8.1: Investigating Powers and Products

*After this lesson you will be able to: use properties of exponents involving products to simplify expressions.*

**Exploration A: Finding products of powers**

1. Complete the table.

|  |  |  |  |
| --- | --- | --- | --- |
| Expression | Expression as repeated multiplication | Number of factors | Simplified expression |
|  |  | 9 |  |
|  |  | 5 |  |
|  |  |  |  |
|  |  |  |  |

1. Find a pattern that relates the exponents of the factors in the first column and the exponent of the expression in the last column.

**Exploration B: Finding powers of powers.**

1. Complete the table.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Expression | Expanded expression | Expression as repeated multiplication | Number of factors | Simplified expression |
|  |  |  | 6 |  |
|  |  |  |  |  |
|  |  |  |  |  |

1. Find a pattern that relates the exponents of the expression in the first column and the exponent of the expression in the last column.

**Exploration 3: Finding Powers of a Product**

1. Complete the table.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Expression | Expanded expression | Rearranging and Combining Like Terms | Simplified with Exponents | Simplified expression |
|  |  |  |  |  |
|  |  |  |  |  |
|  |  |  |  |  |
|  |  |  |  |  |

1. Find a pattern that relates the original expressions in the first column to the simplified expressions in the last column.

**Practice Problems:**

For each problem, write the expression as repeated multiplication and simplified expression like you did in the above tables.

|  |  |  |  |
| --- | --- | --- | --- |
| # | 22-32 even | Expression as Repeated Multiplication | Simplified Expression |
| ***1.*** |  |  |  |
| ***2.*** |  |  |  |
| ***3.*** |  |  |  |
| ***4.*** |  |  |  |
| **5.** |  |  |  |
| **6.** |  |  |  |

**7.** a.Complete the table of values.

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **x** | **0** | **1** | **2** | **3** | **4** |
| **2x** |  |  |  |  |  |
| **2x** |  |  |  |  |  |

b. Sketch the graphs of y=2x and y=2x   
in the same coordinate plane.

c. Compare the graphs.   
How are they the same?   
How are they different?