Weekly Academic Review *Week 17*
How Does an Airplane Fly?

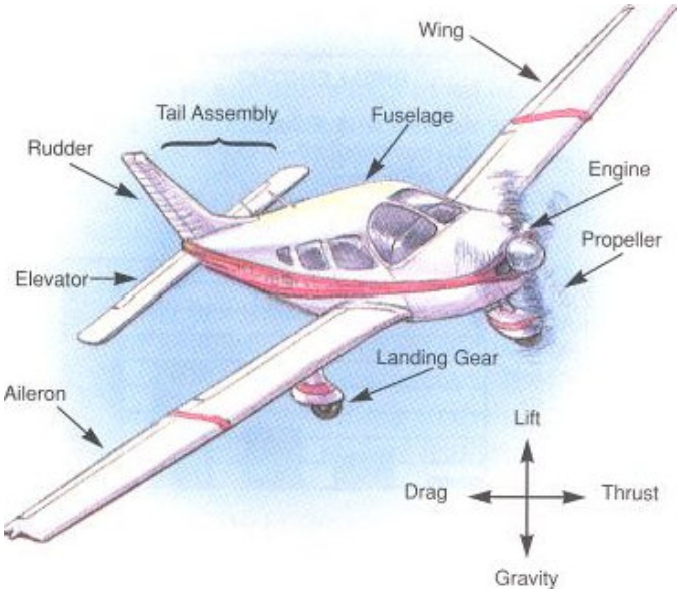
Read to find out how a plane is able to get off the ground. Mark the location of the answers on any question that labels which paragraph the answer can be found.

1 One Friday Pat was invited to a career day at her niece's middle school in South Bend. Pat was lucky enough to be able to arrange her flight schedule to be there. Her job was to talk to a class of sixth and seventh graders about what it was like to be a pilot. After giving a short speech, she asked for questions.

2 Surprisingly, the students didn't have any questions. They were all ears, though, when one of the teachers asked about flying. "Can you tell me how planes that weigh several tons are able to get off the ground?" Ms. Rynex asked.

3 "Well," Pat answered, "I had been flying for some time before I really understood it myself. All I knew was that if I drove down the runway fast enough and used the controls, the plane would lift. But the secret of flying is really simple. The trick is to weaken the pull of gravity on the aircraft.

4 "To understand how it can fly," Pat continued, "you need to know the parts of an airplane." As she spoke, Pat drew an airplane model on the chalkboard. "Like a bird, a plane has wings, or airfoils, and a body, or fuselage. It also has a tail assembly and landing gear. A plane is powered by jet engines or one or more engines that spin propellers. The engines and propellers can be in the front or back of the fuselage or in the wings.



5 "In order for a plane to fly, there are two sets of physical forces to counteract," Pat explained further. "It's sort of like two games of tug of war. On the end of one rope is *drag,* the force you feel pushing against you when you ride a bicycle. On the other end of that rope is *thrust.* Thrust is the force created by the plane's engines that moves the plane forward. To move forward, the thrust team must be stronger than the drag team.

6 "In the other game of tug of war, one end of the rope is *gravity,* the force that pulls things downward toward the earth. The other end of that rope is what we call *lift,* which does exactly what it says: it lifts the airplane off the ground.

7 "The wings of a plane are carefully designed to create lift. If you observe them, you'll notice that like bird wings, they are curved on top. When the plane moves forward, the air falls down the curved top of the wing. The air pressure below the wing tries to push it back up. Because the wing is in the way, this upward pressure lifts the wing instead.

8 "As the plane moves down the runway, the wing creates more lift. Finally the lift is greater than the force of gravity. Heavier planes must travel faster for a longer distance to create enough lift to enable them to get off the ground.

9 "Well," Pat concluded, "I think it all may sound more confusing than it really is. After being a pilot for several years, this knowledge has become second nature to me. Any more questions?"

Knowing the Words

Write the words from the story that have the meanings below.

1. surfaces designed to lift a plane _____ (Par. 4)
2. devices with revolving blades used to move a boat or plane _____ (Par. 4)
3. go against _____ (Par. 5)
4. air pressure making a plane rise _____ (Par. 6)
5. allow _____ (Par. 8)

6. Check the sentence in which *drag* has the same meaning as in paragraph 5.

_____The minutes will drag until dinner.
_____The drag on the car forced the engine to work harder.
_____Can the horses drag the tractor out of the snowdrift?

7. Check the sentence in which *thrust* has the same meaning as in paragraph 5. **8.**

_____Spot thrust his way out the door.
_____I thrust the pin into the balloon.
_____The propeller created enough thrust to get the boat off the sandbar.

Working with Words

The suffix **-ward** means "in the direction of." Write the words from the story that have the suffix **-ward** and that are formed from these base words.

1. fore _____ (Par. 5)
2. down _____ (Par. 6)
3. to _____ (Par. 6)
4. up _____ (Par. 7)

Reading and Thinking

Write the word that best completes each sentence.

1. Gravity and drag are natural, _____ forces.
   adjoining hazardous physical

2. Air _____ creates lift.
   capacity pressure maneuver

3. The pilot increased engine power to create more _____.
   drag gravity thrust

Write **B** before statements that describe birds, write **P** before statements that describe planes, and write **B/P** before statements that describe both.

4. _____ They have curved wings.
5. _____ They have feathers.
6. _____ They have propellers.
7. _____ They have engines.
8. _____ They use lift and thrust to oppose gravity and drag.

Learning to Study

Different references provide different types of information. Write the name of the best reference to find each piece of information.

atlas almanac newspaper
dictionary encyclopedia

1. how an airplane flies _____
2. definition of airfoil _____
3. map of Washington, D.C. _____
4. facts about airport sizes _____
5. weather forecast _____