

Learning Objective 1: To express numbers in standard form

Learning Objective 2: To begin to perform calculations using standard form

Part 1: Write the following numbers in standard form

300000000	500000	7000000000000
218000	220300000	2130001000000
212000000000	90909000000000	30000010000000000000
7 million	2.2 billion	5 hundred thousand
half a million	eighty six	9

0.0000005	0.0000000000001	0.0012
0.0000000189	0.0000000000000009	0.000100302
0.00000222222	0.2	0.00000212
5 hundredths	4 tenths	a half

Part 2: You are told that:

$x = 1.3 \times 10^5$	$y = 2.03 \times 10^{22}$	$z = 1.5 \times 10^{-6}$	$h = 2.45 \times 10^{-33}$
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Perform the following calculations using a calculator, writing your answer in standard form

BONUS if you know what any of the formula below represent...

xy	$x + y$	x^2
xy	$\frac{x}{z}$	$\frac{h}{x}$
πx^2	z^4	$4hz$
$y - h$	$\frac{(y - h)}{z}$	$5(x + y)^2$
$\frac{1}{x}$	$(2x)^3$	$h - z^3$
$\frac{4}{3}\pi z^3$	$4y^2$	$\frac{1}{3}(\pi x^2)h$
$\frac{1}{2}(x + y)h$	$\sqrt{x^2 + y^2}$	$\frac{x}{z^2}$
$\sqrt{x^2 + y^2 + z^2}$	xyz	h^4

Learning Objective: To **fully convert** numbers into standard form

Write the following numbers into standard form (convert to normal numbers first if necessary, though you will find this difficult for some of the later ones in each part!!!)

Part 1:

56×10^4	328×10^7	1204×10^{12}
0.04×10^7	0.00102×10^{14}	123.12×10^{12}
23.441×10^2	123000×10^3	0.000003×10^4
0.3×10^1	23.0001×10^{12}	321×10^{132}
$0.0000034 \times 10^{237}$	32.001×10^{7000}	$0.000004301 \times 10^{214}$

Part 2:

43×10^{-3}	321.13×10^{-7}	0.002×10^{-2}
14.6×10^{-11}	21333×10^{-13}	0.00014×10^{-12}
13.123×10^{-8}	234×10^{-123}	21.05×10^{-56}
$0.000123 \times 10^{-200}$	$0.000102 \times 10^{-2134}$	$0.000000001 \times 10^{-561}$

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Problems involving standard form – calculator allowed

For the following you are told that:

$t = 3.01 \times 10^{11}$	$x = 4.2 \times 10^{13}$	$y = 1.013 \times 10^{-13}$	$r = 2.04 \times 10^{14}$
$A = 3.2 \times 10^5$	$V = 2.014 \times 10^{-7}$	$h = 8.1 \times 10^{-3}$	$s = 6.07 \times 10^{34}$

Find the area of a square which has a side x	Find the area of a rectangle, with sides x, y
Find the area of a circle which has a radius r	Find the dimension of a square which has an area, A
A rectangle has an area, A and a side x . Find the length of the other side	Jack travels at a speed, s , for t , seconds. How far does he go?
The volume of a cube is given by V . Find the side length	What would the average speed of a car be if it travelled a distance of x metres in t seconds
The volume of a cylinder with a radius, r , and a height, h .	The volume of a square based pyramid whose base has dimensions y , and a height of h .
The volume of a sphere with a radius of $4r$.	You are told that $3f + t = r$ Find f .
The radius of a circle with an area of A	The hypotenuse of a right-angled triangle which has sides x and y

Extension

<i>Planet</i>	<i>Mass (kg)</i>	<i>Radius (m)</i>
<i>Mercury</i>	3.3×10^{23}	2,440,000
<i>Venus</i>	4.87×10^{24}	6,051,000
<i>Earth</i>	5.97×10^{24}	6,378,000
<i>Moon</i>	7.35×10^{22}	1,738,000
<i>Mars</i>	6.42×10^{23}	3,397,000
<i>Jupiter</i>	1.90×10^{27}	71,492,000
<i>Saturn</i>	5.69×10^{26}	60,268,000
<i>Uranus</i>	8.66×10^{25}	25,559,000
<i>Neptune</i>	1.03×10^{26}	24,764,000
<i>Pluto</i>	1.3×10^{22}	1,160,000

- 1) Convert the radii into standard form
- 2) Find an approximate value for the volume of each of the planets in standard form (assume they are spherical)
- 3) Find an average density for each of the planets
- 4) Rank the planets in order of density from smallest to largest

Key formula:

$$\text{Volume of a sphere} = \frac{4}{3}\pi r^3$$

$$\text{Volume of a pyramid} = \frac{1}{3}(\text{base area}) \times \text{height}$$

$$\text{Volume of a prism} = (\text{area of cross – section}) \times \text{length}$$

$$\text{Density} = \frac{\text{mass}}{\text{volume}}$$