

ANSWERS**Part D - Individual Questions Part 2 of 2**ANSWERS

Grade 7

Name: _____.

1.) Binary numbers are a number expressed in the base-2 numeral system, which represents numeric values using two different symbols: typically 0 (zero) and 1 (one). For example, number 5 can be represented in binary form as 101.

Counting in binary is similar to counting in any other number system. Beginning with a single digit, counting proceeds through each increment, from right to left.

The byte is a unit of digital information in computing that most commonly consists of eight bits.

decimal	binary
0	0
1	1
2	10
3	11
4	100
5	101
6	110
7	111
8	1000
9	1001

Note: As with all numbering systems
most significant digits are at left,
least significant digits are at right.

How would the number 10 be represented in the binary system?

Answer:

1010

2.) A bag contains 15 units of caps to enclose the monitoring wells installed on Site. Exactly 3 units of these caps were defective.

What is the ratio of good caps to defective caps. Make sure you reduce the ratio.

Answer:

4:1

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3.) An engineer can determine the age of an object using the properties radioactive decay. A quantity of carbon-14 decays to half of its original amount after 5730 years regardless of how much the original quantity was. It means that every 5730 years only half as much of the carbon remains in existence. If you have 20 grams of carbon-14 then...

$$\frac{A}{A_o} = \left(\frac{1}{2}\right)^{\left(\frac{t}{T}\right)}$$

Where

A = the mass of carbon-14 at some time in the future “t”

A_o = the amount of carbon-14 at the beginning

t = the amount of time that has passed (in years)

T = the half life of carbon-14 (5730 years)

How many years will it take until there is only 5 grams of carbon left?

Hint: You could use the formula, however, you can also think of this logically using the knowledge that only half of the original mass of carbon-14 remains after 5730 years.

Answer: 11,460 yrs

4.) A chemical engineer needs to convert the pressure in a vessel from units of PSI or “pounds per square inch” to “atmospheres”. He knows that 1 atmosphere = 14.7 PSI.

If the pressure gauge on the vessel reads 164.35 PSI, what is the pressure in the vessel in units of atmospheres? Round your answer to two decimal places

Answer: 11.18 atm

5.) Simplify the following expressions:

If

$$c = 7$$

Simplify:

$$3c + 6c$$

Answer: 63

6.) Software engineers often convert between the following units of memory capacity:

$$8 \text{ bits} = 1 \text{ byte}$$

$$1 \text{ Megabyte (symbol MB)} = 1,048,576 \text{ bytes}$$

How many bits are in a Megabyte?

Answer: 8,388,608 bits

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7.) Mechanical engineers often need to convert the length of an object from inches to millimeters.
1 inch = 25.4 millimeters (often written as 25.4 mm)

A mechanical engineer measure the length of a part to be 3.25 inches, what is the part length in millimeters?

Answer:

82.55 mm

8.) An aerospace engineer builds a 1:72 scale model of a glider. If the actual glider has a wing span of 15 meters, what is the wing span of the model (in meters)? Give your answer to three decimal places

Answer:

0.208 m

9.) What is the mean (or average) of the set of numbers shown below:
2, 4, 6, 2, 2, 2

Answer:

3

10.) Solve for x in the following equation:

$$4x + 7x - 2x = 27$$

Answer:

3