

Number Sense Review

Try each problem first. You don't need to finish everything.

Core path ~55 min · Full sheet ~1 h 45 min

Recommended: K1-K5, then one A and one T problem

K = Knowledge & Understanding · A = Application · T = Thinking · Boss = Challenge



vertexmath.ca
Hints, answers &
more worksheets

QUICK REFERENCE

Number sets: natural $\{1, 2, 3, \dots\} \subset$ whole $\{0, 1, 2, \dots\} \subset$ integers $\subset$ rationals. Simplify first: $\frac{12}{4} = 3$ is a natural number.

Exponent laws (same base): $a^m \cdot a^n = a^{m+n}$, $\frac{a^m}{a^n} = a^{m-n}$,

$(a^m)^n = a^{mn}$, $a^0 = 1$, $a^{-n} = \frac{1}{a^n}$.

Successive percents multiply: 30% off then 20% off is $\times 0.7 \times 0.8$,
not 50% off.

Show your work on separate paper.

Core Skills (K)

Number Sets · Integers · Fractions · Exponent Laws · Scientific Notation

K1 Sort and Order

Use these six numbers:

$$-\frac{14}{2}, \quad 0.\bar{4}, \quad -0.6, \quad 0, \quad \frac{9}{3}, \quad -\frac{2}{3}$$

- List the numbers that are integers.
- List the numbers that are whole numbers, and the numbers that are natural numbers.
- Order all six numbers from least to greatest.

K2 Integers & BEDMAS

Evaluate.

- $-15 - (-9) + 4$
- $-|3 - 11| + (-2)(-3)(-5)$
- $-3^2 - 4(2 - 6) \div 8$

K3 Fractions & Mixed Numbers

Evaluate. Give each answer in lowest terms, as a mixed number when it is greater than 1.

- $3\frac{1}{6} - 1\frac{3}{4}$
- $2\frac{1}{4} \times 1\frac{1}{3}$
- $\frac{7}{8} - \frac{1}{2} \div \frac{4}{3}$

K4 Exponent Laws

- Evaluate $-2^4 + (-3)^2 + 7^0$.
- Simplify $\frac{m^{10} \cdot m^2}{m^4}$.
- Simplify $\frac{(2y^4)^3}{4y^{10}}$.

K5 Scientific Notation

- Write 0.000 608 and 5 040 000 in scientific notation.

BEDMAS: brackets, exponents, then $\times$ and $\div$ left to right, then $+$ and $-$ left to right. $-3^2 = -9$, but $(-3)^2 = 9$.

Percent change = $\frac{\text{new} - \text{original}}{\text{original}} \times 100\%$. Always divide by the **original** value.

- The table gives approximate masses. Order the four objects from lightest to heaviest.

Object	Grain of rice	Grain of salt	Mosquito	Sesame seed
Mass (kg)	2.5×10^{-5}	6.0×10^{-8}	2.5×10^{-6}	3.5×10^{-6}

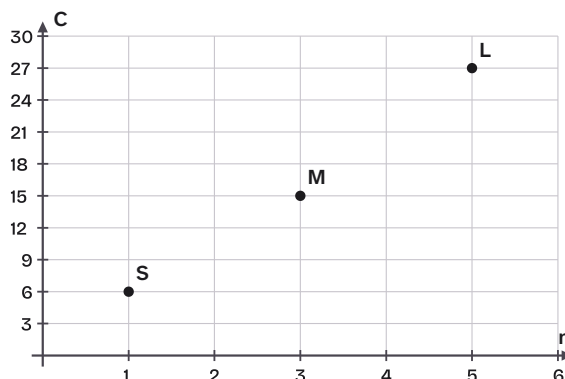
- Evaluate $\frac{(6 \times 10^5)(4 \times 10^{-2})}{8 \times 10^{-3}}$. Give the answer in scientific notation.

Real World (A)

Unit Prices · Sales Tax & Discounts · Very Small Masses

A1 Best Buy on Oats

A store in Thunder Bay sells oats in three bags, S, M and L. The graph shows the mass m of each bag, in kilograms, and its cost C , in dollars.



- Find the unit price of each bag, in dollars per kilogram.
- Which bag is the best buy? How much do you save on 15 kg of oats by buying it instead of bag L?
- An opened bag stays fresh for 4 weeks. Sam eats 0.5 kg of oats a week and throws out stale oats. Which bag gives Sam the lowest cost per week?

A2 Boxing Day Jacket

A winter jacket is priced at \$185. On Boxing Day it is 30% off, and an extra 20% is taken off the sale price at the checkout. The 13% HST is added after both discounts.

- Find the price before tax. What single percent discount does this equal?
- Find the total with HST, to the nearest cent.
- You pay in cash. Canada no longer has a penny, so cash totals are rounded to the nearest 5 cents. How much do you pay?

A3 Bacteria in a Dish

A lab dish holds a colony of 4.0×10^6 bacteria. Each bacterium has a mass of about 2.5×10^{-15} kg. Give each answer in scientific notation.

- Find the total mass of the colony, in kilograms.
- How many of these bacteria have a total mass of 1 g? ($1 \text{ g} = 10^{-3} \text{ kg}$)
- A model says that, if the colony kept doubling every 20 minutes for 2 days, it would hold 8.9×10^{49} bacteria. Find their mass and how many times Earth's mass ($6.0 \times 10^{24} \text{ kg}$) it is. What does this tell you about the model?

Think It Through (T)

Error Analysis · Counterexamples

T1 Spot the Flaw

Gas went from \$1.25/L to \$1.50/L. A student claims:

"That is a 20% increase. If the price drops back to \$1.25/L, that will be a 20% decrease."

- Check each of the two claims. Give the correct percent for any claim that is wrong.
- Both changes are \$0.25/L. Explain why their percents are different.
- A price rises by 60%. By what percent must the new price fall to return to the original price?

T2 Always True?

Decide whether each claim is always true. If it is, show why. If it is not, give a counterexample.

- For every positive whole number n , $3^n + 3^n = 6^n$.
- For every number x , $(x^2)^3 = (x^3)^2$.
- A power with a negative exponent is always a negative number.

Boss Level

Optional challenge

Mixing Juice

Bottle A holds juice and water in the ratio 1 : 3. Bottle B holds juice and water in the ratio 3 : 5.

- 1 L from A is mixed with 1 L from B. Find the ratio of juice to water in the mix.
- How many litres from B must be mixed with 2 L from A to get juice and water in the ratio 1 : 2?
- Can any mix of A and B have juice and water in the ratio 1 : 1? Explain.



vertexmath.ca
Hints, answers &
more worksheets

Free to print, copy, adapt and share for
classroom use · CC BY-NC 4.0 · ©
VertexMath