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 -- Mini-Lessons / Games

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) -- Mini-Lessons / Games

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 -- Mini-Lessons / Games

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 -- Mini-Lessons / Games

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) -- Mini-Lessons / Games

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 -- Mini-Lessons / Games

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 -- Mini-Lessons / Games

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 -- Mini-Lessons / Games

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 -- Mini-Lessons / Games

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

Emergent & Goal 1 – Counting & Facts to Five -- Mini-Lessons

Using Tens Frames to Build the Basic Facts of Five

Math Skills: Build addition facts of five (and then ten) using a ten-frames. (Note: students need to be secure in combining sets up to five (and then ten) using concrete objects, then counting all to ascertain the total number.)

Materials: Counters and ten-frames

Source: www.nzmaths.co.nz

Directions:

1. Teacher shows tens frame with three counters on it and says
   I have three teddies on my bus. Two more are waiting at the bus stop. Let's put the teddies on to the bus and see how many we have.
2. Teacher puts two counters on to the tens frame and teacher and students count together.
3. Repeat using a different story for 3+2
4. Teacher gives each child a blank tens frame and 2 different colour counters
5. Children make up their own number stories about 3+2

Optional
Teacher records on a chart once the sets have been combined for two or three examples.
3 and 2 is the same as 5
The notation *2+3=5* may be brought in after several days' work on joining sets

Note: Students may find it difficult to create story contexts for given number sentences and may need to focus on this for some time to master it.

Additional Activities: The following list of activities could form the basis for further development of the facts of five using tens frames.

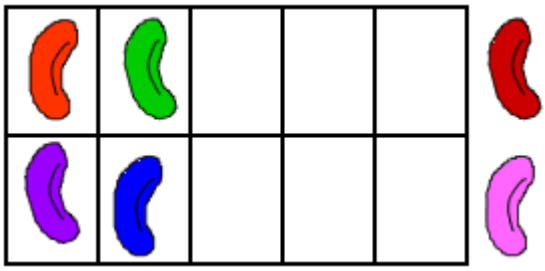
- Repeat above teaching sequence with facts to ten, once facts to five are secure.
- Children work in pairs to complete different number stories for 3+2
- Compare the two ways of recording this addition: 3+2 and 2+3

Broadening Activities

- Teacher poses a problem involving a difference to the children. For example, 3 teddies were on the bus, and some of their friends got on. If there are 5 on the bus now, how many friends got on?
- Children make up a number story and show it on the tens frame. They get others to solve it and write the number sentence.

Jumping Beans

Math Skills: Visualize numbers up to ten using ten frames
.Materials: Tens-frames; beans or multi-link cubes
Source: www.nzmaths.co.nz



Directions:

1. *How many beans are in the ten frame? (4)*
   How many beans are outside? (2)
   Now imagine the beans jumping in.
   How many beans are there altogether?
   How did you solve this?
2. At this point let the children move the counters to display 6 on the ten frame.
3. Repeat this with other number combinations. As an aim of the activity is to encourage children to visualize or image numbers don't move the beans inside the frame except to verify responses. Encourage the children to know the numbers by seeing them.

Emergent & Goal 1 – Counting & Facts to Five -- Games

Blast Off in 5

Math Skills: Game context to develop recognition of 5 frame patterns and groups to 5.
Materials: Blast Off Rocket ; 5 Frame cards ; Blast Off backing for five frame cards ; Counters
Source: www.nzmaths.co.nz

Directions:

1. Players are dealt 5 cards each.
2. Taking turns, players try to find 2 cards in their hand that have 5 black dots in total.
3. If the player has 2 cards that add to 5 they put the cards down and cover one of the 5's on their rocket with a counter.
4. Only one number may be covered in a turn.
5. If a player can not make a 5 they must pick up a card.
6. If the player is left with 1 or no cards in their hand after their turn they may pick up a card(s) so they have 2 cards.
7. The first person to fill up their Blast Off rocket is the winner!

Party Time

Number, Level 1

Purpose of the activity

This activity provides students with a fun, game context in which to develop recognition of 5 frame patterns

Specific Learning Outcomes

- develop recognition of 5 frame patterns.

Number Framework

Count All

Resources

- Party Time gameboard
- 5 Frame cards
- Party Time backing for five frame cards
- Counters

Activity

1. Players take turns to turn over a card from the pile.
2. They work out either

   - how many black dots on the card
   - how many more black dots to fill the card.

3. If the number of black dots matches a number on their Party Time Board, the player covers the number with a counter.
4. If a player already has the number covered they must miss that turn.
5. Only one counter is played at each turn

The first person to fill up their Party Time card is the winner!

(Home)

Goal 2 – With 5s (part 1) -- Mini-Lessons

Using the Slavonic Abacus to Reinforce Five Grouping

Math Skills: Practice "With 5s"
Materials: Slavonic abacus
Source: www.nzmaths.co.nz

Directions: Push over a small number of beads, for example, six, and ask .How many beads did I just push over?. and .How did you know it was six without counting the beads?. Aim for responses like .I know that one more than five is six.. Alternatively, start by pushing across five beads and ask .How many more to make nine?. Follow up by asking .How did you know?.

Fly Flips (see additive equipment animation http://www.nzmaths.co.nz/Numeracy/Animations/animations.aspx

Math Skills: Identify combinations of numbers which sum to 10
Materials: Fly Flip cards (see attached)
Source: Adapted from www.nzmaths.co.nz

Directions: This card has a total of five flies on it. How many flies will it have on the back? (answer: 0). … This card has a total of eight flies on it. How many flies will it have on the back? (answer: 3). …

Using Tens Frames to Visualize With 5s

Math Skills: Develop instant recognition of the quinary pattern of the numbers 5-10. This knowledge is important for building facts to ten; count from one by imaging; recognizing and describing patterns to ten on pre-made cards
Materials: Tens frame flashcards for the numbers 5-10. (2 sets on different color card ideal -- see attached)
Source: Adapted from www.nzmaths.co.nz
Directions: This card has a total of five flies on it. How many flies will it have on the back? (0). … This card has a total of eight flies on it. How many flies will it have on the back? (3).

1. Teacher holds up one card at a time and asks "How many dots are there? How do you know?" [E.g. for seven "There's five and two more"] Children chorus back the number of dots and then the teacher goes around the group asking for individual responses.
2. Teacher changes the focus to quick recognition of the patterns, and repeats the above asking "How many dots are there?"
3. Repeat above asking "How many gaps are there?"
4. Repeat above asking "How many more do we need to get ten?"
5. Initially, teacher also asks "How do you know?"
6. Teacher holds up cards one at a time and says: "I'm looking at seven [for example], what do I see?"

Broadening Activities - Teacher spreads two sets of cards out face up. Students find two cards of different colors that "match". This can evolve into a memory game with the cards face down.

Addition Flash Cards

Math Skills: To connect each single-digit addition fact to the other 11 variations.
Materials: Flash cards (see below or go to http://www.nzmaths.co.nz/Numeracy/2004matmas/MM%204-29,%20AddSub%20Flash%20Cards.pdf)
Source: Adapted from www.nzmaths.co.nz
Directions: Show the students a flash card. For example, the card shows 3, 9, and 6. Practice all 12 combinations of every basic fact. Ask problems like: 5 + 1, 6 - 5, 6 - 3, 5 + __ = 6. The complete list of 12 questions needed for each card is like this:

1 + 5 = ____	____ + 5 = 6	1 + ____ = 6
5 + 1 = ____	____ + 1 = 6	5 + ____ = 6
6 – 5 = ____	____ - 5 = 1	6 - ____ = 1
6 – 1 = ____	____ - 1 = 5	6 - ____ = 5

5 6 1	5 7 2	5 8 3
5 9 4	5 10 5	5 5 0

(Home)

Goal 2 – With 5s (part 1) -- Games

The Lego Game – This game can be played with 2 or more people

Math Skills: Practice "With 5s" (part 1)
Materials: 2 dice or number cubes and a set of 20 or more Lego pieces
Source: www.ellipsismath.com

Directions: Place one die in the center of the table with the 5 facing up. Each play 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 student 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.

Target Practice

Math Skills: Practice "With 5s" (part 1)
Materials: 2 bean bags and a floor template similar to the one below
Source: www.nzmaths.co.nz

Directions:

1. Toss two bean bags at the target (on the floor).
2. Determine the score.
3. Once children are familiar with the task, give them the score and ask them to calculate where the bean bags may have landed.

   For example
   What two number would you need to hit to achieve a score of 8?
   How many other ways could you throw to achieve that score?
   What is the highest score you could achieve using this score board?
   What score could you get in only one way

2	0
3	5
4	1
5	

(Home)

Goal 3 – Within 10s -- Mini-Lessons

Using the Slavonic Abacus to Develop "With Tens"

Math Skills: Practice "Within 10s"
Materials: Slavonic abacus
Source: www.nzmaths.co.nz

Directions: Begin by asking students to make various combinations of ten on different rows of the abacus. Ask students if they can find a way to make the combinations with a pattern (they may need help to develop the stair-step pattern with 10+0, 9+1, 8+2, 7+3, … on the abacus.

Push over a small number of beads, for example, six, and ask .How many beads did I just push over?. and .How did you know it was six without counting the beads?. Aim for responses like .I know that one more than five is six.. Alternatively, start by pushing across five beads and ask .How many more to make ten?. Follow up by asking .How did you know?.

Push across a small number of beads and ask how many more are needed to make 10. This is reinforcing the key knowledge of pairs of numbers that add up to 10.

Tens Frames Again

Math Skills: Learning to recall instantly pairs of numbers that add to 10 and their related subtraction facts.
Materials: Ten frame cards (Material Master 4.6)
Source: www.nzmaths.co.nz

Directions: Check that the students can identify the number of dots on any tens frame card instantly without counting. Then focus their attention on the empty spaces so they realise that the dots plus the spaces equal 10. Practice all the combinations that make 10.

For subtraction, take a card with 10 dots on it and ask the students to imagine removing some dots. For example, for 10 minus 4 the students image four dots removed and see that there are six dots left. Check this by covering four dots. This leaves six dots exposed.

Practice all 12 combinations of every basic fact. For example the basic fact 3 + 7 = 10 is linked to all these problems:

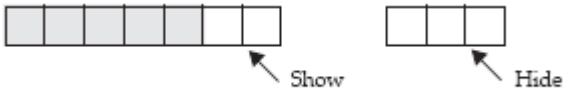
3 + 7 = □	□ + 7 = 10	3 + □ = 10	7 + 3 = □
□ + 3 = 10	7 + □ = 10	10 - 7 = □	□ - 7 = 3
10 .- □ = 3	10 - 3 = □	□ - 3 = 7	10 - □ = 7

Patterns to 10

Math Skills: Learning to recall instantly pairs of numbers that add to 10 and their related subtraction facts.
Materials: Stacks of 10 cubes made up of five cubes of each colour
Source: www.nzmaths.co.nz

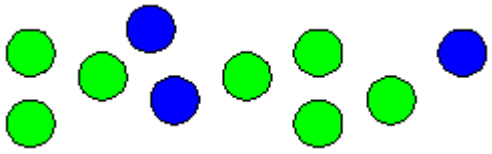
Directions: Group the students in pairs or small groups each with a stack of 10 cubes. Without the others seeing, a student takes some cubes from the stack. They show the other students the remaining cubes and ask the students to say how many cubes were taken.

Show Hide
The problem is made more difficult if cubes are removed from both ends of the stack.



Buttons to Ten

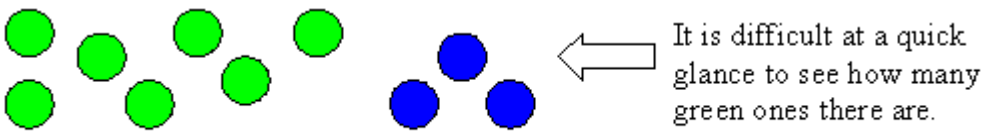
Math Skills: Explore all the combinations to ten. These are necessary facts to come to know as they are used as a base to derive other facts from. For example 8 + 4 = . I know 8 + 2 = 10 there's 2 more so it's 12.
Materials: Beans, buttons or counters that are one color on one side and a different color on the reverse

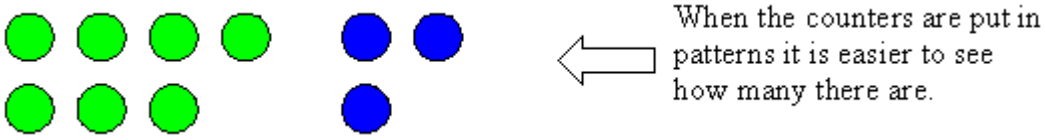


Source: www.nzmaths.co.nz

Directions:

1. Put children into pairs or small groups of 3 or 4. Each group of children will need a set of ten counters coloured different colours on each side.
2. Children can take turns to either shake the counters in their hands, or shake them in a small container and empty them onto the floor in front of them.
3. Children are encouraged to sort the counters into groups of the colour they landed on. Discuss how the separate colours can be sorted so that the pattern is easier to read. For example





4. Children can record the number sentence on a piece of paper.

Buttons and Frames

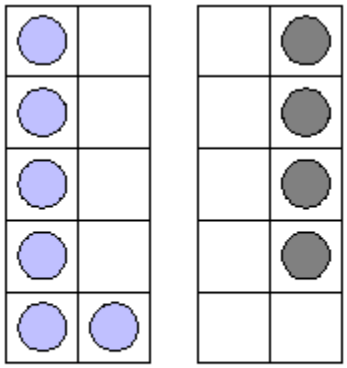
Math Skills: Know the combinations to 10

Materials: Ten frames with dot patterns for 0-10; beans, buttons or counters that are one colour on one side and a different colour on the reverse

Source: www.nzmaths.co.nz

Directions:

1. Flash a ten frame at the children and then hide it. Ask children;
   How many dots did you see?
   How many more would you need to make 10? or
   How many gaps are there?
2. Check by showing the children the ten frame again. Flash a different one. This is to encourage children to image these patterns in their head without having to count the individual dots.
3. Put children into pairs or small groups of 3 or 4. Each group of children will need a set of ten counters coloured different colours on each side and two blank ten frames.
4. Children can take turns to shake the counters and empty them onto the floor in front of them. The counters are then sorted into the 2 colours and placed on the 2 ten frames.



$$6 + 4 = 10$$

5. Children can record the number sentence on a piece of paper.

Animal Strips 3 (see equipment animation at http://www.nzmaths.co.nz/Numeracy/Animations/animations.aspx and master at http://www.nzmaths.co.nz/Numeracy/2004matmas/MM%205-2,%20Animal%20Strips.pdf)

Using Tens Frames to Build the Addition and Subtraction Facts to Ten

Math Skills: Consolidate the addition and subtraction facts to ten.
Materials: Ten frames with dot patterns for the numbers 0 to 10
Source: www.nzmaths.co.nz

A: Focus on Addition:

1. Teacher holds up a tens frame and asks
   Tell me the number pattern?
   How many gaps are there?
   Teacher then states the appropriate number sentence e.g. 6 and 4 is 10.
2. Repeat several times with all cards to build facts to ten.
3. Teacher holds up a tens frame and asks
   Who can tell me the number sentence for this card?
4. Repeat several times, ensuring that all cards (0-10) have been covered up to this point.
5. Teacher models the recording of the number sentences as “6 and 4 is ten”, then “6+4=10”

B: Focus on Subtraction

1. Teacher explains to students that today
   We are using the cards to work on take-away equations starting with ten.
2. Teacher holds up a tens frame and asks
   How many dots could I fit on this frame?
   How many have gone?
   How many are left?
   Who can give me a number sentence for this card?
3. If necessary the teacher gives the appropriate number sentence e.g. 10 take away 6 is 4
4. Repeat several times with all cards to build facts to ten.
5. Teacher gives the number sentence and asks the children to find the appropriate card. For example:
   I had ten dots and I took away 6, how many do I have left? Can you find the card for that? How many are left?
6. Teacher models the recording of the number sentences as “10 take away 6 is 4”, then “10-6=4”

Broadening activities:

- Teacher demonstrates that the facts can be placed in a pattern i.e. 0 + 10 = 10, 1 + 9 = 10, 2 + 8 =10. After the teacher has given some of the pattern students can work independently to find the rest.
- Teacher gives students the number sentence and they find the matching dot pattern.

Independent Activities

- Students make their own dot patterns using blank tens frames and counters. They record these using + /or - and =. (Two sided counters ideal for this activity.)
- Students work on sheets of empty tens frames to fill in dots and record the corresponding number sentence.
- Given one card students record either two complimentary number sentences or the entire family of facts.
- Students match tens frames to appropriate number sentence on cards

Notes: There are many ways to record the work being done and what is appropriate depends on the children in the group. Options include: a) Teacher records; b) Draw a picture; c) Number story e.g. 3 and 4 make 7; d) Number sentence or equation e.g. 3 + 4 = 7; e) Use pre-made equations and match these to the appropriate card

(Home)

Goal 3 – Within 10s -- Games

Go Fish 10

Number, Level 1

Purpose of the activity

This activity encourages children to learn the addition facts of ten.

Relevant Achievement Objectives

- Model and explain addition calculations with a sum of up to 20

Specific Learning Outcomes

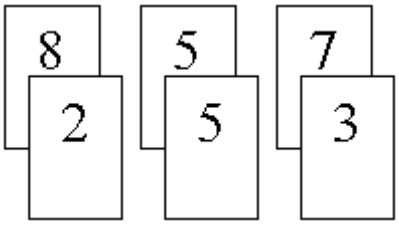
- Identify the addition facts for ten

Resources

- Six sets of numeral cards 1 to 9.

Activity

1. This activity is based on the card game Go Fish and is played in groups of 2 to 4.
2. Shuffle and then deal out all the cards to the players.
3. The children look through their cards and make pairs of cards that sum to 10. These pairs are placed front up in front of each child.
4. The children take turns asking one another for a card that they can use to make 10 with a card in their hand.
5. If the child asked has the card they must give it up.
6. The child keeps asking until they are told that they don't have a card.
7. The aim of the activity is to get the most pairs that sum to 10.



Pyramid Solitaire

Math Skills:

- Identify combinations of numbers which sum to 10
- Problem solving

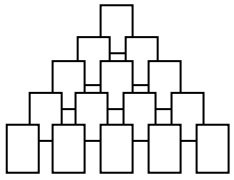
Materials:

- 3 or 4 sets of 0-9 cards or 1-10 cards or ten-frame dot cards

Directions: Place 15 cards face up in 5 rows in a pyramid formation with 1 card in the first row, covered by 2 cards in the second row, etc. with the 5 cards in the 5^{th} row on top. The remaining cards are placed face down in an undealt pile to be drawn later. The object of the game is to remove as many cards as possible from the pyramid. You can only remove cards that are not covered by any other card in the pyramid. You can only remove a pair of cards that add to ten or one card with a value of ten. Begin by moving, to a tens pile, any tens or sums of ten that are uncovered. Next turn over the top card from the extra pile. If it is a ten or if it can be matched with any uncovered card to form a ten, move them to the tens pile. If you cannot use the top card, place it face up in a discard pile.

Keep turning over the top card from the undealt pile, moving tens or sums of ten to the tens pile. You may match cards from the pyramid, from the undealt pile, and from the top of the discard pile. When you have gone through all of the cards from the undealt pile, go through those in the discard pile again. The game is over when you have used up all of the extra cards or removed all cards from the pyramid.

Source: Adapted from Polonsky et al. (from www.successlink.org/great/g503.html)



Goal 4 – With 10s -- Mini-Lessons

Using Tens Frames for "Teen" Numbers

Algebra, Level 6

Overview of the unit

The purpose of this unit is to recognise and understand teen numbers. This is an essential piece of knowledge for the part-whole strategy of bridging to ten.

Stage

Advanced Counting (Counting-On) – Knowledge Building

Pre-requisite knowledge / skills: form addition facts to ten using dot patterns on a quinary frame

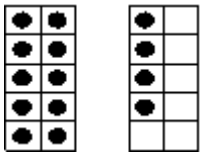
Learning Outcome

- recognise and understand "teen" numbers, 11-20.

Resources

- Quinary tens frames with dot patterns for the numbers 0-10

Sequence



Teacher hold up a full tens frame and asks
How many have I got?

- Teacher holds up another card, alongside the full tens frame, and asks

How many have I got now?

- Repeat several times ensuring that the numbers 11 – 20 have been covered.
- Teacher repeats above but this time shows the students the full tens frame has been turned over so the dots are not visible.
- Teacher models 11 on the tens frame.

Let's look at the number 11. How would we write that?
Records: 10 + 1 = 11 then works through 10 + 2 = 12, 10 + 3 = 13 etc similarly to show the pattern.

- Teacher asks students to solve problems such as 10 + 4, 10 + 9 with a focus on quick recall.

Extension Activities

Teacher models one of the teen numbers on a tens frame. Students record the written form "15" while one child uses the expanded numeral cards to record the number. Once the recording is finished teacher asks:
What does the 1 mean? [1 group of ten]
What does the 5 mean? [5 ones]

Teacher adds further blank tens frames to the model, for example 21: two tens and a 1.

Note: the context of a train with one full carriage and one partly full carriage can be used in this teaching sequence.

(Home)

Goal 4 – With 10s -- Games

(Home)

Goal 5 – With 5s (part 2) -- Mini-Lessons

Make a Ten

Number, Level 2

Over-view of the unit

This unit follows naturally from the **Smart Doubling** unit.
In this unit children are encouraged to further develop part/whole mental methods by using the strategy of "make a ten".

Relevant Achievement Objectives

Number, Level 2

- mentally perform calculations involving addition and subtraction

Specific Learning Outcomes

- have automatic recall of all pairs of single digit addition facts whose total is 10 or less
- learn to use the mental strategy "make a ten" for addition problem
- learning how to use the most efficient mental strategy for a given problem.

A description of the mathematics explored in the unit

In this unit children are encouraged to add to their use of part/whole with doubles by using "make a ten" methods.

Examples of "part/whole" methods using make a ten:

The children work out 8 + 5 by removing 2 from the 5 to leave 3, add this 2 to the 8 to make 10 then add the 3 to the 10 to give 13.

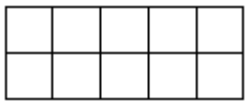
The children work out 38 + 8 by removing 2 from the 8 to leave 6, add the 2 to the 38 to give 40, then add 6 to the 40 to give 46.

It is desirable for children to move to part/whole methods as counting methods fail for larger numbers. For example, a child who attempts to work out 36 + 46 by counting on will soon lose their way, whereas the part/whole thinker could solve this by adding 30 and 40 to give 70, then add 6 and 6 to get 12 then add 12 to 60 to get 72.

Children who have successfully understood the part/whole methods in the Smart Doubling unit will have little trouble learning the Make a Ten part/whole strategy. Teachers should expect those children who failed to make the part/whole connections with doubles to also struggle with this unit. It may be best not to introduce this unit until the children understand the doubling strategy.

Resources

- Sets of counters
- Empty tens frames with squares large enough to contain counters



- Ten different tens frames with dots pre-printed on them.

Teaching Sequence

Getting Started

1. Check the children's knowledge of the addition facts that add to ten facts before starting. This unit builds on the children's knowledge of the known facts of ten, i.e., 1 + 9 = 10, 2 + 8 = 10, 3 + 7 = 10, 4 + 6 = 10, 5 + 5 etc.
2. Also check that the children understand the " teen" numbers. For example, show the children a ten and a four on tens frame as shown. They should respond that 10 + 4 is 14 without needing to count-on by ones

3. Pose an addition problem where one of the numbers is just under 10:
   Bill has 6 pink sweets and 9 yellow sweets. How many sweets does he have altogether?
   Ask the children to model this with counters on tens frames.

4. Ask the children to think about ways that they could make this problem quick (or easy) to solve. Encourage the children to think of ways that do not involve counting on by ones.

For example, Bill moves a pink sweet to the yellow sweets. Now ten and five is shown.

It is important to discuss the fact that the answer to 6 + 9 is the same as the answer to 5 + 10. Without this realisation children will not be able to make progress into mental number processes.

(Note: Although the problem can of course be correctly solved by counting-on the aim of the lesson is to encourage the development of part/whole mental strategies.)

Exploring

Over the next 3-4 days the children are encouraged to use "Make to ten" strategies for solving number story problems.

1. Make up number stories for 9 + 7, 5 + 8, 9 + 8, 7 + 6. Children use counters on empty tens frames and use the technique of filling one of the frames up to show ten counters.
2. Children now use the pre-printed tens frames.
   Moana has 7 oranges sweets and 9 apples. How many apples does she have altogether?
   Ask the children to show 7 + 9with a pre-printed 9 card and a pre-printed 7 card. Children imagine moving 1 out of the 7 to leave 6, and adding 1 to the 9 to create 10. This action of imagining pushes the child towards understanding the movement of numbers around within a problem as a key to mental processing.
3. Only you, as the teacher, have the pre-printed tens frames. Hold the cards so that only you can see the dots and the children have to imagine what you are seeing. Prior to giving the children addition problems ask the children to first imagine single numbers.
   I can see the 8 card. What does it look like?
   Some children will see the 5 + 3, others will "see" the two spaces.
4. Next pose addition problems, which encourage the children to imagine the tens frames that only you can see. For example:
   I can see 8+ 6. How could I move the dots to work that out 8+6?

5. The next step in the progression involves **no** materials. The children imagine the tens frames to move around dots as they solve problems:
   8 + 5, 3 + 9, 8 + 9.
6. Link the doubles to the Make a Ten strategy.

Ask the children to consider all the ways they know to work out 8 + 9. The range of likely responses is:

- Double 8 + 1 = 16 + 1 = 17
- Double 9 – 1 = 18 – 1 = 17
- Double 10 – 1 – 2 = 20 – 1 – 2 = 19 – 2 = 17 (Rarely used)
- 10 + 8 = 18 but this is 1 too many so the answer is 17
- Remove 1 from the 8 and add 1 to the 9 and to give 7 + 10 which is 17
- Add 2 to the 8 and remove 2 from the 9 and to give 10 + 7 which is 17

Children work out and discuss the variety of strategies to work out: 6 + 8, 9 + 7, 6 + 9

7. Attention now turns to using Make a Ten strategies to solve subtraction problems. Subtraction problems with the first number in the teen decade are given.
   Michael has 13 sweets and he eats 5 of them sweets. How many sweets does Michael now have now?

Children model 13 on pre-printed ten frames.

Two equally good methods are likely.
EITHER remove the 3 to leave the 10 then remove a further 2 to leave 8.
OR remove 5 from the 10 to leave 5 and add the 3 to give 8.

8. Children use pre-printed tens frames to solve number stories for subtraction problems. Use: 14 - 6, 17 - 8, 12 - 8, 17 - 5, 13 - 5, 13 - 7, 14 - 3.

Notice the presence of subtractions like 17 - 5. They are prevent the mindset that may develop that make a ten is always appropriate. In fact, in this example, breaking the ten is not necessary because 7 - 5 = 2 and add the 10 back in gives 12.

9. Takeaways by adding.
   Charlotte thinks of a way to work out 13 - 9 by adding. She asks "9 and what makes 13?" and comes up with the answer 4.

Ask the children how they think Charlotte does this. (She has gone 9 + 1= 10, she remembers the 1, she goes 10 + 3 = 13 and adds the 1 to the 3 to get 4.)

10. Uses Charlotte's addition method to work out these:
    12 – 9, 14 – 8, 17 – 14, 16 - 7
11. Choosing the best way:
    Use either an addition and a subtraction way to work these:
    13 - 9, 13 - 4, 17 - 15, 17 - 2, 19 - 17 , 12 – 8.

Reflecting

At the end of each session encourage the children to share and discuss answers as a group or class.

Homelinks

Worksheet on make a Ten goes home.

Number Lines and Bead Strings

Number, Level 2

Overview

In this unit five-based bead strings and number lines are used to solve addition and subtraction problems. The aim is to get children that use a 'count on' or 'count back by ones' strategy to solve problems by making up to 10 and on through the 'ty' numbers

Relevant Achievement Objectives

- write and solve story problems which involve whole numbers, using addition, subtraction and multiplication
- mentally perform calculations involving addition and subtraction

Learning Outcomes

The children will be able to

- solve addition problems like 8 + 4 = by going 8 + 2 = 10, 10 + 2 (more) = 12
- solve subtraction problems like 14 – 6 by going 14 – 4 = 10, 10 – 2 (more) = 8

Learning Objects

New Zealand teachers can access a collection of online learning objects in the Digistore. This includes learning objects focused on number operations. Of particular relevance to this unit are the learning objects called The difference bar: make your own easy subtractions, The takeaway bar: make your own easy subtractions and The number partner as the concepts explored are similar. The Digistore also includes other learning objects in this series that you may like to look at. For information about using the Digistore click here.

A description of the mathematics explored in the unit

There are several things happening in this unit. All of them are aimed at enabling children to become more fluent in number.

The students need to realise that making numbers up to 10 is a good intermediate strategy for solving addition problems. This strategy is reinforced by the use of bead strings and the number line. So the children have to realise the significance of these devices and their relevance for addition and subtraction work.

It is important that the children gradually learn to work without the bead strings and number line, so they are encouraged to 'image' these objects. Instead of actually using the devices they should start to think about what is happening in their heads. The next stage is for these things to become automatic. This may take a reasonable amount of practice for some children.

In the process, children are exposed to problems in context and finally they are given examples of their own to work on.

This unit is important at least two ways in later work in mathematics in school, tertiary studies and even life itself. First, number is at the base of a large percentage of mathematics so it is important to be fluent in addition and subtraction and to have strategies for carrying out these processes. (As we say elsewhere, the best preparation for algebra is a good grounding in number.)

Second, devices like the number line are not just useful to understand about addition and subtraction. Number lines are used extensively in co-ordinate geometry where two perpendicular number lines are used as axes. In this situation they enable us to visualise quite complicated functions.

So even at this early stage in school, students are developing skills that will be useful throughout their school life as well as ideas that will grow into powerful and deep mathematics.

Resources

- number line 1 - 20 (Copymaster 1)
- bead string 1 - 20; (Copymaster 2)
- number line 1 - 100 (Copymaster 3)
- bead string 1 - 100
- pegs
- problem cards – (Copymaster 4)

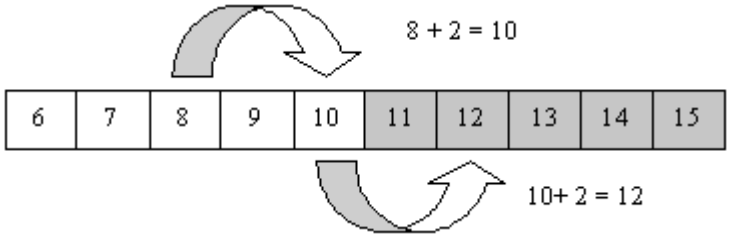
Teaching sequence

Note the following useful prior knowledge:

Children can recall 10 and facts relating to 10, e.g. 10 + 6 = 16, 10 + 8 = 18.
Children have had experience with making the combinations to 10 and recalling facts to 10.

Session 1

1. Begin the session by reminding the class what a number line is. Then pose the following problem.
   Sally the snail starts on number 8 and slides along 4 more spaces. Where does she end up?
2. Ask a child to come forward and place a peg on the number line where Sally started.
   How can we find out where Sally will end up without counting?
   How many spaces will Sally need to go to get to number 10?
   Now how many spaces has she got left to go?



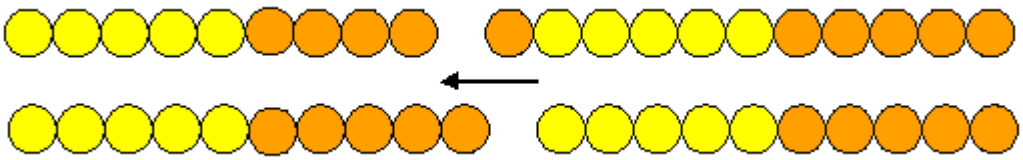
3. Ask similar types of problems such as;
   Sally the snail is on number 9 and slides another 4 places, where will she end up?
   Scott the snail is on number 13 and slides backwards 5 spaces. Where does he end up?
   Have the children predict where they think they will end up before getting children to come out and share their strategies on the number line.
4. Now increase the size of the starting number. For example:
   Sally has been sliding for some time now. She is on number 27 and slides another 5 spaces. Where do you think she will end up?
   Ask children to talk to their partner and discuss how they would work the problem out.
   Challenge children to see if they can solve the problem without counting on, *See if you can solve the problem another way?*
   What is the nice friendly number that Sally is going to pass through?
   How far is it to 30 from 27?
   Now how much further does she have to go?
5. Pose a few more problems that start with a larger number. Continue to model on the number line with pegs. Possible problems are:
   Scott the Snail starts on 49 and slides another 8 spaces. Where does he end up?
   Hadley the Hedgehog starts at number 87 and wanders on another 8. What number does he end up on?
6. Send those children who have got the idea, off with Copymaster 1. Give children the option of remaining on the mat with you to go over some more problems.

Session 2 – Marble Collections

Over the next three days the aim is to slowly remove the number lines and bead strings and encourage children to imagine what would happen on the bead string or bead frame. This is called **imaging.**

Begin by using a bead string 1-20 coloured in 5's like this.

1. Warm up. Build up children's knowledge of the bead string so that they know such things as bead 6 is after the first set of yellow beads. We want children to be able to find these beads without counting each single bead.
   Where is number 8?
   Find number 11.
   Where would number 16 be?
2. Encourage children to explain how they found where each bead was by using groupings, that is by using non-counting strategies. E.g. I knew that 11 was after 10.
3. Now pose some story problems.
   Jim has a marble collection. It starts with 9 marbles. Show me where 9 is on the bead string.
   Jim is on a winning streak and wins 6 more marbles. How many does he have in his collections now?
   Use the bead string to demonstrate putting one marble onto the 9 to make it 10 like this:



   What does that make?
   How many more marbles did he win?

4. Record together on the board:
   9 + 1 = 10; there was 5 left; 10 + 5 = 15.
5. Continue to pose similar problems:
   Kate has 8 marbles and she wins 6 more. How many does she have now?
   Greg has 15 marbles and wins 6 more. How many does he have now?
   Roger has 15 marbles and loses 6. How many does he have left?
6. Give children Copymaster 2. Show them a couple of examples of how you would show your working. Children complete the activity in pairs.

Session 3 – Do and Hide Number line

This session is to use the number line (Copymaster 3) and bead string to solve problems and then the number lines and bead strings are taken away to encourage children to start imaging.

1. *Freda the flea starts on 9 and hops forward 7 more spaces. Where does she end up?*
   Ask a couple of children to take the number line and pegs away and work out the answer. Ask the children remaining to imagine what the others will be doing on the number line.
   The following questions may prompt the children to image the number line.
   Where did the flea start?
   How far does the flea have to go to get to 10?
2. Ask the children who took the number line away to share what they did to solve the problem.
3. Repeat with other problems. The following characters could be used to create similar story problems: Karyn the kangaroo, Greg the grasshopper or Frances the frog.
   Encourage the children to imagine what they would do on either the number line or bead string. Extend some of the problems to numbers beyond 20.
4. The following types of problems will continue to challenge the children further.

Start Unknown ? + 4 = 10	Greg the grasshopper jumps 4 more spaces and ends up on 10. What number did he start on?
Change unknown 3 + ? = 8	Frances the frog starts on 3 and jumps along the number line and ends up on 8. How many spaces did she go?

Session 4 – Problem Solving Bus Stops

In this session, problems are placed on the top of a large sheet of paper. Children move around each bus stop, solving the problem. They record their working on each sheet.

1. Warm up with some whole class problems like the ones that have been shared in the previous sessions. Get children to talk to their neighbour and share how they worked out the answer. Record the different ways children solved the problem by writing it on the board.
2. Place each of the problems from Copymaster 4 on to a large piece of paper. Place the sheets around the room. Children can either rotate around the bus stops in pairs randomly or in a sequence to solve each problem. They are to show their thinking on the large sheet of paper.

Session 5 – Reflection

Use this session to share the solutions children came up with for each of the bus stop problems. Encourage children to act out the problems where appropriate and to remodel their answers on the number lines or bead strings.

Homelink
At home this week we share with our families how to solve problems using number lines.

(Home)

Goal 5 – With 5s (part 2) -- Games

Subtraction Game

Number, Level 2

Purpose of the activity

This game allows students to practice their subtraction skills.

Relevant Achievement Objectives.

- Recall the basic addition and subtraction facts.

Specific Learning Outcomes

- Practice subtraction facts

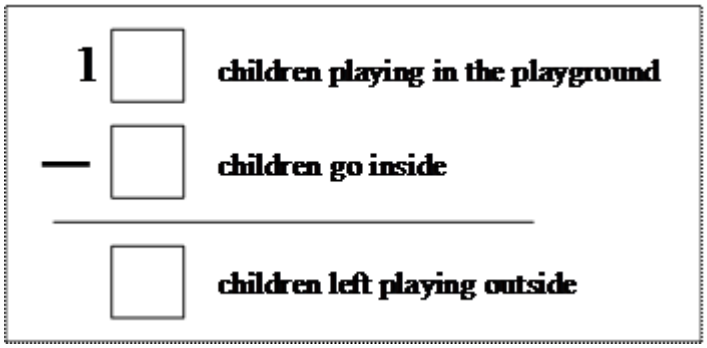
Resources

- 2 dice (if you can find 10-sided dice they are even better)
- Playing board
- Counters

Activity

1. The student rolls the dice and places each into one of the top two squares on the playing board.
2. They then solve the resulting subtraction equation, either using counters, by imaging, or by using known facts.

More playing boards could easily be generated to keep the game interesting.



Goal 6 – Doubles -- Mini-Lessons

(Home)

Goal 6 – Doubles -- Games

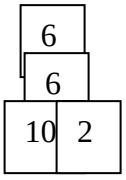
Doubles Solitaire

Math Skills: Doubles Addition

Materials: Thirty-one basic number cards as follows: six 1s, four 2s, two 3s, four 4s, two 5s, four 6s, two 7s, four 8s, two 9s, one 10 (see attached)

Background: Before playing this game for the first time, ask the students to find all the doubles combinations and their sums (e.g., 1, 1, 2; 6, 6, 10, 2). Notice that the sums for 6+6, 7+7, 8+8, and 9+9 use a 10 and the appropriate 1s card (e.g., 8+8's sum will be 10 and 6).

Directions: Shuffle the cards and lay them on the table face up in "fans" of three cards each with the cards face up. There will be one fan with only one card. Only the top card of each fan is available for play. Look at the top cards of each fan and pick up any doubles. Each double should be set up vertically. The sum for each double can be picked up later, but if two cards are needed, they must both be picked up at the same time.



Source: Adapted from Cotter

(Home)

Goal 7 – Under Tens -- Mini-Lessons

(Home)

Goal 7 – Under Tens -- Games

Triple Goal (2 or 3 players)

Math Skills: Mental computation

Materials: 3 dice, a counter for each player, game board (see attached)

Directions: All markers are placed on "START." Players take turns rolling 3 dice. The numbers rolled can be added or subtracted in any order. For example, a 3, 1, and 5 could make 7 (3+5-1), or 9 (5+3+1), or 3 (5+1-3). The player could place her marker on the 7. After the first move, players may move only one space at a time forward, backward, sideward, or diagonally.

Source: Adapted from Kamii (from www.gamesk-5.com/news.htm)

(Home)

Triple Goal Gameboard

GOAL 5	GOAL 4	GOAL 6	GOAL 8
10	0	12	2
6	7	9	6
4	9	4	11
1	3	7	2
6	4	14	4
5	8	2	7
START			

Goal 8 – With 9s -- Mini-Lessons

Number Lines and Bead Strings (see Goal 5)

Using Tens Frames for the Strategy of Bridging to Ten

Number, Level 2

Purpose of the activity

The purpose of this unit is to introduce the part-whole strategy of bridging to ten.

Stage

Early Part Whole

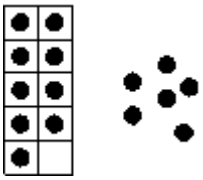
Pre-requisite knowledge / skills: Knowledge and recognition of the quinary patterns, knowledge of the facts to ten and the teen facts.

Learning Outcome

- Bridging to ten to solve number problems

Resources

- Tens frames with 9 fixed dots
- Blank frames
- Counters



Sequence

1. The teacher poses a problem.
   Josh has 9 oranges and 6 apples. How many does he have altogether?
2. Teacher records 9 + 6 on the board.
3. Teacher shows a fixed frame of 9 and asks the students to say where the six more should go without touching the tens frame.
4. Teacher invites a student who answers that the answer is 15 to come and demonstrate how they got the answer.
5. Teacher records the answer on the board.
6. If the students "count-on" teacher encourages them to think about adding one and then five by asking the follow up questions:
   Can we work it out without counting-on?
   Or *Is there a faster way?*
7. Repeat with 9 + 7, 9 + 6 with the students demonstrating using either the teacher's model or individual equipment. Teacher encourages students to explain their thinking.
8. Teacher focuses student attention on the importance of making a ten
   Why do you make a ten?

Note: future lessons could be extended to include 8 + 1̂ and then 18 + 1̂ with the pace depending on the students.

(Home)

Goal 8 – With 9s -- Games

Nine's to One Hundred (2 or more players)

Math Skills: Addition with 9s; visual recognition of tens and parts of ten; part-whole strategies with 9s

Materials: 2 sets of ten-frame playing cards (attached); hundreds chart (with numbers or blank)

Directions: Place one of the 9 cards in the center of the table, face up. Deal out the remaining cards equally among the players. For each turn, each player draws her or his top card, adds it to the 9 in the center of the table, and then announces the problem and the total (e.g., 5 + 9 = 14). The player then moves her or his marker the corresponding number of squares on a hundreds chart. The first player to reach 100 wins.

(Home)

Goal 9 – With 7s and 8s -- Mini-Lessons

Using Tens Frames for the Strategy of Bridging to Ten (see Goal 8)

Use a fixed frame of 8 and follow the rest of the directions for this activity.

The Numbers Get Larger

Number, Level 2

Overview of the unit

This unit follows naturally from the Smart Doubling and Make a Ten units.
In this unit children are encouraged to develop part/whole addition and subtraction mental methods with multi-digit numbers.

Relevant Achievement Objectives

Number, Level 2

- Mentally perform calculations involving addition and subtraction

Specific Learning Outcomes

- Learn to use mental strategies for addition and subtraction problem that use part/whole strategies for multi-digit problems.
- Learning how to use the most efficient mental strategy for a given problem.

A description of the mathematics explored in the unit

In this unit children, are encouraged to extend part/whole methods with small numbers to multi-digit numbers.

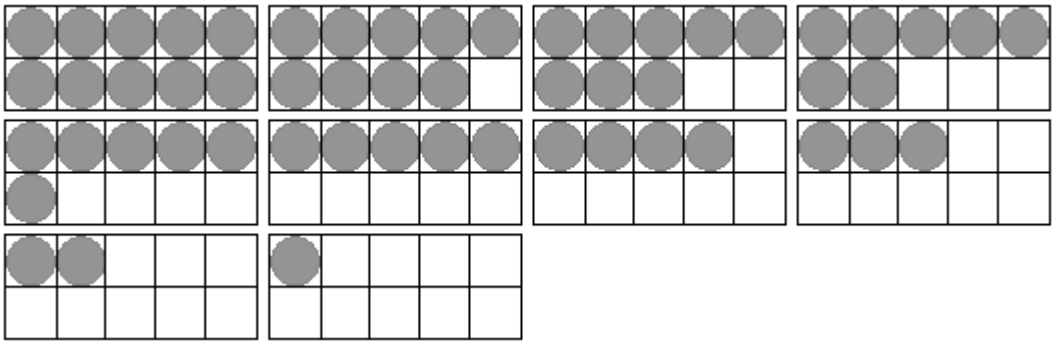
Examples of more advanced "part/whole" methods using make a ten:

- The children work out 38 + 39 by removing 1 from the 38 to leave 37, add this 1 to the 39 to make 40 then add 37 and 40 to give 77.
- The children work out 38 + 39 by 30 + 30 = 60, 8 + 9 = 17, 60 + 17 = 77
- The children work out 38 + 39 by 40 plus 40 = 80 and then remove 2 (to get to 38) and remove a further 1 (to get to 39). So 80 - 2 - 1 = 87 gives the answer.

Children will need to have successfully understood the part/whole methods in the Make a Ten unit before attempting this unit.

Resources

Ten different tens frames with dots pre-printed on them.



Teaching Sequence

Getting Started

In this addition and subtraction unit initially only one of the number is 2 digits or more, while the other number is normally a single digit. This is because the processing load for the children in having both numbers with multi-digit is much higher. When the children have successfully coped with these problems 2 digit plus or minus 2 digit problems can be introduced.

Pose the problem:
Minnie has $8 and her grandmother gives her $19 for her birthday. How much money does Minnie have now?

Children model this on pre-printed tens frames.

Discuss the dots that could be moved to make the addition “easy”. One example is:

(Because pre-printed tens frames are used the dots don’t actually move.)

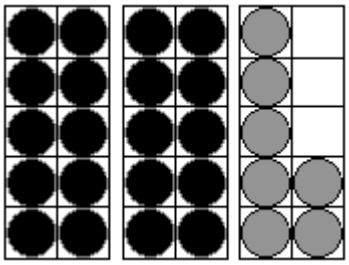
4. Repeat with similar problems, sharing the Make to Ten strategies used.

Exploring

Over the next 3-4 days pose addition and subtraction problems for the children to work on, individually, in pairs or in a small teaching group. Encourage the progression from using pre-printed tens frames to imagining the tens frames and then to completing the problem mentally.

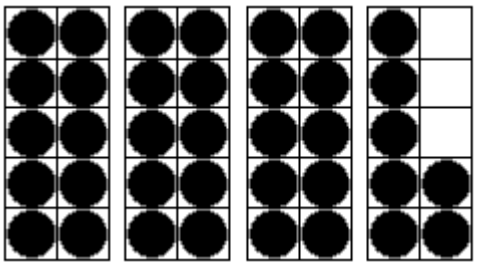
1. Pose the problem:
   Malcolm has $27 and he spends $9 on lunch. How much does he have left? Children model this on pre-printed tens frames.

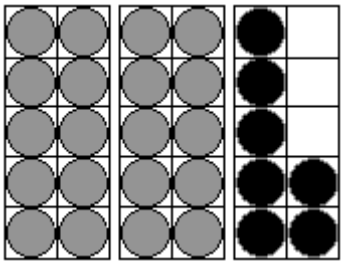
Share solutionsChildren are likely to imagine the 7 is removed leaving 20, then 2 is removed from one of the tens to leave 18. Other methods are possible.



2. Pose the following problems for the children to work on. Give the children pre-printed tens frames to help in their solutions:
   28 + 7, 33 - 6, 24 - 5, 38 - 6, 24 + 9, 33 + 5, 40 - 6
3. Pose the following problems. For these problems encourage the children to imagine the tens frames:
   38 + 6, 23 – 8, 44 – 5, 39 – 9, 9 + 34, 3 + 45, 30 – 9
4. When the children are able to solve problems involving a single and double-digit numbers extend the problems to involve two 2-digits numbers. Have pre-printed tens frames available.

   Pose the problem:
   Betty has 37 Jaffas and 26 wine gums. How many sweets does Betty have altogether?

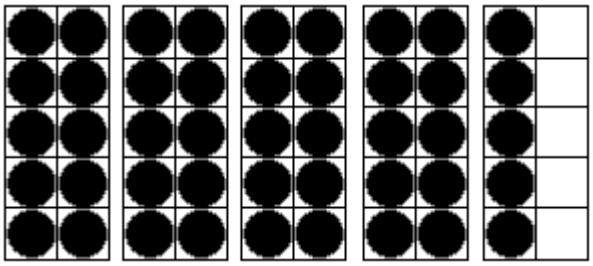




   Discuss the children's ideas for solving the problem.

   - One strategy involves putting the tens together to get 50 sweets and then combining the 7 + 6 to get 13. The 13 is then added to the 50 to get 63.
   - Alternatively they may combine the tens to give 50, then put the 9 with the 50 to give 59, then use previous part/whole thinking to add 3 to the 57 to give 60 then add the remaining 3 to give 63.

5. Pose problems that involve the use of doubles. As with single-digit problems doubling strategies are useful for certain problems. For example:
   24 + 25 (25 + 25 = 50, then subtract 1)
   15 + 16, 35 + 36, 24 + 26, 29 + 3, 97 + 103, 402 + 398
6. Pose the double-digit subtractions problems, for example:
   Bernice has $45. She buys a blouse for $29. How much does she have left?



Discuss the ideas that the children have for solving this problem. Strategies may include:

Monday	28
Tuesday	17
Wednesday	2
Thursday	3
Friday	10

- take away 20 from the 45 to leave 25. Another 9 needs to be removed. Remove the 5 to leave 20 then remove 4 more to give an answer of 16.
- take away 20 from the 45 to leave 25. Another 9 needs to be removed. Remove 9 from a 10 frame to leave 1. There is another 10 and a 5 to add to 1 to give 16.
- take away 30 from the 45 to leave 15. But taking away 30 is 1 too many. So add 1 to 15 to give 16.

7. Pose problems for the children to work on.
   47 – 28, 50 – 27, 100 – 68, 91 – 12, 63 – 23, 42 – 38, 103 – 6, 103 – 98, 81 – 34,
   200 - 188
8. Extras for experts.

In these problems the children are encouraged to add and subtract more than 2 numbers in which there are smart ways to do them. Begin by discussing the following problem:

Harry adds up the number of pies his class order in the week. By pairing up some of the numbers Harry quickly noticed the total pies sold for the week was 60. How did Harry work this answer out so quickly?

(Pairing the 28 with the 2 gives 30. Pairing the 17 with the 3 gives 20: 30 + 20 + 10 = 50.)

9. Molly has $56 when she goes shopping. She buys a hat for $28 and a pair of shoes for $26. To work out how much money she has left over she writes down 56 - 28 - 26. (Write this expression on the board.
   Her friend Kate sees this and almost immediately says Molly has $2 left. How did Molly do this so quickly?

Discuss the children's ideas:

- 56 - 26 = 30, 30 - 28 = 2
- 28 + 26 = 54 (from 27 + 27) and 56-54 =2

10. Ask the children to find "clever" ways to work out the following problems:

198 + 65 + 2	345 - 99 - 245	88 + 45 + 12 + 55
100 - 34 - 66	9 + 456 + 191	7 + 25 + 33 + 25
44 + 17 - 34 - 10		

Reflecting

At the end of each session gather the children together to share strategies.

Homelinks
We send home a worksheet that reinforces mental processes for addition and subtraction problems.

The Part-adder 1

Level 2

Overview of the Unit

This unit uses one of the digital learning objects, the part-adder, to support students as they investigate the addition of whole numbers. It is the first in a series of two units that focus on using this learning object and outlines how it can be used with students working at stage 5 of the Number Framework. The second unit in the series looks at using the learning object with students at stage 6. The unit includes problems and questions that can be used by the teacher when working with a group of students on the learning object, and ideas for independent student work.

Relevant Achievement Objectives

Within a range of meaningful contexts, students should be able to:

- mentally perform calculations involving addition and subtraction;

- make sensible estimates and check the reasonableness of answers.

Specific Learning Outcomes

The children will be able to:

- use mental strategies to solve two digit plus one digit addition problems: using known facts, making tens and compensation;
- describe the mental strategies they are using to solve two digit plus one digit addition problems.

Relevant Stages of the Number Framework

The strategy section of the New Zealand Number Framework consists of a sequence of global stages that students use to solve mental number problems. On this framework students working at different strategy stages use characteristic ways to solve problems. This unit of work and the associated learning object are useful for students in transition between stages 4 and 5 of the Number Framework, moving from Advanced Counting to Early Additive. This transition involves students moving from using counting strategies to solve addition problems to being able to partition and recombine numbers. For example, when adding 8 and 5 students working at stage 4 will count (8...9,10,11,12,13) to get the answer; students working at stage 5 will repartition the numbers to find a solution, for example 8 + 5 = 8 + 2 + 3 = 10 + 3 = 13. The Number Framework also includes a knowledge component which details the knowledge students will need to develop in order to progress through the strategy stages of the framework. This unit draws on students' knowledge of groupings and basic facts; in particular knowledge of the addition facts to 10, doubles facts, the pattern of teen numbers and groupings within 10 and 20.

The Learning Objects

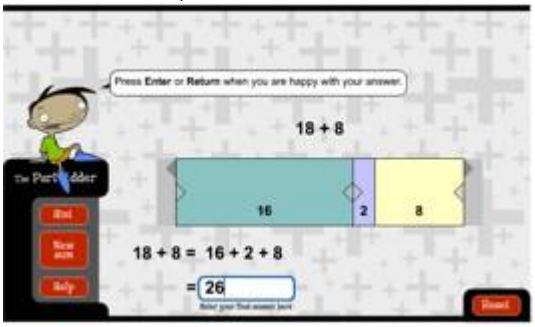
The learning object, the part-adder, can be accessed from the link below, using your school's username and password:

- The part-adder: make your own easy sums

For more information about the learning objects and who can register to use them click here.

Working with the learning object with students

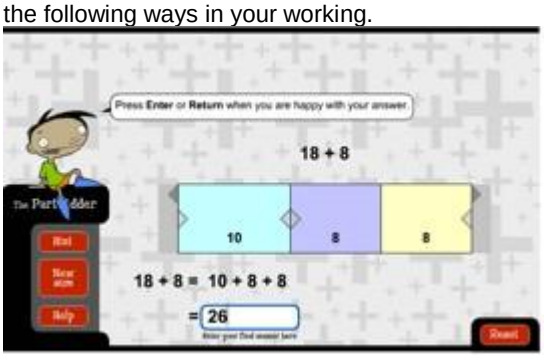
1. Show students the learning object and introduce them to Alex. Explain that he is going to help them solve addition sums by breaking the numbers up.
2. Enter a problem into the learning object. 18 + 8 is a good problem to start with.
3. Click through the instructions in Alex's speech bubble, reading the instructions with the students, and then close the instructions to experiment with the learning object.
4. Show the students how use the sliders to break up the numbers in the sum. Experiment with breaking up the 8, and show the students that the yellow bar representing 8 always stays the same length but it can be split in different ways. Find all the ways you can to split the 8, for example 7+1, 2+6, 4+4.
5. Show the students how to use the extenders to make the numbers you are working with larger. Explain that if they make numbers larger to help solve the problem they need to remember to take them away from the final answer.
6. Ask the students what would be a helpful way to split the numbers to solve the problem 18 +8.
   How can we split the numbers to make the problem easier to solve?
   How could we break up these numbers to make it easier to find the total?
7. Use one of students' suggestions and the learning object to come up with an answer. For example, split the 8 into 6 and 2 so that 18 can be made into 20 easily. Use the slider on the learning object to make the split, leaving the 2 closest to the 18, and then discuss how the numbers can then be recombined.



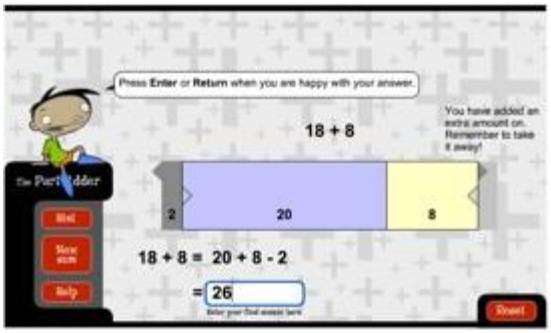
Now we have split the number we have 18 and 2 and 6. How can we add these together easily?
Is there an easy way to combine 18 and 6 and 2?

Tell the students that this way of breaking the numbers up is called making a ten.
Why do you think it is called that? (Because one of the numbers in the problem gets made up to the nearest ten).
How does it make problems easier to solve? (Ten is an easy number to add with).

8. Ask the students to suggest other ways to split the numbers to solve the problem.
   Is there another way to split the numbers to make the sum easier?
   Can anybody see a different way to split the numbers?
9. Use the students' suggestions to work through other ways to solve the problem using the learning object. Include the following ways in your working.



18 + 8 = 10 + 8 + 8 = 10 + 16 = 26, using doubles.



18 + 8 = 20 + 8 - 2 = 26, compensation.

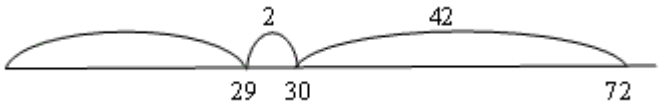
10. Once you have worked through these examples ask the students which ways they find helpful. You may like to list these ways so students can refer back to them when solving problems independently.
    Which way of splitting the numbers do you find helpful? Why?
11. Explain to the students that they are going to use the learning object to help them work out how many people are on a bus. Pose the problem:
    There are 16 adults and 6 children on the bus going to town. How many people are on the bus altogether?
12. Use the learning object to work through the problem, encouraging the students to split the numbers in ways that make the problem easier to solve and come up with a number of different ways to solve each problem.
    How could we split the numbers to make the addition easier to do?
    Do you know any other number facts that could help you solve this problem?
    Can you think of any other ways to split these numbers to make the problem simpler?
13. Pose other problems involving people on the bus. Helpful examples include:
    22 adults and 9 children are on the bus. How many people altogether?
    25 adults and 6 children are on the bus. How many people altogether?
    17 adults and 8 children are on the bus. How many people altogether?

Students working independently with the learning object

Use one of the contexts below to set problems for the students to solve independently, either on their own or in pairs, using the learning objects.

- Fruit bowls, for example:
  There are 14 pears and 8 apples in a bowl. How many pieces of fruit altogether?
- Money, for example:
  You go to the toy shop and buy a Barbie doll for $17 and some new felt pens for $7. How much will you need to pay altogether?
- Collections, for example:
  You have 35 matchbox cars in your collection and you receive 9 cars for your birthday. How many cars do you now have in your collection?

Once students have solved the problem ask them to draw a diagram to show how they used the learning object in their solution. Using a number line in their representation would be useful but encourage students to use a variety of methods to record their thinking. For example, 43 + 29:



How did you use the part adder?
How did you split the numbers in the problem? Why did you choose to do it that way?
How could you show what you did in a diagram?

When all students have described their solutions in a diagram, reassemble as a group and have students describe their solutions to each other using their diagrams.

Students working independently without the learning object

Independent activities that develop the same concepts as the learning object include:

- Playing the game Bridges, which can be found on Material Master 4-34.
- Playing the game Double Somersaults Plus or Minus One, which can be found on Material Master 4-33.

Independent activities that consolidate the knowledge students require at this level include

- Addition Flashcards, Material Master 4-29.
- Number Boggle, Material Master 4-35.

Homelinks

This week at home we talk to our families about the strategies we are using at school to solve addition problems.

Additive Strips **(see equipment animation at http://www.nzmaths.co.nz/Numeracy/Animations/animations.aspx and master at http://www.nzmaths.co.nz/Numeracy/2004matmas/MM%205-2,%20Animal%20Strips.pdf)**

Open Number Lines and Open Number Lines 2 (http://www.nzmaths.co.nz/Numeracy/Animations/animations.aspx)

(Home)

Goal 9 – With 7s and 8s -- Games

Eight's to One Hundred (2 or more players)

Math Skills: Addition with 8s; visual recognition of tens and parts of ten; part-whole strategies with 8s

Materials: 2 sets of ten-frame playing cards (attached); hundreds chart (with numbers or blank)

Directions: Place one of the 8 cards in the center of the table, face up. Deal out the remaining cards equally among the players. For each turn, each player draws her or his top card, adds it to the 8 in the center of the table, and then announces the problem and the total (e.g., 5 + 8 = 13). The player then moves her or his marker the corresponding number of squares on a hundreds chart. The first player to reach 100 wins.

Variation: Place a 7 card in the center of the table.

Ten Frame Double-War (2 or more players)

Math Skills:

- Addition to 20
- Visual recognition of tens and parts of ten

Materials:

- 2 sets of ten-frame playing cards (attached)

Directions: Deal out all the cards equally among the players. For each turn, each player draws her or his top two cards, adds them together, and then announces the problem and the total (e.g., 5 + 9 = 14). The player with the highest sum wins all of the cards from that turn from all the students. If there is a tie, a second round is played between those involved in the tie, and the winner of that second round wins all the cards from both rounds.

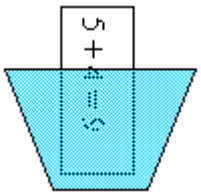
(Home)

Pocket facts

Number, Level 2

Purpose of the activity

This activity encourages children to recall their basic addition and subtraction facts.



Relevant Achievement Objectives

- Recall the basic addition and subtraction facts

Specific Learning Outcomes

- Recall addition and subtraction facts for the numbers 0-9.

Resources

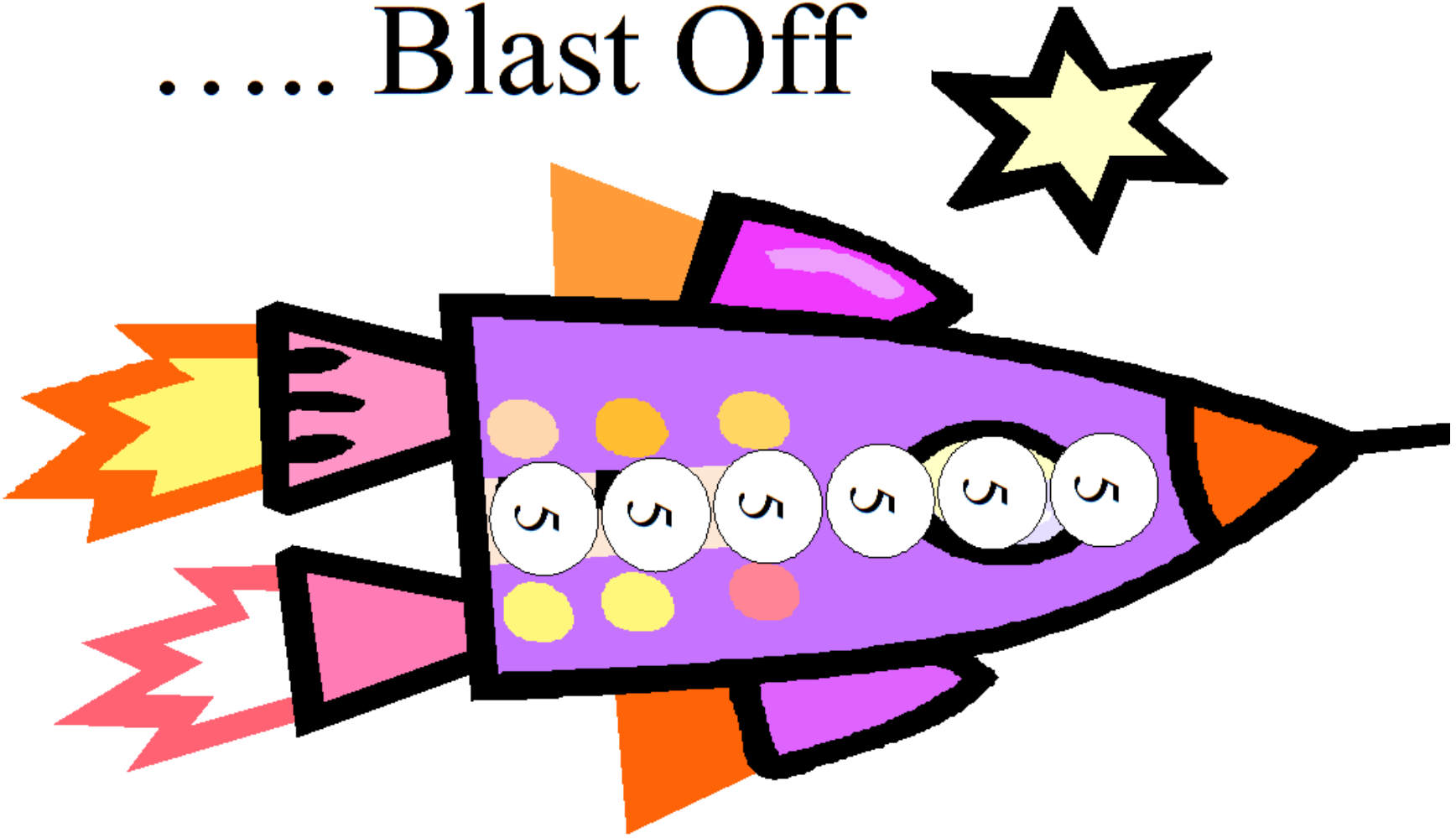
- Facts written on pocket-sized cards

Activity

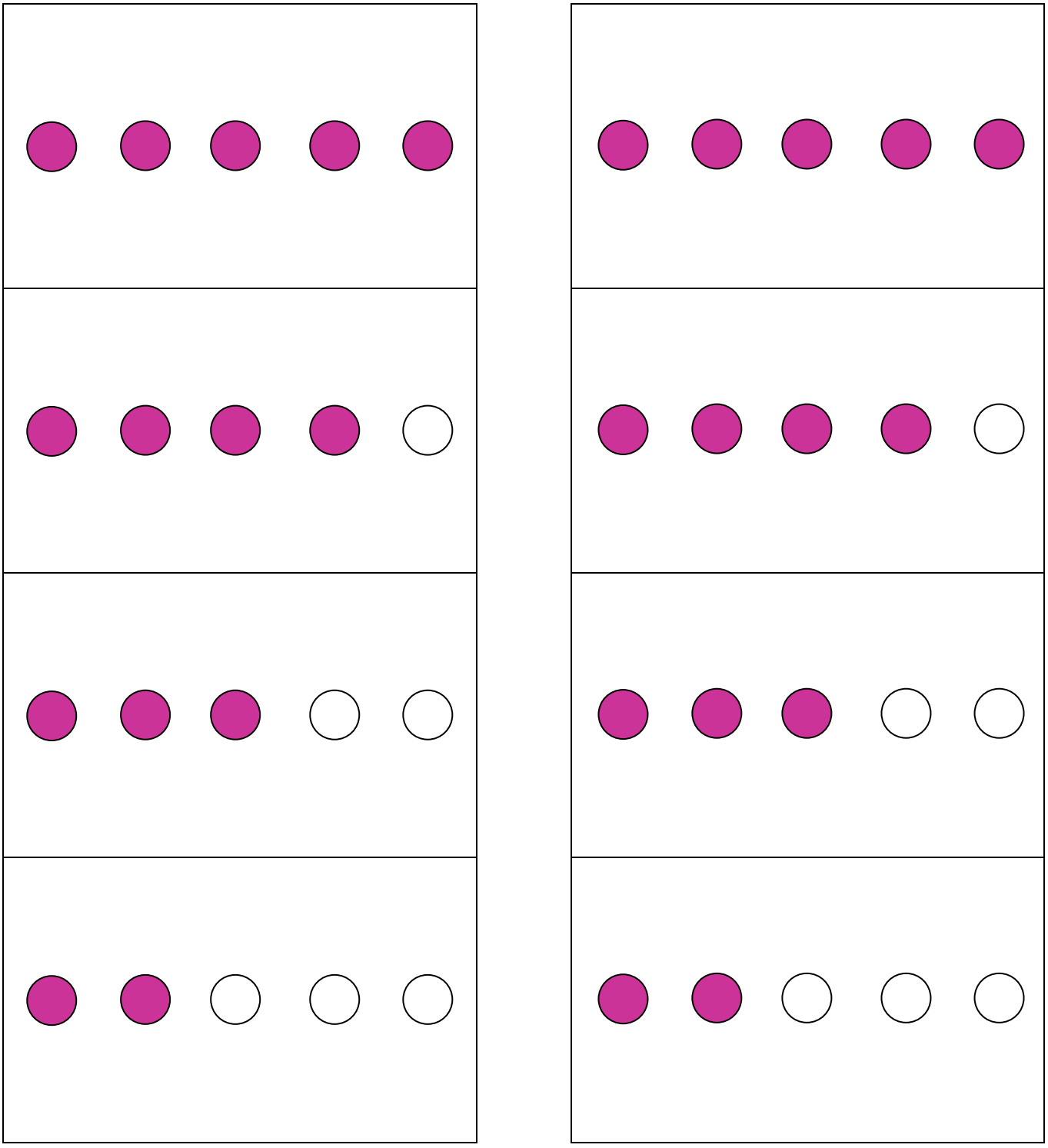
1. The children select an unknown addition or subtraction fact to place in their pocket. They carry this fact with them for a day and also take it home after school. During the day other children or the teacher ask the children to recall their fact.
2. At the start of the following day the child selects another fact to place in their pocket.

Note: Known facts may be recorded on an individual chart. Alternatively each child can have a pack of number fact cards that are divided into two piles: the DO KNOWS and the DON"T KNOWS. The pocket facts are then drawn from the DON"T KNOW pile.

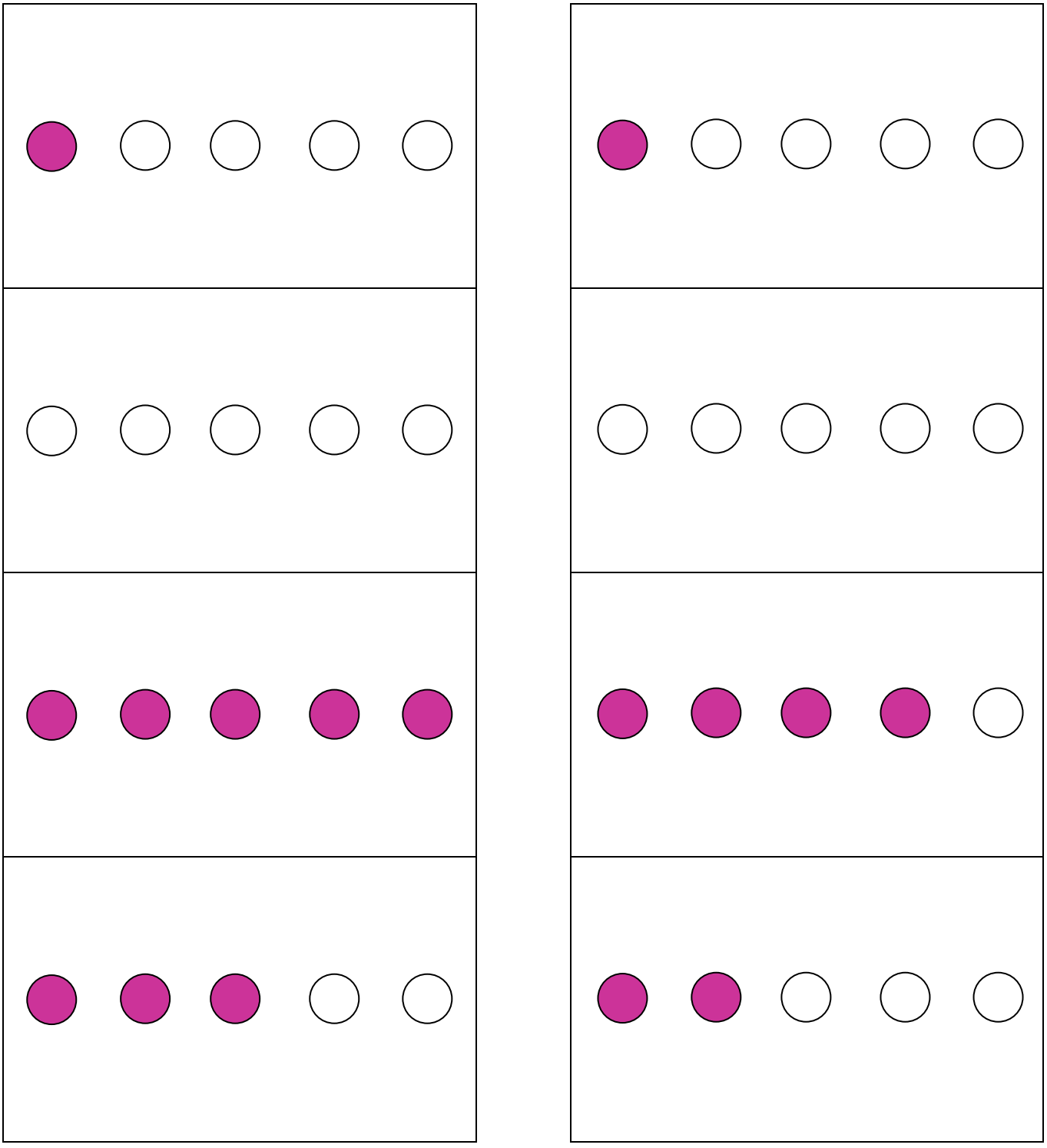
….. Blast Off



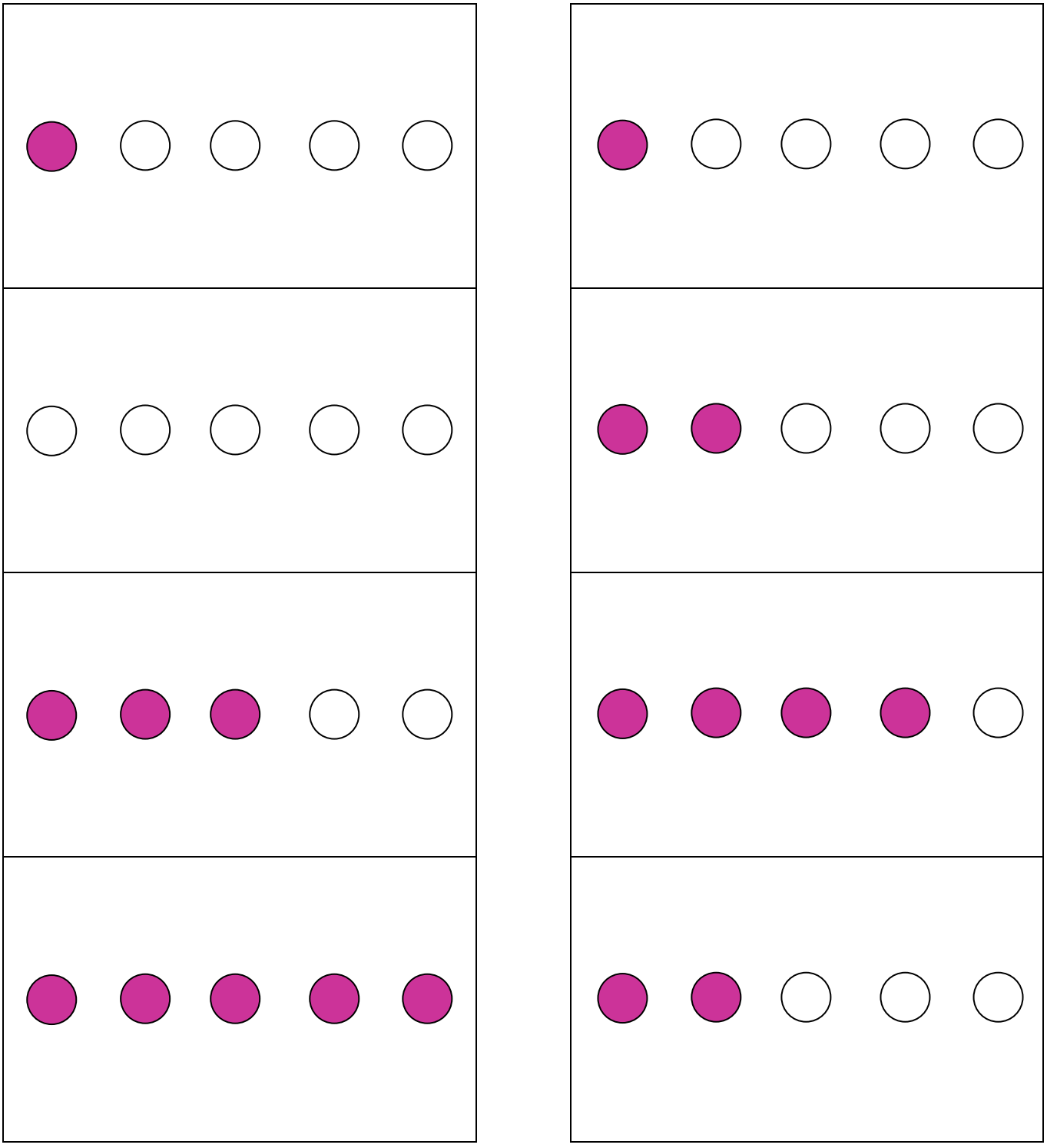
Blast Off (page 1)



Blast Off (page 2)



Blast Off (page 3)



Blast Off (if you like, print on second sides of previous three pages)

… BLAST OFF

… BLAST OFF

… BLAST OFF

… BLAST OFF

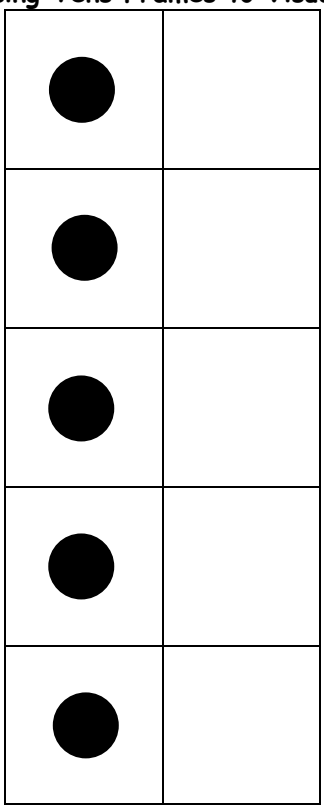
… BLAST OFF

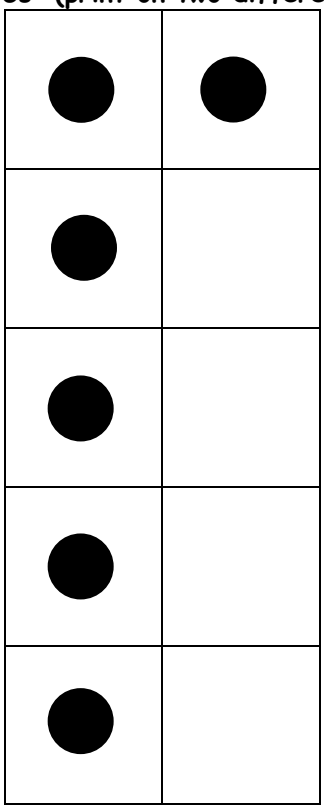
… BLAST OFF

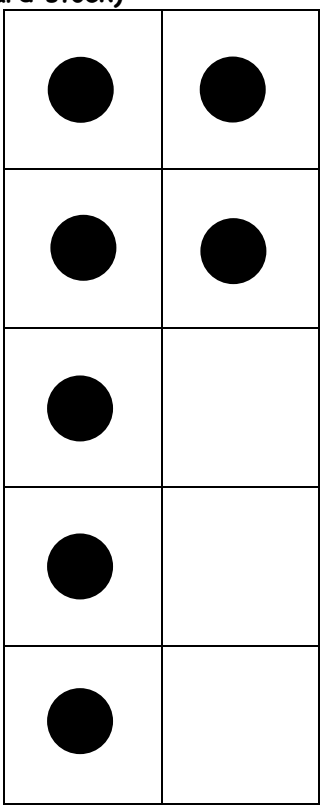
… BLAST OFF

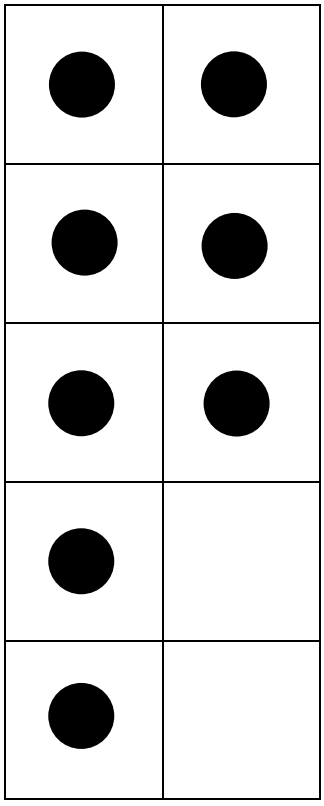
… BLAST OFF

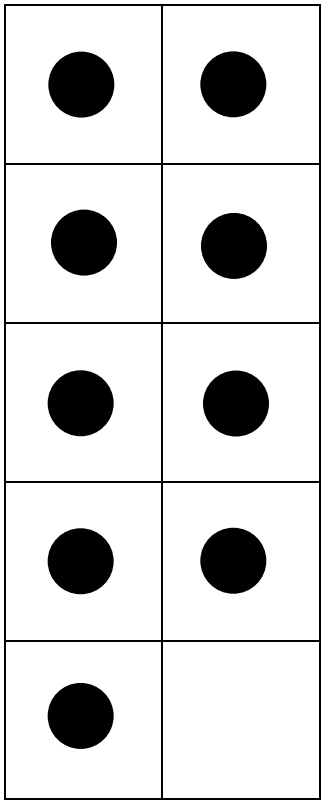
Using Tens Frames to Visualize "With 5s" (print on two different colors card stock)

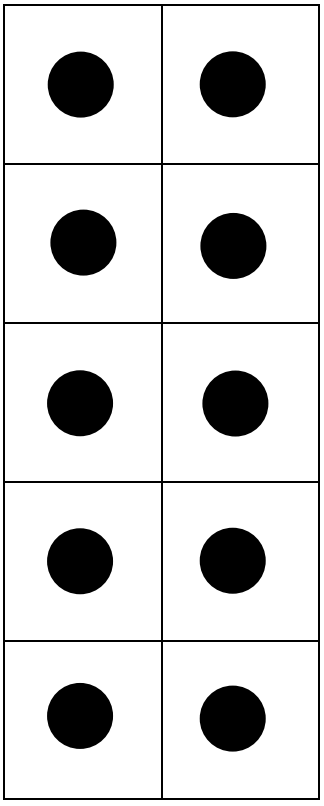


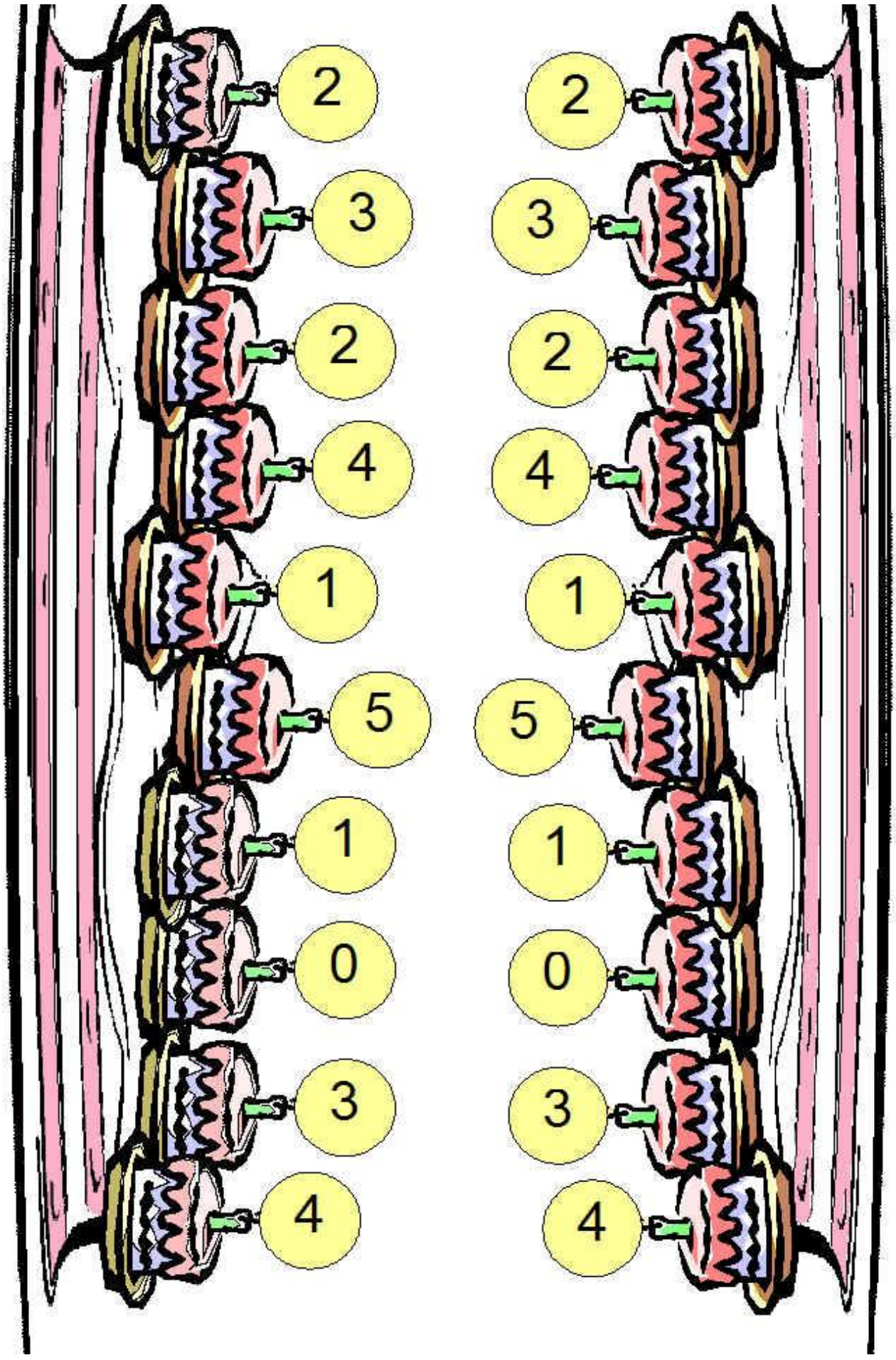











2
3
2
4
1
5
1
0
3
4
2
3
2
4
1
5
1
0
3
4

Doubles Solitaire Cards (page 1)

1	1	10
10	10	10
2	2	2

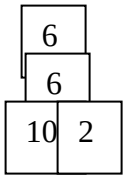
Doubles Solitaire Cards (page 2)

2	3	3
4	4	4
4	5	5

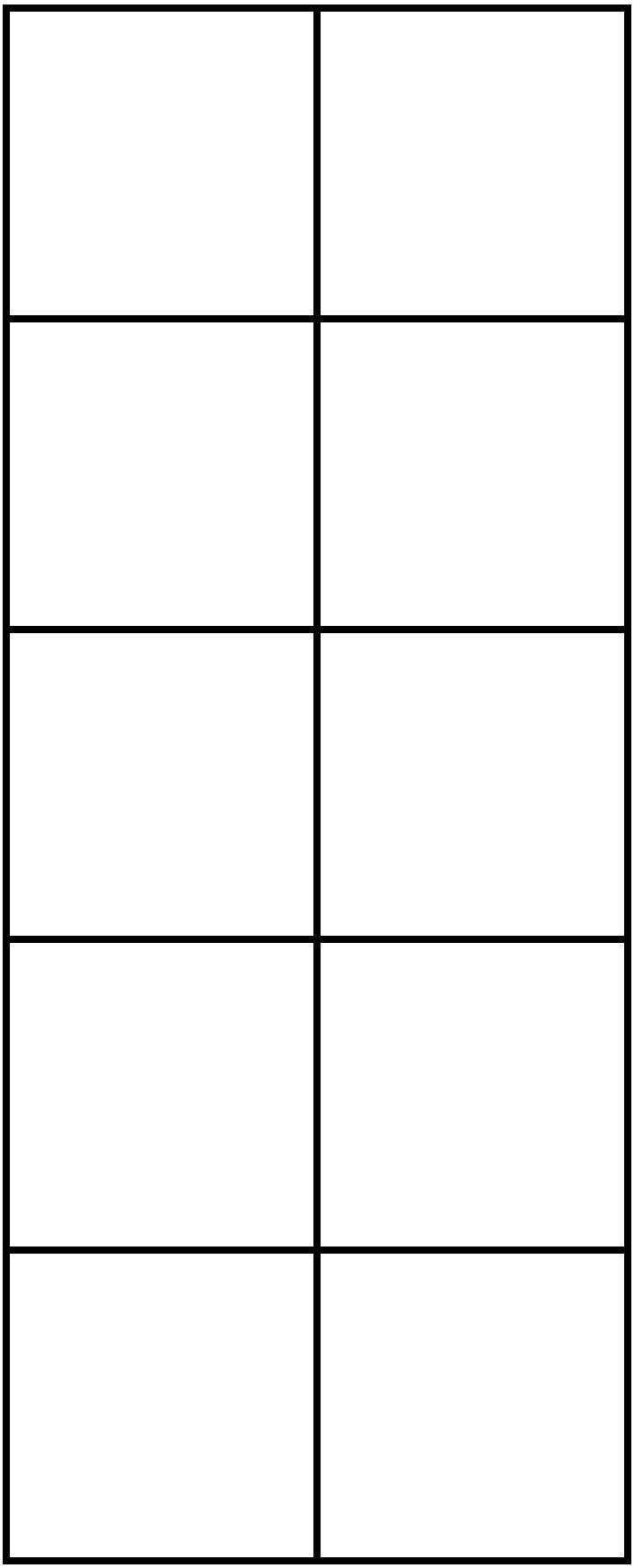
Doubles Solitaire Cards (page 3)

6	6	6
6	7	7
8	8	8

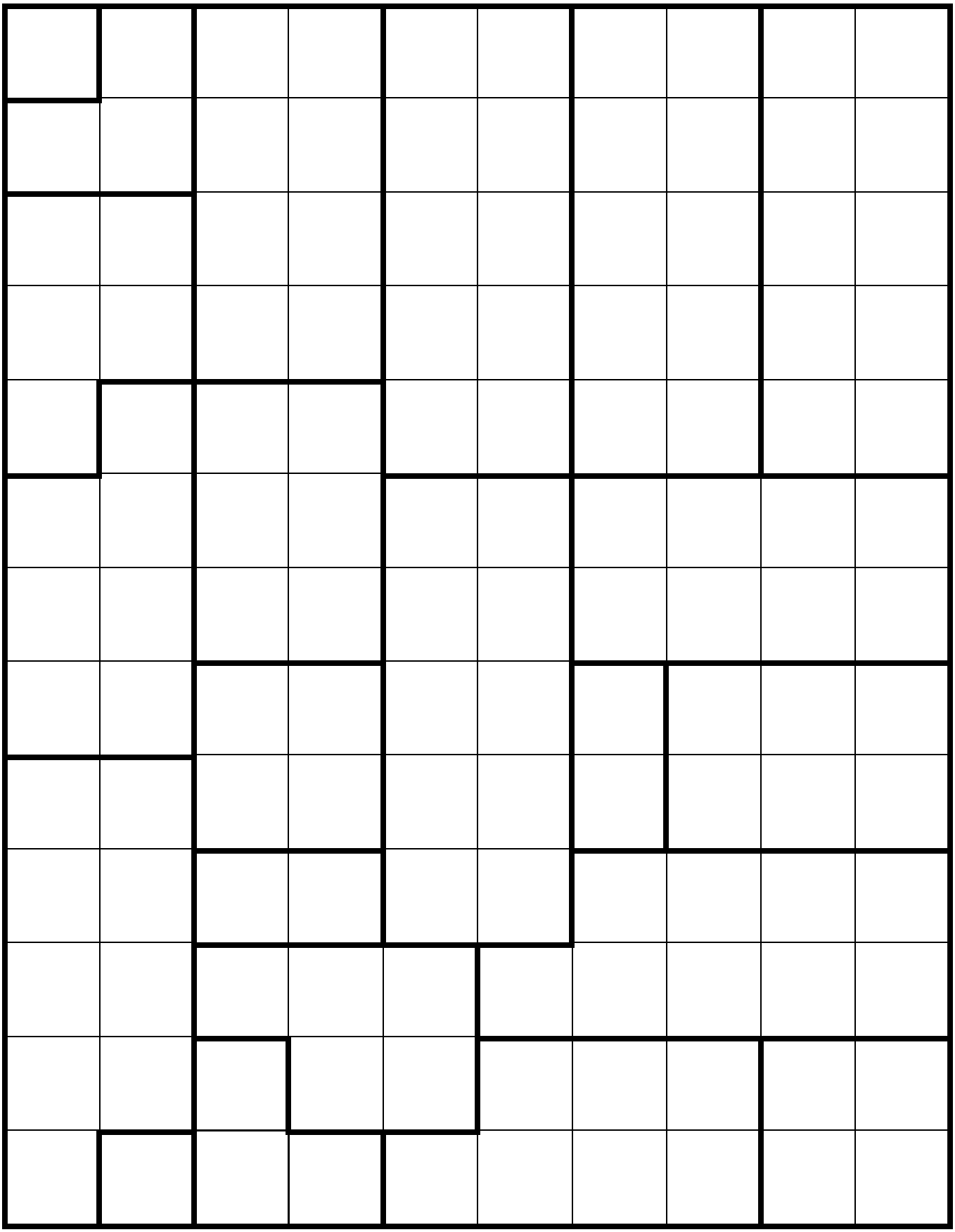
Doubles Solitaire Cards (page 4)

8	9	9
10	Doubles Solitaire 	Doubles Solitaire **Directions:** Shuffle the cards and lay them on the table face up in "fans" of three cards each with the cards face up. There will be one fan with only one card. Only the top card of each fan is available for play. Look at the top cards of each fan and pick up any doubles. Each double should be set up vertically. The sum for each double can be picked up later, but if two cards are needed, they must both be picked up at the same time.

Ten-Frame



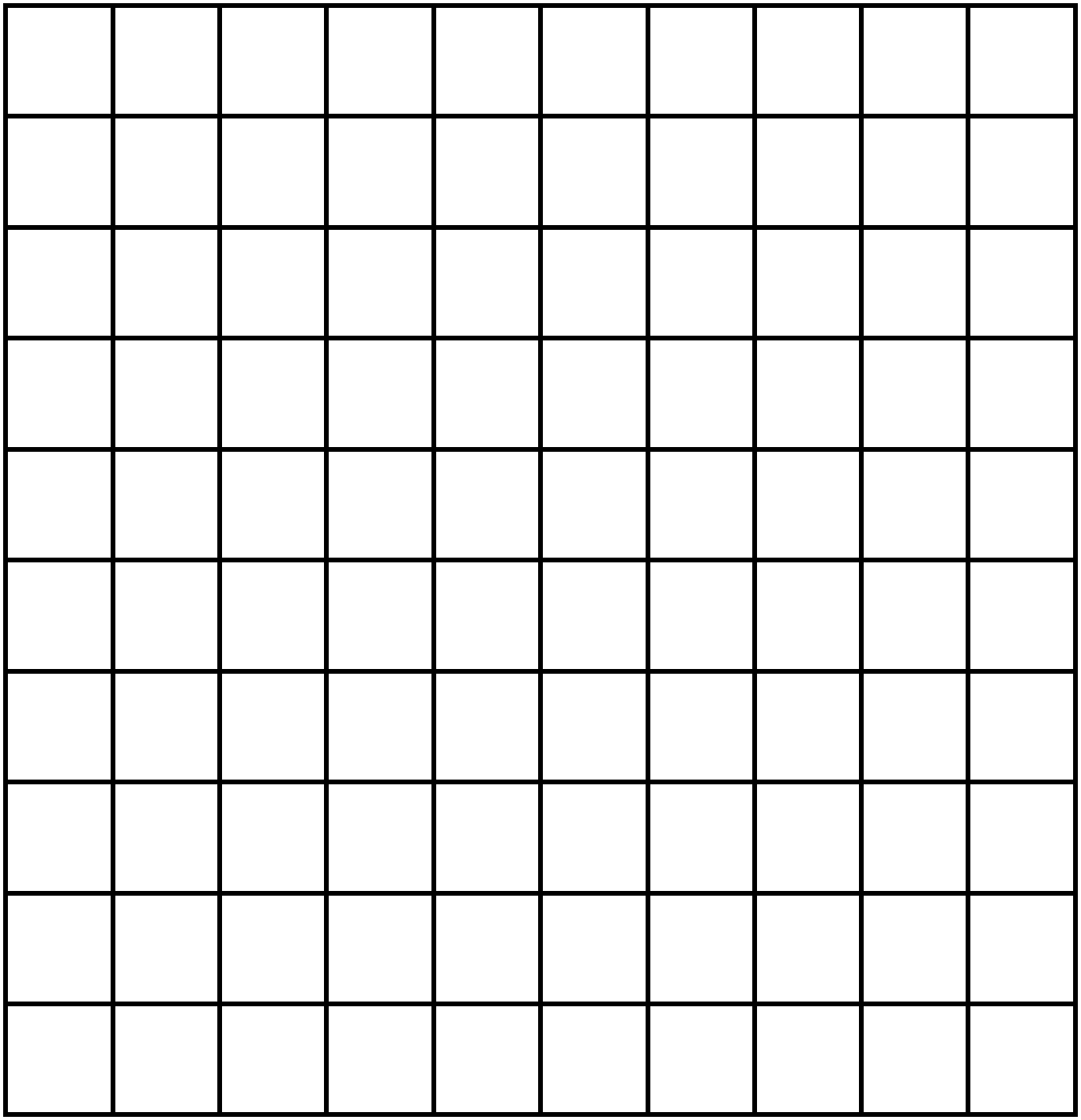
Alternative Ten-Frame

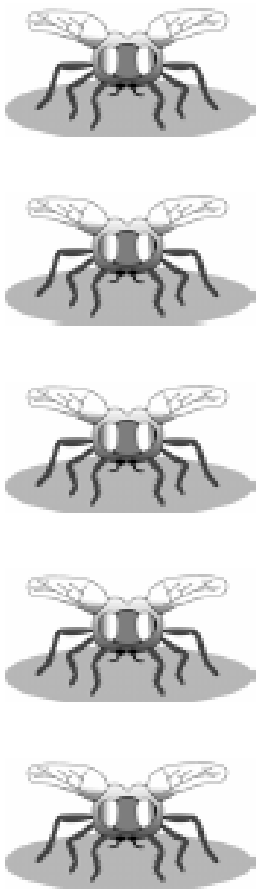
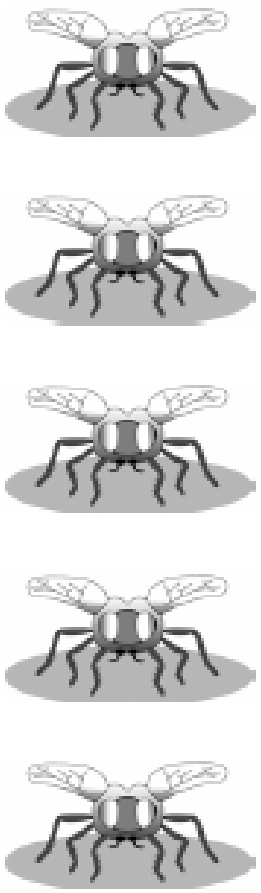
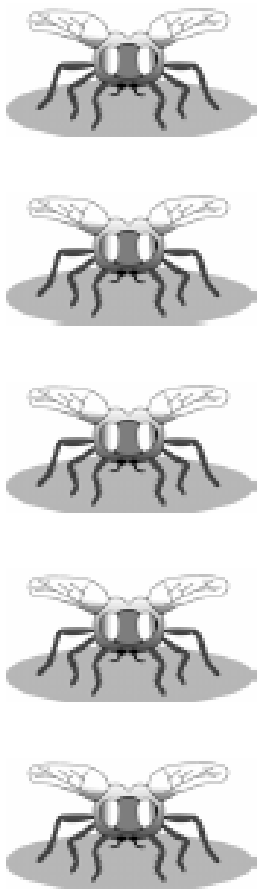
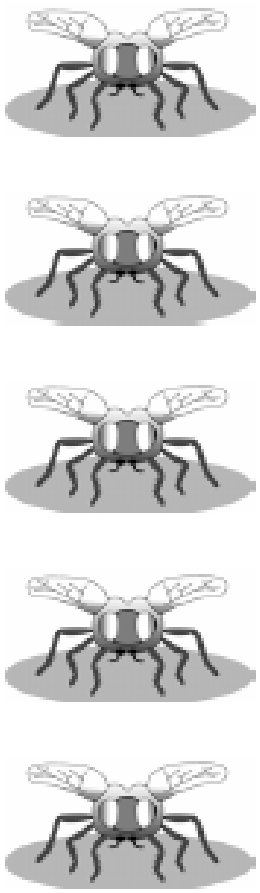
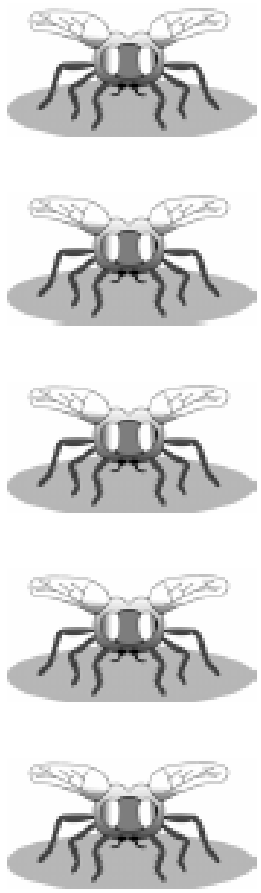
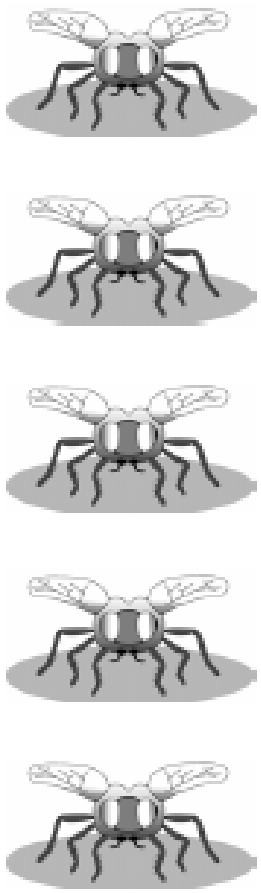


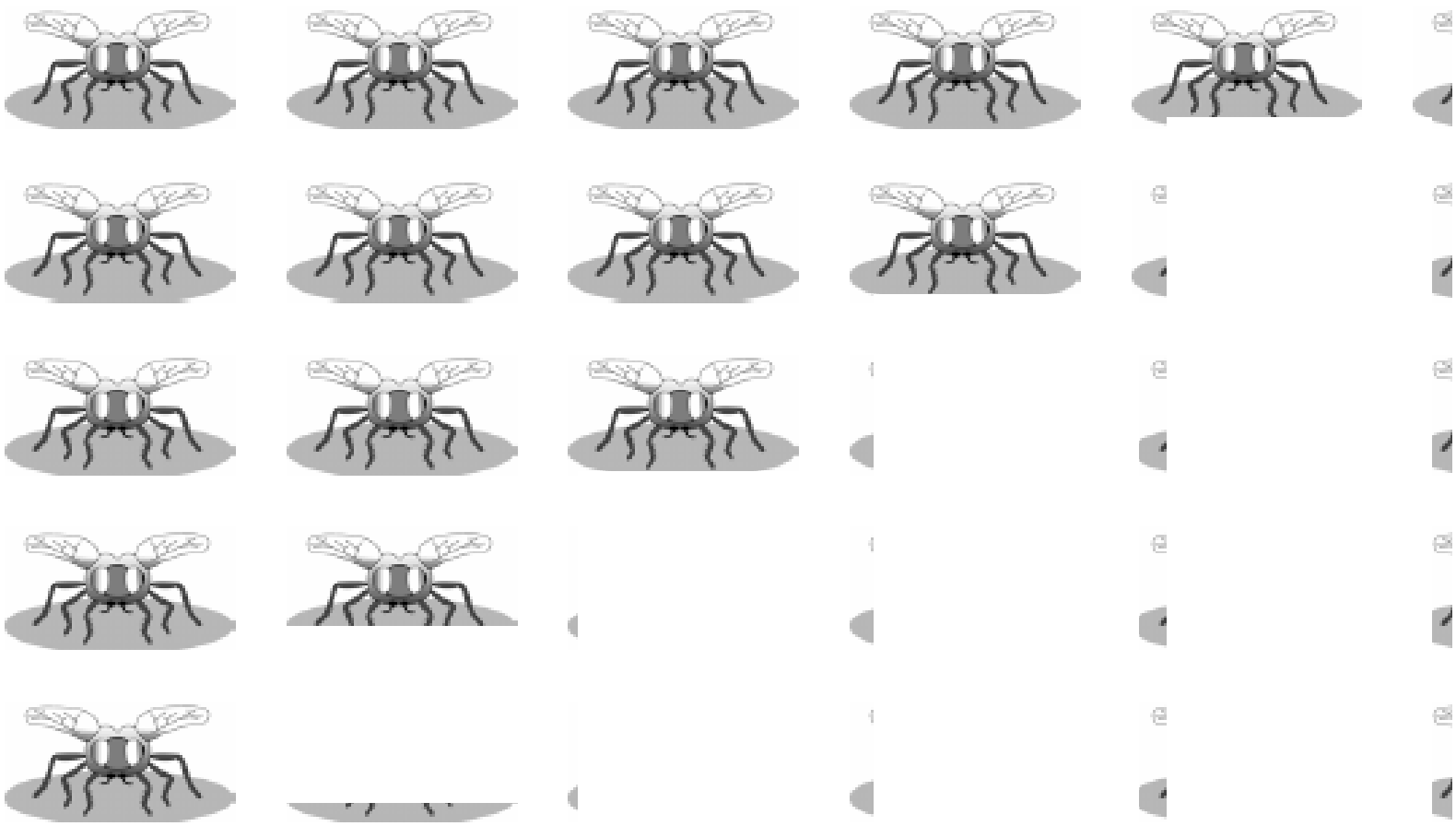
Hundreds Chart

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

Hundreds Chart



					
5	6	7	8	9	10



10 9 8 7 6 5