

CHAPTER 9: STABILITY

CENTRE OF GRAVITY OF OBJECTS

<http://www.grc.nasa.gov/WWW/K-12/airplane/cg.html>

<http://www2.umist.ac.uk/construction/intranet/teaching/ul222/exp/cogex.htm>

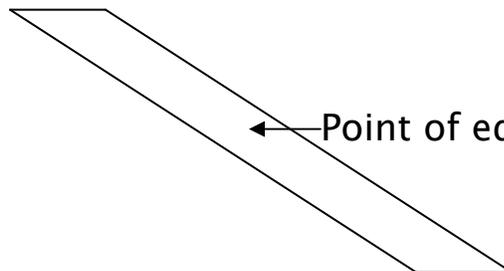
1. When an object is stationary or at rest, it is said to be in equilibrium.
2. The centre of gravity is the exact point where an object can be balanced.
3. The point at which an object can be balanced horizontally is called the centre of gravity of the object.
4. The equilibrium point of an object is also its centre of gravity.



Balanced at the point of equilibrium

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5. When the ruler is balanced at its centre, it remains in its position.
6. However, when the ruler is balanced at some other point away from its centre, it will become unbalanced and tilt to one side.

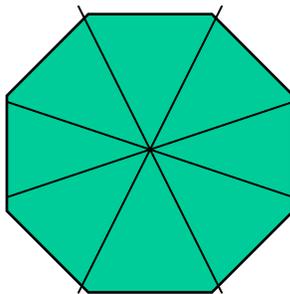


Ruler is not balanced

http://www.exploratorium.edu/snacks/center_of_gravity.html

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7. The point of equilibrium in regular-shaped objects, such as the ruler in the diagram above, is usually at its centre.
8. The point of equilibrium in a triangle or a rectangle is the intersection of diagonal lines drawn from the corners.



centre of gravity is
The point where the
Lines meet.

9. An object with a higher centre of gravity is less stable.
10. An object with a larger base area is more stable.
11. When two objects have the same shape and size, the heavier object is more stable.

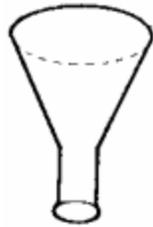
Relationship Between Centre of Gravity and Stability.

1. When an object is in equilibrium, its supported either at its centre of gravity or at a point vertically above or below its centre of gravity.
2. Stability refers to an object's ability to remain in its original position.
3. The stability of an object is its ability to return to its original position when the object is moved or tilted slightly.
4. Its is unstable equilibrium if it continues to move further from its original position after being displaced and then released.
5. Its in neutral equilibrium if remains in its displaced position.

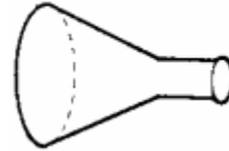
6. Figure below shows three type of equilibrium;



Stable
Equilibrium



unstable
equilibrium



neutral
equilibrium

EXPERIMENT

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Questions (underline the answer)

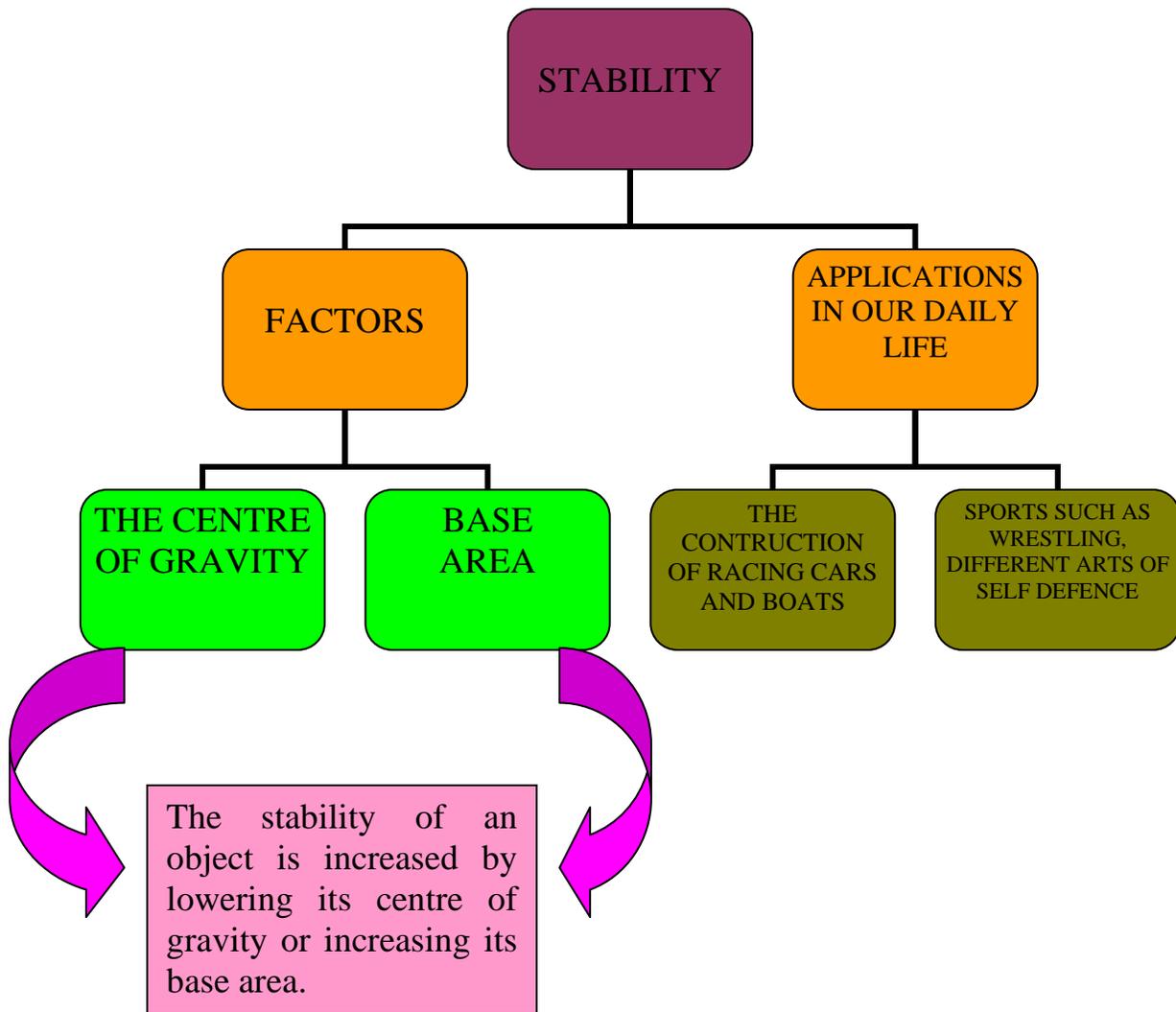
1. Is an object more stable or less stable when its centre of gravity is raised? (more stable / less stable)
2. Is the stability of an object increased or decreased when its base area is smaller? (increased / decreased)

Factors that affect stability.

1. The position of the centre of gravity.
A lower centre of gravity gives more stability to an object.
2. The size of the base area.
An object with a large base has better support and more stability compared to an object with a smaller base.
3. The weight of the object.
A heavier object is more stable than a lighter one. If an object has different densities, the heavier part of it will have a lower centre of gravity.

THE IMPORTANCE OF STABILITY IN OUR DAILY LIFE.

1. Racing cars are made more stable by having most of their weight as low down as possible. This ensures a low centre of gravity for the cars. Their wheels are also kept far apart to give them a wide base.
2. A weight lifter bends his leg and keeps them wide apart.
3. The passengers of a double-decker bus are not allowed to stand on the upper deck.



- other reference books add one more factor that affect the stability is the weight of the object.

.....the end.....

DICTIONARY

Base area	-	luas tapak
Pulley	-	takal
Topple	-	tumbang
Tilt	-	condong
Centre of gravity	-	pusat gravity
Equilibrium	-	keseimbangan
Pivot	-	pangsi
Stationary	-	pegun
Due	-	
Incline	-	
Blows	-	
Sails	-	
Beat	-	
Opponent	-	
Regular	-	
Irregular	-	
Edge	-	
Intersection	-	
Hip	-	
Equidistance	-	
Spinning	-	