

DIFFERENTIATING INSTRUCTION TO DEVELOP CONCEPTUAL  
UNDERSTANDING IN MULTIPLICATION, THE RESOURCES

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## Appendix A

### Understanding by Design Stage One - Desired Results

#### **Established Goals:**

Minnesota Standards-

**3.1.2** Add and subtract multi-digit whole numbers; represent multiplication and division in various ways; solve real-world and mathematical problems using arithmetic.

**4.1.1** Demonstrate mastery of multiplication and division basic facts; multiply multi-digit numbers; solve real-world and mathematical problems using arithmetic.

**4.2.2** Use number sentences involving multiplication, division and unknowns to represent and solve real-world and mathematical problems; create real-world situations corresponding to number sentences.

**Understandings:** Students understand that numbers can be flexibly changed in order to solve problems (Anoka-Hennepin Independent School District #11, 2014).

Students understand there are many patterns and strategies to solve multiplication problems.

#### **Essential Questions:**

How does knowing a variety of strategies help me solve multiplication and division problems?

How can I solve real-world problems using multiplication and division?

How can I represent my thinking in order to help me solve multiplication and division problems?

Which strategy is most efficient?

Students will know...

Students will know how to represent a single digit multiplication problem.

Students will know how to solve multiplication basic facts (0-10).

Students will know how to explain an equal grouping problem describing the number of objects and the number of groups.

Students will be able to....

Students will be able to use known facts to solve unknown facts.

Students will be able to represent their thinking verbally and visually.

Students will be able to apply multiplication and division processes to real world problems.

Students will be able to use multiple strategies to solve problems.

(Anoka-Hennepin Independent School District #11, 2014; Wiggins and McTighe, 2005)

Appendix B  
Understanding by Design Stage Two - Assessment Evidence

Summative assessments:

- Conceptual Multiplication Assessment - Completed every ten days (Appendix D)
- District multiplication assessment

Formative assessments:

- Guided whole group discussions
- Materials completed during Proof station and Practice station
- Work during Game station

Students will self assess their progress made through their Conceptual Multiplication Assessment and through comparison of scores in the Everyday Math unit diagnostic and unit post-test.

Assessment Timeline:

The Conceptual Multiplication Assessment (Appendix D) will be administered by the instructor after every ten days of instruction. Instruction will be differentiated depending on how students score on the assessment.

## Appendix C

### Understanding by Design Stage Three - Activities

The curriculum materials are designed for a forty five minute time period every day for a duration of six weeks. There should be at least three stations daily with each respective station lasting for fifteen minutes. After each fifteen minutes, students rotate to a new station. Students should be grouped by stages as determined by how they perform on the Conceptual Multiplication Assessment (Appendix D). Every tenth day students will be reassessed and new student groups should be created. The new groups should reflect the new assessment scores.

During the station period there will be up to four stations possibilities:

**Teacher Station** - This station will be completed in a small group with teacher instruction. Teachers will use the assessment to decide what instruction to provide in this intervention period. Effective instruction includes math talks, games using practiced skills and discussion of word problems that students have completed during proof station. Materials are provided and directly correlate to the level that students placed in their assessment. See Appendix F for further directions. See Appendix G for materials.

**Game Station** - Students will play games that directly correlate with the skills they are learning. Some game materials are provided. Some game materials are not provided as they are from the Everyday Math Curriculum. See Appendix H for further directions.

**Proof Station** - Students will be given word problems in which they have to use manipulatives and/or show their work in order to prove their solution. Students will be held accountable for this work through discussion in the teacher station. For extension, students could be given word problems a level above their current level to spark discussion. Materials are provided in Appendix I and Appendix J.

**Practice Station** - Students will work in their groups to complete district developed curriculum that directly correlates with developing multiplicative number sense. Materials are provided from Everyday Math Curriculum. Some materials are provided in Appendix K for use.

(Andreasen & Hunt, 2012; Tomlinson, 1999)

Appendix D  
Conceptual Multiplication Assessment

Name: \_\_\_\_\_

Assessor: \_\_\_\_\_

<b>Date</b>			
<b>CMAScore</b>			

**Stage 1 - Skip Counting**

Can you count by 2s? By 5s, 10s?

Answer:

Can count by 2, 5, 10 - **Go to 2.1**Incorrect/Count by 1s - **Stage 1****Stage 2 - Repeated Equal Groups Visible**

Place five cards with three dots face down. Show the student one card and tell student that each card has three dots. How many dots are there altogether? Flip over all cards.

2.1 Show five groups of three.

Answer:

Skips counts - **Go to 2.2**Automatic/known facts - **Go to 2.2**Incorrect/Count by 1s - **Stage 2**

2.2 Show six groups of 4.

Answer:

Skips counts - **Go to 3.1**Automatic/known facts - **Go to 3.1**Incorrect/Count by 1s - **Stage 2****Stage 3 - Repeated Equal Groups with Items Blocked and Groups Visible**

Place all the cards flipped over with dots facing down. Turn over one card and tell them that each card has the same number of dots. Ask them how many total dots there are.

3.1 Five cards with two dots.

Answer:

Skips counts - **Go to 3.2**Automatic/known facts - **Go to 3.2**Incorrect/Count by 1s - **Stage 3**



3.2 Six cards with 4 dots

Answer:

Skips counts - **Go to 4**

Automatic/known facts - **Go to 4**

Incorrect/Count by 1s - **Stage 3**

**Stage 4** - Repeated Equal Groups with Items and Groups Blocked and Arrays

Students are told that you have cards with a certain number of dots on each card. Students are asked how many total dots there are.

4.1 I have two groups of four. How many dots do I have?

Answer:

Skips counts - **Go to 4.2**

Automatic/known facts - **Go to 4.2**

Incorrect/Count by 1s - **Stage 4**

4.2 I have five groups of six. How many dots do I have?

Answer:

Skips counts - **Go to 4.3**

Automatic/known facts - **Go to 4.3**

Incorrect/Count by 1s - **Stage 4**

4.3 Show student one row from array (five dots). Ask student what they see. The array has seven rows of five. How many dots are there altogether?

Answer:

Skips counts - **Go to 5**

Automatic/known facts - **Go to 5**

Incorrect/Count by 1s - **Stage 4**

**Stage 5** - Problem Solving and Relational Thinking

5.1 Show student the  $7 \times 4$  card and ask them to solve it. If student is correct ask if student can use this to solve  $4 \times 7$ .

Answer:

Explains Commutative property - **Go to 5.2**

Skips counts - **Go to 5.2**

Automatic/known facts - **Go to 5.5**

Incorrect/Count by 1 - **Stage 5**

5.2 Show student the  $14 \times 4 = 56$  card. If fourteen times four equals fifty-six. What is the answer to  $15 \times 4$ ?

Correct and states needs one more group of four - **Exit**

Correct but makes no connection - **Stage 5**

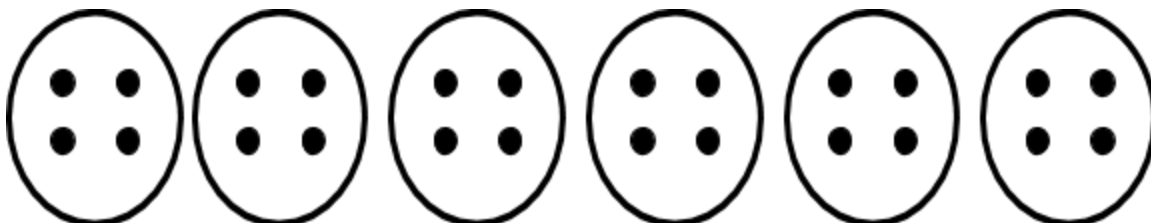
Incorrect - **Stage 5**

Appendix E  
Conceptual Multiplication Assessment Materials

Stage 2.1



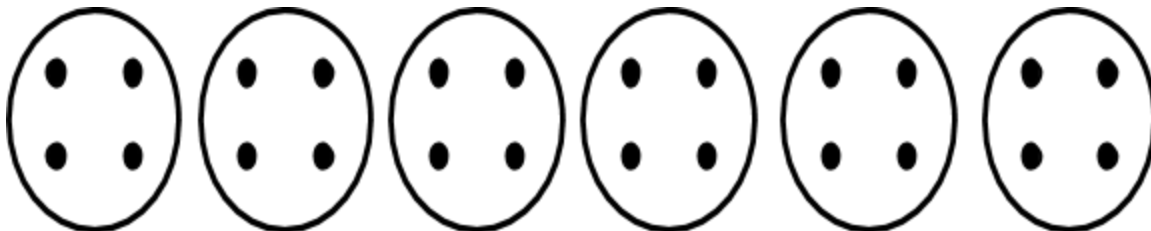
Stage 2.2



Stage 3.1



Stage 3.2



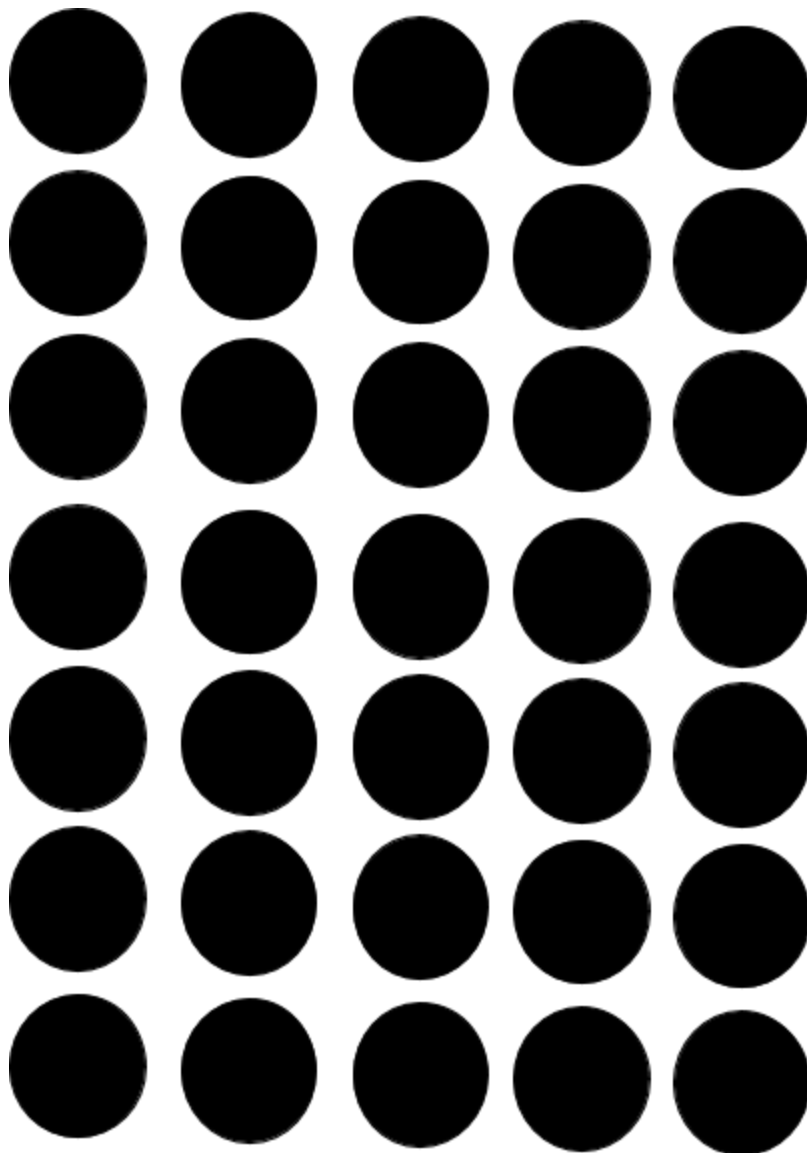
Stage 4.1

I have two groups of four dots.  
How many total dots are there?

Stage 4.2

I have five groups of six dots.  
How many dots do I have?

Stage 4.3



5.1

5.1

5.2

5.2

$$4 \times 7 = \quad 7 \times 4 = \quad 14 \times 4 = \quad 15 \times 4 =$$

(Anoka-Hennepin Independent School District #11, 2013; Wright et al., 2006)

Appendix F  
Teacher Station Instruction Guide

**Stage 1:** Mastery students are able to skip count by 2, 5, 10.

- Students practice multiples (Wright et al, 2006).  
Have students count and raise hand/say buzz/give thumbs up/clap with number sequence as students are learning. For instance when learning multiples of five students would count and then clap at bolded numbers: 1, 2, 3, 4, **5**, 6, 7, 8, 9, **10**... When students demonstrate mastery count only multiple factors such as 5, 10, 15...  
Suggestions:  
-Practice counting forwards (10, 20, 30...) and backwards (60, 55, 50...)  
-Start at different places (54, 56, 58...)
- True/False. Have students directly model repeating single digit addition problems such as  $2+2+2$ ,  $3+3+3$ , etc. (Carpenter et al., 2003).  
Suggestions:  
-Use True and False number sentences for discussion such as:  
1)  $\underline{\quad} = 5+5+5$   
2)  $15 = 5+5+5+0$   
3)  $15 = 0+5+5+5$   
4)  $5+5+5+ \underline{\quad} + \underline{\quad} = 25$   
-Utilize other multiples (4, 7, 8, etc) for additional development of relational thinking  
-Use open number sentences such as in number 4 ( $6+ \underline{\quad} + \underline{\quad} = 18$ )  
-Use a variety of addends  $4+4+4+4$ ,  $2+2+2+2+2$ , etc
- Have students double a single digit number. Have students flip over a card and use a deck of playing cards with single digit numbers (Brickwedde, 2012a).
- Have students jump from a number such as  $58 \rightarrow 100$ ,  $216 \rightarrow 300$ ,  $62 \rightarrow 102$ . Have students go backwards from a decade number such as 43 go back 6, 34 go back 7, 94 go back 5. Practice using decade number and jumping by tens. (taken from: Brickwedde, 2016).
- Develop place value by a rate of tens with small group discussion (taken from: Brickwedde, 2016).

4 10 40	Do you agree that there are 4 tens in 40?
<u>   </u> 10 80	If you know there are 4 tens in 40, how many tens are in 80?

- \_\_\_ 10 160      How many tens are in 160?
- 5 10 50      Do you agree that there are 5 tens in 50?
- \_\_\_ 10 70      If you know there are 5 tens in 50, how many tens are in 70?
- \_\_\_ 10 140      How many tens are in 140?

- Subitizing Cards - Flash a card and have students discuss answers. Do not reveal answer. Then show the card again and have students explain how they knew what the answer was. Sets to complete- Subitisation Dice and Card Set, and Subitisation Two Collections 1-5 (State Government of Victoria, 2012). See Appendix L for subitizing cards resource.
- Discuss how to solve problems. Give example of  $2 \times 2$  and  $2 \times 364$ . Ask students which one they know and what they need to figure out. After completing individual sheets P1-P9 in Appendix J, discuss how we can use what we know to solve problems we do not know. Give students examples such as 3 groups of 3 is 9, how can that be used to solve 6 groups of 3. Ask students if  $3 \times 3 = 9$  and  $4 \times 3 = 12$ , what can we use to solve  $11 \times 3$ ? (Brickwedde, 2016).
- Have a guided group discussion on word problems 1.1 - 1.6 in Appendix I or word problems in Appendix J. Problems from Appendix I and Appendix J can be completed or worked on during proof station. Have students use manipulatives to model problems and discuss solutions (Brickwedde, 2012b; Brickwedde 2016).  
 Suggestions:  
 Discuss student strategies that demonstrate methods that involve array models, repeated addition and equal groups.

- Games

-Trio for Multiples.

Materials: At least 24 cards. For a deck of 5s you would have 4 cards of each multiple of 5 such as 5, 10, 15, 20, 25, 30, etc.

Rules: Students are dealt five cards. They try to get three multiples in a row. After every turn pick a new card and discard a card. For instance 15, 20, 25 would be a winner. Can increase difficulty can increase number of multiples such as have multiples of three and five (Wright et al, 2006).

**Stage 2** - Students are able to solve an equal groups problem with the problem modeled

- True/False. Have students directly model single digit multiplication problems such as  $4 \times 5$ ,  $6 \times 4$ ,  $3 \times 8$ , etc. (Carpenter et al., 2003).

Suggestions:

-Use True and False number sentences for discussion such as:

1.       $4 \times 6 = 6 + 6 + 6 + 6$

2.  $3 \times 9 = 9 + 9 + 9$
3.  $3 \times 7 = 7 + 7 + 7$
4.  $7 \times 3 = 3 + 3 + 3 + 3 + 3 + 3$  (False)

For extension of discussion integrate multiplication facts that students have already learned in the problem

5.  $4 \times 6 = 12 + 6 + 6$
  6.  $4 \times 6 = 12 + 12$
  7.  $3 \times 7 = 14 + 7$
  8.  $3 \times 6 = 12 + 3$  (false)
- Have students double a single digit number and eventually a smaller two-digit number. Have students flip over a card and use a deck of playing cards or cards made from 0-100 number chart. Start with small numbers and expand to larger numbers when doubling, tripling and quadrupling. When beginning tripling or quadrupling numbers start again with smaller numbers and expand to larger numbers when students demonstrate mastery. (Brickwedde, 2012a)
  - Have students jump from a number such as 43->71, 88->110, 93->206. Have students go backwards from a decade number such as 35 go back 9, 71 go back 26, and 100 go back 64. Practice using decade number and jumping by tens. (taken from: Brickwedde, 2016).
  - Subitizing Cards - Flash a card and have students discuss answers. Don't reveal answer. Then show the card again and have students explain how they knew what the answer was. Sets to complete- Subitisation Two Collections 1-5, Ten Frame Doubles Set, and Ten Frame Build on Five Set (State Government of Victoria, 2012). See Appendix L for subitizing cards resource.
  - Develop scaling up and using known numbers to solve problems (taken from: Brickwedde, 2016).
    - 3 x 7 What are three sevens?
    - 6 x 7 If you know what 3 sevens are, can you use that to figure out six sevens?
    - 12 x 7 If you know three sevens and six sevens, how can you use either of those to figure out what 12 sevens are?
  
    - 4 x 7 What are four sevens?
    - 8 x 7 If you know what 4 sevens are, can you use that to figure out eight sevens?
    - 16 x 7 If you know four sevens and eight sevens, how can you use either of those to figure out what 16 sevens are?
  
    - 4 x 8 What are four eights?

2 x 8 If you know what 4 eights are, can you use that to figure out two eights?

8 x 8 If you know four eights and two eights, how can you use either of those to figure out what eight eights are?

- Have a guided group discussion on word problems 2.1 - 2.6 in Appendix I or word problems in Appendix J. Problems from Appendix I and Appendix J can be completed or worked on during proof station. Have students use manipulatives to model problems and discuss solutions (Brickwedde, 2012b; Brickwedde, 2016).

Suggestions:

Discuss student strategies that demonstrate methods that involve array models, repeated addition and equal groups.

- Games

-Draw Multiples (Wright et al, 2006)

Need: 4 sets of cards for the first ten set of multiples (2, 4, 6, 8, 10, 12, 14, 16, 18, 20)

Rules: Players are dealt 15 cards and are placed in a pile face down in front of each player. Remaining 10 cards are split 5 for each player and put in front of each player. Each player draws three cards from their pile of 15 cards. At the same time players flip over one card from pile in front of them. They may play a card from their hand that goes either forward or backward. They continue to play one card at a time and may flip over a card or add a card. They may have only 3 cards in their hand but draw from their draw pile after each card is played. If a card of 12 is drawn the player may play a 10 or 14 next to it. Winner has used their entire draw pile and cards are in order either forward or backward. An example might be 8, 10, 12, 10, 8, 6, 4.

Cards can be made from any multiple such as 3, 5, 10

-Rolling Groups (Wright et al, 2006)

Materials: Two dice and grid paper

Rules: Have students roll two dice and one dice represents the groups and the other dice represents the amount in the groups. Have students shade in amount on grid paper

Suggestions

-Use manipulatives or drawings to represent the problem

-Students use numbers they are unfamiliar with

-Students count in multiples



**Stage 3** -Students are able to solve an equal groups problem with groups visible but items in the groups not visible.

- True/False. Have students model single digit multiplication problems. Build up basic facts background (Carpenter et al., 2003).

1.  $3 \times 8 = 16 + 8$
2.  $9 \times 3 = 2 \times 9 + 9$
3.  $3 \times 7 = 14 + 7$
4.  $3 \times 6 = 12 + 3$  (false)
5.  $7 \times 6 = 7 \times 5 + 6$  (false)

Develop relational thinking, using bigger numbers encourages students not to solve the problem but rather think about the relationship.

6.  $7 \times 4 = 4 \times 7$
7.  $32 \times 5 = 4 \times 33$  (false)
8.  $250 \times 10 = 10 \times 250$
9.  $6 \times 8 = 8 \times 6$
10.  $60 \times 8 = 8 \times 60$

- Have students double a two-digit number and have students triple a single digit or small two-digit number. Use a deck of playing cards or cards made from 0-100 number chart. Start with small numbers and expand to larger numbers when doubling, tripling and quadrupling. When beginning tripling or quadrupling numbers start again with smaller numbers and expand to larger numbers when students demonstrate mastery. (Brickwedde, 2012a)
- Develop place value by a rate of tens with small group discussion (taken from: Brickwedde, 2016).

10 10s in 100  
 \_\_\_ 10s in 1000  
 \_\_\_ 10s in 1230

10 10s in 100  
 \_\_\_ 10s in 1000  
 \_\_\_ 10s in 2000  
 \_\_\_ 10s in 1350

- Subitizing Cards - Flash a card and have students discuss answers. Do not reveal answer. Then show the card again and have students explain how they knew what the answer was. Sets to complete- Subitisation Two Collections 1-7 and Ten Frame Random Set (State Government of Victoria, 2012). See Appendix L for subitizing cards resource.

- Subitizing Cards - Flash students a card with a grid of dots such as a 5 by 8 grid. Ask students to find as many different strategies as possible besides counting by one (Brickwedde, 2016). See attached Grid Cards.
- Have a guided group discussion on word problems 3.1 - 3.7 in Appendix I or word problems in Appendix J. Problems from Appendix I and Appendix J can be completed or worked on during proof station. Have students model problems and discuss solutions (Brickwedde, 2012b; Brickwedde, 2016).

Suggestions:

-Discuss student strategies that demonstrate methods that involve array models, repeated addition and equal group

- Math Games

-Multiplication top it

Materials: Dice, recording method (paper, whiteboards, etc)

Rules: Students take turns rolling two dice and multiply the two numbers that are rolled by the dice. They write down the product. The other player then rolls and finds the product. Keep tallies for the higher score.

**Stage 4** - Students are able to solve an equal groups problem with the groups and items not being visible.

- True/False. Encourage students to use basic facts they know when working on single digit multiplication relationships. (Carpenter et al., 2003)
  1.  $9 \times 9 = 9 \times 8 + 9 + 9$  (false)
  2.  $7 \times 6 = 4 \times 6 + \_ \times 6$
  3.  $8 \times \_ = 6 \times 9 + 3 \times 9$
  4.  $6 \times 10 = 6 \times 5 + 6 \times 5$
  5.  $8 \times 4 = 8 \times 3 + 4$  (false)

Begin to introduce students proving double or triple digit numbers multiplied by a single digit digit  $12 \times 3$ .

6.  $16 \times 4 = \underline{\hspace{2cm}}$
  7.  $6 \times 5 + 6 \times 6 = 6 \times 11$
  8.  $60 \times 5 = 2 \times 60 + 2 \times 60 + 60$
  9.  $2 \times 24 = 2 \times 10 + 2 \times 10 + 2 \times 4$
  10.  $9 \times 25 = 4 \times 25 + 4 \times 25 + 25$
  11.  $24 \times 6 = 7 \times 23$  (false)
  12.  $32 \times 5 = 5 \times 32$
- Have students double a three digit number and triple a small two-digit number. Possibly have students quadruple a single digit number or a small two-digit number. Use a deck of playing cards or cards made from 0-100 number chart. Start with small numbers and expand to larger numbers when double, tripling and quadrupling. When beginning triple or quadruple start again with smaller numbers

and expand to larger numbers when students demonstrate mastery (Brickwedde, 2012a).

- Subitizing Cards - Flash a card and have students discuss answers. Do not reveal answer. Then show the card again and have students explain how they knew what the answer was. Sets to complete- Two Ten Frame Set and Subitisation Three Collections 1-5 (State Government of Victoria, 2012). See Appendix L for subitizing cards resource.
- Subitizing Cards - Flash students a card with a grid of dots such as a 5 by 8 grid. Ask students to find as many different strategies as possible besides counting by one (Brickwedde, 2016). See attached Grid Cards.
- Have a guided group discussion on word problems 4.1 - 4.7 in Appendix I or word problems in Appendix J. Problems from Appendix I and Appendix J can be completed or worked on during proof station. Have students model problems and discuss solutions (Brickwedde, 2012b; Brickwedde, 2016).

Suggestions:

-Discuss student strategies that demonstrate methods that involve array models, repeated addition and equal group

- Math Games

-Lemonade Stand Game (Wright et al, 2006)

Materials: cups and 60 snap cubes, record sheet

Rules: Students in pairs take turn preparing the lemonade order of their peer. One student rolls two dice. The first one is the number of cups the player orders. The second dice roll is the number of ice cubes inside the cup. While the first player figures out how many ice cube were ordered, the second player prepares it. Then they reverse roles and whoever has more ice cubes is the winner. Student sheet is in Appendix G.

-Array Go Fish (Wright et al, 2006)

Materials: Cards that are split with numbers and a visual representation

Rules: Each student draws five cards. When they have a pair they put the cards down for everybody to see. For every players turn, the player asks an opposing player if they have a card that matches with one in their hand. If the opposing player has it, he/she must give the card to the player asking and the original player can ask for another card. If the opposing player doesn't have the card then that player will say "no go fish". If the player says "no go fish," the original player must draw one card. Then it is the next player's turn. When one player has no cards left in their hand the game is over. Cards are in Appendix G.

**Stage 5** - Students are able to solve problem solving and/or relational thinking to solve a single by double digit multiplication problem.

- True/False. Have students solve and prove double or triple digit numbers multiplied by a single digit digit  $12 \times 3$ ,  $62 \times 4$ , etc. (Carpenter et al., 2003)
  1.  $\underline{\quad\quad} = 18 \times 3$
  2.  $7 \times 13 = \underline{\quad}$
  3.  $15 \times 5 = 15 \times 2 + 15 \times 2 + 15$
  4.  $24 \times 5 = 24 \times 3 + 24$  (false)
  5.  $50 \times 7 = 300 + 50$
  6.  $240 = 24 \times \underline{\quad}$
  7.  $2 \times 24 = 2 \times 10 + 2 \times 10 + 2 \times 4$
  8.  $60 \times 5 = 2 \times 60 + 2 \times 60 + 60$
  9.  $16 \times 6 = 15 \times 5 + \underline{\quad}$
- Have students double a three or four digit number and triple two-digit number. Students quadruple a single digit number or a small two-digit number. Use a deck of playing cards or cards made from 0-100 number chart. Start with small numbers and expand to larger numbers when doubling, tripling and quadrupling. When beginning tripling or quadrupling numbers start again with smaller numbers and expand to larger numbers when students demonstrate mastery (Brickwedde, 2012a).
- Subitizing Cards - Flash a card and have students discuss answers. Do not reveal answer. Then show the card again and have students explain how they knew what the answer was. Sets to complete- Subitisation Three Collections 1-7, Subitisation Four Collections 1-5, and Subitisation Four Collections 1-7 (State Government of Victoria, 2012). See Appendix L for subitizing cards resource.
- Have a guided group discussion on word problems 5.1 - 5.7 in Appendix I or word problems in Appendix J. Problems from Appendix I and Appendix J can be completed or worked on during proof station. Have students model problems and discuss solutions (Brickwedde, 2012b; Brickwedde 2016).
 

Suggestions:

  - Discuss student strategies that demonstrate methods that involve array models, repeated addition and equal group
- Math Games
  - Dueling Arrays Game (Wright et al, 2006)
  - Materials: Dueling Array Cards
  - Rules: Students line up in two lines. Show students the card and the quickest student to get it correct goes to end of line and the other student sits down.

-Multiplication top it

Materials: Dice, recording method (paper, whiteboards, etc)

Students take turns rolling two dice and recording product. Keep tallies for the higher score.

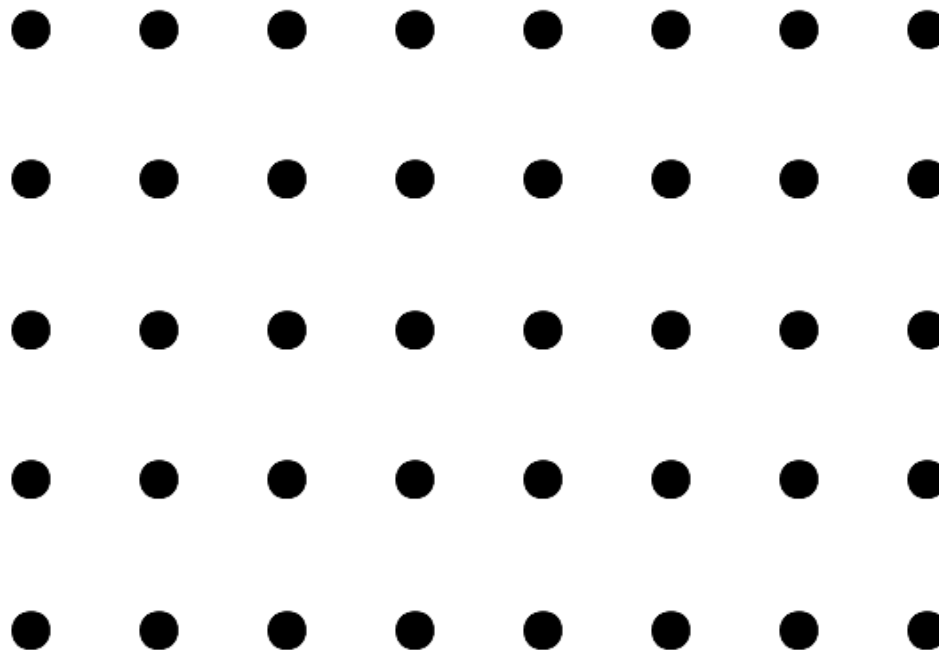
Suggestions

-Have students check answer

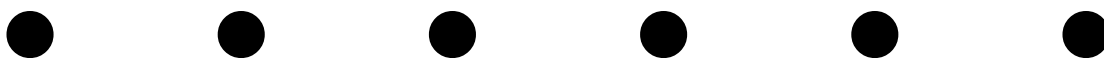
-Use three dice for their dice roll and have students do a double digit number multiplied by a single digit number (such as  $24 \times 3 =$ )

Appendix G  
Teacher Station Materials

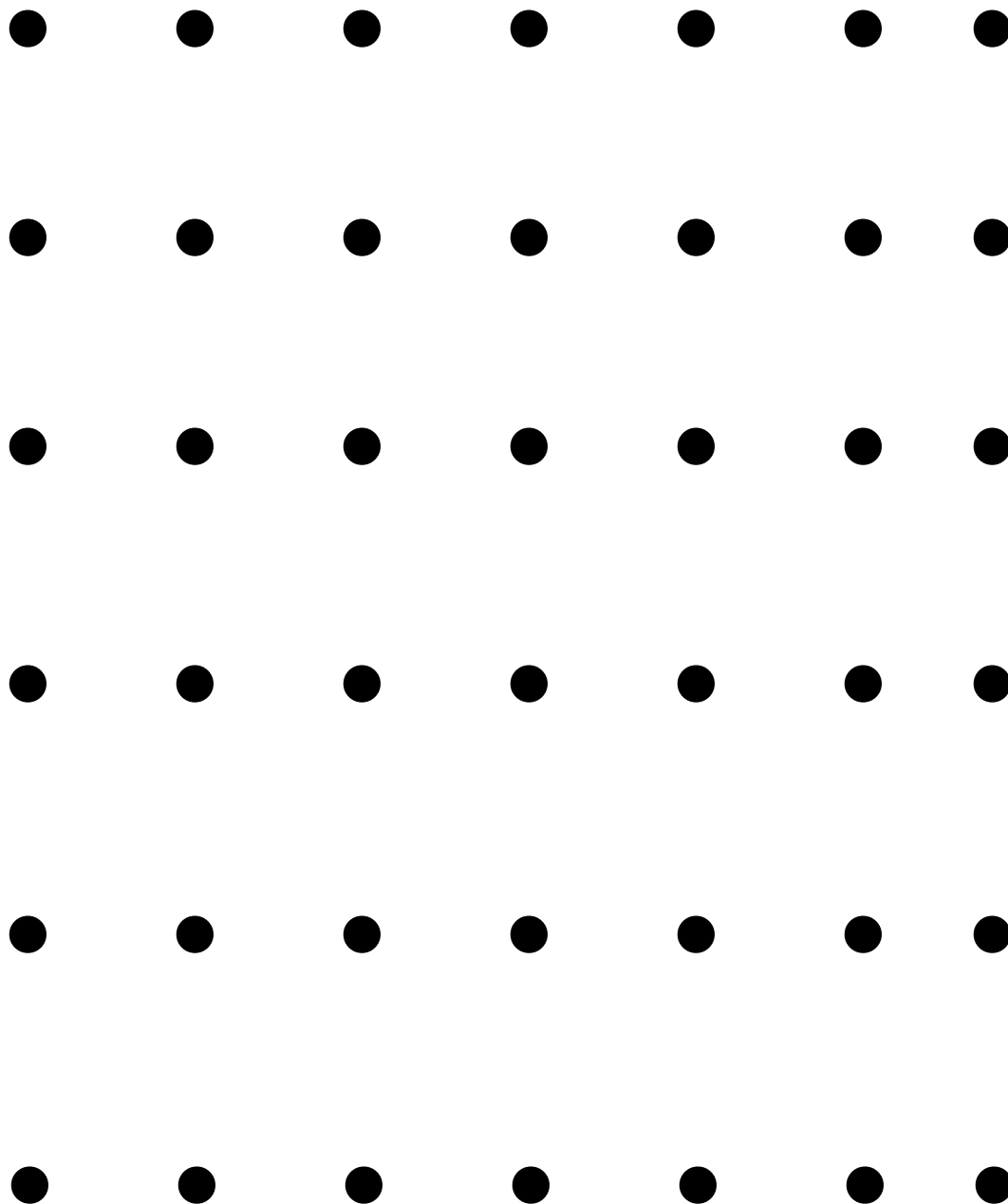
Stage 3 or 4 Subitizing grid cards for discussion (Brickwedde, 2016)



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Stage 3 or 4 Subitizing grid cards for discussion (Brickwedde, 2016)

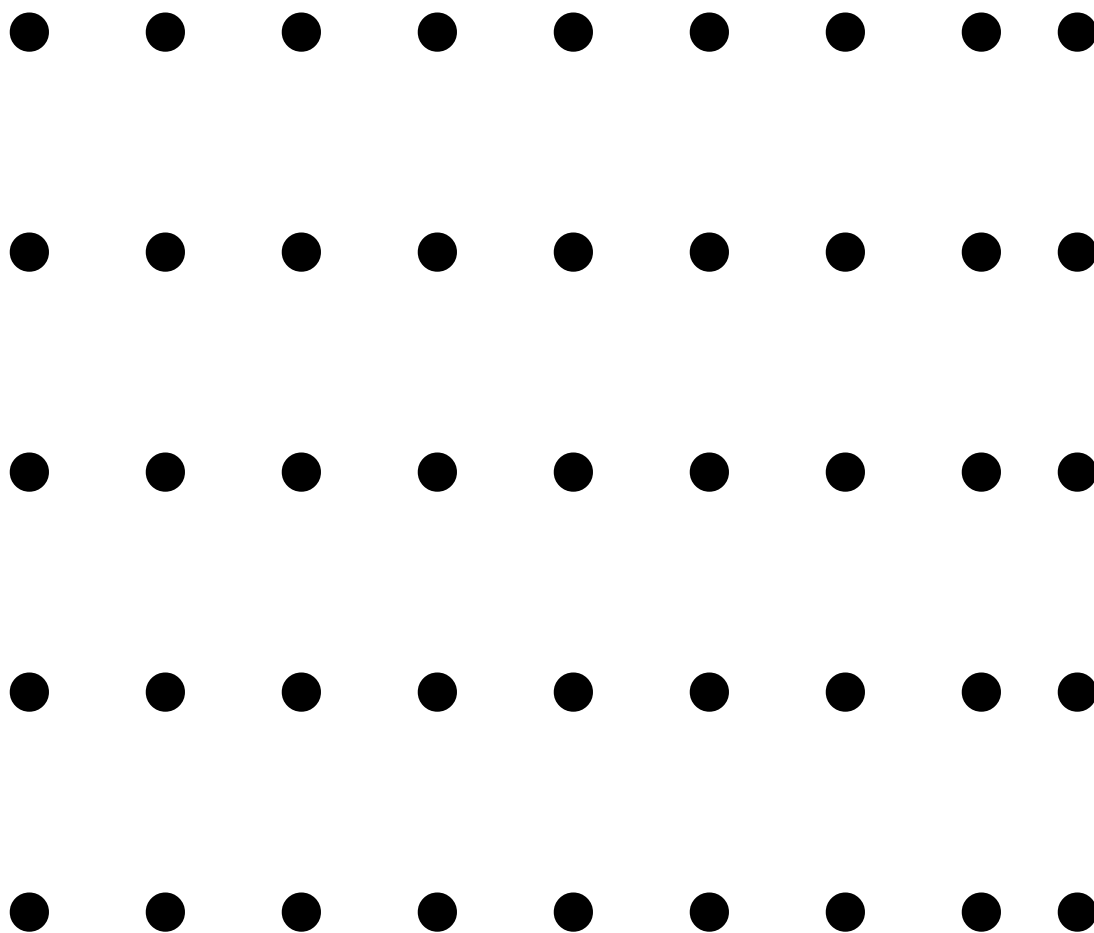




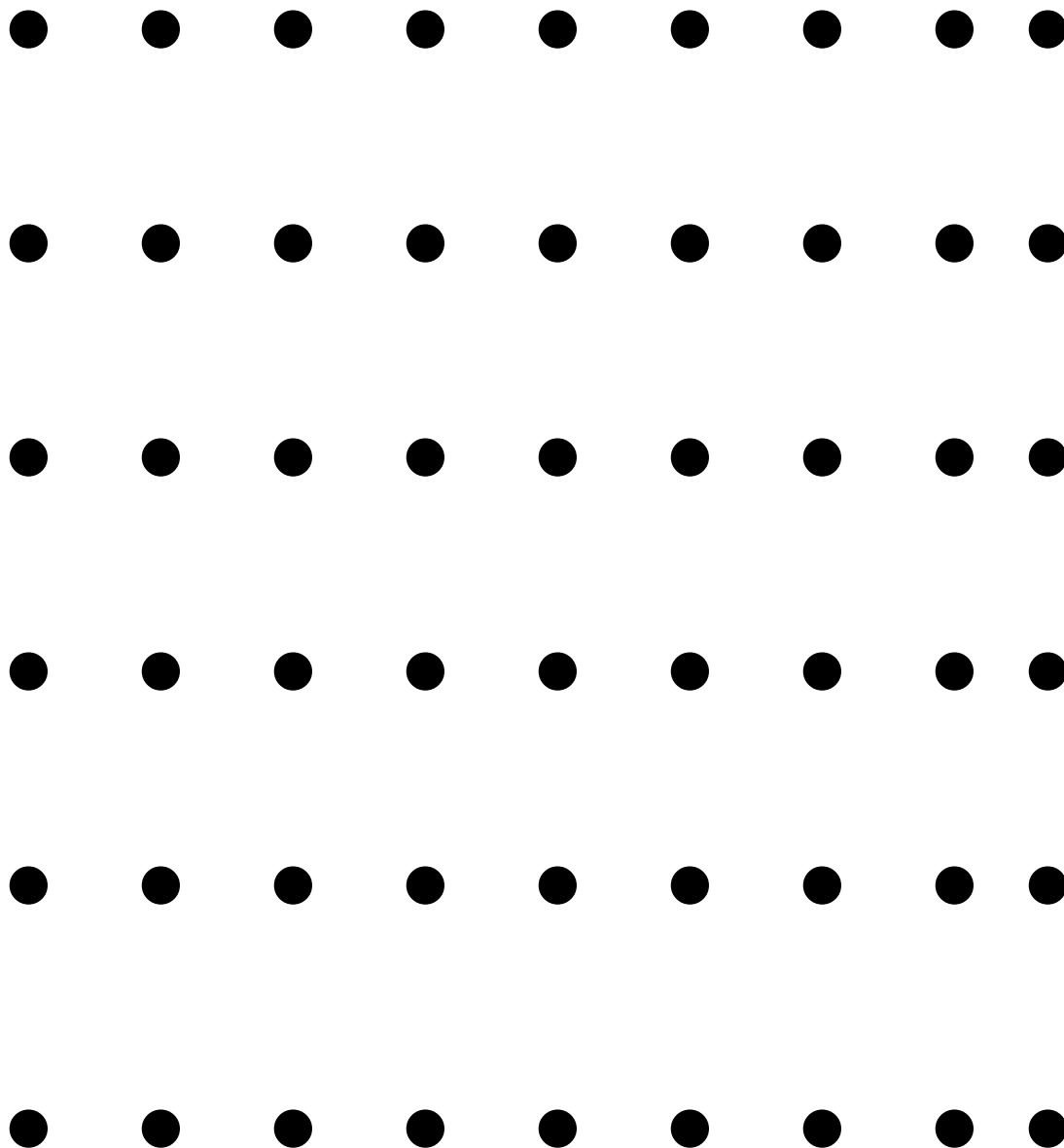
Stage 3 or 4 Subitizing grid cards for discussion (Brickwedde, 2016)



Stage 3 or 4 Subitizing grid cards for discussion (Brickwedde, 2016)



Stage 3 or 4 Subitizing grid cards for discussion (Brickwedde, 2016)



4.1 Lemonade Stand (Wright et al, 2006)

Player 1	Player 2
----------	----------

Round 1

Number of Cups	Ice-cubes in one cup	Total number of Ice-cubes	Number of Cups	Ice-cubes in one cup	Total number of Ice-cubes

Player 1	Player 2
----------	----------

Round 2

Number of Cups	Ice-cubes in one cup	Total number of Ice-cubes	Number of Cups	Ice-cubes in one cup	Total number of Ice-cubes

Player 1	Player 2
----------	----------

Round 3

Number of Cups	Ice-cubes in one cup	Total number of Ice-cubes	Number of Cups	Ice-cubes in one cup	Total number of Ice-cubes

Player 1	Player 2
----------	----------

Round 4

Number of Cups	Ice-cubes in one cup	Total number of Ice-cubes	Number of Cups	Ice-cubes in one cup	Total number of Ice-cubes

Player 1	Player 2
----------	----------

Round 5

Number of Cups	Ice-cubes in one cup	Total number of Ice-cubes	Number of Cups	Ice-cubes in one cup	Total number of Ice-cubes

Player 1	Player 2
----------	----------

Round 6

Number of Cups	Ice-cubes in one cup	Total number of Ice-cubes	Number of Cups	Ice-cubes in one cup	Total number of Ice-cubes

## 4 Stage- Array Go Fish

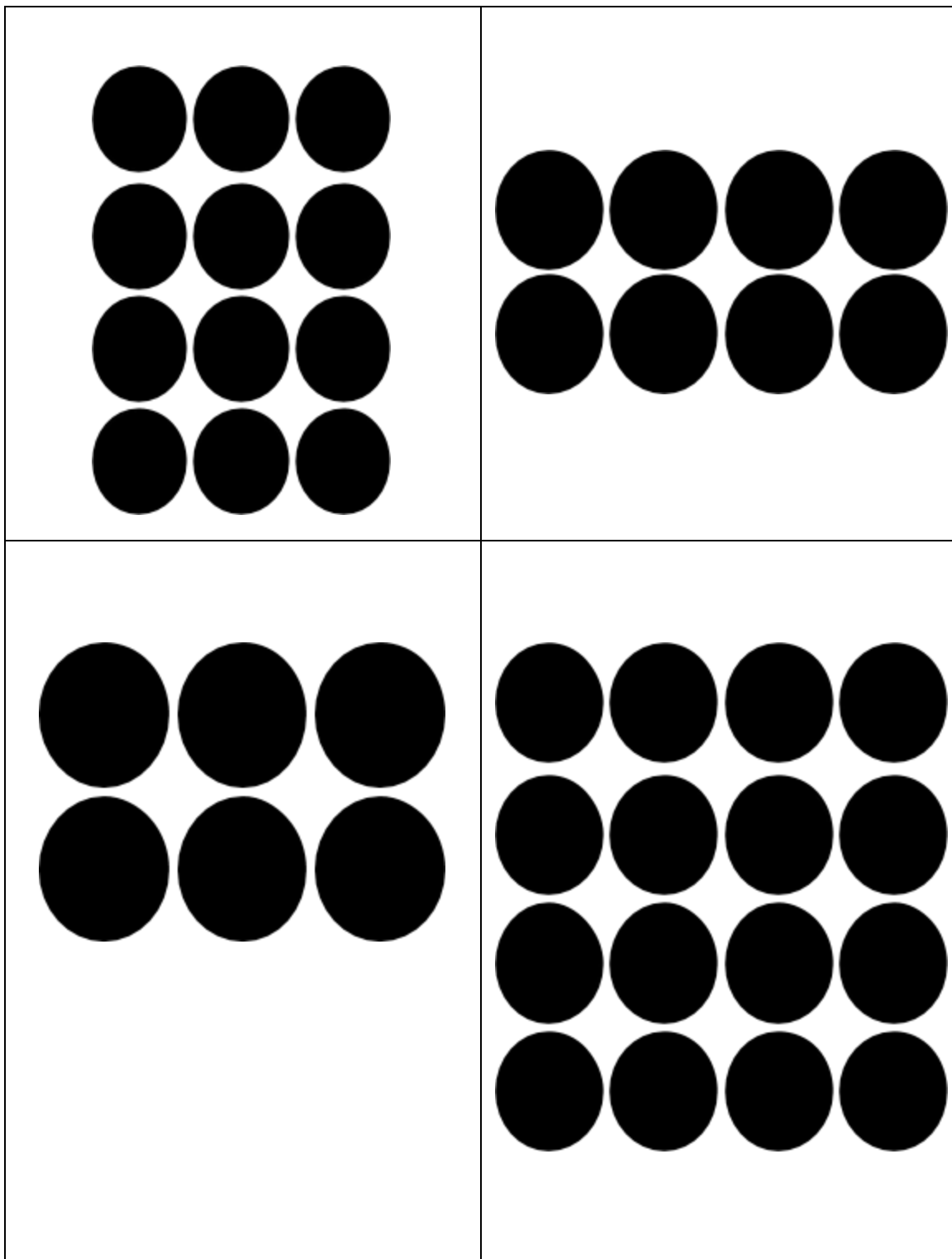
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6	16

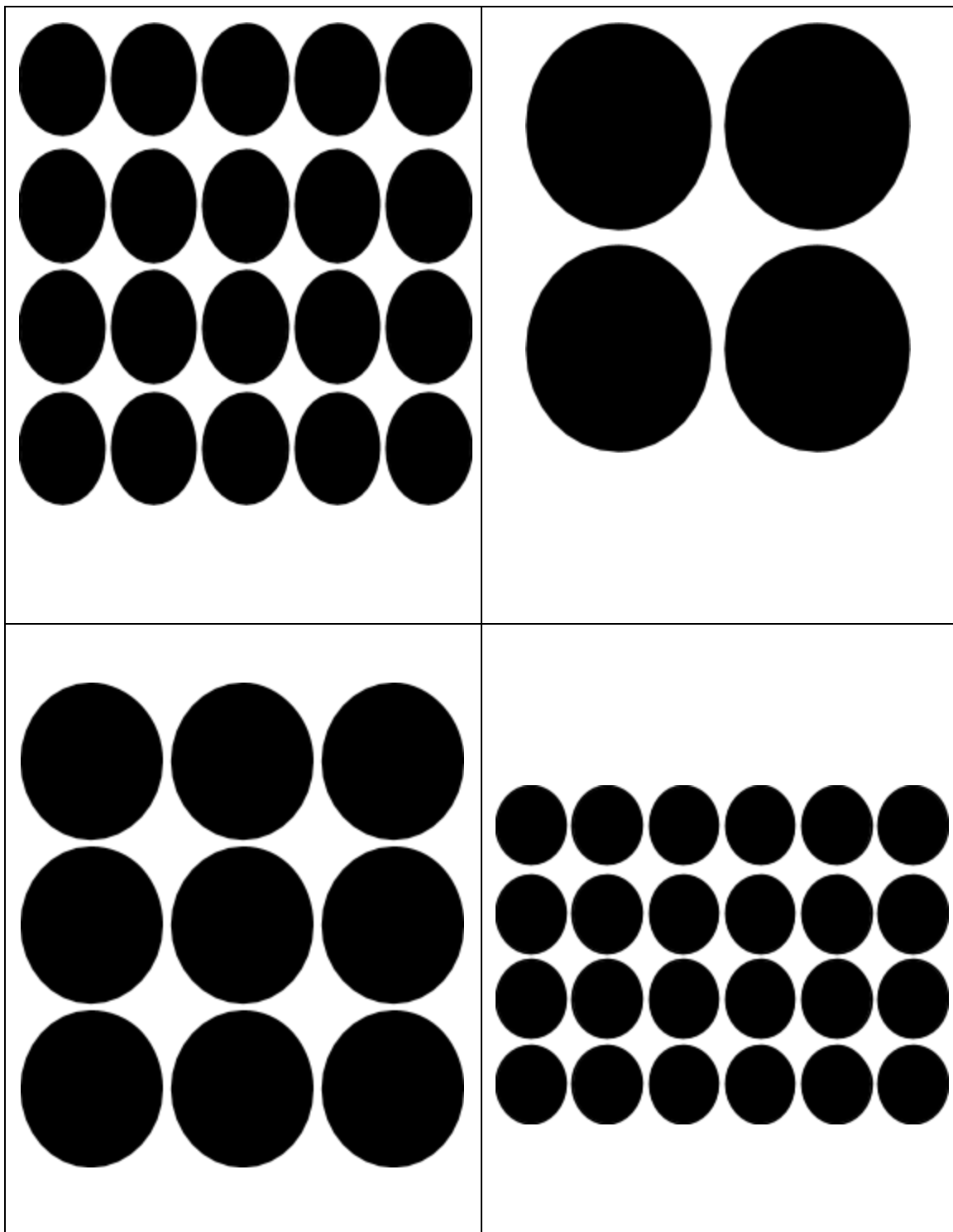
4	20
24	9

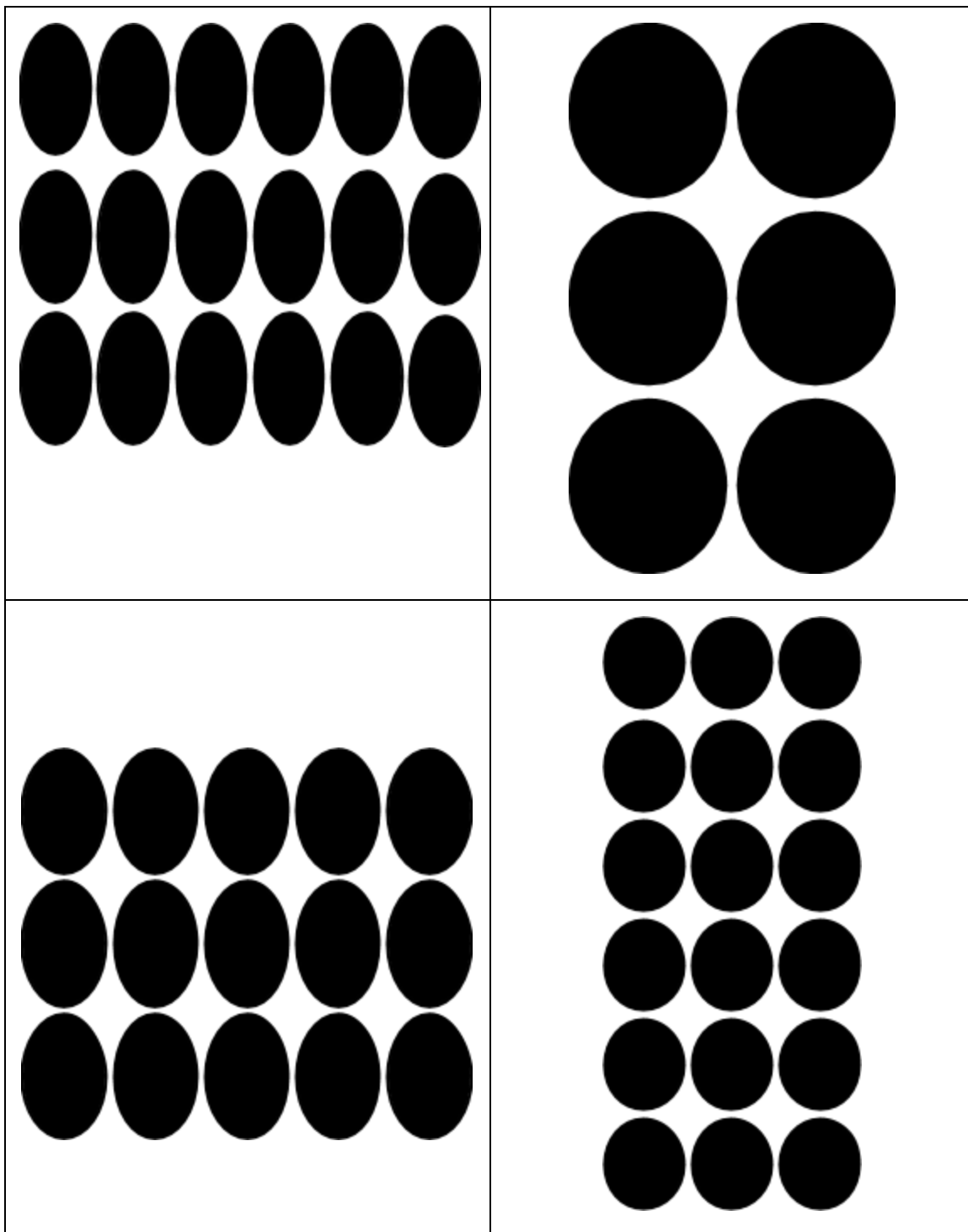
6	18
15	21

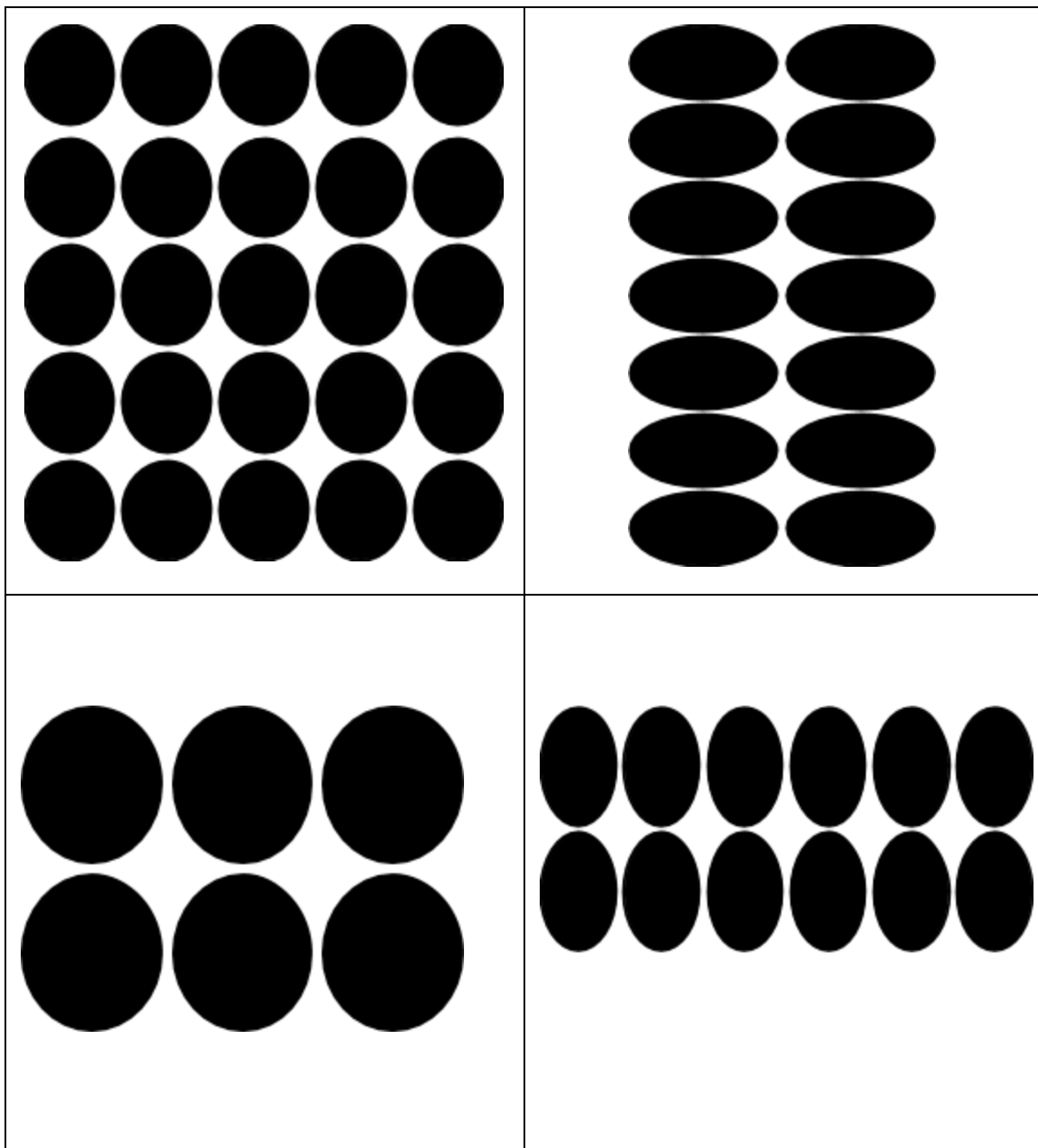


20	14
6	12

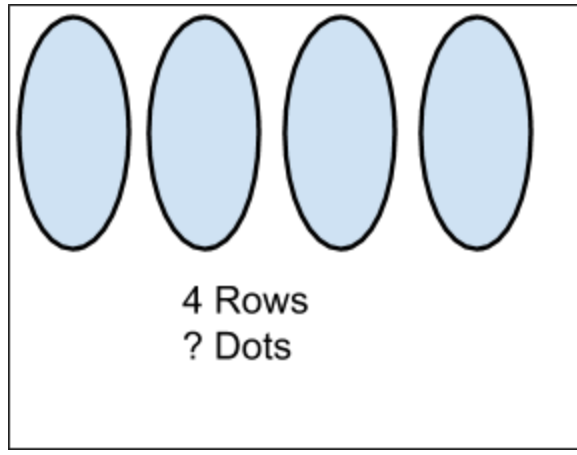
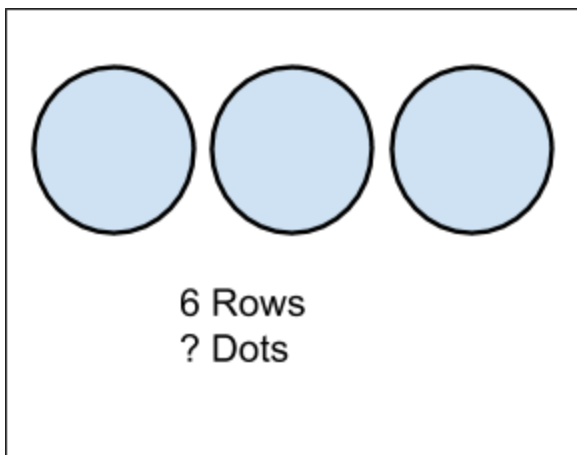
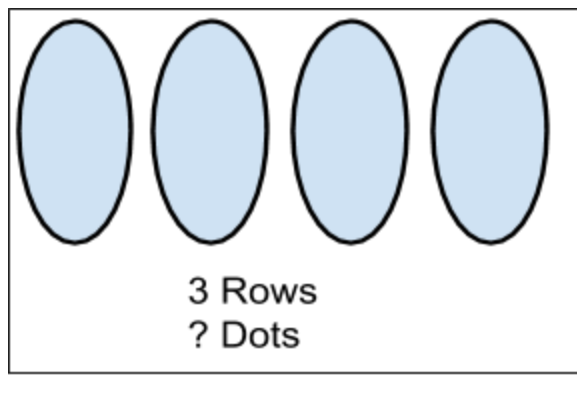
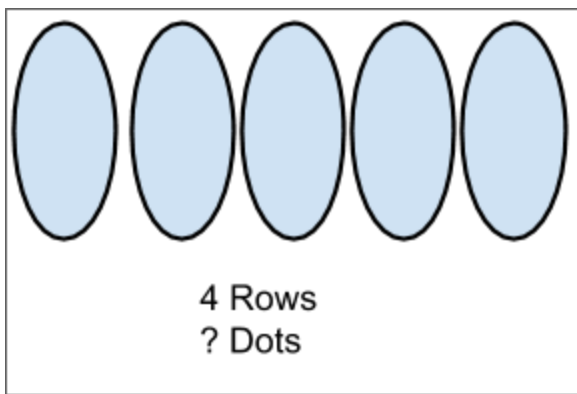
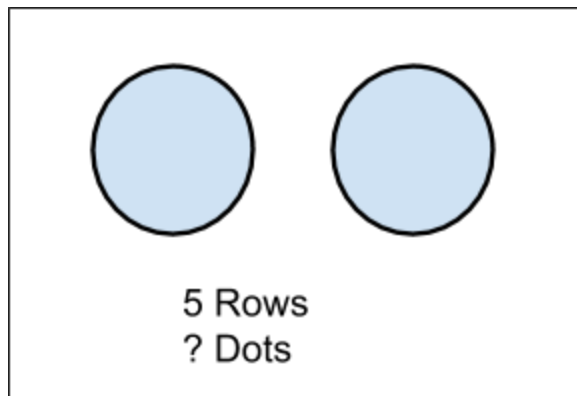
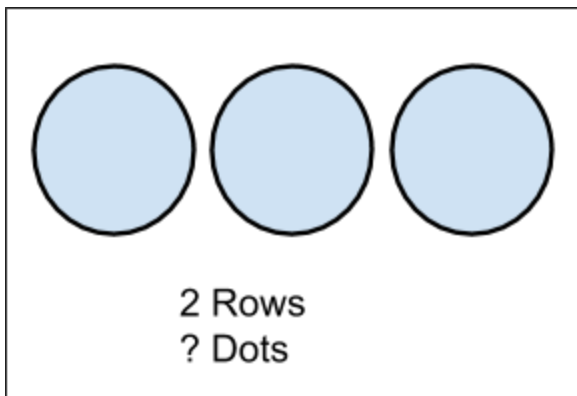


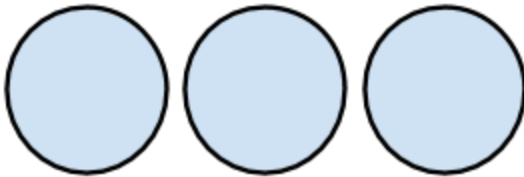




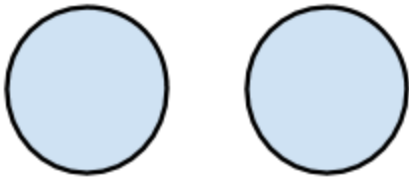


5 Stage-Dueling Array (Wright et al, 2006)

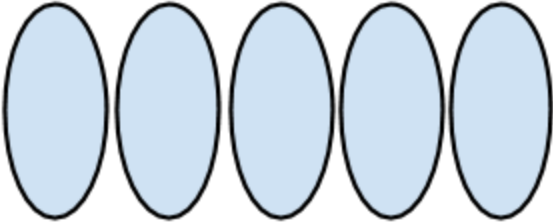




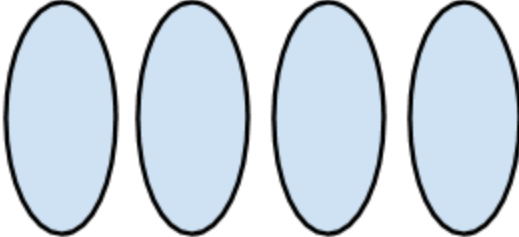
? Rows  
9 Dots



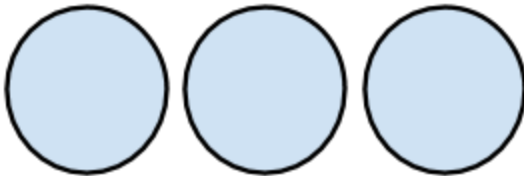
? Rows  
12 Dots



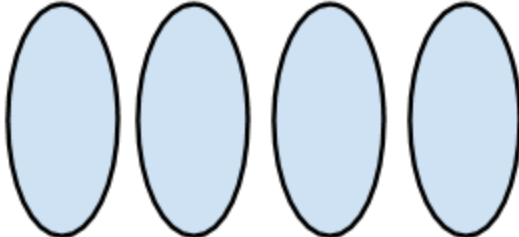
? Rows  
15 Dots



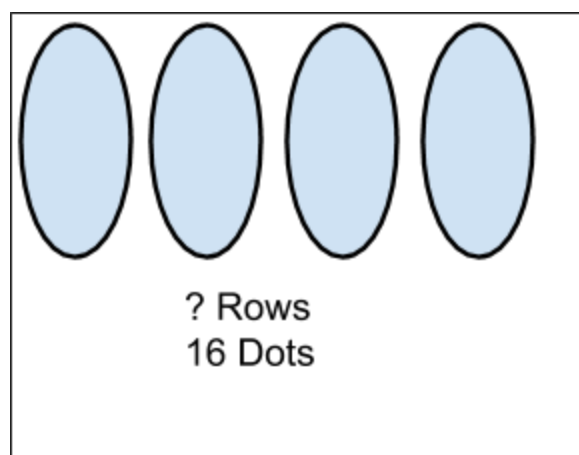
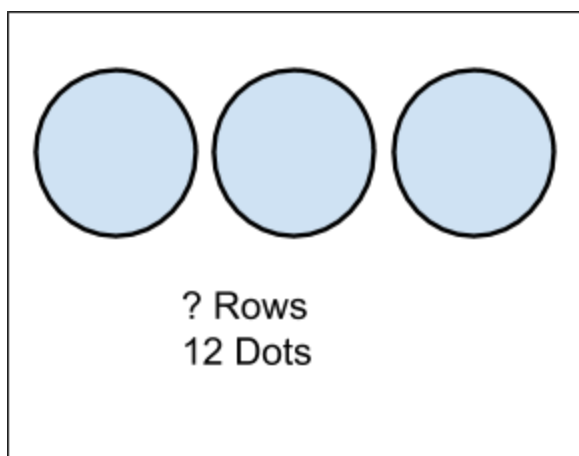
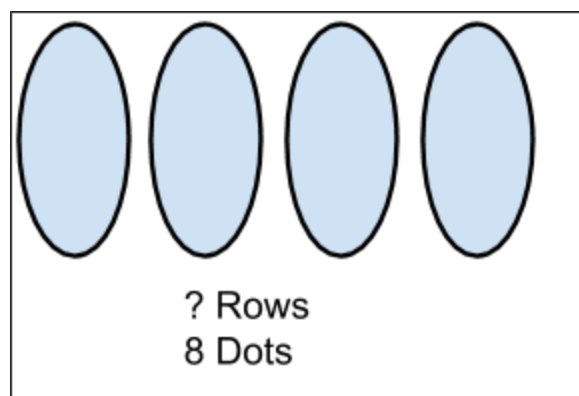
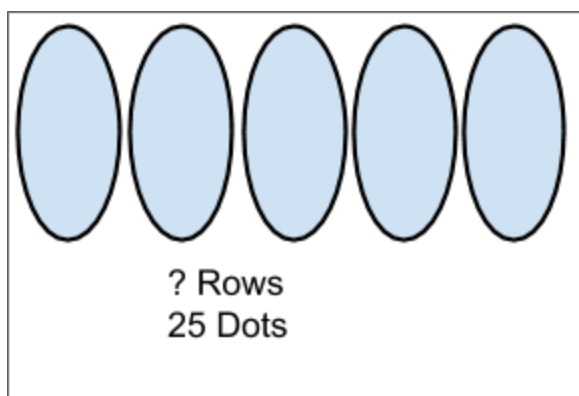
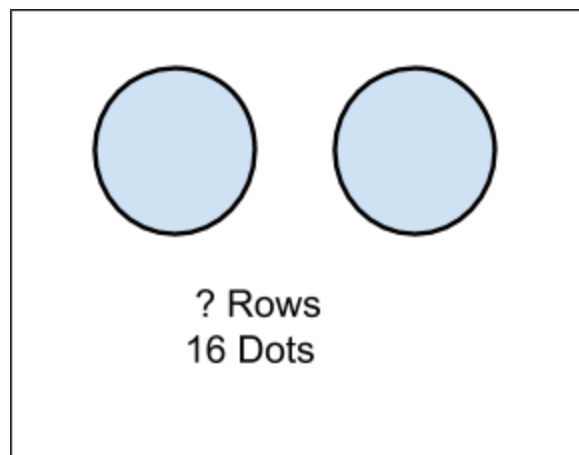
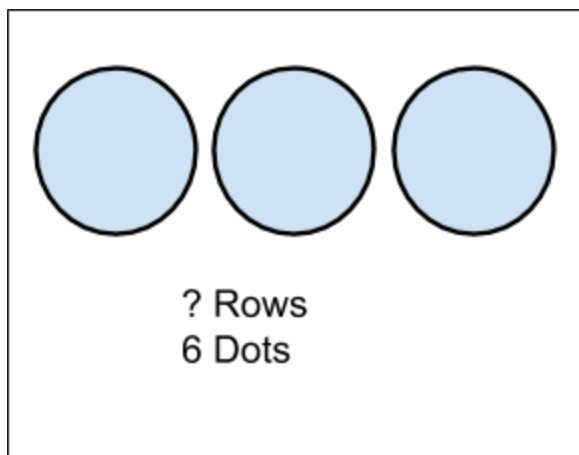
? Rows  
24 Dots



? Rows  
18 Dots



? Rows  
8 Dots





## Appendix H Game Station

Game Station: To be completed in small groups during stations. The games are grouped by stages to best meet the needs of students. If the game is designated with an asterisk, rules and materials are found in the Everyday Math Curriculum. The descriptions of the rules have been modified from the Everyday Math Curriculum.

### **Stage 1**

24

Addition Top It\*

Multiplication Top it\*

Name that Number\*

Number Toss

Snake - Adding

Subtraction Top It\*

Who am I (with addition)

### **Stage 2**

24

Addition Top It\*

Multiplication Top it\*

Name that Number\*

Number Toss

Snake - Adding

Subtraction Top It\*

Who am I (with addition)

### **Stage 3**

24

Multiplication Compare

Multiplication Top it\*

Multiplication Toss

Name that Number\*

Number Toss

Who am I

### **Stage 4**

24

Beat the Calculator\*  
 Factor Captor\*  
 Multiplication Compare  
 Multiplication Top it\*  
 Multiplication Toss  
 Number Toss  
 Product Pileup\*  
 Snake  
 Who am I

### **Stage 5**

24  
 Beat the Calculator\*  
 Division Arrays\*  
 Fact Triangles flip\*  
 Factor Captor\*  
 Multiplication Compare  
 Multiplication Top it\*  
 Multiplication Toss  
 Number Toss  
 Product Pileup\*  
 Snake  
 Who am I

#### **Game Descriptions:**

24 - Students take a card which has four numbers on it. They must use all four numbers and may add, subtract, multiply or divide to reach the number 24. The game is differentiated as the one dot cards are the easiest and the three dot cards are the hardest to solve. This is a game that can be purchased for classroom use.

Addition Top it\* - Every player draws two cards from a pile in the middle and states the sum for their pair of cards. The player with the highest sum gets all of the cards. In case of a tie each player draws two more cards and calls out their sum. The winner takes all of the cards. The player who collects the most cards wins.

Extended version ideas - Have players draw three cards and find the sum. Have players draw four cards and make two double digit numbers to add together.

Beat the Calculator\* - Use Number cards 1-10. Have one player be the Caller, Calculator and Brain. The caller draws two cards and asks for the product of the two numbers. The

Calculator solves the problem using the calculator. The Brain solves it without the calculator. The Caller states who got the correct answer first. Switch roles every 7 turns or so.

Extended version - Have the caller attach a zero to one or both factors before asking for the product.

Division Arrays\* - Players shuffle cards (6-18) and place facedown. For each turn, each player takes one card. On the graph paper students mark that number with counters. Then the player rolls a dice once and that is the number of equal rows a player must have. Each player scores the number of counters in the row. If there are no leftovers, the score is double the number of counters in 1 row. So if a player gets a 15 and rolls a 2, the player puts down two rows of seven counters with one left over. The player's score is a seven. Highest score wins at the end.

Factor Captor\* - Player one covers a number on the grid with a counter and records the number for player one's score. Numbers can only be used once. Player two puts counters on all the factors for player one and adds them up for Player two's score. If Player two missed any factors, then player one can cover them and add the points to his/her score. Now players switch roles and repeat, Player two picks a number and Player one finds the factors. The player with the highest score wins. Grid 1(Beginning), Grid 2(More advanced). May use a calculator if needed.

Fact Triangles flip\* - Use fact triangle cards and have students flip over the cards and write all the fact families. The winner is the first to write the fact family correctly. The cards can be fact triangle cards or arrays.

Multiplication Compare - Each player draws two cards and finds the product for their pair of cards. Players must record the equation on their board and the player with the highest product gets a point for the round (Brickwedde, 2016).

Multiplication Top it\* - Every player draws two cards from a pile in the middle and states the product for their pair of cards. The player with the largest product gets all of the cards. In case of a tie each player draws two more cards and states their product. The winner takes all of the cards. The player who collects the most cards wins.

Extended version ideas - Have students draw three cards and find the product. Another possibility is to have each player make a double digit and a single digit number and find the product

Multiplication Toss - Two or more players roll 2 six-sided dice or 2 ten-sided dice. The players attempt to fill the grid as much as possible without overlapping. If a roll of 3 and 8 is rolled. Then the player may draw a border around 3 rows of 8 or 8 rows of 3. A player may partition the region as well. So if a player rolled 5 sixes, the player could draw a border around two separate areas of 2 rows of 6 and 3 rows of 6 or 4 rows of six and 1 row of six (State Government of Victoria; 2012).

Name that Number\* - Place five cards face up and place the rest of the cards face down in a pile. Flip over the top card in the pile, that is your target number. You may use any of the five cards only once by adding, subtracting, multiplying or dividing to get to the target number.

Number Toss - Two students are playing with seven dice with one dice represents each place value, ones, tens, hundreds to the millions. The students roll the dice and read and write the number. Students then can use the greater than and less than symbol with their partner.

May use all 7 dice or less dice depending on student background/comfort

Dice may be purchased from: [www.eaieducation.com](http://www.eaieducation.com), EAI® Education Place Value Dice - Ones to Millions: Set of 7.

Product Pileup\* - Deal 12 cards (Need eight cards each for numbers 1-10) to every player and put the rest of the cards face down. First player picks two cards and states the product. Each subsequent player tries to play two cards that have a higher product than the last product played. If the player cannot play then must draw two cards and may play. If the player still cannot play then the player must pass. The winner is the player that gets rid of all of their cards first or the player with the fewest number of cards when there are no cards left to draw.

Snake - Students roll two dice and write the product down. After each roll the player may exit and keep their score or continue to roll and add the new product to their current total. The round ends if they roll a 1 and their score on this turn is a zero. If they roll a 1 they keep their score from the previous round. If the player rolls a Snake Eyes of two 1s then the player loses all points they have accrued in the game. If a player rolls a 1 or stays at its score, it is the next player's turn. First player to 100 points wins.

This game can be adapted for addition practice.

Subtraction Top it\* - Every player draws two cards from a pile in the middle and subtracts their smaller number from their larger number. The player with the largest difference gets all of the cards. In case of a tie each player draws two more cards and

states the difference. The winner with the largest number takes all of the cards. The player who collects the most cards wins.

Extended version ideas: Have each player draw three cards and find the sum of two cards in their hand. Then players subtract the smallest number from the largest. Have players draw four cards and make two double digit numbers to subtract.

Who am I - In groups of three with cards (1-10), have two players pick a card face down and put it on their forehead. The third player states the product. The winner is the student that says their own number first. Can be adapted to complete with addition as well.

## Appendix I Proof Station

### Proof Station:

The word problems in Appendix I and Appendix J are to be utilized during the proof station working in their small groups and/or independently. These problems can be turned in and/or reflected upon during small group teacher guided instruction. The problems 1.1-5.7 were developed to match each stage of multiplication development (Appendix I). The worksheets in Appendix J were taken from the Project for Elementary Mathematics website which provide alternative activities that promote conceptual development of multiplication and number sense. Appendix J is a tool to use during discussion in the teacher guided group station. The questions from Project of Elementary Mathematics curriculum are to be completed based on student readiness and used for math talks during the teacher station.

Name \_\_\_\_\_

### 1.1 WORD PROBLEM

Michael bought four bags of stickers with two stickers in each bag.

How many stickers does Michael have?

Tell me what you need to do with the numbers to answer the question.

**Create a Number Sentence:**

**Solve the problem** (show your work!):

Name \_\_\_\_\_

## 1.2 WORD PROBLEM

Joe returned to the library two bags with three books in each bag.

How many books did he return to the library?

Tell me what you need to do with the numbers to answer the question.

**Create a Number Sentence:**

**Solve the problem** (show your work!):



Name \_\_\_\_\_

### 1.3 WORD PROBLEM

Natalie went to Cub foods and bought two bags of apples. Each bag had three apples. How many apples did Natalie buy?

Tell me what you need to do with the numbers to answer the question.

**Create a Number Sentence:**

**Solve the problem** (show your work!):

Name \_\_\_\_\_

### **1.4 WORD PROBLEM**

Josh's dog eats four pounds of food every day. How much food does Josh's dog eat in three days?

Tell me what you need to do with the numbers to answer the question.

**Create a Number Sentence:**

**Solve the problem** (show your work!):

Name \_\_\_\_\_

### **1.5 WORD PROBLEM**

How much would three pizzas cost if they each cost two dollars?

Tell me what you need to do with the numbers to answer the question.

**Create a Number Sentence:**

**Solve the problem** (show your work!):

Name \_\_\_\_\_

### **1.6 WORD PROBLEM**

Three pens will cost Ma'laika five dollars. How much will nine pens cost Ma'laika?

Tell me what you need to do with the numbers to answer the question.

**Create a Number Sentence:**

**Solve the problem** (show your work!):

Name \_\_\_\_\_

## 2.1 WORD PROBLEM

There are four basketball teams playing and each team has five players. How many players are there?

Tell me what you need to do with the numbers to answer the question.

**Create a Number Sentence:**

**Solve the problem** (show your work!):

Name \_\_\_\_\_

## 2.2 WORD PROBLEM

Jose read fifteen books in five days. How many books did Jose read every day?

Tell me what you need to do with the numbers to answer the question.

**Create a Number Sentence:**

**Solve the problem** (show your work!):

Name \_\_\_\_\_

### **2.3 WORD PROBLEM**

Rosita bought six bags of candy that had seven pieces of chocolate in each bag. How many pieces of chocolate did Rosita have?

Tell me what you need to do with the numbers to answer the question.

**Create a Number Sentence:**

**Solve the problem** (show your work!):

Name \_\_\_\_\_

## 2.4 WORD PROBLEM

Jordan ate eight cookies and each cookie had four raisins inside of them. How many raisins did Jordan eat?

Tell me what you need to do with the numbers to answer the question.

**Create a Number Sentence:**

**Solve the problem** (show your work!):



Name \_\_\_\_\_

## 2.5 WORD PROBLEM

Bella watched six movies each month for eight months. How many movies did Bella watch?

Tell me what you need to do with the numbers to answer the question.

**Create a Number Sentence:**

**Solve the problem** (show your work!):

Name \_\_\_\_\_

## 2.6 WORD PROBLEM

How many days are there in eleven weeks?

Tell me what you need to do with the numbers to answer the question.

**Create a Number Sentence:**

**Solve the problem** (show your work!):

Name \_\_\_\_\_

### 3.1 WORD PROBLEM

Washington thirty crayons in his desk. He wants to give his crayons equally to six friends. How many crayons did each friend get?

Tell me what you need to do with the numbers to answer the question.

**Create a Number Sentence:**

**Solve the problem** (show your work!):

Name \_\_\_\_\_

### 3.2 WORD PROBLEM

Georgine had seven boxes of cupcakes for her birthday party. Each box had six cupcakes in it. How many cupcakes did Georgine have?

Tell me what you need to do with the numbers to answer the question.

**Create a Number Sentence:**

**Solve the problem** (show your work!):

Name \_\_\_\_\_

### 3.3 WORD PROBLEM

Hannah had eight gift bags with M&Ms. Each bag had 12 M&Ms.

How many M&Ms did Hannah have?

Tell me what you need to do with the numbers to answer the question.

**Create a Number Sentence:**

**Solve the problem** (show your work!):

Name \_\_\_\_\_

### 3.4 WORD PROBLEM

Jordy had twenty-four marbles and wanted to give all of his marbles to his three friends equally. How many marbles did each friend get?

Tell me what you need to do with the numbers to answer the question.

**Create a Number Sentence:**

**Solve the problem** (show your work!):

Name \_\_\_\_\_

### 3.5 WORD PROBLEM

Madison walked her dog twenty-eight times in a week. She walked the dog the same number of times each day. How many times did she walk her dog in one day?

Tell me what you need to do with the numbers to answer the question.

**Create a Number Sentence:**

**Solve the problem** (show your work!):

Name \_\_\_\_\_

### 3.6 WORD PROBLEM

Karissa had twenty-seven stuffed animals in her room. Her mom wants her to put them in three boxes. How many will go in each box?

Tell me what you need to do with the numbers to answer the question.

**Create a Number Sentence:**

**Solve the problem** (show your work!):



Name \_\_\_\_\_

### 3.7 WORD PROBLEM

Samantha has vacuumed her room three times every month for a year. How many times has she vacuumed her room in one year?

Tell me what you need to do with the numbers to answer the question.

**Create a Number Sentence:**

**Solve the problem** (show your work!):

## 4.1 WORD PROBLEM

Alan bought six boxes of Pokemon cards. Each box has nine cards.  
How many Pokemon cards did Alan buy?

Tell me what you need to do with the numbers to answer the question.

**Create a Number Sentence:**

**Solve the problem** (show your work!):

Name \_\_\_\_\_

## 4.2 WORD PROBLEM

On a road trip the Johnson family traveled sixty miles per hour for six hours. How many miles did the Johnson family travel?

Tell me what you need to do with the numbers to answer the question.

**Create a Number Sentence:**

**Solve the problem** (show your work!):

Name \_\_\_\_\_

### 4.3 WORD PROBLEM

Jesse bought ten new pencils and six new notebooks for school. At the store, Jesse spent \$0.74 for each pencil and \$1.25 for each notebook. How much money did Jesse spend?

Tell me what you need to do with the numbers to answer the question.

**Create a Number Sentence:**

**Solve the problem** (show your work!):

Name \_\_\_\_\_

### 4.4 WORD PROBLEM

While walking in the park, Hernandez saw four birds in eight different trees. How many birds did Hernandez see on his walk?

Tell me what you need to do with the numbers to answer the question.

**Create a Number Sentence:**

**Solve the problem** (show your work!):

Name \_\_\_\_\_

### **4.5 WORD PROBLEM**

Jafaar had six quarters in his jar and five quarters in his wallet.  
How many quarters does he have? How much money does he  
have?

Tell me what you need to do with the numbers to answer the  
question.

**Create a Number Sentence:**

**Solve the problem** (show your work!):

Name \_\_\_\_\_

### **4.6 WORD PROBLEM**

Carmelo and Rufio were playing a basketball game. Each basket was three points. Carmelo scored twenty four points and Rufio scored thirty-six points. How many baskets did each boy make?

Tell me what you need to do with the numbers to answer the question.

**Create a Number Sentence:**

**Solve the problem** (show your work!):

Name \_\_\_\_\_

### **4.7 WORD PROBLEM**

Brandon bought seven boxes of oranges. In each box was six oranges. How many oranges does Brandon have?

Tell me what you need to do with the numbers to answer the question.

**Create a Number Sentence:**

**Solve the problem** (show your work!):



Name \_\_\_\_\_

### 5.1 WORD PROBLEM

Josey had six quarters in his jar and five quarters in his wallet.  
How many quarters did he have? How much money did he have?

Tell me what you need to do with the numbers to answer the question.

**Create a Number Sentence:**

**Solve the problem** (show your work!):

Name \_\_\_\_\_

## 5.2 WORD PROBLEM

Isabella had some money. Her dad gave her eight dimes and 5 quarters. Now she has \$42.25. How much money did she have to start with?

Tell me what you need to do with the numbers to answer the question.

**Create a Number Sentence:**

**Solve the problem** (show your work!):

Name \_\_\_\_\_

### **5.3 WORD PROBLEM**

A football team has eleven players. At the tournament this weekend there were fifteen teams. How many players were at the tournament?

Tell me what you need to do with the numbers to answer the question.

**Create a Number Sentence:**

**Solve the problem** (show your work!):

Name \_\_\_\_\_

### **5.4 WORD PROBLEM**

Chris ate five pieces of pizza. He bought nine pizzas with eight slices each. How many pizza slices does he have left?

Tell me what you need to do with the numbers to answer the question.

**Create a Number Sentence:**

**Solve the problem** (show your work!):

Name \_\_\_\_\_

### **5.5 WORD PROBLEM**

I have six puzzles. Each puzzle has 75 pieces. How many total pieces do I have?

Tell me what you need to do with the numbers to answer the question.

**Create a Number Sentence:**

**Solve the problem** (show your work!):

Name \_\_\_\_\_

### **5.6 WORD PROBLEM**

A carton of eggs holds twelve eggs. I have 22 cartons of eggs.

How many eggs do I have?

Tell me what you need to do with the numbers to answer the question.

**Create a Number Sentence:**

**Solve the problem** (show your work!):

Name \_\_\_\_\_

### **5.7 WORD PROBLEM**

Every student in our school has six notebooks. There are five hundred students in our school. How many notebooks are in our school?

Tell me what you need to do with the numbers to answer the question.

**Create a Number Sentence:**

**Solve the problem** (show your work!):

Appendix J

For stages 1-2 - Taken from: Grade 3 - Brickwedde, 2016

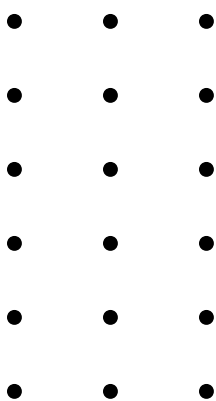
#P1

Name: \_\_\_\_\_

Date: \_\_\_\_\_

**Directions:** How can you find the number of dots or boxes in the figure using chunks of numbers?

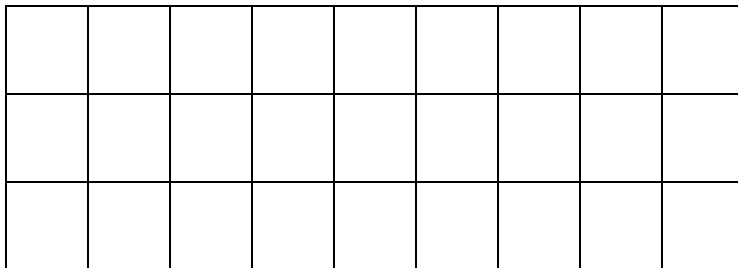
*Do not count by ones!*



How many rows? \_\_\_\_\_ How many columns? \_\_\_\_\_

How many total dots? \_\_\_\_\_

Show your work here:

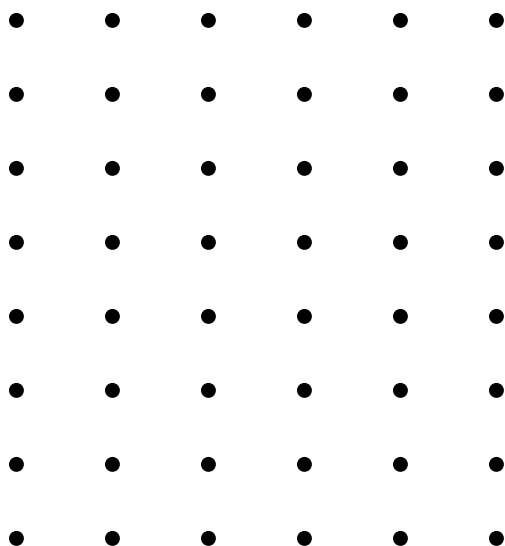


How many rows? \_\_\_\_\_ How many columns? \_\_\_\_\_

How many total squares? \_\_\_\_\_

Show your work here:



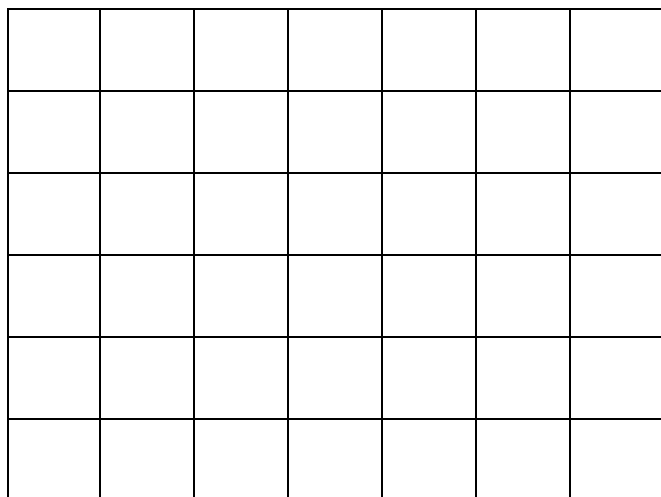


How many rows? \_\_\_\_\_

How many columns? \_\_\_\_\_

How many total dots? \_\_\_\_\_

Show your work here:



How many rows? \_\_\_\_\_

How many columns? \_\_\_\_\_

How many total squares? \_\_\_\_\_

Show your work here:

For stages 1-2 - Taken from: Grade 3 - Brickwedde, 2016

#P2

Name: \_\_\_\_\_

Date: \_\_\_\_\_

*Look at the following basic facts combinations. If you know it without counting, write the answer then circle the phrase “know it.” If you have to count leave the answer blank and circle “have to count.” Be honest with yourself!*

1 x 3	_____	know it	have to count
2 x 3	_____	know it	have to count
5 x 3	_____	know it	have to count
10 x 3	_____	know it	have to count

1 x 5	_____	know it	have to count
2 x 5	_____	know it	have to count
5 x 5	_____	know it	have to count
10 x 5	_____	know it	have to count

1 x 4	_____	know it	have to count
2 x 4	_____	know it	have to count
5 x 4	_____	know it	have to count
10 x 4	_____	know it	have to count

1 x 6	_____	know it	have to count
2 x 6	_____	know it	have to count
5 x 6	_____	know it	have to count
10 x 6	_____	know it	have to count

For stages 1-2 - Taken from: Grade 3 - Brickwedde, 2016

#P3

Name: \_\_\_\_\_

Date: \_\_\_\_\_

**Practice developing a plan.**

- **Step one:** Go through the list and do the ones you know *without counting*.
- **Step two:** Write out a plan for how you can *use the ones you know to figure out the ones you have to count*.

**1 x 3 =**                      **Plan:** \_\_\_\_\_**2 x 3 =**                      **Plan:** \_\_\_\_\_**3 x 3 =**                      **Plan:** \_\_\_\_\_**4 x 3 =**                      **Plan:** \_\_\_\_\_**5 x 3 =**                      **Plan:** \_\_\_\_\_**6 x 3 =**                      **Plan:** \_\_\_\_\_**7 x 3 =**                      **Plan:** \_\_\_\_\_**8 x 3 =**                      **Plan:** \_\_\_\_\_**9 x 3 =**                      **Plan:** \_\_\_\_\_**10 x 3 =**                      **Plan:** \_\_\_\_\_**11 x 3 =**                      **Plan:** \_\_\_\_\_**12 x 3 =**                      **Plan:** \_\_\_\_\_

For stages 1-2 - Taken from: Grade 3 - Brickwedde, 2016

#P4

Name: \_\_\_\_\_

Date: \_\_\_\_\_

**Practice developing a plan.**

- **Step one:** Go through the list and do the ones you know *without counting*.
- **Step two:** Write out a plan for how you can *use the ones you know to figure out the ones you have to count*.

**1 x 4 = \_\_\_\_\_ Plan: \_\_\_\_\_****2 x 4 = \_\_\_\_\_ Plan: \_\_\_\_\_****3x 4 = \_\_\_\_\_ Plan: \_\_\_\_\_****4 x 4 = \_\_\_\_\_ Plan: \_\_\_\_\_****5 x 4 = \_\_\_\_\_ Plan: \_\_\_\_\_****6 x 4 = \_\_\_\_\_ Plan: \_\_\_\_\_****7 x 4 = \_\_\_\_\_ Plan: \_\_\_\_\_****8 x 4 = \_\_\_\_\_ Plan: \_\_\_\_\_****9 x 4 = \_\_\_\_\_ Plan: \_\_\_\_\_****10 x 4 = \_\_\_\_\_ Plan: \_\_\_\_\_****11 x 4 = \_\_\_\_\_ Plan: \_\_\_\_\_****12 x 4 = \_\_\_\_\_ Plan: \_\_\_\_\_**

For stages 1-3 - Taken from: Grade 3 - Brickwedde, 2016

#P5

Name: \_\_\_\_\_

Date: \_\_\_\_\_

Solve the following questions.

*Who gets more strawberries or do they get the same, a person who buys 3 boxes of 16 strawberries in each box or a person who buy 8 boxes with 6 strawberries inside each box?*

---

*Answer with a label*

*Who gets more cherries or do they get the same, a person who buys 12 boxes with 3 cherries inside each box, or a person who buy 4 boxes with 10 inside each box?*

---

*Answer with a label*

For stages 1-3 - Taken from: Grade 3 - Brickwedde, 2016

#P6

Name: \_\_\_\_\_

Date: \_\_\_\_\_

**Practice developing a plan.**

- **Step one:** Go through the list and do the ones you know *without counting*.
- **Step two:** Write out a plan for how you can *use the ones you know to figure out the ones you have to count*.

$1 \times 5 = \underline{\hspace{2cm}}$

Plan: \_\_\_\_\_

$2 \times 5 = \underline{\hspace{2cm}}$

Plan: \_\_\_\_\_

$3 \times 5 = \underline{\hspace{2cm}}$

Plan: \_\_\_\_\_

$4 \times 5 = \underline{\hspace{2cm}}$

Plan: \_\_\_\_\_

$5 \times 5 = \underline{\hspace{2cm}}$

Plan: \_\_\_\_\_

$6 \times 5 = \underline{\hspace{2cm}}$

Plan: \_\_\_\_\_

$7 \times 5 = \underline{\hspace{2cm}}$

Plan: \_\_\_\_\_

$8 \times 5 = \underline{\hspace{2cm}}$

Plan: \_\_\_\_\_

$9 \times 5 = \underline{\hspace{2cm}}$

Plan: \_\_\_\_\_

$10 \times 5 = \underline{\hspace{2cm}}$

Plan: \_\_\_\_\_

$11 \times 5 = \underline{\hspace{2cm}}$

Plan: \_\_\_\_\_

$12 \times 5 = \underline{\hspace{2cm}}$

Plan: \_\_\_\_\_

For stages 1-3 - Taken from: Grade 3 - Brickwedde, 2016

#P7

Name: \_\_\_\_\_

Date: \_\_\_\_\_

**Practice developing a plan.**

- **Step one:** Go through the list and do the ones you know *without counting*.
- **Step two:** Write out a plan for how you can *use the ones you know to figure out the ones you have to count*.

$1 \times 6 = \underline{\hspace{2cm}}$

**Plan:** \_\_\_\_\_

$2 \times 6 = \underline{\hspace{2cm}}$

**Plan:** \_\_\_\_\_

$3 \times 6 = \underline{\hspace{2cm}}$

**Plan:** \_\_\_\_\_

$4 \times 6 = \underline{\hspace{2cm}}$

**Plan:** \_\_\_\_\_

$5 \times 6 = \underline{\hspace{2cm}}$

**Plan:** \_\_\_\_\_

$6 \times 6 = \underline{\hspace{2cm}}$

**Plan:** \_\_\_\_\_

$7 \times 6 = \underline{\hspace{2cm}}$

**Plan:** \_\_\_\_\_

$8 \times 6 = \underline{\hspace{2cm}}$

**Plan:** \_\_\_\_\_

$9 \times 6 = \underline{\hspace{2cm}}$

**Plan:** \_\_\_\_\_

$10 \times 6 = \underline{\hspace{2cm}}$

**Plan:** \_\_\_\_\_

$11 \times 6 = \underline{\hspace{2cm}}$

**Plan:** \_\_\_\_\_

$12 \times 6 = \underline{\hspace{2cm}}$

**Plan:** \_\_\_\_\_

For stages 1-3 - Taken from: Grade 3 - Brickwedde, 2016

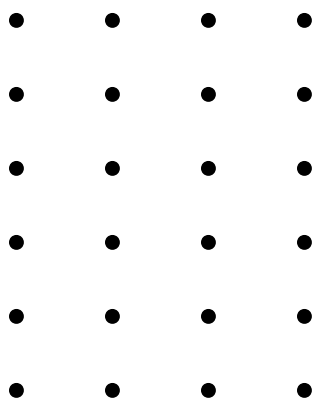
#P8

Name: \_\_\_\_\_

Date: \_\_\_\_\_

**Directions:** How can you find the number of dots or boxes in the figure using chunks of numbers?

***Do not count by ones!***

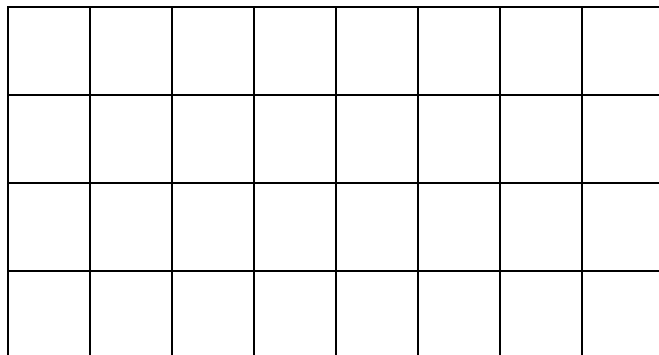


How many rows? \_\_\_\_\_

How many columns? \_\_\_\_\_

How many total dots? \_\_\_\_\_

Show your work here:



How many rows? \_\_\_\_\_

How many columns? \_\_\_\_\_

How many total squares? \_\_\_\_\_

Show your work here:



For stages 1-3 - Taken from: Grade 3 - Brickwedde, 2016

#P8

•	•	•	•	•	•	How many rows? _____
•	•	•	•	•	•	How many columns? _____
•	•	•	•	•	•	How many total dots? _____
•	•	•	•	•	•	Show your work here:
•	•	•	•	•	•	
•	•	•	•	•	•	
•	•	•	•	•	•	


How many rows? \_\_\_\_\_ How many columns? \_\_\_\_\_

How many total squares? \_\_\_\_\_

Show your work here:

For stages 1-3 - Taken from: Grade 3 - Brickwedde, 2016

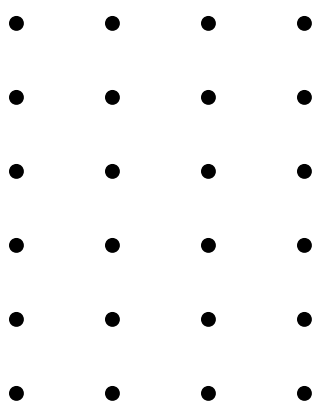
#P9

Name: \_\_\_\_\_

Date: \_\_\_\_\_

**Directions:** How can you find the number of dots or boxes in the figure using chunks of numbers?

**Do not count by ones!**

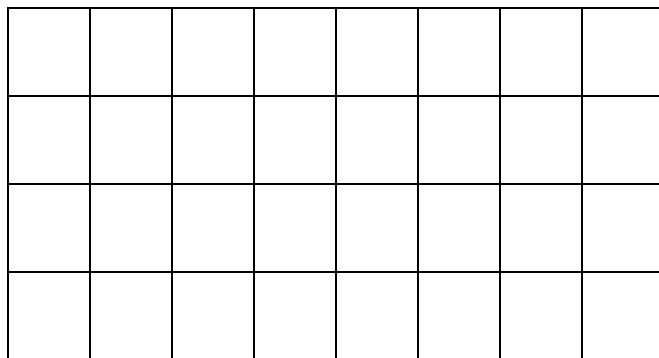


How many rows? \_\_\_\_\_

How many columns? \_\_\_\_\_

How many total dots? \_\_\_\_\_

Show your work here:



How many rows? \_\_\_\_\_

How many columns? \_\_\_\_\_

How many total squares? \_\_\_\_\_

Show your work here:

For stages 1-3 - Taken from: Grade 3 - Brickwedde, 2016

#P9

•	•	•	•	•	•	How many rows? _____
•	•	•	•	•	•	How many columns? _____
•	•	•	•	•	•	How many total dots? _____
•	•	•	•	•	•	Show your work here:
•	•	•	•	•	•	
•	•	•	•	•	•	
•	•	•	•	•	•	


How many rows? \_\_\_\_\_      How many columns? \_\_\_\_\_

How many total squares? \_\_\_\_\_

Show your work here:

**For stages 2-3 - Taken from: Grade 3 - Brickwedde, 2016**

**#P10**

**Name:** \_\_\_\_\_

**Date:** \_\_\_\_\_

George had the job of placing apples into clear plastic bags and tying them shut to get the apples ready for sale. He started with a big crate of apples. When he was done he had tied shut \_\_\_ bags with \_\_\_ apples inside each bag. He still had \_\_\_ apples in the crate. How many apples were in the crate to begin with?

(7, 10, 4)      (12, 10, 7)      (24, 10, 8)

*Answer with label:* \_\_\_\_\_

**Write a complete sentence to explain your answer**

---

Celia has the same job. She knows ahead of time how many apples are in her crate. If she puts ten apples inside each bag, how many full plastic bags will she have filled if she starts with \_\_\_\_\_ apples in the crate?      (217) (812)  
(1,243)

*Answer with label:* \_\_\_\_\_

**Write a complete sentence to explain your answer:**

---

For stages 2-3 - Taken from: Grade 3 - Brickwedde, 2016

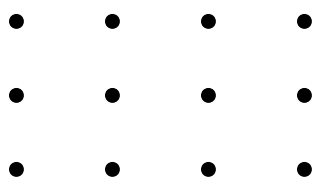
#P11

Name: \_\_\_\_\_

Date: \_\_\_\_\_

**Directions:** How can you find the number of dots or boxes in the figure using chunks of numbers?

*Do not count by ones!*

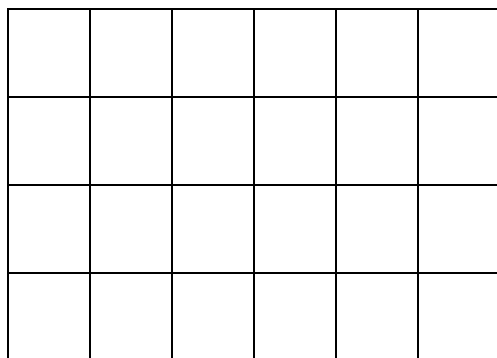


How many rows? \_\_\_\_\_

How many columns? \_\_\_\_\_

How many total dots? \_\_\_\_\_

Show your work here:

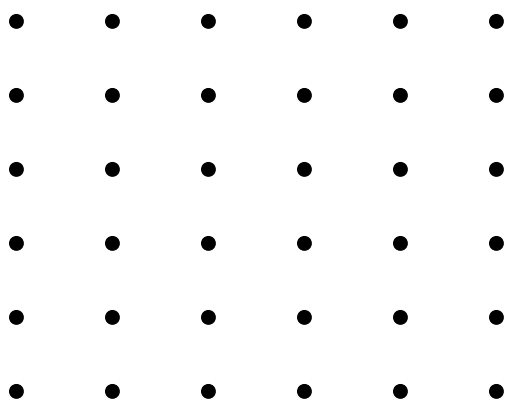


How many rows? \_\_\_\_\_

How many columns? \_\_\_\_\_

How many total squares? \_\_\_\_\_

Show your work here:



How many rows? \_\_\_\_\_

How many columns? \_\_\_\_\_

How many total dots? \_\_\_\_\_

Show your work here:

**For stages 2-3 - Taken from: Grade 3 - Brickwedde, 2016**

**#P12**

**Name:** \_\_\_\_\_

**Date:** \_\_\_\_\_

Gisselle is making \_\_\_ gift bags for guests coming to her birthday party. If she puts 4 candies in each bag, how many pieces of candy will she give away in all of the bags?

(6)    (9)    (14)

---

*Answer with a label*

Jordan was helping to bake cookies in the kitchen. He puts \_\_\_ rows of cookies with \_\_\_ cookies in each row. If he did that on \_\_\_ cookie sheets, how many cookies will he have made?

(4, 7, 3)

(4, 8, 4)

(5, 7, 6)

---

*Answer with a label*

**For stages 2-3 - Taken from: Grade 3 - Brickwedde, 2016**

**#P13**

**Name:** \_\_\_\_\_

**Date:** \_\_\_\_\_

Solve the problems. Think about how to do it in as few steps as possible!

Alexis bought \_\_\_\_\_ pairs of sox at the store. Each pair cost \_\_\_\_\_. How much money did she spend?

(3, \$4.50)      (3, \$4.99)      (6, \$4.55)

---

*Answer with a label*

Ronald read \_\_\_\_\_ pages in his book. Jacqueline read \_\_\_\_\_ times as many. How many pages did Jacqueline read?

(25, 4) (14, 6) (36, 4)

---

*Answer with a label*

**For stages 2-3 - Taken from: Grade 3 - Brickwedde, 2016**

**#P14**

**Name:** \_\_\_\_\_

**Date:** \_\_\_\_\_

Solve the problems. Think about how to do it in as few steps as possible!

The cafeteria has \_\_\_\_ apples. If each apple is cut into six slices, how many slices will they have to serve for students to eat?

(10) (25) (36)

---

*Answer with a label*

Jared was helping to sort \_\_\_\_ individual grapes into cups for the students to eat for snacks. If he puts the \_\_\_\_ grapes into a cup, how many cups can he fill?

(35, 5) (48, 6) (72, 6)

---

*Answer with a label*



**For stages 3-5 - Taken from: Grade 4 - Brickwedde, 2016**

**#P15**

**Name:** \_\_\_\_\_

**Date:** \_\_\_\_\_

The art teacher needed to buy some new boxes of crayons for the class to use on projects. Crayons come in different size boxes with some sizes having more colors than others. If she bought \_\_\_ boxes with six crayons inside each and bought \_\_\_ boxes with eight crayons inside each, how many individual new crayons would she have for the class to use?

(4, 5) (6, 8)

*Answer with label:* \_\_\_\_\_

**Write a complete sentence to explain your answer**

---

The art teacher has \_\_\_ crayons. She has \_\_\_ baskets into which she can place the crayons. If she place the same number of crayons into each basket, how many crayons will she end up having in each?

(48, 4) (64, 8) (54, 6)

*Answer with label:* \_\_\_\_\_

**Write a complete sentence to explain your answer:**

---

**For stages 3-5 - Taken from: Grade 4 - Brickwedde, 2016**

**#P16**

**Name:** \_\_\_\_\_

**Date:** \_\_\_\_\_

The shop owner of a clothing store is doing inventory. She is counting the number of packages of sox that are on the shelf for customers to buy. She notes that there are \_\_\_\_\_ packages with \_\_\_\_\_ pairs of sock inside each package. There is also another brand of socks next to those on the shelf. There are \_\_\_\_\_ packages with only \_\_\_\_\_ pairs of sock inside each one. How many pairs of sox are inside all of those packages on the shelf?

(3, 9, 3, 6) (5,9,7,4) (10,8,5,4)

*Answer with label:* \_\_\_\_\_

**Write a complete sentence to explain your answer**

---

Imagine that you are working at the factory that sorts individual sox into pairs of sox, then places them on the small hangers to then ship to stores to be sold to customers. If you have \_\_\_\_\_ sox in front of you, how many pairs of sox can you place onto the plastic hangers?

(32) (54) (136)

*Answer with label:* \_\_\_\_\_

**Write a complete sentence to explain your answer:**

---

**For stages 3-5 - Taken from: Grade 4 - Brickwedde, 2016**

**#P17**

**Name:** \_\_\_\_\_

**Date:** \_\_\_\_\_

Hot dogs are sold 8 to a package. Hot dog buns are sold 10 to a package. This makes having everything come out even hard to do. If I bought \_\_\_\_ packages of hot dogs and \_\_\_\_ packages of buns, would I have more hot dogs or buns? And how many extra would I have of the one more than the other?

(8, 6) (12, 10)

*Answer with label:* \_\_\_\_\_

**Write a complete sentence to explain your answer:**

---

**For stages 3-5 - Taken from: Grade 4 - Brickwedde, 2016**

**#P18**

**Name:** \_\_\_\_\_

**Date:** \_\_\_\_\_

Teachers use more blue ink pens than red ink pens over the course of the school year. Blue pens are sold with 10 pens in each box; red pens come 8 to a box. In the supply room down by the office, there is a drawer that has \_\_\_\_ boxes of blue pens and \_\_\_\_ boxes of red pens. Are there more individual blue pens than red, or the opposite? How many more of the one color pen is there than the other pen?

(5, 6) (7, 8)

*Answer with label:* \_\_\_\_\_

**Write a complete sentence to explain your answer:**

---

---

**For stages 3-5 - Taken from: Grade 4 - Brickwedde, 2016**

**#P19**

**Name:** \_\_\_\_\_

**Date:** \_\_\_\_\_

There are \_\_\_\_ markers to be placed into 4 baskets so that there are the same number of markers in each basket. How many markers, therefore, will be in each basket?

(32) (48) (56)

*Answer with label:* \_\_\_\_\_

**Write a complete sentence to explain your answer**

---

There are \_\_\_\_ markers to be placed into cups. If \_\_\_\_ markers go into each cup, how many cups will be needed for all those markers?

(27, 3) (48, 6) (56, 8)

*Answer with label:* \_\_\_\_\_

**Write a complete sentence to explain your answer:**

---

**For stages 3-5 - Taken from: Grade 4 - Brickwedde, 2016**

**#P20**

**Name:** \_\_\_\_\_

**Date:** \_\_\_\_\_

The bakery at the grocery store sells packages of sugar cookies with 10 cookies inside each package. How many individual cookies are there if I opened up \_\_\_\_ packages and put those cookies on a tray?

(13) (22) (45)

*Answer with label:* \_\_\_\_\_

**Write a complete sentence to explain your answer**

---

The baker has a tray filled with \_\_\_\_ chocolate chocolate-chip cookies. If ten cookies go into a box, how many full boxes can be placed out on the shelf for sale?

(132) (431) (1256)

*Answer with label:* \_\_\_\_\_

**Write a complete sentence to explain your answer:**

---

**For stages 3-5 - Taken from: Grade 4 - Brickwedde, 2016**

**#P21**

**Name:** \_\_\_\_\_

**Date:** \_\_\_\_\_

Jars of tomato sauce come in cartons with 10 jars inside one carton. If a grocery store receives a delivery of \_\_\_ cartons, how many individual jars of tomato sauce does the store now have to sell?

(16) (45) (123)

*Answer with label:* \_\_\_\_\_

**Write a complete sentence to explain your answer**

---

At the bakery where they make fortune cookies to give away as a treat at restaurants, there are \_\_\_ individually wrapped fortune cookies. One hundred fortune cookies fill a carton that is then sealed and ready for shipment to restaurants. How many cartons can be filled with that many fortune cookies?

(512) (1014) (2604)

*Answer with label:* \_\_\_\_\_

**Write a complete sentence to explain your answer:**

---

**For stages 3-5 - Taken from: Grade 4 - Brickwedde, 2016**

**#P22**

**Name:** \_\_\_\_\_

**Date:** \_\_\_\_\_

Ten cookies are inside each box. Ten boxes fill up a carton. How many individual cookies would be in 16 cartons?

*Answer with label:* \_\_\_\_\_

**Write a complete sentence to explain your answer**

\_\_\_\_\_

How many boxes of cookies can be filled with 4,321 cookies if 10 cookies are inside each box?

*Answer with label:* \_\_\_\_\_

**Write a complete sentence to explain your answer:**

\_\_\_\_\_

A pair of sox costs \$4.99. How much would five pairs of sox cost?

*Answer with label:* \_\_\_\_\_

**Write a complete sentence to explain your answer:**

\_\_\_\_\_



**For stages 3-5 - Taken from: Grade 4 - Brickwedde, 2016**

**#P23**

**Name:** \_\_\_\_\_

**Date:** \_\_\_\_\_

Ahmed had the job today of placing apples into clear plastic bags and tying them shut to get the apples ready for sale. Just like his friend the day before, he started with a big crate of apples. When he was done he had tied shut \_\_\_ bags with \_\_\_ apples inside each bag. He still had \_\_\_ apples in the crate. How many apples were in the crate to begin with? Can he fill any more bags with 10 in each bag? When he is done, what would be the total number of bags that he has filled?

(12, 10, 4)      (29, 10, 2)      (54, 10, 36)

*Answer with label:* \_\_\_\_\_

**Write a complete sentence to explain your answer**

---

Tatia has the same job today as her friend had yesterday as well. She took the time to find out ahead of time how many apples are in her crate before she started to work. If she puts ten apples inside each bag, how many full plastic bags will she have filled if she starts with \_\_\_\_\_ apples in the crate?

(341)      (1,114)      (2,513)

*Answer with label:* \_\_\_\_\_

**Write a complete sentence to explain your answer:**

---

## For stages 3-5 - Taken from: Grade 4 - Brickwedde, 2016

#P24

Name: \_\_\_\_\_

Date: \_\_\_\_\_

**Fact Combinations**

**Directions:** Use the “groups of language” when reading out loud a fact such as  $5 \times 3$  (Say, “five groups of three”)

Use what you know about easier combinations to help figure out the harder combinations. Example: If you know  $3 \times 3$  is 9, then  $6 \times 3 = 9 + 9$  because six threes are three threes plus another group of three threes.

$$\begin{array}{cccccc}
 10 \times 6 = \underline{\quad} & \underline{\quad} = 4 \times 7 & 6 \times 3 = \underline{\quad} & \underline{\quad} = 3 \times 7 & 3 \times 3 = \underline{\quad} & \\
 \underline{\quad} = 5 \times 5 & 4 \times 4 = \underline{\quad} & \underline{\quad} = 7 \times 5 & 6 \times 2 = \underline{\quad} & \underline{\quad} = 5 \times 8 & \\
 4 \times 6 = \underline{\quad} & \underline{\quad} = 9 \times 2 & 2 \times 8 = \underline{\quad} & \underline{\quad} = 3 \times 8 & 8 \times 10 = \underline{\quad} & 
 \end{array}$$

**Open Number Sentences**

**Directions:** What goes on the line to make the number sentence true? Use the “groups of language” when you read the number sentences to help you find the missing piece of information.

$$\begin{array}{cc}
 9 \times 10 = \underline{\quad} & 9 \times 10 = 8 \times 10 + \underline{\quad} \\
 9 \times 5 = \underline{\quad} & 9 \times 8 = 10 \times 8 - \underline{\quad} \\
 9 \times 15 = 9 \times \underline{\quad} + 9 \times 5 & 5 \times 9 = \underline{\quad} \times 9 + 2 \times 9 \\
 3 \times 9 = \underline{\quad} & 5 \times 9 = \underline{\quad}
 \end{array}$$

**More – Less**

**Directions:** Write the number that is more or less then the number the question asks.

$$\begin{array}{cc}
 \underline{\quad}, 34,627 & \underline{\quad}, 16,076 \\
 10 \text{ less} & 10 \text{ more} \\
 \underline{\quad}, 274,426 & \underline{\quad}, 760,804 \\
 100 \text{ less} & 100 \text{ more} \\
 \underline{\quad}, 760,804 & \underline{\quad}, \\
 1000 \text{ less} & 1000 \text{ more}
 \end{array}$$

**For stages 3-5 - Taken from: Grade 4 - Brickwedde, 2016**

**#P25**

**Name:** \_\_\_\_\_

**Date:** \_\_\_\_\_

One hundred fortune cookies go in a carton. How many individual fortune cookies would there be in 75 cartons?

*Answer with label:* \_\_\_\_\_

**Write a complete sentence to explain your answer**

---

A thousand paper clips come in a carton. Inside that carton the paper clips are in smaller boxes with 100 paper clips inside each box. How many smaller boxes of paper clips are there in 5 cartons? How many individual paper clips are in those 5 cartons?

*Answer with label:* \_\_\_\_\_

**Write a complete sentence to explain your answer:**

---

A pair of sox costs \$5.95. How much would seven pairs of sox cost?

*Answer with label:* \_\_\_\_\_

**Write a complete sentence to explain your answer:**

**For stages 3-5 - Taken from: Grade 4 - Brickwedde, 2016**

#P26

Name: \_\_\_\_\_

Date: \_\_\_\_\_

**Fact Combinations**

**Directions:** Use the “groups of language” when reading out loud a fact such as  $5 \times 3$  (Say, “five groups of three”)

Use what you know about easier combinations to help figure out the harder combinations. Example: If you know  $3 \times 3$  is 9, then  $6 \times 3 = 9 + 9$  because six threes are three threes plus another group of three threes.

$6 \times 3 = \underline{\quad} \quad \underline{\quad} = 3 \times 6 \quad 3 \times 12 = \underline{\quad} \quad \underline{\quad} = 12 \times 3 \quad 10 \times 10 = \underline{\quad}$

$\underline{\quad} = 5 \times 5 \quad 4 \times 4 = \underline{\quad} \quad \underline{\quad} = 3 \times 3 \quad 12 \times 1 = \underline{\quad} \quad \underline{\quad} = 0 \times 5$

$3 \times 7 = \underline{\quad} \quad \underline{\quad} = 7 \times 3 \quad 4 \times 8 = \underline{\quad} \quad \underline{\quad} = 7 \times 4 \quad 3 \times 4 = \underline{\quad}$

**Open Number Sentences**

**Directions:** What goes in the box to make the number sentence true? Use the “groups of language” when you read the number sentences to help you find the missing piece of information.

$9 \times 8 = \underline{\quad} \times 8 - 1 \times 8 \quad 9 \times 9 = 9 \times 10 - 9 \times \underline{\quad} \quad 7 \times 7 = 7 \times \underline{\quad} + 7 \times 5$

$11 \times 6 = \underline{\quad} \times 6 + 1 \times 6 \quad 12 \times 8 = \underline{\quad} \times 8 + 2 \times 8 \quad 6 \times 8 = 5 \times 8 + \underline{\quad} \times 8$

**Order & Compare**

**Directions:** Which one is bigger or are the numbers the same? Use  $<$ ,  $>$ , or  $=$  on the line to show your answer.

Remember:  $x$  is less than ( $<$ )  $y$ ;  $x$  is greater than ( $>$ )  $y$ .

$5,000 + 400,000 + 5 + 70,000 + 10 \quad \underline{\hspace{2cm}} \quad 400,000 + 70 + 600 + 1,000 + 5 + 60,000$

$700 + 50,000 + 3,000 + 20 \quad \underline{\hspace{2cm}} \quad 9,000 + 50,000 + 600 + 4 + 30$

**Round to the Nearest 10 or 100 or 1,000**

**Directions:** The mathematician’s rule for rounding is if the number in the place you are ask to round is 5 (50) (500) or higher, you go up to the next ten (or hundred, or thousand). If the number in the place is you are ask to round is 4 (49) (499) or less, then go back to the ten (or hundred or thousand).

$1,403, \text{ Round to the nearest } 10. \quad \underline{\hspace{2cm}} \quad 8,676, \text{ Round to the nearest } 10. \quad \underline{\hspace{2cm}}$

$5,101, \text{ Round to the nearest } 100. \quad \underline{\hspace{2cm}} \quad 7,468, \text{ Round to the nearest } 100. \quad \underline{\hspace{2cm}}$

$4,165, \text{ Round to the nearest } 1000. \quad \underline{\hspace{2cm}} \quad 6,283. \text{ Round to the nearest } 1000. \quad \underline{\hspace{2cm}}$

## Appendix K Practice Station

Practice Station - This station is to be completed in small groups or working independently without teacher assistance. It can be used for homework if students do not finish. Materials in the practice station should be district developed curriculum that directly correlates with developing multiplicative number sense. Materials are provided in Everyday Math Curriculum for students to use. Materials are provided if needed in the following pages. Materials in Appendix K are taken from Brickwedde Grade 3 Unit 9 (2016).

**Taken from: Unit 9 Grade 3 - Brickwedde, 2016**

Name: \_\_\_\_\_

Date: \_\_\_\_\_

**Directions:** Read the story. Fill in the sheet with your answers. Show how you solved the problem.

The school carnival sells tickets for various games at \$.25 a ticket. Tickets are sold in a sheet of 10 tickets. Your task is to organize a sheet that the ticket sellers will use that organizes how much money to ask customers based on the number of ticket sheets they buy.

Number of Sheets	Number of Tickets	Cost of Tickets
1	10	
2		
3		
4		
5		
10		

**True/False Questions**

**Directions:** Read the numbers sentences below. Decide if it is true or false. Write a sentence to say why it is true or why it is false. HINT: It will be useful to use your "groups of language." Example: Read  $2 \times 3$  as "two groups of three."

$8 \times 8 = 4 \times 8 + 4 \times 8$       True/False

Why true or why false?

$7 \times 6 = 3 \times 6 + 3 \times 6$       True/False

Why true or why false?

**Taken from: Unit 9 Grade 3 - Brickwedde, 2016**

Name: \_\_\_\_\_

Date: \_\_\_\_\_

**Directions:** Read the story. Fill in the sheet with your answers. Show how you solved the problem.

The clerk in the ticket office at the movie theater is selling tickets for \$5.00 for the matinee shows. The table below helps that person know how much money to ask people to pay. Fill out the chart then answer the question below it.

Number of People	Number of Tickets	Cost of Tickets
1		
2		
3		
5		

How can the ticket seller use this chart to quickly figure out the price for a group of 4 friends and 6 friends? Explain your thinking.

**True/False Questions**

**Directions:** Read the numbers sentences below. Decide if it is true or false. Write a sentence to say why it is true or why it is false. HINT: It will be useful to use your "groups of language." Example: Read  $2 \times 3$  as "two groups of three."

$$7 \times 8 = 4 \times 8 + 4 \times 8 \quad \text{True/False}$$

Why true or why false?

$$8 \times 6 = 3 \times 6 + 3 \times 6 \quad \text{True/False}$$

Why true or why false?

**Taken from: Unit 9 Grade 3 - Brickwedde, 2016****Name:** \_\_\_\_\_**Date:** \_\_\_\_\_*Directions: Read the story. Fill in the sheet with your answers. Show how you solved the problem.*

The coaches of the Little League baseball teams are making plans to order T-shirts for the players on their teams. Each T-shirt costs \$2. There are 12 players on each team roster. Fill in the chart below to show how much money will be spent buying T-shirts.

Number of Teams	Number of T-Shirts	Cost of T-Shirts
1		
2		
3		
5		
7		
8		

How can the coaches use this chart to quickly figure out the price for 4 teams and 6 teams? Explain your thinking.

***True/False Questions***

*Directions: Read the numbers sentences below. Decide if it is true or false. Write a sentence to say why it is true or why it is false. HINT: It will be useful to use your "groups of language." Example: Read  $2 \times 3$  as "two groups of three."*

$$6 \times 8 = 5 \times 8 + 1 \times 8 \quad \text{True/False}$$

Why true or why false?

$$7 \times 7 = 5 \times 7 + 3 \times 7 \quad \text{True/False}$$

Why true or why false?



**Taken from: Unit 9 Grade 3 - Brickwedde, 2016**

Name: \_\_\_\_\_

Date: \_\_\_\_\_

**Fact Combinations**

**Directions:** Use the “groups of language” when reading out loud a fact such as  $5 \times 3$  (Say, “five groups of three”) Use what you know about easier combinations to help figure out the harder combinations.

Example: If you know  $3 \times 3$  is 9, then  $6 \times 3 = 9 + 9$  because six threes are three threes plus another group of three threes.

What are...

Two twos? \_\_\_\_\_ Three threes? \_\_\_\_\_ Four fours? \_\_\_\_\_ Five fives? \_\_\_\_\_

$4 \times 4 =$  \_\_\_\_\_  $2 \times 2 =$  \_\_\_\_\_  $10 \times 10 =$  \_\_\_\_\_  $3 \times 3 =$  \_\_\_\_\_

$2 \times 5 =$  \_\_\_\_\_  $4 \times 5 =$  \_\_\_\_\_  $8 \times 5 =$  \_\_\_\_\_  $5 \times 5 =$  \_\_\_\_\_

$3 \times 5 =$  \_\_\_\_\_  $6 \times 5 =$  \_\_\_\_\_  $12 \times 5 =$  \_\_\_\_\_  $5 \times 10 =$  \_\_\_\_\_

$3 \times 4 =$  \_\_\_\_\_  $6 \times 4 =$  \_\_\_\_\_  $12 \times 4 =$  \_\_\_\_\_  $4 \times 10 =$  \_\_\_\_\_

$2 \times 4 =$  \_\_\_\_\_  $4 \times 4 =$  \_\_\_\_\_  $8 \times 4 =$  \_\_\_\_\_  $10 \times 4 =$  \_\_\_\_\_

**Open Number Sentences**

**Directions:** What goes in the box to make the number sentence true? Use the “groups of language” when you read the number sentences to help you find the missing piece of information.

$$6 \times 6 = (3 \times 6) + (\quad \times 6)$$

$$6 \times 6 = (6 \times 5) + (6 \times \quad)$$

$$6 \times 6 = (\quad \times 6) + (4 \times 6)$$

$$\quad \times 6 = (4 \times 6) + (4 \times 6)$$

**More – Less**

**Directions:** Write the number that is more or less than the number the question asks.

\_\_\_\_\_, 5,030 \_\_\_\_\_,  
10 less                      10 more

\_\_\_\_\_, 90,184 \_\_\_\_\_,  
1000 less                      1000 more

\_\_\_\_\_, 43,715 \_\_\_\_\_,  
100 less                      100 more

\_\_\_\_\_, 37,712 \_\_\_\_\_,  
10 less                      10 more

## Taken from: Unit 9 Grade 3 - Brickwedde, 2016

Name: \_\_\_\_\_

Date: \_\_\_\_\_

### Fact Combinations

*Directions: Use the “groups of language” when reading out loud a fact such as  $5 \times 3$  (Say, “five groups of three”)*

*Use what you know about easier combinations to help figure out the harder combinations. Example: If you know  $3 \times 3$  is 9, then  $6 \times 3 = 9 + 9$  because six threes are three threes plus another group of three threes.*

$$\underline{\quad} = 4 \times 4$$

$$3 \times 4 = \underline{\quad}$$

$$\underline{\quad} = 4 \times 6$$

$$3 \times 8 = \underline{\quad}$$

$$\underline{\quad} = 2 \times 6$$

$$5 \times 2 = \underline{\quad}$$

$$\underline{\quad} = 6 \times 3$$

$$3 \times 7 = \underline{\quad}$$

$$\underline{\quad} = 4 \times 3$$

$$10 \times 7 = \underline{\quad}$$

$$\underline{\quad} = 7 \times 0$$

$$9 \times 2 = \underline{\quad}$$

$$\underline{\quad} = 10 \times 5$$

$$5 \times 5 = \underline{\quad}$$

$$\underline{\quad} = 8 \times 5$$

### Open Number Sentences

*Directions: What goes in the box to make the number sentence true? Use the “groups of language” when you read the number sentences to help you find the missing piece of information.*

$$6 \times 6 = 4 \times 6 + \underline{\quad} \times 6$$

$$\underline{\quad} \times 6 = 6 \times 6 + 1 \times 6$$

$$\underline{\quad} \times 6 = 5 \times 6 + 1 \times 6$$

$$7 \times 6 = \underline{\quad} \times 6 + 3 \times 6$$

$$6 \times 6 = 3 \times 6 + \underline{\quad} \times 6$$

$$7 \times 6 = 5 \times 6 + \underline{\quad} \times 6$$

$$\underline{\quad} = 6 \times 6$$

$$7 \times 6 = \underline{\quad}$$

### More – Less

*Directions: Write the number that is more or less than the number the question asks.*

\_\_\_\_\_, 9,789 \_\_\_\_\_,  
10 less                      10 more

\_\_\_\_\_, 9,789 \_\_\_\_\_,  
100 less                      100 more

\_\_\_\_\_, 50,856 \_\_\_\_\_,  
100 less                      100 more

\_\_\_\_\_, 50,856 \_\_\_\_\_,  
10 less                      10 more

## Taken from: Unit 9 Grade 3 - Brickwedde, 2016

Name: \_\_\_\_\_

Date: \_\_\_\_\_

### *Fact Combinations*

*Directions: Use the “groups of language” when reading out loud a fact such as  $5 \times 3$  (Say, “five groups of three”)*

*Use what you know about easier combinations to help figure out the harder combinations. Example: If you know  $3 \times 3$  is 9, then  $6 \times 3 = 9 + 9$  because six threes are three threes plus another group of three threes.*

$$3 \times 3 = \underline{\quad} \quad \underline{\quad} = 6 \times 2 \qquad 5 \times 6 = \underline{\quad} \quad \underline{\quad} = 4 \times 3 \qquad 4 \times 6 = \underline{\quad}$$

$$\underline{\quad} = 5 \times 4 \qquad 2 \times 9 = \underline{\quad} \qquad \underline{\quad} = 3 \times 8 \qquad 9 \times 5 = \underline{\quad} \qquad \underline{\quad} = 3 \times 9$$

$$6 \times 3 = \underline{\quad} \quad \underline{\quad} = 3 \times 7 \qquad 7 \times 5 = \underline{\quad} \quad \underline{\quad} = 10 \times 4 \qquad 4 \times 4 = \underline{\quad}$$

### *Open Number Sentences*

*Directions: What goes in the box to make the number sentence true? Use the “groups of language” when you read the number sentences to help you find the missing piece of information.*

$$\underline{\quad} \times 7 = 4 \times 7 + 3 \times 7$$

$$6 \times \underline{\quad} = 6 \times 5 + 6 \times 3$$

$$\underline{\quad} \times 7 = 4 \times 7 + 4 \times 7$$

$$6 \times \underline{\quad} = 6 \times 5 + 6 \times 1$$

$$7 \times 7 = 5 \times 7 + \underline{\quad} \times 7$$

$$6 \times \underline{\quad} = 6 \times 5 + 6 \times 2$$

$$7 \times 7 = 10 \times 7 - \underline{\quad} \times 7$$

$$6 \times \underline{\quad} = 6 \times 5 - 6 \times 1$$

$$\underline{\quad} = 7 \times 7$$

$$\underline{\quad} = 6 \times 5$$

### *More – Less*

*Directions: Write the number that is more or less than the number the question asks.*

\_\_\_\_\_, 2,771 \_\_\_\_\_  
10 less                      10 more

\_\_\_\_\_, 2,771 \_\_\_\_\_  
1000 less                      1000 more

\_\_\_\_\_, 61,587 \_\_\_\_\_  
100 less                      100 more

\_\_\_\_\_, 61,587 \_\_\_\_\_  
10 less                      10 more

**Taken from: Unit 9 Grade 3 - Brickwedde, 2016**

Name: \_\_\_\_\_

Date: \_\_\_\_\_

**Fact Combinations**

**Directions:** Use the “groups of language” when reading out loud a fact such as  $5 \times 3$  (Say, “five groups of three”)

Use what you know about easier combinations to help figure out the harder combinations. Example: If you know  $3 \times 3$  is 9, then  $6 \times 3 = 9 + 9$  because six threes are three threes plus another group of three threes.

$$10 \times 10 = \underline{\quad} \quad \underline{\quad} = 4 \times 6 \quad 8 \times 3 = \underline{\quad} \quad \underline{\quad} = 4 \times 7 \quad 3 \times 4 = \underline{\quad}$$

$$\underline{\quad} = 5 \times 5 \quad 3 \times 7 = \underline{\quad} \quad \underline{\quad} = 5 \times 7 \quad 6 \times 3 = \underline{\quad} \quad \underline{\quad} = 5 \times 8$$

$$4 \times 4 = \underline{\quad} \quad \underline{\quad} = 9 \times 2 \quad 4 \times 5 = \underline{\quad} \quad \underline{\quad} = 2 \times 8 \quad 6 \times 10 = \underline{\quad}$$

**Open Number Sentences**

**Directions:** What goes in the box to make the number sentence true? Use the “groups of language” when you read the number sentences to help you find the missing piece of information.

$$9 \times 10 = \underline{\quad}$$

$$9 \times 3 = 10 \times 3 - \underline{\quad}$$

$$9 \times 5 = \underline{\quad}$$

$$9 \times 8 = 10 \times 8 - \underline{\quad}$$

$$4 \times 9 = 4 \times \underline{\quad} - 4 \times 1$$

$$7 \times 9 = 7 \times \underline{\quad} - 7 \times 1$$

$$6 \times 9 = 6 \times \underline{\quad} - 6 \times 1$$

$$7 \times 9 = \underline{\quad}$$

**More – Less**

**Directions:** Write the number that is more or less than the number the question asks.

$$\underline{\quad}, 3,409 \quad \underline{\quad},$$

*10 less*                      *10 more*

$$\underline{\quad} 4,270 \quad \underline{\quad}$$

*100 less*                      *100 more*

$$\underline{\quad}, 13,444 \quad \underline{\quad},$$

*100 less*                      *100 more*

$$\underline{\quad}, 39,985 \quad \underline{\quad}$$

*1000 less*                      *1000 more*

**Taken from: Unit 9 Grade 3 - Brickwedde, 2016**

Name: \_\_\_\_\_

Date: \_\_\_\_\_

***Fact Combinations***

**Directions:** Use the “groups of language” when reading out loud a fact such as  $5 \times 3$  (Say, “five groups of three”)

Use what you know about easier combinations to help figure out the harder combinations. Example: If you know  $3 \times 3$  is 9, then  $6 \times 3 = 9 + 9$  because six threes are three threes plus another group of three threes.

$$10 \times 6 = \underline{\quad} \quad \underline{\quad} = 4 \times 7 \quad 6 \times 3 = \underline{\quad} \quad \underline{\quad} = 3 \times 7 \quad 3 \times 3 = \underline{\quad}$$

$$\underline{\quad} = 5 \times 5 \quad 4 \times 4 = \underline{\quad} \quad \underline{\quad} = 7 \times 5 \quad 6 \times 2 = \underline{\quad} \quad \underline{\quad} = 5 \times 8$$

$$4 \times 6 = \underline{\quad} \quad \underline{\quad} = 9 \times 2 \quad 2 \times 8 = \underline{\quad} \quad \underline{\quad} = 3 \times 8 \quad 8 \times 10 = \underline{\quad}$$

***Open Number Sentences***

**Directions:** What goes in the box to make the number sentence true? Use the “groups of language” when you read the number sentences to help you find the missing piece of information.

$$9 \times 10 = \underline{\quad}$$

$$9 \times 10 = 8 \times 10 + \underline{\quad}$$

$$9 \times 5 = \underline{\quad}$$

$$9 \times 8 = 10 \times 8 - \underline{\quad}$$

$$9 \times 15 = 9 \times \underline{\quad} + 9 \times 5$$

$$5 \times 9 = \underline{\quad} \times 9 + 2 \times 9$$

$$3 \times 9 = \underline{\quad}$$

$$5 \times 9 = \underline{\quad}$$

***More – Less***

**Directions:** Write the number that is more or less than the number the question asks.

$$\underline{\quad}, 34,627 \quad \underline{\quad},$$

*10 less*                      *10 more*

$$\underline{\quad}, 16,076 \quad \underline{\quad}$$

*100 less*                      *100 more*

$$\underline{\quad}, 274,426 \quad \underline{\quad},$$

*100 less*                      *100 more*

$$\underline{\quad}, 760,804 \quad \underline{\quad}$$

*1000 less*                      *1000 more*

Appendix L  
Website Resources

1. A website that focuses on cognitively guided instruction research and responding to children's thinking in mathematics which provides resources for teachers to use in the form of curriculum, research, games, other website resources.

<http://www.projectmath.net/>

2. Resource for subitizing cards for teacher stations. Also is a resource for math games and research.

<http://www.education.vic.gov.au/school/teachers/teachingresources/discipline/maths/assessment/Pages/resourcelibrary.aspx#4>

3. A website which has variety of electronic games that students can do independently.

[www.gamebaseded.com](http://www.gamebaseded.com)

Appendix M  
Reference List for Project

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