Multiplication/Division Edition
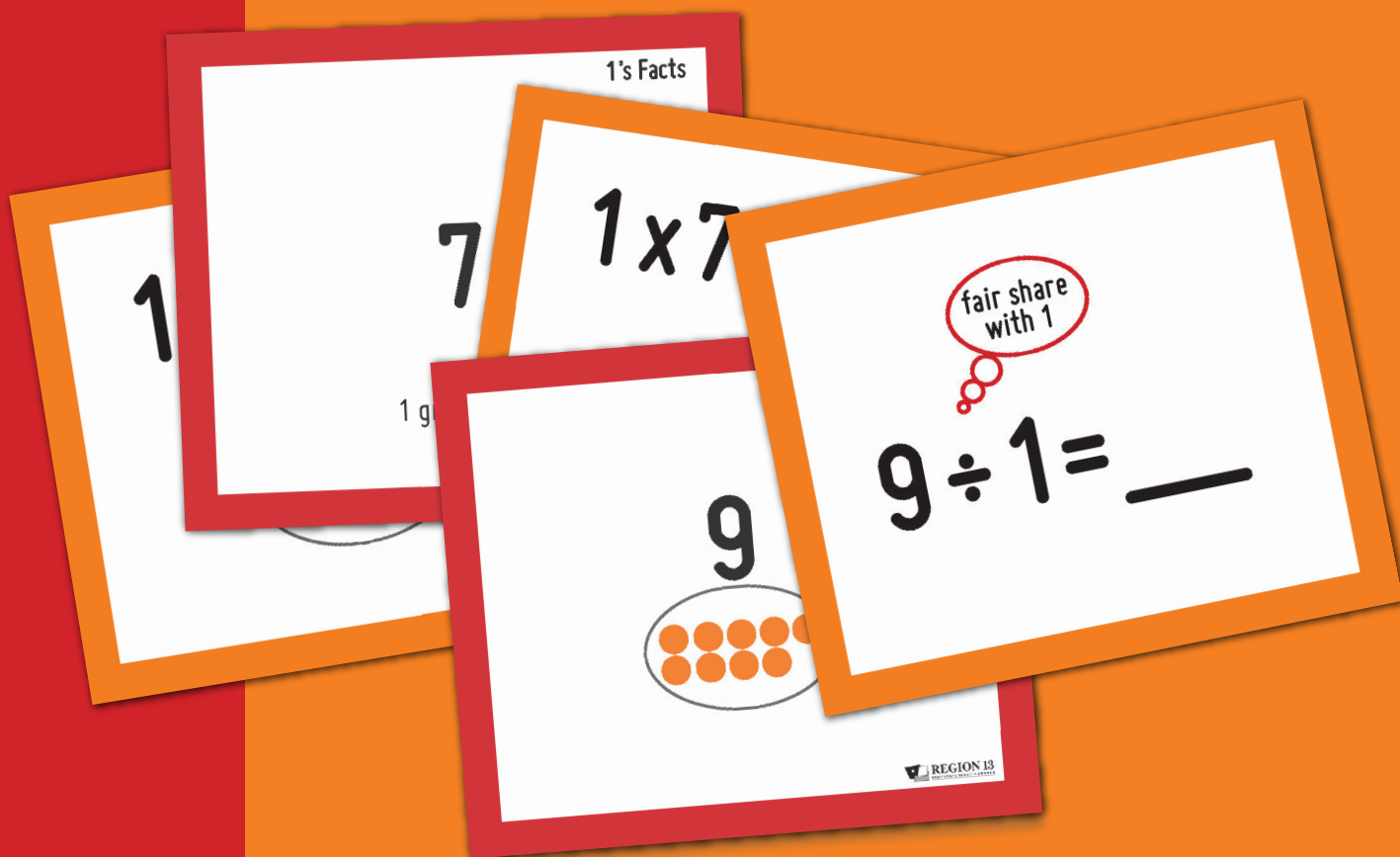
FACTastic
MATH STRATEGY CARDS

Player's Guide

Sample

REGION 13
EDUCATION SERVICE CENTER

Acknowledgments

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Strategy Sequence:

Beginning Strategies

- 0's Facts (p. 1)
- 1's Facts (p. 1)
- 2's Facts (p. 2)
- 10's Facts (p. 3)
- 5's Facts (p. 4)

Advanced Strategies

- Square Facts (p. 5)
- 9's Facts (p. 6)
- 3's Facts (p. 7)
- 6's Facts (p. 8)
- 7's Facts (p. 9)
- 4's Facts (p. 10)
- 8's Facts (p. 11)

Beginning strategies are often strategies students develop on their own and already have in their toolbox of problem-solving skills. Advanced strategies employ the knowledge of one or more of the beginning strategies and therefore should be taught after beginning strategies are mastered.

Purpose:

Teaching of strategies to recall basic facts builds flexible thinking in students. Students with flexible thinking are able to see a number in several forms and use the knowledge and skills they already possess to find a solution. Counting is not an efficient or effective strategy. "If drill is undertaken when counting is the only strategy available, all you get is faster counting." (Van de Walle and Lovin, 2005). Strategies encourage a deeper understanding of numbers and their relationships. The ultimate goal of fact strategies is to develop students' automaticity of the facts.

The more students use strategies to solve basic computation, the more likely it is that strategy and fact will become an innate skill for them. In most cases, students scaffold the strategies individually. Once they feel comfortable with their own strategies and confident in their knowledge of the facts, their use of the strategy will become less and less apparent.

Many students are able to develop their own strategies and should be encouraged to do so, as long as their strategies are efficient and effective. Students who struggle in math may not be able to develop efficient and effective strategies independently. The strategies in this series are designed to help build fact fluency in students who struggle with mathematics. For these students, explicit, systematic instruction is most effective.

Each strategy is introduced by a short activity that includes examples of think-aloud techniques and key points to emphasize to students. The activities follow the same sequence for each strategy: objective, materials, preview, activate background knowledge, teacher demonstration, guided practice followed by independent or partner practice. The guided and independent practices are listed separately because these same instructions apply to each strategy activity.

Sample

Productive Practice:

Remember, practice makes permanent, not perfect. When a new strategy is being introduced, work with a small group of students so you can deliver explicit, systematic instruction. Introduce the strategy through concrete and visual representations. Use teacher think-aloud to help students develop their own internal monitoring system.

Once students understand the strategy and can demonstrate basic mastery of the strategy in a small group, move on to independent practice, including partner work, to practice the facts and strategies. Monitor the students' progress by going through the set of strategy fact cards with them individually. Collect data on the number of correct problems, speed of recall, and which facts the student continues to struggle with in the set.

When the student shows mastery of the strategy set, move him or her on to a new strategy set. However, always have the student continue to practice the strategies already mastered so that the facts are not lost. Have the student practice the facts learned in the strategy set using basic flashcards without the strategy hint on the front. This will allow the student to build automaticity of the strategy.

Send strategy cards home for parents to work with their children. Provide a short explanation regarding the purpose of the cards, or let parents know where to purchase their own household set of FACTastic Math Strategy Cards (www.store.esc13.net). Assigning fact practice time as homework sets the expectation that fact fluency is important.

Mastery of the strategies will take more time than just the demonstration of the strategy.
The following guided and independent practices apply to each strategy to expand upon students' understanding and ensure mastery.

Guided Practice:

Practice facts as a group first. Students should state the full problem and answer instead of just calling out the answer. When practicing with the group, have students wait three seconds before they are allowed to respond. Cue the students by holding up three fingers and counting down. This will allow students some time to think and ensure that everyone has a chance to practice the fact. The group expectation is to respond in unison.

When you feel the group has a clear understanding of the strategy, play the game Beat the Teacher. Show each card, one at a time. If the group gets it right, the card is placed in a student stack. If the group is incorrect, the card is placed in the teacher stack. After the group reviews the cards, count the stacks to see who "won." Then have the students practice the teacher stack again to earn back those points lost. Another variation of Beat the Teacher is having one student at a time in the group answer the fact. Go around in a circle, showing a fact card to one student at a time. That student must answer the problem. If the answer is correct, the card goes in the student stack; if incorrect, it goes to the teacher stack.

Independent Practice:

Once students have been introduced to a particular strategy and can restate the strategy in their own words, the strategy cards can be added to their practice piles for pair or independent practice. Set clear expectations for how the students are to prompt their partner if their partner gets stuck. Also, model appropriate wait time so that the students have a clear understanding of how to be encouraging and patient with one another's learning. When the strategy is new, students should be allowed as much time as they need. Once the students have practiced with a particular strategy, wait time should decrease; ultimately, students should recall the solution to the fact in roughly three seconds.

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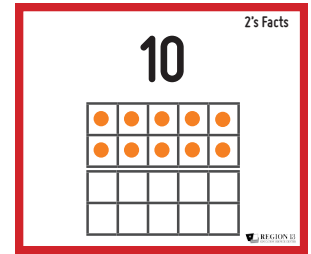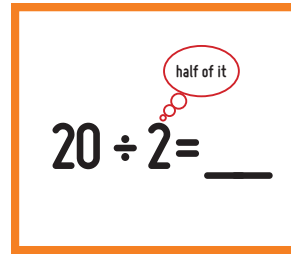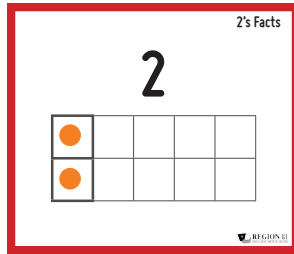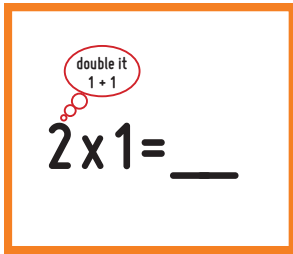
2's Facts:

Objective:
Student will solve multiplication and division facts that include 2 as a factor or a divisor.

Materials:
Set of 2's Facts cards, doubles ten-frames and 20 counters per student

Preview:
"Today we will multiply by two. We will use ten-frames and our knowledge of doubles addition facts to quickly recall these multiplication and division facts."

Activate Background Knowledge:
Have students define the words double and half. Practice skip counting by 2s past 30.

Demonstration:

1. Show the students the 2's Facts cards.
2. Ask students, "What does it mean to multiply a number by two?" (to double it) "What does it mean to divide a number into two equal parts?" (to halve it) Point out the double and half bubbles on the front of the cards. This bubble is to help students quickly remember that times 2 means to double, and divided by 2 means to find half.
3. Have students build 4 on their ten-frames using their counters. Then ask students to double it. Next have students build 12 on their ten-frames using their counters. Then ask students to halve it. Repeat this exercise several times with different multiples of 2. Challenge students to build a number and then double or halve it mentally (without the use of the counters).
4. Discuss any patterns seen when multiplying and dividing by 2. Are the answers ever odd? Why? What are the numbers that are repeated in the ones places for multiples of 2? Challenge your students to name a number greater than 20 that would be a multiple of 2. Can students identify a number you name as being a multiple of 2?
5. Present the cards one set at a time, first multiplication and then division. When students are ready for a challenge, mix multiplication and division cards together.

Sample

10's Facts:

	10's Facts
10 x 1=___	**10**

Hundreds	Tens	Ones

Hundreds	Tens	Ones
	1	0

	10's Facts
20 ÷ 10=___	**2**

Hundreds	Tens	Ones

Hundreds	Tens	Ones
		2

Objective:
Student will solve multiplication and division facts that include 10 as a factor or a divisor.

Materials:
Set of 10's Facts cards, place value chart (laminated or in plastic sleeves) and dry-erase maker for each student

Preview:
"Today we will multiply and divide by ten. We will use the place value chart and our knowledge of skip counting by ten to quickly recall these multiplication and division facts."

Activate Background Knowledge:
Have students skip count by 10 up to 150.

Demonstration:

1. Show the students the 10's Facts cards. Walk through the place value chart on the front of the card as a memory trigger.

2. Students quickly see how multiplying by 10 results in the origional number with a zero added on the back. To build conceptual understanding of multiplying by 10, we want students to move past this beginning notation of "just adding a zero."

3. Have students write 1 in the ones place on their place value chart. Then have them write 10 under it on the same place value chart. Discuss with students the movement of the 1 from 1 to 10. Ask students, "What makes a number in the ones place move to the tens place?" (the value is greater than 9) "What makes a number in the tens place move to the hundreds place?" (the value is greater than 99)

4. Have students write numbers you name in the place value chart and then ask them to multiply or divide that number by 10.

5. To challenge students, ask them to use their chart or to mentally, solve 10 × 30 and 500 ÷ 10. Continue with challenging problems to build students' conceptual understanding of the 10's facts.

6. Present the cards one set at a time, first multiplication and then division. When students are ready for a challenge, mix multiplication and division cards together.

3

Sample

Card images:

double & double & double
2 x 2 x 2

$8 \times 1 = \_\_$

8

| 1 | |

8's Facts

Double it $1 \times 2 = 2$
Double again $2 \times 2 = 4$
Double again $4 \times 2 = \boxed{8}$

---

half & half & half
÷ 2

$16 \div 8 = \_\_$

8

| ? | 16 |

8's Facts

$16 \div 2 = 8$
$8 \div 2 = 4$
$4 \div 2 = \boxed{2}$

Objective:

Student will solve multiplication and division facts that include 8 as a factor or a divisor.

Materials:

Set of 8's Facts cards

Prerequisite Skills:

2's Facts or Doubles Addition Facts (Addition/Subtraction Edition)

Preview:

"Today we will multiply and divide with eight. We will use our knowledge of doubling to solve Eight's Facts we do not know. Multiplying by eight can be difficult, so when possible, the best strategy for an unknown fact with eight in it is to use the strategy for the other factor."

Activate Background Knowledge:

Practice doubling numbers. Ask student to double 1-digit and 2-digit numbers. To strengthen students' mental math abilities, have them work through doubling a 2-digit number by breaking the number into 10s and 1s. First, double the tens place, then double the ones place, and then add the products together to get the total.

Demonstration:

1. Show the students the 8's Facts cards.

2. Think aloud to model the strategy for the students. Say, "If I don't know the answer to the problem eight times three, I can think of eight as two times two times two because what is two times two?" (4) "What is four times two?" (8) I can double the number,

double again, and double again because two times two times two is eight. Double three is six, double six is twelve, and double twelve is twenty-four. Eight times three equals twenty-four."

3. Continue talking through the strategy using different 8's Facts. Have students write out the work that is on the back of each card so they can practice what they should be thinking mentally when they encounter an 8's Facts they do not automatically know.

4. Think aloud for the mental addition of double 2-digit numbers as well.

5. Remind students that this strategy is challenging because of all of the doubling, and when possible, they should try to use the strategy of the other factor instead of working through double it, double again, and double again.

6. Remind students when dividing by 2, they would find half. Say, "Now, when dividing by eight, you will find half, half, and then half a third time." Continue to talk through the division strategy of finding half, half again, and half again with different multiples of 8. Have students write out the work that is on the back of the division cards.

7. Present the cards one set at a time, first multiplication and then division. When students are ready for a challenge, mix multiplication and division cards together.

Sample