

EC33-413* Bioproduction and Machinery/Structure Laboratory
Feedback Quiz: Pumps and Basic Hydraulics (Open Book)
Total Points 10

1. The flow rate (Q) can be calculated if we know the orifice size, and the velocity of the material. For example, a nozzle has an opening of $.002 \text{ m}^2$ and a particle within the fluid travels 30 m/sec.

2. A custom applicator is traveling 20 kilometers per hour and the sprayer has 20 nozzles spaced on 100-cm centers. How much time (in hours) would be required to spray 12 ha.

3. If the flow rate (Q) and the pressure (P) are known, the power can be calculated. For example, you collect 36 fl oz of liquid in 27 seconds from a nozzle. The pressure is 20 psi. What is the power (Hp) that is required to deliver this liquid through the nozzle? Please checkout the conversion factors.

Common Conversion Factors

$$1 \text{ gal} = 231 \text{ in}^3$$

$$1 \text{ qt} = 32 \text{ oz}$$

$$1 \text{ ft}^3 = 1728 \text{ in}^3$$

$$1 \text{ pt} = 16 \text{ oz}$$

$$1 \text{ ft}^3 = 7.48 \text{ gal}$$

$$1 \text{ gal} = 128 \text{ oz}$$

$$1 \text{ ft}^2 = 144 \text{ in}^2$$

$$1 \text{ qt} = 2 \text{ pt}$$

$$1 \text{ gal} = 4 \text{ qt}$$

$$1 \text{ oz} = 2 \text{ tbsp}$$

$$1 \text{ Hp} = 33000 \text{ ft-lb/min}$$

$$1 \text{ tbsp} = 3 \text{ tsp}$$

$$1 \text{ Hp} = 550 \text{ ft-lb/sec}$$

$$1 \text{ gal} = 3.785 \text{ liters}$$

$$1 \text{ acre} = 43,560 \text{ ft}^2$$

$$1 \text{ gal of H}_2\text{O} = 8.33 \text{ lb}$$

$$1 \text{ hectare} = 10000 \text{ m}^2$$

$$1 \text{ in} = 2.54 \text{ cm}$$

$$1 \text{ hectare} = 2.47 \text{ acres}$$

$$1 \text{ kilogram} = 2.2046 \text{ lb}$$

$$1 \text{ meter} = 39.37 \text{ in}$$

$$1 \text{ lb} = 16 \text{ oz}$$

$$1 \text{ gallon} = 3.785 \text{ liters}$$

$$1 \text{ kilometer} = 0.621 \text{ miles}$$

$$1 \text{ mile} = 5280 \text{ ft}$$