BTU1113 PHYSICS : REVISION 3

Work Done by a constant Force

1. The International Space Station orbits the Earth in an approximately circular orbit at a height of h- 375 km above the Earth's surface. In one complete orbit, is the work done by the Earth on the space station positive, negative, or zero?. Explain.

Work Done by a variable Force

2. A block of mass m and speed v collides with a spring, compressing it a distance Δx. What is the compression of the spring if the force constant of the spring is increased by a factor of four?

3. A 1.2-kg block is held against a spring of force constant $1.0\ x\ 10^4 \frac{N}{m}$, compressing it a distance of 0.15 m. How fast is the block moving after it is released and the spring pushes it away?

4. How much work is needed for a 73-kg runner to accelerate from rest to 7.7 m/s?

5. A 9.50-g bullet has a speed of 1.3 km/s .
   a) What is its kinetic energy in Joules
   b) What is the bullet's kinetic energy if the speed is halved?
   c) If its speed is doubled?

Power

6. Calculate the power output of a 1.4-g fly as it walks straight up a windowpane at 2.3 cm/s

7. You raise a bucket of water from the bottom of a deep well. If your power output is 108 W, and the mass of the bucket and the water in it is 5.00 kg, with what speed can you raise the bucket? Ignore the weight of the rope.