**Pre-Calculus 11**

**Note Package**

**Delview Secondary School**

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Delview Secondary School Department Of Mathematics

**Pre-Calculus 11 Syllabus**

**Course Rational**

Learning to solve problems is the main reason for studying mathematics. In today’s technological world, many people are finding that their job demands higher levels of mathematical ability than ever before.

**Course Structure**

The material for this course will be delivered in a variety of ways, the intention being to address the different learning style preferences of students enrolled in the course and at the same time, utilize suitably proven teaching methods to ensure successful concept development. It is expected that all students will endeavor to work equally well independently or collaboratively.

Textbook assignments will be given on a regular basis. On going student self-assessment will be an integral part of this course as students learn to take responsibility for their own learning.

**Course Grade**

Students will be assessed and evaluated on an individual basis using a variety of the following techniques:

|  |  |  |
| --- | --- | --- |
| **Category** | **Description** | **Weight** |
| **Tests**  **&**  **Projects**  Teacher evaluation | • midterm testing  • chapter tests  • cumulative testing  • cross-grade testing  • projects | 80 % |
| **Quizzes**  Student self-assessment | • skill assessment  • *may* have chance for rewrite | 10 % |
| **Assignments**  **&**  **Practice**  Teacher evaluation  Student self-assessment  &  Concept and skill development | • worksheets  • group assignments  • homework completion  • in-class warm up questions | 10 % |

**Work Habits Grade**

Students are encouraged to demonstrate the kind of work habits that would be valued in any job situation. In general, qualities like punctuality, preparedness, perseverance through problem solving activities and diligence are minimum expectations in the work force. Students will be evaluated specifically as outlined in the Delview Student Agenda.

**Materials Required For Class**

|  |  |
| --- | --- |
| **Required Every Class** | **Required Occasionally** |
| • 2 pencils (no erasable pens)  • good eraser  • Math textbook  • 3-ring binder with loose-leaf paper  • scientific calculator  • ballpoint pen for marking work  • 30 cm ruler (unbroken)  • Math workbook  • Math notebook | • graphing paper (always have some in binder)  • pencil crayons  • scissors  • graphing calculator  • miscellaneous minor supplies as required |

**Course Content**

The Pre-Calculus 11 curriculum covers 9 main topics. It is meant to give the skills required for Pre-calculus 12. For those students who wish to go on, the concepts will also be needed for Calculus and beyond.

**Course Outline**

|  |  |
| --- | --- |
| **Topic** | **Chapter Of Textbook** |
| Radical Expressions and Equations  Quadratic Functions  Quadratic Equations  Systems of Equations  Linear and Quadratic Inequalities  Rational Expressions and Equations  Absolute Value and Reciprocal Functions  Sequences and Series  Trigonometry | 5  4  3  8  9  6  7  1  2 |
|  |  |
|  |  |
|  |  |

**Unit 1**

**Quadratics and Radicals**

Chapter 5 – Radical Expression and Equations

Chapter 4 – Quadratic Equations

Chapter 3 – Quadratic Functions

**Chapter 5 - Radical Expressions and Equations**

**5.1 Radicals**

**Lesson 1**

We’ll open this section with the definition of the radical.  If *n* is a positive integer that is greater than 1 and *a* is a real number then,

|  |  |  |
| --- | --- | --- |
|  | http://tutorial.math.lamar.edu/Classes/Alg/Radicals_files/eq0001MP.gifhttp://tutorial.math.lamar.edu/Classes/Alg/Radicals_files/eq0001M.gifhttp://tutorial.math.lamar.edu/Classes/Alg/Radicals_files/empty.gifhttp://tutorial.math.lamar.edu/Classes/Alg/Radicals_files/empty.gif |  |

where *n* is called the **index**, *a* is called the **radicand**, and the symbol http://tutorial.math.lamar.edu/Classes/Alg/Radicals_files/eq0002MP.gifhttp://tutorial.math.lamar.edu/Classes/Alg/Radicals_files/eq0002M.gifhttp://tutorial.math.lamar.edu/Classes/Alg/Radicals_files/empty.gifhttp://tutorial.math.lamar.edu/Classes/Alg/Radicals_files/empty.gifhttp://tutorial.math.lamar.edu/Classes/Alg/Radicals_files/empty.gif  called the **radical**.  The left side of this equation is often called the radical form and the right side is often called the exponent form.

Note as well that the index is required in these to make sure that we correctly evaluate the radical.  There is one exception to this rule and that is square root.  For square roots we have,

http://tutorial.math.lamar.edu/Classes/Alg/Radicals_files/eq0003MP.gifhttp://tutorial.math.lamar.edu/Classes/Alg/Radicals_files/eq0003M.gifhttp://tutorial.math.lamar.edu/Classes/Alg/Radicals_files/empty.gifhttp://tutorial.math.lamar.edu/Classes/Alg/Radicals_files/empty.gifhttp://tutorial.math.lamar.edu/Classes/Alg/Radicals_files/empty.gif

Radicals are the root of a number; for example, √16 is the \_\_\_\_\_\_\_\_\_\_\_\_ root of 16, 3√8 is the \_\_\_\_\_\_\_\_\_\_\_\_ root of 8, and n√x is the \_\_\_\_ root of \_\_\_\_ where *n* is a natural number.

The symbol √ is the radical sign. If n is even, this expression represents only the positive root.

Examples: √16 = \_\_\_\_ √-16 = \_\_\_\_

3√8 = \_\_\_\_ 3√-8 = \_\_\_\_

4√625 = \_\_\_\_ 4√-625 = \_\_\_\_

5√243 = \_\_\_\_ 5√-243 = \_\_\_\_

For the following, the radicals and their simplified expressions are given. Fill in the blanks.

RADICAL SIMPLIFIED

√4 √\_\_ × \_\_ 2

√8 √\_\_ × \_\_ ×\_\_ 2√2

√12 √\_\_ × \_\_ × \_\_ 2√3

√16 √\_\_×\_\_ OR √\_\_×\_\_×\_\_×\_\_ 4

√20 √\_\_×\_\_ OR √\_\_ × \_\_ × \_\_ 2√5

What patterns do you notice when simplifying radicals? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

How would you simplify the following?

1. 2√4 = \_\_\_\_\_\_ (b) 3√8= \_\_\_\_\_\_ (c) (√4)2 = \_\_\_\_\_\_

(d) 3√24 = √\_\_×\_\_ = √\_\_×\_\_×\_\_×\_\_ = \_\_3√\_\_

Simplify the following radicals:

(a) √(48*y*5) = (b) 3√-320 = (c) ( 3√24)3 =

(d) 3√163 = (e) 43√81 = (f) 43√27 =

(g) ½ 3√-192 = (h) 4√-81= (i) 4√*C*9 =

Example 2: Express each mixed radical in entire radical form. Identify the values of the variable for which the radical represents a real number.

1. 7√2 b) *a*4√*a* c)5*b* 3√3*b*2

**Like Radical:** they have the same radicand. Ex. 7√2 & 5√2

5√3 & √48 (√48 simplifies to 4√3)

Example 3: Order these irrational numbers from least to greatest.

# 4(13)1/2 8√3 14 √202 10√2

***Assignment:*** worksheet 204 & 207

**Lesson 2**

**Adding and Subtracting Radicals**

Adding and subtracting radicals is the same as adding and subtracting *like terms*.

Example: 2x + 3x = 5x → 2√3 + 3√3 = 5√3

5x – 3x = 2x → 5√3 - 3√3 = 2√3

4x + 2y = not possible to simplify → 4√6 + 2√10 = not possible (n.p.)

You try the following:

1. 8√3 - 3√15 = 2. 10√7 + 35√7 =

3. 52√11 - 9√11 = 4. 6√2 - 4√2 + √2 =

However, adding and subtracting can become complicated if you can simplify the radical first.

Example: 3√20 - √45 (√20 and √45 can be simplified!!!)

3√4×5 - √9×5 (4 and 9 can be square rooted or 4 and 9 contain doubles)

3×2√5 - 3√5 (now you can collect like terms)

6√5 - 3√5 = **3√5**

You try the following:

1. 4√18 - √8 2. √18 + √2 \*\*3. **3√**16 + 5 **3√** 54

4. √(4*c*) - 4√9*c*, c≥0 4. √(20x) - 3√45x, x≥0

Express the perimeter of the quadrilateral √8



in simplest radical form.





***Assignment:*** pg. 278 #1-6, 8-10, 13

Quiz next class

**Lesson 3**

**Multiplying Radicals**

1. √3 × √11 = 2. √7 × √5 = 3. √3 × √12 =

4. √8 × √128 = 5. 2√6 × √8 = 6. 5√10 × -3√6 =

7. 4√14 × 12√21 = 8. -9√2 × -8√32 = 9. 3√25 × √4 =

10. **3√**9 × **3√**12 = 11. 7 **3√**25× 3**3√**15 = 12. 4√20 × 10√8 × -6√6 =

**Multiplying Radicals and Binomials (FOIL)**

1. (-3√(2*x*))(4√6), *x*≥0
2. 
3. (9 3√(2*w*))(3√(4*w*) + 73√28), *w*≥0
4. 
5. 
6. 
7. 

Express the volume of the rectangular

prism in the simplest radical form.







An isosceles triangle has a base of √20 m. Each of the equal sides is 3√7m long. What is the exact area of the triangle?

***Assignment:*** worksheet 209 & 215

**Lesson 4**

**Dividing Radicals**

* 1. √30 = 2. √48 = 3. √52 =

√5 √6 √13

1. √2 = 5. √20 = 6. 3√3 =

√32 √36 √48

1. -2√30 = 8. 24√56 = 9. 35√120 =

√3 8 √8 7√5

1. 3√(20*x*2) , *x*>0= 11. 6√(75*n*), *n*≥0= 12. 4√11 , *y≠0*

4√(9*x*) 5√18 *y* 3√8

**RATIONALIZING THE DENOMINATOR**

Multiply the following:

a) √5 × √5 = b) √3 × √3 = c) √12 ×√12 =

d) 2√5 × √5 e) 7√3 × √3 f) 4√12 ×4√12 =

What did you notice in the above questions? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

You might have noticed from last class homework that your answers in the back of the book might have looked different. This is because the book uses the technique “*rationalizing the denominator.”* To rationalize the denominator means that there should be no radicals in the denominator for your final answer. It is another thing you are to do when you are asked to *simplify*.

Examples: For the following questions, simplify by rationalizing the denominator.

1. 12 Solution: 12 **× √3** = 12√3 (when multiplying fractions, multiply the top and bottom)

√3 √3 **√3** 3

= 4√3 (always reduce fractions if you can)

1. 5 Solution: 5 **× √5** = 5√5

√5 √5 **√5** 5

= √5

(c) 14 Solution: 14 **× √6** = 14√6 = 14√6

3√6 3√6 **√6** 3 × 6 18

= 7√6

9

Look at the above 3 examples on rationalizing the denominator. What must you do to the question in order to rationalize the denominator?

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

You try the following:

1. 8 = 2. 7 = 3. 6\_\_ = 4. 12 = \*\*5. 3\_\_ \*\* 6. 12

√2 √7 3√2 5√3 √18 √20

For a binomial denominator that contains a square root, multiply both the numerator and denominator by a **conjugate** of the denominator

The product of a pair of conjugates is a difference of squares.

(a-b)(a+b) = a2-b2

(√u+√v)(√u-√v) = (√u)2 + (√v)(√u)- (√v)(√u) – (√v)2

= u-v

Example 1:



Example 2:



Example 3:



***Assignment:*** worksheet & pg. 289 #6-14

**Lesson 5**

**SOLVING RADICAL EQUATIONS**

Recall that radical equations are those with the symbol . In order to solve these types if equations we must remove the radical sign by \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ both sides of the equation.



**NOTE**: The process of squaring both sides of an equation can change a false statement into a true statement (or an equation without a solution into one with a solution).

-5 = 5 FALSE

(-5)2 = (5)2

25 = 25 TRUE

Example:



x = 9 This is called an \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ because the root was obtained after squaring, but it is not a root of the original equation: not -3



*STEPS TO SOLVING RADICAL EQUATIONS:*

1. Isolate the radical on one side of the equation.
2. Square each side, and then solve the equation that results.
3. Identify the extraneous roots and reject them.

*EXAMPLES*: SOLVE EACH EQUATION

|  |  |
| --- | --- |
| (1) x≥0 | (2) x≥0 |
|  |  |
| CHECK: | CHECK: |
| (3) x≥0 | (3) x≥0 |
|  |  |
| CHECK: | CHECK: |

Assignment: Worksheet 216 & 217

Quiz next class

Review Assignment due: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Test:\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_