

Name:

Date:

Topic:

Class:

Main Ideas/Questions

Notes

Real Numbers

()

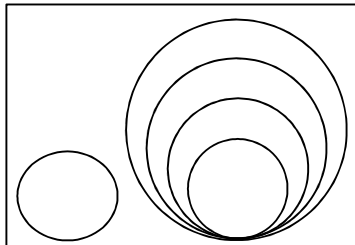
The **Real Numbers** consist of the following sets of numbers:

- **Irrational Numbers:** Numbers in which the decimal form never terminates and does not repeat. Common examples are π and non-perfect square roots.
- **Rational Numbers:** Numbers in which the decimal form either terminates or repeats. Rational numbers can always be written as a **fraction** (a/b) where a and b are integers.

Subsets of Rational Numbers:

- **Integers:** $\{..., -3, -2, -1, 0, 1, 2, 3, ...\}$
- **Whole Numbers:** $\{0, 1, 2, 3, 4, ...\}$
- **Natural Numbers:** $\{1, 2, 3, 4, 5, ...\}$

Organizing the Real Numbers



Set

Letter

Examples

Irrational Numbers

Rational Numbers

Integers

Whole Numbers

Natural Numbers

Practical Name all sets to which each value belongs.

1. -10

2. $\sqrt{30}$

3. $1\frac{7}{9}$

4. $\frac{24}{8}$

5. 2.48

6. $-\sqrt{81}$

7. $\pi - \pi$

8. $\sqrt{\frac{16}{25}}$

9. $0.\overline{15}$

10. 109

11. $-\frac{8}{3}$

12. $\frac{\sqrt{7}}{\sqrt{7}}$

Properties of Real Numbers

Property	Addition Example	Multiplication Example
Commutative		
Associative		
Identity		
Inverse		
Distributive		

Name that Property!

13. $5 \cdot (2 \cdot 8) = (5 \cdot 2) \cdot 8$	14. $6(3 - 7) = 6 \cdot 3 - 6 \cdot 7$
15. $7y + (-7y) = 0$	16. $3a + 2b = 2b + 3a$
17. $(x^2 + 8x) + 1 = x^2 + (8x + 1)$	18. $\frac{1}{5} \cdot 5 = 1$
19. $3m + 3n = 3(m + n)$	20. $9c + 0 = 9c$

Name the additive and multiplicative inverse for each number.

21. -8 Additive: _____ Multiplicative: _____	22. $\frac{2}{3}$ Additive: _____ Multiplicative: _____
23. $6w$ Additive: _____ Multiplicative: _____	24. $\sqrt{10}$ Additive: _____ Multiplicative: _____

Closure Property

A set is **closed** (under an operation) if the operation always produces an element of the same set. If an element outside the set is produced, then the operation is **not closed**.

Answer True or False. If false, give a counterexample.

- 25.** Integers are closed under multiplication. _____
- 26.** Irrational numbers are closed under subtraction. _____
- 27.** Whole numbers are closed under division. _____
- 28.** Odd numbers are closed under addition. _____

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Main Ideas/Questions		Notes									
Order of Operations <table><tr><td>G</td><td>Grouping Symbols (), [], { }, and fraction bars</td></tr><tr><td>E</td><td>Exponents (and Roots)</td></tr><tr><td>MD</td><td>Multiplication & Division (left → right)</td></tr><tr><td>AS</td><td>Addition & Subtraction (left → right)</td></tr></table>		G	Grouping Symbols (), [], { }, and fraction bars	E	Exponents (and Roots)	MD	Multiplication & Division (left → right)	AS	Addition & Subtraction (left → right)	Directions: Simplify each expression.	
		G	Grouping Symbols (), [], { }, and fraction bars								
		E	Exponents (and Roots)								
		MD	Multiplication & Division (left → right)								
		AS	Addition & Subtraction (left → right)								
1. $29 - (11 - 2^3) + 6^2 \div 4$		2. $4^3 - -8 \cdot 6 \div 16$									
3. $\frac{7 - (10 - 12 + 5^2)}{9 - 2^2}$		4. $\frac{(2 - 3^2)^2 + \sqrt{81}}{10 - 6 \div 3}$									
5. $\frac{[15 - (-6 + 2 + \sqrt{9})]^2}{3 - 3^3}$		6. $\frac{(9 - 15)^2 \cdot (7 - 2^2)}{\sqrt{49} + 5} - -5 $									
Evaluating Expressions		Directions: Evaluate each expression given the variable replacements.									
7. $\frac{a \cdot b^2}{c + 12}$ (if $a = 3$, $b = -4$, and $c = 8$)		8. $ 10m - 8n^2 $ (if $m = 2$ and $n = -3$)									

	9. $-x^2 + 7(y + 2) - 1$ (if $x = 5$ and $y = -9$)	10. $3r - 4s$ (if $r = 5$ and $s = \frac{2}{3}$)
	11. $ x^2 - y^2 - x \cdot y$ (if $x = -6$ and $y = 8$)	12. $\frac{2}{5}(a + 2b)^2$ (if $a = 3$ and $b = -4$)
	13. $\frac{w^3 - 4v}{\sqrt{wv}}$ (if $w = 2$ and $v = 18$)	14. $2m^2 + 9m$ (if $m = \frac{1}{4}$)
Simplifying Expressions	Directions: Simplify each expression below by distributing and/or combining like terms.	
	15. $16x - 11 - 7x + 10$	16. $13 + 2(3n - 7) + 19n$
	17. $6(c - 2) - (8c + 1)$	18. $-15y - 7z + y + 9z$
	19. $3(3a - 5b) - (a - 7b)$	20. $-8(2x + y) - 3(-5x - 2y)$

Name:

Date:

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Main Ideas/Questions

Solving Equations

Basic Steps to Follow

①

Distribute

②

Simplify Each Side
by combining like terms.

③

Move Variables
to one side.

④

Solve
using inverse operations.

Examples

Directions: Solve each equation below.

1. $6(n + 5) = 2$

2. $\frac{3(5 - 3x)}{-4} = -15$

3. $2(2 - 7y) - 5 = 111$

4. $-16 = -\frac{15}{16}\left(\frac{4}{5}q + \frac{32}{3}\right)$

5. $10a - 7 = 21 - 6a$

6. $\frac{5}{6}w + 21 = -\frac{1}{3}(2w - 9)$

7. $-5(8p + 6) = 5 - 5p$

8. $16 - (7m + 3) = 8(1 - m)$

	9. $\frac{10x+17-(x-9)}{2} = 3x+1$	10. $\frac{9}{8}\left(4-\frac{1}{2}a\right) = 3\left(\frac{1}{4}a+\frac{5}{2}\right)$
Special Cases	11. $1 + 3c = 5(1 - c) + 8c$	12. $40 - 8x = -8(x - 5)$
Proportions	13. $\frac{5}{3} = \frac{2}{x+4}$	14. $\frac{10}{5x-9} = \frac{8}{2x-8}$
Literal Equations	Directions: Solve each equation or formula for the specified variable.	
	15. $C = 2\pi r$ (for π)	16. $A = \frac{1}{2}ap$ (for p)
	17. $\frac{a+b}{c} = 5$ (for b)	18. $3x - 3y = 24$ (for x)
	19. $7w = \frac{1}{2}(w+v)$ (for v)	20. $S = (n-2) \cdot 180$ (for n)

USING EQUATIONS *to solve* WORD PROBLEMS

Directions: Set up and solve an equation for each problem below.

1. The product of 7 and a number, increased by 3, is equal to twice the number, subtracted from 39. Find the number.

2. Five less than twice a number is equal to one half the difference of three times the number and 13. Find the number.

3. One number is 9 more than twice another number. If the sum of the numbers is 129, find both numbers.

4. Kara's golf score was 1 less than three fourths of Greg's golf score. If the sum of their scores was 153, find Kara's golf score.

5. The length of a rectangle is one more than four times its width. If the perimeter of the rectangle is 62 meters, find the dimensions of the rectangle.

6. The length of one base of a trapezoid is 19 less than five times the length of the other base. If the trapezoid has a height of 18 feet and an area of 477 ft^2 , find the length of the longer base.

7. The measure of one angle is six more than half the measure of another angle. If the angles are complementary, find both measures.	8. Kelly, Laura, and Tia sold boxes of cookies for a fundraiser. Kelly sold 15 boxes less than Laura. Tia sold twice as many boxes as Kelly. If they sold 83 boxes of cookies in total, how many boxes did each girl sell?
9. The measure of the vertex angle in an isosceles triangle is six less than four times the measure of a base angle. Find the measure of the vertex angle.	10. The sum of four consecutive integers is 222. Find the integers.
11. The sum of three consecutive odd integers is 93. Find the integers.	12. Find three consecutive even integers such that the sum of the smallest integer and twice the median integer is 20 more than the largest integer.

Name:	Date:
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Main Ideas/Questions	Notes	
WARM-UP	1. If $ x = 7$, what are the possible values of x ?	2. If $ x = -4$, what are the possible values of x ?
STEPS TO SOLVE Absolute Value Equations	①	ISOLATE the absolute value expression.
	②	CREATE TWO CASES. Set the "inside" equal to both the positive and negative value of the number on the opposite side of the equal sign.
	③	SOLVE both equations.
	④	CHECK for extraneous solutions.
What are Extraneous Solutions?		

Directions: Solve each equation. Be sure to check for extraneous solutions.

3. $ x - 9 = 5$	4. $3 = 2k + 7 $
5. $ y - 1 + 17 = 23$	6. $3 m + 8 = 39$
7. $16 r - 5 = -32$	8. $\frac{ y - 10 }{-2} = -6$

9. $-5 = |8 - p| - 11$

10. $\frac{|3a + 12|}{9} = 0$

11. $9 - 4|c + 10| = -15$

12. $-16 = -12\left|\frac{k}{5}\right| + 8$

13. $|3x - 9| = x + 1$

14. $2|h + 8| = 14h$

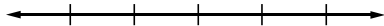
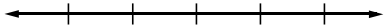
15. $|8 - 2n| - 5n = n + 2$

16. $-4w - 2 = |6w + 20|$

Name:	Date:
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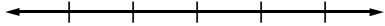
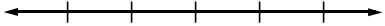
Main Ideas/Questions	Notes
Graphing Inequalities	- Use a _____ dot for _____ or _____ symbols. - Use an _____ dot for _____ or _____ symbols.
Interval Notation	Interval notation is a way to write the solution to an inequality using <u>infinity symbols</u>, <u>parentheses</u>, and <u>brackets</u>. Parentheses indicate “not included” or “open” Brackets indicate “included” or “closed”

Directions: Graph each inequality and write the solution in interval notation.

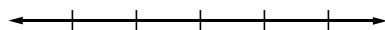
1. $x \geq 8$  Interval Notation: _____	2. $a < -1$  Interval Notation: _____
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Solving Inequalities	- Follow the same rules to solve an inequality as you do an equation. _____ the inequality symbol if you multiply or divide by a _____ number.
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Examples: Solve, graph, and write the solution to each inequality in interval notation.

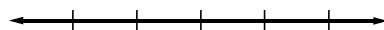
3. $5v + 1 > 7v - 17$  Interval Notation: _____	4. $21x - 3(5x + 9) \geq 7$  Interval Notation: _____
5. $12p + 52 > -2(4 - 2p)$  Interval Notation: _____	6. $3 - (4m + 1) \geq 5m - 25$  Interval Notation: _____

7. $3(8x - 9) > 4(6x + 1)$



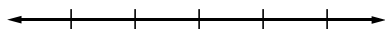
Interval Notation: _____

8. $10(a - 3) - 13a \leq 9(a - 8)$



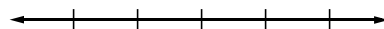
Interval Notation: _____

9. $8 - 7(2r + 3) \leq 3(r - 10)$



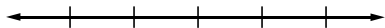
Interval Notation: _____

10. $-3(2p + 8) < -4(2p + 6)$



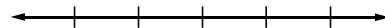
Interval Notation: _____

11. $11x - 4 \leq 6x - (3 - 5x)$



Interval Notation: _____

12. $\frac{4 + 5(2w - 10)}{-2} < w + 7$



Interval Notation: _____

Set Notation

Set Notation is another way of expressing the solution to an inequality.

Example: $x > 5$ **Set Notation:** _____

Read as _____

Name:

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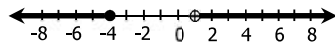
Class:

Main Ideas/Questions

Notes

Compound Inequalities

TYPE 1: "OR"



Written: _____

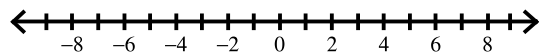
Int. Notation: _____

Solving "Or" Inequalities

To solve "or" inequalities, solve each part, then graph on a number line to show the solutions.

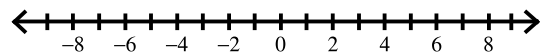
Directions: Solve, graph, and write each solution in interval notation.

1. $3x + 4 \leq 10$ or $5x > 45$



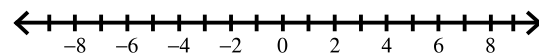
Interval Notation:

2. $n + 6 \leq 5$ or $9n + 7 > 43$



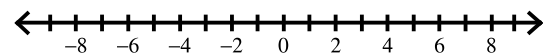
Interval Notation:

3. $-3y + 8 \leq -7$ or $10y - 3 \leq -33$



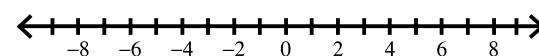
Interval Notation:

4. $6 - 2a < 8$ or $\frac{a}{2} + 1 < -2$



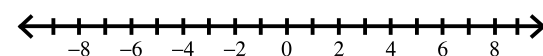
Interval Notation:

5. $3(5 - 2k) < -12$ or $\frac{1}{3}(15k - 9) \leq -3$

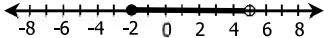
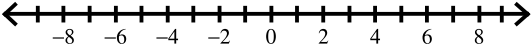
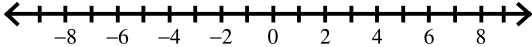
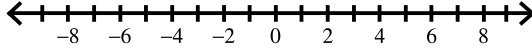
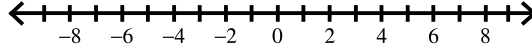
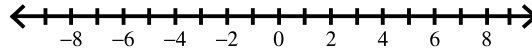
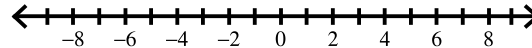


Interval Notation:

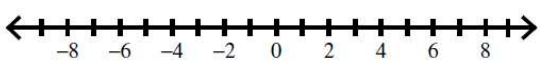
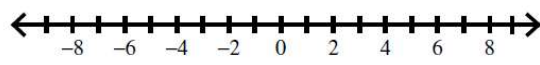
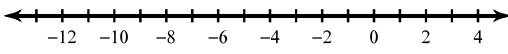
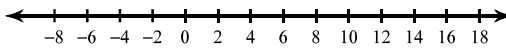
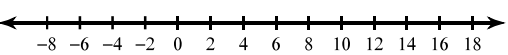
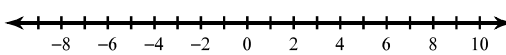
6. $\frac{8-x}{-3} \leq -5$ or $5 - \frac{3}{2}x < -1$



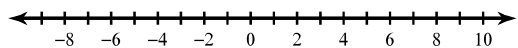
Interval Notation:

TYPE 2: "AND"	Written: _____ Int. Notation: _____ 
Rewriting "And" Inequalities	Because the solutions to an "and" inequality fall between two endpoints, they are frequently written in a more condensed form. Example: _____ ➡ _____
Solving "And" Inequalities	If the "and" inequality is written out, solve each part separately. If condensed, you can solve it all together, working inside out. Then, graph to show all possible solutions.
Directions: Solve, graph, and write each solution in interval notation.	
7. $2x + 3 > -9$ and $8x - 2 < 30$  Interval Notation: _____	8. $2w + 1 \leq 11$ and $1 - 5w < 41$  Interval Notation: _____
9. $-2 \leq a - 1 \leq 6$  Interval Notation: _____	10. $4 < 3p + 4 < 19$  Interval Notation: _____
11. $28 > -2 - 10m \geq -7$  Interval Notation: _____	12. $-5 \leq \frac{12 - x}{-2} < -2$  Interval Notation: _____

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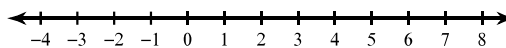
Main Ideas/Questions	Notes	
Absolute Value Inequalities	CASE 1	GREATER THAN/GREATER THAN OR EQUAL TO
		Example: $ x \geq 7$  Interval Notation:
	CASE 2	LESS THAN/LESS THAN OR EQUAL TO
		Example: $ x \leq 4$  Interval Notation:
What does this mean?		
STEPS TO SOLVE Absolute Value Inequalities	①	ISOLATE the absolute value expression.
	②	CREATE TWO CASES. Use the "KISS" Method (Keep it, switch, switch) to set up the two cases.
	③	SOLVE both inequalities.
	④	GRAPH your solutions and write your answer in interval notation.
Directions: Solve, graph, and write each solution in interval notation.		
1. $ x + 6 > 7$  Interval Notation:	2. $ 2v - 3 < 19$  Interval Notation:	
3. $\left -5 + \frac{k}{3} \right \geq 1$  Interval Notation:	4. $ 7 - 4n \leq 27$  Interval Notation:	

5. $\frac{|q-1|}{4} \geq 2$



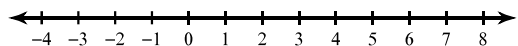
Interval Notation:

6. $|8a+10|+3 < 25$



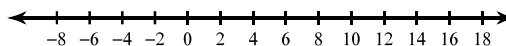
Interval Notation:

7. $-10|2r-1| \leq -60$



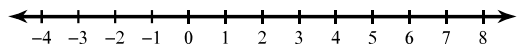
Interval Notation:

8. $9|3-k|-5 \geq 67$



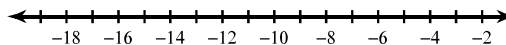
Interval Notation:

9. $6|-5n|+7 > 37$



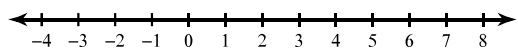
Interval Notation:

10. $-1-4|x+9| \leq -21$



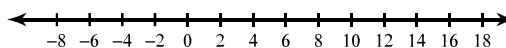
Interval Notation:

11. $3|8x+5|-9 \geq 24$



Interval Notation:

12. $4|9-3n|-9 < 75$



Interval Notation: