

8 - CHAPTER 1: REAL NUMBERS - NOTE SHEET

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HOUR: 1st

Lesson 1.1: Rational Numbers

Vocabulary		
Term	Definition	
Rational Numbers	A number that can be written as a fraction. The denominator can't be zero.	
Repeating Decimal	A decimal that repeats in a pattern	$0.\overline{3}$ $0.1\overline{6}$
Terminating Decimal	A decimal that ends.	0.125 0.05

Lesson 1.2: Powers and Exponents

Vocabulary		
Power	A product of repeated factors	
Exponent	tells how many times the base is multiplied	Base is the common factor
<u>power</u>	5^2	<u>exponent</u> <u>base</u>

$$5 \cdot 5 = 5^2 = 25$$

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Lesson 1.3: Multiply and Divide Monomials

Vocabulary		
Term	Definition	
	a number, a variable, or a product of a number and one or more variables	
Monomials	Example	Non-Example
	100 $2mn$ c	$2c - 4$ $\frac{5d}{7}$
Product of Powers	to multiply powers with the same base, add their exponents. $2^4 \cdot 2^3 = 2^{4+3} = 2^7$	
Quotient of Powers	to divide powers with the same base, subtract their exponents $\frac{3^7}{3^3} = 3^4 = 3^{7-3}$	

Lesson 1.4: Powers of Monomials

Vocabulary	
Term	Definition
Power of a Power	To find the power of a power, multiply the exponents. $(a^m)^n = a^{m \cdot n}$
Power of a Product	The distributive property of exponents

Lesson 1.5: Negative Exponents

Vocabulary	
Term	Definition
Zero Exponent	Any non zero number to the zero power is 1 $\frac{z^2}{z^2} = \frac{\cancel{z} \cdot \cancel{z}}{\cancel{z} \cdot \cancel{z}} = 1 = z^0$


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Negative Exponent	Any nonzero number to the negative n power is the reciprocal of its n^{th} power $2^{-3} = \frac{1}{2^3}$ $\frac{1}{2^{-3}} = 2^3$
Multiplicative Exponents Inverse	Reciprocal... is the Flipped version of a number $\frac{3}{4} \rightarrow \frac{4}{3}$

Lesson 1.6: Scientific Notation

Vocabulary	
Term	Definition
Scientific Notation	When a very small or very large number is written as the product of a factor and an integer power of 10. $a \times 10^n$ $1 \leq a < 10$
Positive Exponent the number is greater than or equal to 1	Negative Exponent the number is between 0 and 1 the
Comparing Scientific Notation	① pay attention to the exponent ② compare the factor (a)

Lesson 1.7: Computation with Scientific Notation

Vocabulary	
Term	Definition
 Commutative Property	move numbers around with multiplication and addition $ab = ba$ $a + b = b + a$
Associative Property	When you group number together with multiplication and addition $a(bc) = (ab)c$ $a + (b+c) = (a+b)+c$

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<p>Multiplication</p> $(7.2 \times 10^3)(1.6 \times 10^4)$ $(7.2 \times 1.6)(10^3 \times 10^4)$ $(11.52)(10^3 \times 10^4)$ $11.52 \times 10^{3+4}$ $\boxed{11.52} \times 10^7$ $\boxed{1.152 \times 10^8}$	<p>Division</p> $\frac{7 \times 10^9}{3 \times 10^8}$ $\left(\frac{7}{3}\right) \left(\frac{10^9}{10^8}\right)$ $\approx 2.3 \times 10^{9-8}$ $\approx \boxed{2.3 \times 10^1}$
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Vocabulary

Term	Definition
Distributive Property	Distribute the multiplication to what is in the parentheses. $9(7+4) = 9 \cdot 7 + 9 \cdot 4$ $9(7-4) = 9 \cdot 7 - 9 \cdot 4$

When adding/subtracting scientific notations the numbers must have...

the same exponents

<p>Add to the exponent... When the decimal is moved to the left</p>	<p>Subtract from the exponent... When the decimal is moved to the right.</p>
<p>Addition</p> $(6.89 \times 10^4) + (9.24 \times 10^5)$ $(6.89 \times 10^4) + (92.4 \times 10^4)$ $(6.89 + 92.4) \times 10^4$ $\boxed{99.29} \times 10^4$ 9.929×10^5	<p>Subtraction</p> $(7.83 \times 10^8) - (1.161 \times 10^7)$ $(78.3 \times 10^7) - (1.161 \times 10^7)$ $(78.3 - 1.161) \times 10^7$ $\boxed{77.139} \times 10^7$ 7.7139×10^8

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Lesson 1.8: Roots

Vocabulary			
Term	Definition		Perfect Squares
Square Roots	A square root of a number is one of its two equal factors		x x^2
			1 1
			2 4
Positive	Negative	Both	3 9
$\sqrt{\quad} = +$	$-\sqrt{\quad} = -$	$\pm\sqrt{\quad} = \pm$	4 16
Radical Signs	indicate the principal square root $\sqrt{\quad}$		5 25
			6 36
			7 49
			8 64
			9 81
10 100			
Term	Definition		Perfect Cubes
Cube Roots	a cube root of a number is one of its three equal factors		x x^3
			1 1
			2 8
Positive	Negative	Both	3 27
$\sqrt[3]{\quad} = +$	$\sqrt[3]{\quad} = -$	Both	4 64
$- \cdot - = +$ $+ \cdot - = -$			5 125
			6 216
			7 343
			8 512
			9 729
			10 1,000

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Lesson 1.9: Estimate Roots

Steps to Estimate Roots		$\sqrt{68}$
Step 1	Find the square root ^{perfect square} just smaller than the number	$\sqrt{64} = 8$
Step 2	Find the perfect square just bigger than the number	$\sqrt{81} = 9$
Step 3	The number minus the smaller perfect square	$68 - 64 = 4$
Step 4	Subtract smaller by larger	$81 - 64 = 17$
Step 5	Whole number = \sqrt{S} numerator = step 3 denominator = step 4	$8 \frac{4}{17}$

Lesson 1.10: Compare Real Numbers

Vocabulary	
Term	Definition
Irrational Number	A number that <u>cannot</u> be written as a fraction
Real Number	the combination of rational & irrational numbers

How to compare and order real numbers...

Change the numbers into decimal form

$$\text{Integer: } \mathbb{Z} = \{-\infty, \dots, -2, -1, 0, 1, 2, \dots, \infty\}$$

$$\text{Whole: } \mathbb{W} = \{0, 1, 2, \dots, \infty\}$$

$$\text{Natural: } \mathbb{N} = \{1, 2, 3, \dots, \infty\}$$

$$\text{Rational: } \mathbb{Q} = \{-\infty, -3, -\frac{1}{2},$$

$$0, 1, 1.5, \dots, \infty\}$$