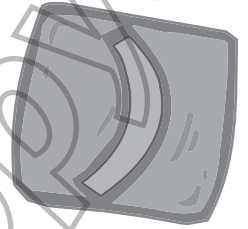
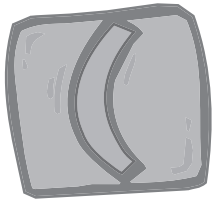
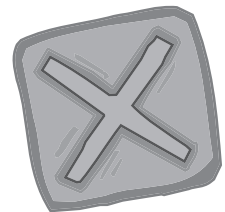
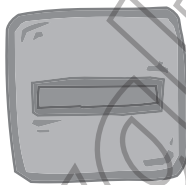


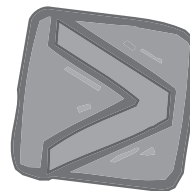
# Integer Number Concepts & Operations:



## Teacher Resource Guide



- Suggested Notes
- Supplementary worksheets
- Units tests
- Answer keys



Copyright © 2003 Clear Educational Solutions

This publication, in whole or in part, may not be reproduced or transmitted in any form or by any means, electronic or mechanical, including photocopying, recording, or any information storage and retrieval system now known or to be invented, without permission in writing from the publisher.

Clear Educational Solutions and Calvin Leung hereby grants written permission to teachers to produce and retain ONE over head projector acetate copy, if and only if, said copy is used directly in conjunction with a class set of legally purchased workbooks during classroom instruction.

Leung, Calvin

Integer Number Concepts & Operations: Teacher Resource Guide

ISBN 0-9733755-1-5

Published by

Clear Educational Solutions

Langley, British Columbia

Canada

[www.ClrEduSol.com](http://www.ClrEduSol.com)

# Integer Number Concepts & Operations

## Teacher Resource Guide

**Calvin Leung**

The purpose of this publication is to provide an outline for teachers and students to use during direct classroom instruction. Through a workbook format, students can follow lessons more easily with less copying and more time-on-task. Each day starts with review of earlier work from the unit. The structure of each lesson is to review and work from the familiar to develop understanding. There is built in practice throughout each lesson. By the end of each lesson, it is hoped that teachers will also emphasize upon students the need to practice and remember what they have learned. By the end of the booklet, students will have developed fundamental ways to understand the core concepts regarding integer numbers and their operations. Understanding is important but ultimately, the students need to be able to carry out the operations without teacher or calculator assistance. Here is how to use this program:

- 1) Make an Over head projector acetate copy of the student work book.
- 2) Supply each of your students with a notebook/workbook.
- 3) Following the suggested notes in this Teacher Resource Guide, fill out the questions and notes as the students follow the lesson. Be sure to have the students attempt the lesson practice questions as opposed to simply having them copy the answers that you write down.
- 4) Assign the practice (homework) for that day.
- 5) Each go over the answers to the previous day's work. If students need more practice, assign the Supplemental sheet for that concept.

**THIS MATERIAL IS DESIGNED TO MINIMIZE TEACHER PREPARATION TIME  
WHILE DELIVERING HIGHLY EFFECTIVE INSTRUCTION TO THE STUDENT.**

The method of instruction can be manipulative based if desired. There is much pictorial and some language linking in the instruction. Kinesthetic movement may also be helpful. For example, you may have your students rise up or down, or use their thumbs to indicate a positive, zero, or negative answers. You may have a student come to the front of the class and give him/her text books as weights and ask what would happen as each text is added or taken away – would they float upwards or downwards.

The content of this book is focussed mainly at middle school level students. Because of the level of difficulty, some of the questions involving Order of Operations may be used as extensions depending on the grade level of the students. All notations for use during lessons is in the following font:

*This is a font sample of the notes to give to students during the lessons: 1, 2, 3, 4, 5, 6, 7...*

This Teacher Resource book contains all the suggested notes and answers to student practice questions. Also included is a supplemental student practice sheet for each major concept as well as two versions of an unit end test. Each supplemental sheet starts with easier questions for practice, building to more difficult examples. Please note that Unit Test Version 1 is more difficult than Version 2.

**Table of Contents:**

Integer Numbers and How to Add Them (Lesson Notes)	1
Practice Questions (and Answers)	7
Subtracting Integers (Lesson Notes)	11
Practice Questions (and Answers)	14
Multiplying Integers (Lesson Notes)	16
Practice Questions (and Answers)	19
Dividing Integers (Lesson Notes)	21
Practice Questions (and Answers)	23
Order of Operations & Integers: Part One (Lesson Notes)	26
Practice Questions (and Answers)	32
Order of Operations & Integers: Part Two (Lesson Notes)	33
Practice Questions (and Answers)	34
Integer Unit Review: Practice Test (and Answers)	36
Integer Concepts Supplement	38
Integer Addition Supplement	39
Integer Subtraction Supplement	40
Integer Multiplication Supplement	41
Integer Division Supplement	42
Integers – Mixed Operations Supplement	43
Integers & BEDMAS Supplement	44
Integer Unit Test Version 1	45
Integer Unit Test Version 2	49
Answer Keys to Tests & Supplemental Sheets	52

## TOPIC: SUBTRACTING INTEGERS

**Review** from last class.

Simplify the following:

a)  $(-8) + (-15) = -23$

b)  $22 + (-14) = 8$

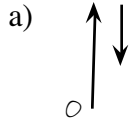
c)  $(-37) + (24) = -13$

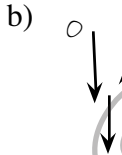
d)  $-12 + 17 + (-11) = -6$

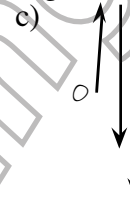
e)  $(-53) + (-20) + 13 = -60$

f)  $(+12) + (-30) + (-7) = -25$

Given the following arrow diagrams, what are the signs on the numbers being added, and on the answer?

a)   
 $(+) + (-) = +$

b)   
 $(-) + (-) + (+) = -$

c)   
 $(+) + (-) + (-) = -$

### **What does it mean to subtract something?**

In your own words, write an explanation for the word "subtraction." *To take away or to lose something*

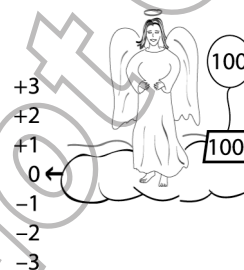
List as many words or phrases as you can, that mean "subtract or subtraction."

*Take away, lost, decrease, remove, give away, reduced by, shrink by, ...*

### **Understanding subtraction of integers**

Imagine Integer Angel floating at zero. If we gave her 100 balloons and 100 weights, what would happen to her? Explain why.

*She would not move at all because the weights and balloons perfectly cancel each other out.*



So, there is Integer Angel with her 100 balloons and 100 weights. Now, let's say you want her to go **up 4** spaces but you do not have any balloons to give her. How can you still make her move up 4 spaces?

*If we take away 4 of her weights, she will get lighter and move upwards.*

Again, there is Integer Angel at zero with 100 balloons and 100 weights. If you want to make her drop **down 28** steps but do not have any weights to give her, how can you still get the end result of 28 down?

*If we take away 28 balloons she will move downwards.*

TAKING AWAY BALLOONS makes Integer Angel move down

TAKING AWAY WEIGHTS makes Integer Angel move up



## Another way to "subtract" integers.

Now that we understand the results of the operation of subtraction for integers, let's see if we can think of another, possibly easier way, to get the same results. This is based on the idea that most people have a much easier time with addition than they do with subtraction. Remember what we found earlier?

Taking away balloons is the same as adding weights.

Taking away weights is the same as adding balloons.

See what we wrote just above? An easier way to do subtraction is to "ADD THE OPPOSITE." Look at the following examples to see the original expression and then what we change it to make it easier:

Original expression	Equivalent expression	
a) $43 - (-6)$	$43 + (+6)$	taking away weights $\rightarrow$ adding balloons = 49
b) $15 - (+6)$	$15 + (-6)$	taking away balloons $\rightarrow$ adding weights = 9
c) $-23 - 8$	$-23 + (-8)$	taking away balloons $\rightarrow$ adding weights = -31
d) $-14 - (-5)$	$-14 + (+5)$	taking away weights $\rightarrow$ adding balloons = -9
e) $15 - 34 + (-3) - (-9)$	$15 + (-34) + (-3) + (+9)$	= -13

When we change a *subtraction* sign to addition, the sign on the second integer changes its opposite. Concentrate on one subtraction sign and the number immediately to its left and right. Try changing these and then evaluating for practice:

a)  $19 + (+30) = -11$    b)  $17 + (-31) = -14$    c)  $-12 + (+34) = 22$    d)  $5 + (+14) + (-6) = 13$

Some of you may prefer to perform the subtraction without changing to "add the opposite." For example some of you might think according to Method 1. Other prefer to follow "add the opposite" in Method 2.

Method 1	Method 2
$\begin{array}{c} \boxed{-5} - \boxed{-14} \\ \swarrow \quad \searrow \\ \text{five weights} \quad \text{take away 14 weights} \\ \text{means down 5} \quad \text{means up 14} \end{array}$ <p style="text-align: center;">answer = +9</p>	$\begin{array}{c} \boxed{-5} + \boxed{+14} \\ \swarrow \quad \searrow \\ \text{five weights} \quad \text{add 14 balloons} \\ \text{means down 5} \quad \text{means up 14} \end{array}$ <p style="text-align: center;">answer = +9</p>

Notice that both methods get the same answer so it does not matter which method you choose. Just use the way that works better for you. Practice changing and evaluating:

a)  $8 + (-19) + (-4) = -15$    b)  $-7 + (+3) + (-14) + (-8) = -26$    c)  $12 + (+5) + (+9) + (-3) = 13$

**Lesson Summary:**

*For subtracting integers, it is often easier to "ADD THE OPPOSITE".*

*Taking away weights gives the same result as adding balloons (the Angel moves up).*

*Taking away balloons gives the same result as adding weights (the Angel moves down).*

*When I change a subtraction sign to a "+", the sign on the integer to the immediate right changes to the opposite of whatever it was to begin with.*

**PRACTICE QUESTIONS:** (No calculators for any of these questions!)

1. Write a precise balloons and weights statement that means:

a)  $-(-15)$  take away fifteen weights

b)  $-(+7)$  take away seven balloons

c)  $+(-8)$  add eight weights

d)  $-20$  twenty weights

2. Draw an up or down arrow for each separate question:

a)  $-14$  ↓      c)  $-(-12)$  ↑      e)  $+(-5)$  ↓      g)  $+20$  ↑

b)  $(-29)$  ↓      d)  $-(+9)$  ↓      f)  $-(14)$  ↓      h)  $+(-32)$  ↓

3. Subtract the following.

a)  $-15 - 8 = -23$

g)  $-12 - (-19) = 7$

b)  $17 - 26 = -9$

h)  $-8 - 5 - 2 = -15$

c)  $24 - 18 = 6$

i)  $12 - 20 - (+4) = -12$

d)  $-7 - 7 = -14$

j)  $-4 - (-12) - 5 = 3$

e)  $-28 - (-20) = -8$

k)  $6 - (+8) - (-7) = 5$

f)  $8 - (-6) = 14$

l)  $-17 - 6 - (-4) = -19$

4. For each word statement write a number expression and then evaluate.

a) Take away five balloons, add ten weights, then take away six balloons.

$$\underline{- (+5) + (-10) - (+6) = -21}$$

b) Add three balloons, take away eleven weights.

$$\underline{3 - (-11) = 14}$$

c) Take away thirteen weights, then take away seven weights.

$$\underline{-(-13) - (-7) = 20}$$

d) Give Angel twenty-five balloons, then give twenty-five weights.

$$\underline{(+25) + (-25) = 0}$$

e) Give Angel nineteen balloons, then take away nineteen weights.

$$\underline{19 - (-19) = 38}$$

f) Give Angel sixty-two weights, then take away seventeen balloons.

$$\underline{-62 - 17 = -79}$$

g) Give Angel thirty weights, then take away eighteen weights.

$$\underline{-30 - (-18) = -12}$$

5. Simplify (notice that there is now a mix of addition and subtraction questions):

a)  $6 + (-14) - 8 = -16$

g)  $(-12) + (-5) - 15 = -32$

b)  $15 - (-7) + (-4) = 18$

h)  $(+23) + 7 - (21) = 9$

c)  $-9 - 11 + 7 = -13$

i)  $(-8) + (-19) - (-12) = -15$

d)  $20 - (+15) - 9 = -4$

j)  $-17 - 8 - (-21) = -4$

e)  $-12 - (-7) + (-9) = -14$

k)  $50 + (-35) - (-7) = 22$

f)  $-9 + (-14) - (-7) = -16$

l)  $-14 - (-8) - (+9) = -15$

## Integer Addition Supplement

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

*Remember:* Adding integers of the same sign mean they are: both going upwards  $(+) + (+) = +$   
or both going downwards  $(-) + (-) = -$

Add the numbers together, then use the sign that was on the numbers for the answer.

e.g.,  $(+6) + (+8) = 14$        $(-5) + (-19) = -24$

Adding integers of opposite signs mean they are going in different directions. One of the numbers makes the Angel go upwards, the other downwards. Which way did she move more, up or down?

Subtract the numbers, then use the sign from the larger magnitude number.

e.g.,  $12 + (-9) = 3$        $(11) + (-19) = -8$        $(-6) + 6 = 0$

---

1. Simplify the following:

a)  $-5 + 3$

f)  $7 + (-9)$

k)  $(-2) + (8)$

b)  $8 + 7$

g)  $6 + (+8)$

l)  $(+7) + (-2)$

c)  $(-7) + (-3)$

h)  $(+9) + (-4)$

m)  $7 + (-7)$

d)  $(-4) + 9$

i)  $(-4) + (-4)$

n)  $(-9) + (-7)$

e)  $(-6) + (-8)$

j)  $(7) + (-1)$

o)  $(-4) + (+5)$

2. Evaluate:

a)  $(-14) + (-8)$

f)  $37 + 12$

k)  $(-3) + (12)$

b)  $(+12) + (-11)$

g)  $(-11) + (-9)$

l)  $(-21) + (-11)$

c)  $-9 + 32$

h)  $-11 + 20$

m)  $(-8) + (19)$

d)  $65 + (-40)$

i)  $-6 + (-19)$

n)  $(-15) + (-7)$

e)  $-24 + 17$

j)  $(+7) + (-21)$

o)  $(-24) + (+30)$

3. Simplify:

a)  $(-7) + 12 + (-3)$

f)  $45 + (-20) + (-25)$

k)  $7 + (-14) + (-3)$

b)  $8 + (-10) + (-12)$

g)  $(-15) + 14 + (-18)$

l)  $(-4) + 6 + (-8) + 3$

c)  $(-22) + (9) + (2)$

h)  $(9) + (23) + (-8)$

m)  $2 + 9 + (-13) + 5$

d)  $(12) + (9) + (-7)$

i)  $(-5) + (-12) + (-9)$

n)  $(-7) + (-4) + 2 + 5$

e)  $15 + (-11) + 19$

j)  $(-11) + (-5) + (16)$

o)  $12 + (-7) + (-8) + 1$

## Answer Keys to Supplemental Worksheets & Integer Unit Tests

### Integer Concepts Supplement p. 38

1. Integers:

$-\frac{3}{4}$   $-9$   $0.1$   $\sqrt{9}$   $\frac{20}{5}$   $-15.75$   $1$   $\sqrt{12}$   $\frac{2}{6}$

2. Largest value: a) 3 b) 20 c) 0 d) -2 e) 12 f) -5

3. a) -9, -3, 0, 1, 12 b) -21, -18, 17, 19 c) -100, -9, 0, 3

4. a)  $-10 > -16$  c)  $-3 < 21$  e)  $-1000 < 2$   
b)  $-12 < 0$  d)  $-9 < -8$  f)  $-45 > -91$

5. a) -5 b) -7 c) -8 d) -15 e) -4 f) +300 g) -5 h) -75

6. a)  $\downarrow 6$  b)  $\downarrow 7$  c)  $\uparrow 5$  d)  $\downarrow 12$  e)  $\uparrow 4$  f)  $\uparrow 9$  g)  $\downarrow 20$  h)  $\downarrow 11$

### Integer Addition Supplement p. 39

1. a) -2 b) 15 c) -10 d) 5 e) -14 f) -2 g) 14 h) 5  
i) -8 j) 6 k) 6 l) 5 m) 0 n) -16 o) 1

2. a) -22 b) 1 c) 23 d) 25 e) -7 f) 49 g) -20 h) 9  
i) -25 j) -14 k) 9 l) -32 m) 11 n) -22 o) 6

3. a) 2 b) -14 c) -11 d) 14 e) 23 f) 0 g) -19 h) 24  
i) -26 j) 0 k) -10 l) -3 m) 3 n) -4 o) -2

### Integer Subtraction Supplement p. 40

1. a) -4 b) -10 c) 9 d) 9 e) -7 f) -11 g) -5 h) 6  
i) -8 j) -18 k) 0 l) -6 m) -5 n) 2 o) 13

2. a) -21 b) 25 c) -17 d) -37 e) -8 f) 27 g) 21 h) 15  
i) -44 j) 61 k) -15 l) -18

3. a) 6 b) -12 c) -19 d) -3 e) -16 f) -3 g) -4 h) -29  
i) -18 j) -19 k) 13 l) 0

Evaluation Sample.  
Pages Missing.  
Do Not Copy.

Clear **Educational Solutions**

Producer & Distributor of InstaGraphs  
[www.ClrEduSol.com](http://www.ClrEduSol.com)

ISBN 0-9733755-1-5