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CREATE WITH MATH

Worksheet Solutions

CREATE WITH MATH

Foundation

GRADE 8

Learning Outcome:
Explore use of scientific notation in real-life context and use the context to convert numbers between standard form and scientific notation.
(8.EE.A.3)

1 The population of Mapa Valley is 100,000. Express this in exponential form.

Answer: ____

2 Convert the given numbers to standard form and fill in the blanks.

a) $1 \times 10^{?} =$ ____ = ____ million b) $5 \times 10^{10} =$ ____ = ____ billion

3 Write the following numbers in standard form.

a) 3.23×10^{4} ____ b) 1.14×10^{-3} ____

4 There are around 1.01×10^{4} taste buds on a human tongue. Write the number in standard form.

Answer: ____

5 Fill in the missing items in the table.

Scientific notation	Standard form
3.474×10^{6} meters	____ meters
____ meters	150,000,000,000 meters
$1.56 \times 10^{?}$ kelvin	____ kelvin
____ kg	0.000000000001 kg

6 A carrier van is carrying 52 tonnes of construction material. Represent the total load of 4 such vans carry in scientific notation. (Hint: 1 tonne = 1000 kg)

Answer: ____ kg

Foundation

1 The population of Mapa Valley is 100,000. Express this in exponential form.

Answer:

Given:
Maps valley population is 100,000.

Solution:

1. To show the given number in the exponential form we count number of zeros and write it as exponent of 10.
2. Total zeros = 5, Thus, the exponent is 5
   Hence, 100,000 = 10^5

10^5

2 Convert the given numbers to standard form and fill in the blanks.

a) 1×10^7 = [ ] = [ ] million b) 5×10^{10} = [ ] = [ ] billion

Given:

1×10^7 and 5×10^{10}.

Solution:

(a) $1 \times 10^7 = 10{,}000{,}000$

1 million = 1,000,000 $\Rightarrow 1 \times 10^7 = 10$ millions.

(b) $5 \times 10^{10} = 50{,}000{,}000{,}000$

1 billion = 1,000,000,000 $\Rightarrow 5 \times 10^{10} = 50$ billions.

a) 1×10^7 = 10,000,000 = 10 million

b) 5×10^{10} = 50,000,000,000 = 50 billion

3 Write the following numbers in standard form.

a) 3.23×10^4 ____ b) 1.14×10^{-3} ____

Given:

3.23×10^4 and 1.14×10^{-3}.

Solution:

(a) When multiplying a positive exponent with base 10, shift the decimal point to the right.
So, $3.23 \times 10^4 = 32300$.

(b) When multiplying a negative exponent with base 10, shift the decimal point to the left.
So, $1.14 \times 10^{-3} = 0.00114$.

a) 3.23×10^4 32300

b) 1.14×10^{-3} 0.00114

4 There are around 1.01×10^4 taste buds on a human tongue. Write the number in standard form.

Given:

1.01×10^4 = Number of taste buds on a human tongue.

Solution:

1. When multiplying a positive exponent with base 10, shift the decimal point to the right.
   So, $1.01 \times 10^4 = 10100$.

10100

5 Fill in the missing items in the table.

Scientific notation	Standard form
3.474×10^6 meters	____ meters
____ meters	150,000,000,000 meters
1.56×10^7 kelvin	____ kelvin
____ kg	0.000000000001 kg

Given:
3.474×10^6 meters,
150,000,000,000 meters,
1.56×10^7 kelvin,
0.000000000001 kg.

Solution:
3.474×10^6 meters
$= 3.474 \times 1000000 = 3{,}474{,}000$ m

150,000,000,000 meters
$= 150 \times 10^9$ meters
$= 1.5 \times 10^{11}$ meters

1.56×10^7 kelvin
$= 1.56 \times 10000000$
$= 15{,}600{,}000$ kelvin

0.000000000001 kg
$= 1 \times 10^{-12}$ kg

Scientific notation	Standard form
3.474×10^6 meters	3,474,000 meters
1.5×10^{11} meters	150,000,000,000 meters
1.56×10^7 kelvin	15,600,000 kelvin
1×10^{-12} kg	0.000000000001 kg

6 A carrier van is carrying 52 tonnes of construction material. Represent the total load of 4 such vans carry in scientific notation. (Hint: 1 tonne = 1000 kg)

Answer: _____ kg

Given:
52 tonnes in one truck; Count of truck = 4
1 tonne = 1000 kg

Solution:

1. 1 truck is carrying 52 tonnes of material. 4 truck will carry 4 × 52= 208 tonnes

2. 1 tonnes = 1000kg
   ⇒ 208 tonnes = 208 × 1000 kg
   ⇒ 208000 kg

3. Factor should be more than 1 and less than 10 to express it in the scientific notation. Hence, it will be 2.08 and the exponent of 10 will be 5

4. 208000 kg = 2.08×10^5 kg.

IDEA

2.08×10^5 kg

Hence, 4 trucks can carry
2.08×10^5 kg worth of material.

CREATE WITH MATH

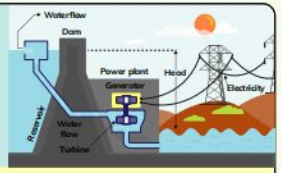
Application

GRADE 8

Learning Outcome:
Explore use of scientific notation in real-life context and use the context to convert numbers between standard form and scientific notation.
8.RP.A.3

1 The reservoir is supposed to hold 100,000,000 gallons of water. Express this in exponential form with base 10.

Answer: _____

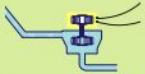


2 During the electricity production, generators are used which release pollutants weighing 0.000035 micrograms per cubic meter. Express this in scientific notation.

Answer: _____

3 The amount of water flowing through the turbine per second is 0.38 m^3. If the following steps show the conversion of the value to liters and then it's representation in scientific notation, find the incorrect step.

- ☐ Step 1: 1 m^3 = 1000 liters
- ☐ Step 2: 0.38 m^3 = 0.38 x 10^3 liters
- ☐ Step 3: Standard form, 3800 liters
- ☐ Step 4: Scientific notation, 3.8 x 10^2 liters



Answer: _____

4 The money earned by selling electricity produced by a hydroelectric power plant is 7.17 x 10^7 dollars per year. Express this amount in standard notation.

Answer: _____

5 Power produced by a hydropower plant in a day is 3.34 x 10^6 watts. Write it in standard form.

Answer: _____

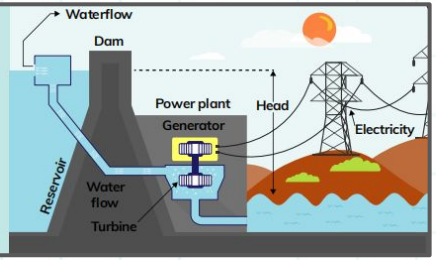
6 The hydropower plant could save 120 tonnes of coal per month. Express it in kilograms. (1 tonne = 1000 kg)

Answer: _____

Application

1 The reservoir is supposed to hold 100,000,000 gallons of water. Express this in exponential form with base 10.

Answer:



Given:

Reservoir is supposed to hold 100,000,000 gallons of water.

Solution:

1. To show it in the exponential form we count the number of zeros and write it as the exponent.
2. Total zeros = 8, Thus, the exponent is 8.

Hence, 100,000,000 = 10^8 gallons.

10^8 gallons

2 During the electricity production, generators are used which release pollutants weighing 0.000035 micrograms per cubic meter. Express this in scientific notation.

Answer:

Given:

Pollutants released = 0.000035 micrograms per cubic meter.

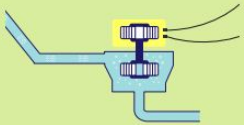
Solution:
To express it as a scientific notation, the factor should be between 1 and 10. Here, the factor will be 3.5.

Hence, $0.000035 = 3.5 \times 10^{-5}$ micrograms per cubic meter.

3.5×10^{-5} micrograms per cubic meter

3 The amount of water flowing through the turbine per second is 0.38 m^3 . If the following steps show the conversion of the value to liters and then it's representation in scientific notation, find the incorrect step.

- ☐ Step 1: 1 m^3 = 1000 liters
- ☐ Step 2: 0.38 m^3 = 0.38 x 10^3 liters
- ☐ Step 3: Standard form, 3800 liters
- ☐ Step 4: Scientific notation, 3.8 x 10^2 liters



Answer:

Given:
Amount of water flowing on turbine = 0.38 m^3.

Solution:
Step 1: 1 m^3 = 1000 liters
This step is correct.

Step 2: 0.38 m^3 = 0.38 × 10^3 liters
Conversion at this step is correct.

Step 3: Standard form, 3800 liters
Statement above is incorrect as 0.38 × 10^3 = 380 liters.

Step 4: Scientific notation, 3.8 × 10^2 liters
Above statement is correct.

Step 3 is incorrect.

4 The money earned by selling electricity produced by a hydroelectric power plant is 7.17×10^7 dollars per year. Express this amount in standard notation.

Answer:

Given:

7.17×10^7 per year to be expressed in standard notation.

Solution:

$$\$7.17 \times 10^7 = 7.17 \times 10000000$$
$$= 71{,}700{,}000$$

$71,700,000

5 Power produced by a hydropower plant in a day is 3.34×10^5 watts. Write it in standard form.

Answer:

Given:

Power 3.34×10^5 watts per day to be converted into standard notation.

Solution:

3.34×10^5 watts per day = 334,000 watts per day.

334,000 watts

6 The hydropower plant could save 120 tonnes of coal per month. Express it in kilograms. (1 tonne = 1000 kg)

Answer:

Given:

120 tonnes of coal saved per month.
1 tonne = 1000 kg

Solution:

If 1 tonnes = 1000 kg
Hence, replacing tonne with 1000 kg in 120 tonnes,
⇒ 120 **tonnes** = 120 **× 1000 kg**
⇒ 120,000 kg.

120,000 kg

CREATE WITH MATH

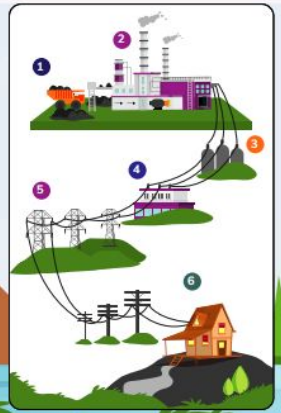
Create

GRADE 8

Learning Outcome:
Explore use of scientific notation in real-life context and use the context to convert numbers between standard form and scientific notation.
(8.EE.A.3)

Create your own power grid map using the image shown below as reference.

1. Draw the building of a power plant in the middle of your sheet. Write its power generation capacity between 1000000 watts to 5000000 watts next to it in scientific notation.
2. This power plant will supply electricity to 3 cities around it.
3. Draw 4 to 6 transmission towers towards City 1 (name it as you wish) and connect them with transmission lines.
4. Mark the power loss(Wh) for each transmission tower in ascending order from the power plant. Remember: 3.24×10^6 Wh <Power loss> 9.24×10^5 Wh.
5. Find the total power loss by adding all the power loss values.
6. Represent City 1 by drawing a cluster of buildings. Enter the power consumption of City 1(700 kW to 1000 kW) and connect the transmission line from the last transmission tower to the city buildings.
7. Similarly represent City 2 and City 3 by drawing a cluster of buildings on the other side of the power plant. Enter the power consumption of City 2 and City 3 (700 kW to 1000 kW) and connect them to the Power Plant through 4 to 6 transmission towers.
8. Now, check whether the power plant generates enough electricity for the three cities. (1 kW = 1000 watts)



Draw here

Create

??!

Create your own power grid map using the image shown below as reference.

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7. Similarly represent City 2 and City 3 by drawing a cluster of buildings on the other side of the power plant. Enter the power consumption of City 2 and City 3 (700 kW to 1000 kW) and connect them to the Power Plant through 4 to 6 transmission towers.
8. Now, check whether the power plant generates enough electricity for the three cities. (1 kW = 1000 watts)

Total Power loss

3.24×10^5 Wh
4.4×10^5 Wh
6.73×10^5 Wh
8.8×10^5 Wh
(+) 9×10^5 Wh

3.217×10^6 Wh

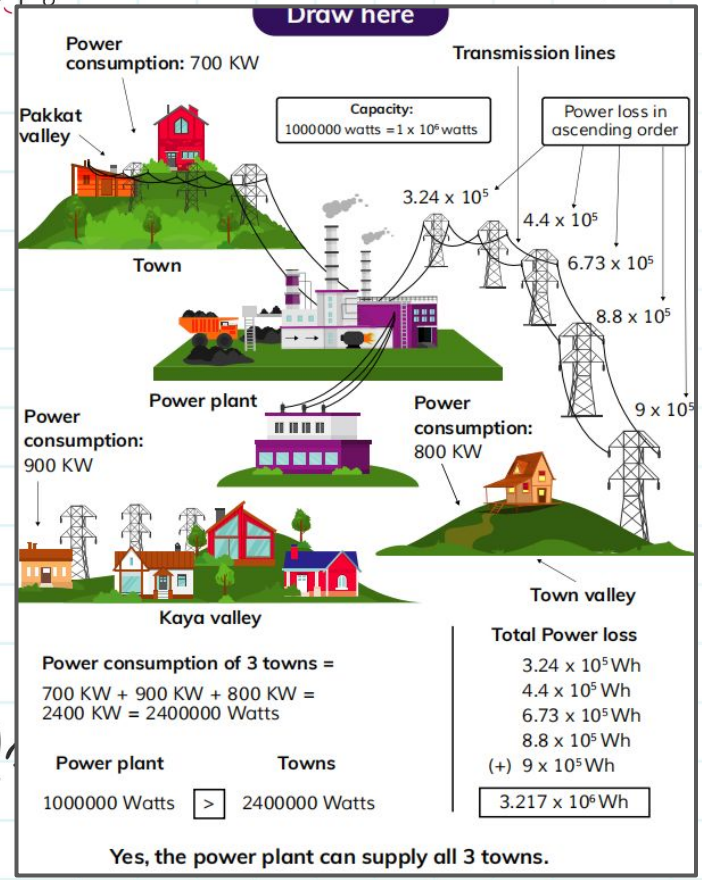
Given:
Criteria to design and draw power grid.

Solution:
1. Draw the building of a power plant in the middle of your sheet. It's power generation capacity we choose 1000000 watts = 1×10^6 watts.

2. Power plant supply electricity to 3 cities. Namely Pakkat valley (700 KW), Kaya valley (900 KW) and Town valley (800 KW). Draw 4 to 6 transmission towers towards all three city.

3. Mark the power loss for each transmission tower in ascending order.

4. Find the total power loss by adding all the power loss values.



5. Now, check whether the power plant generates enough electricity for the three cities.
(1 kW = 1000 watts)

Power consumption of 3 towns =

700 KW + 900 KW + 800 KW =
2400 KW = 2400000 Watts

Power plant		Towns
1000000 Watts	>	2400000 Watts

6. Check if powerplant power is more than town needs.
Yes the power plant has more power and can supply all three towns.

Multiple solutions are possible for this sheet.