

I. Units

_____/5 pts

Scientists use SI units (m, kg, s). Units only have one division sign in them.

Using only these three symbols (m, kg, s) what are the SI units of

- 1) volume m^3
 b) density kg/m^3
 c) acceleration m/s^2 (acceleration is the rate of change of velocity)
 d) force $kg \cdot (m/s^2)$ (a force accelerates a mass)
 e) pressure $kg/(cm \cdot s^2)$ (pressure is a force per area)

II. The Metric System

_____/25 pts

Length

2) 5 miles wide is approximately how wide:

- 1.5 km 3 km 5 km 8 km 11 km

Velocity

3) 20 m/s equals is approximately:

- 1 mph 5 mph 10 mph 20 mph 40 mph

Volume

4) A seawater sample has a volume of one liter. This is approximately:

- an ounce a half-pint a pint a quart a half-gallon a gallon

Mass

5) 10 kg equals approximately

- 2 lbs 5 lbs 10 lbs 15 lbs 20 lbs

Temperature

6) Today the ocean at Myrtle Beach is 85°F or:

- 12 °C 30 °C 53 °C 85 °C 117 °C

III. Converting Units

_____/15 pts

- 7) $1000 \text{ cm}^2 = \underline{.1} \text{ m}^2$

8) If an inlet has a volume of 100 m^3 , how many liters of water are in the inlet?
(1 L = 1000 cm^3) 10^5 or $100,000$

9) $30 \text{ cm} \times 10 \text{ m} = \underline{3} \text{ m}^2$.

IV. Numbers

_____/30 pts

10) $10^5 / 10^3 = \underline{10^2}$

b) $10^6 - 10^3 = \underline{999,000}$

11) An object with a mass of 30 kg increases its mass by 33% .
Its new mass is 40 kg

12) A pond with a volume of 10^4 L has its volume doubled.
Its new volume is 2×10^4

13) A pond is shaped like a circle and has a diameter of 100 m . What is the surface area of the pond?

$$\begin{aligned} & \pi r^2 \\ & = \pi (50 \text{ m})^2 = \pi \cdot 2500 \text{ m}^2 \\ & \sim 7500 \text{ m}^2 \end{aligned}$$

14) That same pond is uniformly 2 km deep. What is the volume of the pond?

$$\begin{aligned} & 7500 \text{ m}^2 \cdot 2000 \text{ m} \\ & = 15,000,000 \text{ m}^3 \end{aligned}$$

15) ^{14}C has a half life of approximately 8000 years . (A half life is the time it takes for one half of the atoms to convert to a different isotope, such as ^{16}C). If a sample contains 12.5% ^{14}C and 87.5% ^{16}C , how old is the sample?

$24,000 \text{ yrs}$

VI. Algebra

_____/25 pts

16) Near S.C., a degree of latitude is approximately 110 km and a degree of longitude is 90 km. A boat travels from 36°N, 80°W to 40°N, 77°W in a straight line. How many km did it travel?

$$\sqrt{(440 \text{ km})^2 + (270 \text{ km})^2} = 516 \text{ km}$$

17) A storm is 36 km away. The biggest waves have a speed of 18 m/s. How much time until the biggest waves reach shore?

$$2000 \text{ s} = 33 \text{ min}$$

18) A current is flowing at 1 m/s in the direction 30° east of due north as shown to the right. What are the velocity components in the (a) east direction and (b) north direction?



$$a) 1 \cdot \cos 60 = .5$$

$$b) 1 \cdot \sin 60 = .86$$

$$19) 4x^2/y = 10x$$

$$x = \frac{10y}{4}$$

20) The water and salt budget equations for an estuary are

$$T_i + P + R = T_{out} + E$$

$$S_e \cdot T_{out} = S_o \cdot T_i$$

T_i and T_{out} are the 2 unknowns. Combine the 2 equations to get one expression for T_{out} that only contains the known variables (and each variable only appears once).

$T_{out} =$

$$\frac{E - P - R}{\frac{S_e}{S_o} - 1}$$

or
$$\frac{P + R - E}{1 - \frac{S_e}{S_o}}$$

or
$$\frac{S_o (E - P - R)}{S_e - S_o}$$

or
$$\frac{S_o (P + R - E)}{S_o - S_e}$$