



## Force panel, machine components, gears and pulleys, springs, levers EQ032JP1

### Function

Intended for experimental study, physics laboratory and carrying out physics experiments on: Kinematics. Assembling a transmission system with belt and pulleys. The transmission ratio between the coupled pulleys. The reducer and amplifier with pulleys. Assembling a transmission system with gears. The reducer and amplifier with gears. Assembling a transmission system with belt, pulleys and gears. Coupling between different gears. Gear trains. Intermediate gears. Gear train. Driving, driven or intermediate gears. Assembling a transmission system between gear and rack. Static. Mass, weight and determination of local  $g$  value. Measuring mass weights. Table and graph. The composition of competing coplanar forces, at  $90^\circ$  to each other. Force and vector. Operations with coplanar and non-parallel vectors. Some types of strength. Comparing the resultant force with the balancing force. The composition and decomposition of competing coplanar forces at  $60^\circ$  to each other. The parallelogram rule. Measuring the angle between component forces. Measuring the component forces and determining the resultant force. Comparing the resultant force with the balancing force. The composition and decomposition of competing coplanar forces within  $120^\circ$  of each other. The composition and decomposition of competing coplanar forces. Vector operations. Force diagram. Measuring the angle, the component forces and determining the resultant force. Calculating the percentage relative error. Rigid body equilibrium conditions, Varignons theorem. The pure translational motion of a rigid body. The pure rotational motion of a rigid body. What is meant by torque (or conjugate, or moment of a force) in relation to the center of moments. The torque direction. The direction of torque, right-hand rule. The

two conditions, necessary and sufficient, for the equilibrium of a rigid body. Checking the equilibrium conditions of the rigid body. Verifying the equilibrium conditions of a rigid body, Varignons theorem. Identifying the values  $\ell_i$  of the acting forces and the positions in which they act on the beam. Determining the force resulting from the sum of the forces acting on the rigid body. Determining the resulting moment of the forces acting on the beam. Rigid body equilibrium, the interfixed lever, Varignons theorem. Determining the force resulting from the sum of the forces acting on the constructed interfixed lever. Determining moment resulting from the sum of the moments of the forces acting on the interfixed lever. Equilibrium of a rigid body, the inter-resistant lever, Varignons theorem. Equilibrium of an applied rigid body, the interpotent lever, Varignons theorem. Dynamics. The simple machine called fixed pulley The simple machine called movable pulley and its mechanical advantage. Determining the mechanical advantages of the fixed pulley. Exponential hoisting and its mechanical advantage. The parallel block and its mechanical advantage. An application of fixed pulleys, a load elevator system. An application of fixed and movable pulleys in a freight elevator system. The elastic constant of a helical spring, Hookes law, restoring force. Building the table and graph F versus x. Elastic deformation and plastic deformation. The elastic constant of a series association of springs, Hookes law, restoring force. The elastic constant of a parallel association of springs, Hookes law, restoring force. Energy conservation. Work and mechanical energy in a mass and helical spring system. The physical meaning of the graph area F versus x. Wave The simple pendulum and its laws. The mass and spring oscillator, dynamic determination of the elasticity constant. Simple harmonic motion (MHS) in a mass and spring system. The elongation and amplitude of an MHS, etc.

## Knowledge areas

Physics

## Key Experiments

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