



a WOW Lab

BLUEPRINT

Indoor Rockets

Inquiry Approaches

Initial Inquiry

If an object is thrown off the top of a building, what factors determine how far away from the building the object will land?

The angle of launch, the height of the building and the initial velocity of the object will affect how long the object will stay in the air and how far it will travel horizontally. The shape of the object and the presence or absence of wind will also play a role.

What are qualitative observations? What are quantitative observations?

Qualitative information is based on the easily observable characteristics of an object, while quantitative information requires the measurement of an object's properties. For example, observing that it is sunny outside is a qualitative observation. Determining that the temperature on a sunny day is 28 °C is a quantitative observation.

Experimental Procedure Inquiry

What were some qualitative and quantitative observations collected in this activity?

The horizontal and vertical displacements of the rocket are quantitative observations. Observing that the horizontal and vertical displacements change as the angle of the launcher is adjusted is a qualitative observation.

What happened to the trajectory of the rocket when you changed the angle? What launch angle launches the rocket the furthest horizontal distance? The furthest vertical distance?

The trajectory changed as the angle was changed. The rocket launches the furthest horizontal distance when angled at 45 degrees. It launches the furthest vertical distance when angled at 90 degrees.

Why are you asked to calculate average horizontal displacement?

Taking the average of the three observations helps lessen the effect that small variations in the performance of the procedure have on the end result. For example, it is very difficult to apply exactly the same force to the bellow pump every time that the rocket is launched; these differences in launch speed will have an effect on displacement.

Is it possible to get the rocket to land in the same spot three times in a row? What obstacles might prevent this from occurring? How could you improve the activity procedure to get the rocket to land in the same spot?

For the rocket to land in the same spot three times consecutively, it is easiest to launch it from the same spot and the same angle. If the base or the clip shifts between launches, the rocket will land in a different spot. The same amount of force needs to be exerted on the bellow pump each time; if the same force is not exerted, then the rocket will land in a different spot. To ensure the rocket follows the same trajectory each time, the base, clip and bellow pump could be secured in place so they do not shift between launches. To control the amount of force exerted, an object could be dropped on the pump to launch the rocket, or a pump with a gauge could be used.



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In-Depth Inquiry

Do heavy objects fall faster than lighter ones?

No. Acceleration due to gravity is the same for all objects, regardless of their mass. If someone dropped a feather and a hammer in a vacuum, they would fall at the same rate. We do not observe this in our day-to-day life because of air resistance.