

BUILDING BASIC FACTS AUTOMATICITY

Dear Parents,

Research has shown that long-term success in mathematics is closely tied to strong number sense, including fluency with basic facts. The sooner your child becomes fluent with her or his addition and subtraction facts, the better! Addition and subtraction of larger numbers will be much easier to master, and multiplication and division are easier to learn with the support of addition and subtraction fluency. Even algebra, introduced in 4th grade in California, will be easier to learn if your child does not have to use mental energy counting to solve addition and subtraction facts.

This basic facts program has been designed based on international research. We know that countries where children learn their facts quickly and fluently seem to have at least three things in common:

- Children work on their facts at school and at home
- Children learn their facts with fives (e.g. $5+3$ and $7+5$) and within tens (e.g. $2+8$ and $6+4$) to build relationships that support strategic number sense
- Children are encouraged to develop strategies beyond counting (e.g., $9+7=10+6$ and $13-4=(13-3)+1$ or $13-4=(10-4)+3$)

With this information in mind, this program progresses from facts less than five to facts with fives, to facts within tens and facts with tens. Once your child is fluent with these facts, we can then work on developing strategies that work equally well with the basic facts and with larger sums and differences (e.g., $8+7=10+5$ uses the same strategy as $28+37=30+35$).

The goals outlined below are the same goals we will be developing at school. As part of your daily homework plan, we are asking that you spend 5 or 10 minutes working on basic facts. Because each child is unique, we recommend that you start with Goal _____ and use the following activities to help your child move beyond counting to more efficient strategies and memorization. Once your child no longer needs to count (using fingers or mentally) to solve the goal's addition problems, move to the related subtraction facts. After this goal has been learned to automaticity, practice with all of the flashcards your child has worked on so far.

Repeat this procedure for each new goal, making sure that you first work with the new goal, and then review previous goal facts, before moving on to the next goal.

NINE GOALS FOR BASIC FACTS SUCCESS

Once a child is fluent with the addition facts in each goal, begin work on the related subtraction facts.

Goal 1 - Within 4s & 5s

Add: $1+3$, $2+2$, $3+1$, $1+4$, $2+3$, $3+2$, $4+1$

Sub: $4-1$, $4-2$, $4-3$, $5-1$, $5-2$, $5-3$, $5-4$

Goal 2 - With 5s (part 1)

Add: $1+5$, $2+5$, $3+5$, $4+5$, $5+5$

Sub: $6-1$, $6-5$, $7-2$, $7-5$, $8-3$, $8-5$, $9-4$, $9-5$, $10-5$

Goal 3 - Within 10s

Add: $0+10$, $1+9$, $2+8$, $3+7$, $4+6$

Sub: $10-0$, $10-10$, $10-1$, $10-9$, $10-2$, $10-8$, $10-3$, $10-7$, $10-4$, $10-6$

Goal 4 - With 10s

Add: $10+1$, $10+2$, $10+3$, $10+4$, $10+5$, $10+6$, $10+7$, $10+8$, $10+9$, $10+10$

Sub: $11-1$, $11-10$, $12-2$, $12-10$, $13-3$, $13-10$, $14-4$, $14-10$, $15-5$, $15-10$,
 $16-6$, $16-10$, $17-7$, $17-10$, $18-8$, $18-10$, $19-9$, $19-10$, $20-10$

Goal 5 - With 5s (part 2)

Add: $5+6$, $5+7$, $5+8$, $5+9$

Sub: $11-5$, $11-6$, $12-5$, $12-7$, $13-5$, $13-8$, $14-5$, $14-9$

Goal 6 - Doubles

Add: $3+3$, $4+4$, $6+6$, $7+7$, $8+8$, $9+9$

Sub: $6-3$, $8-4$, $12-6$, $14-7$, $16-8$, $18-9$

Goal 7 - Under Tens

Add: $2+4$, $2+6$, $2+7$, $3+4$, $3+6$

Sub: $6-2$, $6-4$, $8-2$, $8-6$, $9-2$, $9-7$, $7-3$, $7-4$, $9-3$, $9-6$

Goal 8 - With 9s

Add: $2+9$, $3+9$, $4+9$, $6+9$, $7+9$, $8+9$

Sub: $11-2$, $11-9$, $12-3$, $12-9$, $13-4$, $13-9$, $15-6$, $15-9$, $16-7$, $16-9$, $17-8$, $17-9$

Goal 9 - With 7s & 8s

Add: $4+7$, $6+7$, $3+8$, $4+8$, $6+8$, $7+8$

Sub: $11-4$, $11-7$, $13-6$, $13-7$, $11-3$, $11-8$, $12-4$, $12-8$, $14-6$, $14-8$, $15-7$, $15-8$

RECOMMENDED DAILY PRACTICE ROUTINE

- Monday - Activity or game for the target goal from the attached list
- Tuesday - Activity or game for the target goal
- Wednesday - Five minutes of flashcard practice on target goal
- Thursday - Activity or game for the target goal
- Friday, Saturday, Sunday - Try practicing with your child for a minute or two while you're running errands.

BASIC FACT ACTIVITIES, GAMES, AND RESOURCES

Goal 1 (1+3, 2+2, 3+1, 1+4, 2+3, 3+2, 4+1 & related subtractions)

- Use small toys, coins, other objects, or a slavonic-style abacus (www.alabacus.com) to model these problems.
- One-Hand Recognition - help student show these problems using the fingers on one hand.
- Try the Five-Frame online activities at <http://illuminations.nctm.org/> (go to Activities and then K-2)
- [Flashcards](#) - only begin using these flashcards when students can solve these problems using objects.
- [Online flashcards, games, and quizzes](#) created specifically for this basic facts program. Once you get to the website, scroll down to find the Early Number Fluency Online Activities word document on the left-hand side of the screen. Download and save this word document, and you'll be able to access the many activities by clicking on the embedded links in the document.

Goal 2 (with 5s to 5: 5+1, 5+2, 5+3, 5+4, 5+5, reversals, & related subtractions)

- Two-Hand Recognition - help student show these problems using five on one hand, and the second addend on the other hand.
- Use a Slavonic-style abacus (www.alabacus.com) to help students develop visual models of these problems. Also consider using the Electronic Abacus activities at <http://illuminations.nctm.org/> (go to Activities and then K-2).
- Try the Ten-Frame online activities at <http://illuminations.nctm.org/> (go to Activities and then K-2).
- Yellow is the Sun - go to www.alabacus.com to find a song to practice these facts.
- The Lego Game - This game can be played with 2 or more people, using 2 dice (or number cubes) and a set of 20 or more Lego pieces.
 - Place one die (or number cube) in the center of the table with the 5 facing up. Each player takes turns rolling the other die and adding this number to the 5. The player with the highest sum gets to select a Lego piece. If a tie occurs for the largest sum, then all players with the largest sum select one Lego piece each.

- At the end of the game, each player gets to make a Lego creation to share. For older children, this game can be adapted to play with points, or using a Cribbage board, rather than building with Legos.
- Flashcards - introduce the addition facts for this level. When the student is confident and fluent with the addition facts, begin working on the related subtraction facts. When the student seems fairly confident with both the addition and subtraction facts for this goal, begin integrating them with the Goal 1 cards. Be sure to spend more time on the new facts than on the earlier facts, and more time on larger facts than smaller facts.
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Goal 3 (within 10s: 0+10, 1+9, 2+8, 3+7, 4+6, reversals, & related subtractions)

- Splitting 10 - Enter 10 on an abacus (or put 10 objects in a row, or use two hands). Move over 1 bead (or object, or finger) and ask the student to say the groupings ($1 + 9 = 10$). Continue moving one bead at a time ($2 + 8$, $3 + 7$, ...). Be sure to discuss the patterns.
- Try the Ten-Frame and Electronic Abacus online activities at <http://illuminations.nctm.org/> (go to Activities and then K-2).
- Go to the Dump Game (adapted from *Math Card Games* from www.alabacus.com) - This game can be played with 2 to 4 people, using 4 or more sets of number cards 1 to 9. (You can use Aces through Nines from a regular deck of cards, or use index cards for a homemade deck.) Hand out 5 cards to each player.
 - At the beginning of each turn, the players check over their hands for pairs that total 10. An abacus can be useful for an early learner. Paired cards are placed face up in two piles in front of each player, allowing easy checking and no need for shuffling between games.
 - After all pairs are played, the player asks the player on the left for a number that will complete a 10. If the second player has it, it must be given to the first player, who lays the two cards down. If the player does not have the requested card, the player says "Go to the Dump," at which time the first player takes the top card from the dump (all cards not handed out at the beginning of the game). This player's turn is now over.
 - If a player runs out of cards, the player takes 5 new cards, but then must wait until the next turn to play them.
 - At the end of the game, players combine the two stacks of cards in front of them and decide who has the most (by comparing heights or by counting). Cards can then be stacked together for the next game - no need to shuffle.
- Flashcards - introduce the addition facts for this level. When the student is confident and fluent with the addition facts, begin working on the related subtraction facts. When the student seems fairly confident with both the addition and subtraction facts for this goal, begin integrating them with the previous goal cards. Be sure to spend more time on the new facts than on the earlier facts, and more time on larger facts than smaller facts.

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Goal 4 (with 10s: 10+1, 10+2, 10+3, 10+4, 10+5, 10+6, 10+7, 10+8, 10+9, 10+10, reversals, & related subtractions)

- Seeing Tens - use an abacus or a baggie filled with 10 objects plus extra objects to show these problems. Also use a hundreds chart (<http://math.about.com/od/countin1/a/100chart.htm>). Help students think about the "teen" syllable in the teen numbers (13, 14, ..., 19) as "ten more". For instance, thirteen can be thought of as th[i]ree and ten more. Eleven and twelve are more challenging, and may actually take more practice because the words are not helpful in seeing the "ten more" structure.
- Try the Ten-Frame and Electronic Abacus online activities at <http://illuminations.nctm.org/> (go to Activities and then K-2).
- Use a Hundreds Chart (<http://math.about.com/od/countin1/a/100chart.htm>) to encourage student to see the patterns when adding and subtracting with 10s.
- The Lego Game with Tens - this game can be played with 2 or more people, using all of the aces through 10s from one deck of cards and a set of 20 or more Lego pieces.
 - Place one of the 10 cards in the center of the table and the rest of the cards face down in a pile. Each player takes turns drawing a card from the pile and adding this number to the 10. The player with the highest sum gets to select a Lego piece. If a tie occurs for the largest sum, then all players with the largest sum select one Lego piece each.
 - At the end of the game, each player gets to make a Lego creation to share. For older children, this game can be adapted to play with points, or using a Cribbage board, rather than building with Legos.
- Flashcards - introduce the addition facts for this level. When the student is confident and fluent with the addition facts, begin working on the related subtraction facts. When the student seems fairly confident with both the addition and subtraction facts for this goal, begin integrating them with the previous goal cards. Be sure to spend more time on the new facts than on the earlier facts, and more time on larger facts than smaller facts.
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Goal 5 (with 5s to 10: 5+6, 5+7, 5+8, 5+9, reversals, & related subtractions)

- Finding Fives & Tens - use an abacus (www.alabacus.com) or objects to help the student break the second addends into 5 + extras (e.g., $5 + 7 = 5 + 5 + 2$), and then add the 10 and the extras (e.g., $5 + 5 + 2 = 10 + 2$).
- Use a Slavonic-style abacus (www.alabacus.com) to help students develop visual models of these problems. Also consider using the Electronic Abacus activities at <http://illuminations.nctm.org/> (go to Activities and then K-2).
- Try the Ten-Frame online activities at <http://illuminations.nctm.org/> (go to Activities and then K-2).
- The Lego Game with Cards - This game can be played with 2 or more people, using one 5 and all of the 6s, 7s, 8s, and 9s from one or two decks of cards, and a set of 20 or more Lego pieces. (Once the student is confident with these four facts, you can add in the aces through 5s to solidify all of the with 5s.)
 - Place one die (or number cube) in the center of the table with the 5 facing up. Each player takes turns rolling the other die and adding this number to the 5. The player with the highest sum gets to select a Lego piece. If a tie occurs for the largest sum, then all players with the largest sum select one Lego piece each.
 - At the end of the game, each player gets to make a Lego creation to share. For older children, this game can be adapted to play with points, or using a Cribbage board, rather than building with Legos.
- Flashcards - introduce the addition facts for this level. When the student is confident and fluent with the addition facts, begin working on the related subtraction facts. When the student seems fairly confident with both the addition and subtraction facts for this goal, begin integrating them with the previous goal cards. Be sure to spend more time on the new facts than on the earlier facts, and more time on larger facts than smaller facts.
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Goal 6 (doubles: 3+3, 4+4, 6+6, 7+7, 8+8, 9+9, & related subtractions)

- Seeing Double - use an abacus (www.alabacus.com) to show these problems. This is particularly helpful with 7+7, 8+8, and 9+9, which are usually more difficult for students to remember.
- Concentration (from <http://www.capousd.org/gwes/finn/math.html>). Two or more people can play, "Concentration." The object of the game is to find pairs of matching cards among an array of face down cards. Help your child write addition or subtraction facts (e.g., $9+6$ or $7-5$) on one set of index cards and the answers (e.g. 15 or 2) on another set. Use a limited number of cards to

start with, maybe 8 pairs, and slowly increase the number when your child seems ready for more.

- Shuffle the cards and lay them out face down. The first player turns over two cards, if they match, the player keeps the two cards and takes another turn. If the two cards are different, the cards must be placed back in their same positions face down. The next player takes a turn trying to find two matching cards. As the game progresses, players must concentrate and try to remember where the different numbered cards are located. When all the cards have been collected, the person with the most pairs wins.
- Flashcards - introduce the addition facts for this level. When the student is confident and fluent with the addition facts, begin working on the related subtraction facts. When the student seems fairly confident with both the addition and subtraction facts for this goal, begin integrating them with the previous goal cards. Be sure to spend more time on the new facts than on the earlier facts, and more time on larger facts than smaller facts.
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Goal 7 (under tens: 2+4, 2+6, 2+7, 3+6, 3+4, reversals, & related subtractions)

- Play strategy games including Yahtzee, Monopoly, cribbage, dominoes, ...
- Additional games specifically designed to build student basic facts fluency can be found in *Math Card Games*, a book from www.alabacus.com.
- Flashcards - introduce the addition facts for this level. When the student is confident and fluent with the addition facts, begin working on the related subtraction facts. When the student seems fairly confident with both the addition and subtraction facts for this goal, begin integrating them with the previous goal cards. Be sure to spend more time on the new facts than on the earlier facts, and more time on larger facts than smaller facts.
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Goal 8 (9s: 9+2, 9+3, 9+4, 9+6, 9+7, 9+8, reversals, & related subtractions)

- 9s strategy - use an abacus or ten frames to help students make tens by decomposing the addend in 9s problems in $1 + \underline{\quad}$ and then adding the $\underline{\quad}$ to 10. For example: $9 + 5 = 9 + (1 + 4) = (9 + 1) + 4 = 10 + 4 = 14$.

- Flashcards - introduce the addition facts for this level. When the student is confident and fluent with the addition facts, begin working on the related subtraction facts. When the student seems fairly confident with both the addition and subtraction facts for this goal, begin integrating them with the previous goal cards. Be sure to spend more time on the new facts than on the earlier facts, and more time on larger facts than smaller facts.
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Goal 9 (7s and 8s: 7+4, 7+6, 8+3, 8+4, 8+6, 8+7, reversals, & related subtractions)

- Making Tens - use an abacus or ten frames with counters to show these problems. Provide students with many experiences decomposing one of the addends and putting it back together with the other addend to make a ten, and then add the remainder on to the ten. For example: $7 + 4 = 7 + (3 + 1) = (7 + 3) + 1 = 10 + 1 = 11$.
- Flashcards - introduce the addition facts for this level. When the student is confident and fluent with the addition facts, begin working on the related subtraction facts. When the student seems fairly confident with both the addition and subtraction facts for this goal, begin integrating them with the previous goal cards. Be sure to spend more time on the new facts than on the earlier facts, and more time on larger facts than smaller facts.
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Addition Games

ADDITION WAR (from <http://www.capousd.org/gwes/finn/math.html>)

Use a regular deck of playing cards. Divide the cards evenly among the players. Cards are dealt face down. Each player turns over two cards and adds the numbers on the cards. The player with the greatest sum keeps all the cards played that round.

Variations: Change the rule and the player with the lowest sum wins. Another version would be to remove the jokers, tens and face cards. Each player turns over 3 cards, adds the numbers together and the player with the greatest sum collects the cards.

BOARD GAMES (from <http://www.capousd.org/gwes/finn/math.html>)

Play any board game where you could roll dice to determine the number of spaces to move. This will reinforce the addition facts to 12. If the game would be completed too quickly by moving the higher sums of 10, 11, and 12, just move the number in the ones place when you roll a number over 10. For example; if 6 and 6 is rolled, just move 2 spaces because the 2 is in the ones place.

Variation: If your child is comfortable adding multiple addends, use 3 dice, add the three numbers together and move the number of spaces in the ones place. For example, if 7, 5 and 6 are rolled, just move 8 spaces because the 8 is in the one's place.

It is interesting, informative and diagnostic to observe the method your child uses to add the 3 addends. Does he/she group in tens or add the doubles first or count by ones using the dots on the dice? Watch and explore his/her strategies.

Addition/Subtraction Games

CONCENTRATION (from <http://www.capousd.org/gwes/finn/math.html>)

Two or more people can play, "Concentration." The object of the game is to find pairs of matching cards among an array of face down cards. Help your child write addition or subtraction facts (e.g., $9+6$ or $7-5$) on one set of index cards and the answers (e.g. 15 or 2) on another set. Use a limited number of cards to start with, maybe 8 pairs, and slowly increase the number when your child seems ready for more.

Shuffle the cards and lay them out face down. The first player turns over two cards, if they match, the player keeps the two cards and takes another turn. If the two cards are different, the cards must be placed back in their same positions face down. The next player takes a turn trying to find two matching cards. As the game progresses, players must concentrate and try to remember where the different numbered cards are located. When all the cards have been collected, the person with the most pairs wins.

DICE (from <http://www.capousd.org/gwes/finn/math.html>)

For the following games, You will need 2, 3 or 4 dice and one score sheet. Tally to so many rolls or to a preset score like 50 or 100 points.

- Add sum of two dice, greatest or least wins.
- Add sum of three or four dice, greatest sum wins.
- Roll three dice, (3 colored, 1 white), subtract the number on the white dice from the sum of the colored dice, greatest sum wins.

Addition, Subtraction

For the following games, you will need one score sheet to keep track of wins. In addition, each player will need a pencil and a sheet of paper for calculating.

- add the sums of each roll to the total from previous rolls, first person to reach 50 or 100 wins
- subtract from 100, person closest to 0 wins

Tally to so many games or so many points; or play until someone rolls a double six, then use a calculator to get individual scores. The player with the greatest sum wins.

UP TO A HUNDRED (from <http://www.capousd.org/gwes/finn/math.html>)

Players: 2 or more

This is an addition game, and is great fun for the mathematically inclined. It would be a great game to remember while you are waiting for the food to arrive at a restaurant or your turn at the dentist's office. All you need is paper and pencil.

1. The first player writes down any number from one to nine.
2. The next player adds any other number from one to nine and writes the sum underneath the first number.
3. The players continue like this, each person adding any number from one to nine. The object of the game is to be the person whose final addition brings the sum to exactly 100.
4. This is harder than it sounds. You are trying to be the first person to bring it up to 100, and you are also trying to keep all the other players from finishing before you do. (Easier version: use a hundred's chart to add the numbers.)

5. Variations: Try playing it in reverse - subtract one-digit numbers from 100, the first player to reach zero is the winner. You could also try with numbers between one and 20 to reach a final sum of 517 or 739, or whatever. For these variations, a calculator may be used.

Subtraction Games

Pay the Difference (from <http://www.capousd.org/gwes/finn/math.html>)

Number or players: two

Pay the Difference: Play this game many times. It gives students practice with a valuable math concept. What's the difference between 8 and 13? What is $13 - 8$? How much greater is 13 than 8? If it is 4:30 p.m. now, how many hours will pass before it is 10:30 p.m.?

Materials: Deck of cards (jokers removed), chips, pennies, tokens or small squares of paper cut up. The Ace equals 1, the King equals 13, the Queen equals 12 and the Jack equals 11.

Directions: Each player begins the game with 30 or more chips, pennies or other types of markers. The deck of cards is placed between the players. Each turns over a card from the top of the deck. The one with the low number must "pay" the difference between his/her number and the opponent's number.

Winning: The round is over when one player wins all of the other player's tokens. Play several rounds. You should establish the winner before you start the game. For example; the first person to win five rounds, or the person who wins the most rounds out of six. It would depend on the amount of time you have to play.

Note: If your child is having difficulty, he/she may use a number line (1 2 3 4 5 etc.), a 12 inch ruler, or similar device. In order to establish how many numbers in between, your child would mark the lower number with a finger and count up to the higher number.

**Since the playing deck would be limited to 13, you could make up your own number cards using index cards. On the index cards, include numbers up to 18 so your child can practice subtraction facts through 18. For example, the difference between 15 and 9, 17 and 8, 16 and 7. The rest of the game would be played the same, except each player may need to start the game with more than 30 chips or tokens.

Be creative and add variables to the game to make it more interesting after you have played the original game several times.