

Work and Power Questions for GCSE Physics

1. Define work done in terms of energy transferred.

Work done is the same as the amount of energy transferred.

2. What is the equation for work done when force and distance are given?

Work done = force applied \times distance moved in the direction of the force

3. If a force of 10 N moves an object 5 m, how much work is done?

$$W = F s$$

$$= 10 \times 5$$

$$= 50 \text{ J}$$

4. A machine transfers 500 J of energy in 2 seconds. What is its power output?

$$P = E / t$$

$$= 500 / 2$$

$$= 250 \text{ W}$$

5. A car engine does 1,200 J of work in 10 seconds. Calculate the power of the engine.

$$P = W / t$$

$$= 1200 / 10$$

$$= 120 \text{ W}$$

6. A student lifts a 20 N weight 2 m vertically. How much work is done?

$$W = F s$$

$$= 20 \times 2$$

$$= \mathbf{40 \text{ J}}$$

7. A light bulb transfers 60 J of energy in 1 second. What is its power?

$$P = E / t$$

$$= 60 / 1$$

$$= \mathbf{60 \text{ W}}$$

8. A car does 900 J of work while moving 3 m. What is the force applied?

$$W = F s$$

$$900 = F \times 3$$

$$900 / 3 = F \qquad = \mathbf{300 \text{ N}}$$

9. A light bulb has a power rating of 100 W. How much energy does it transfer in 3 minutes?

$$P = E / t$$

$$100 = E / (3 \times 60) \qquad \text{[convert 3 minutes to 3 x 60 seconds]}$$

$$100 \times 180 = E \qquad = \mathbf{18,000 \text{ J}}$$

10. A machine exerts a force of 200 N to move an object 4 m. Calculate the work done and the power output if it takes 2 seconds.

$$W = F s$$

$$= 200 \times 4 \quad = \mathbf{800 \text{ J}}$$

$$P = W / t$$

$$= 800 / 2 \quad = \mathbf{400 \text{ W}}$$



11. A lift raises a total weight of 12000 N by 60 m in 20 seconds. What is the work done and the power of the lift?

$$W = F s$$

$$= 12000 \times 60 = 720,000 \text{ J}$$

$$P = W / t$$

$$= 720,000 / 20 = 36,000 \text{ W}$$

12. A machine has a power output of 250 W and transfers 5,000 J of energy. How long does it operate?

$$P = E / t$$

$$250 = 5000 / t$$

$$250 \times t = 5000$$

$$t = 5000 / 250 = 20 \text{ seconds}$$

13. A 60 W fan operates for 2 hours. How much energy does it consume in joules?

$$P = E / t$$

$$60 = E / (2 \times 60 \times 60) \quad [2 \text{ hours} = 2 \times 60 \times 60 \text{ seconds}]$$

$$60 = E / 7200$$

$$60 \times 7200 = E = 432,000 \text{ J}$$

14. A car engine transfers 50,000 J of energy in 20 seconds. Calculate the power and the force if the car travels 40 m in this time.

$$P = E / t = 50,000 / 20 = 2,500 \text{ W}$$

$$W = F s$$

$$50,000 = F \times 40$$

$$50,000 / 40 = F = 1250 \text{ N}$$

15. A machine applies a horizontal force of 200 N to push a box 10 m across a rough surface. At the same time, it lifts the box vertically 2 m using a crane attachment. If the weight of the box is 500 N, calculate:

a) The total work done by the machine.

b) The power output if the process takes 15 seconds.

$$W = F s = 200 \times 10 = 2000 \text{ J}$$

$$W = F s = 500 \times 2 = 1000 \text{ J}$$

$$\text{Total work done} = 2000 + 1000 = 3000 \text{ J}$$

$$P = W / t = 3000 / 15 = 200 \text{ W}$$

