For each of the following rules of exponents, explain the rule in your own words and explain why the rule works.

1. Multiplying a power by a power: $x^{4}∙x^{3}$
2. Dividing a power by a power: $\frac{x^{9}}{x^{5}}$ .
3. Raising a power to a power: $\left(x^{2}\right)^{3}$ .
4. Exponent of 0: $x^{0}$.

Assume that *a* > 0. Indicate if each expression would be positive or negative when simplified.

|  |  |
| --- | --- |
| **Expression** | **Positive or Negative** |
| 1. $-a^{2}$
 |  |
| 1. $\left(–a\right)^{2}$
 |  |
| 1. $-a^{3}$
 |  |
| 1. $\left(–a\right)^{5}$
 |  |

Simplify:

|  |  |
| --- | --- |
| 1. $2xy^{4}∙4x^{2}y^{2}$
 | 1. $ \frac{15a^{7}}{20ab}$
 |

1. Circle any expressions below that ***cannot*** be simplified using the rules of exponents.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| $$3x^{2}∙5x^{2}$$ | $$6x^{4}÷6y^{4}$$ | $$\left(xy^{4}\right)^{2}$$ | $$\frac{a^{2}}{b}$$ | $$a^{2}∙5b^{3}$$ |

1. Explain why the expressions in #11 cannot be simplified.

**Place a check in the cells below to indicate if the expressions could be combined by addition or simplified by multiplication.**

|  |  |  |
| --- | --- | --- |
| Terms | Combined by addition? | Simplified by multiplication? |
| $$4a^{2}, 4a^{3}$$ |  |  |
| $$2x^{4}y^{2}, y^{3}$$ |  |  |
| $$4x^{2}, -9x^{2}$$ |  |  |
| $$3y^{3}, 2x^{3}$$ |  |  |