Sets & Steps
Math Practice & Worked Solutions

Algebra 1

Scientific Notation Operations & Comparisons | Algebra 1 | 2-Topic Bundle

2-topic bundle | 192 problems | Four activity formats

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01 Operations with Scientific Notation

View individual product and its full preview

02 Comparing Scientific Notation

View individual product and its full preview

In every topic

Answer Bank Challenge	24 tasks
Grid Rounds	24 tasks
Match & Move	24 cards
Error Analysis & Strategy	24 tasks
Quick Answer Key and Full Worked Solutions	included
Teacher / Parent Use Guide and Terms of Use	included

Product previews

The following preview pages show the cover, all four activity formats, and worked examples for each included resource, in the listed order.

16 PDFs and 2 READMEs; 107 buyer PDF pages across the 2 products.

Preview pages are not included in the buyer page count. Check the list against resources you already own.

This is a fixed collection of the listed products. Purchase includes the existing individual resource files. To open a product's online preview, follow its title link and select View Preview.

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Sets & Steps
Math Practice & Worked Solutions

Algebra 1

Operations with Scientific Notation

Operations with Scientific Notation | A1-U07-P07

96 problems · Four activity formats

Topic focus

Across 96 tasks this topic asks for exact normalized scientific notation with any required units or explicit final rounding, decision with exact calculation and justification, missing normalized quotient with a substitution check, exact quotient and order-of-magnitude confirmation, sign justification and normalized quotient and exact normalized quotient and power-of-ten scale check.

8 PDFs and a README; 52 buyer pages.

The following pages use the same questions, given data, and notation as the final files. Question/card serial numbers and internal IDs are omitted in this preview only. Table values and matching responses are retained. Full answer keys are not included.

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Algebra 1

Operations with Scientific Notation

Name: _____ **Date:** _____ **Class:** _____

Answer each question and record the matching bank letter. Give exact values. A value without its unit is not a complete answer.

Multiply $-1.2 \cdot 10^{3}$ by $-8.3 \cdot 10^{2}$. Keep the calculation exact, add the powers of ten, and normalize the final coefficient. Bank label: _____	Multiply $-7.7 \cdot 10^{8}$ by $-1.3 \cdot 10^{0}$. Keep the calculation exact, add the powers of ten, and normalize the final coefficient. Bank label: _____
Multiply $2.01 \cdot 10^{-4}$ by $3.02 \cdot 10^{-5}$. Keep the calculation exact, add the powers of ten, and normalize the final coefficient. Bank label: _____	Multiply $3.125 \cdot 10^{3}$ by $3.2 \cdot 10^{2}$. Keep the calculation exact, add the powers of ten, and normalize the final coefficient. Bank label: _____
Multiply $-2.005 \cdot 10^{8}$ by $4.9 \cdot 10^{0}$. Keep the calculation exact, add the powers of ten, and normalize the final coefficient. Bank label: _____	Multiply $9.999 \cdot 10^{12}$ by $9.999 \cdot 10^{-12}$. Keep the calculation exact, add the powers of ten, and normalize the final coefficient. Bank label: _____
Multiply $9.05 \cdot 10^{-6}$ by $-1.12 \cdot 10^{9}$. Keep the calculation exact, add the powers of ten, and normalize the final coefficient. Bank label: _____	Multiply $-3.333 \cdot 10^{7}$ by $3.003 \cdot 10^{-7}$. Keep the calculation exact, add the powers of ten, and normalize the final coefficient. Bank label: _____

Algebra 1

Operations with Scientific Notation

Name: _____ **Date:** _____ **Class:** _____

Answer each question and show your reasoning in the workspace. Give exact values rather than decimals unless the question supplies a decimal. A value without its unit is not a complete answer.

Divide $9 \cdot 10^{-2}$ by $3 \cdot 10^{-5}$. Keep any nonterminating coefficient as an exact fraction, subtract the denominator exponent, and normalize.	Divide $4.8 \cdot 10^{4}$ by $-1.2 \cdot 10^{0}$. Keep any nonterminating coefficient as an exact fraction, subtract the denominator exponent, and normalize.
For $\frac{-6.3 \cdot 10^{7}}{-3.5 \cdot 10^{-3}}$, determine the sign before doing any magnitude arithmetic. Then calculate the exact quotient.	Evaluate $\frac{-9.05 \cdot 10^{10}}{2.5 \cdot 10^{-7}}$. Track the sign independently from the exponent subtraction so neither is lost.
The direct coefficient in $\frac{1.02 \cdot 10^{-8}}{-5.1 \cdot 10^{6}}$ is -0.2. Carry the negative sign through the normalization step and state the final result.	In $\frac{2.02 \cdot 10^{-2}}{4.04 \cdot 10^{3}}$, the denominator coefficient is twice the numerator coefficient. Use that relation to get the coefficient quotient, then handle the powers.

Algebra 1

Operations with Scientific Notation

Name: _____ **Date:** _____ **Class:** _____

Begin at START. Answer the card, then find the matching final answer at the top of another card. Use the recording sheet for your reasoning. Visit each card once and continue to FINISH.

Incoming: $1.2 \cdot 10^{6}$ grams

Evaluate $\frac{9.996 \cdot 10^{3}}{1.0001 \cdot 10^{7}}$ exactly, then round the final normalized result to 3 significant digits. If the coefficient rounds to 10, renormalize and change the exponent.

Your response: _____

Incoming: $3.6 \cdot 10^{-3}$

Compute $\frac{[0.000505(8 \cdot 10^{9})]}{2 \cdot 10^{4}}$ exactly. Convert the decimal only as preparation, respect the product-then-quotient dependency, and normalize once at the end.

Your response: _____

Incoming: X = $1.6 \cdot 10^{7}$

In the relationship $\frac{9.01 \cdot 10^{-2}}{X} = R$, let $R = (\frac{901}{300}) \cdot 10^{-7}$. Recover the missing normalized quantity X using the correct inverse operation, then verify it by substitution.

Your response: _____

Incoming: $6 \cdot 10^{6}$

Multiply $1.5 \cdot 10^{3}$ by $4 \cdot 10^{2}$. Keep the calculation exact, add the powers of ten, and normalize the final coefficient.

Your response: _____

Incoming: $3 \cdot 10^{-8}$

Compute $0.000505(2 \cdot 10^{9})$ exactly. First interpret the decimal input, then perform the stated operation and give a normalized scientific-notation result.

Your response: _____

Incoming: $3.9 \cdot 10^{5}$ meters

A rectangular panel is $3.2 \cdot 10^{4}$ centimeters by $2.5 \cdot 10^{3}$ centimeters. A coating uses $1.5 \cdot 10^{-2}$ grams per square centimeter. Determine the requested total or per-unit quantity in normalized scientific notation. Let the units decide whether to multiply or divide, and retain the resulting unit.

Your response: _____

Algebra 1

Operations with Scientific Notation

Name: _____ **Date:** _____ **Class:** _____

Evaluate the supplied statement or method. Say whether it is correct, repair it if it is not, and verify the result exactly. Not every prompt contains an error.

A proposed quotient for $\frac{9.1\cdot10^{-2}}{1.3\cdot10^{3}}$ is $7\cdot10^{-5}$. Verify it by multiplication and report the exact result.

Compare converting 0.0042 to scientific notation first with multiplying the decimals first. Choose a valid exact route for $0.0042(3.5\cdot10^{6})$, explain why it works, and normalize the result.

A device reports $(-3.5\cdot10^{6})$. To divide this by $-7\cdot10^{2}$, should you interpret $E6$ as times 10^{6} or as times 6? Choose, justify the sign and exponent operations, and compute exactly.

For $\frac{[1250000(1.6\cdot10^{-5})]}{4\cdot10^{2}}$, choose between grouping the numerator product before dividing and multiplying all three quantities. Explain which respects the expression and compute exactly.

Operations with Scientific Notation

Full Worked Solutions - excerpt

Worked example

Problem. Multiply $2 \cdot 10^{2}$ by $3 \cdot 10^{4}$. Keep the calculation exact, add the powers of ten, and normalize the final coefficient.

Answer. $6 \cdot 10^{6}$

Explanation and check.

Multiply coefficients to get 6 and add exponents to get 6. Thus the direct product is $6 \cdot 10^{6}$; normalizing it gives $6 \cdot 10^{6}$.

Worked example

Problem. Multiply $1.5 \cdot 10^{3}$ by $4 \cdot 10^{2}$. Keep the calculation exact, add the powers of ten, and normalize the final coefficient.

Answer. $6 \cdot 10^{5}$

Explanation and check.

Multiply coefficients to get 6 and add exponents to get 5. Thus the direct product is $6 \cdot 10^{5}$; normalizing it gives $6 \cdot 10^{5}$.

Sets & Steps
Math Practice & Worked Solutions

Algebra 1

Comparing Scientific Notation

Comparing Scientific Notation | A1-U07-P08

96 problems · Four activity formats

Topic focus

Across 96 tasks this topic asks for assigned power, selected decade label, selected power and threshold comparison, selected power, area interval and boundary-crossing conclusion and inclusive total interval and decade conclusion.

8 PDFs and a README; 55 buyer pages.

The following pages use the same questions, given data, and notation as the final files. Question/card serial numbers and internal IDs are omitted in this preview only. Table values and matching responses are retained. Full answer keys are not included.

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Algebra 1

Comparing Scientific Notation

Name: _____ **Date:** _____ **Class:** _____

Answer each question and record the matching bank letter. Give exact values. A value without its unit is not a complete answer.

Find the multiplicative factor that compares 2.7×10^{-4} to 9×10^{-3}; that is, evaluate the first quantity divided by the second. Interpret a result below 1. Use the complete originally requested response for the match, including both factors, the complete inequality, or both policy results when asked. Preserve the specified units, estimate convention, tie rule and precision; give the original justification. Bank label: _____	Sample A has 1.2×10^{7} particles and sample B has 8×10^{5} particles. A student says A has about 100 times as many because the exponents differ by 2. Compute the actual factor and explain why 100 is misleading. Use the complete originally requested response for the match, including both factors, the complete inequality, or both policy results when asked. Preserve the specified units, estimate convention, tie rule and precision; give the original justification. Bank label: _____
Estimate $\frac{7.8\times10^{9}}{2.1\times10^{6}}$ to one significant digit. Is $1,000$ or $4,000$ the better description of the scale factor? Use the complete originally requested response for the match, including both factors, the complete inequality, or both policy results when asked. Preserve the specified units, estimate convention, tie rule and precision; give the original justification. Bank label: _____	An oak is 2.4×10^{1} m tall and a seedling is 6×10^{-1} m tall. How many times as tall is the oak as the seedling? Then state the seedling's height as a multiplicative fraction of the oak's. Use the complete originally requested response for the match, including both factors, the complete inequality, or both policy results when asked. Preserve the specified units, estimate convention, tie rule and precision; give the original justification. Bank label: _____
A table shows a quantity changing from 2.4×10^{-6} moles to 9.6×10^{-4} moles. By what multiplicative factor did it increase? Use the complete originally requested response for the match, including both factors, the complete inequality, or both policy results when asked. Preserve the specified units, estimate convention, tie rule and precision; give the original justification. Bank label: _____	The value 0.000001 is an exact power-of-ten boundary. Express it as a power of ten, then give the next larger adjacent power. Do not claim it is strictly between them. Use the complete originally requested response for the match, including both factors, the complete inequality, or both policy results when asked. Preserve the specified units, estimate convention, tie rule and precision; give the original justification. Bank label: _____
A component is 38 mm long. Using $1,000$ mm = 1 m, convert the length to meters and bracket it between adjacent powers of ten measured in meters. Use the complete originally requested response for the match, including both factors, the complete inequality, or both policy results when asked. Preserve the specified units, estimate convention, tie rule and precision; give the original justification. Bank label: _____	For $M = 2.6 \times 10^{7}$, $N = 4.1 \times 10^{-2}$, and $P = 10^{3}$, give the adjacent power-of-ten bounds for each. For the exact boundary P, state equality rather than using two strict inequalities. Use the complete originally requested response for the match, including both factors, the complete inequality, or both policy results when asked. Preserve the specified units, estimate convention, tie rule and precision; give the original justification. Bank label: _____

Algebra 1

Comparing Scientific Notation

Name: _____ **Date:** _____ **Class:** _____

Answer each question and show your reasoning in the workspace. Give exact values rather than decimals unless the question supplies a decimal. A value without its unit is not a complete answer.

A student orders three concentrations as $Y < X < Z$, where $X = 7.9 \times 10^{-6}$, $Y = 1.2 \times 10^{-5}$, and $Z = 6.4 \times 10^{-7}$. Correct the order and explain the student's likely exponent mistake.	Panel A has area $3.2 m^2$ and panel B has area $3.1 \times 10^{4} cm^2$. Given $1 m^2 = 10^{4} cm^2$, which panel has greater area? Write the comparison in square centimeters.
Event A lasts $0.0042 s$, B lasts $3,900$ microseconds, and C lasts $4.5 ms$. With $1 s = 1,000 ms$ and $1 ms = 1,000$ microseconds, order the events from shortest duration to longest.	File A is 0.84 MB and file B is 8.6×10^{5} bytes. Using 1 MB = 10^{6} bytes, determine which file is larger and the size difference in bytes.
A stone has mass 0.0062 kg, a bead has mass $5,900 mg$, and a clip has mass 6.05 g. Convert to grams and order them from greatest mass to least.	Order 2.03×10^{-2}, 9.7×10^{-4}, 1.99×10^{-2}, and 3.1×10^{-3} from least to greatest. Explain how the exponents organize the comparison.

Algebra 1

Comparing Scientific Notation

Name: _____ **Date:** _____ **Class:** _____

Begin at START. Answer the card, then find the matching final answer at the top of another card. Use the recording sheet for your reasoning. Visit each card once and continue to FINISH.

Incoming: 1.5 Reading A is 8.4×10^{-5} and reading B is 1.2×10^{-7}. Is A70,700, or 7,000 times B? Use the coefficient ratio as well as the exponent gap. Use the complete originally requested response for the match, including both factors, the complete inequality, or both policy results when asked. Preserve the specified units, estimate convention, tie rule and precision; give the original justification. Your response: _____	**Incoming:** 15 Locate 6.7×10^{4} between two adjacent powers of ten. Write a complete inequality. Use the complete originally requested response for the match, including both factors, the complete inequality, or both policy results when asked. Preserve the specified units, estimate convention, tie rule and precision; give the original justification. Your response: _____
Incoming: $10^{4} < 6.7 \times 10^{4} < 10^{5}$ Without rounding the value, place 0.00082 between adjacent powers of ten and explain how its decimal position determines the bounds. Use the complete originally requested response for the match, including both factors, the complete inequality, or both policy results when asked. Preserve the specified units, estimate convention, tie rule and precision; give the original justification. Your response: _____	**Incoming:** $7.2cm^{3}$, so $10^{0}cm^{3} < 7.2cm^{3} < 10^{1}cm^{3}$ The arithmetic midpoint between 10^{4} and 10^{5} is 5.5×10^{4}. If a midpoint tie is assigned to the upper power, what is the nearest-power estimate of 5.5×10^{4}? Use the complete originally requested response for the match, including both factors, the complete inequality, or both policy results when asked. Preserve the specified units, estimate convention, tie rule and precision; give the original justification. Your response: _____
START About how many times as large is 6.4×10^{8} as 1.6×10^{6}? Separate the coefficient ratio from the power-of-ten ratio. Use the complete originally requested response for the match, including both factors, the complete inequality, or both policy results when asked. Preserve the specified units, estimate convention, tie rule and precision; give the original justification. Your response: _____	**Incoming:** 4 Mass A is 1.35×10^{-3} g and mass B is 4.5×10^{-5} g. Which statement is defensible: A is 3 times, 30 times, or 300 times B? Justify using both coefficients and exponents. Use the complete originally requested response for the match, including both factors, the complete inequality, or both policy results when asked. Preserve the specified units, estimate convention, tie rule and precision; give the original justification. Your response: _____

Algebra 1

Comparing Scientific Notation

Name: _____ **Date:** _____ **Class:** _____

Evaluate the supplied statement or method. Say whether it is correct, repair it if it is not, and verify the result exactly. Not every prompt contains an error.

A positive factor A is between 2×10^3 and 3×10^3, inclusive, while B is between 4×10^2 and 5×10^2, inclusive. Bound AB using endpoints. Do the bounds force AB to stay in one decade? Choose the endpoint method appropriate to the displayed operation: pair lower with lower and upper with upper for a product of positive factors, or pair a lower numerator with an upper denominator and vice versa for a positive quotient. Explain which method applies here, then use it to answer the original bound and decade questions.

Let $6 \times 10^7 \le N \le 8 \times 10^7$ and $2 \le D \le 4$, with both positive. Find the tight endpoint bounds for $\frac{N}{D}$. Is its decade determined by these data? Choose the endpoint method appropriate to the displayed operation: pair lower with lower and upper with upper for a product of positive factors, or pair a lower numerator with an upper denominator and vice versa for a positive quotient. Explain which method applies here, then use it to answer the original bound and decade questions.

A report compares 3.2 km with 480 m and says, “The longer distance is about 0.0067 times the shorter distance.” Using 1 km $= 1,000$ m, identify the scale error and give a defensible factor.

A data rate stays between 3×10^4 and 4×10^4 bytes per second for a duration between 2×10^2 and 2.5×10^2 seconds. Bound the total bytes using positive endpoints. Does every possible total lie strictly in the 10^6 decade? Choose the endpoint method appropriate to the displayed operation: pair lower with lower and upper with upper for a product of positive factors, or pair a lower numerator with an upper denominator and vice versa for a positive quotient. Explain which method applies here, then use it to answer the original bound and decade questions.

Comparing Scientific Notation

Full Worked Solutions - excerpt

Worked example

Problem. Which is larger, 8.7×10^6 or 1.02×10^7? Rewrite one value so the coefficient comparison is direct.

Answer. 1.02×10^7 is larger.

Explanation and check.

Rewrite 1.02×10^7 as 10.2×10^6. Since $10.2 > 8.7$, the second quantity is larger.

Worked example

Problem. Estimate $\frac{6.2 \times 10^{-7}}{1.7 \times 10^{-9}}$ to one significant digit. Show why the answer is closer to 400 than to 100.

Answer. About 4×10^2, or 400

Explanation and check.

The power ratio is 10^2 and $\frac{6.2}{1.7}$ is about 3.65. The product is about 3.65×10^2, which rounds to 4×10^2.