas. Ideas will be shared the next day. Record students' responses on chart paper. Students will benefit by having the charts displayed throughout the multiplication unit. Add to the charts as needed.

Embedded Assessment- Monitor student progress throughout the discussion, observe during activities, and evaluate written responses.

Reteaching/Extension-

- Model examples in the classroom of different groups. Example: 2 hands on a clock, 5 fingers on a hand

- Journal Entry: How do you think the activity we did today relates to multiplication?
- Pose the following question to students: List ways to classify or group students in our class if we were playing a game.

Lesson 2 Arrays

Preassessment- Give each student a baggie of raisins. A good choice would be 24 in each baggie. Tell the students that they will use the raisins as manipulative to group and find the total amount. Have the students represent the way they arranged their group of raisins. Encourage them to label their picture using numbers and words. Use (SR 5 – S) to complete the activity. Ask the students to label their picture using numbers and words. Discuss possible answers and strategies for the different ways they grouped their raisins.

Launch – Read the story, One Hundred Hungry Ants. Tell the students, “Remember, those raisins? They were really ants that have invaded your picnic! Now they have come to invade my picnic!”

Teacher Facilitation - Drop raisins on the overhead (to represent the ants invading your picnic). Model how to organize the “ants” by placing them into equal rows, forming an *array*. Ask, “what did I do, Why did I do it?” Model another example on the overhead. Discuss the word array. Ask students why an array might be helpful when determining the total amount of objects. Guide students to discover that putting objects into rows equally will make them easier to count. Ask the students if they can think of any real life arrays. For example, eggs in a carton, ice cube trays, six pack of coke, cookies in a package. If possible, have some examples.

Write array on a card and draw an example of an array on the card. Display in the classroom as a reference for students. Have real life examples of arrays available for students to view.

Student Application- Gives pairs of students a variety of manipulatives in different baggies (Example: 1 bag of beans, 1 bag of tiles, 1 bag of small Cheerios) grid paper transparency (RS 6- S), and overhead markers (Be sure these items can fit inside of the grid paper). Have students work in pairs to build arrays on grid paper to determine the total amount of objects they received.). Students should draw the object inside the squares. Encourage students to write number sentences that represent the arrays. Once students have done this, have students present their arrays on the overhead. Discuss the arrays. Identify patterns of repeated addition and groups with students.

Embedded Assessment- Monitor student progress throughout discussion, observe during activities, and evaluate written responses. Ask students how One Hundred Hungry Ants related to building arrays. Model how to play “Catching Those Bugs” using a transparency of (SR 7– T). Play 1 round as a class. Have students play “Catching Those Bugs” in pairs (SR 8- S).

Use Modified Version of SR 8-S.

Reteaching/Extension-

- Revisit “Groups of” charts and books , and provide additional practice to students who still have difficulty building arrays and identify the repeated addition number sentence (SR 9 –S).
- In journals have students describe a time when you could have used an array to help you count the number of objects you have had. Illustrate how you would have organized the objects. Write a number sentence that represents the array.
- Provide students with a Venn Diagram to compare and contrast multiplication and addition Resource Sheet (SR 10 – S)

Lesson 3 Multiplication Number Sentences

Preassessment- Journal Prompt: Explain what you know about this symbol “X” in pictures, numbers and words. Have students write their responses in their math journals.

Launch – Read the book Creature Features to the class. Have them take turns guessing the bugs using the clues.

Teacher Facilitation – Tell the students that they have prior knowledge of multiplication as repeated addition, and that multiplication requires you to put objects into groups. An organized way to do this is to create an *array*. Now, we will think about multiplication as a *number sentence*. What is the *symbol* for multiplication? Ask students to give examples of multiplication sentences. Elicit the symbol “X” in a multiplication means “groups of” Make an overhead transparency of (RS 11- T). Cut out each set and display one set at a time on the overhead. Leave space to write both an addition sentence and multiplication sentence.

Provide students with copies of RS 11- T to manipulate.

Have students identify the addition number sentence and multiplication number sentence to represent the number of bug legs in all. Ask, How many spiders are there? (3) Record. Then ask how many legs one spider has? (8) Record. Then ask how many spider legs are there in all? Show the multiplication fact $3 \times 8 = 24$ and show repeated addition $8 + 8 + 8 = 24$. Then have students explain how they found their answers orally (Example: I found my answer knowing there are three spiders and each spider had 8 legs so $8 + 8 + 8 = 24$ and $3 \times 8 = 24$).

On the overhead model how to explain how they found their answer. Now, complete the other 2 examples on the Resource sheet. Show the directions and model how to complete a "Multiplication Bug Book" on the overhead (RS 12 – S)

Provide modified copy of RS 12 –S for students.

Student Application – Have students complete the multiplication bug book. and provide support where needed (RS 13a-c S). First, read the directions, and model one page. Be sure they are drawing the same bug, number of legs, and each bug is the same size. Elicit total number of legs in all, multiplication fact, and addition number sentence. Share scoring rubric with students (RS 14 – T).

Provide modified copy of RS 13a-c S for students.

Embedded Assessment –Monitor student progress. Use the scoring rubric for the "Multiplication Bug Book".

Reteaching/Extension-

- Teacher pulls a small group for reteaching and continues to provide extra practice using pictures and/or manipulatives.
- Students create their own multiplication book using items of their choice.

Summative Assessment:

The students will complete the Assessment Activity (RS 15a-b – S). They will apply their knowledge of repeated addition, arrays, and multiplication to answer the questions.

Provide modified copy of RS15a-b. Read the assessment to students.

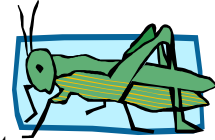
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Dear Parent,



In our next math unit, the children will learn about multiplication. The unit involves them with multiplication in a variety of ways—through investigations of real-life situations, numerical patterns and problem solving. The children solve problems, explore with concrete materials, write multiplication story problems, and play games.

The unit begins by relating multiplication to the world around us. The children first investigate things that come in 2s—eyes, chopsticks, wheels on a bicycle, earrings, shoes, and so forth. The children then think of things that come in 3s, 4s, 5s, and so on, up to 12s. The items on their lists are then used to pose problems: How many wheels are there on 5 tricycles? How many feet are there in our class? The items are also used to generate lists of multiples: 1 spider has 8 legs, 2 spiders have 16 legs, 3 have 24, and so on. The children look for patterns in these lists.

A game called “Catching Bugs” introduces the children to multiplication as a way of adding the same number over and over. The game requires the children to think about probability, too, as they try to determine which scores are more likely to occur than others.

Instead of teaching the facts and procedures of multiplication as abstract ideas, the experiences offered in the unit actively engage the children with multiplication. In this way, the standard mathematical symbolism for multiplication is connected to their experiences.

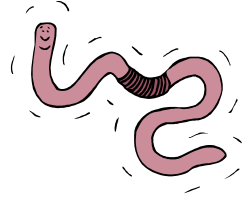
Please feel welcome to visit the class at any time and see the children’s involvement.

Sincerely,



Show What You Know About Multiplication!

Solve the problem using pictures, numbers, and words.



You have five friends digging for worms. You want to give each friend four worms. How many worms will you need?

Numbers: _____

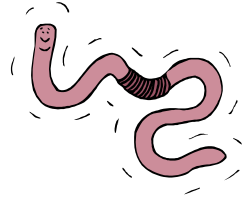
Words: _____

Choose one of the strategies you used to solve the problem and explain how you found your answer.



Show What You Know About Multiplication!

Solve the problem using pictures, numbers, and words.



You have five friends digging for worms. You want to give each friend four worms. How many worms will you need?

Numbers: _____

Words: _____

Choose one of the strategies you used to solve the problem and explain how you found your answer.

Strategies:	pictures	writing a problem
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I found the answer by using the strategy _____.

For example, I _____

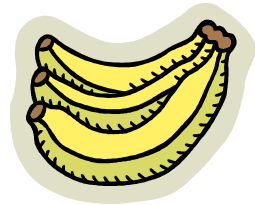
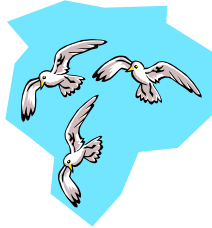


MULTIPLICATION



K	W	L

THINGS THAT
COME IN
GROUPS



GROUPS OF 2

GROUPS OF 3

GROUPS OF 4

GROUPS OF 5

GROUPS OF 6

GROUPS OF 7

GROUPS OF 8

GROUPS OF 9

GROUPS OF 10

GROUPS OF 11

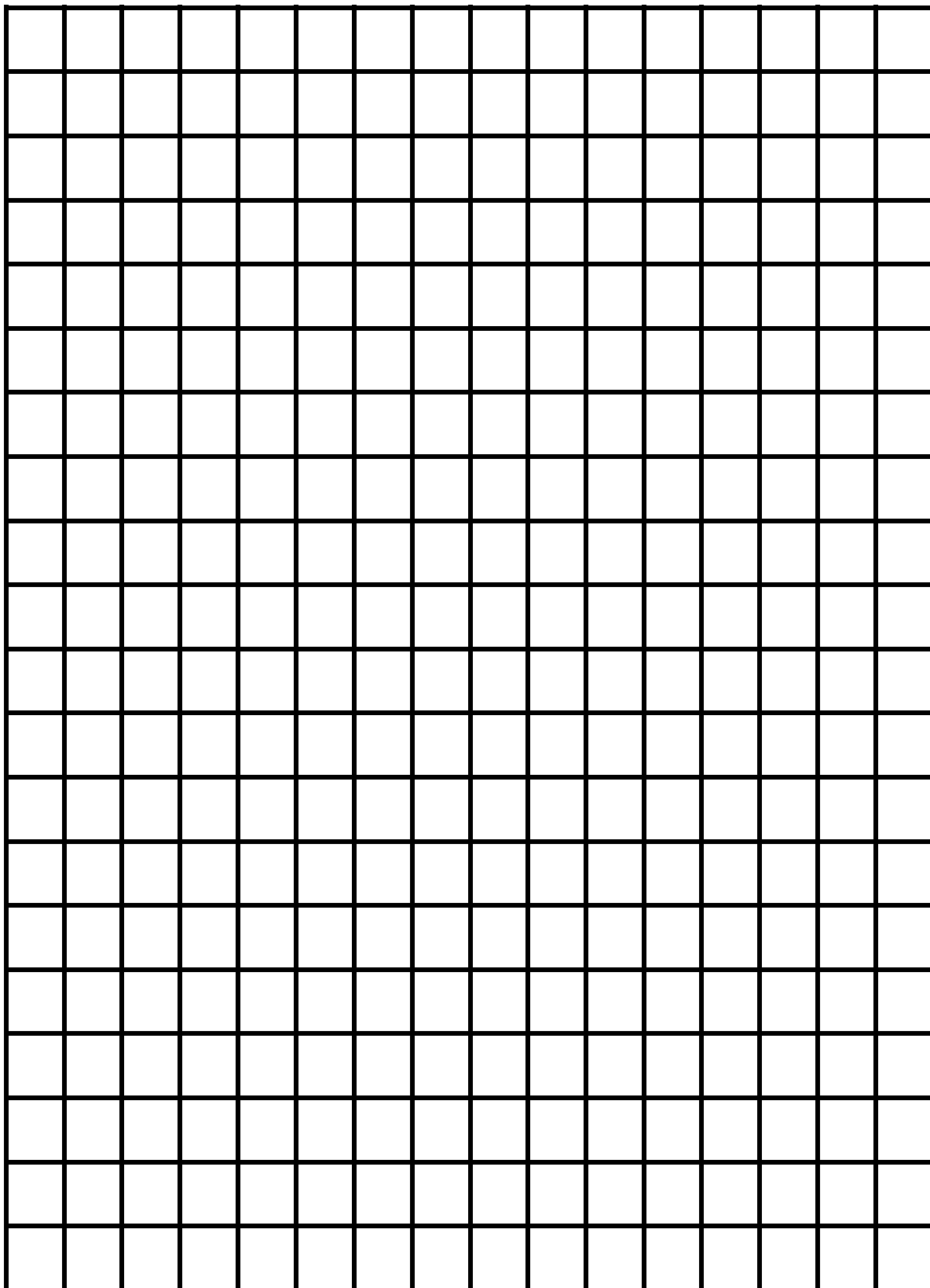
GROUPS OF 12

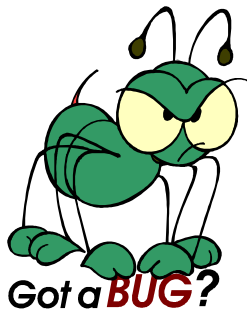
The Ants Go Marching One By One



Name _____

Date _____





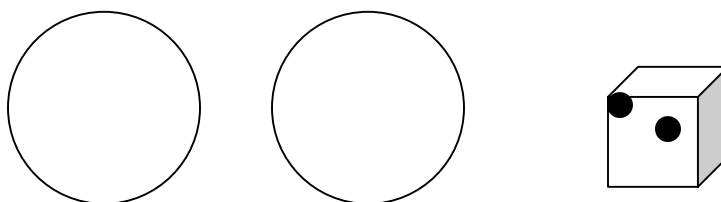
Catching Those Bugs!

Materials:

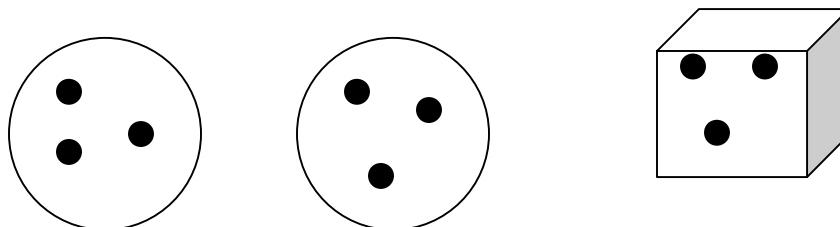
Dice

Game sheet

1. Roll the die and draw that number of circles in the box. Be sure the circles are large enough to fit your “bugs”!



2. Roll the die again and draw that number of “bugs” (dots) in the circles.

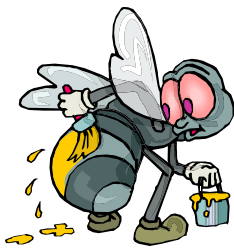


Answer:

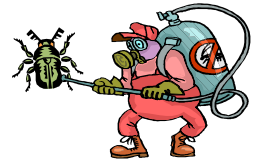
$$3+3=6$$

2 sets of 3

3. Determine how many “bugs” were drawn on the lines as repeated addition and in words.



Catching Those Bugs!



Game_____

Addition_____

Words_____

Multiplication_____

Game_____

Addition_____

Words_____

Multiplication_____

Game_____

Addition_____

Words_____

Multiplication_____

Name_____

Game_____

Addition_____

Words_____

Multiplication_____

Date_____

Catching Those Bugs!



Game _____

Addition (+) _____ + _____ = _____

Words _____ groups of _____

-----fold-----

Game _____

Addition (+) _____ + _____ = _____

Words _____ groups of _____

Name _____ Date _____

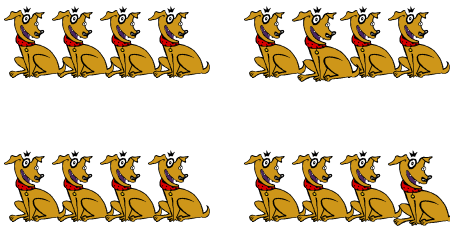
Name _____

Date _____

Multiplication: Exploring Repeated Addition and Equal Groups

Directions:

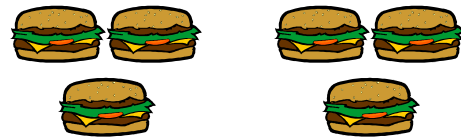
1. Write the number of equal groups.
2. Write an addition number sentence.
3. Write a multiplication number sentence.



_____ groups of _____

Addition: _____

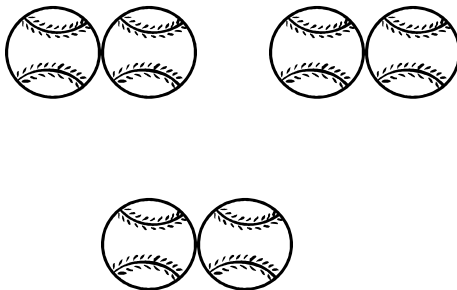
Multiplication: _____



_____ groups of _____

Addition: _____

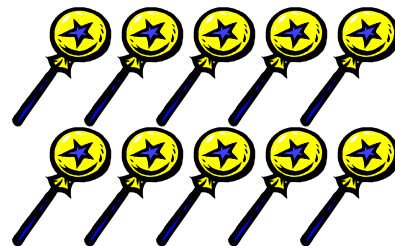
Multiplication: _____



_____ groups of _____

Addition: _____

Multiplication: _____



_____ groups of _____

Addition: _____

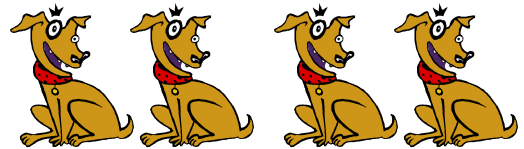
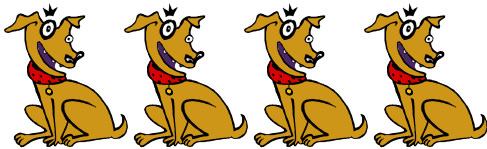
Multiplication: _____

Name _____ Date _____

Multiplication: Exploring Repeated Addition and Equal Groups

Directions:

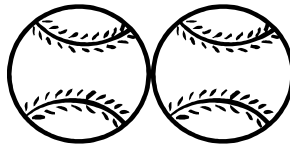
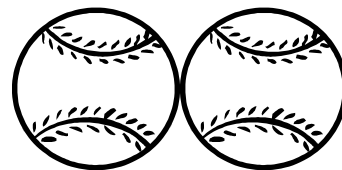
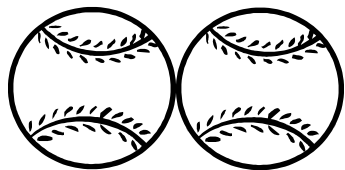
1. Write the number of equal groups.
2. Write an addition number sentence.
3. Write a multiplication number sentence.



_____ groups of _____

Addition: _____ + _____ = _____

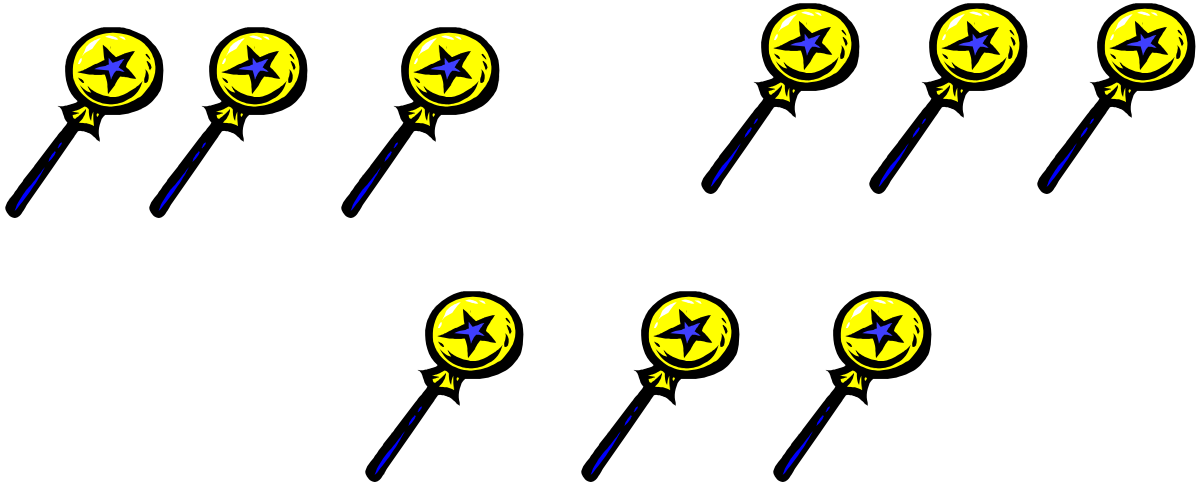
Multiplication: _____ X _____ = _____



_____ groups of _____

Addition : _____ + _____ + _____ = _____

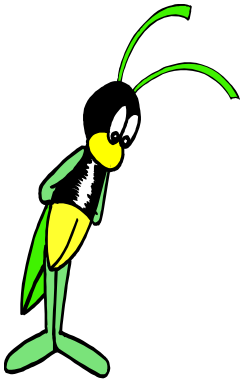
Multiplication: _____ X _____ = _____



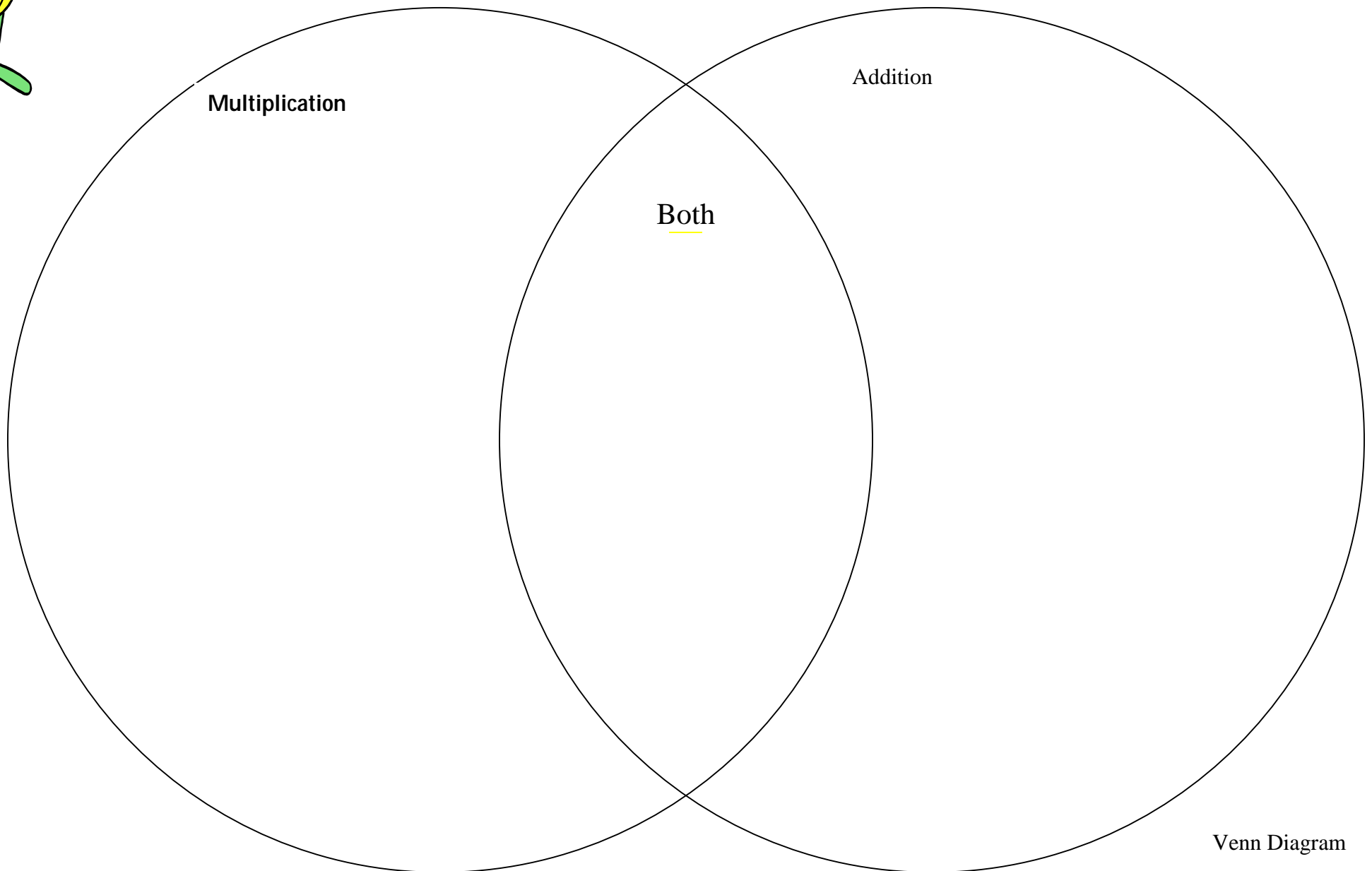
_____ groups of _____

Addition : _____ + _____ + _____ = _____

Multiplication: _____ X _____ = _____



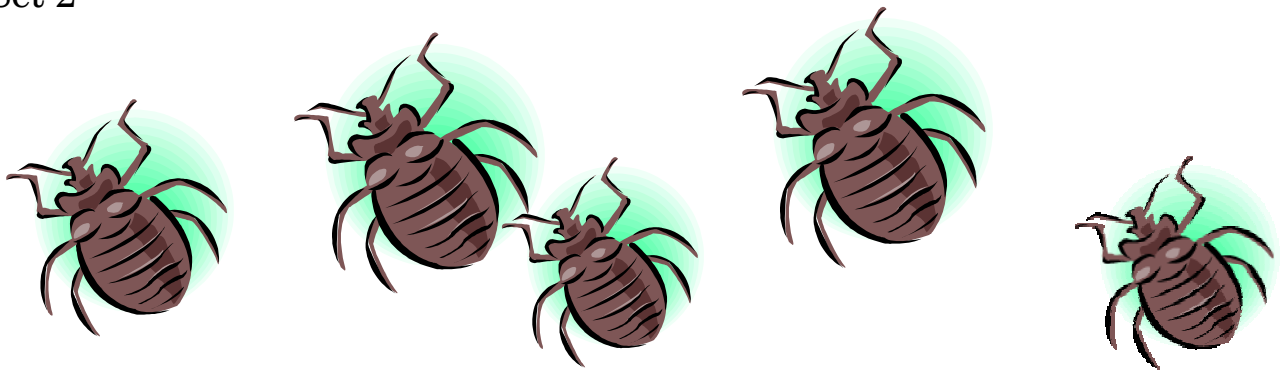
Comparing Multiplication and Addition



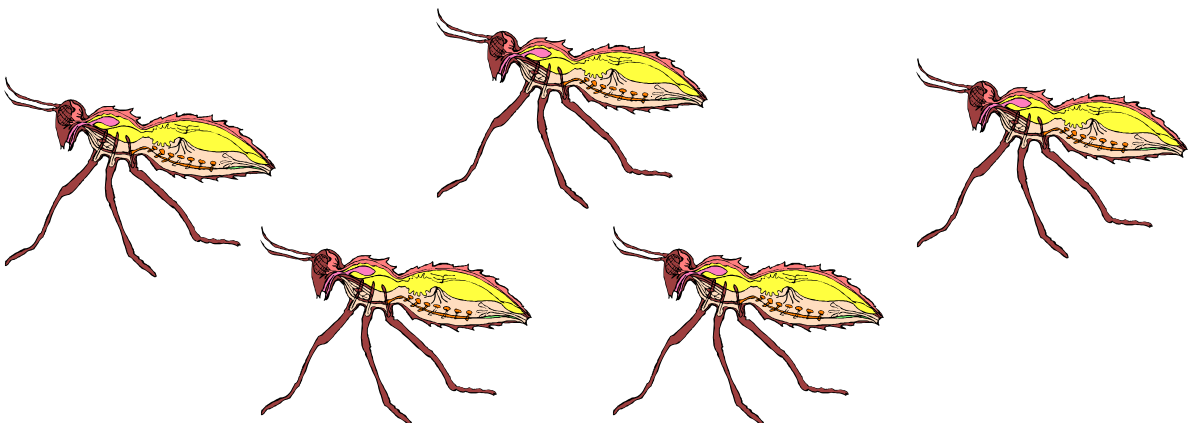
Set 1



Set 2

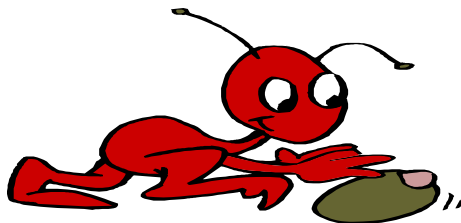


Set 3



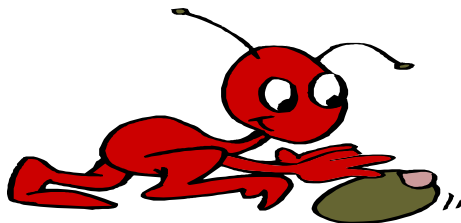
Creating a Multiplication Bug Book

- 1) Decide on what kind of bugs you'd like to feature in your book.
- 2) Think about which bug you'd like to feature on your first page.
- 3) Draw up to 9 bugs on your page with up to 9 legs on each bug.
- 4) Think about what the multiplication sentence would be for your drawing. Record it on the line.
- 5) Think about what the addition number sentence would be for your drawing. Record it on the line.
- 6) Color your picture in crayon.
- 7) Begin to think about your next page. Create all four pages.
- 8) Be sure each page is different. Be creative!



Creating a Multiplication Bug Book

- 9) Decide on what kind of bugs you'd like to feature in your book.
- 10) Think about which bug you'd like to feature on your first page.
- 11) Draw up to 4 bugs on your page with up to 4 legs on each bug.
- 12) Think about what the multiplication sentence would be for your drawing. Record it on the line.
- 13) Think about what the addition number sentence would be for your drawing. Record it on the line.
- 14) Color your picture in crayon.
- 15) Begin to think about your next page. Create all four pages.
- 16) Be sure each page is different. Be creative!





My Multiplication Bug Book





My Multiplication Bug Book



Mr. Terminex found ____ bugs at
your house.

Each bug had ____legs.

There are ____ legs in all.

Multiplication Fact

Addition Number Sentence

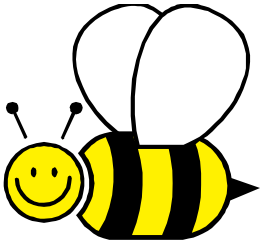
Mr. Terminex found ____ bugs at
your house.

Each bug had ____legs.

There are ____ legs in all.

Multiplication Fact

Addition Number Sentence



My Multiplication Bug Book





Mr. Terminex found _____ bugs at your house.

Each bug had _____ legs.

There are _____ legs in all.

$$\text{-----} \times \text{-----} = \text{-----}$$

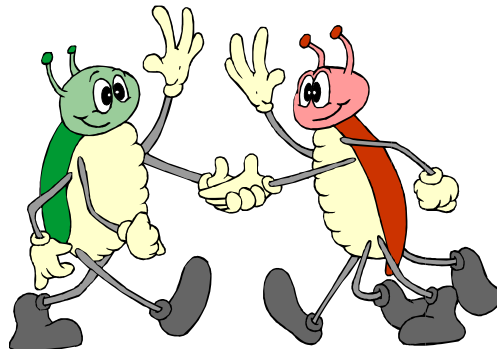
(Multiplication Fact)

$$\text{-----}$$

(Addition Fact +)

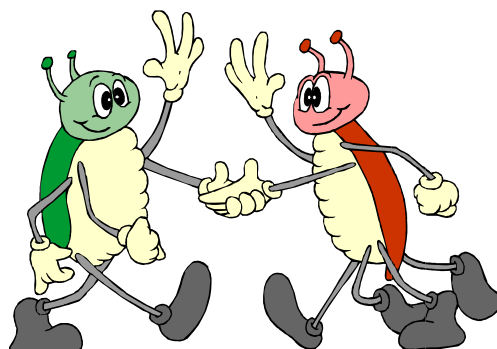
Multiplication Bug Book Rubric

- ▣ Illustration to represent problem
- ▣ Multiplication sentence written correctly
- ▣ Addition number sentence written correctly
- ▣ Neatness



Multiplication Bug Book Rubric

- ▣ Illustration to represent problem
- ▣ Multiplication sentence written correctly
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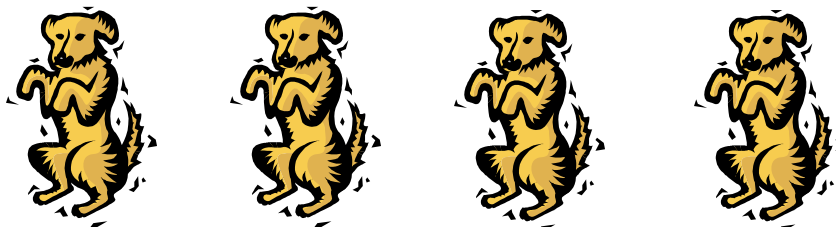


Name _____

Date _____

Assessment – Understanding the Concept of Multiplication

1. Look at the picture below. Which addition number sentence would best answer the question, How many dog legs in all?

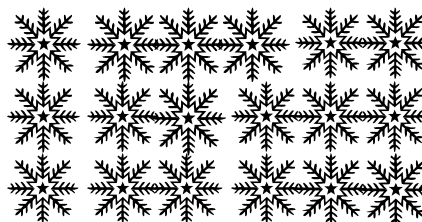


- Ⓐ $1+1+1+1$
- Ⓑ $2+2+2+2$
- Ⓒ $4+4+4+4$
- Ⓓ $7+7+7+7$

2. Which multiplication sentence would represent the number of dogs legs?

- Ⓐ 2×4
- Ⓑ 4×4
- Ⓒ 7×4
- Ⓓ 1×4

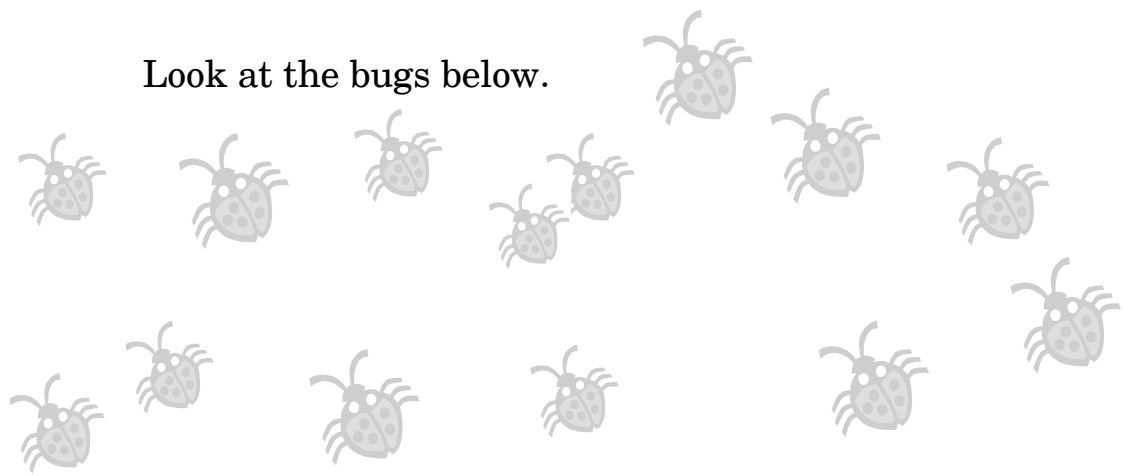
3. Look at the snowflake array below. Which multiplication number sentence represents the array.



- Ⓐ 3×6
- Ⓑ 5×3
- Ⓒ 3×3
- Ⓓ $3 + 6$

Part A:

Look at the bugs below.



Write a multiplication sentence that correctly represents the number of bugs by creating an array. Remember, your bugs need to be just dots.

_____ x _____ =

Part B:

Use what you know about multiplication to explain how you found the correct number sentence to Part A. Use math vocabulary, words and numbers in your explanation.

Name _____

Date _____

Assessment – Understanding the Concept of Multiplication

1. Look at the picture below. Which addition number sentence would best answer the question, How many dog legs in all?

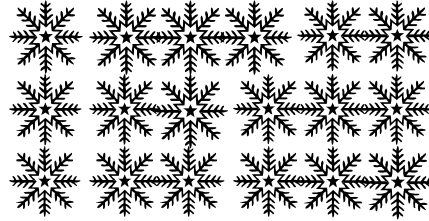


- Ⓐ $1+1+1+1$
Ⓑ $2+2+2+2$
Ⓒ $4+4+4+4$
Ⓓ $7+7+7+7$
2. Which multiplication sentence would represent the number of dogs legs?

- Ⓐ 2×4
Ⓑ 4×4
Ⓒ 7×4
Ⓓ 1×4

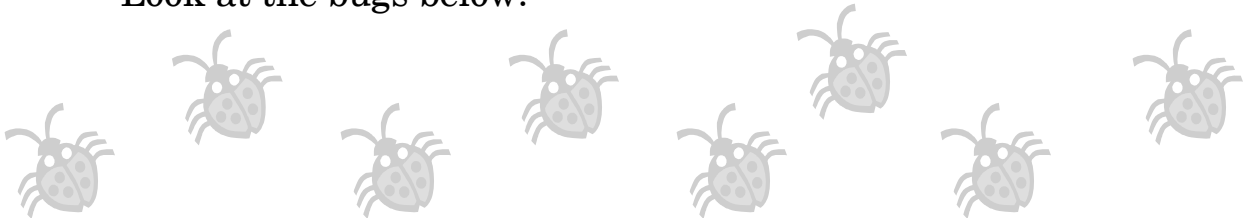
3. Look at the snowflake array below. Which multiplication number sentence represents the array.

- Ⓐ 3×6
- Ⓑ 5×3
- Ⓒ 3×3
- Ⓓ $3 + 6$



- #### 4. Part A:

Look at the bugs below.



Write a multiplication sentence that correctly represents the number of bugs by creating an array. Remember, your bugs need to be just dots.

[illegible]

_____ x _____ =

Part B:

Use what you know about multiplication to explain how you found the correct number sentence to Part A. Use math vocabulary, words and numbers in your explanation.

Word Box: array

I know there are _____ bugs because I made an
_____ making _____ groups of _____ .

I know there are _____ bugs in all because

_____.