10.4

Zero and Negative Exponents

Do Now

Simplify.

1) $h^2 \cdot h^4$

2) $z \cdot z^{12}$

3) $\left(y^2\right)^4$

4) $\left(x^2 y^3\right)^3$

5) $\left(5a^8\right)^2$

6) $\dfrac{x^8}{x^3}$

7) $\dfrac{a^9 b}{a^2}$

Understanding Zero Exponents

Use the pattern to find the zero exponent result:

	Simplified Exponent	Evaluate
$\frac{2^6}{2^2}$		
$\frac{2^6}{2^3}$		
$\frac{2^6}{2^4}$		
$\frac{2^6}{2^5}$		
$\frac{2^6}{2^6}$		

Zero Exponent Rule

Any number to the zero power equals to _____.

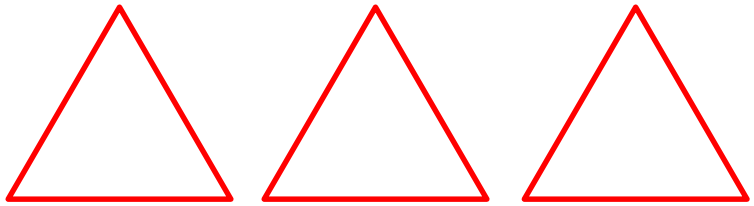
a) 4^0

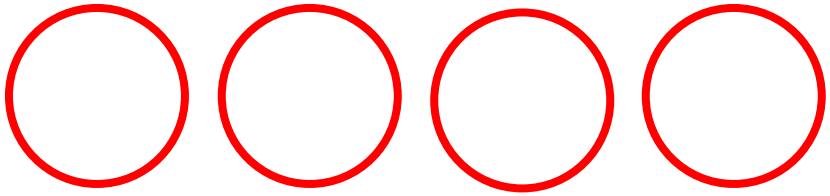
b) 17^0

c) 125^0

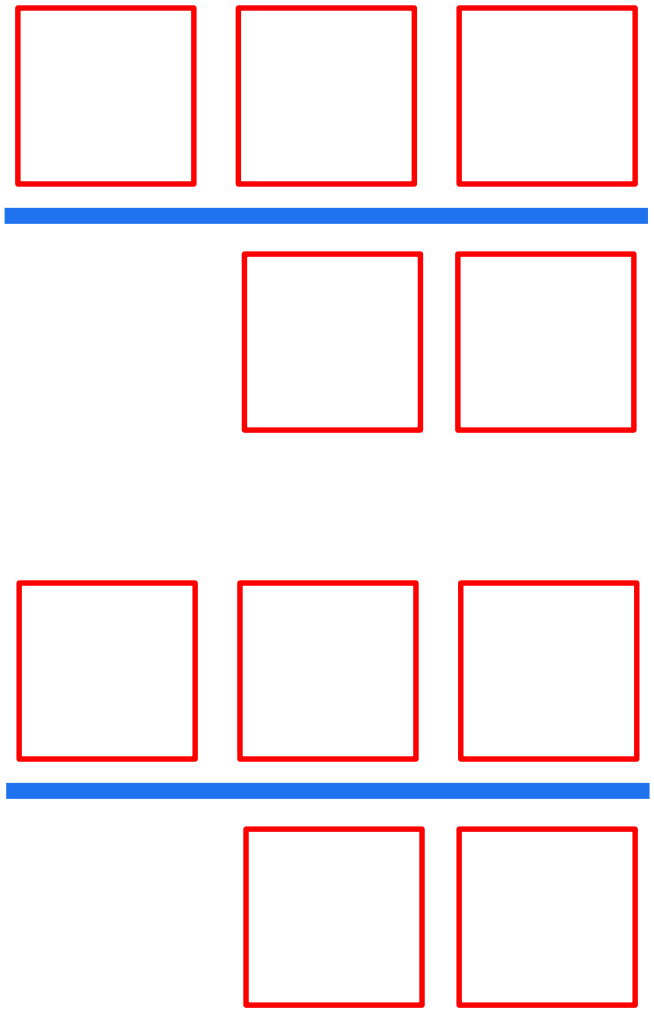
d) $5,785,123^0$

Understanding: Gathering and Cancelling Activity



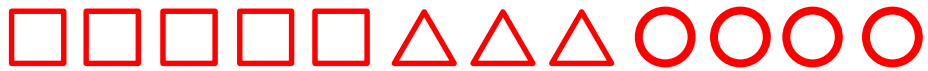


Understanding: Gathering and Cancelling Activity



Understanding: Gathering and Cancelling Activity

Gather and cancel as much as possible. ***(Order of shapes doesn't matter)***

1) 

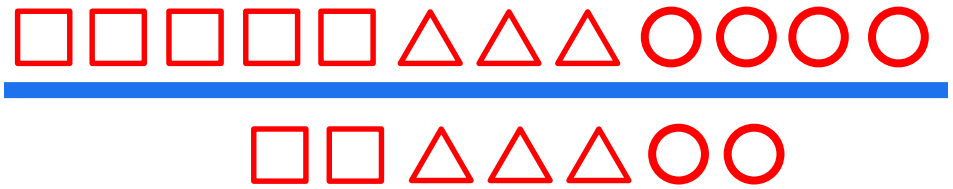
2) 

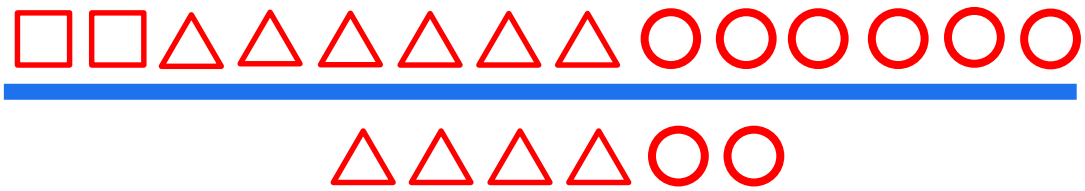
3) 

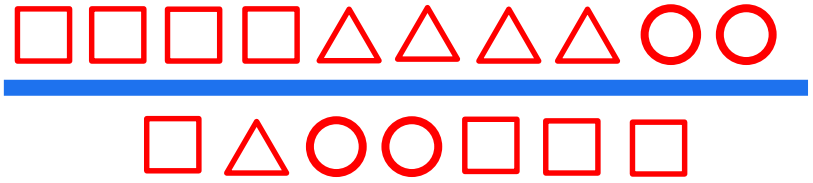
4) 

Understanding: Gathering and Cancelling Activity

Gather and cancel as much as possible. ***(Order of shapes doesn't matter)***

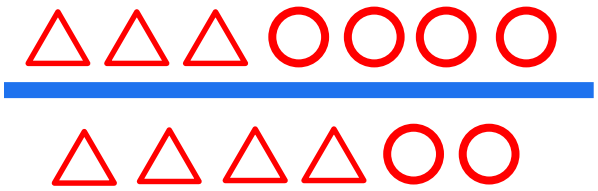
5) 

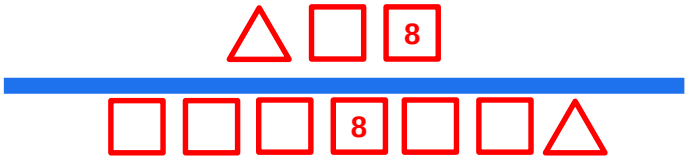
6) 

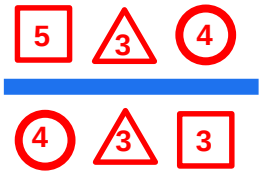
7) 

Understanding: Gathering and Cancelling Activity

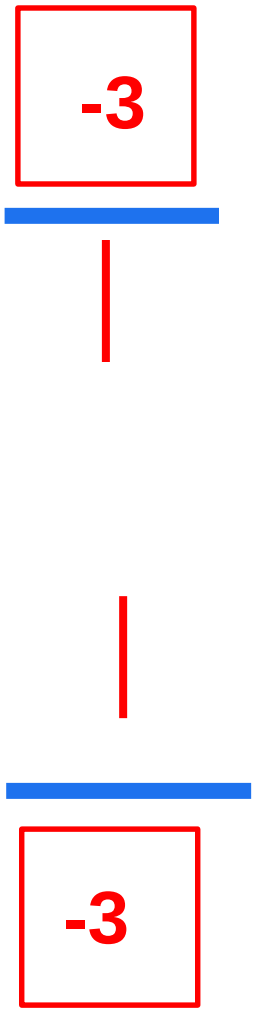
Gather and cancel as much as possible. ***(Order of shapes doesn't matter)***

8) 

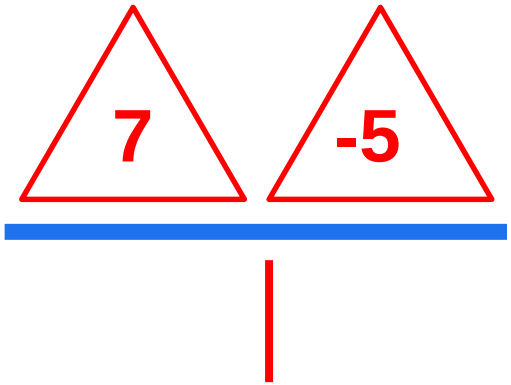
9) 

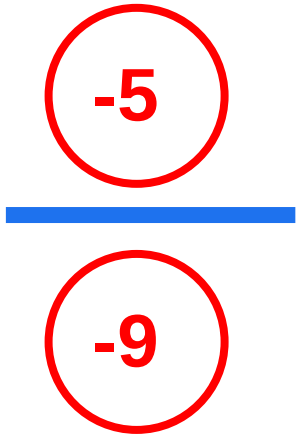
10) 

Understanding: Gathering and Cancelling Activity



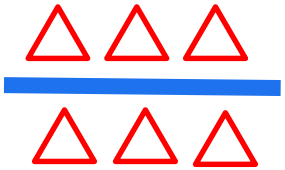
Understanding: Gathering and Cancelling Activity





Understanding: Gathering and Cancelling Activity

Gather and cancel as much as possible. ***(Order of shapes doesn't matter)***

11) 

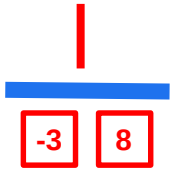
12) 

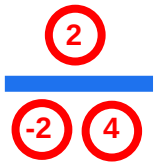
13) 

Understanding: Gathering and Cancelling Activity

Gather and cancel as much as possible. ***(Order of shapes doesn't matter)***

14) 

15) 

13) 

10-4 Define and Use Zero and Neg. Exponents

Use the pattern to find zero exponent and negative exponents results:

2^4	
2^3	
2^2	
2^1	
2^0	
2^{-1}	
2^{-2}	
2^{-3}	

RULES:

- ANY number to the zero power equals _____.
- a^{-n} is the _____ of a^{n}.

Evaluate

1) 4^{-2}

2) 8^{0}

3) $(-24)^{0}$

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

5) $\frac{1}{2^{-4}}$

6) $(-5)^{-3}$

Practice

Evaluate

7) $\dfrac{1}{3^{-4}}$

8) $(4^{-2})^{-2}$

9) $\dfrac{5^{-1}}{5^{2}}$

10) $(5^{-3})^{-1}$

Practice

Evaluate

11) $2^4 \bullet 2^4 \bullet 2^4$

12) $(-3)^5 \bullet (-3)^{-5}$

Practice

Simplify

13) $3f^{-4}$

14) $(3f)^{-4}$

15) $\dfrac{a^{-7}}{b^{4}}$

16) $\dfrac{m^{6}}{n^{-7}}$

Practice

Simplify

17) $\dfrac{c^{-2}}{d^{-3}}$

18) $6x^{-2}yz^{-4}$

Practice

Simplify

1) 10^{-3}

2) $(-2)^{-6}$

3) 7^{0}

4) $\dfrac{1}{5^{-4}}$

5) $10^{-7} \bullet 10^{5}$

Practice

Simplify

6) x^{-7}

7) $6y^{-4}$

8) $a^{2}b^{-4}$

9) $3x^{-2}y^{-5}$

10) $\dfrac{1}{3x^{-3}y^{-7}}$

ON YOUR OWN

Simplify. Write your answer as a power.

1) $\dfrac{5^4 \bullet 5^2}{5^3}$

2) $\dfrac{2^{11} \bullet 2^5}{2^{13}}$

3) $\dfrac{a^{13} \bullet a^{11}}{a^{12}}$

ON YOUR OWN

Simplify.

1. 5^{-3}

2. $(-8)^{0}$

ON YOUR OWN

Simplify.

3. $\dfrac{6^{-3}}{6^{-5}}$

4. $\dfrac{15^{-4}}{15^{-4}}$

ON YOUR OWN

Simplify.

5. $10^{-1} \bullet 10^{-2}$

6. $\frac{1}{3^{-4}} \bullet \frac{1}{3^{6}}$

ON YOUR OWN

Simplify.

7. $27^{-18} \cdot 27^{18}$

8. $\dfrac{4^{-7}}{4^{2} \cdot 4^{-5}}$

ON YOUR OWN

Simplify.

10. $\dfrac{14u^{-4}}{7u^{8}}$

11. $\dfrac{18w^{-8}}{w^{-5}}$

ON YOUR OWN

Simplify.

12. $y^5 \bullet z^{-3}$

13. $\dfrac{2^{-3} \bullet a^0 \bullet b^5}{b^{-4}}$