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Exponents & Roots

Positive Exponents:

Simplify.

❶ 9^2 =

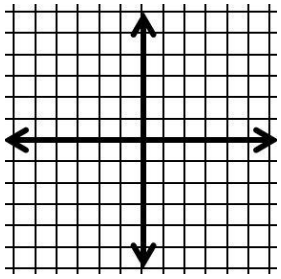
❷ 3^5 =

❸ 6^3 =

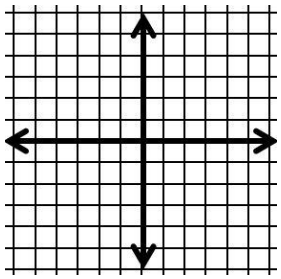
❹ 12^0 =

Find the distance between the two points. Round to the nearest tenth, if necessary.

❺ (1, 2) and (6, 4)



❻ (-3, 5) and (2, -2)

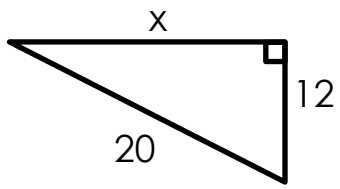


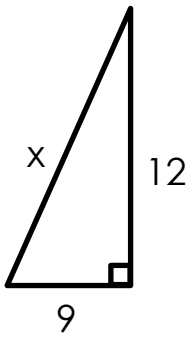
❼ What is the length of the diagonal on a standard sheet of 8 ½ x 11 inch computer paper? Round to the nearest tenth.

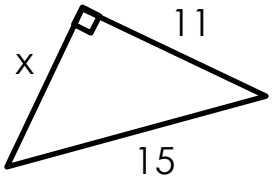
❽ A ladder must be placed 5 feet from the base of a wall and must reach a height of 11 feet. What length ladder is needed? Round your answer to the nearest tenth.

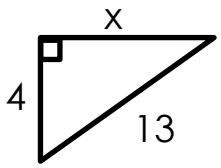
The Pythagorean Theorem

Find the missing side length. Round your answer to the nearest tenth, if necessary.

1. 

2. 

3. 

4. 

Negative Exponents:

Simplify.

5. $6^{-2} =$

6. $2^{-5} =$

7. $(-9)^{-3} =$

8. $(-3)^{-4} =$

Integer Exponents

Scientific notation to standard form:

Write each number in standard form.

❶ $9.2 \times 10^{6} =$

❷ $3.6 \times 10^{-2} =$

❸ The mass of a dust particle is about 7.53×10^{-10} kg. What is the mass in standard form?

Multiply:

Simplify.

❼ $\sqrt{32} \cdot \sqrt{2}$ ❽ $6\sqrt{3} \cdot \sqrt{3}$ ❾ $3\sqrt{12} \cdot -5\sqrt{4}$

Divide:

Simplify.

❿ $\sqrt{\frac{9}{16}}$ ⓫ $\sqrt{\frac{12}{169}}$ ⓬ $\sqrt{\frac{162}{49}}$

Square Roots

Simplify:

❶ $\sqrt{500}$ ❷ $\sqrt{63}$ ❸ $\sqrt{98}$

Add & Subtract:

❹ $7\sqrt{13} - 2\sqrt{13}$ ❺ $-2\sqrt{3} + 2\sqrt{2} - 6\sqrt{3}$ ❻ $\sqrt{12} - \sqrt{8} + \sqrt{18}$

Standard Form to Scientific Notation

Write each number in scientific notation.

❹ 6,500,000 =

❺ 0.000729 =

❻ Jupiter is about 778,120,000 km from the Sun. Write this number in scientific notation.

Scientific Notation

MULTIPLY (*keep the base, **ADD** the exponents*)

❶ $6^3 \cdot 6^7 =$

❷ $27^5 \cdot 27^5 =$

❸ $3^5 \cdot 3 \cdot 3^7 =$

❹ $x^4 \cdot x^9 =$

DIVIDE (*keep the base, **SUBTRACT** the exponents*)

❺ $\frac{7^9}{7^5} =$

❻ $\frac{3^{12}}{3^5} =$

❼ $\frac{8^4}{8^7} =$

❽ $\frac{x^{10}}{x^9} =$

RAISING A POWER TO A POWER

(*keep the base, **MULTIPLY** the exponents*)

❾ $(5^3)^6 =$

❿ $(9^2)^7 =$

⓫ $(3^4)^8 =$

⓬ $(x^{10})^{-6} =$

Use the laws of exponents to simplify each expression.

⓭ $\frac{x^8y^4z^3}{x^5yz^7}$

⓮ $(9m^3n^5)^2$

LAWS OF EXPONENTS

Answer Key!

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Exponents & Roots

Positive Exponents:

Simplify.

❶ $9^2 =$ $9 \cdot 9 = 81$

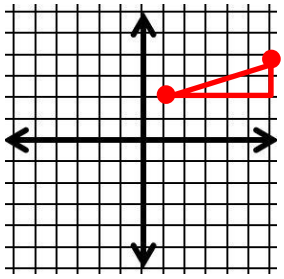
❷ $3^5 =$ $3 \cdot 3 \cdot 3 \cdot 3 \cdot 3 = 243$

❸ $6^3 =$ $6 \cdot 6 \cdot 6 = 216$

❹ $12^0 = 1$

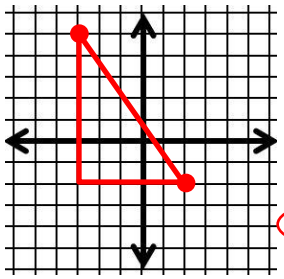
Find the distance between the two points. Round to the nearest tenth, if necessary.

❺ (1, 2) and (6, 4)



$a^2 + b^2 = c^2$
$2^2 + 5^2 = c^2$
$4 + 25 = c^2$
$29 = c^2$
$c = 5.4$

❻ (-3, 5) and (2, -2)



$a^2 + b^2 = c^2$
$7^2 + 5^2 = c^2$
$49 + 25 = c^2$
$74 = c^2$
$c = 8.6$

❼ What is the length of the diagonal on a standard sheet of 8 ½ x 11 inch computer paper? Round to the nearest tenth.

$a^2 + b^2 = c^2$
$8.5^2 + 11^2 = c^2$
$72.25 + 121 = c^2$
$193.25 = c^2$

13.9 inches

❽ A ladder must be placed 5 feet from the base of a wall and must reach a height of 11 feet. What length ladder is needed? Round your answer to the nearest tenth.

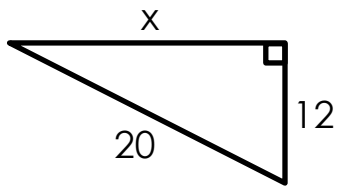
$a^2 + b^2 = c^2$
$5^2 + 11^2 = c^2$
$25 + 121 = c^2$
$146 = c^2$

12.1 feet

The Pythagorean Theorem

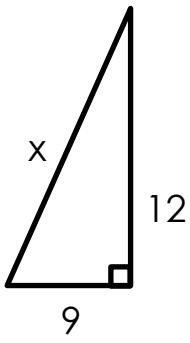
Find the missing side length. Round your answer to the nearest tenth, if necessary.

❶



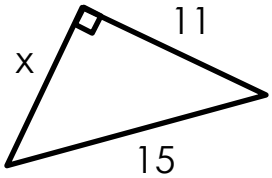
$a^2 + b^2 = c^2$
$x^2 + 12^2 = 20^2$
$x^2 + 144 = 400$
$x^2 = 256$
$x = 16$

❷



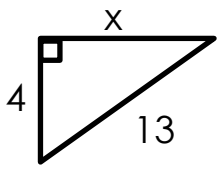
$a^2 + b^2 = c^2$
$9^2 + 12^2 = x^2$
$81 + 144 = c^2$
$225 = c^2$
$x = 15$

❸



$a^2 + b^2 = c^2$
$x^2 + 11^2 = 15^2$
$x^2 + 121 = 225$
$x^2 = 104$
$x = 10.2$

❹



$a^2 + b^2 = c^2$
$4^2 + x^2 = 13^2$
$16 + x^2 = 169$
$x^2 = 153$
$x = 12.4$

Negative Exponents:

Simplify.

❺ $6^{-2} = \frac{1}{36}$

❻ $2^{-5} = \frac{1}{32}$

❼ $(-9)^{-3} = \frac{-1}{729}$

❽ $(-3)^{-4} = \frac{-1}{81}$

Integer Exponents

Scientific notation to standard form:

Write each number in standard form.

❶ $9.2 \times 10^{6} =$ 9,200,000

❷ $3.6 \times 10^{-2} =$ 0.036

❸ The mass of a dust particle is about 7.53×10^{-10} kg. What is the mass in standard form?

0.000000000753

Multiply:

Simplify.

❼ $\sqrt{32} \cdot \sqrt{2}$

$= \sqrt{64}$

$= 8$

❽ $6\sqrt{3} \cdot \sqrt{3}$

$= 6\sqrt{9}$

$= 6 \cdot 3$

$= 18$

❾ $3\sqrt{12} \cdot -5\sqrt{4}$

$= -15\sqrt{48}$

$= -15 \cdot \sqrt{16} \cdot \sqrt{3}$

$= -15 \cdot 4 \cdot \sqrt{3}$

$= -60\sqrt{3}$

Divide:

Simplify.

❿ $\sqrt{\frac{9}{16}} = \frac{\sqrt{9}}{\sqrt{16}}$

$= \frac{3}{4}$

⓫ $\sqrt{\frac{12}{169}} = \frac{\sqrt{12}}{\sqrt{169}}$

$= \frac{\sqrt{4} \cdot \sqrt{3}}{13}$

$= \frac{2\sqrt{3}}{13}$

⓬ $\sqrt{\frac{162}{49}} = \frac{\sqrt{162}}{\sqrt{49}}$

$= \frac{\sqrt{81} \cdot \sqrt{2}}{7}$

$= \frac{9\sqrt{2}}{7}$

Square Roots

Simplify:

❶ $\sqrt{500}$

$= \sqrt{100} \cdot \sqrt{5}$

$= 10\sqrt{5}$

❷ $\sqrt{63}$

$= \sqrt{9} \cdot \sqrt{7}$

$= 3\sqrt{7}$

❸ $\sqrt{98}$

$= \sqrt{49} \cdot \sqrt{2}$

$= 7\sqrt{2}$

Add & Subtract:

❹ $7\sqrt{13} - 2\sqrt{13}$

$= 5\sqrt{13}$

❺ $-2\sqrt{3} + 2\sqrt{2} - 6\sqrt{3}$

$= 2\sqrt{2} - 8\sqrt{3}$

❻ $\sqrt{12} - \sqrt{8} + \sqrt{18}$

$= \sqrt{4} \cdot \sqrt{3} - \sqrt{4} \cdot \sqrt{2} + \sqrt{9} \cdot \sqrt{2}$

$= 2\sqrt{3} - 2\sqrt{2} + 3\sqrt{2}$

$= \sqrt{2} + 2\sqrt{3}$

Standard Form to Scientific Notation

Write each number in scientific notation.

❹ 6,500,000 = 6.5×10^{6}

❺ 0.000729 = 7.29×10^{-4}

❻ Jupiter is about 778,120,000 km from the Sun. Write this number in scientific notation.

7.7812×10^{8}

Scientific Notation

MULTIPLY (*keep the base, **add** the exponents*)

❶ $6^3 \cdot 6^7 = 6^{3+7} = 6^{10}$

❷ $27^5 \cdot 27^5 = 27^{5+5} = 27^{10}$

❸ $3^5 \cdot 3 \cdot 3^7 = 3^{5+1+7} = 3^{13}$

❹ $x^4 \cdot x^9 = x^{4+9} = x^{13}$

DIVIDE (*keep the base, **subtract** the exponents*)

❺ $\frac{7^9}{7^5} = 7^{9-5} = 7^4$

❻ $\frac{3^{12}}{3^5} = 3^{12-5} = 3^7$

❼ $\frac{8^4}{8^7} = 8^{4-7} = 8^{-3} = \frac{1}{8^3}$

❽ $\frac{x^{10}}{x^9} = x^{10-9} = x^1 = x$

RAISING A POWER TO A POWER

(*keep the base, **multiply** the exponents*)

❾ $(5^3)^6 = 5^{3 \cdot 6} = 5^{18}$

❿ $(9^2)^7 = 9^{2 \cdot 7} = 9^{14}$

⓫ $(3^4)^8 = 3^{4 \cdot 8} = 3^{32}$

⓬ $(x^{10})^{-6} = x^{10 \cdot -6} = x^{-60} = \frac{1}{x^{60}}$

Use the laws of exponents to simplify each expression.

⓭ $\frac{x^8y^4z^3}{x^5yz^7} = \frac{x^3y^3}{z^4}$

⓮ $(9m^3n^5)^2 = 81m^6n^{10}$

LAWS OF EXPONENTS

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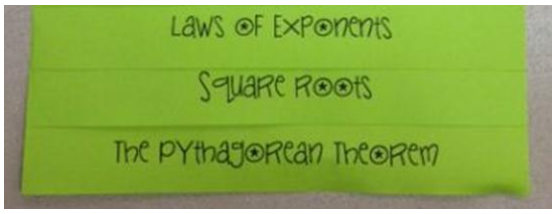
Step 1: Print pages 1&2, 3&4, 5&6 front to back so that the information is facing different directions (flip along the short edge).

Step 2: Cut off the extra strip of paper (along the dotted lines).

Step 3: Line up the bottom of the 3 pages as shown below.



Step 4: Fold over the top portion of all three pages and secure at the top with a few staples.