

## Challenge P15


T

### How Many Parts To A Whole?

#### Expectations

- 2m3** - compare proper fractions using concrete materials;
- 2m8** - use a calculator to skip count, explore number patterns, and solve problems beyond the required pencil-and-paper skills;
- 2m19** - represent and explain halves, thirds, and quarters as part of a whole and part of a set using concrete materials and drawings (e.g., colour 2 out of 4 circles);
- 2m20** - compare two proper fractions using concrete materials (e.g., use pattern blocks to show that the relationship of 3 triangles to 6 triangles is the same as that of 1 trapezoid to 2 trapezoids because both represent half of a hexagon);
- 2m23** - represent multiplication as repeated addition using concrete materials (e.g., 3 groups of 2 is the same as  $2 + 2 + 2$ );

#### Teaching Strategies

1. Have the students use pattern blocks in order to compare fractions.
2. Have the students explore and manipulate the blocks to find out the following:  
how many trapezoids = 1 hexagon?  
how many diamonds = 1 hexagon?  
how many triangles = 1 hexagon?
3. Discuss the fraction equivalents of each.
4. Have the students order the fractions from greatest to least  $1/2$ ,  $1/3$ ,  $1/6$ .
5. Students can then trace the pattern block on to the worksheet provided in *Appendix 6* and label the parts of each fraction; e.g., 
6. Complete the chart.

#### Suggested Resources

- computer program *Mathville Jungleyway Bug Blast* and *Finish the Symphony*
- pattern blocks
- student worksheet, *Appendix 6*

#### Catholic School Commentary

(3) *A reflective, creative and holistic thinker* who solves problems and makes responsible decisions with an informed moral conscience for the common good. (b) Creates, adapts, evaluates new ideas in light of the common good. (e) Adopts a holistic approach to life by integrating learning from various subject areas and experience. (OCSGE)

- **John 15:1-18**

#### Assessment

- Can students label the fraction parts?
- Can students order fractions accurately?



# Number Sense and Numeration

## Challenge P15




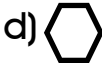
S

### How Many Parts To A Whole?

#### Materials

- pattern blocks
- student worksheet, *Appendix 6*

#### Procedures

1. Using a hexagon, find out how many
  - a)  triangles,
  - b)  diamonds,
  - c)  trapezoids,
  - d)  hexagons,it will take to cover the hexagon.
2. Remember to estimate first.
3. Trace each shape on the worksheet.
4. Label each part of the fraction.
5. Complete the chart.

#### Further Challenges

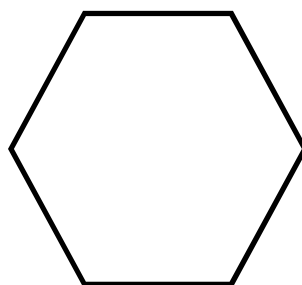
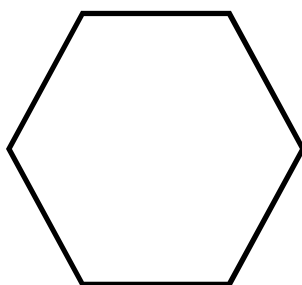
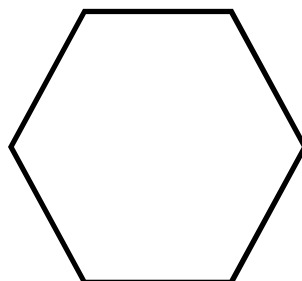
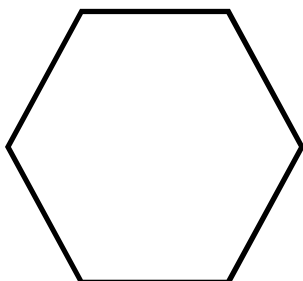
- How many triangles would it take to cover 5 hexagons? How many diamonds, trapezoids would it take? You can use a calculator if you wish.





# The Ontario Curriculum: Mathematics

## Appendix 6

How Many Parts To A Whole?

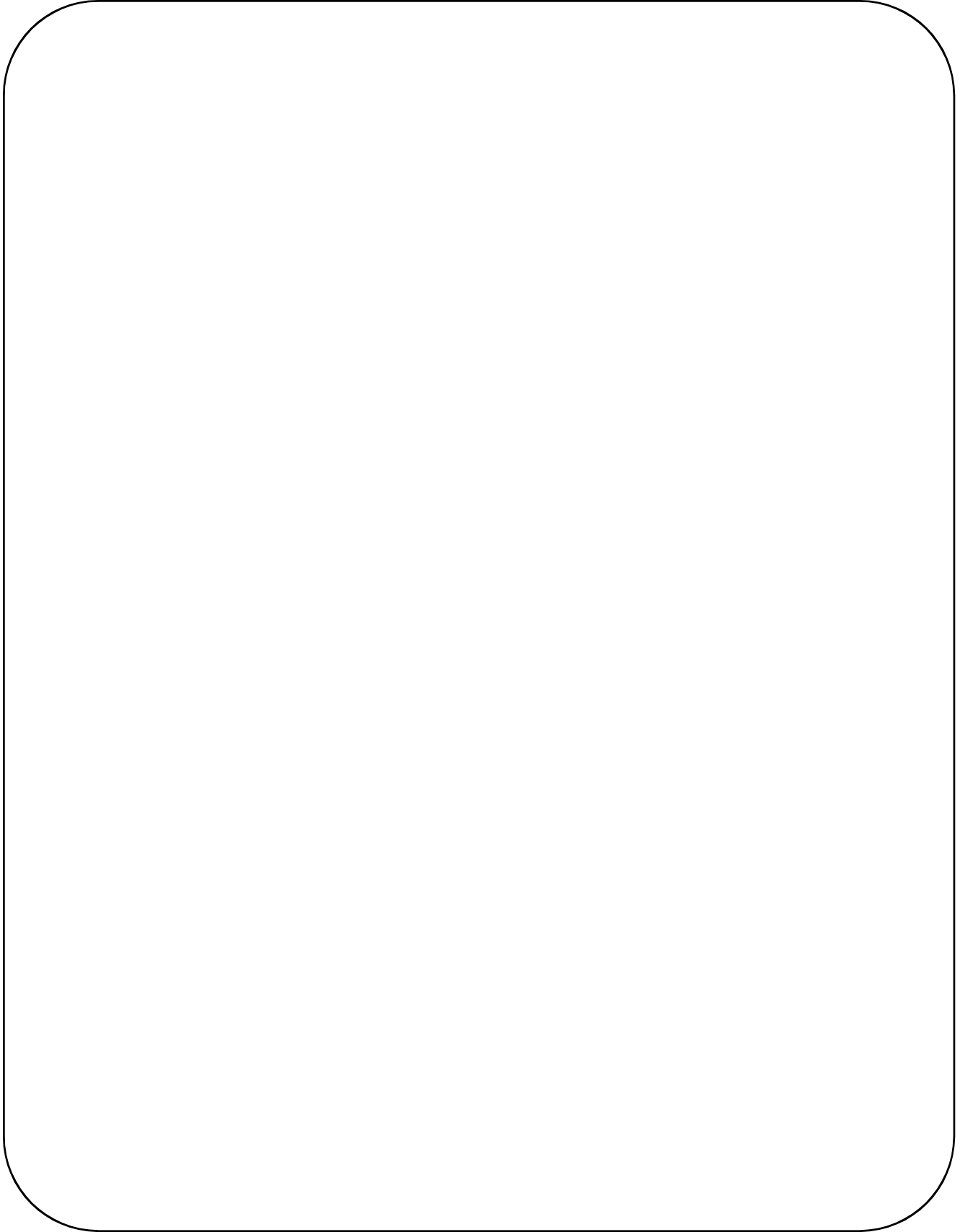
Name: \_\_\_\_\_



Type of Block	Estimate How Many It Will Take	How Many Did It Take?	What Is the Fraction?
			
			
			
			



# **Number Sense and Numeration**



# The Ontario Curriculum: Mathematics

## Challenge P 16

T

### Fractions Are All About Sharing

#### Expectations

- 2m3** - compare proper fractions using concrete materials;
- 2m15** - use mathematical language to identify and describe numbers to 100 in the world around them;
- 2m16** - discuss the use of number and arrangement in their community (e.g., cans on a grocery store shelf, cost of 5 candies);
- 2m19** - represent and explain halves, thirds, and quarters as part of a whole and part of a set using concrete materials and drawings (e.g., colour 2 out of 4 circles);
- 2m24** - demonstrate division as sharing (e.g., sharing 12 carrot sticks among 4 friends means each person gets 3);

#### Teaching Strategies

1. Use the overhead projector, and a set of items, to elicit student suggestions on how to divide a set into halves, thirds, and quarters. Use 10 for  $\frac{1}{2}$ , 6 for  $\frac{1}{3}$ , and 16 for  $\frac{1}{4}$ 's.
2. List, on chart paper, some of the ideas which the students suggest .
3. Model several different strategies. Determine which work best and discuss why.
4. Have the students work in pairs in order to solve the problem outlined on the task card, *Appendix 7*. You will need to give each pair a *baggie* containing 24 items; *i.e.*, candy, crackers, *Timbits*, etc.

#### Suggested Resources

- *Appendix 7*
- baggies containing 24 items. One per pair of students.
- chart paper
- computer program Broderbund **Math Workshop**, *Rhythm Shop*
- markers
- overhead projector
- sets of 10, 6, and 16 items

#### Catholic School Commentary

- (5) *A collaborative contributor* who finds meaning, dignity and vocation in work which respects the rights of all and contributes to the common good. (f) Exercises Christian leadership in the achievement of individual and group goals. (g) Achieves excellence, originality, and integrity in one's own work and supports these qualities in the work of others.
- (7) *A responsible citizen* who gives witness to Catholic social teaching by promoting peace, justice and the sacredness of human life.
- **1 Corinthians 12:4**

#### Assessment

- Can students divide a set of items accurately into halves, thirds and quarters?
- Does the student solve problems appropriately and share their thinking using numbers, pictures and words? (See problem solving Rubric, Appendix 9b, page 2 - 65).



# Number Sense and Numeration

## Challenge P16

S

### Fractions Are All About Sharing

#### Materials

- *baggie* containing 24 items
- pencil
- worksheet, *Appendix 7*, to record answers to the problem

#### Procedures

1. Solve the following problem:  
You have 24 items in your bag. You have to make a choice. Do you want to share the items with 2, 3, or 4 people? Use numbers and pictures to explain your choice.
2. Complete the chart in *Appendix 7*.

#### Further Challenges

- Can you share 20 items evenly between 2, 3 and 4 people? Why or why not?

# The Ontario Curriculum: Mathematics

## Appendix 7

### Fractions Are All About Sharing

Name: \_\_\_\_\_

You have 24 items in your bag. You have a choice to make. Do you want to share the items with 2, 3 or 4 people? Solve this problem using numbers, pictures and words to explain your choice.

Show your work. 

Number of People Sharing	How Many Does Each Person Get?	What Is The Fraction of The Whole?
2		$\frac{24}{2} = \frac{1}{2}$
3		$\frac{24}{3} = \frac{1}{3}$
4		$\frac{24}{4} = \frac{1}{4}$



# Number Sense and Numeration

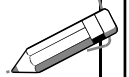
## Appendix 7

### Fractions Are All About Sharing Further Challenge

Name: \_\_\_\_\_

Can you share 20 items evenly between 2, 3, and 4 people? Why or why not?

Show your work using numbers, pictures and words.



Number of People Sharing	How Many Does Each Person Get?	What Is The Fraction of The Whole?
2		$\frac{20}{2} = \frac{1}{2}$
3		$\frac{20}{3} = \frac{1}{3}$
4		$\frac{20}{4} = \frac{1}{4}$

# The Ontario Curriculum: Mathematics

## Challenge P17

T

### Trading Places

#### Expectations

**2m14** - compare, order, and represent whole numbers to 100 using concrete materials and drawings;

**2m17** - identify place-value patterns (e.g., trading 10 ones for 1 ten) and use zero as a place holder;

#### Teaching Strategies

1. Review the concept of tens and ones (place value). Have students show 2-digit numbers a variety of ways; e.g., 17 as 1 ten, 7 ones or 17 ones.
2. Reinforce the concept of trading ones for 10's; i.e., 17 ones becomes 1 ten and seven ones. Do several examples using numbers between 11 and 50, and using both tens and ones. 35 should be shown as 2 tens, 15 ones so that students are required to trade 10 ones for one more ten making 3 tens and 5 ones.
3. Provide plenty of concrete practice in pairs. Once you feel that the students are ready, have them move on to the independent follow up sheet.
4. Have the students complete the worksheet on trading ones for tens.

#### Suggested Resources

- place value mats
- place value pieces
- trading worksheet, *Appendix 8*

#### Catholic School Commentary

- (3) *A reflective, creative and holistic thinker* who solves problems and makes responsible decisions with an informed moral conscience for the common good. (c) Thinks reflectively and creatively to evaluate situations and solve problems.
- (4) *A self-directed, responsible, lifelong learner* who develops and demonstrates their God-given potential. (b) Demonstrates flexibility and adaptability. (f) Applies effective communication, decision-making, problem-solving, time and resource management skills. (OCSGE)

#### Assessment

- Can students demonstrate the ability to trade tens and ones independently?
- Does the student understand the concept of place value and that numbers can be represented in different ways?



# Number Sense and Numeration

## Challenge P 17

S

### Trading Places

#### Materials

- place value mats
- place value pieces
- recording sheet, *Appendix 8*
- trading worksheet, *Appendix 8*

#### Procedures

1. Using your place value mat to show the following numbers:  
72, 38, 18, 56, 87, and 44.  
Use the recording sheet, *Appendix 8*, to represent the numbers.
2. Compare your work to your neighbour's. Did he/she find a different way to show the numbers?
3. Complete the Trading worksheet, *Appendix 8*.

#### Further Challenges

- Using dimes and pennies, on your place value mat, show 65¢, 24¢, 49¢, and 78¢, in at least two different ways. Show your work by rubbing a crayon or pencil on top of the amount of money. Would you rather have 49 pennies or 4 dimes and 9 pennies? Explain your answer.

# The Ontario Curriculum: Mathematics

## Appendix 8

### Recording Sheet for Trading Places

Name: \_\_\_\_\_

Tens	Ones	Tens	Ones
Draw the number.		Draw the number.	

Tens	Ones	Tens	Ones
Draw the number.		Draw the number.	

Tens	Ones	Tens	Ones
Draw the number.		Draw the number.	



# Number Sense and Numeration

## Appendix 8

### Trading Worksheet

Name: \_\_\_\_\_

**35**

Tens	Ones	Tens	Ones
Draw the number.		Draw the number.	

**92**

Tens	Ones	Tens	Ones
Draw the number.		Draw the number.	

**20**

Tens	Ones	Tens	Ones
Draw the number.		Draw the number.	

# The Ontario Curriculum: Mathematics

## Challenge P18

T

### Roll and Add

#### Expectations

**2m25** - recall addition and subtraction facts to 18;

**2m28** - mentally add and subtract one-digit numbers;

\* this task card also explores probability

#### Teaching Strategies

- In pairs, students will take turns rolling the dice and adding the two numbers.
- The students colour in the square, on the game board, above the total of the two dice which they rolled.

#### Suggested Resources

- activity sheet for each player, *Appendix 9*
- crayons
- 2 dice

#### Catholic School Commentary

- (5) *A collaborative contributor* who finds meaning, dignity and vocation in work which respects the rights of all and contributes to the common good. (a) Works effectively as an interdependent team member. (e) Respects the rights, responsibilities and contributions of self and others. (g) Achieves excellence, originality, and integrity in one's own work and supports these qualities in the work of others. (OCSGE)

#### Assessment

- Observe students as they work cooperatively.



# Number Sense and Numeration

## Challenge P18

S

### Roll and Add

#### Materials

- activity sheet for each player, *Appendix 9*
- crayons
- 2 dice

#### Procedures

1. In groups of two, roll the dice and add the two resulting numbers.
2. Colour the square, on the game board, above the total of the two dice.
3. Keep playing until one of you has been able to colour a complete column on the game board.
4. Answer the question, *Which number came up most often?*

#### Further Challenges

- Play the same game, but subtract the larger number from the smaller number.
- Use the roll and subtract game board, *Appendix 9a*, to record your results.
- Which result came up most often?

# The Ontario Curriculum: Mathematics

## *Appendix 9*

### Finish Line Roll and Add

Name \_\_\_\_\_

1	2	3	4	5	6	7	8	9	10	11	12



# Number Sense and Numeration

## *Appendix 9 a*

### Finish Line Roll and Subtract

Name: \_\_\_\_\_

<b>0</b>	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>

## *Appendix 9 b*

### Problem Solving Rubric

	1	2	3	4
<b>General Problem Solving Rubric</b>	Unable to solve problems, using numbers, pictures and words, without teacher assistance	Able to solve problems, using numbers, pictures and words, with some accuracy	Able to solve problems, using numbers, pictures and words, with usual accuracy	Able to solve problems, using numbers, pictures and words, with accuracy



# Grade 2

# Problem Bank

**Photocopy these problems for your students when you feel that they have the skills needed to solve them. Use the rubric for general problem solving, Appendix 9b, to mark student work.**

# The Ontario Curriculum: Mathematics

## Appendix 9 c



### Popcorn For Sale!

- 2m26** - explain a variety of strategies to find sums and differences of 2 two-digit numbers;
- 2m29** - add and subtract two-digit numbers with and without regrouping, with sums less than 101, using concrete materials;
- 2m30** - add and subtract money amounts to 100¢ using concrete materials, drawings, and symbols;
- 2m32** - pose and solve number problems with at least one operation (e.g., if there are 24 students in our class and 8 wore boots, how many students did not wear boots?);
- 2m33** - select and use appropriate strategies (e.g., pencil and paper, calculator, estimation, concrete materials) to solve number problems involving addition and subtraction.

#### Question:

Wednesday is popcorn day. Each bag costs 35¢. You wish to purchase two bags. The student salesperson gives you back 20¢ change from the \$1.00 you used to pay for the popcorn.

#### Step 1

How much did two bags of popcorn cost? Show your calculation using numbers, pictures and words.

#### Step 2

How much change should you get back from the dollar? Show your calculations.

#### Step 3

Did you get the right amount of change, if you were given 20¢? Explain.



# Number Sense and Numeration

## Appendix 9 d

**2m23** - represent multiplication as repeated addition using concrete materials (e.g., 3 groups of 2 is the same as  $2 + 2 + 2$ );

**2m24** - demonstrate division as sharing (e.g., sharing 12 carrot sticks among 4 friends means each person gets 3);

**2m32** - pose and solve number problems with at least one operation (e.g., if there are 24 students in our class and 8 wore boots, how many students did not wear boots?);

**2m33** - select and use appropriate strategies (e.g., pencil and paper, calculator, estimation, concrete materials) to solve number problems involving addition and subtraction.

### Hooray for Hundred's Day

It is Hundred's Day at your school. There are two Grade 2 classes participating. Class A has 20 students. Class B has 25 students. The teacher has brought in 100 jellybeans. How many jellybeans will each child get in Class A and in Class B?



	Number of Students	Number of jellybeans for each student
Class A	20	
Class B	25	

Show your work using numbers, pictures and words.

Which class would you like to be in? Why?

# The Ontario Curriculum: Mathematics

## Appendix 9 e

**2m19** - represent and explain halves, thirds, and quarters as part of a whole and part of a set using concrete materials and drawings (e.g., colour 2 out of 4 circles);

**2m23** - represent multiplication as repeated addition using concrete materials (e.g., 3 groups of 2 is the same as  $2 + 2 + 2$ );

**2m24** - demonstrate division as sharing (e.g., sharing 12 carrot sticks among 4 friends means each person gets 3);

**2m32** - pose and solve number problems with at least one operation (e.g., if there are 24 students in our class and 8 wore boots, how many students did not wear boots?);

### School's Out: Part A

You are having an end of the year party. If there are 24 students in your class, how much of each type of food will you have to order?

What each person will get	How many do we need? (Show your work here)
2 hot dogs each	
1/4 of a dessert pizza	
one juice box each	



# Number Sense and Numeration

## Appendix 9 f

**2m30** - add and subtract money amounts to 100¢ using concrete materials, drawings, and symbols;


**2m31** - use a calculator to solve problems with numbers larger than 50 in real-life situations;

**2m32** - pose and solve number problems with at least one operation (e.g., if there are 24 students in our class and 8 wore boots, how many students did not wear boots?);

**2m33** - select and use appropriate strategies (e.g., pencil and paper, calculator, estimation, concrete materials) to solve number problems involving addition and subtraction.

### School's Out: Part B

You now have to figure out how much the food, for the party, will cost. Use a calculator, and the chart below, to calculate the total cost.

Type of Food	Cost Per Item	Total cost for 24 Students
hot dogs	50¢ each	
dessert pizza	\$ 1.00 each 	
juice boxes	25¢ each	
Show your work		Total cost of food items

## Appendix 9 g

**2m29** - add and subtract two-digit numbers with and without regrouping, with sums less than 101, using concrete materials;

**2m32** - pose and solve number problems with at least one operation (e.g., if there are 24 students in our class and 8 wore boots, how many students did not wear boots?);

### A Problem on the Farm

$$25 - 19 = 6$$

You are visiting a farm with many different kinds of animals on it. Using the number sentence above, create a number story which matches the number sentence. Use numbers, pictures and words.

Can you think of a different number story?



# Number Sense and Numeration

## Appendix 9 h

**2m25** - recall addition and subtraction facts to 18;

**2m27** - use one fact to find another (e.g., use fact families or adding on);

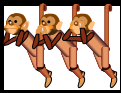




**2m28** - mentally add and subtract one-digit numbers;

**2m29** - add and subtract two-digit numbers with and without regrouping, with sums less than 101, using concrete materials;

**2m32** - pose and solve number problems with at least one operation (e.g., if there are 24 students in our class and 8 wore boots, how many students did not wear boots?);

**2m33** - select and use appropriate strategies (e.g., pencil and paper, calculator, estimation, concrete materials) to solve number problems involving addition and subtraction.

### A Day At The Zoo

	Animal	Number at the Zoo
	monkeys	12
	giraffes	4
	lions	10
	gorillas	3
	snakes	9

1. How many animals are there in all?  
Show your calculations below.

2. How many more monkeys are there than gorillas? Show your work using numbers, pictures and words.

3. How many legs in all are there on 4 giraffes? Show your calculations using numbers, pictures and words.

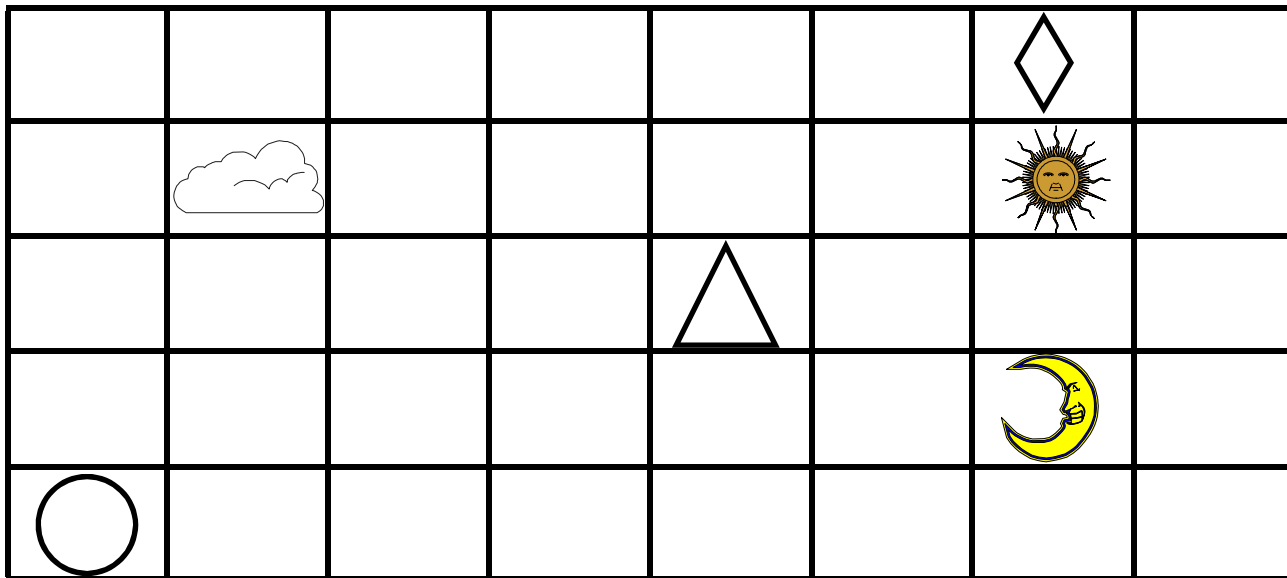
# The Ontario Curriculum: Mathematics

## Appendix 9 i

2m15 - use mathematical language to identify and describe numbers to 100 in the world around them;

2m18 - use ordinal numbers to thirty-first;

### Grid Lock



Follow these instructions:

1. Draw a red balloon in the 5th square.
2. Which square has the triangle in it?
3. Draw a star in the 22nd square.
4. In what position is the circle?
5. Is the diamond in the seventh or eighth position?
6. Draw a house in the 30th square.
7. Colour the half-moon yellow. In what position is it?
8. Draw a tree in the ninth square.



# Number Sense and Numeration

## Appendix 9j

### Strategies for Teaching Addition and Subtraction

Expectations	Teaching Strategies	Assessment Strategies
<p><b>2m4</b> - understand and explain basic operations (addition, subtraction, multiplication, and division) of whole numbers by modelling and discussing a variety of problem situations (e.g., show that division is sharing, show addition and subtraction with money amounts);</p> <p><b>2m5</b> - develop proficiency in adding and subtracting one- and two-digit whole numbers;</p> <p><b>2m6</b> - solve number problems involving addition and subtraction, and describe and explain the strategies used;</p> <p><b>2m21</b> - investigate the properties of whole numbers (e.g., addition fact families, <math>3 + 2 = 2 + 3</math>);</p> <p><b>2m25</b> - recall addition and subtraction facts to 18;</p> <p><b>2m27</b> - use one fact to find another (e.g., use fact families or adding on);</p> <p><b>2m28</b> - mentally add and subtract one-digit numbers;</p>	<p><b>Fact Families</b> -</p> <p>a) teach the concept of turn-arounds; e.g., <math>4+3</math> is the same as <math>3+4</math>;</p> <p>b) have the students explore <i>fact families</i>; e.g., <math>5+1</math>, <math>5+2</math>, etc. to find the patterns within;</p> <p>c) use flashcards to reinforce facts; d) teach the students to be aware that addition and subtraction facts are related; e.g., <math>4+3=7</math>, <math>7-4=3</math>; e) use counters to find all of the facts for each sum; e.g., <math>2+3=5</math>, <math>4+1=5</math>, <math>8-3=5</math>, etc. to the sum of 20.</p> <p><b>Methods of Addition</b></p> <p>a) <i>Counting on by 1,2,3</i> - <math>2+1</math>, <math>2+2</math>, <math>2+3</math> etc. - Practice the skill of counting on until it becomes rote.</p> <p>b) <i>Turn Arounds</i> - <math>4+3 = 3+4</math> - Let your students know that this is a way to cut down on the number of facts to memorize.</p> <p>c) <i>Learn Facts of 0</i></p> <p>d) Provide plenty of opportunities to apply these skills using <i>Mad Minute</i>, drill sheets, flashcards, etc.</p> <p>e) <i>Teach Doubles</i> - <math>2+2</math>, <math>3+3</math>, <math>4+4</math> etc.</p> <p>f) Provide opportunities for students to explore facts, or check work, using calculators</p>	<p><b>Daily</b></p> <p>a) Timed flashcards or worksheet drills.</p> <p>b) Practice in pairs with flashcards. Use a checklist to monitor program.</p> <p>c) Use the strategies to solve problems.</p> <p>d) Oral dictation.</p> <p>e) Student-teacher conference.</p> <p>f) Anecdotal observations.</p> <p>g) Rubric for addition/subtraction.</p> <p><b>Modifications for Exceptional Students</b></p> <p>a) Use number line, ruler, concrete material, abacus, computer.</p> <p>b) Provide a model, steps to follow and tape them to the students' desks.</p> <p>c) Modified workload; e.g., 5 questions rather than 10.</p> <p>d) Model self-talk so that the student is able to learn how to do this when working through the answers.</p> <p>e) Allow the use of calculators.</p> <p>f) Break process of 2 digit calculation into steps. Don't move on until the concept is grasped.</p>

# The Ontario Curriculum: Mathematics

## Appendix 9 k

### Strategies for Teaching Addition and Subtraction

Expectations	Teaching Strategies	Assessment Strategies
<p><b>2m7</b> - use and describe an estimation strategy (e.g., grouping, comparing, rounding to the nearest ten), and check an answer for reasonableness using a defined procedure;</p> <p><b>2m21</b> - investigate the properties of whole numbers (e.g., addition fact families, <math>3 + 2 = 2 + 3</math>);</p> <p><b>2m25</b> - recall addition and subtraction facts to 18;</p> <p><b>2m26</b> - explain a variety of strategies to find sums and differences of 2 two-digit numbers;</p> <p><b>2m27</b> - use one fact to find another (e.g., use fact families or adding on);</p> <p><b>2m28</b> - mentally add and subtract one-digit numbers;</p> <p><b>2m29</b> - add and subtract two-digit numbers with and without regrouping, with sums less than 101, using concrete materials;</p> <p><b>2m31</b> - use a calculator to solve problems with numbers larger than 50 in real-life situations;</p>	<p><b>Methods of Subtraction</b></p> <p>a) <i>Counting back by 1,2,3, e.g., 5-1, 5-2, 5-3, etc.</i></p> <p>b) <i>Facts of 0</i> (some of these are doubles) 9-9, 9-0.</p> <p>c) <i>Relate doubles</i> - addition fact to the subtraction fact; e.g., <math>5+5 = 10-5</math>.</p> <p>d) <i>Lots of opportunity to practice.</i></p> <p><b>Addition/Subtraction of 2-digit Numbers</b></p> <p>a) Use concrete materials to practice how to add/subtract large numbers.</p> <p>b) Review trading. Apply it to addition/subtraction.</p> <p>c) Teach student to realize when trading, re-grouping, is required and when it is not.</p> <p>d) Have students verbalize their thought processes. Steps which they go through to complete large number computations.</p> <p>e) Use estimation as a tool to check reasonableness of the answers.</p> <p>f) Model checking subtraction by using addition.</p> <p>g) Use calculators to check work.</p> <p>h) Use computer programs such as <b>Mathville Jungleway</b>, <i>Bubble Fish</i>, <i>Jungle Seesaw</i>, <i>Lots of Legs</i>, etc.</p>	<p><b>Daily</b></p> <p>a) Timed flashcards or worksheet drills.</p> <p>b) Practice in pairs with flashcards. Use a checklist to monitor program.</p> <p>c) Use the strategies to solve problems.</p> <p>d) Oral dictation.</p> <p>e) Student-teacher conference.</p> <p>f) Anecdotal observations.</p> <p>g) Rubric for addition/subtraction.</p> <p><b>Modifications for Exceptional Students</b></p> <p>a) Use number line, ruler, concrete material, abacus.</p> <p>b) Provide a model, steps to follow and tape them to the students' desks.</p> <p>c) Modified workload; e.g., 5 questions rather than 10.</p> <p>d) Model self-talk so that the student is able to learn how to do this when working through the answers.</p> <p>e) Allow the use of calculators.</p> <p>f) Break process of 2 digit calculation into steps. Don't move on until the concept is grasped.</p>



# **Number Sense and Numeration**

