

Propeller Thrust & Efficiency Simulator

Classroom worksheet · Interactive simulation: <https://lkforge.com/tools/physics/propeller/>

Name: _____ Date: _____

Learning objectives

- Explain how a propeller generates thrust.
- Relate thrust to the air it accelerates.
- Describe how blade pitch affects performance.

Variables to change

- Rotation speed (RPM)
- Blade pitch
- Airspeed

Procedure

1. Spin the propeller and observe the thrust produced.
2. Increase the RPM and observe thrust rise.
3. Change the blade pitch and observe the effect on thrust and efficiency.

Observations

Record thrust versus RPM and blade pitch.

Questions

1. How does a propeller produce thrust?
2. How does thrust depend on rotation speed?
3. What does blade pitch control?

4. Why do many aircraft use variable-pitch propellers?
5. What is propulsive efficiency?

Answer key (instructors)

- **1.** By accelerating a mass of air rearward; the reaction pushes the aircraft forward.
- **2.** It rises with RPM (more air accelerated per second), roughly with the square of speed at fixed pitch.
- **3.** The angle of attack of the blades — how much air each blade grabs per revolution.
- **4.** To stay efficient across takeoff, climb, and cruise, like gears on a bicycle.
- **5.** The fraction of engine power converted into useful thrust power rather than wasted in the wake.

A propeller is a rotating wing that accelerates air backward, and the reaction thrusts the aircraft forward. Thrust rises with RPM and blade pitch; variable pitch keeps it efficient across flight phases, much like changing gears.