National Aeronautics and Space Administration

World Flyers

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Lesson 6: World Flyers

Although not all children have flown on an airplane before, this lesson helps students to see that airplanes transport more than just people. The focus story of this lesson is *Planes Fly*!, and it uses simple rhyming to help children understand the segments of a typical passenger flight from check-in and takeoff to landing, as well as the various types of aircraft (jets, fire-fighting planes, and sea planes), and type of cargo carried by planes (live animals and food). While learning about where planes travel, children will learn about **geography** and map-making with a very conceptual approach to learning Euclidean and spherical **geometry**.

Focus Storybook

Planes Fly!

Learning Goals

Language	• Vocabulary: airplane, pilot, and takeoff. • Writing: Practice writing the letters "A," "P," and "T."
Math	• Convert a spherical surface into a flat surface (as in the map-making process) to determine the most accurate type of flat-map projection of the globe.
Science / Engineering	• Identify the seven continents.
Art	• Identify and match the colors of beads to their continents on a color-coded world map. • Make a tissue paper flower to give to a friend.
Fine Motor Skills	• Separate individual tissue papers to fluff up a paper flower.

Key Q's

What materials are needed to make a good kite? What is lift?

Materials

Items shipped by air cargo (fresh flowers, fresh fruit, empty medicine bottles, foreign souvenirs, etc.)

World map print-out

Beads

Globe

Oranges or other spherical citrus fruit

Map projections sheet

Resources

High Flyers e-Book

Reading: Planes Fly!

Read the story *Planes Fly*! Engage listeners with the following activities:

- Have children share their own experiences of being on an airplane.
- Encourage children to act out some of the scenes, such as putting on their seatbelt, looking out the window, taking a nap, etc.
- Have children identify the USES of airplanes. *Airplanes are often used to carry cargo (commercial items, mail, etc.), to dust crops, to fight fires, and for personal transportation.*
- Have children identify the PRODUCTS that get shipped by air cargo in the story. *In the story, lobsters, horses, and people are all shown being transported by airplanes.*
- Have students work through the "T: Takoff" worksheet provided by the NASA High Flyers Alphabet Activity book after reading *Planes Fly!*

Science / Engineering: Book-Based Activities

Application Activity: Air Cargo

Airplanes bring us so many things that we could not typically get otherwise, including fresh fruits and flowers out of season, seafood, live animals, medicines, and human organs for transplant, among many other perishable and season-sensitive items. Perhaps most importantly, airplanes bring us closer to people and places we would likely never meet.

In this activity, children will learn about the many objects that are shipped to us by air, as well as the names and locations of the seven continents.

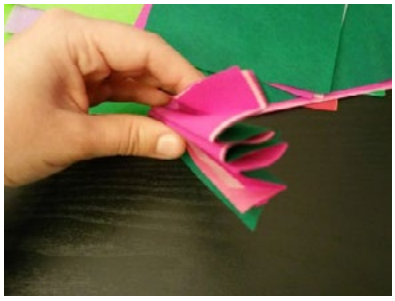
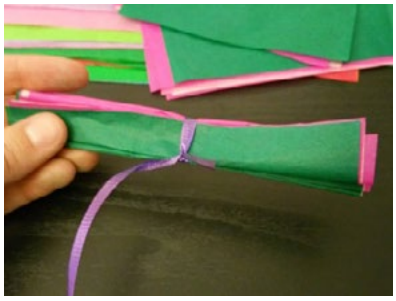
- Provide each child with a printout of a colorful world map divided up by continent.
- Give each child seven small beads (if possible, in color-coordination of the continents on the map).
- Show each child an object that comes from each continent. If necessary, show images of things that might get shipped by air (see the examples listed below number 2).
- As the object's continent of origin is listed, ask students to place a matching bead on the continent (identify the continent both by its name and its color).
- Allow students to count the number of continents that have beads placed on them after each object is listed.

1. Provide each student (or small group of students) with a map of the continents and seven beads or small objects (buttons, etc.).

2. Show students – one at a time – examples of items that have been imported by aircraft. Depending upon the age, ask students to guess where the object came from. Besides souvenirs from international travel, the following are some examples of items that can be displayed:
   a. North America – any U.S.-made items, preferably perishable or time-sensitive items that are likely to have been flown in an aircraft.
   b. South America – fruits/vegetables, coffee, flowers
   c. Europe – chocolates, specialty foods, flowers
   d. Asia – clothing, specialty foods
   e. Africa – diamonds (i.e. wedding bands), flowers
   f. Australia – diamonds

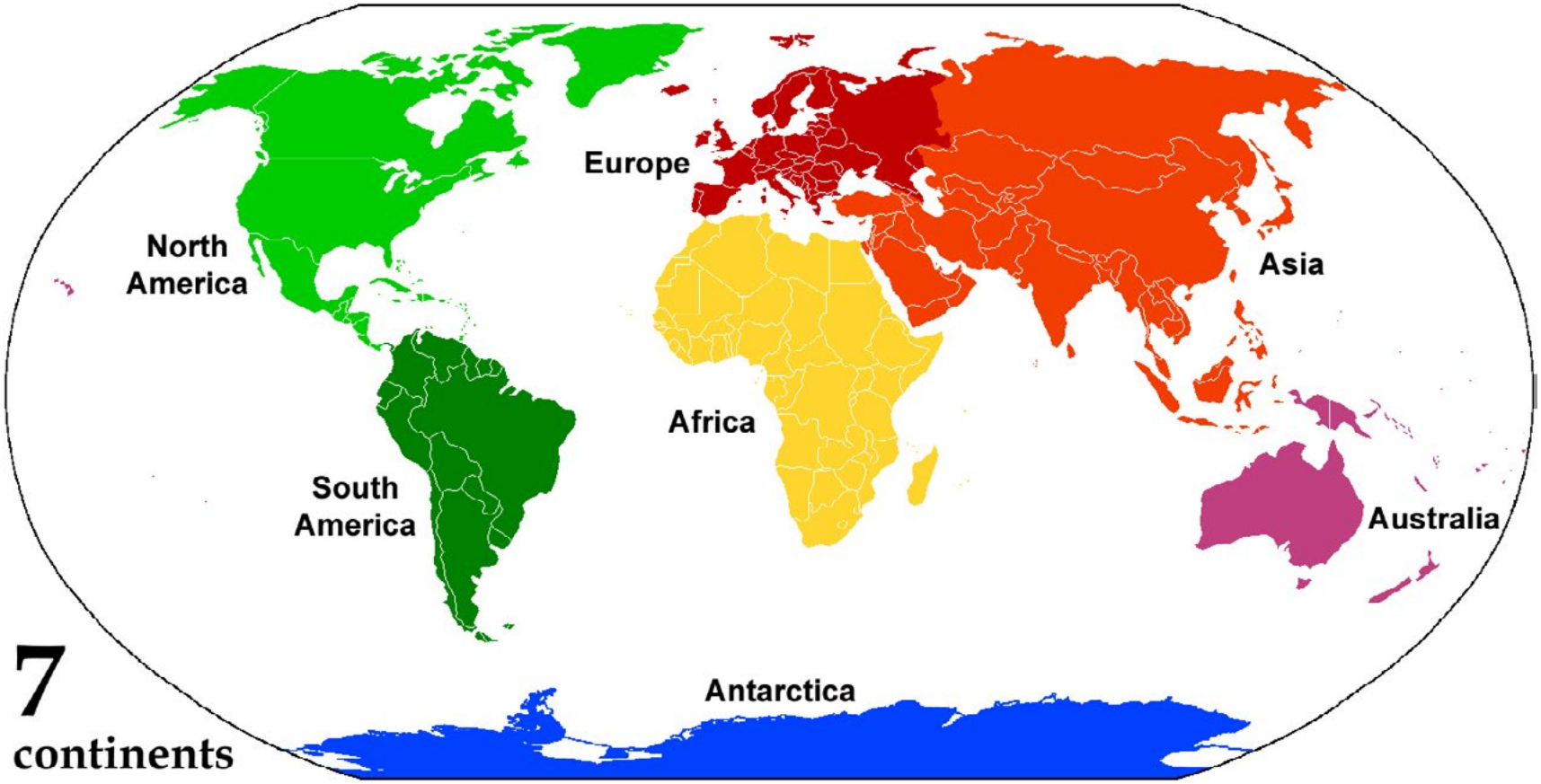
3. As the nation or continent of origin is identified, ask students to identify the continent by placing a bead or small marker object on the map. Help younger students to identify the continents by referring to both the continent name as well as the color of the continent on the map.

4. Flowers are one of the most internationally transported perishable items. Explain to students that they will be making tissue paper flowers to attach to a card that they can give to a friend or family member to help them to share what they learned about the importance of air cargo.
5. Cut out tissue-paper squares that are approximately 4" x 4". Stack approximately 5-7 tissue paper squares one on top of the other. (If appropriate, prepare these squares in advance).
6. Fold the tissue paper back and forth multiple times in a folded-fan pattern.
7. Use a piece of ribbon to hold the folds together by tying it tightly in the middle.
8. Use scissors to scallop the edges of the folds to give the paper the appearance of petals.
9. Carefully unfold the folds.
10. Delicately separate each tissue paper layer and fluff it up until it has been made into the shape of a flower.
11. Use ribbon to attach the tissue paper flower to a car printed on cardstock.



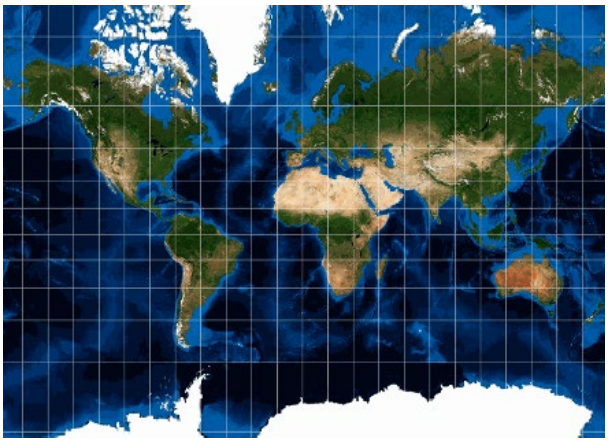

Flower photo image credit: Tricia Carzoli

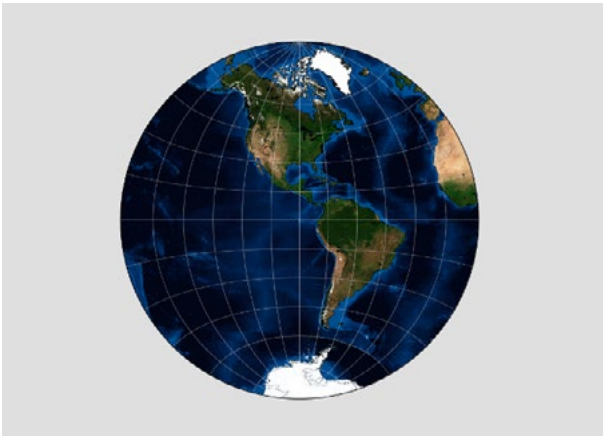


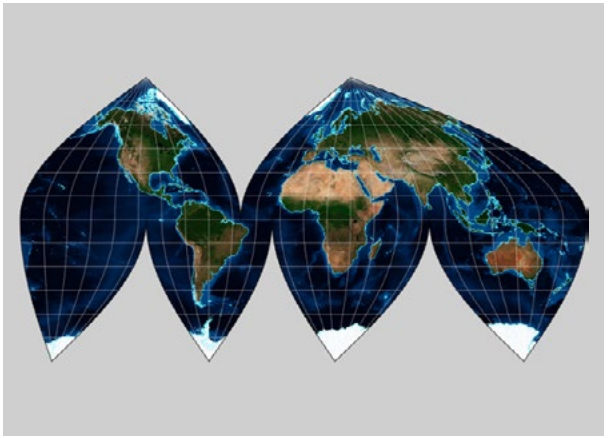
7
continents

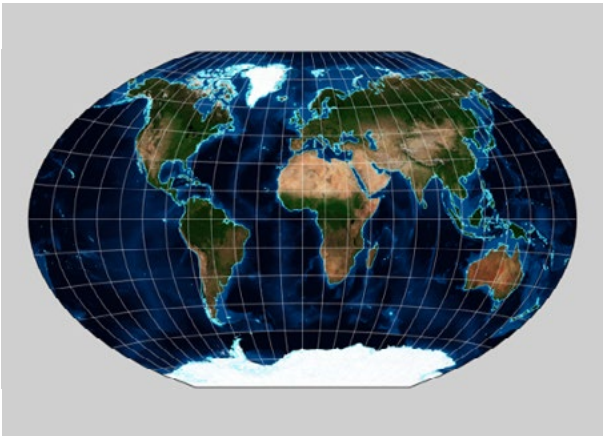
Inquiry Lab: Round Globe, Flat Map

By pre-school age, most children are aware that the Earth is round, like a ball. (If possible, consider providing children with a small globe). However, maps of the Earth are flat! Show children the following four maps, and ask them which map they think is best to represent the Earth on which we live. Many children will choose the Airy Projection because it is round, like the globe. However, help them to see that there are some important parts missing (the entire Eastern hemisphere!)









1. To find out which type of flat map is actually best for representing the whole spherical Earth, give each student or student group a single orange. (Oranges with thick skins that do not easily tear are best for this activity). Optionally, allow students to draw a map of their design on the orange.

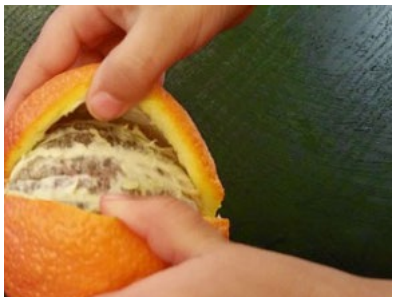
2. Using a butter knife, help students to cut a vertical slit in the orange from the top to the bottom.

3. Ask students to flatten their spherical maps. This can be accomplished by carefully peeling the skin of the orange using a butter knife to make sections. Students should notice that a curved surface cannot be flattened on its own. The orange peel can be carefully flattened, but it is expected that the peel will rip.

4 Once students have flattened their peels, ask them to notice where most of the cutting or ripping had to occur, and in which direction. Students should find that most of the cuts or rips occurred near the top and bottom ends of the map, going vertically. (Caution: This is not true if the incision in the globe goes along its "equator," rather than across it).

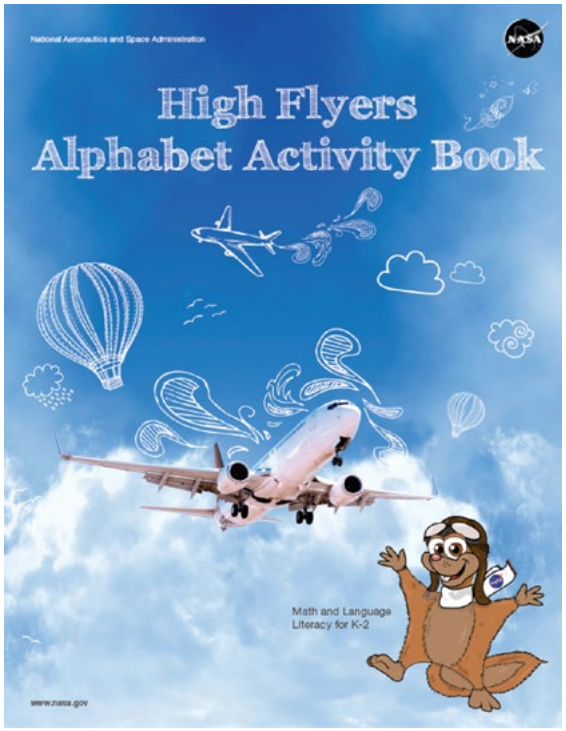
5. Ask students to compare their flattened peels to the maps first introduced to them.

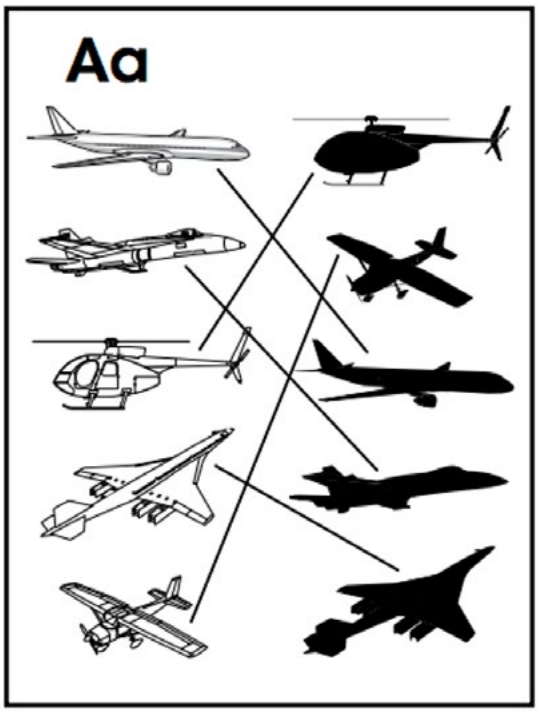
6. Ask students to now choose which map they think is best for representing the spherical globe on a flat map. Most students will see that the circular map is not at all the best choice, nor, for that matter, the common rectangular map. A sinusoidal map is actually best, because it represents the rips and tears that are experienced by taking a spherical shell and flattening it.

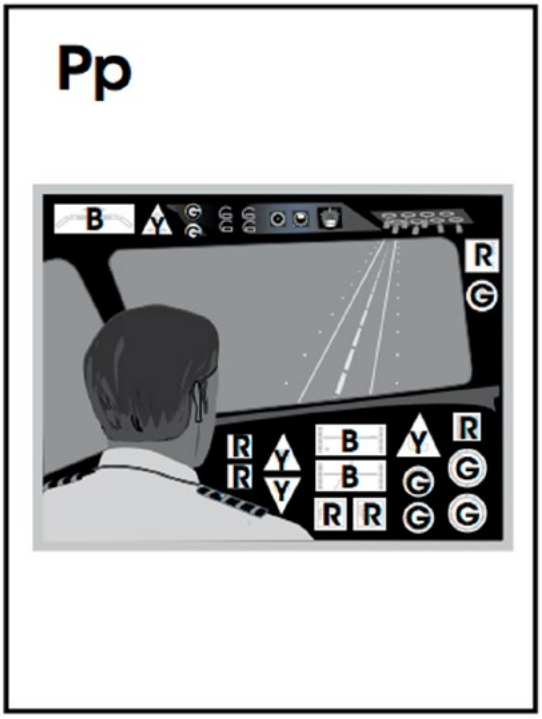



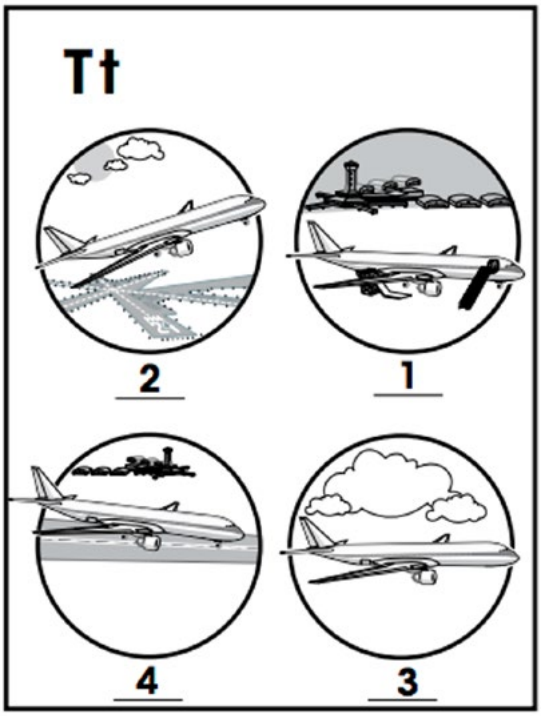

Writing: “A,” AND “P,” AND “T.”

Practice writing the letters A, P, and T. Use NASA’s High Flyers Alphabet Activity Book.





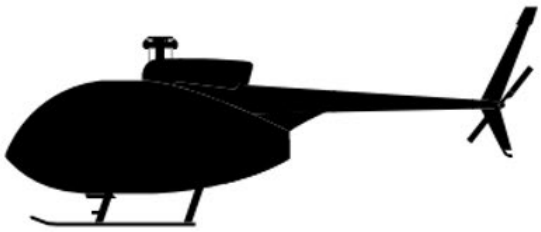


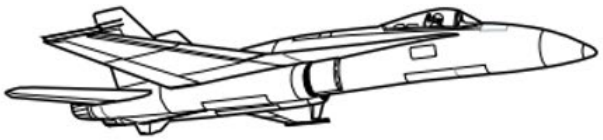


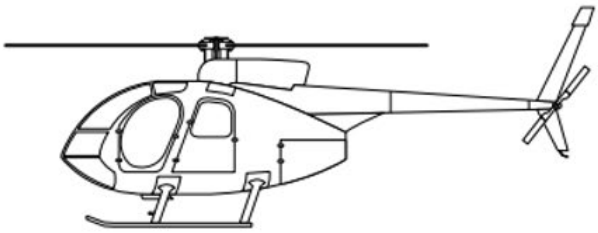
Aa Aa

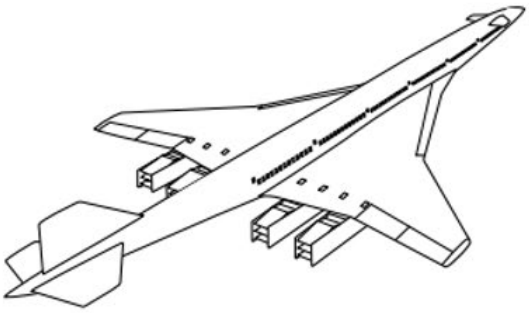
aircraft

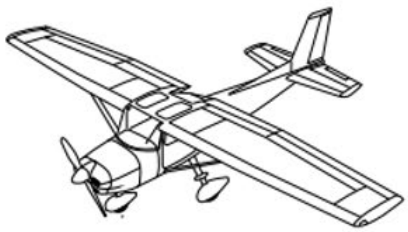
Draw a line to match each **aircraft** to its shadow.











Pp Pp

pilot

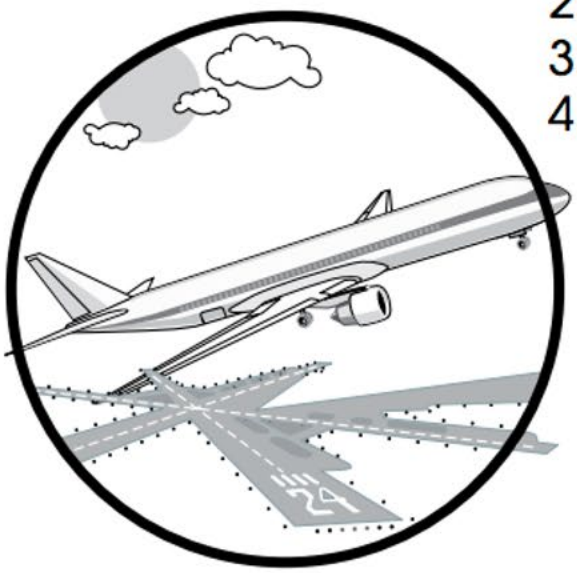
A **pilot** uses instruments in the cockpit to fly. Color the circles green, the squares red, the triangles yellow, and the rectangles blue.

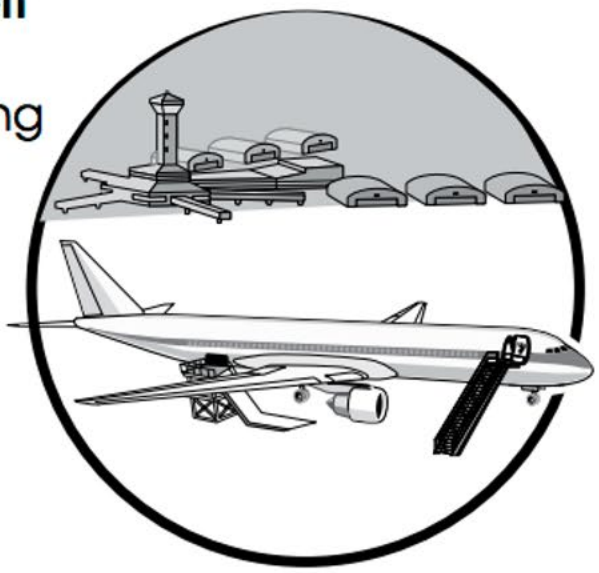
Tt

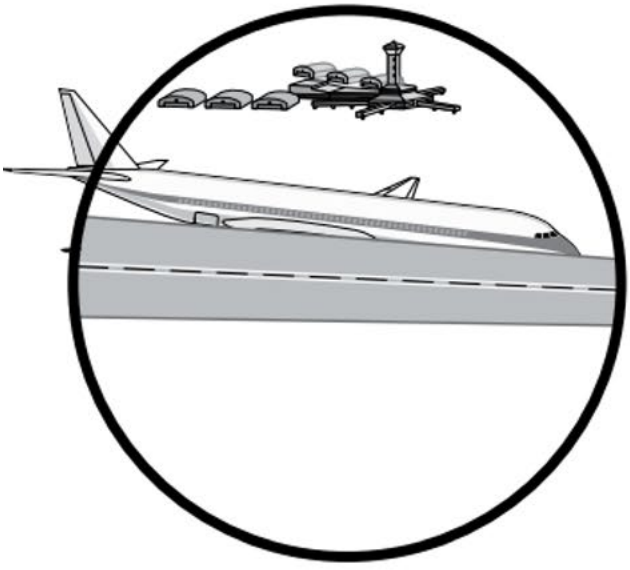
takeoff

Write the number under the matching picture.

1. Loading
2. **Takeoff**
3. Flying
4. Landing







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