

Unit 3 – Work, Energy & Power

Unit 3C – Power

Power is

You do work if you lift a heavy box up a flight of stairs. You do the same amount of work whether you lift the box slowly or quickly. But your power is greater if you do the work in a smaller amount of time.

Power can also be used to describe

A light bulb converts electrical energy into heat (thermal energy) and light (radiant energy). The power of a light bulb is the rate at which the electrical energy is converted into these other forms.

To calculate the power of a person, machine, or other device, you must know the work done or energy converted and the time. Work can be calculated using the following formula:

Power is calculated by dividing the work or energy by the time.

Power is measured

In one second, a 60-watt light bulb converts 60 joules of electrical energy into heat and light. Power can also be measured in *horsepower*. One horsepower is equal to 746 watts.

Power

1. Calculate the power of a light bulb that uses 36J of electrical energy in 6 seconds.
2. Calculate the power of a motor that uses 800J of electrical energy in 20 seconds.
3. Calculate the power of a boy who performs 1200J of work in 4 seconds.
4. Calculate the power of a girl who performs 3000J of work in 6 seconds.
5. Calculate the power of a car that uses 80000J of chemical energy in 2 seconds.

6. Calculate the power of a car that uses 120kJ of chemical energy in 5 seconds
7. Calculate the power of a light bulb that uses 2kJ of electrical energy in 20 seconds
8. Calculate the power of a train that uses 4MJ of electrical energy in 8 seconds
9. Calculate the power of a person who does 24000J of work in 2 minutes
10. Calculate the power of a clock that uses 14.4kJ of electrical energy in 2 hours

11. Calculate the energy used by a light bulb of power 60W in 8 seconds.
12. Calculate the energy used by an iron of power 700W in 20 seconds.
13. Calculate the energy used by a radio of power 20W in 200 seconds.
14. Calculate the work done by a motor of power 2000W in 5 seconds.
15. Calculate the work done by a car of power 40000W in 25 seconds.

16. Calculate the energy used by a light bulb of power 40W in 2 minutes.
17. Calculate the energy used by a car of power 60kW in 10 seconds.
18. Calculate the energy used by a radio of power 10W in 4 hours.
19. Calculate the work done by a marathon runner of power 200W in 3 hours.
20. Calculate the work done by a generator of power 3MW in 7 days.

21. How long does it take a light bulb of power 150W to produce 900J of energy?
22. How long does it take a car of power 50000W to use 2000000J of energy?
23. How long does it take a television of power 300W to use 120kJ of energy?
24. How long does it take an electric fire of power 3kW to produce 6MJ of energy?
25. How long does it take a motor of power 20kW to do 4MJ of work?

26. Calculate the power of a light bulb that uses 400J of electrical energy in 20 seconds.
27. Calculate the energy used by a light bulb of power 15W in 200 seconds.
28. How long does it take a light bulb of power 60W to produce 7200J of energy?
29. Calculate the power of a doorbell that uses 360kJ of electrical energy in 200 hours
30. Calculate the work done by a generator of power 50kW in 4 hours.