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COMPACT RAMP KIT

LA30-390

INSTRUCTIONS FOR USE

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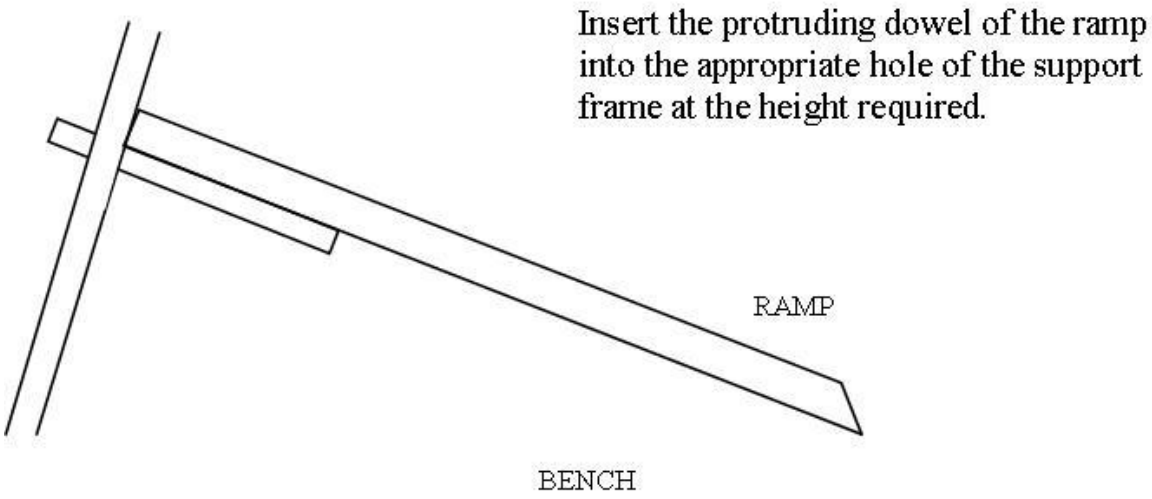
INTRODUCTION

These compact ramps bring dynamics experiments to the desk top.

Use them to investigate moving vehicles and friction in a versatile and self-contained system.

SETTING UP



The track can be used as it is or a different surface piece can be fitted. These surfaces are hooked on to the screw at the top of the ramp to keep them in place.

The wooden block is used for sliding/friction experiments and can have 10g slotted masses attached to the pin to increase the weight.

The different surfaces can be shared around. Additional surfaces packs are available from your supplier.

EXPERIMENTS

The ramps lend themselves to many investigations. A selection are outlined below. The complexity of the treatment will be determined by the age group using the kit.

EXPERIMENT 1 MOTION UNDER GRAVITY

Release the model car from the same point on the ramp each time and measure how far it rolls along the bench. Use different ramp heights and see if there is a link between height and distance i.e. does twice the ramp height result in twice the distance travelled?

NOTES. If the car rolls too far along the bench release it from lower down the ramp. An alternative is to place the ramp on a wooden board which is slightly inclined so that the car is running uphill.

Small changes in height (in between the ramp positions) can be achieved by spacers such as exercise books under the ramp foot.

EXPERIMENT 2 MOTION UNDER GRAVITY 2

Release the model car from different points on the ramp each time and measure how far it rolls along the bench. Keep the ramp height the same and see if there is a link between distance up the ramp and distance travelled along the bench.

NOTES. In both experiment 1 and 2 the height determines the potential energy given to the car. This is converted to kinetic energy and hence speed at the bottom of the track. This kinetic energy is converted to heat by doing work against friction on the bench. The formulae PE =mgh and KE = 0.5 x mv^2 can be discussed if appropriate.

EXPERIMENT 3 STATIC FRICTION

Use the wooden block at the top of the ramp. Raise the ramp one level at a time and see at what level the block begins to slide. Repeat several times to get an average result.

Predict what will happen with different surfaces.
Repeat the experiment for different surfaces and compare with predictions.
Predict the results if extra weights are added to the block.
Repeat using extra weights on the block to see if the results are the same

EXPERIMENT 4 DYNAMIC FRICTION

Static friction is the force to be overcome to get a stationary object moving. This is usually larger than the frictional forces (dynamic friction) to be overcome to keep the object in motion at a constant speed. Dynamic friction is a more predictable quantity but is measured in a similar way.

Use the wooden block at the top of the ramp. Raise the ramp one level at a time and gently tap the ramp to find the level required for the block to continue to slide once it is moving. The gentle tapping overcomes static friction so that the block is then moving. When the block continues at roughly constant speed the forces due to gravity are equal to the frictional forces opposing the motion. Repeat several times to get an average result.

Predict what will happen with different surfaces.

Repeat the experiment for different surfaces and compare with predictions.

Predict the results if extra weights are added to the block.

Repeat using extra weights on the block to see if the results are the same.

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