

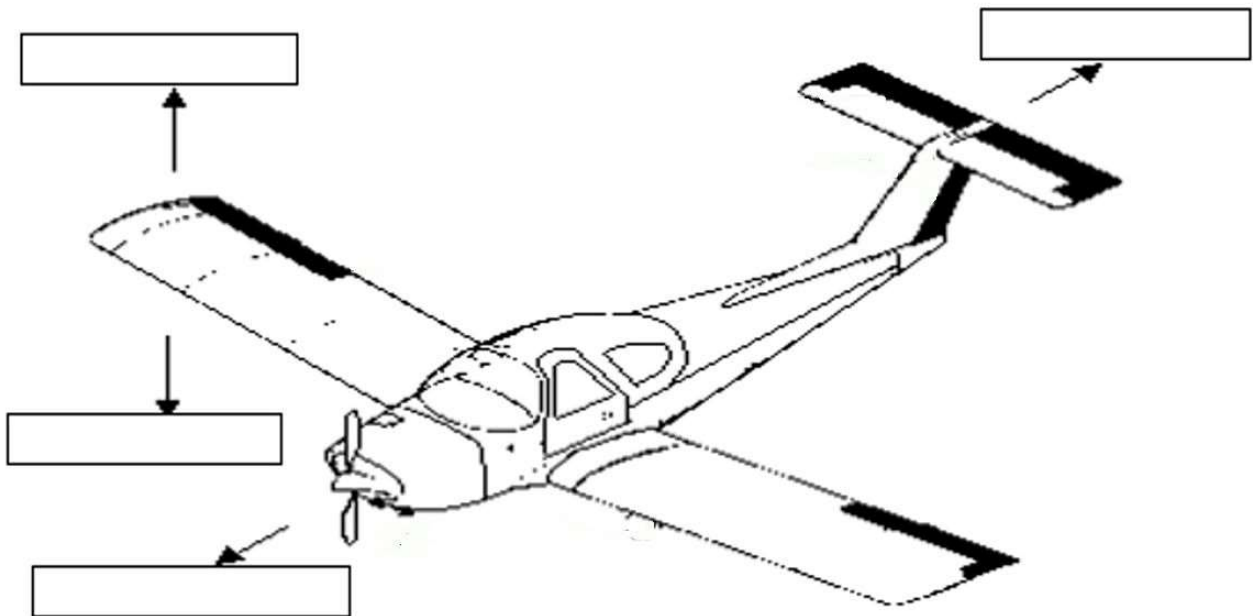
Explain the operation of piston, turboprop, and jet engines.

Piston:

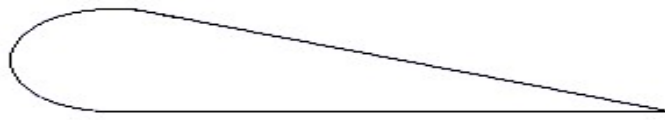
Turboprop:

Jet:

b. Point out on a model airplane the forces that act on an airplane in flight.



- c. Explain how an airfoil generates lift, how the primary control surfaces (ailerons, elevators, and rudder) affect the airplane's attitude, and how a propeller produces thrust.



Airfoil:	<hr/> <hr/> <hr/> <hr/> <hr/> <hr/> <hr/> <hr/>
Ailerons:	<hr/> <hr/> <hr/> <hr/> <hr/> <hr/> <hr/> <hr/>
Elevators:	<hr/> <hr/> <hr/> <hr/> <hr/> <hr/> <hr/> <hr/>
Rudder:	<hr/> <hr/> <hr/> <hr/> <hr/> <hr/> <hr/> <hr/>
Propeller:	<hr/> <hr/> <hr/> <hr/> <hr/> <hr/> <hr/> <hr/>

- d. Demonstrate how the control surfaces of an airplane are used for takeoff, straight climb, level turn, climbing turn, descending turn, straight descent, and landing.

	Ailerons	Elevators	Rudder	Flaps
Takeoff				
Straight climb				
Level turn				
Climbing turn				
Descending turn				
Straight descent				
Landing				

- e. Explain the following: the sport pilot, the recreational pilot and the private pilot certificates; the instrument rating.

Sport pilot certificate	
Recreational pilot certificate:	
Private pilot certificate:	

Altimeter:

Airspeed indicator:

Turn and bank indicator:

Vertical speed indicator:

Compass:

Navigation (GPS and VOR):

Communication radios:

Tachometer:

Oil pressure gauge:

Oil temperature gauge:

- f. Create an original poster of an aircraft instrument panel. Include and identify the instruments and radios discussed in requirement 2e.

3. Do ONE of the following:

- a. Build and fly a fuel-driven or battery powered electric model airplane. Describe safety rules for building and flying model airplanes.

Tell safety rules for use of glue, paint, dope, plastics, fuel, and battery pack.

- b. Build a model FPG-9. Get others in your troop or patrol to make their own model, then organize a competition to test the precision of flight and landing of the models.

4. Do ONE of the following:

- a. Visit an airport. After the visit, report on how the facilities are used, how runways are numbered, and how runways are determined to be "active."

How the facilities are used

How runways are numbered,

How runways are determined to be "active."

- b. Visit a Federal Aviation Administration facility - a control tower, terminal radar control facility, air route traffic control center, or Flight Standards District Office. (Phone directory listings are under U.S. Government Offices, Transportation Department, and Federal Aviation Administration. Call in advance.)

Report on the operation and your impressions of the facility.

- c. Visit an aviation museum or attend an air show.

Report on your impressions of the museum or show.

5. Find out about three career opportunities in aviation.

1.	
2.	
3.	

Pick one and find out the education, training, and experience required for this profession. _____

Education:

Training:

Experience:

Discuss this with your counselor, and explain why this profession might interest you.

When working on merit badges, Scouts and Scouters should be aware of some vital information in the current edition of the *Guide to Advancement* (BSA publication 33088). Important excerpts from that publication can be downloaded from <http://usscouts.org/advance/docs/GTA-Excerpts-meritbadges.pdf>. You can download a complete copy of the *Guide to Advancement* from <http://www.scouting.org/filestore/pdf/33088.pdf>.