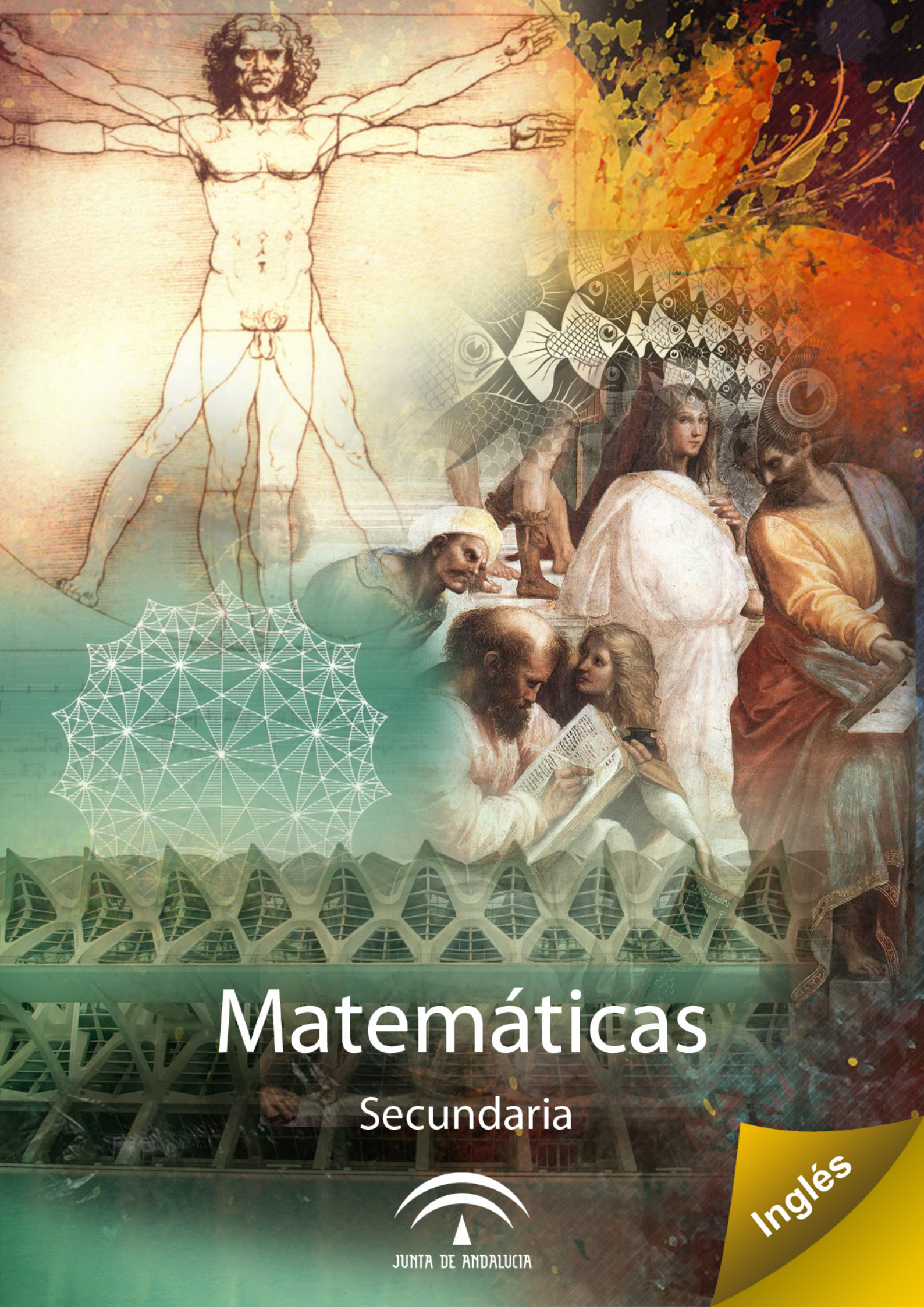
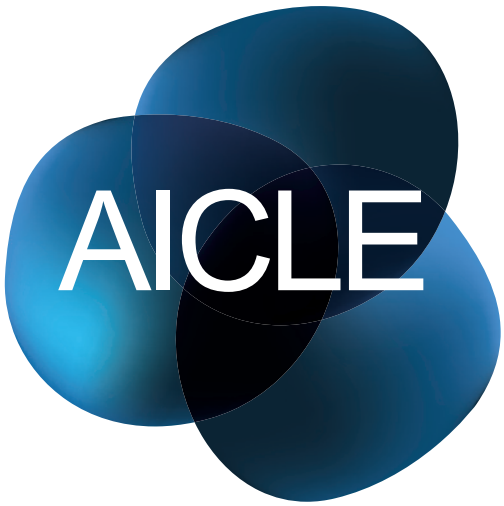


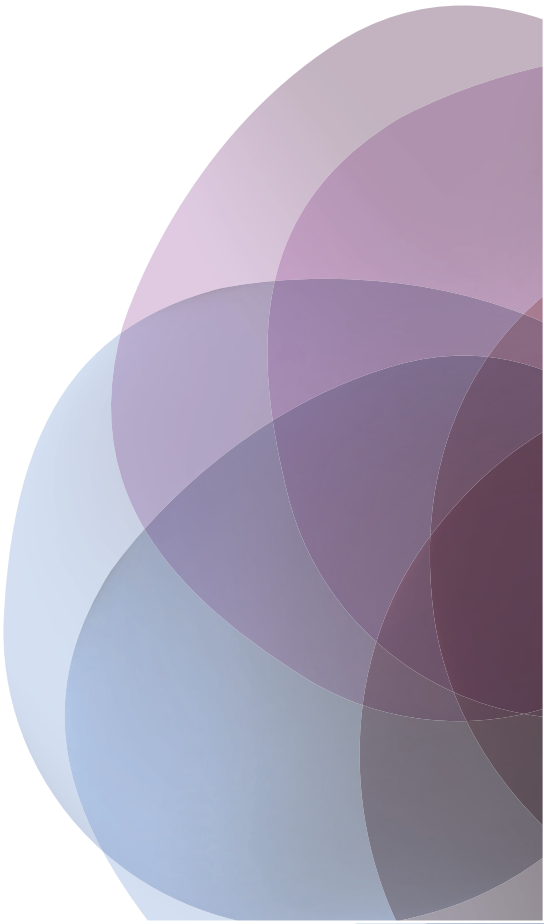
Matemáticas

Secundaria

Inglés

JUNTA DE ANDALUCIA





JUNTA DE ANDALUCIA

Identificación del material AICLE

TÍTULO	Equations and Inequalities
NIVEL LINGÜÍSTICO SEGÚN MCER	A2.2
IDIOMA	Inglés
ÁREA / MATERIA	Matemáticas
NÚCLEO TEMÁTICO	Álgebra
GUIÓN TEMÁTICO	La resolución de ecuaciones e inecuaciones para su posterior aplicación a la resolución de problema y la adquisición del vocabulario específico de la unidad.
FORMATO	Material didáctico en formato PDF
CORRESPONDENCIA CURRICULAR	4º de Educación Secundaria. Matemáticas B
AUTORÍA	Patricia Sánchez España
TEMPORALIZACIÓN APROXIMADA	5 sesiones
COMPETENCIAS BÁSICAS	Competencia lingüística: - Conocer, adquirir, ampliar y aplicar el vocabulario del tema - Ejercitar una lectura comprensiva de textos relacionados con el núcleo temático Competencia Matemática: - Identificar ecuaciones - Utilizar los algoritmos para resolver ecuaciones e inecuaciones - Resolver problemas matemáticos que involucren el uso de ecuaciones e inecuaciones Competencia en tratamiento de la información y competencia digital: - Realizar las actividades propuestas haciendo uso de la calculadora Aprender a aprender: - Organizar información en esquemas Autonomía e iniciativa personal: - Ser autónomos para realizar las actividades individuales
OBSERVACIONES	Las fichas de vocabulario de trabajo en parejas, se pueden usar como introducción a la unidad. Las actividades propias de la materia se pueden utilizar como repaso, al final de la unidad, o intercalando las sesiones en segunda lengua una vez explicado los conceptos en la lengua materna. Atención a la diversidad Ampliación: WRITING WORD PROBLEMS Refuerzo: USING YOUR CALCULATOR

Tabla de programación AICLE

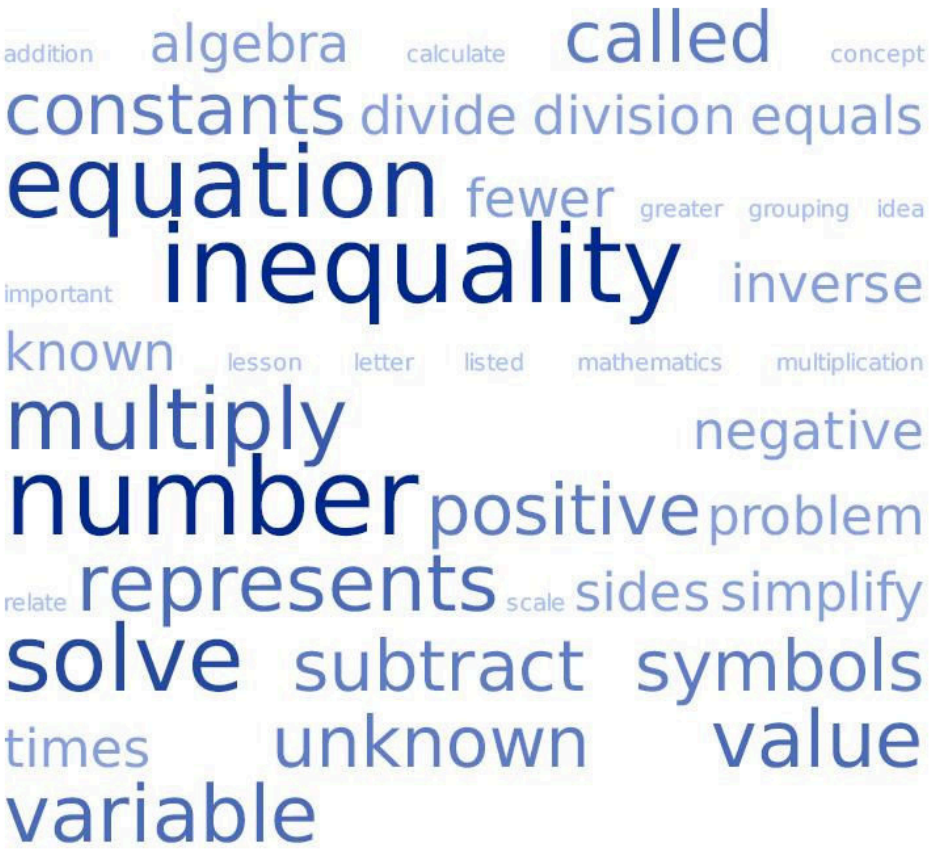
OBJETIVOS	- Concebir el conocimiento científico como un saber integrado, que se estructura en distintas disciplinas, así como conocer y aplicar los métodos para identificar los problemas en los diversos campos del conocimiento y de la experiencia - Comprender y expresarse en una o más lenguas extranjeras de manera apropiada
CONTENIDOS DE CURSO / CICLO	1. Contenidos comunes referentes a la resolución de problemas y la utilización de herramientas tecnológicas. 3. Álgebra. 4. Geometría.
TEMA	- Ecuaciones de primer y segundo grado: estudio y resolución - Otros tipos de ecuaciones: bicuadradas, conteniendo fracciones algebraicas y conteniendo radicales - Inecuaciones. Resolución y representación de las soluciones - Resolución de problemas
MODELOS DISCURSIVOS	- Clasificar los tipos de ecuaciones - Distinguir las partes de una ecuación - Analizar las diferencias con las inecuaciones
TAREAS	- Ejercicios de resolución de ecuaciones e inecuaciones - Relación de problemas - Tarea de producción escrita: problemas - Tarea en grupo para aprender a usar la calculadora
CONTENIDOS LINGÜÍSTICOS	FUNCIONES: - Mostrar acuerdo sobre una decisión - Preguntar por el resultado correcto - Preguntar y responder sobre los pasos de una secuencia ESTRUCTURAS: Solve the following problems What does this expression mean? No, biquadratic equation does not go in this column I think this is an inequality. I don't think so. I agree. what is the symbol for …? how do you read this? what is the next step? LÉXICO: Algebra, linear equation, quadratic equation, biquadratic, inequality, coefficient, variable, operator, constants, expression, terms, problem , inverse, operations (addition, add, sum ,plus, subtraction, subtract, minus, multiply, times, divide, ...), Solve, value, greater, less, more, fewer, ...
CRITERIOS DE EVALUACIÓN	- Resolver ecuaciones de primer grado y de segundo grado incompletas - Aplicar la fórmula general para resolver ecuaciones de segundo grado - Resolver ecuaciones bicuadradas, ecuaciones con radicales y con fracciones algebraicas - Resolver inecuaciones de primer y segundo grado y con fracciones algebraicas, y representar el conjunto solución - Plantear y resolver problemas reales con ecuaciones e inecuaciones

EQUATIONS AND INEQUALITIES

How many words do you know?
What's the meaning of ...?

Give me a sentence using the word ...

Can you see words that are opposites?
Can you find any others?



Key vocabulary

VOCABULARY PRACTICE

Where did you put …?
I put it in …
… goes in ….

What is the symbol for …?
How do you read this?

I don't think so.
I agree

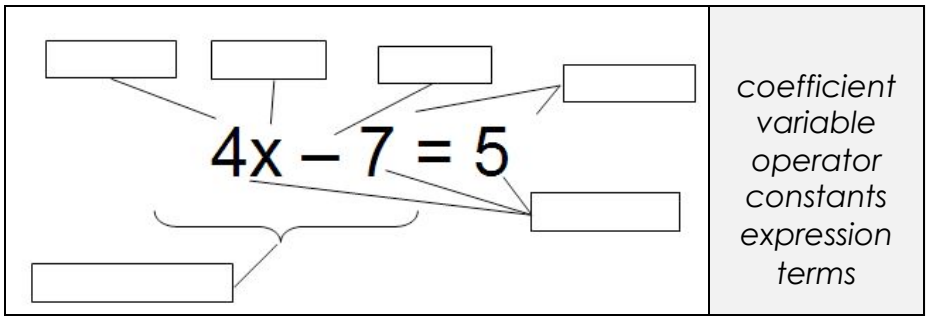
no,...does not go in...!
what does this word mean?

Can this be the …
equation?

1. Types of equations. Match each equation with its name. Work in pairs.

Linear Equation	$\frac{x}{x-2} = 5$
Quadratic Equation	$x^2 - 2x + 1 = 0$
Biquadratic Equation	$2x + 3 = 5(x - 1)$
Equation containing Algebraic Fractions	$-2x + 1 \geq 9$
Radical Equation	$2x = \sqrt{x - 5}$
Inequality	$x^4 - 6x^2 + 8 = 0$

2. Parts of an equation. Complete the chart with the following words. Work in pairs.



coefficient
variable
operator
constants
expression
terms

3. Linear Inequalities. Translate each phrase into a mathematical symbol. Work in pairs.

key words	sign of inequality
is greater than is more than has more	
is less than is fewer than has fewer	
is greater than or equal to is at least has at least	
is less than or equal to is at most has at most	

4. The Language of Algebra. Listen to your teacher and write a verbal phrase for the following numerical expressions.

8 + x < 12	eight plus _____is less than _____.
2 x = 20	_____ times _____.
x / 2 > 9	half _____.
2 x + 5 = 8	two _____.
- 2 x = 152	_____ equals _____.
x / 3 + 1= 67	_____.
21 x + 5 ≥ - 7	_____.
x^2 – 9 x + 1 > 0	_____.

5. Listen to the lessons about solving equations and inequalities. At the beginning of each section you must read the information in the first box. In the second box you must put all of the steps in the correct order.

EQUATIONS & INEQUALITIES PRACTICE

Steps for solving linear equations:

- Use addition/subtraction to put all variable terms on one side of the equation and all constants on the other side.
- Clear fractions. (Multiply each term in the equation by the LCD)
- Divide both sides of the equation by the coefficient of x.
- Clear parentheses. (by distributive property)
- Simplify
- Combine similar terms on each side of the equal sign.

Steps for solving linear equations

1. Clear

2.

3.

4.

5.

6.

6. Linear Equations. Given the following linear equations:

A) $5-2x=3+2(4-2x)$	B) $\frac{x}{4}-\frac{x}{3}=\frac{5}{6}$

a) Label the parts of the equation.

$5-2x=3+2(4-2x)$	$\frac{x}{4}-\frac{x}{3}=\frac{5}{6}$

b) Check if x = - 10 is a solution of the equation. Show your work.

A)

B)

c) Solve for x. Show your work and identify the steps.

A) $5-2x=3+2(4-2x)$	**B)** $\frac{x}{4}-\frac{x}{3}=\frac{5}{6}$

d) Check your solution.

A)

B)

Steps for solving a quadratic equation using the quadratic formula

- Simplify.
- Determine the values of a, b, and c; a is the coefficient of x, b is the coefficient of x, and c is the constant.
- Write the equation in standard form, $ax^2 + bx + c = 0$.
- Substitute these values of a, b and c into the quadratic formula.

Steps for solving a quadratic equation using the quadratic formula

1.

2.

3.

4.

7. Quadratic Equations. Given the following quadratic equations:

A) $3x^2 = 1 + 2x$	**B)** $7x^2 - 12 = 0$	**C)** $2x^2 + 3x = 0$

a) Solving the determinant, decide how many solutions the equation has.

A)	**B)**	**C)**

b) Solve for x. Show your work and identify the steps.

A) $3x^2 = 1 + 2x$	**B)** $7x^2 - 12 = 0$	**C)** $2x^2 + 3x = 0$

c) Check your solutions.

A)	**B)**	**C)**

Steps for solving a biquadratic equation

- Solve the equation with the new unknown factor (apply the quadratic formula)
- Call $x^2 = z$, which means that $x^4 = z^2$
- Simplify the equation and write it in standard form, $ax^4 + bx^2 + c = 0$
- Use these values of z to work out the values of x: $z = x^2$, from which: x = the square root of z

Steps for solving a biquadratic equation

1.

2.

3.

Steps for solving an equation containing algebraic fractions

- Find the LCD of the entire equation.
- Check for extraneous solutions.
- Multiply both sides of the equation by the LCD.
- Find any excluded values (values of the variable that would make the denominator 0)
- Solve the remaining equation.

Steps for solving an equation containing algebraic fractions

1.

2.

3.

4.

5.

Steps for solving radical equations

- If you still have a radical sign left, repeat steps 1 and 2.
- Check for extraneous solutions.
- Get rid of your radical sign
  (the inverse operation to a radical or a root is to raise it to an exponent)
- Isolate one of the radicals
  (get one radical on one side and everything else on the other using inverse operations)
- Solve the remaining equation.

Steps for solving radical equations

1.

2.

3.

4.

5.

8.More equations. Given the following equations:

A) $x^4 - 7x^2 + 10 = 0$	**B)** $\frac{3}{x-2} + \frac{4}{x+2} = 3$	**C)** $3x - \sqrt{5x} = 10$

a) Classify the equation.

A) $x^4 - 7x^2 + 10 = 0$	**B)** $\frac{3}{x-2} + \frac{4}{x+2} = 3$	**C)** $3x - \sqrt{5x} = 10$

b) Solve for x. Show your work and identify the steps.

A) $x^4 - 7x^2 + 10 = 0$	**B)** $\frac{3}{x-2} + \frac{4}{x+2} = 3$	**C)** $3x - \sqrt{5x} = 10$

c) Check your solution and reject answers that are not possible.

A)	**B)**	**C)**

Steps for solving inequalities

- If a test point satisfies the original inequality, then the region that contains that test point is part of the solutions.
- Solve the inequality as though it were an equation. The real solutions to the equation become boundary points for the solution to the inequality.
- Select points from each of the regions created by the boundary points. Replace these “test points” in the original inequality.
- Represent the solution in graphic form and in solution set form.
- Make the boundary points solid circles if the original inequality includes equality; otherwise, make the boundary points open circles.

Steps for solving inequalities

1.

2.

3.

4.

5.

9. Inequalities. Solve and graph the following inequalities. Show your work and identify the steps.

A) $\frac{2x}{5} - \frac{x}{2} \geq \frac{9}{10}$	**B)** $x^2 - 9 \leq 0$	**C)** $\frac{x-1}{x+2} \geq 0$
		

10. Fill in the gaps with the words given bellow.

Rules to remember when writing algebraic equations

1. _____ through the entire problem.
2. Highlight the important information and ____ words that you need to solve the problem.
3. Identify the unknown, which is your _____.
4. Look for key words that will help you to write the equation. Highlight the key words and write an _____ to match the problem.
5. Write the equation or inequality.

The following key words will help you to write equations for algebraic word problems:

a. more than - means _____
b. less than - means _____
c. _____ as many - means multiply
d. "per" - means multiply
6. Solve.
7. Write your answer in a complete sentence.
8. _____ or justify your answer.

key **variable** **add** **Check** **Read** **equation** **times** **subtract**

11. Word Problems. Solve the following problems. Explain your reasoning.

a) Three less than a certain number is 12 less than twice the number. Write an equation and solve to find the number.

The unknown is _____ **because** _____
_____
_____.
The equation is _____ **and the steps to solve are:**

The solution is _____ **because** _____
_____.

b) The formula for the total amount of money owed over a long period of time is A= p + prt. Solve for t and find t when p=$7,400 (principal), A is $9,176 (total amount) and r is 8% (rate)

The unknown is _____ **because** _____
_____
_____.
The equation is _____ **and the steps to solve are:**

The solution is _____ **because** _____
_____.

c) Mr. Smith took 55 minutes to drive into the city and back. He took 5 minutes less for the return trip than for the drive into the city. How long did his return trip take?

The unknown is _____ because _____
_____
_____.
The equation is _____ and the steps to solve are:

The solution is _____ because _____
_____.

d) The perimeter of a rectangle is 22 feet, and the area is 24 square feet. Find the length and width.

The unknown is _____ because _____
_____
_____.
The equation is _____ and the steps to solve are:

The solution is _____ because _____
_____.

e) The members of a school club are creating buttons to sell at a basketball game. The machine to make buttons costs $45. The material to make each button costs 20 cents. The buttons will be sold for $1 each. How many buttons must be sold to make a profit of at least $100?

The unknown is _____ **because** _____
_____
_____.
The equation is _____ **and the steps to solve are:**

The solution is _____ **because** _____
_____.

WRITING WORD PROBLEMS

12. Write 3 different word problems where the solution is based on the relationship:

money earned each month - expenses/taxes each month = money to use each month

1. Tony earns _____ and he pays _____ in taxes. How much money _____?

2. My sister earns _____ _____. How much money _____?

3. _____
_____

Solve the problems and check your solutions.

1.	2.	3.

13. Write 3 different word problems using another relationship that you like (age, numbers, distance, time, …) Present them to the class.

1. _____
_____
2. _____
_____
3. _____
_____

Solve the problems and check your solutions.

1.	2.	3.

USING YOUR CALCULATOR

Design a calculator in the template below and prepare a short presentation to share your design with the class.

Look, … is here... it's next to …

Do you have this key?

…. goes here.

Where is ….?

Can you find the key to multiply / add / divide …?

You can calculate the solutions to a quadratic equation using parenthesis and the special functions keys on your calculator.
Suppose you want to find the solutions for the equation: $6x^2 + 5x - 25 = 0$
Remember that the quadratic formula is:

$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

where a, b, and c are the coefficients of the quadratic equation in order.
Our calculation is

$$x = \frac{-5 \pm \sqrt{5^2 - 4(6)(-25)}}{2(6)}$$

You find the values of x by first finding the value of the determinant (the part under the radical) and storing it in memory. You then substitute this value into the quadratic formula:

(	(-)	5	+	$\sqrt{}$	MR	)	÷	(	2	x	6	)	=

Repeat this calculation with – instead of +

You should obtain 1.6666667 and -2.5. You can check these answers by substituting them into the original equation.

15. Practice with your calculator by solving the following quadratic equations.

a) $x^2 + 2x - 15 = 0$	**c)** $3x^2 + 8x + 4 = 0$
b) $36x^2 - 229x + 25 = 0$	**d)** $4x^2 + 24x + 20 = 0$

Go back to activity number 14 and highlight the keys that you used to find the solution of one of quadratic equations.

FINAL PROJECT

16. Design a poster explaining your favorite equation and the steps to solve it. Prepare a short presentation about your equation that will help your classmates to guess what it is.

SELF ASSESSMENT

	ALWAYS	SOMETIMES	NEVER
LISTENING			
I can understand when my teacher talks about how to solve equations and inequalities			
I can understand a dialogue between classmates about classifying equations and inequalities			
READING			
I can understand problems related to equations and inequalities and find their solutions			
SPEAKING			
I can talk about classifying and solving equations and inequalities			
I can talk about finding the solutions of problems related to equations and inequalities			
WRITING			
I can write the steps related to solving equations and inequalities.			
VOCABULARY			
I can use words related to equations and inequalities			
I can use basic number terminology: positive, negative, add, subtract, multiply, ...			

Pictures taken from:
http://bancoimagenes.isftic.mepsyd.es/