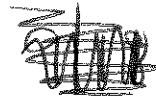


1.4 Properties of Real Numbers:

CA1



Vocab:

Equivalent Expressions: algebraic expressions that have the same value for all values of the variable(s).

Properties of Real Numbers:

Commutative Properties of Addition and Multiplication:

- Changing the order of the addends does not change the sum.
- Changing the order of the factors does not change the product.

Alg:

Ex:

Add: $a + b = b + a$

$18 + 54 = 54 + 18$

mult: $a \cdot b = b \cdot a$

$6 \cdot 4 = 4 \cdot 6$

Associative Properties of Addition and Multiplication:

- Changing the grouping of the addends does not change the sum.
- Changing the ~~addends~~ grouping of the factors does not change the product.

Alg:

Ex:

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

$(23 + 9) + 4 = 23 + (9 + 4)$

mult $(a \cdot b) \cdot c = a \cdot (b \cdot c)$

$(7 \cdot 9) \cdot 10 = 7 \cdot (9 \cdot 10)$

Identity Properties of Addition and Multiplication:

The sum of any real number & 0 is the original #
The product of any real # & 1 " " " "

Alg:

Ex:

Add $a + 0 = a$

$5\frac{3}{4} + 0 = 5\frac{3}{4}$

mult $a \cdot 1 = a$

$67 \cdot 1 = 67$

Zero Property of Multiplication:

The product of a and 0 is 0 .

Alg:

$$a \cdot 0 = 0$$

Ex:

$$18 \cdot 0 = 0$$

Multiplication Property of -1

The product of -1 and a is $-a$.

Alg:

$$-1 \cdot a = -a$$

Ex:

$$-1 \cdot 9 = -9$$

What property is illustrated in each statement:

a) $42 \cdot 0 = 0$

b) $(y + 2 \cdot 5) + 28 = y + (2 \cdot 5 + 28)$

c) $10x + 0 = 10x$

d) $4x \cdot 1 = 4x$

e) $x + (\sqrt{y} + z) = x + (z + \sqrt{y})$

a) zero prop of x

b) assoc. prop of $+$

c) id prop of $+$

d) id prop of x

e) comm. prop of $+$

id = identity

comm = commutative

Use Properties to write equivalent expressions. Simplify each expression:

a) $5(3n)$

$(5 \cdot 3)n$

$15n$

assoc. prop of mult
simplify

b) $(4+7b)+8$

$(7b+4)+8$ comm (+)

$7b+(4+8)$ assoc (+)

$7b+12$ simplify

c)

$$\frac{6x \cdot y}{y} = \frac{6x \cdot y}{1 \cdot y} = \frac{6x \cdot \cancel{y}}{1 \cdot \cancel{y}} = 6x \cdot 1 = 6x$$

Vocab:



Deductive Reasoning:

the process of reasoning logically from given facts to a conclusion

Counterexample:

an example showing a statement is false.

Using deductive reasoning and counterexamples:

Is the statement true or false? If false give a counterexample.

a) For all real numbers a and b , $a \cdot b = a + b$.

False: $5 \cdot 3 = 5 + 3$

b) For all real numbers a , b , and c , $(a+b)+c = b+(a+c)$

True: $(a+b)+c$

$= (b+a)+c$

$= b+(a+c)$

comm (+)

assoc (+)

HW

Pg. 21 #56-62, 65, 66
69-71

Pg. 26 # 13-18, 20-27,
52-55