يسمح باستخدام الالة الحاسبة   (الاسئلة في صفحتين)

First: Answer the following question (mandatory):

First question: complete the following statements to be correct:

1) *The body still in its state of rest or of moving uniformly except ………*

2) *If a body falls vertically down then the increase in the …………energy equals the decrease in the ………… energy.*

3) *The opposite figure represents a string passes over a smooth pulley and two masses of magnitudes m kg. and 1 kg. are attached to its terminals where m > 1 .If the system moved from rest with acceleration 4.9 m/sec^2,then m = ……….*

4) *If a force of magnitude 10 newton acts on a body for 0.7 sec ,then the impact of this force on the body = …………*

5) *If the direction of a force is perpendicular to the linear path of a body, then the magnitude of the work done by this force to the body equals …………*

6) *The rate of change of the work with respect to time is known as ……………*
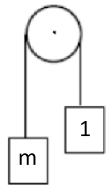
Second: Answer three of the following questions:

Second question:

a) *A body of mass 5 kg. is moving upwards with uniform velocity on a rough horizontal plane inclined to the horizontal by an angle whose tangent $\frac{3}{4}$ and the coefficient of friction between them is 0.3 , find in newton, approximating to the nearest integer, the magnitude of the force acts on the body and parallel to the line of the greatest slope of the plane .*

b) *A body moves from point A(-1, 4)to point B(3,1)under the action of a force of magnitude 26 Newton makes with the positive direction of X-axis an angle of sine $\frac{5}{12}$. find the work done by this force if this displacement is measured in meter.*

Third question:

a) *If a body falls vertically down from the top of a tower .evaluate its momentum at any instant of time, then prove that the rate of change of its momentum according to time equals a constant vector.*

b) Two smooth spheres of masses   m kg. , 2 m kg. move on a smooth horizontal table in the same straight line and in the same direction. Such that the smaller sphere is in front and moving with velocity 10 m / sec and the bigger one at the back and moving with velocity 13 m / sec. after impact they moved as one body. What is the velocity of the new body after impact?

And if the loss in energy due to the impact equals 45 joule find the value of m.

Fourth question:

a) A body is suspended from the end of a spring balance fixed in the ceiling of a lift. When the lift was moving upwards with an acceleration of magnitude **a** m/sec ^{2} , the balance reading was 16 kg.wt. and when it was moving upwards with an acceleration of magnitude $\frac{3}{2}$ **a** m/ sec ^{2}, the balance reading was 17 kg.wt . Find :

1- The mass of the body and the magnitude of **a**.

2- The balance reading when the lift is descending with a uniform retardation of magnitude $\frac{3}{2}$ **a**   m/ sec ^{2}

b) A car of mass 1710 kg. and the power of its engine is 12 horse moves on a horizontal road with its max. velocity which is 72 km / h.   Find the max. velocity of the car when it ascends a road inclined to the horizontal at an angle of sine $\frac{1}{10}$ assuming that the resistance is the same on the two roads.

Fourth question:

a) A body of mass 250gm is placed on a rough plane inclined to the horizontal at an angle whose tangent is $\frac{4}{3}$. The body is joined to one end of a string passing through a pulley fixed at the top of the plane. At the other end of the string, a body of mass k gm. hangs vertically. If the least value of k necessary to keep the body at the rest on the plane is 150gm, prove that the coefficient of friction between the body and the plane is $\frac{1}{3}$

If a body of mass 350gm is hanged from the free end of the string, find the acceleration of motion of the system.

b) Find the resistance of the material of a wooden target if a bullet of mass 200 gm. is fired towards it with velocity 400 cm/sec and imbedded on it to came to rest after having covered 20 cm .If the same kind of bullet is fired on another target from the same material with thickness 15 cm find the velocity of the bullet when it come out of the target .