

AQA GCSE Physics: Power Calculations Worksheet (Work, Energy, Time)

Question 1: The Speedy Lift

- **Answer:** Work done = force x distance = mass * gravitational field strength * distance = $500 \text{ kg} * 9.8 \text{ N/kg} * 20 \text{ m} = 98,000 \text{ J}$ Power = work done / time = $98,000 \text{ J} / 10 \text{ s} = \mathbf{9800 \text{ W}}$

Question 2: The Bright Bulb

- **Answer:** Power = energy transferred / time = $600 \text{ J} / 1 \text{ s} = \mathbf{600 \text{ W}}$

Question 3: The Sprinting Athlete

- **Answer:** Kinetic energy = $0.5 * \text{mass} * (\text{speed})^2 = 0.5 * 70 \text{ kg} * (100 \text{ m} / 10 \text{ s})^2 = 3500 \text{ J}$ (This assumes the athlete starts from rest) Power = work done / time = $3500 \text{ J} / 10 \text{ s} = \mathbf{350 \text{ W}}$

Question 4: The Efficient Motor

- **Answer:** Power = work done / time = $10,000 \text{ J} / 5 \text{ s} = \mathbf{2000 \text{ W}}$

Question 5: The Climbing Cyclist

- **Answer:** Time in seconds = 2 minutes * 60 seconds/minute = 120 s Power = work done / time = $50,000 \text{ J} / 120 \text{ s} = \mathbf{416.67 \text{ W}}$ (approximately)

Question 6: The Powerful Kettle

- **Answer:** Energy transferred = power * time = $2000 \text{ W} * 120 \text{ s} = \mathbf{240,000 \text{ J}}$

Question 7: The Lifting Machine

- **Answer:** Work done = force x distance = mass * gravitational field strength * distance = $100 \text{ kg} * 9.8 \text{ N/kg} * 5 \text{ m} = 4900 \text{ J}$ Power = work done / time = $4900 \text{ J} / 2 \text{ s} = \mathbf{2450 \text{ W}}$

Question 8: The Energy-Saving Appliance

- **Answer:** Time in seconds = 30 minutes * 60 seconds/minute = 1800 s Energy transferred = power * time = $100 \text{ W} * 1800 \text{ s} = \mathbf{180,000 \text{ J}}$

Question 9: The Human Heart

- **Answer:** Time in seconds = 1 day * 24 hours/day * 60 minutes/hour * 60 seconds/minute = 86,400 s Work done = power * time = $1.3 \text{ W} * 86,400 \text{ s} = \mathbf{112,320 \text{ J}}$

Question 10: The Stair Climb

- **Answer:** Work done = force x distance = mass * gravitational field strength * distance = $60 \text{ kg} * 9.8 \text{ N/kg} * 3 \text{ m} = 1764 \text{ J}$ Power = work done / time = $1764 \text{ J} / 10 \text{ s} = \mathbf{176.4 \text{ W}}$