CHAPTER 7: DYNAMIC

1. WHAT IS A FORCE?

http://education.yahoo.com/reference/dictionary/entry/force

http://www.contennialofflight.gov/essay/dictionary/force/D1121.htm

i. Push and pull are types of force.
ii. We cannot see force but we can see the effects of force.
iii. Activities such as pushing a box, riding a bicycle, pulling a rope involve the use of force.
iv. Force can change the shape, position, speed, size, stop and direction of the movement of an object.

The Various Types of Forces

http://force.kiwiki.homelp.net/

v. Types of force:-
   a. frictional force (friction)
      - friction occurs whenever two surfaces rub against each other. Friction is a force that always oppose motion.

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   b. gravitational force (gravity)
      - gravitational force or gravity is the force of attraction that pulls objects towards the Earth.
      - The force of gravity acts equally in all objects. Thus, in a vacuum, all objects whether heavy or light will fall to the Earth with the same velocity(halaju).

- Example, a heavy stone and a light feather will fall to the Earth with the same velocity.

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c. electrostatic force
- produced by charged substances.
- Are caused by the presence of static electrical charges. The electrical charges are produced when two different objects are rubbed against each other. Like charges repel while unlike charges attract.
- Example, it can attract small pieces of paper, stream of water flowing from a tap.

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d. electrical force
- Is produced when electrons move through a conductor placed in a magnetic field.

e. magnetic force
- Are the attractive and repulsive forces exerted by magnets. Like poles of magnets repel each other while unlike poles of magnets attract each other.

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2. THE MEASUREMENT OF FORCE.

i. The unit of force is measured in Newton (N).
ii. Force is measured using the spring balance.
iii. 1 N shown on a spring balance is equal to nearly 100g. (10N = 1kg)
iv. Example, if

$$\frac{force}{weight} = 6N$$

$$mass = \frac{6}{10} = 0.6kg = 600g$$

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3. FRICTIONAL FORCE AND ITS APPLICATION.

i. A force which slows down moving objects is called frictional force or friction.
ii. Frictional force can also be used to start or stop a motion.
iii. Frictional force acts when two surfaces come into contact, sliding over each other.
iv. Friction can at times be useful but in other instances it an also be a nuisance.
v. Friction is a force that opposes motion. It acts in the opposite direction to movement.
vi. Friction always produces heat.
vii. Friction has direction and magnitude.

How different types of surface affect frictional force.

1. Friction has magnitude and direction.
2. Magnitude depend on:
   a. Nature surface – smooth or rough
   b. Weight – light or heavy
3. Surface area not influenced magnitude of force. (big or small)
4. Different types of surfaces affect the magnitude of frictional force.
5. Rough surfaces have more friction than smooth.

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viii. Advantages of friction (friction is useful)

a. Friction plays an important role in our daily activities.
b. Friction between a piece of rough metal and a flint produces sparks. These sparks ignite the gas in a lighter.
c. Friction enables the mechanical belt in car engines and machines to turn engine parts. This moves the vehicle and machines.

ix. Disadvantages of friction (friction is a nuisance).

a. Friction produces heat. For example, machine parts that move produce heat. This heat can damage certain parts of the machines if the machine is not carefully controlled.
b. Friction opposes and slows down movement. For examples ridding a bicycle up a slope or paddling a boat.
c. Friction wears away materials. For examples, friction wears out the soles of shoes and the tyres of vehicles.

4. WORK, POWER AND THE IMPORTANCE OF FORCE IN OUR DAILY LIFE.

Go to www.beyondbooks.com.pcs91/4b.asp to gain information on forces. For easy access, go to www.icd.com.my

1. Work is the energy used to shift and abject from one place to another or to change the shape of and object.
2. Work is done when a force moves an object through the distance in the direction of the force.

Work (J) = Force (N) X Distance (m)

1 newton-metre (Nm) = 1 joule (J)

3. Power is the rate of doing work, that is the work done in one second (or the energy used per second).
4. The S.I unit for power is joule per second (J s^{-1}) or watt (w).

   1 watt (W) = 1 joule per second (J/s)

5. One watt is one joule of work done in one second.
6. The relationship between power, work and time is shown in the formula below.

$$\text{power (watt/w)} = \frac{\text{work done (joule/J)}}{\text{time (second/s)}}$$

$$\text{power} = \frac{\text{work done}}{\text{time}}$$

$$\text{power} = \frac{\text{Force X Distance}}{\text{Time}}$$

Example:
Calculate the work done and the power required to carry a bag weighing 200N, up five floors in 50s, given that each floor is 250 cm high.

Solution.

Work done = force X distance
= 200N X (250 cm X 5)
= 200N X (2.5m X 5)
= 200N X 12.5m
= 2500Nm (1Nm = 1 J)
= 2500J

$$\text{power} = \frac{\text{work done}}{\text{Time taken}}$$

$$= \frac{2500\text{J}}{50\text{s}}$$

$$= 50\text{J/s}$$

$$= 50\text{Watt}$$

7. The relationship between work, force and the distance an object moves is represented by the following equation.

Work done (joule/J) = Force (Newton/N) X Distance (Metre/m)

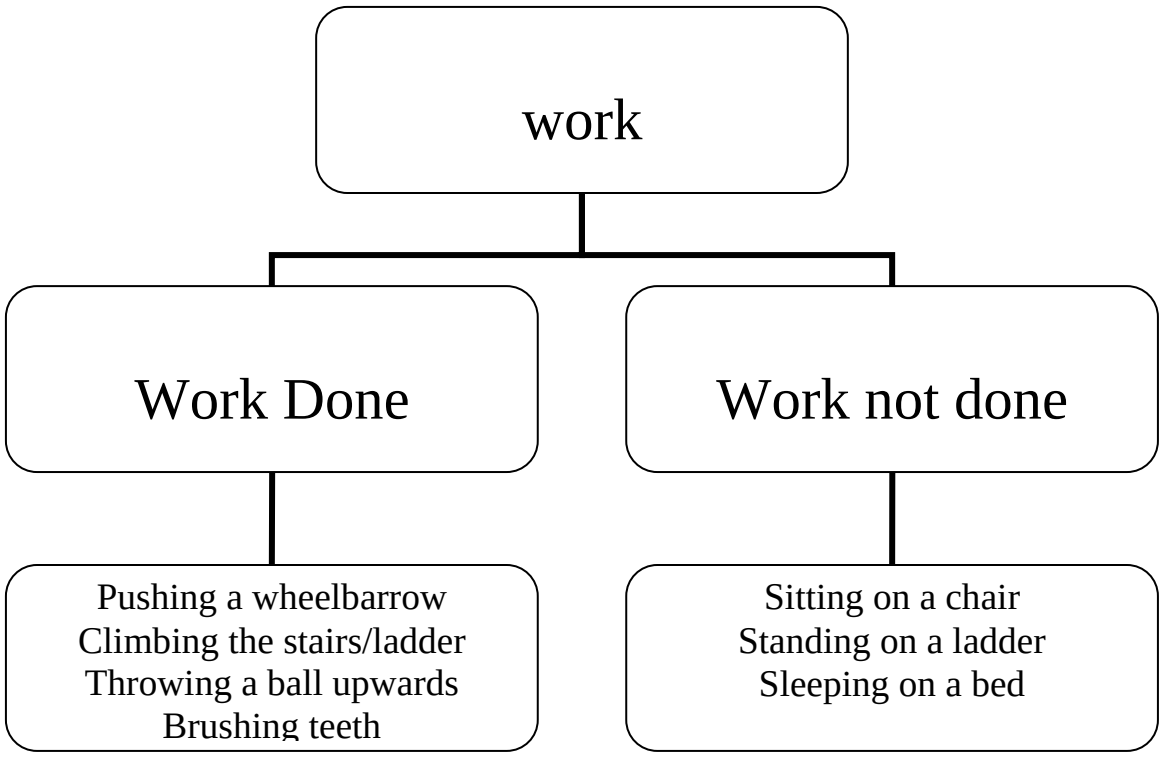
example:

Aizat used a forced of 50 N to push a trolley 2m across a horizontal floor. How much was done by Aizat when he pushed the trolley?

Solution.

Work done = Force X Distance
= 50N X 2m
= 100Nm
= 100J

8. The unit of work is measured in Joules (J) or Newton metres (Nm).
9. Energy is the ability to do work and is also measured in units called Joules (J) or Newton metre (Nm)
10. The chart below shows situations when work is done and when work is not done.



11. Force is importance as it enables us to carry out our daily activities.
12. Without
    a. gravitational force, we would be floating around in the air
    b. friction, we would slip and fail, vehicles would not be able to stop moving.
    c. Electrical force, we would not be able to use electrical appliance which make our lives more comfortable.
    d. Magnetic force, the compass would not function.

……The end…….

DICTIONARY

Magnitude	-	absolute value of physical mathematical (larger, mass, volume etc)
Groove	-	alur
Nuisance	-	gangguan
Slip	-	tergelincir
Wear	-	menjadi haus
Distance	-	jarak
Force	-	daya
Power	-	tenaga
Rate	-	kadar
Work	-	kerja
Compress	-	mampat
Stretch	-	regang
Spring balance	-	neraca spring
Repulsion	-	penolakan
Velocity	-	halaju
Slipping	-	tergenlicir
Skidding	-	colapse