Work, Energy and Power Equations Worksheet

Level: GCSE / A-Level / AP Physics 1 | Difficulty: Intermediate | Topic: Mechanics

Practice the core energy equations with 10 problems covering kinetic energy, gravitational potential energy, work done, and power. Full solutions included.

Equations you will need

W = Fs cos theta	Work done = force x distance x cos(angle)
KE = 1/2mv^2	Kinetic energy
PE = mgh	Gravitational potential energy
P = W/t	Power = work done / time
P = Fv	Power = force x velocity
Efficiency = (useful output / t	Efficiency

Symbol key

Symbol	Quantity	Unit
W	work / energy	J (joules)
F	force	N
s	distance	m
m	mass	kg
v	velocity	m/s
h	height	m
P	power	W (watts)
t	time	s

Practice problems

1. A 50 N force pushes a box 8 m horizontally. Find the work done.

2. Find the kinetic energy of a 2 kg ball moving at 10 m/s.

3. A 5 kg book is lifted 1.5 m. Find the gain in PE. (g = 9.8 m/s^2)

4. A motor does 6000 J of work in 30 s. Find the power.

5. A 1500 kg car accelerates from rest to 20 m/s. Find the work done by the engine.

6. A pump lifts 50 kg of water 10 m in 20 s. Find the power. (g = 9.8 m/s^2)

7. A force of 100 N pulls a sled 20 m at 30deg to the horizontal. Find the work done.

8. A 0.5 kg ball is dropped from 20 m. Find its speed just before hitting the ground (no air resistance).

9. An engine outputs 800 W useful power but consumes 1000 W. Find its efficiency.

10. A 70 kg runner climbs stairs of total height 5 m in 4 s. Find the power developed. (g = 9.8 m/s^2)

Answer key

Full worked solutions for each problem.

1. W = Fs = 50 x 8 = 400 J
2. KE = 1/2mv^2 = 1/2(2)(100) = 100 J
3. PE = mgh = 5(9.8)(1.5) = 73.5 J
4. P = W/t = 6000/30 = 200 W
5. W = DKE = 1/2(1500)(400) = 300,000 J
6. W = mgh = 4900 J; P = 4900/20 = 245 W
7. W = Fs cos theta = 100(20)(cos 30deg) = 1732 J
8. PE -> KE: mgh = 1/2mv^2 -> v = ?(2gh) = ?(392) = 19.8 m/s
9. Efficiency = 800/1000 x 100% = 80%
10. W = mgh = 70(9.8)(5) = 3430 J; P = 3430/4 = 857.5 W