



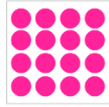
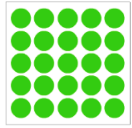
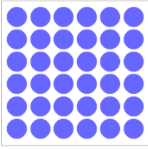
Unit 3 ü Exponents, Perfect Squares, Integers, Order of Operations

SOL 6.4: The student will evaluate exponents, identify perfect squares, patterns of positive exponents including powers of 10.

SOL 6.3: The student will represent, model (a), identify (a), compare and order integers (b) and describe the absolute value of an integer (c).

SOL 6.6c: Use the order of operations to simplify and evaluate expressions.

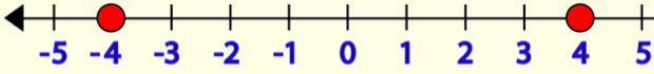
Extended: SOL 7.1ab: Recognize and represent powers of 10 with negative exponents, convert and compare numbers written in scientific notation, and determine the positive square root of a perfect square.

	<u>Target Defined</u>	<u>Example of Target</u>	<u>Challenge A</u>	<u>Challenge B</u>	<u>Challenge C</u>
Target 1	Investigate and describe patterns of positive exponents	<p style="text-align: center;">Exponent (index or power)</p> <p style="text-align: center;">Base $6^3 = 6 \times 6 \times 6$</p> <p style="text-align: center;">Shorthand way of representation Normal representation (Base multiplied exponent number of times)</p>			
Target 2	Investigate and describe patterns of perfect squares.	<p style="text-align: center; background-color: #90EE90;">perfect square</p> <p style="text-align: center; font-size: small;">Another name for square number.</p> <div style="display: flex; flex-wrap: wrap; justify-content: space-around; align-items: center;"> <div style="text-align: center;"> <p>4</p>  <p>2 x 2</p> </div> <div style="text-align: center;"> <p>9</p>  <p>3 x 3</p> </div> <div style="text-align: center;"> <p>16</p>  <p>4 x 4</p> </div> <div style="text-align: center;"> <p>25</p>  <p>5 x 5</p> </div> <div style="text-align: center;"> <p>36</p>  <p>6 x 6</p> </div> </div>			

Target 3	Recognize powers of 10	<table border="1"> <tr><td>One</td><td>1</td><td>10^0</td></tr> <tr><td>Ten</td><td>10</td><td>10^1</td></tr> <tr><td>Hundred</td><td>100</td><td>10^2</td></tr> <tr><td>Thousand</td><td>1,000</td><td>10^3</td></tr> <tr><td>Ten Thousand</td><td>10,000</td><td>10^4</td></tr> <tr><td>Hundred Thousand</td><td>100,000</td><td>10^5</td></tr> <tr><td>Million</td><td>1,000,000</td><td>10^6</td></tr> <tr><td>Ten Million</td><td>10,000,000</td><td>10^7</td></tr> <tr><td>Hundred Million</td><td>100,000,000</td><td>10^8</td></tr> </table>	One	1	10^0	Ten	10	10^1	Hundred	100	10^2	Thousand	1,000	10^3	Ten Thousand	10,000	10^4	Hundred Thousand	100,000	10^5	Million	1,000,000	10^6	Ten Million	10,000,000	10^7	Hundred Million	100,000,000	10^8
One	1	10^0																											
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Target 4	Represent Integers	<p align="center">Represent with Integers</p> <p>a) A 30° drop in temperature → -30</p> <p>b) A \$450 deposit into account → +450</p> <p>c) A weight loss of 5 kilograms → -5</p> <p align="center">Key Words</p> <p>NEGATIVE: decrease, fall, drop, loss/less</p> <p>POSITIVE: increase, add, more, deposit</p>
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Target 5	Compare and order integers	<p>Key Concept: Comparing and Ordering Integers</p> <p align="center">{...-5, -4, -3, -2, -1, 0, 1, 2, 3, 4, 5, ...}</p> <p>The further right → the greater the number</p> <p>The further left ← the lesser the number</p>
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Target 6	Describe the absolute value of integers	<p>How far away from zero are the following? -4 and 4</p>  <p>Notice that both 4 and -4 are a distance of 4 units away from zero. This means that 4 and -4 are both 4.</p>
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Target 7
T7

Solve numerical expressions using order of operations. Positive integers.

Target 8
T8

Adding Integers

Adding Integers

Same sign, add and keep
Different sign subtract
Take the sign of the number with the greater absolute value
Then you'll be EXACT!

Target 9
T9

Subtracting Integers

BUH BLAM!

To subtract, Add the Opposite!

Target 10
T10

Multiplying Integers

Multiplying and Dividing Integers

Same Signs -
POSITIVE





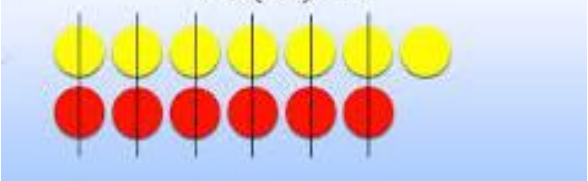

$-9 \cdot -5 = 45$
 $\frac{-72}{-8} = 9$

Two negatives -
MAKE A POSITIVE

Different Signs -
NEGATIVE

$-9 \cdot 5 = -45$
 $\frac{72}{-8} = -9$

One negative
STAYS NEGATIVE

Target 11 T11	Dividing Integers	<h3 style="text-align: center;">Multiplying and Dividing Integers</h3> <div style="display: flex; justify-content: space-around;"> <div style="border: 1px solid black; border-radius: 15px; padding: 10px; width: 45%;"> <p style="text-align: center;">Same Signs - POSITIVE</p> <div style="display: flex; justify-content: center; gap: 20px;">   </div> <p style="text-align: center;"> $-9 \cdot -5 = 45$ $\frac{-72}{-8} = 9$ </p> <p style="text-align: center;">Two negatives - MAKE A POSITIVE</p> </div> <div style="border: 1px solid black; border-radius: 15px; padding: 10px; width: 45%;"> <p style="text-align: center;">Different Signs - NEGATIVE</p> <div style="display: flex; justify-content: center; gap: 20px;">   </div> <p style="text-align: center;"> $-9 \cdot 5 = -45$ $\frac{72}{-8} = -9$ </p> <p style="text-align: center;">One negative STAYS NEGATIVE</p> </div> </div>			
Target 12 T12	Modeling Integers	<p style="text-align: center;">Modeling addition of integers using counters:</p> <p style="text-align: center;">$7 + (-6) = 1$</p> 			
Target 13 T13	Mixed Integer Operations	<p style="text-align: center;">ALL Operations! Take your time!!!!!!!!!!!!!!!!!!!!!!!!!!!!</p>			
Target 14 T14	Order of operations with integers.	<div style="text-align: center;"> <h1 style="margin: 0;">ORDER of OPERATIONS with GEMS!</h1>  </div>			
Extended Target 1 ET1	Recognize powers of 10 with negative exponents	<div style="background-color: #f4a460; padding: 5px; text-align: center;"> Negative Powers </div> <div style="background-color: #ffe4c4; padding: 10px; text-align: center; margin-bottom: 5px;"> $10^{-1} = \frac{1}{10} = 0.1$ </div> <div style="background-color: #e0ffe0; padding: 10px; text-align: center; margin-bottom: 5px;"> $10^{-2} = \frac{1}{100} = 0.01$ </div> <div style="background-color: #ffe4c4; padding: 10px; text-align: center; margin-bottom: 5px;"> $10^{-3} = \frac{1}{1000} = 0.001$ </div> <div style="background-color: #e0ffe0; padding: 10px; text-align: center; margin-bottom: 5px;"> $10^{-4} = \frac{1}{10,000} = 0.0001$ </div> <div style="background-color: #ffe4c4; padding: 10px; text-align: center; margin-bottom: 5px;"> $10^{-5} = \frac{1}{100,000} = 0.00001$ </div> <div style="padding: 10px; text-align: center;"> $10^{-6} = \frac{1}{1,000,000} = 0.000001$ </div>			

Extended Target 2 Scientific Notation

SCIENTIFIC NOTATION

Scientific Notation is used to write VERY LARGE and VERY SMALL numbers more easily.

★ Expressed as a product of 2 factors.

- ~ Factor #1 is a number between 1 and 10.
- ~ Factor #2 is a power of 10.

LARGE Numbers

Step #1: Move the decimal to the left to make a # between 1 and 10.

$72,000,000 = 7.2$ ← Factor #1

Step #2: Count the number of places you moved the decimal point. Write as a power of 10.

Moved 7 places to the left = 10^7 ← Factor #2

$72,000,000 = 7.2 \times 10^7$

SCIENTIFIC → STANDARD

POSITIVE EXPONENTS = Move decimal to the RIGHT (LARGER NUMBER)

$6.2 \times 10^6 = 6,200,000$

SMALL Numbers

Step #1: Move the decimal to the right to make a # between 1 and 10.

$.0000072 = 7.2$ ← Factor #1

Step #2: Count the number of places you moved the decimal point. Write as a NEGATIVE power of 10.

Moved 6 places to the right = 10^{-6} ← Factor #2

$.0000072 = 7.2 \times 10^{-6}$

SCIENTIFIC → STANDARD

NEGATIVE EXPONENTS = Move decimal to the LEFT (SMALLER NUMBER)

$6.2 \times 10^{-6} = .0000062$

Extended Target 3 Square roots through 400.

X	1	2	3	4	5	6	7	8	9	10
1	$\sqrt{1}$	2	3	4	5	6	7	8	9	10
2	2	$\sqrt{4}$	6	8	10	12	14	16	18	20
3	3	6	$\sqrt{9}$	12	15	18	21	24	27	30
4	4	8	12	$\sqrt{16}$	20	24	28	32	36	40
5	5	10	15	20	$\sqrt{25}$	30	35	40	45	50
6	6	12	18	24	30	$\sqrt{36}$	42	48	54	60
7	7	14	21	28	35	42	$\sqrt{49}$	56	63	70
8	8	16	24	32	40	48	56	$\sqrt{64}$	72	80
9	9	18	27	36	45	54	63	72	$\sqrt{81}$	90
10	10	20	30	40	50	60	70	80	90	$\sqrt{100}$

Quiz/Test Grades: