

DIY: *Scientific Notation*

To review the Scientific Notation, watch the following set of YouTube videos. The videos go over representing numbers in scientific notation and performing arithmetic operations on them. They are followed by several practice problems for you to try, covering all the basic concepts covered in the videos, with answers and detailed solutions. Some additional resources are included for more practice at the end.

1. [Introduction to Scientific Notation](#)
2. [Multiplying and Dividing with Scientific Notation](#)
3. [Adding and Subtracting with Scientific Notation](#)

Practice problems: The following problems use the techniques demonstrated in the above videos. The answers are given after the problems. Then detailed solutions, if you need them, are provided after the answer section. For further assistance and help please contact [Math Assistance Area](#).

1. Write the following in Scientific Notation:
a) 15230000000
b) 0.000000963
c) 12.23006
d) .09560002
2. Write the following in expanded form or Standard notation
a) 2.3×10^5
b) $5.123456789 \times 10^{10}$
c) 9.6379×10^{-7}
d) 1.189×10^{-2}
3. Perform the indicated operation:
a) $(1.5 \times 10^{15}) * (1.5 \times 10^{-5})$
b) $(9.99 \times 10^3) - (4.99 \times 10^3)$
c) $(2.36 \times 10^{16}) + (2.35 \times 10^{16})$
d) $(2.69 \times 10^{151}) \div (2.69 \times 10^{-11})$
e) $(3.6985 \times 10^{25}) + (1.01 \times 10^{24})$
f) $(8.15 \times 10^{-8}) - (3.6 \times 10^{-9})$
g) $(7.2 \times 10^{-23}) \div (7.2 \times 10^{-23})$
h) $(1.01 \times 10^{27}) * (2 \times 10^4)$
i) $(6.3 \times 10^5) * (2.2 \times 10^{-5})$
j) $(1.0 \times 10^{10}) + (2.012 \times 10^8)$
4. The circumference of the Earth at the equator is about 24,900 miles.
a) Express circumference (in miles) in scientific notation.
b) If there are 5280 ft. in a mile then, what is the circumference of the Earth in feet? Express your answer in scientific notation
c) What is the radius of the earth in feet? Express your answer in scientific notation. (*Hint: $C = 2\pi r$*)
5. The speed of light is approximately 6.71×10^8 miles per hour.
a) Express this number in standard form.
b) Express the speed of light in miles per minute. Express the answer in scientific notation

Answers:

1.
a) 1.523×10^{10}
b) 9.63×10^{-7}
c) 1.223006×10^1
d) 9.560002×10^{-2}
2.
a) 230,000
b) 51,234,567,890
c) 0.00000096379
d) 0.01189
3.
a) 2.25×10^{10}
b) 5×10^3

- c) 4.71×10^{16}
 e) 3.7995×10^{25}
 g) 1 or 1×10^0
 i) 1.386×10

- d) 1×10^{162}
 f) 7.79×10^{-8}
 h) 2.02×10^{31}
 j) 1.02012×10^{10}

4.

- a) 2.49×10^4
 b) 1.31472×10^8 ft
 c) 2.09244×10^7 ft

5.

- a) 671,000,000 mph
 b) 1.12×10^7 miles per minute \approx

Detailed Solutions

1a) $1.523000000000 = \boxed{1.523 \times 10^{10}}$
 ← 10 places

1b) $0.000000963 = \boxed{9.63 \times 10^{-7}}$
 → 7 places

1c) $12,23006 = \boxed{1.223006 \times 10^7}$
 1 place

1d) $0.09560002 = \boxed{9.560002 \times 10^{-2}}$
 2 places

2a) $2.3 \times 10^5 = 230000 = \boxed{230,000}$

2b) $5.123456789 \times 10^{10} = 51234567890 = \boxed{51,234,567,890}$

2c) $9.6379 \times 10^{-7} = 0.00000096379 = \boxed{0.00000096379}$

2d) $1.189 \times 10^{-2} = 0.01189 = \boxed{0.01189}$

3a) $(1.5 \times 10^{15}) \times (1.5 \times 10^{-5}) = (1.5 \times 1.5) (10^{15} \times 10^{-5})$
 $= 2.25 \times 10^{15-5} = \boxed{2.25 \times 10^{10}}$

3b) $(9.99 \times 10^3) - (4.99 \times 10^3)$
 since 10 is raised to same power for both
 the numbers we can say
 $= (9.99 - 4.99) \times 10^3 = \boxed{5 \times 10^3}$

3c) $(2.36 \times 10^{16}) + (2.35 \times 10^{16})$
 Both the numbers have 10^{16} hence
 $= (2.36 + 2.35) \times 10^{16}$
 $= \boxed{4.71 \times 10^{16}}$

$$3d) (2.69 \times 10^{151}) \div (2.69 \times 10^{-11})$$

$$= \frac{2.69 \times 10^{151}}{2.69 \times 10^{-11}} = 1 \times (10^{151} \times 10^{11}) = \boxed{1 \times 10^{162}}$$

$$3e) (3.6985 \times 10^{25}) + (1.01 \times 10^{24}) =$$

Since the powers of 10 are not the same for both the numbers hence we convert them to the same power as follows.

$$(3.6985 \times 10^{25} + 0.101 \times 10^{25})$$

$$= (3.6985 + 0.101) \times 10^{25}$$

$$= \boxed{3.7995 \times 10^{25}}$$

$$3f) (8.15 \times 10^{-8}) - (3.6 \times 10^{-9})$$

Since the powers of 10 are not the same for both the numbers we can make them the same as follows

$$= 8.15 \times 10^{-8} - (3.6 \times 10^{-9}) = 8.15 \times 10^{-8} - 0.36 \times 10^{-8}$$

$$= (8.15 - 0.36) \times 10^{-8} = \boxed{7.79 \times 10^{-8}}$$

$$3g) (7.2 \times 10^{-23}) \div (7.2 \times 10^{-23})$$

$$= \frac{7.2 \times 10^{-23}}{7.2 \times 10^{-23}} = \boxed{1 = 1 \times 10^0}$$

$$3h) (1.01 \times 10^{27}) * (2 \times 10^4)$$

$$= (1.01 * 2) \times (10^{27} * 10^4)$$

$$= 2.02 \times 10^{27+4} = \boxed{2.02 \times 10^{31}}$$

$$3i) (6.3 \times 10^5) * (2.2 \times 10^{-5})$$

$$= (6.3 * 2.2) \times (10^5 * 10^{-5})$$

$$= 13.86 \times 10^{5-5}$$

$$= 13.86 = \boxed{1.386 \times 10^1}$$

$$\begin{array}{r} 6.3 \\ \times 2.2 \\ \hline 126 \\ 1260 \\ \hline 13.86 \end{array}$$

$$3j) (1.0 \times 10^0) + (2.012 \times 10^0)$$

The powers of 10 are not the same for both the numbers hence

$$(1.0 \times 10^0) + (2.012 \times 10^0)$$

$$= (1.0 + 2.012) \times 10^0$$

$$= \boxed{1.02012 \times 10^0}$$

$$4 a) 24900 \text{ miles} = 24900 \text{ miles}$$

$$= \boxed{2.49 \times 10^4 \text{ miles}}$$

b) we know
Hence

$$1 \text{ mile} = 5280 \text{ ft}$$

$$24900 \text{ miles} = (24900 \times 5280) \text{ ft}$$

$$= 131,472,000 \text{ ft}$$

$$= \boxed{1.31472 \times 10^8 \text{ ft}}$$

c) we know that circumference = $2\pi r$
ie. $1.31472 \times 10^8 = 2\pi r$
or $r = \frac{1.31472 \times 10^8}{2\pi}$

$$= \frac{1.31472 \times 10^8}{2 \times \pi}$$

(using calculator)

$$= 0.209244 \times 10^8 \text{ ft}$$

$$\boxed{r = 2.09244 \times 10^7 \text{ ft}}$$

$$5 a) 6.71 \times 10^8 \text{ mph} = 671,000,000 = 671,000,000 \text{ mph}$$

b) we know that 1 hr = 60 minutes

$$671,000,000 \text{ mph} = 671,000,000 / 60 \text{ miles per minute}$$

$$= 11,183,333.3 \text{ miles per minute}$$

$$= \boxed{1.1183333 \times 10^7 \text{ miles per minute}}$$

$$\approx \boxed{1.12 \times 10^7 \text{ miles per minute}}$$

Additional Resources

1. Go to <http://www.kutasoftware.com/freeipa.html>
2. Under “**Exponents and Radicals**” find:
 - [Writing scientific notation](#)

You can print out the worksheets and work on them. The solutions are provided at the end of the worksheets

3. For help please contact the [Math Assistance Area](#).