

Properties of real numbers Solutions
Practice problems

NAME:

Here are some practice problems. Simplify the following expressions. State the property or properties that contribute to each step. The first one is done for you.

a.) $\frac{x^2}{y} * \left(\frac{10 + 5x + 7x + 6}{4xy} \right)$

$$\frac{x^2}{y} * \left(\frac{10 + 5x + 7x + 6}{4xy} \right)$$

$$= \frac{x^2}{y} * \left(\frac{16 + 12x}{4xy} \right)$$

$$= \frac{x^2}{y} * \left(\frac{4(4 + 3x)}{4xy} \right)$$

$$= \frac{x^2}{y} * \left(\frac{(4 + 3x)}{xy} \right)$$

$$= \frac{x^2(4 + 3x)}{xy^2}$$

$$= \frac{x(4 + 3x)}{y^2}$$

Commutativity of addition,
 combining like terms

Distribution
 property

Canceling
 common factors

Multiplying fractions

Canceling
 common factors

b.) $5ab^3 * \left(\frac{6a^2 - 8a}{10a^2b^3} \right)$

$$= \frac{5ab^3}{1} * \left(\frac{2a(3a - 4)}{5ab^3(2a)} \right)$$

$$= \frac{5ab^3}{5ab^3} * \frac{2a}{2a} * \frac{3a - 4}{1}$$

$$= 3a - 4$$

I wrote $5ab^3$ as a fraction over 1 to keep the tops and bottoms organized. I used the distribution property to factor the big fraction to prepare to cancel common factors. Then we see common factors (on top and bottom) of $5ab^3$ and $2a$.

$$\begin{aligned}
\text{c.) } & \frac{2}{yz} * \frac{3xyz^2 - 4xz}{2} \\
& = \frac{2}{yz} * \frac{xz(3yz - 4)}{2} \\
& = \frac{2}{2} * \frac{z}{z} * \frac{x(3yz - 4)}{y} \\
& = \frac{x(3yz - 4)}{y}
\end{aligned}$$

I factored the top of the big fraction using the distribution property. Then, we see common factors on top and bottom of 2 and z. Cancel those to get the final answer.

$$\begin{aligned}
\text{d.) } & (5a + 6a) \frac{12xy^2}{3x} \\
& = \frac{(11a)}{1} * \frac{(3x)(4y^2)}{3x} \\
& = 11a * 4y^2 \\
& = 44ay^2
\end{aligned}$$

I added 5a and 6a to get 11a. Then I wrote it over 1 to keep track of the tops and bottoms. Then factor the top of the second fraction to check for common factors. There is a common factor of 3x on top and bottom. Cancel that and multiply everything left together.

$$\begin{aligned}
\text{e.) } & \left(\frac{4xy^2 + 2x}{6y^2 + 3} \right)^2 \\
& = \left(\frac{2x(2y^2 + 1)}{3(2y^2 + 1)} \right)^2 \\
& = \left(\frac{2x}{3} \right)^2 \\
& = \left(\frac{2x}{3} \right) \left(\frac{2x}{3} \right) \\
& = \frac{4x^2}{9}
\end{aligned}$$

First, simplify what we can inside the parentheses. Using the distribution property, we can factor the top and bottom of the fraction. Then cancel the common factor of "2y² + 1" on top and bottom. Then we simply need to square our left over fraction. Multiply it by itself to get the final answer.

$$\begin{aligned} \text{f.) } & 4(3x^2 + x - 5) + x^2 + 2x \\ & = 12x^2 + 4x - 20 + x^2 + 2x \\ & = 13x^2 + 6x - 20 \end{aligned}$$

*Distribute the 4 through the parentheses.
Then combine like terms.*

$$\begin{aligned} \text{g.) } & 2(3xy + 4x^3 + 7xy) - 9xy - 2x^3 \\ & = 6xy + 8x^3 + 14xy - 9xy - 2x^3 \\ & = 20xy - 9xy + 8x^3 - 2x^3 \\ & = 11xy + 6x^3 \end{aligned}$$

*Distribute the 2 through the parentheses.
Then combine like terms. We are using the
distribution property and the commutativity
and associativity of addition.*