

Phys171 - Tue 3/26

Friday March 30, Midterm 2 (Ch 8-11)

HW will be due on THU

Third midterm moved to Mon Apr 23

Lowest grade quiz will not count!

Please email me if you need an extension
on ONE HW assignment. I will give one
away free...

To reach the same final speed with a force that is only half
as big, the force must be exerted on the cart for a
distance_____ that for the stronger force.

1. four times as long as
2. twice as long as
3. equal to
4. half as long as
5. a quarter of

Lets assume your car's motor can apply a maximum force F_{MAX} .
With F_{MAX} it reaches a speed of 60 mph in 100 meters.
To reach twice the final speed, 120 mph, the force must
be exerted on the cart for a distance of

1. 800 meters
2. 400 meters
3. 200 meters
4. 100 meters
5. 50 meters

Scalar Product rules for unit vectors

$$\begin{aligned} A &= A_x \hat{i} + A_y \hat{j} + A_z \hat{k} \\ B &= B_x \hat{i} + B_y \hat{j} + B_z \hat{k} \\ A \cdot B &= A_x B_x + A_y B_y + A_z B_z \end{aligned}$$



$$\begin{aligned} \hat{i} \cdot \hat{i} &= \hat{j} \cdot \hat{j} = \hat{k} \cdot \hat{k} = 1 \\ \hat{i} \cdot \hat{j} &= \hat{i} \cdot \hat{k} = \hat{j} \cdot \hat{k} = 0 \end{aligned}$$

What is the work $W = F \cdot \Delta r$ exerted by a force $F = \hat{i} + 2\hat{j}$ N that displaces an object by $\Delta r = 2\hat{i} + 2\hat{j}$ m

1. 3 Nm
2. 4 Nm
3. 5 Nm
4. 6 Nm
5. Don't know

Mechanical Energy

Without friction:

$$\Delta E_{\text{mech}} = \Delta K + \Delta U = W$$

ΔU is the change in all forms of potential energy

W is work done by a force from OUTSIDE the "system" i.e. a force for which we do not have a potential energy U included

Example: Block sliding down onto spring