

## Energy calculations

(3 marks per question. 1 mark for equation, 1 mark for working, 1 mark for answer and unit). 3 marks will be awarded for the correct answer with units by itself) If you cannot remember the equations you may ask for them but you will lose 5 marks for each equation you request.

1. An athlete (mass 60kg) is jogging at 2m/s. Calculate the kinetic energy of the athlete.
2. A formula one racing car with a mass of 600kg has reached a speed of 50 m/s along a straight. What is the kinetic energy of the car?
3. A fighter jet has just taken off from an aircraft carrier. It is fully loaded with fuel and weighs 1600kg. It has reached a speed of 270 m/s. Calculate the kinetic energy of the aircraft.
4. A rock sits on top of a hill. It has a mass of 120kg. The hill is 30m high. Calculate the gravitational potential energy of the rock (assume  $g = 10$ ).
5. A roller coaster is at the top of a big drop. It is 80m above the ground. The roller coaster has a mass of 800kg. Calculate the gravitational potential energy of the roller coaster (assume  $g = 10$ ).
6. A weightlifter lifts 100kg of weights over his head to a height of 2.5m. Calculate the gravitational potential energy of the weights (assume  $g = 10$ ).

The equation for elastic potential energy is  $E_e = \frac{1}{2}ke^2$

7. An Olympic archery bow has a string made of Dyneema, which is a synthetic fibre. It has a spring constant of 560N/m. Calculate the elastic potential energy on the string that has been stretched 0.8m.

8. A car is travelling slowly. Its kinetic energy is 900J and it has a mass of 200kg. Calculate how slowly the car is travelling.

9. A parachutist has a mass of 55kg. Her gravitational potential energy is 66000J. Calculate how far above the ground she is. (assume  $g = 10$ ).

10. A spring has been stretched by attaching a weight. The spring constant ( $k$ ) for the spring = 300 N/m. The spring has 24 J of elastic potential energy. Calculate the extension of the spring.

## Energy calculations

(3 marks per question. 1 mark for equation, 1 mark for working, 1 mark for answer and unit). 3 marks will be awarded for the correct answer with units by itself) If you cannot remember the equations you may ask for them but you will lose 5 marks for each equation you request.

1. An athlete (mass 60kg) is jogging at 2 m/s. Calculate the kinetic energy of the athlete.

$$KE = 120 \text{ J}$$

2. A formula one racing car with a mass of 600kg has reached a speed of 50 m/s along a straight. What is the kinetic energy of the car?  $KE = 750000 \text{ J}$  (750KJ)

3. A fighter jet has just taken off from an aircraft carrier. It is fully load with fuel and weighs 1600kg. It has reached a speed of 270 m/s. Calculate the kinetic energy of the aircraft.

$$KE = 58320000 \text{ J}$$
 (58320 KJ)

4. A rock sits on top of a hill. It has a mass of 120kg. The hill is 30m high. Calculate the gravitational potential energy of the rock (assume  $g = 10$ ).  $GPE = 36000 \text{ J}$  (36 KJ)

5. A roller coaster is at the top of a big drop. It is 80m above the ground. The roller coaster has a mass of 800kg. Calculate the gravitational potential energy of the roller coaster (assume  $g = 10$ ).  $GPE = 640000 \text{ J}$  (640 KJ)

6. A weightlifter lifts 100kg of weights over his head to a height of 2.5m. Calculate the gravitational potential energy of the weights (assume  $g = 10$ ).  $GPE = 2500 \text{ J}$  (2.5 KJ)

7. An Olympic archery bow has a string made of Dyneema, which is a synthetic fibre. It has a spring constant of 560N/m. Calculate the elastic potential energy on the string that has been stretched 0.8m.  $EPE = 179.2 \text{ J}$

8. A car is travelling slowly. It's kinetic energy is 900J and it has a mass of 200kg. Calculate how slowly the car is travelling.  $velocity = 3 \text{ m/s}$

9. A parachutist has a mass of 55kg. Her gravitational potential energy is 66000J. Calculate how far above the ground she is. (assume  $g = 10$ ).  $Height = 120 \text{ m}$

10. A spring has been stretched by attaching a weight. The spring constant (k) for the spring = 300 N/m. The spring has 24J of elastic potential energy. Calculate the extension of the spring.

$$Extension = 0.4 \text{ m}$$