

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

Grade 6

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.

What number does 1011 correspond to?

Answer:

11

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 percentage of caps is defective?

Answer:

3/15

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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)

After 11,460 years, what mass of carbon will remain?

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 5 grams

Answer:

5 grams

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 88.2 PSI, what is the pressure in the vessel in units of atmospheres?

Answer:

6 PSI

5.) Simplify the following expressions:

If

$$w = 2$$

Simplify:

$$3w + 10$$

Answer:

16

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

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

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

If a microchip has 32 bytes of memory, how many bits is this?

Answer:

256 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 reads a part specification sheet that says the part is exactly 1.45 inches in diameter, what is the part diameter in millimeters?

Answer:

36.83 mm

8.) An aerospace engineer builds a 1:72 scale model of a glider. If the actual glider has a wing span of 18 meters, what is the wing span of the model (in meters)?

Answer:

0.25 m

9.) What is mode for the following set of numbers? The mode is the value that appears the most often.
3, 2, 4, 7, 4, 9, 8, 4

Answer:

4

10.) Solve for x in the following equation:

$$5x - 3x = 12$$

Answer:

6