# Energy, Work and Power

Energy · 4 questions · step-by-step answers at the end

Name: Date: Score: / 4

**USEFUL EQUATIONS**

$W = Fd$ $E_k = \frac{1}{2}mv^2$ $E_p = mgh$ $P = E / t$ efficiency = useful out / total in

## Questions

Show your working in the space under each question.

**1.** A motor takes in 500 J and lifts a load, giving it 350 J. What is its efficiency?

**2.** A 50 kg student runs up stairs 3.0 m high in 5.0 s. Find the energy gained and the power.

**3.** A 1000 kg car travels at 30 m/s. Find its kinetic energy. What happens to it if the speed doubles?

**4.** A lamp takes in 20 W and gives out 15 W as light. Find its efficiency.

## Step-by-step answers

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**1.** 350/500 = 0.70 = **70%**. The other 150 J heats the motor and surroundings.

**2.** 1. $E_p$ = mgh = 50 × 9.8 × 3.0 = **1470 J**.
2. P = E/t = 1470/5.0 = **294 W**.
**Answer: 1470 J; 294 W**

**3.** ½ × 1000 × $30^2$ = **450 000 J**. Doubling the speed makes it **four times** larger.

**4.** 15/20 = **75%**.