

## INCLINED PLANE

11362

Strong and fairly stable. Aluminium-made, hinge system- assembled with fixing road which allows highly accuracy at the adjustment of slanting angles from 0 up to 90°. Ideal for quantitative static experiments.

In the first experiment, two dynamometers are used in order to measure tangential ( $F_t$ ) and normal force ( $F_n$ ) to the plane as a function of the slanting angle ( $\alpha$ ) from 0 up to 90° keeping cart mass constant. Equations  $F_t = P_c \sin(\alpha)$  and  $F_n = P_c \cos(\alpha)$  are verified,  $P_c = m_c g$  being the carts weight and  $m_c$  being the mass.

In the second experiment, a dynamometer is used in order to measure tangential force  $F_t$  as a function of the cart mass  $m_c$  keeping the slanting angle constant. Equation  $F_t = \sin(\alpha) g m_c$  is verified. If  $\alpha = 30^\circ$  is fixed, then  $F_t = (g/2) m_c$ . Cart mass value is modified by putting weights into it. The value of  $g$  may be verified from the graph of  $F_t$  as a function of  $m_c$ .

In the third experiment the pulley and a weights&weights carrier kit are used. The angle at which forces balance is to be measured for each mass hanging from the weights carrier, cart mass being kept constant. Such measurement value for  $\alpha$  is such that the carts weight tangential component  $F_t = P_c \sin(\alpha)$  equals the weight of the weights carrier  $P_p = m_p g$ ,  $m_p$  being the mass put plus that of the carrier. The graph of  $P_p$  as a function of  $\alpha$  is to be drawn and will be compared with that obtained in the first experiment. In this experiment we will study the reasons why the inclined plane behaves as a simple machine since  $P_p < P_c$  save for  $\alpha = 90^\circ$ .



## COMPONENTS:

- ◆ 60 cm length inclined plane and 0-90° graduated scale
- ◆ Pulley with low friction ball bearing
- ◆ Two fixing clips for dynamometer
- ◆ 180g cart with wheels containing low friction microbearings
- ◆ Four extra 50g weights for putting into the cart
- ◆ Weights kit and weights carrier (20g carrier, 8x 10g weights and 5x 20g weights)
- ◆ String
- ◆ Two 2N Dynamometers. 0,02N accuracy

## EXPERIMENTS:

- ✓ Forces on the inclined plane as a function of the angle.
- ✓ Forces on the inclined plane as a function of the mass.
- ✓ Inclined plane as a simple machine, forces balance.