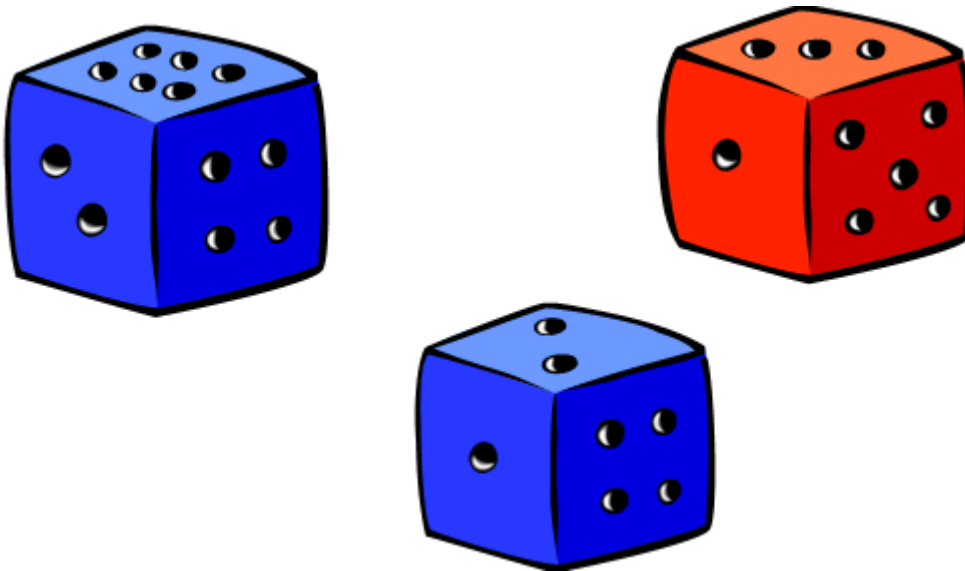


Integer War

A game with a purpose

Instructional Unit Resource Guide

Based on Principles of Universal Design and Differentiated Instruction



$$6 + 2 - 3 = 5 \quad 6 \times 3 + 2 = 20 \quad 2^3 + 6 = 14$$

Include the following information on this page:

Project Title: Integer War

Grade Level 6- 12

Focus Adding, Subtracting, Multiplying, and Dividing Integers

Author names: Dave Andrews & Becki Demuth

Agency/School District: Richmond Community Schools, Richmond Indiana

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Appendix A - The Game

Message to the Reader / Teacher

Teaching integer operations in most cases should be nothing more than an extension of basic math of adding and subtracting whole numbers, but when we add in negative numbers the world goes haywire for many students. This lesson is designed to be used after the integers have been introduced, examples have been worked out and the students have been given plenty of practice. An integer war is a culminating activity designed to let the students show their understanding by designing their own equations using the mathematical operations to arrive at a prescribed solution. The best time to do this lesson would be prior to the summative assessment as a break from the everyday hum drum activities. Our goal in the future is to make the game totally electronic but for now it is paper version with the help from the projected video and scientific calculators.

Two teachers prepared this lesson plan and unit of instruction. It is used by all five teachers on the math team of our Ninth Grade Academy. Dave Andrews, is a general education math teacher who teaches both pre-algebra and algebra classes. Dave is technology savvy and not afraid to try new things. He has been teaching for four years in our Academy and serves as the math academic coach for Richmond High School. Becki Demuth, a special education teacher has 33 years of experience and teaches pre-algebra as the inclusion teacher in the Academy. Becki knows more about technology than when the PATINS Project began and has been instrumental in guiding the use of the technology. Becki also serves as the special education department chairman.

This unit was designed using Richmond High School's guaranteed and viable curriculum that is aligned with Indiana academic standards. It is taught during the second trimester of pre-algebra and first trimester of algebra. The object of this unit is for students to understand and be able to work with integers. It is designed to change as students' level of understanding progresses. Beginning with simple equations designed by the students using whole numbers operations, progressing to the next level where students operations using integers to write their own equations and finally culminating in the students write equations using integers, basic mathematical operations, exponents and roots.

Dave Andrews can be reached at floyda@rcs.k12.in.us

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Standards and Benchmarks

What standards will be met by teaching this unit?

The following Indiana State standards will be met as a result of student learning during this unit of study.

6.1.1 Understand and apply the basic concept of negative numbers

6.2.1 Add and subtract positive and negative integers.

6.2.2 Multiply and divide positive and negative integers.

7.2.1 Solve addition, subtraction, multiplication, and division problems that use integers, fractions, and decimals, and combinations of the four operations.

8.2.1 Add, subtract, multiply, and divide rational numbers (integers, fractions, and terminating decimals) in multi-step problems.

A1.9.3 Use the properties of the real number system and the order of operations to justify the steps of simplifying functions and solving equations.

These standards are from The Indiana Department of Education, Indiana Standards and Resources located at:

<http://dc.doe.in.gov/Standards/AcademicStandards/StandardSearch.aspx>

Common Core State Standards

7NS-2 Understand and perform addition and subtraction with rational numbers

7NS-3 Understand and perform multiplication and division with rational numbers

A-CED-1 Understand that equations in one variable are often created to describe properties of a specific but unknown number.

These standards are from Common Core Standards Organization Page located at:

<http://www.corestandards.org/Standards/K12/>

Resource Help

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Developing Educational Standards: <http://www.edStandards.org/Standards.html>

MCREL: <http://www.mcrel.org/standards-benchmarks/>

Indiana Learning Standards: <http://www.doe.state.in.us/standards/>

http://www.indianastandardsresources.org/files/math/math_7_2_1.pdf

http://www.indianastandardsresources.org/files/math/math_6_2_1.pdf

http://www.indianastandardsresources.org/files/math/ca_math_6_2_1_b.pdf

http://www.indianastandardsresources.org/files/math/ca_math_6_2_1_a.pdf

http://www.indianastandardsresources.org/files/math/ca_math_6_2_1_b.pdf

www.MathMammoth.com adding, subtracting, multiplying, and dividing integers

ISTE - National Educational Technology Standards: <http://www.cnets.iste.org>

Common Core State Standards: <http://www.corestandards.org/Standards/K12/>

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Planning Pyramid

Some students will know

How to write equations using exponents and square roots of perfect squares

How to write and solve a three operation equation to represent a specific number

Most students will know

How to simplify expression and solve equations using distributive property

How to write and solve equations using parentheses

How to write and solve a two step equation

All students will know

How to recognize the inverse of a given operation

Understand vocabulary:

inverse operation ○ integer

evaluation ○ whole number

like terms ○ order of operation

evaluate ○ arithmetic operations

simplify ○ exponents

Perform basic operations +, -, x, / with integers

How to write and solve one step equations

Teacher Library

What materials and resources will be useful for teachers?

Pre-made math games can be found at MATH-PLAY.COM <http://www.math-play.com/>

This website offers games which can be played as individuals or as a group project using your technology here is their goal. 1 to copy or modify is granted if rights are

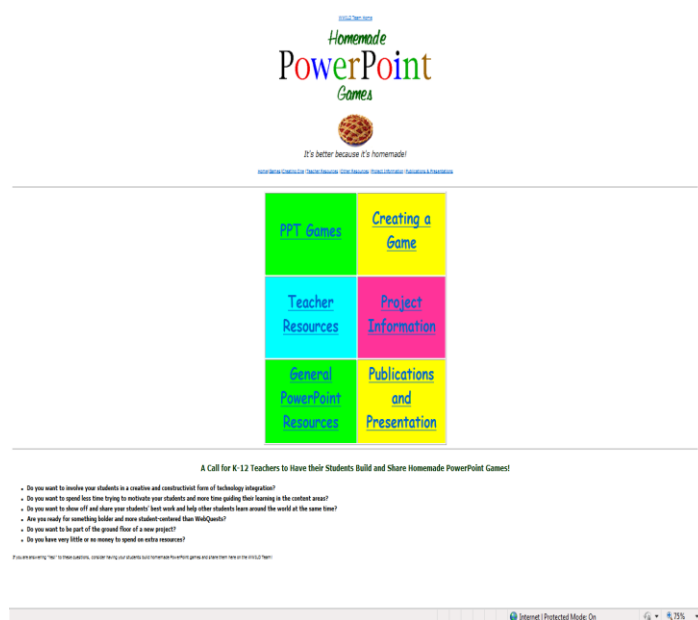
"Whether you are a student, parent, or teacher looking for [free online math games](#), Math Play tries to provide you

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Make your on math based games at Homemade PowerPoint Games at <http://it.coe.uga.edu/wwild/pptgames/index.html>

As part of PowerPoint game infrastructure, this project will take advantage of the WWILD (World Wide Interactive Learning Design) Team web site. Its searchable database now includes PowerPoint games as a software category. Teachers can have their students' best PowerPoint games added to the WWILD Team database



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Learner Activities

What materials and resources will be useful for engaging students in meaningful learning activities?

Game board: Print out game board (slides 7) one for each pair of student

Score Sheet: Print out score sheet (slide 8) one for each student

6 dice 3 red & 3 white

1 bag to keep the dice

Pencils

Scientific Calculators

Video projection unit to display game examples.

The three versions of the game are designed to be used as the students level of understanding increases over a couple of weeks.

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Assessment

What materials and resources will be useful for assessing student knowledge and skills?

Do they know it? Students should have their basic arithmetic facts and their basic operations involving fractions, decimals, whole numbers, and integers, as well as place value.

When the students have had enough practice solving equation the game will enforce their understanding and demonstrate their complete knowledge of working with integers.

Recognize the declarative rules for addition, subtraction, multiplication, and division of integers.

Can they do it? Students will be assessed in a variety of ways:

Informal daily assessments over material from previous day's lessons (daily five)

Informal clickers quizzes

Informal smart notebook work

Periodic notebook check for the class notes and examples

Weekly Friday quizzes assessing the week's work

Final exam covering complete trimester material

Possible resources for locating assessment materials:

Scoring Guide for Student Projects: <http://www.ncrtec.org/tl/sgsp/index.html>

Rubrics, Rubric Maker: http://teachers.teach-nology.com/web_tools/rubrics

RubiStar: <http://rubistar.4teachers.org>

Electronic Quizzes: <http://www.funbrain.com>

<http://quiz.4teachers.org/>

<http://school.discovery.com/quizcenter/quizcenter.html>

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Authoring Software: <http://www.inspiration.com> (Kidspiration/Inspiration)

http://www.edhelper.com/teachers/graphic_organizer.htm

Test Taking Software: <http://www.quia.com>

Modifications Planning for Academic Diversity

For students that cannot read at grade level...

Try text to speech <http://www.readplease.com>

If a student has difficulty comprehending the material...

Try study aids <http://www.sparknotes.com>

If students have **difficulty mastering the vocabulary** of the unit, some suggestions include...

Try a picture dictionary <http://www.enchantedlearning.com/Dictionary.html>

Try a talking dictionary <http://www.webster.com/>

Try the visual thesaurus <http://www.visualthesaurus.com>

If you have students who need the instructional materials in a language other than English...

Try Babel Fish <http://babelfish.altavista.com>

If you have students who have **difficulty with handwriting**, (either speed or accuracy), then...

Consider dictation <http://www.idictate.com>

Consider allowing them to speak their answers in Kidspiration

<http://www.inspiration.com>

If you have students who need additional challenge, then...

Search Google or TrackStar for enrichment activities

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For students who have difficulty with the calculating activities in this unit, try...

Using Webmath <http://www.webmath.com>

Using Ask Dr. Math <http://mathforum.org/dr.math/>

If your unit requires students to conduct research, you might want to...

Use the NewsTracker <http://my.yahoo.com>

Use the Google Toolbar <http://toolbar.google.com/>

Use a simplified search engine <http://yahooligans.yahoo.com/>

Appendix A - The Game

Modifications: Planning for Academic Diversity

| <u>LEARNING BARRIER</u> | <u>POSSIBLE SOLUTIONS</u> | <u>WEB RESOURCES</u> |
|---|--|--|
| <u>Student cannot read at grade level.</u> | <u>Read Write Gold</u> <u>Inclusion adult read aloud</u> <u>Reading Pens</u> | www.readwritegold.com www.mindconnection.com |
| <u>Student has difficulty comprehending the material.</u> | <u>Extra practice</u> | www.k11.k12.il.us/King/math.htm |
| <u>Student has difficulty mastering the vocabulary of the unit.</u> | <u>Vocabulary word wall</u> <u>Think Alouds</u> | www.edu.gov.on.ca/eng/studentsuccess/thinkliteracy/files/ThinkLitWordWalls |
| <u>Student has difficulty with handwriting (speed or accuracy).</u> | <u>Dragon speak software</u> <u>Use squared paper for organization</u> | www.Nuance.com |
| <u>Student has difficulty with calculating activities.</u> | <u>Premier software on screen calculator</u> <u>Model correct steps</u> | www.fi.uu.nl/toepassing/02017/toepassing www.aaamath.com |
| <u>Student needs the instructional material in a language other than English.</u> | <u>Use diagrams and graphics</u> <u>Limit number of problems</u> <u>Clarity checks</u> | teachingtoday.glencoe.com |
| <u>Student needs additional challenge.</u> | <u>Math sites</u> <u>calculator games</u> | www.math-videos-online.com http://www.shodor.org http://www.mathwire.com |

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Possible resources for developing modifications and accommodations:

Making Modifications in the Classroom: A Collection of Checklists:

http://www.ldonline.org/ld_indepth/teaching_techniques/mod_checklists.html

National Center on Educational Outcomes: <http://www.education.umn.edu/NCEO/>

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Appendix A - The Game

Slide 1 - The Story behind the game:

The Story of the "Integer War"

In the real world, there are guys who accentuate the negative, then there are guys who are positively positive, and finally there is this guy called zero who seems to give value to everyone.

The positive guys wanted to include zero in their group so they would feel whole and have all the value. The negatives were upset with this idea and wanted to claim zero for their own.

The battle is on to see who will win zero.....



Slide 2 - Game directions

Game Directions

- The goal of the game is to claim as many spaces on the board by using equations to solve the war.
- To play the game you have to pull three dice out of the bag and make an equation to solve for one of the 34 spaces.
- To win the game you have to secure the most spaces on the game board.

Rules



Rules of game

- **Rule 1** Pull three colored dice from the bag and roll the dice, record value on sheet in appropriate column.
- **Rule 2** Using at least two different operations (+, -, \times , \div , $\sqrt{\quad}$) write and solve an equation that equals a number on the game board.
- **Rule 3** Using the answer to your equation, claim your board space with your initials.
- **Rule 4** If your opponent's equation is solved incorrectly after they initialed the space, you may correct the equation and claim the space as your own.



Rules of game

- **Rule 5** If your number is already occupied or does not exist on the game board, you lose your turn.
- **Rule 6** Once all the spaces are filled or the time limit has expired, the person with the most claimed spaces wins.
- **Rule 7** In case of a tie one player rolls three dice. Both players use two different operation to create the largest answer with those numbers.



Game Preparation

- **Game board:** Print out game board (slides 7) one for each pair of student
- **Score Sheet:** Print out score sheet (slide 8) one for each student
- 6 dice 3 red & 3 white
- 1 bag to keep the dice



Slide 6 - Game Board Version 1

| | | | | | | | | | | | |
|----|----|----|----|----|----|----|----|----|----|----|----|
| 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 | 25 | 26 | 27 | 28 |
| 16 | | | | | | | | | | | 29 |
| 15 | | | | | | | | | | | 30 |
| 14 | | | | | | | | | | | 31 |
| 13 | | | | | | | | | | | 32 |
| 12 | | | | | | | | | | | 33 |
| 11 | 10 | 9 | 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 | 0 |

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VERSION 1




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Slide 7 - Game board version 2 & 3

| | | | | | | | | | | | |
|-----|-----|----|----|----|----|----|----|----|----|----|---|
| 17 | 16 | 15 | 14 | 13 | 12 | 11 | 10 | 9 | 8 | 7 | 6 |
| -16 | | | | | | | | | | | 5 |
| -15 | | | | | | | | | | | 4 |
| -14 | | | | | | | | | | | 3 |
| -13 | | | | | | | | | | | 2 |
| -12 | | | | | | | | | | | 1 |
| -11 | -10 | -9 | -8 | -7 | -6 | -5 | -4 | -3 | -2 | -1 | 0 |

VERSION 2 & 3

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Slide 8 - Score Card all versions


Integer War

Player 1 record rolls and work

| Roll | Die 1 | Die 2 | Die 3 | Equation w/answer |
|------|-------|-------|-------|-------------------|
| 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 | | | | |

Player 2 record rolls and work

| Roll | Die 1 | Die 2 | Die 3 | Equation w/answer |
|------|-------|-------|-------|-------------------|
| 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 | | | | |

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Educational Objectives

- **Audience**
 - Pre-Algebra & Algebra students
- **Subject Area Objectives**
 - Students solve addition, subtraction, multiplication, and division problems that use whole numbers and combinations of the four operations.
 - Write and solve linear equations, interpret the solution in the context, and verify the reasonableness of the results.
 - Advanced versions require the student to learn to use both positive and negative integers to write and solve equations
 - Final version requires students to integers, exponents and roots to write equations to solve

