**Content Area:** Mathematics **Grade Level: 3**

**Content Standard:** M3 Computation and Algebra

**PASA Anchor:**

**PASA linked to PSSA Anchor(s):** M3.A.1 Solve problems using addition, subtraction, and multiplication (straight computation and word problems); M3.D.1 Demonstrate an understanding of patterns, relations and fucntions.

**Grade Level PSSA Anchor/Eligible Content:** M3.A.1.2 Solve problems involving multiplication through the 9’s tables through 9x5; M3.D.1.1 Recognize, describe, or extend a variety of patterns

|  |  |
| --- | --- |
| **Webb’s Depth of Knowledge (Cognitive Demand)** | |
| **1 – Recall**  **2 – Application of Skill/Concept** | **3 – Strategic Thinking**  **4 – Extended Thinking** |

**Big Idea:** [The base-ten number system is a way to organize, represent, and compare numbers using groups of ten and place value.](javascript:__doPostBack('ctl00$_PageContent$rptBigIdeas$ctl01$lnkBigIdea',''))

**Essential Questions:** What strategies and models help us understand how to solve multiplication and division problems and how multiplication and division are related.

|  |
| --- |
| **Prioritization** |
| Skill is assessed in the general assessment  Skill is assessed in the alternate assessment  Skill is required for future learning in the content area  Needed in next age/appropriate environment  Required for instructional activities in a variety of practice communities  Lesson plan available in SAS Voluntary Model Curriculum |

**Example of General Education Instructional Activity:**

In this unit, students learn multiplication. Students will:

* demonstrate the meaning of multiplication using number sentences
* explain how to multiply to solve real-world problems
* extend or find the missing element in a pattern
* describe the pattern used to find the missing number
* create a new pattern for another student to solve

**Materials**

* **Internet accessible computers**
* **Practice pages exploring multiplication that include real-world problems**
* **Paper plates (2 per student)**
* **Round head fasteners (brads)**
* **On-line student lesson, -Spinning Wheels- located at (**<http://beaconlc.org/beacon/lessons/signup.asp?LessonID=24>**)**
* **Copies of activity sheet for on-line student lesson,-Spinning Wheels- (download from Attached Files)**
* **Pencils**
* **Manipulatives**

**Preparations**

***(Download construction procedures and drawings for the Spinning Wheel Activity from Attached Files)***

1. **Teacher will prepare one set of paper plates as follows: Divide the paper plate into 8 equal pie shapes using a ruler and drawing evenly spaced lines. On the edge of the paper plate, in each pie piece, cut out a rectangle approximately 1/2- in height by 1- in length.**
2. **Teacher will prepare second set of paper plates as follows:(This is the bottom plate, which will contain the students' answers to their chosen multiplication facts.) Again, divide the paper plate into 8 equal pie shapes using a ruler and drawing evenly spaced lines.Place this paper plate on the bottom and the paper plate containing the pre-cut holes on top. Using a pencil, outline one rectangle in each pie piece. (This will contain the students' answers.)**
3. **Set up the activity center with prepared paper plates, pencils, brads and multiplication charts.**
4. **Turn on computers and load the Web activity -Spinning Wheels,- (**<http://www.beaconlearningcenter.com/lessons/24.htm>**)**

**Whole Group activity – Skip Counting**

1. **The teacher will discuss skip counting**

“Today we are going to practice skip counting. Counting by two's is called skip counting because you skip every second number. We are going to practice skip counting by 2’s, 3’s, 4’s and lots of other numbers. Let’s start with skip counting by 2’s”

Use a pointer to point to the numbers on a multiplication table chart as the class counts. Student volunteers can be used. Have students skip count in unison from 0 to 50 by two's, three's, four's and five's. Also, have students skip count in unison from 0 to 100 by ten's.

1. The teacher will introduce multiplication by using examples of repeated addition. Have students use counters as manipulatives to model the repeated addition.

**Example:** 3 x 4 = 12

4 + 4 + 4 = 12

**Example:** 4 x 3 = 12

3 + 3 + 3 + 3 = 12

Practice examples of multiplication facts by using repeated addition.

**Whole Group Activity – Multiplication Mania, constructing the Spinning Wheel**

The Multiplication Mania activity is described below (download construction drawings and procedures from Attached Files). This activity is completed as a whole group with the teacher modeling one step at a time.

1. Each student will take two paper plates (one with pre-cut holes and one with no holes) and one round head fastener (brad).
2. The teacher will assign a multiplication fact families from 1-9 to each student. On the paper plate with the holes, each student will write 8 multiplication facts from their assigned family on the lines next to the holes.
3. On the paper plate with no holes, each student will write the corresponding answer to each multiplication fact on the pre-drawn lines. Please have each student check his or her answers with the multiplication chart or manipulatives.
4. Each student will put the paper plate with the multiplication facts on top of the paper plate, which contains the answers, and attach with the round head fastener (brad).

**Divide students into three rotating groups.**

**Group 1:**

Complete multiplication practice work at desks that includes real-world problems and a space for students to explain how they multiplied to solve problems. Students can solve multiplication problems using number sentences. When finished, turn work in to be checked.

**Group 2:**

Complete the Web lesson, -Spinning Wheels- at the computer workstations. After the lesson, complete the activity sheet (see Attached Files) and turn it in to be checked.

**Group 3:**

Spinning Wheels that were completed in the whole group activity will be used by students in this center. Teacher direction: “Work with your assigned partner, choose one spinning wheel. Take turns answering the problems using your spinning wheel. When you are finished, take another spinning wheel from the pile.”

**Wrap-Up:**

When all rotations have been completed, class will come back together and discuss what they have learned about multiplication by repeated addition and skip counting.

**Assessments**

1. Assessment criteria for the completed practice page on multiplication:

Students;

- demonstrate the meaning of multiplication using number sentences

- explain how to multiply to solve real-world problems

1. Assessment criteria for the on-line student lesson, completion of the Spinning Wheels worksheet:

Students

- identify the missing parts in the multiplication pattern

- describe the pattern used to find the missing parts

- continue the pattern successfully

- create a new pattern for another student to solve

Use this formative assessment to re-teach and guide further multiplication lessons

|  |  |
| --- | --- |
| **General Instructional Format** | **Formative Assessment Options** |
| **Cooperative learning**  **Project based**  **Performance event/task**  **Note-taking**  **Presentation**  **Direct Instruction (I do, We do, You do)**  **Indirect Instruction**  **Other: graphic organizers** | **Observation with Data Collection**  **Random Reporter**  **Ticket out the door**  **Think Pair Share**  **Student work sample**  **Video tape**  **Multiple choice Item**  **Open response Item**  **Item Other:** |

**Access to the Instructional Activity for Students at Different Communication Levels**

**Symbolic**

In this unit, students learn multiplication. Students will:

* demonstrate the meaning of multiplication using number sentences
* explain how to multiply to solve real-world problems
* extend or find the missing element in a pattern
* describe the pattern used to find the missing number
* create a new pattern for another student to solve

**Whole Group activity – Skip Counting**

1. The teacher will discuss skip counting’

Provide a copy of the multiplication table chart to the learner. “Today we are going to practice skip counting. Counting by two's is called skip counting because you skip every second number. We are going to practice skip counting by 2’s, 3’s, 4’s and lots of other numbers/ Let’s start with skip counting by 2’s” Use a pointer to point to the numbers on a multiplication table chart as the class counts. If appropriate, laminate the chart and have the learner mark off the numbers on the chart as they are recited. Student volunteers can be used. Have students skip count in unison from 0 to 50 by two's, three's, four's and five's. Also, have students skip count in unison from 0 to 100 by ten's. Students should use their mode of communication to participate in group counting (use a voice output device; hold up symbol representations; touch tactile cues in a sequence, etc.

1. The teacher will introduce multiplication by using examples of repeated addition. Have students use counters as manipulatives to model the repeated addition.  
     
   Example: 3 x 4 = 12  
     
   4 + 4 + 4 = 12  
     
   Example: 4 x 3 = 12  
     
   3 + 3 + 3 + 3 = 12  
     
   Practice examples of multiplication facts by using repeated addition.

Some students may need Unifix Cubes or other similar manipulative to create each set needed to represent the repeated addition. Student will count out the correct number of cubes needed and then snap them together to create a set and then place all sets together to count the total of the specified repeated addition problem.

**Whole Group Activity – Multiplication Mania, constructing the Spinning Wheel**

The Multiplication Mania activity is described below (download construction drawings and procedures from Attached Files). This activity is completed as a whole group with the teacher modeling one step at a time.

1. Each student will take two paper plates (one with pre-cut holes and one with no holes) and one round head fastener (brad).
2. The teacher will assign multiplication fact families from 1-9 to each student. On the paper plate with the holes, each student will write 8 multiplication facts from their assigned family on the lines next to the holes. Students may use multiplication table charts to generate multiplication facts.
3. On the paper plate with no holes, each student will write the corresponding answer to each multiplication fact on the pre-drawn lines. Please have each student check his or her answers with the multiplication chart or manipulatives.  
   Students may use multiplication table charts to generate multiplication answers or use unifix cubes to represent the problem and determine the answer, etc. Pre-printed numbers (use labels) can be used to complete the wheel.
4. Each student will put the paper plate with the multiplication facts on top of the paper plate, which contains the answers, and attach with the round head fastener (brad).

**Divide students into three rotating groups.**

**Group 1:**   
Complete multiplication practice work at desks that includes real-world problems and a space for students to explain how they multiplied to solve problems. Students can solve multiplication problems using number sentences. When finished, turn work in to be checked.

Provide a multiplication table chart, templates and manipulatives for use in solving problems. Adaptations for word problems could include: remove unnecessary information, simplify the language, use a graphic organizer to organize the information from the real world problem (attached), highlight important information within the word problem.

**Group 2:**  
Complete the Web lesson, -Spinning Wheels- at the computer workstations<http://www.beaconlearningcenter.com/WebLessons/SpinningWheels/default.htm>

After the lesson, complete the activity sheet (see Attached Files) and turn it in to be checked.

Use of text-to-voice software to have the text on the website read to the learner. Use of peer partner to read text, use multiplication table chart to locate answers. Adapt and modify worksheet as appropriate.

**Group 3:**  
Spinning Wheels that were completed in the whole group activity will be used by students in this center. Teacher direction: “Work with your assigned partner, choose one spinning wheel. Take turns answering the problems using your spinning wheel. When you are finished, take another spinning wheel from the pile.”

Have the student use the multiplication table chart, unifix cubes or other manipulatives to determine the answers.

**Wrap-Up:**

When all rotations have been completed, class will come back together and discuss what they have learned about multiplication by repeated addition and skip counting.

**Assessments**

1. Assessment criteria for the completed practice page on multiplication:  
   Students  
   - demonstrate the meaning of multiplication using number sentences   
   - explain how to multiply to solve real-world problems
2. Assessment criteria for the on-line student lesson, completion of the Spinning Wheels worksheet:  
   Students  
   - identify the missing parts in the multiplication pattern  
   - describe the pattern used to find the missing parts  
   - continue the pattern successfully  
   - create a new pattern for another student to solve

Use this formative assessment to re-teach and guide further multiplication lessons

**Emerging Symbolic**

In this unit, students learn multiplication. Students will:

* demonstrate the meaning of multiplication using number sentences
* explain how to multiply to solve real-world problems
* extend or find the missing element in a pattern
* describe the pattern used to find the missing number
* create a new pattern for another student to solve

**Whole Group activity – Skip Counting**

1. **The teacher will discuss skip counting**

Provide a copy of the multiplication table chart up to 4 only, to the learner. “Today we are going to practice skip counting. Counting by two's is called skip counting because you skip every second number. We are going to practice skip counting by 2’s, 3’s, 4’s and lots of other numbers/ Let’s start with skip counting by 2’s”. Use a pointer to point to the numbers on a multiplication table chart as the class counts. Laminate the chart and have the learner mark the numbers on the chart as they are recited. Some students may need to be provided with a graphic representation of the number as they recited as well. Student volunteers can be used. Have students skip count in unison from 0 to 50 by two's, three's, four's and five's. Also, have students skip count in unison from 0 to 100 by ten's. Students should use their mode of communication to participate in group counting (use a voice output device; hold up symbol representations; touch tactile cues in a sequence, etc.

1. The teacher will introduce multiplication by using examples of repeated addition. Have students use counters as manipulatives to model the repeated addition.  
     
   Example: 3 x 4 = 12  
     
   4 + 4 + 4 = 12  
     
   Example: 4 x 3 = 12  
     
   3 + 3 + 3 + 3 = 12  
     
   Practice examples of multiplication facts by using repeated addition. Provide templates for creating one number set for a specified multiplication fact, and manipulatives to place into that number set template. For example, provide a template to create a set of 4 for the multiplication fact 3x4. The student will create a set in the template and then move the set into another template that represents the total array (illustrates repeated addition, for example, move a set of 4 three times to form one set of 12) and have the learner count the total number of items.

**Whole Group Activity – Multiplication Mania, constructing the Spinning Wheel**

The Multiplication Mania activity is described below (download construction drawings and procedures from Attached Files). This activity is completed as a whole group with the teacher modeling one step at a time.

1. Each student will take two paper plates (one with pre-cut holes and one with no holes) and one round head fastener (brad).
2. The teacher will assign a multiplication fact families from 1-9 to each student. On the paper plate with the holes, each student will write 8 multiplication facts from their assigned family on the lines next to the holes. Students may use multiplication table charts to generate multiplication facts. Pre-printed equations (use labels) can be used to complete the wheel.
3. On the paper plate with no holes, each student will write the corresponding answer to each multiplication fact on the pre-drawn lines. Please have each student check his or her answers with the multiplication chart or manipulatives.  
   Provide manipulatives (unifix cubes) and an array to calculate the answers. Provide a calculator for the student to use to calculate the answers. Pre-printed labels should be available.
4. Each student will put the paper plate with the multiplication facts on top of the paper plate, which contains the answers, and attach with the round head fastener (brad).

**Divide students into three rotating groups.**  
  
**Group 1:**   
Complete multiplication practice work at desks that includes real-world problems and a space for students to explain how they multiplied to solve problems. Students can solve multiplication problems using number sentences. When finished, turn work in to be checked. Present real world problems using graphics paired with text. Use the graphic organizer to highlight the important information in the word problems. Provide the student with a picture bank of possible responses for inserting into the graphic organizer. Use a calculator or manipulatives and templates used above to assist in solving problems.

**Group 2:**  
Complete the Web lesson, -Spinning Wheels- at the computer workstations<http://www.beaconlearningcenter.com/WebLessons/SpinningWheels/default.htm>

After the lesson, complete the activity sheet (see Attached Files) and turn it in to be checked.

Use of text-to-voice software to have the text on the website read may be used if available, or use peer partner to read text if software is not available. A present graphic/picture representation of the relevant mathematical information to the student, as the problem is read. Use a calculator or manipulatives and templates to assist in solving problems. Provide that student with multiple choice graphic representations of the answer from which to choose. A peer partner may help input the answer into the computer program.

**Group 3:**  
Spinning Wheels that were completed in the whole group activity will be used by students in this center. Teacher direction: “Work with your assigned partner, choose one spinning wheel. Take turns answering the problems using your spinning wheel. When you are finished, take another spinning wheel from the pile.”

Use a calculator or manipulatives and templates to assist in solving problems.

**Wrap-Up:**  
  
When all rotations have been completed, class will come back together and discuss what they have learned about multiplication by repeated addition and skip counting.

**Assessments**

1. Assessment criteria for the completed practice page on multiplication:  
   Students  
   - demonstrate the meaning of multiplication using number sentences   
   - explain how to multiply to solve real-world problems
2. Assessment criteria for the on-line student lesson, completion of the Spinning Wheels worksheet:  
   Students  
   - identify the missing parts in the multiplication pattern  
   - describe the pattern used to find the missing parts  
   - continue the pattern successfully  
   - create a new pattern for another student to solve

Use this formative assessment to re-teach and guide further multiplication lessons

**Pre-Symbolic**

In this unit, students learn multiplication. Students will:

* demonstrate the meaning of multiplication using number sentences
* explain how to multiply to solve real-world problems
* extend or find the missing element in a pattern
* describe the pattern used to find the missing number
* create a new pattern for another student to solve

**Whole Group activity – Skip Counting**

1. **The teacher will discuss skip counting**

Each time the teacher introduces a specified number for skip counting, present the student with a tactile representation of that number. Today we are going to practice skip counting. Counting by two's is called skip counting because you skip every second number (present the student with a tactile representation that looks something like this ). We are going to practice skip counting by 2’s, 3’s , 4’s and lots of other numbers/ Let’s start with skip counting by 2’s” Use a pointer to point to the numbers on a multiplication table chart as the class counts. Student volunteers can be used. Have students skip count in unison from 0 to 50 by two's, three's, four's and five's. Also, have students skip count in unison from 0 to 100 by ten's. Student may use assistive technology that includes a talking word processer and a program or computer calculator that can be set up to skip count each time a switch or alternate keyboard is pressed. The switch or keyboard should contain the tactile cue the student must feel/press in order to skip count.

1. The teacher will introduce multiplication by using examples of repeated addition. Have students use counters as manipulatives to model the repeated addition.  
     
   Example: 3 x 4 = 12  
     
   4 + 4 + 4 = 12  
     
   Example: 4 x 3 = 12  
     
   3 + 3 + 3 + 3 = 12  
     
   Practice examples of multiplication facts by using repeated addition. Computer program with alternate keyboard. Given an alternate keyboard set up for one cell and a tactile representation of one number set (i.e. 4) as the input and design the program so that a given number sentence such as 3X4= is displayed on the computer screen. Each time the student presses/touches the tactile cue on the keyboard a pre-determined set (in this case a set of 4) is represented on the screen. The student should press/touch the tactile cue on the keyboard the correct number of times to represent the given number sentence, in this case 3 times. A cue appears if the student has hit the switch too many times (see example keyboard and screen shot)

**Whole Group Activity – Multiplication Mania, constructing the Spinning Wheel**

The Multiplication Mania activity is described below (download construction drawings and procedures from Attached Files). This activity is completed as a whole group with the teacher modeling one step at a time.

1. Each student will take two paper plates (one with pre-cut holes and one with no holes) and one round head fastener (brad).
2. The teacher will assign a multiplication fact families from 1-9 to each student. On the paper plate with the holes, each student will write 8 multiplication facts from their assigned family on the lines next to the holes. Students may use multiplication table charts to generate multiplication facts. Pre-printed equations (use labels) can be used to complete the wheel. Give student a tactile representation of a limited number of equations (as appropriate). Tactile representation could include an array that illustrates both components of the fact (2 x 3=… the 2 may be the vertical array and the 3 may be the horizontal array) Give student a tactile representation of a limited number of equations (as appropriate). Tactile representation could include an array that illustrates both components of the fact (2 x 3 represented as x )
3. On the paper plate with no holes, each student will write the corresponding answer to each multiplication fact on the pre-drawn lines. Please have each student check his or her answers with the multiplication chart or manipulatives.  
   Provide a complete tactile array that represents the answer for each of the facts. Student can match fact to answer.
4. Each student will put the paper plate with the multiplication facts on top of the paper plate, which contains the answers, and attach with the round head fastener (brad).

**Divide students into three rotating groups.**  
  
**Group 1:**   
Complete multiplication practice work at desks that includes real-world problems and a space for students to explain how they multiplied to solve problems. Students can solve multiplication problems using number sentences. When finished, turn work in to be checked. Word problems are presented using a talking word processor (or other appropriate device). As the word problem is read, tactile cues representing the important component of the word problem are introduced to the learner.  
  
  
**Group 2:**  
Complete the Web lesson, -Spinning Wheels- at the computer workstations<http://www.beaconlearningcenter.com/WebLessons/SpinningWheels/default.htm> After the lesson, complete the activity sheet (see Attached Files) and turn it in to be checked. Use of text-to-voice software to have the text on the website read may be used if available, or use peer partner to read text if software is not available. A present tactile representation of the relevant mathematical information to the student, as the problem is read. Use the tactile cues to assist in solving problems. Provide that student with multiple choice tactile representations of the answer from which to choose. A peer partner may help input that answer into the computer program. Or use an alternate computer program that covers the same content but allows for accessibility using switches or alternate keyboards (check such websites as www.CAST.org for any possible links)  
  
**Group 3:**  
Spinning Wheels that were completed in the whole group activity will be used by students in this center. Teacher direction: “Work with your assigned partner, choose one spinning wheel. Take turns answering the problems using your spinning wheel. When you are finished, take another spinning wheel from the pile.” Match the array to the equation (using their tactile cue)

**Wrap-Up:**

When all rotations have been completed, class will come back together and discuss what they have learned about multiplication by repeated addition and skip counting.

**Assessments**

1. Assessment criteria for the completed practice page on multiplication:  
   Students  
   - demonstrate the meaning of multiplication using number sentences   
   - explain how to multiply to solve real-world problems
2. Assessment criteria for the on-line student lesson, completion of the Spinning Wheels worksheet:  
   Students  
   - identify the missing parts in the multiplication pattern  
   - describe the pattern used to find the missing parts  
   - continue the pattern successfully  
   - create a new pattern for another student to solve  
   Use this formative assessment to re-teach and guide further multiplication lessons

Sample Screen Shot

3 x 4 =

4



8



12



12

Sample Alternate Keyboard

4’s time table tactile cue, hit the array of 4 the correct number of times to complete the on screen multiplication problem.

