

Vision 6.1 (day 2)

Scientific notation is a method used by scientists to write very large or very small numbers.

For example, the distance from earth to closest star (other than the sun), proxima centauri, is:

40 208 000 000 000 km

$$4.0208 \times 10^{13}$$

positive exponents
indicates a large
number

$$3.14 \times 10^6 = 3,140,000$$
$$= 3\,140\,000$$

move the decimal
to the left
the exponent gets
larger

Very small numbers can also be written in scientific notation. For example, light travels one kilometer in:

0.0000033 seconds

$$3.3 \times 10^{-6}$$

negative exponents
indicates a
very small
number

$$7.5 \times 10^{-2} = 0.075$$
$$= 0.075$$

a negative exponent
moves the decimal
left

Multiplying & Dividing Scientific Notation

When multiplying and dividing numbers in scientific notation, we can apply our knowledge of exponent laws.

Example:

$$\frac{7 \times 10^5}{(2 \times 10^{-2})(2.5 \times 10^9)}$$

Multiply/divide constants normally

Use exponent laws for base 10 scientific notation

$$\begin{aligned} &= \frac{7 \times 10^5}{5 \times 10^{-2+9}} \\ &= \frac{7 \times 10^5}{5 \times 10^7} \\ &= 1.4 \times 10^{5-7} \\ &= 1.4 \times 10^{-2} \end{aligned}$$

Adding & Subtracting Scientific Notation

When adding and subtracting numbers in scientific notation, you must ensure that the powers with base 10 are equal and then it is possible to add or subtract the coefficients, keeping the powers with base 10 the same.

$$\begin{aligned} \text{Example: } (4.1 \times 10^{-2}) - (2.6 \times 10^{-3}) &= (41 \times 10^{-3}) - (2.6 \times 10^{-3}) \\ &= 38.4 \times 10^{-3} \\ &= 3.84 \times 10^{-2} \end{aligned}$$

Check Your Understanding

Textbook pg. 84

Questions 2, 3, 12, 16, 17