

real numbers

\mathbb{R}

any number that is not imaginary

natural numbers

\mathbb{N}

1, 2, 3, 4, 5, ...

whole numbers

\mathbb{W}

0, 1, 2, 3, 4, 5, ...

integers

\mathbb{Z}

... - 5, -4, -3, -2, -1, 0, 1, 2, 3, 4, 5, ...

rational numbers

\mathbb{Q}

a fraction or a decimal that terminates or repeats

irrational numbers

\mathbb{P} or $\mathbb{R} - \mathbb{Q}$

numbers that do not terminate or repeat

$\sqrt{3}$ and π

pi

π

represents the approximate number 3.1415...

Properties of Math Operations

commutative property of addition

$$a + b = b + a$$

addition may be done in any order and the result will remain the same

commutative property of multiplication

$$a(b) = b(a)$$

multiplication may be done in any order and the result will remain the same

associative property of addition

$$(a + b) + c = a + (b + c)$$

in addition, numbers may be grouped in any way and the result will remain the same

associative property of multiplication

$$(ab)c = a(bc)$$

in multiplication, numbers may be grouped in any way and the result will remain the same

distributive property

$$a(b + c) = ab + ac$$

additive identity

$$a + 0 = a$$

any number added to zero is the original number

multiplicative identity

$$a(1) = a$$

any number multiplied by 1 is the original number

additive inverse

$$a + (-a) = 0$$

any number added to its opposite is 0

multiplicative inverse

$$a\left(\frac{1}{a}\right) = 1$$

any number multiplied by its reciprocal is 1

UNIT 1/RATIONAL NUMBER OPERATIONS

1.1/RELATE INTEGERS AND THEIR OPPOSITES

opposites

any two numbers that when added equal 0

absolute value

the distance between a number and zero; always positive

1.2/UNDERSTAND IRRATIONAL NUMBERS

terminating decimal

a decimal that ends in zero

repeating decimal

a decimal expansion that repeats the same digit or sequence of digits without end

1.3/ADD INTEGERS

additive inverses

opposites

sum

the answer to an addition problem

1.4/SUBTRACT INTEGERS

difference

the answer to a subtraction problem

1.5/ADD AND SUBTRACT RATIONAL NUMBERS

fraction

a portion or piece of a whole; another representation of a division problem

numerator

the part of the fraction that is above the line

denominator

the part of the fraction that is below the line

mixed number

a number consisting of an integer and a proper fraction

improper fraction

a situation in which the numerator is greater than the denominator

commutative property of addition

$$\mathbf{a + b = b + a}$$

addition may be done in any order and the result will remain the same

1.6/MULTIPLY INTEGERS**product**

the answer to a multiplication problem

1.8/DIVIDE INTEGERS**quotient**

the answer to a division problem

1.9/DIVIDE RATIONAL NUMBERS**reciprocal or multiplicative inverses**

two numbers whose product is 1; created by moving the numerator to the denominator and the denominator to the numerator

complex fraction

$$\frac{\frac{a}{b}}{\frac{x}{y}}$$

a case in which there are fractions in both the numerator and denominator

UNIT 2/RATIONAL NUMBER OPERATIONS

2.1/CONNECT RATIOS, RATES, AND UNIT RATES

ratio

$\frac{a}{b}$, $a:b$, or a to b

compares two or more numbers

rate

a ratio of two quantities with different units

unit rate

the rate for a single item

2.3/UNDERSTAND PROPORTIONAL RELATIONSHIPS: EQUIVALENT RATIOS

proportion

an equation that shows that two fractions (ratios) are equal; ex. $\frac{1}{2} = \frac{2}{4}$

proportional relationship

as one quantity changes, the other quantity changes at the same or another constant rate

2.4/DESCRIBE PROPORTIONAL RELATIONSHIPS: CONSTANT OF PROPORTIONALITY

direct variation

an equation in which the x - and y -values are proportional to each other

constant of variation (proportionality)

the constant rate of change in a direct variation equation

2.5/GRAPH PROPORTIONAL RELATIONSHIPS

coordinate plane

a grid that shows the relationship between two items

axis

a reference line

origin

the point where the x - and y -axes cross

ordered pair

(x, y)

UNIT 3/ANALYZE AND SOLVE PERCENT PROBLEMS

3.1/ANALYZE PERCENTS OF NUMBERS

percent (percentage)

parts per hundred; represents a ratio or fraction that is out of 100

3.2/CONNECT PERCENT AND PROPORTION

percent proportion

$\frac{p}{w} = \frac{x}{100}$ where p is the part, w is the whole, and x is the percentage

3.3/REPRESENT AND USE THE PERCENT EQUATION

percent equation

$part = percent \times whole$

3.4/SOLVE PERCENT CHANGE AND PERCENT ERROR PROBLEMS

percent increase

a percentage change that is greater than the original amount

percent decrease

a percentage change that is less than the original amount

percent error (relative error)

the accuracy of an estimated change and its actual change expressed as a percent

3.5/SOLVE MARKUP AND MARKDOWN PROBLEMS

markup

the amount added to the cost of a product or service that determines its selling price

percent markup

the difference between the original cost of the item and the *increased* selling price as expressed by a percentage

markdown

the amount deducted from the cost of a product or service that determines its selling price

percent markdown

the difference between the original cost of the item and the *decreased* selling price as expressed by a percentage

3.6/SOLVE SIMPLE INTEREST PROBLEMS

interest

the price paid to borrow money

simple interest

interest calculated only on the principal

principal

the original amount that is borrowed, saved, or invested

interest rate

the proportion of a loan that is charged as interest to the borrower

UNIT 4/GENERATE EQUIVALENT EXPRESSIONS

4.1/WRITE AND EVALUATE ALGEBRAIC EXPRESSIONS

expression

a math problem or statement that does not include an equal to ($=$) sign or inequality ($< \leq > \geq$) signs

ex. $5x + 2$

order of operations

when simplifying an expression work left to right starting with anything in parentheses (), brackets [], and braces { }; then work left to right on exponents and radicals; next multiplication and division; finally addition and subtraction

4.2/GENERATE EQUIVALENT EXPRESSIONS

term

a number, a variable, or the product of a number and variable in an expression

coefficient

the number attached to the variable through multiplication or division

variable

a letter that takes the place of a number in an expression or equation

constant

a term that has no variable

like terms

terms that have the same variables

4.4/EXPAND EXPRESSIONS

distributive property

$$a(b + c) = ab + ac$$

4.5/FACTOR EXPRESSIONS

factor (factorization)

a number that divides the given number evenly or exactly, leaving no remainder

GCF (greatest common factor)

the largest term that can be divided out of an expression