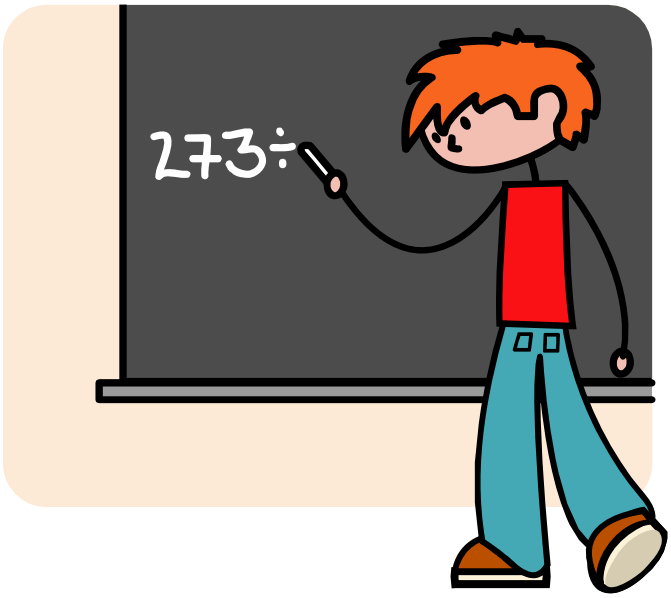


MATH FACT STRATEGIES

This packet contains information to help students become more fluent in "basic math facts". It emphasizes strategies that go beyond just memorization of facts and focuses on helping students learn their facts by understanding numerical relationships.

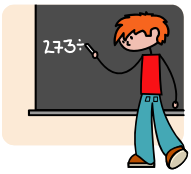
The following is a quote from the **NCTM Curriculum Focal Points** *Questions and Answer* section:

At grade two quick recall of addition and subtraction facts and fluency with supporting algorithms is a focus. Note that the focal point suggests efficient procedures, including the standard algorithm—meaning including, not exclusively, access to the standard algorithm. Students should certainly use what they can do efficiently and accurately. They should not have to use any algorithm until it is understood. As you state, "Our goal should be that students can use a method to subtract that allows them to get the right answer, to do so reasonably fast, and to be able to do this repeatedly."

Similarly for grade four the quick recall of multiplication facts and fluency with efficient procedures, including the standard algorithm, is a focus. Most important is that fluency emerges through deep understanding of the multiplication process—how multiplication is represented, how properties are used when multiplying, etc. Students become fluent through their understanding of efficient procedures that include the standard algorithm.

Also note that a focal point is an area of emphasis in a given year; earlier work with multiplication would occur in grade three and extend in grade five.

Adapted from information on Teacher Web



STRATEGIES FOR COMPUTATION:

Addition Strategies

Add Zero Facts – Adding zero is "easy" to learn. Children will see how adding zero to any number will always equal that number if they use real life examples, such as,

- "If you have 3 pieces of candy, and I don't give you any more, how many pieces of candy will you have?"

Plus One and Plus Two Facts – Once students have developed counting skills, these are also easy to learn.
Plus One facts are just "one more."
"Plus Two" facts are "one more than plus one", or, +1 +1.

Doubles - These are also "easy" to learn for children because the number is simply doubled.

- Give a digit and the child says and/or writes the doubles fact.
- For example: "Six." "Six plus six is twelve."

Near Doubles – Mastering the doubles facts, will help students learn the "near doubles" facts.

- For example, knowing 6 + 6 = 12 helps the child know 6 + 7 = 13 because 7 is one more than 6 so the answer to 6 + 7 must be one more than 6 + 6.
- This also helps the child know 6 + 5 = 11 because 5 is one less than 6.
- Give a digit and have the child name the doubles fact and the near doubles fact.
- For example: "Seven." "7 plus 7 is 14. So 7 plus 8 is 15 and 7 plus 6 is 13.

Make-Ten Facts - These facts all have at least one addend of 8 or 9.
One strategy for these facts is to build onto the 8 or 9 up to 10 and then add the rest.

- For 6 + 8, start with 8, then 2 more makes 10, and that leaves 4; 10 + 4 = 14 so 6 + 8 = 14.
- Using a 10 frame grid helps students visual this concept as they build understanding.

What's Left - After master of zeros, one or two more, doubles, near doubles and make ten facts, there are **only 12 remaining addition facts for students to learn**. And because of "turn around" facts (5 +3 = 8 and 3 + 5 = 8), there are REALLY only **6 remaining facts,** and two of them are Make 10 facts:

5 + 3, 6 + 3, 6 + 4, 7 + 3, 7 + 4, and 7 + 5.

All of these are make ten, and then add or subtract 1 or 2 as needed.

Students should use the strategies they have been practicing for the last 6 facts.

- "If you don't know 7 + 5 (or any fact that you want to work on), what are some strategies you can use to determine the answer. **Think: Double Plus.**
- For example, 7 + 5 can be thought of as 5 + 5 = 10, plus 2 = 12; OR 5 and 7 are two apart from each other so the answer must be two apart from the sum of either of them: 5 + 5 = 10 plus 2 more = 12;
- or 7 + 7 = 14 less two = 12; OR to make 10, I need to take 3 from the 5, add it to the 7 to make 10 and that leaves 2 from the 5 to add to the 10 I now have and that = 12.

Subtraction Strategies

Think Addition~ Subtraction facts ARE more difficult than addition.

- If subtraction is modeled in such a way that children are encouraged to think,
  "What goes with this part to make the total?"

- When done in this *think addition* manner, the child uses known addition facts to produce the unknown quantity or part.

- When children see 9 - 4, encourage them to think, "*Four plus what equals nine?*" The value of think-addition in developing fluency in subtraction facts cannot be overstated.

Multiplication Strategies

Zeros & Ones- These facts, although "easy," can cause confusion because of what they know about the addition facts. Children need a basic understanding of the concept of multiplication before these become "easy" facts.

- "If three girls/boys get no cookies, how many cookies do the girls/boys have altogether?" The number model would be 3 * 0 = 0. (Strategy – Act this out with students)

Similarly the Plus One addition model means one more, but multiplying by 1does not change the value of a number.

- "If three girls/boys each get one cookie, how many cookies do the boys/girls have altogether?" The number model would be 3 * 1 = 3.
-

Doubles - These are the same as the addition fact doubles and should already be known. The only challenge is for students to see that not only is 2 * 7 double 7, but 7 * 2 is also double 7.

- *Doubles Activity:* Play "Say the Double". You say a number, and the child says the double of that number. Use the overhead calculator to practice doubles (press 2 * =).

Fives Facts - These are easy for children who have mastered counting by fives. Have students find the pattern (0 or 5 in the ones place).

Nifty Nines - These are easy because of the patterns present in the nines tables that are fun for children to discover, and, if possible, they should be allowed to discover then, NOT told them. Two of the patterns useful for mastering the nines:

- The tens digit of the product is always one less than the "other" factor (the one other than 9), and
- 2) The sum of the two digits in the products is always 9.

So these two ideas can be used together to get any nine fact quickly. For 7 * 9, 1 less than 7 is 6, 6and 3 are 9, so the answer is 63.

Patterns in the Nines Facts- In column form, write the nines tables (9 * 1 = 9, 9 * 2 = 18,..., 9 * 9 = 81). The task is to find as many patterns as possible in the tables.

- Have children continue to look for patterns until they discover the two patterns necessary for the strategy have been found.
- A follow-up task is to use the patterns to think of a clever way to figure out a nine fact if you didn't know it. Even students who know their nine facts will benefit from this task.

Use 10-Facts for Nines: By the end of grade 3, students understand that multiples of 10 have a zero in the ones place. They can easily tell you 5 X 10 = 50. They can use this knowledge to figure out 5 X 9 = 45. Reasoning: If ten fives are equal to 50, then nine fives should be 5 less.

- Example: 9 X 4 =? Ten fours are 40, so nine fours are 40-4, or 36.
- Think times 10- an alternative strategy for learning the nines is to "think times 10". 7 * 10 = 70; 9 is one less than 10 so 7 * 9 is 7 less than 70; 7 * 9 = 63

Almost There! After students master zeros, ones, doubles, fives and nines facts, there are 25 remaining facts. If we consider the 10 pairs of "turn around" facts included in these facts, there are really only 15 left to learn.

These facts can be learned by relating them each to an already known fact or helping fact.

- For example, 3 * 8 is connected to 2 * 8 (double 8 and 8 more).
- The 6 * 7 fact can be related to either 5 * (5 sevens and 7 more) or to 3 * 7 (double 3 * 7).
- **The helping fact must be known and the ability to do mental addition must be there also.**

Double Double- This approach is applicable to all facts with 4 as one of the factors. For example, 4 * 6 can be thought of as double 6 (12) and double again (24).

Division Strategies

Think Multiplication –

Children should be encouraged to use the corresponding multiplication fact to think of a division fact.

- In thinking about 36 divided by 9, children should think, "What number times 9 equals 36?"

Mastery of multiplication facts and connections between multiplication and division are the key elements of division fact mastery.