

ELECTRICAL POWER

There are two different equations for power. Each equation has three forms making six possible equations:

$P = V \times I$	$V = \frac{P}{I}$	$I = \frac{P}{V}$	$P = \text{power (W) watts}$
			$V = \text{potential difference (V) volts}$
			$I = \text{current (A) amperes}$

$P = \frac{E}{t}$	$E = P \times t$	$t = \frac{E}{P}$	$P = \text{power (W) watts}$
			$E = \text{energy (J) joules}$
			$t = \text{time (s) seconds}$

Use the first set of equations to solve:

1. Calculate the power in watts when a current of 30 A and a potential difference of 220 V passes through a large industrial motor?
2. How much current passes through a 500 W light bulb if the potential difference is 120 V?
3. What potential difference in V is required to push 20 A of current through a large heating coil that is rated at 5 000 W?
4. What is the current through a 10 000 W heating element when provided with 220 V potential difference?
5. What is the maximum power that can flow through a 15 A fuse if the potential difference is 120 V?

Use the second set of equations to solve:

1. How long in minutes does it take for 20000 J of heat energy to be supplied by a 25 W heating coil?
2. Determine the energy produced when a 500 W heater is left on for 2 hr
3. What is the power produced when 50000 J is consumed per hour?
4. If 1 J of energy can heat 1 mL of water by one degree Celcius, what power is required to heat 1000 mL by one degree Celcius in 30 s?

Answers: 1. 6600 W 2. 4.167 A 3. 250 V 4. 45.5 A 5. 1800 W
 1. 13.3 min 2. 3 600 000 J 3. 13.9 W 4. 33.3 W