

## ANSWERS\*\*Part A - Individual Questions Part 1 of 2\*\*ANSWERS

Grade 8

Name: \_\_\_\_\_.

1.) Calculate  $1,425 - 85 + 720 - 6,201$ 

Answer:
-4,141

2.) What is 2.95524 rounded to the nearest hundredth?

Answer:
2.96

3.) Calculate the sum of the following mixed fractions:

$$1\frac{1}{2} + 4\frac{2}{3}$$

Answer:
6 $\frac{1}{6}$

4.) Safety Factor =  $\frac{\text{Maximum load a structure can support before breaking}}{\text{Actual load that a structure is designed to support}}$

Calculate the safety factor if the maximum load is 2,484 kg and the actual load is 621 kg.

Answer:
4

5.) Find the answer for  $F_f$  where:  $F_f = \mu m g$ 

$$\begin{aligned}\mu &= 0.125 \\ m &= 15.48 \text{ kg} \\ g &= 9.81 \text{ m/s}^2\end{aligned}$$

Where:  
 $F$  = Force due to friction (units of Newtons (N))  
 $\mu$  = co-efficient of friction  
 $m$  = mass (units of kilograms, kg)  
 $g$  = constant (acceleration due to earth's gravity,  $9.81 \text{ m/s}^2$ )

Round your answer to two decimal places.

Answer:
18.98 N

6.) Simplify the expression:  $9b + 4(2c + 3b)$ 

Answer:
$21b + 8c$

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7.) If a sequence is given by the formula

$$2 \times 4n$$

Where  $n = 1, 2, 3$  and so on, what is the 3rd value in the sequence?

Answer:

128

8.) The **air** in our atmosphere is composed of molecules of different gases.

By volume, the composition of air is

78% nitrogen

21% oxygen

?% other gases including argon, carbon dioxide and others

If a tank contains 13 liters of air, how many liters of oxygen does it contain?

Answer:

2.73 l

9.) One of the most widely used types of stainless steel is known as “Stainless Steel 18-8” since its composition is 18% chromium and 8% nickel.

What is the ratio of chromium to nickel. Make sure you reduce the ratio to the simplest terms.

Write your answer in the form X:Y

Answer:

9:4

10.) The 2014 Porsche 911 has the following specifications:

350 horsepower

289 km/hr top speed

4.8 seconds 0 to 100 km/hr

64 liters fuel tank capacity

Average fuel consumption = 9.1 liters of fuel used for every 100 km of driving.

Mass 1815 kg

Price \$96,200

Assuming the Porsche drives at it's top speed, after 10 minutes, what distance would it have traveled? Round your answer to one decimal place.

Remember, distance = speed (km/hr) x time (in hours)

There are 60 minutes in 1 hour

Answer:

48.2 km

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11.) If

$$y = -2$$

Then evaluate the following expression:

$$5y^2$$

Answer:

20

12.) The refractive index, referred to as  $n$ , is defined as

$$n = \frac{c}{v}$$

Where  $c$  is the speed of light in outer space, that is  $c = 299,792,458$  m/sAnd  $v$  is the velocity of light in the medium it's traveling in (usually the optical lens)

If you write the speed of light in scientific notation, what would the exponent be in the statement below?

$$2.99792458 \times 10^? \text{ m/s}$$

Answer:

8

13.) Ohm's law is one of the most important principles used in Electrical Engineering.

Ohm's law states that the current through a conductor between two points is directly proportional to the potential difference across the two points as described in equation below:

I is the current through the conductor in units of amps (A)

V is the voltage measured across the conductor in units of volts (V)

R is the resistance of the conductor in units of ohms ( $\Omega$ )

$$I = \frac{V}{R}$$

For the current to increase by 100% for a fixed voltage, by what factor should the resistance change?

Answer: \*

by a factor of 1/2

half the R if V is cst

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- 14.) Electrical Energy is the capacity to do work.

Electrical energy is the product of power multiplied by the length of time it was consumed.

Energy = power x time

Power = voltage x current or more simply written as  $P = V \times I$

Where Energy has the unit of in joule (J)

P is power in unit of watts (W)

Time has the unit of second (s)

A student has a 60W lamp on his desk. The student is also charging their iphone and written on the charger is the current and voltage it consumes: it says “input 1 amp at 5 volts”. What fraction of power does the iphone charger consume compared to the lamp?

Answer:
1/12

- 15.) Calculate the following:  $-1^3 + (-2)^4$

Remember:

$-1 \times -1 = +1$

$+1 \times -1 = -1$

Answer:
15

- 16.) If the Prince Edward Viaduct was constructed 6 years earlier than Lasalle Causeway and Lasalle Causeway was constructed 3 years later after the Leaside Bridge.

What was the year the Leaside Bridge constructed if the Prince Edward Viaduct was already built in 1990?

Answer:
*
1993

- 17.) The Environmental Engineer conducted two test pits, each with an area of 25m<sup>2</sup>, to collect soil samples for chemical analysis. If the test pits are placed side by side to form a larger rectangular excavation pit.

Assume there 2 teams of Environmental Engineer are collecting soil sample to compare later on, so they divide the 2 pits evenly into 2 triangle pits. What is the length of the diagonal of 2 pits?

Answer:
*
11.12 m