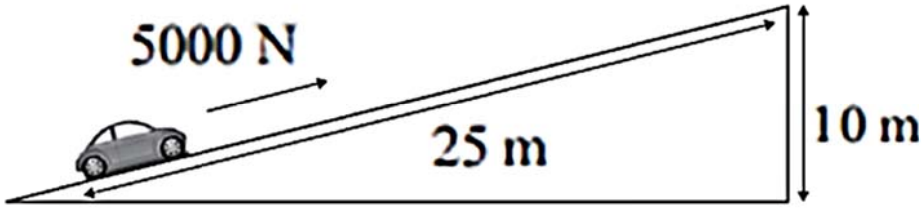
SCIENCE: PHYSICS 90191 MECHANICS:ENERGY

ENERGY (2009;1)

The same car now drives 25 m up a slope and stops.



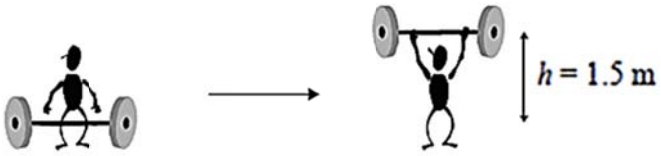
(a) Calculate the work done by the car as it travels up the slope, and give the appropriate unit.
(b) The energy gained by the car (m = 1200 kg) at the top of the slope does not equal the work done. Discuss why these two values are not equal. In your answer you should:
- Name the type of energy the car has, when stopped at the top of the slope
- Calculate the difference between the work done and the energy at the top of the slope
- Explain where the "missing" energy has gone and why this occurs.

A REMOTE CONTROL CAR (2008;2)

A child plays with a remote control car on concrete. The mass of the car is 400 grams (0.4 kg). The car then travels 28 m at a constant speed of 4 ms^{-1} for 7 seconds.
Using the equation $E_K = ½ mv^2$ calculate the kinetic energy of the car at this speed.

SPORTS TRAINING (2007;1)

The final part of the athlete's training involves weight training.



The athlete lifts a 100 kg set of weights above his head, so that the height is changed by 1.5 m.

(a) Calculate the work done by the athlete to lift the weights to the new height of 1.5m above its original position. Give an appropriate unit.
(b) Describe the major energy change that occurs when the athlete drops the weights from the new height.

CYCLING (2006;1)

The speed of Toni on her bike during is 8.3 ms^{-1} and the combined mass of Toni and her bike is 70 kg. Calculate the kinetic energy of Toni and the bike as she travels at that constant speed.

TANDEM SKYDIVING (2005;1)

Ariana wins a competition for a Tandem Skydive. The plane flies to a height of 5 000 m above sea level. Ariana is strapped to her jumpmaster. Ariana and the jumpmaster have a combined mass of 150 kg.

(a) Using the equation $F_{gravity} = mg$ find the combined weight of Ariana and the jumpmaster.
(b) Calculate the amount of gravitational potential energy Ariana and the jumpmaster have just before they jump out of the plane at 5 000 m.

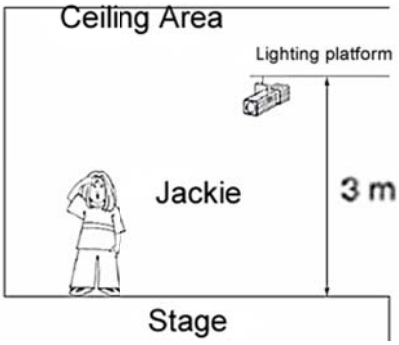
THE GAME CONTINUES (2004;3)

Jacki's team bats later in the day. When Jacki first strikes the ball, she hits it badly and it travels straight up.

(a) The ball left the bat with an initial speed of 20 ms^{-1} The mass of the ball is 160 g (0.16 kg). Use the formula $E_k = \frac{1}{2} mv^2$ to find the initial kinetic energy of the ball.
(b) Assuming that the energy is conserved throughout the upward flight of the ball, calculate the maximum height reached by the ball.

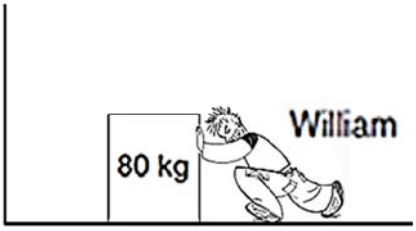
QUESTION ONE (2003;1)

A group of friends have decided to help in the school stage production.



Jackie helped carry the bar and spotlights up a ladder. The bar and spotlights were fixed in place 3 m from the stage floor. Using the formula $E_p = mgh$ calculate the gravitational potential energy gained by the bar and spotlights. The units are required.

QUESTION TWO (2003;1)



The box William is pushing is pushed at 3 ms^{-1} and has a mass of 80 kg. Calculate the box's kinetic energy. The units are required.