## Unit 6 Lesson 15: Equivalent Exponential Expressions

### 1 Up or Down? (Warm up)

#### Student Task Statement

Find the values of $3^{x}$ and $\left(\frac{1}{3}\right)^{x}$ for different values of $x$. What patterns do you notice?

|   $x$   |   $3^{x}$   |   $\left(\frac{1}{3}\right)^{x}$   |
| --- | --- | --- |
| 1 |   |   |
| 2 |   |   |
| 3 |   |   |
| 4 |   |   |

### 2 What's the Value?

#### Student Task Statement

Evaluate each expression for the given value of $x$.

1. $3x^{2}$ when $x$ is 10
2. $3x^{2}$ when $x$ is $\frac{1}{9}$
3. $\frac{x^{3}}{4}$ when $x$ is 4
4. $\frac{x^{3}}{4}$ when $x$ is $\frac{1}{2}$
5. $9+x^{7}$ when $x$ is 1
6. $9+x^{7}$ when $x$ is $\frac{1}{2}$

### 3 Exponent Experimentation

#### Student Task Statement

Find a solution to each equation in the list. (Numbers in the list may be a solution to more than one equation, and not all numbers in the list will be used.)

1. $64=x^{2}$
2. $64=x^{3}$
3. $2^{x}=32$
4. $x=\left(\frac{2}{5}\right)^{3}$
5. $\frac{16}{9}=x^{2}$
6. $2⋅2^{5}=2^{x}$
7. $2x=2^{4}$
8. $4^{3}=8^{x}$

List:

$\frac{8}{125}$

$\frac{6}{15}$

$\frac{5}{8}$

$\frac{8}{9}$

1

$\frac{4}{3}$

2

3

4

5

6

8



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