



Potential Difference Calculations Worksheet

potential difference = $\frac{\text{energy}}{\text{charge}}$

$$V = \frac{E}{Q}$$

Units: V is V (volts)
 Q is C (coulombs)
 E is J (joules)

1. Find the unknown quantity:

a) $V = ?$ $E = 45 \text{ J}$ $Q = 15 \text{ C}$ $V = \frac{45}{15} = 3 \text{ V}$	b) $V = 9 \text{ V}$ $E = ?$ $Q = 150 \text{ C}$ $E = 150 \times 9 = 1350 \text{ J}$	c) $V = 1.5 \text{ V}$ $E = 225 \text{ J}$ $Q = ?$ $Q = \frac{225}{1.5} = 150 \text{ C}$
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2. Find the unknown quantity (CONVERT FIRST to volts, joules, or coulombs)

a) $V = 1000 \text{ mV} = \underline{1} \text{ V}$ $E = ?$ $Q = 20 \text{ C}$ $E = 1 \times 20 = 20 \text{ J}$	b) $V = ?$ $E = 1.25 \text{ kJ} = \underline{1250} \text{ J}$ $Q = 1500 \text{ C}$ $V = \frac{1250}{1500} = 0.83 \text{ V}$	c) $V = 1.21 \text{ GV} = \underline{1200000000} \text{ V}$ $E = ?$ $Q = 2000000 \text{ C}$ $E = 1.21 \times 10^9 \times 2 \times 10^6$ $= 2.42 \times 10^{15} \text{ J}$
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WORD PROBLEMS

1. The potential difference between the two terminals on a battery is 9 volts. How much work (energy) is required to transfer 10 coulombs of charge across the terminals?

$$E = 9 \times 10 = 90 \text{ J}$$

2. Ten joules of work (energy) are required to transfer 2 coulombs of charge from X to Y. What is the difference in potential between these two points?

$$V = \frac{10}{2} = 5 \text{ V}$$

3. It requires 600 joules of energy to transfer a quantity of charge between points C and D of a circuit, which have a potential difference of 30 volts. How much charge is transferred?

$$Q = \frac{600}{30} = 20 \text{ C}$$