Algebra 1 Unit 1 worksheet: Commutative, associative and distributive properties

Name _____ Date _____ Period _____

1. Complete each statement so that it is an example of the property named. Do not simplify.

(a) Commutative property of multiplication: $(x+3)\cdot 5 =$ _____

(b) Associative property of addition: $(-2+y)+7 =$ _____

(c) Distributive property: $4(m-6) =$ _____

(d) Distributive property, read right to left: $9k + 9\cdot 2 =$ _____

(e) Commutative property of addition: $(a+b)+c =$ _____ (two different answers are possible; give one)

2. Hannah earns 13 dollars an hour at a bike shop and works 5 hours on Saturday and 2 hours on Sunday.

(a) Write an expression for the weekend's pay that finds each day's pay first.

(b) Write a different expression for the same pay that finds the total number of hours first.

(c) Which property says the two expressions are equal?

(d) Find the weekend's pay.

3. Hannah simplified $29 - x + 9$ like this:

$$29 - x + 9 = 29 - 9 + x = 20 + x$$

(a) Explain what went wrong.

(b) Simplify $29 - x + 9$ correctly.

(c) Show that Hannah's answer and the original expression have different values when $x = 2$.

4. Factor $-12x + 20$ so that the factor outside the parentheses is negative and as large in size as possible. Check your answer by expanding it.

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5. Write 42 = 40 + 2 and 62 = 60 + 2. Use the identity $(a+b)(c+d) = ac + ad + bc + bd$ to work out $42 \cdot 62$ without a calculator, showing the four products.

6. Here is why $(3x)(4y)$ may be written $12xy$. Give the property or arithmetic behind each numbered step.

Expression	Step
$(3x)(4y)$	
$= 3\big(x(4y)\big)$	(1)
$= 3\big((x \cdot 4)y\big)$	(2)
$= 3\big((4x)y\big)$	(3)
$= 3\big(4(xy)\big)$	(4)
$= (3 \cdot 4)(xy)$	(5)
$= 12xy$	(6)

Then check that the first and last expressions agree when $x = 2$ and $y = -1$.

7. Define a new operation on real numbers by $a * b = ab + a + b$.

(a) Find $2 * (-3)$.

(b) Show that $*$ is commutative: $a * b = b * a$ for all real numbers a and b. Name the property used at each step.

(c) Show that $*$ is associative: $(a * b) * c = a * (b * c)$ for all real numbers a, b and c.

Statements	Reasons

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