APPLICATIONS OF FORCES

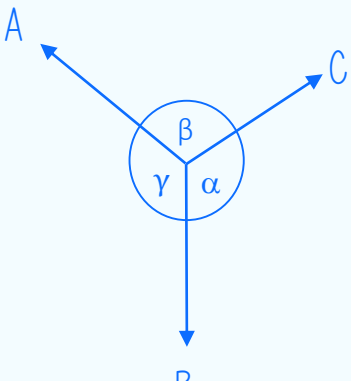
KEY WORDS & DEFINITIONS

Static Equilibrium

A particle is in static equilibrium if it is at rest and the resultant force acting upon it = 0

A rigid body is in static equilibrium if the body is stationary, the resultant force in any direction = 0 and the resultant moment = 0

LAMI'S THEOREM



$$\frac{A}{\sin\alpha} = \frac{B}{\sin\beta} = \frac{C}{\sin\gamma}$$

MODELLING

If a particle is attached separately to two strings, the tension can be different in each string.

If a smooth bead is threaded on a string, the tension in the string will be the same on both sides.

Unless connected particles are moving in the same direction, they must be considered separately.

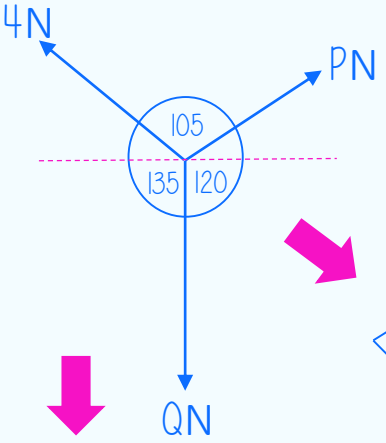
WHAT DO I NEED TO KNOW

1. The maximum value of the frictional force $F_{max} = \mu R$ is reached when the body being considered is on the point of moving. The body is then said to be in 'limiting equilibrium'.

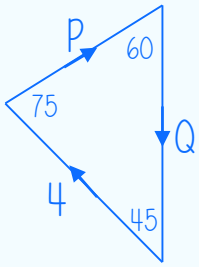
2. In general, the force of friction F is such that $F \leq \mu R$ and the direction of the frictional force is opposite to the direction in which the body would move, if the frictional force were absent.

3. To solve equilibrium problems, draw both a force diagram and a vector diagram.

4. If the angle between forces on a force diagram is θ, the angle between those forces in a triangle of forces is $180° - \theta$. The length of each side of the triangle is the magnitude of the force. (If the particle is not in equilibrium, the vector diagram will not be a closed triangle).



Method 2:
Use Sine Rule



Method 1:
Resolve horizontally & vertically

→ $P\cos30 - 4\cos45 = 0$

↑ $P\sin30 + 4\sin45 - Q = 0$

@Lucyjc1612