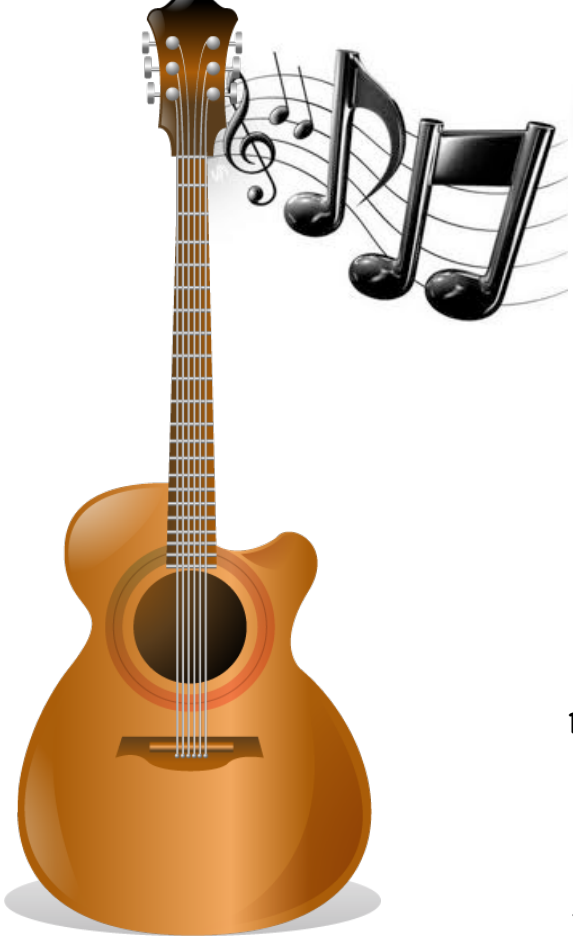


Mathematical Melodies

Groups

Music and Lyrics by Ruth Jean Charles

Groups

2x2, 2x2
This happens when you multiply
But really this is a disguise of two groups of two
Don't just stand around come on, join in and clap with me

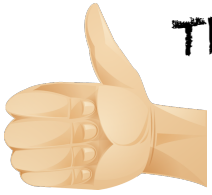
Groups of 2, Groups of 2
Bilinguals, and bicycles, bifocals and bilaterals
Are two groups of two
Don't just stand around come on join in and clap with me

3x3, 3x3
This happens when you multiply
But really this is a disguise of three groups of three
Don't just stand around come on join in and clap with me

Groups of 3, Groups of 3
Trilingual and tricycles, triathlons, and trilogies
Are three groups of three
Don't just stand around come on join in and clap with me

Groups

PRIMARY/JUNIOR: Grade 2, Grade 3 and Grade 4



The Big Ideas

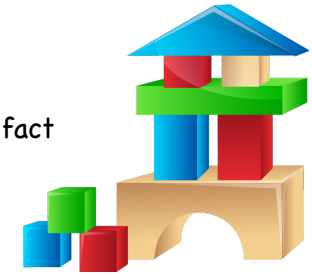
The acquisition of operational sense requires an ability to know when each operation is appropriate to use and having enough practice so the computational skills needed (i.e., multiplication facts) are efficient and accurate.

For multiplication, students should eventually be able to recall facts from memory with quickness and accuracy as well as know what those facts mean. This is best achieved through a mastery of counting skills including skip counting by 2's, 3's, 4's, 5's, 10's and 100's.

Another strategy toward understanding multiplication is to create models to represent math problems involving multiplication. Models can be used to practice the concept of skip counting. Arrays, arrangement of objects in columns and rows, are useful here. By working with 5-10 groups of 2 or 3 objects students can then count by 2's or 3's. Letting students build several arrays by adding or removing groups of objects is recommended. This activity may be further extended by linking the model with its corresponding math fact.

Once students have had plenty of practice using mathematical models students should be encouraged to use some mental math strategies. Greg Tang's book The Best of Times: Math Strategies That Multiply is invaluable here.

One of the most effective instructional strategies for fact memorization is to organize them into small systematic steps.



Curriculum Connections

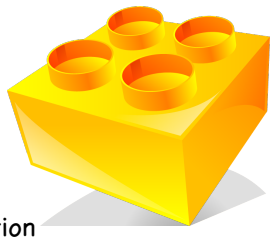
Number Sense and Numeration

Operational Sense

Grade 2

- represent and explain, through investigation using concrete materials and drawings, multiplication as the combining of equal groups (e.g., use counters to show that 3 groups of 2 is equal to 2 + 2+ 2 and to 3 x 2)

Grade 3



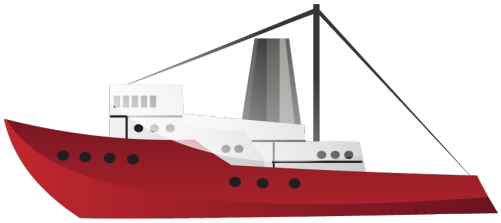
- relate multiplication of one-digit numbers to real-life situations, using a variety of tools and strategies (e.g., place objects in equal groups, use arrays, write repeated addition or subtraction sentences) (Sample problem: Give a real-life example of when you might need to know that 3 groups of 2 is 3 x 2.)
- multiply to 7 x 7 using a variety of mental strategies (e.g., doubles, doubles plus another set, skip counting).

Grade 4

- multiply to 9 x 9 using a variety of mental strategies (e.g., doubles, doubles plus another set, skip counting);
- solve problems involving the multiplication of one-digit whole numbers, using a variety of mental strategies (e.g., 6 x 8 can be thought of as 5 x 8 + 1x8);s
- multiply whole numbers by 10, 100, and 1000, and divide whole numbers by 10 and 100, using mental strategies (e.g., use a calculator to look for patterns and generalize to develop a rule);
- multiply two-digit whole numbers by one-digit whole numbers, using a variety of tools (e.g., base ten materials or drawings of them, arrays), student-generated algorithms, and standard algorithms;

Inaugural Voyage

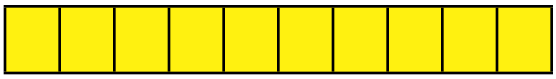
One way to introduce Arrays....



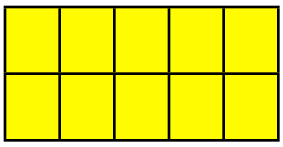
Multiplication Models Using Arrays and Graph Paper

Teaching students how to make arrays, an arrangement of objects or numbers in columns and rows is helpful when teaching multiplication. Arrays can first be taught using objects. Organizing objects into columns and rows makes counting them easier (and helps students understand the grouping principle connecting to multiplication). Using coloured counters, students are going to organize a set depending on the number given. Write an (even) number on the board and have them demonstrate with their counters how they would organize them in columns and rows. Encourage different ways to show one number.

Once students have had plenty of practice with objects, graph paper can be introduced as an alternative visual to show multiplication. Give students copies of graph paper. Have them either cut out models or colour models, known as ARRAYS, to show multiplication facts. For example, how many ways can students model the product 10.



1 x 10 = 10



2 x 5 = 10

Ask students to find other ways to show specific products.

Let's Play a Game

Multiplication Mayhem

Materials Needed: 2 sets of playing cards from 1-12 (Ace=1, Jack=11, Queen=12), for each group of 3 players. Two students play while one student acts as the product checker. Three rounds are needed to make sure everyone has a chance to complete each role.

Two players divide the factor cards equally and then turn their cards facedown in piles on a hard surface. Count "1, 2, 3, GO!" then the players simultaneously turn their top cards face up in front of each other. Whoever correctly multiplies the two numbers faster keeps both cards. The game continues until all factors have been multiplied or time runs out.

Using the Hundreds Chart to learn ...

Multiplication Madness

Strong counting skills help children become successful at multiplication. Skip counting provides a bridge between counting and multiplication so skip counting by 2's, 5's, 10's, 3's and 4's will help students understand the connection between counting and multiplication. A 100's chart is an excellent tool for teaching counting and skip counting. Give each student a copy of a 100s chart and have them use a yellow pencil crayon or marker. First, have students skip count by 2's by circling multiples of 2. Then have skip count by 5's by drawing a triangle around each multiple of 5. Then, have students skip count by 10's and colour the multiples of 10 yellow.

Discussing the relationship between the numbers that have a circle

Handout(s):

100s Chart

Cross Curricular...

DEAR DIARY

Combining math and language with Grade 2 Science: Growth and Changes in Animals.

First, begin by reading Diary of A Worm by Doreen Cronin This story is about a young worm who discovers, day by day, that there are some very good and some not so good things about being a worm in this great big world. This book is also available as a TUMBLE READER (www.tumblebooks.com).

The worm in the story keeps a diary. Have a discussion about diaries. Start by asking students, "What is a diary? Have you or anyone you know kept a diary? What kinds of things are written and kept in a diary? Today you are going to create a diary from the point of view of your favourite animal. Three diary entries will be required. But first, you will need to learn more about your animal (particularly concentrating on growth and changes)." Students will research their animal (concentrating on growth and change). Once research is complete students will create a few diary entries based on their animal's point of view.

Math Journaling

for Understanding Multiplication

Problem of The Day/Literature Connections: Students are to use their math journals to solve the following problem(s) using the Problem Solving Sheet:

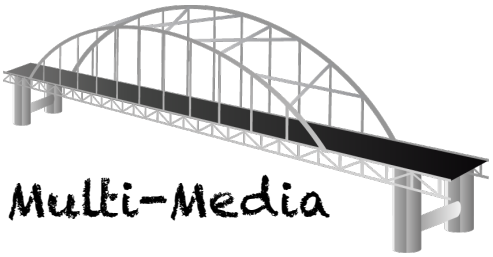
a) Worm's mother said Worm could invite 5 friends to his birthday party. She plans on putting 3 pieces of leaf in each friend's treat bag. How many pieces of leaf will she need? and/or

b) Worm is going on vacation for 3 weeks. How many days will he be gone?

Final item: Students are to complete another page in their math journal. The writing prompt is, **Could you have found the answer by doing something different?** What?

Handout(s):

Problem Solving Sheet
Math Journal with Writing



Multi-Media

Websites:

Interactive Times Table http://illuminations.nctm.org/ActivityDetail.aspx?ID=155

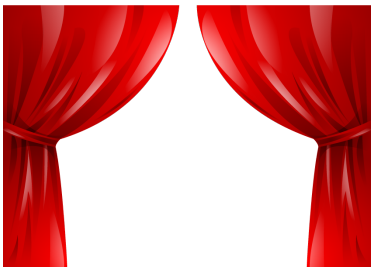
Concentration Game that practices many mathematical concepts including multiplication http://illuminations.nctm.org/ActivityDetail.aspx?ID=73

Meteor Multiplication http://www.arcademicskillbuilders.com/games/meteor/meteor.html

SmartBoard: Multiplication and arrays. http://exchange.smarttech.com/details.html?id=8f5daf89-0492-487b-b63d-735de32a8374

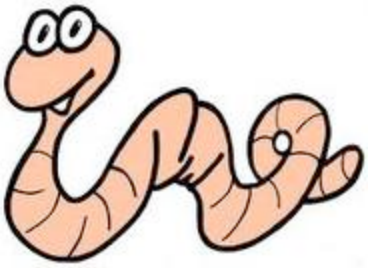
Learn 360: Math Park is an excellent video series that explores multiplication facts with one family per video:

- What to do: Multiplying by 2's
- Strategies: Multiplying by 3's
- Sakes Alive: Multiplying by 5's
- Easy to Win: Multiplying by 10's



Squiggley, Wiggley, WORMS

Connecting Math with Science for Grade 3: Soils in the Environment...



Repeated Addition using gummy worms

When introducing beginning multiplication concepts, it is important that students have many hands-on experiences. To demonstrate the relationship between repeated addition and multiplication facts, students can use coins, interlocking cubes, small edibles, etc. Today students will work with gummy worms.

Supplies: Gummy worms (453 grams worth) for each group, scale

Vermicomposting is the process of using worms to process organic food waste into nutrient rich soil. Worms eat decaying food waste and produce vermicompost, a very effective soil amendment. As we have been learning, worms are fantastic composters. Red wigglers are typically the worms used to recycle organic matter. When individuals or organization want to start vermicomposting they use a big bucket and have to purchase at least 453 grams of worms to start, I wonder how many worms that is?" "How are we going to figure it out? It is easy to count a small number of things. But what if you have lots of things to count?"

The class is divided into small groups (after they wash their hands) and each group gets 453 grams of worms. Using the worms students are asked to come up with a solution of counting the worms quickly. Using the worms and the problem solving sheet students indicate their solutions. Once completed students are asked to share their thinking. Affirm effort and focus in on the use of groups.

"If we have lots of things to count, it can be easier to count in groups. Let's give it a giant worm try!

Working in pairs students will be given 20 worms to use. Their first task is to make 3 groups of 2 worms each.

Then, have students connect the three groups and count the number of worms. Write the addition sentence:

2 + 2 + 2 = 6

Have students write a multiplication sentence to describe the model

3 x 2 = 6

(# of groups) (number of worms)

Use the worms to repeat the process and have students build models and write multiplication sentences for these facts.

3+3+3+3, 4+4+4, 5+5+5

Handout(s):

Problem Solving Sheet

Resources Related to Soils in the Environment:

Dirt Books: The Dirt on Dirt by Paulette Bourgeois

Vermicomposting Books: Composting: Decomposition by Buffy Silverman

Worm Guide from California: http://www.calrecycle.ca.gov/Publications/Schools/56001007.pdf and related **classroom activities** http://www.calrecycle.ca.gov/Education/curriculum/worms/98Activities.pdf

Worm Guide from Calgary http://www.greencalgary.org/images/uploads/File/Vermicomposting.pdf

The Worm Factory From Westport, ON (owned by Gerry Baker) provides guidance and supplies for vermicomposting. Will do classroom visits. http://www.thewormfactory.ca/

Picture This!

More Literature links for multiplication...

Fiction:

Best of Times: Math Strategies by Greg Tang (2002)

Greg Tang's proven methods--giving kids tools rather than rules and more memorization--pay off once again, as he uses rhymes and commonsense tricks to walk through the multiplication tables from zero to 10. For example, if you know how to multiply by two ("Two is very fast and fun, quickly double and you're done. What's that you say, be more precise? Okay then, just add it twice!"), then fours ("... please just always double twice!") and eights ("... doubling three times works just great!") should be a cinch.

Multiplying Menace: The Revenge of Rumpelstiltskin by Pam Calvert (2006)

Rumpelstiltskin is back! This time he's making mischief with his multiplying stick. Can Peter unlock the secret of the stick in time to save the kingdom? Whimsical illustrations bring fun to multiplying whole numbers and fractions.

Amanda Bean's Amazing Dream by Cindy Neuschwander (1998)

Amanda loves to count everything, but not until she has an amazing dream does she finally realize that being able to multiply will help her count things faster.

Anno's Mysterious Multiplying Jar by M Anno (1999)

Simple text and pictures introduce the mathematical concept of factorials

Six Dinner Sid by Inga Moore (1991)

Sid the cat plays the pet of six different owners on Aristotle Street so that he can get six dinners every night.

Non-Fiction:

Multiplication on the Farm by Jennifer Roy (2006)

Reinforces both multiplication and reading skills, stimulates critical thinking, and provides students with an understanding of math in the real world.

Board Games:

SUMOKU Pure Adding Fun

Sumoku is a unique crossword-style game with numbers. It can be played 5 different ways. Just add up tiles to multiples of the number shown on the die, connect them all together, and you have a sumoku!

All content for Picture This was provided by Novelist (http://www.ebscohost.com/novelist/).

References

California Integrated Waste Management Board.(2004). The Worm Guide: A Vermicomposting Guide for Teachers. Retrieved November 21, 2011 from http://www.worms.com/worm-pdfs/teachers%20guide%20to%20vermicomposting.pdf

Ontario Ministry of Education. (2006). The Ontario curriculum grades 1-8: Language. Retrieved from http://www.edu.gov.on.ca/eng/curriculum/elementary/language18currb.pdf

Ontario Ministry of Education. (2005).The Ontario curriculum grades 1-8: Mathematics. Retrieved from http://www.edu.gov.on.ca/eng/curriculum/elementary/math18curr.pdf

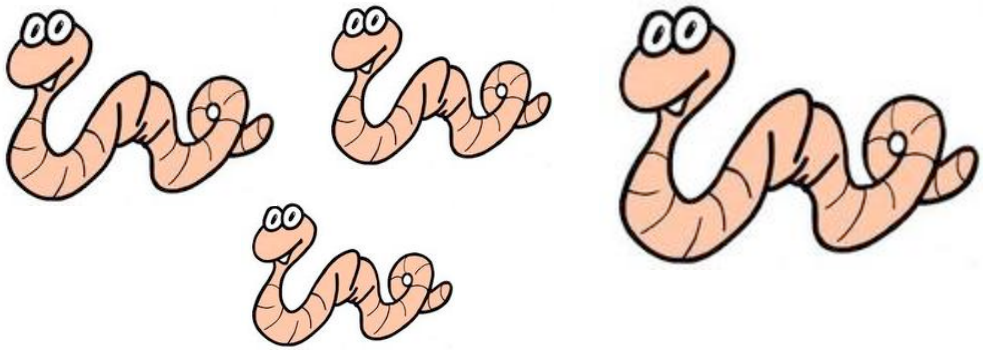
Ontario Ministry of Education. (2007). The Ontario curriculum grades 1-8: Science and technology. Retrieved from http://www.edu.gov.on.ca/eng/curriculum/elementary/scientec18currb.pdf

Reys, R., Lindquist, M., Lambdin, D., Smith, N., & Colgan, L.(2010). Helping Children Learn Mathematics. Toronto: John Wiley & Sons Canada, Ltd.

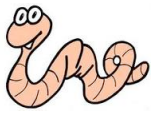
Small, M. (2009). Good questions: Great ways to differentiate mathematics instruction. (2009). New York: Teacher's College Press.

Van de Walle, J.A., Folk, S., Karp, K., & Bay-Williams, J. (2011). Elementary and middle school mathematics: Teaching developmentally. Toronto: Pearson.

1	2	3	4	5	6	7	8	9	10
11	12	13	14	15	16	17	18	19	20
21	22	23	24	25	26	27	28	29	30
31	32	33	34	35	36	37	38	39	40
41	42	43	44	45	46	47	48	49	50
51	52	53	54	55	56	57	58	59	60
61	62	63	64	65	66	67	68	69	70
71	72	73	74	75	76	77	78	79	80
81	82	83	84	85	86	87	88	89	90
91	92	93	94	95	96	97	98	99	100



Problem Solving



My Work

My Explanation

My Answer

Name: _____

Dear Math Journal,

In math today I _____

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____