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Gordon Gore Photo

How can an aircraft (or this glider, photographed at a Kamloops Airshow decades ago) fly upside down? According to explanations we have been given (and shared naively) for years it should not be possible. Even the typical aerofoil with its curved upper surface is not needed to achieve lift. Notice that the pilot of this inverted glider is keeping the leading edge of his wings tilted slightly upward, so that the air through which the craft moves is deflected downward.

Gordon Gore Photos

Left: Four members of the Snowbirds perform at an airshow in Kamloops (c2002). Notice that two of the jets are upside down. Imagine the skill required to achieve and maintain this formation!
Right: Wings of this very high-speed military jet are relatively flat. To achieve lift, the wing surfaces must be tilted slightly upward so that as the wings slice through the air, they deflect air downward. As the air is deflected downward, the air exerts a reaction force upward on the wings, causing lift. Air deflected above the wing also contributes to lift. Air travelling immediately above the wing is 'spread out' and pressure immediately above the wing is therefore lowered. Higher (normal) air pressure further above pushes the streamed air downward above and behind the wing. The overall effect is that air through which the wing passes is forced downward. The reaction force (Newton's Third Law) is the upward force the air exerts on the wing (called **lift**).
According to recent explanations, lower pressure immediately above the wing causes higher air velocity in the space above, not the reverse (as is claimed by traditional 'Bernoulli' explanations.)

The propellers of a helicopter are really rotating wings that slice through the air, deflecting air downward. The reaction force of air on the wings creates lift.

Gordon Gore Photo

The clearest explanation of lift that I could find was **AIRPLANES,** by **Chris Woodward** (updated June 16 2019). Search **"Explain That Stuff! AIRPLANES" by Chris Woodward**. He explains clearly not only LIFT but other factors involving flight. Also look **at "How Wings ACTUALLY Create Lift-YouTube"**

From the Kamloops News Advertiser Wednesday April 7 1971

Staff Photo by Lou Armstrong

Text from the Front Page: Here's the WW1 Flying Ace…

"Five! Four! Three! Two! One! Contact" was the cry as a mob of boys, dressed in clothes similar to those worn by World War One flying aces, charged down the playing field of the Rayleigh school yesterday, hoisting a homemade glider over their heads.

For a brief moment Len Perry, a student at the school, hovered fifteen feet above a breathless crowd of students, before a gust of wind upended the frail craft. It came down with a splintering crash on one wing and the wind continued to buffet the light structure until it was completely upended.

But within minutes students had made repairs to the glider and were again hurtling down the field with hopes of catching a strong headwind that would again lift one of the boys into the blue.

Student teacher Paul Kipp originated the idea of building the glider. He had seen the construction described in an aircraft magazine and the boys in grades five and six art classes worked on its construction.

Mr Kipp has been an art and physical education teacher at the school since January and leaves at the end of the week.

"If anyone had told me a month ago that this thing would fly, I wouldn't have believed it," remarked school principal Ron Watts.

The boys flew the glider, constructed of wood, twine, plastic and cardboard, on Monday and Tuesday afternoons.

A cooperative effort, the 26-foot wings were built in four sections by different groups of boys before they were put together to form the completed aircraft which resembled a Wright Brothers type plane.

To get the glider off the ground the boys gripped the wings on the back edge and ran forward with it until aerodynamics caused it to lift skyward.

Editor's Note: I purchased this 1971 photo from the now-defunct newspaper because I was so impressed with (a) the photography and (b) the spectacular nature of the activity. I think the warning "Don't try this at home!" might be appropriate. However, all the kids survived this unforgettable experience.

BIG Little Science Centre Summer Camps

2020 summer camp registration open NOW

We will take registrations for each camp based on when we receive the completed registration form. Register now so you don't miss out. **NOTE: Due to the COVID-19 Pandemic Camp payment is not required at this time.** Payment will be due when we are able to reopen the Centre (and notify you) or on the first day of the Camp.
Please scan and email your completed registration form to the email address on the bottom of the last page of the form. Registration forms are available for download from the link in each camp description below.

Robotics Camp #1, July 06 to July 10, 9:00 am to 3:00 pm, Ages 9 and up: Cost $ 190.00: Registration Form - Here
Start exploring robotics in this hands-on summer camp. Participants will use Lego Mindstorms, Microbits and more to create their very own robot and complete awesome challenges.

Super Wow Nature Science Camp #1, July 13 to July 17, 9:00 am to 3:00 pm, Must have finished Kindergarten to Grade 3: Cost $ 190.00: Registration Form - Here
Enjoy hands-on science activities outside mixed with games, experiments, crafts and art with a nature focus. Active science learning allows a child's brain to discover the world around them while their body is busy. Fun STEAM (Science, Technology, Engineering, Art, and Math) science at its best.

STEM Camp, July 20 to July 24: Partially supported by TRU. 9:00 am to 3:00 pm. Ages 11 and up: Cost $ 100.00: Registration Form - Here
Want to push your understanding of science deeper? Join the BIG Little Science Centre in partnership with TRU to complete in-depth hands-on science experiments. The STEM Camp introduces science curriculum through fun, hands-on activities designed by Dr. Gordon R. Gore, the retired science teacher who started BLSC, and led by Thompson Rivers University (TRU) STEM teacher-candidates.

Super Wow Science Camp #2, July 27 to July 31, 9:00 am to 3:00 pm. Must have finished Kindergarten to Grade 3: Cost $ 190.00: Registration Form - Here
Enjoy hands-on science activities mixed with games, experiments, crafts and art. Active science learning allows a child's brain to discover the world around them while their body is busy. Fun STEAM (Science, Technology, Engineering, Art, and Math) science at its best.

Super Wow Nature Science Camp #3, August 10 to August 14, 9:00 am to 3:00 pm. Must have finished Kindergarten to Grade 3: Cost $ 190.00: Registration Form - Here
Enjoy hands-on science activities outside mixed with games, experiments, crafts and art with a nature focus. Active science learning allows a child's brain to discover the world around them while their body is busy. Fun STEAM (Science, Technology, Engineering, Art, and Math) science at its best.

BIG Little Science Centre Film School, August 17 to August 21, 9:00 am to 3:00 pm. Ages 10 and up: Cost $ 190.00: Registration Form - Here
Do you dream of seeing your name on the silver screen? Join us as participants become Directors, Script Writers, Actors and more all while learning the science and technology behind movie making. At the end of the week films will be screened at the Paramount Theatre.

Robotics Camp #2, August 24 to August 28, 9:00 am to 3:00 pm. Ages 9 and up: Cost $ 190.00: Registration Form - Here
Start exploring robotics in this hands-on summer camp. Participants will use Lego Mindstorms, Microbits and more to create their very own robot and complete awesome challenges.

Bursary Awards are available. For details, please contact the Science Centre at 250-554-2572.

Member Discount: BLSCS members receive a $10 discount per child per camp.

Consent Registration Form and payment are required on or before the registration deadline for each camp.
(**NOTE: Due to the COVID-19 Pandemic Camp payment is not required at this time.**Payment will be due when we are able to reopen the Centre (and notify you) or on the first day of the Camp)

NOTE:
Lunch or snacks are **not provided** at any of the camps. Campers must bring their own lunch and snacks.

Investigations You Can Do at Home

A Crushing Experience

You Will Need:
rubber kitchen gloves
1 empty 2-L pop bottle, with cap
hot and cold water taps
a sink

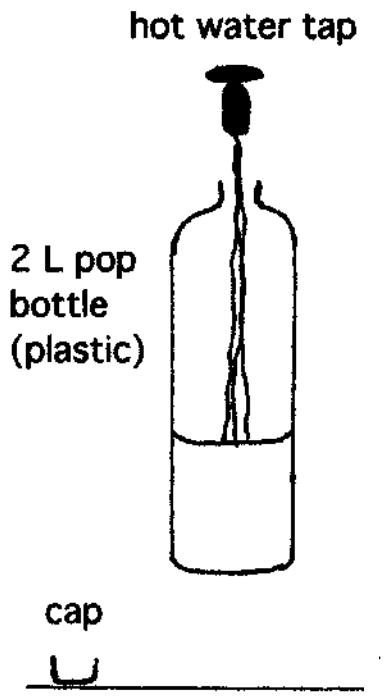


Figure 1

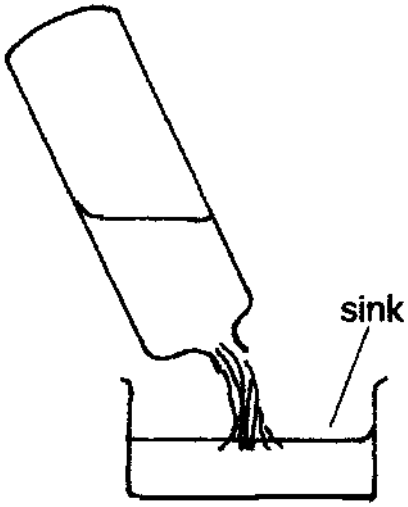


Figure 2

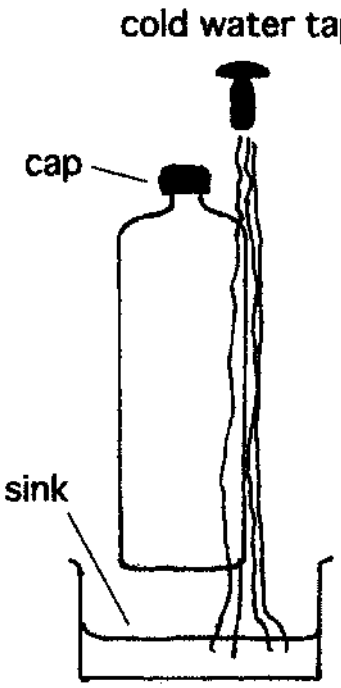


Figure 3

What to Do

1. Put on a pair of rubber kitchen gloves. (Tap water can be very hot!)
2. Fill a plastic pop bottle with hot water from the tap. (**Figure 1**)
3. Let the hot water sit in the bottle for a minute, and then pour it out into a sink. (**Figure 2**)
4. ***Immediately*** cap the empty bottle. ***Make sure the cap is on tight.***
5. Run cold water from a tap over the capped pop bottle. (**Figure 3**) What happens?
6. What happens to the pop bottle after it warms up? (This may take some time.)

When you pour out the hot water, the 'empty' bottle still contains water vapour. Cooling the sealed bottle by running cold water over it causes the water vapour to condense to liquid water, which occupies far less volume. This creates a partial vacuum inside the bottle. Air pressure outside the bottle crushes the bottle.

The ‘Magic’ Ice Cutter

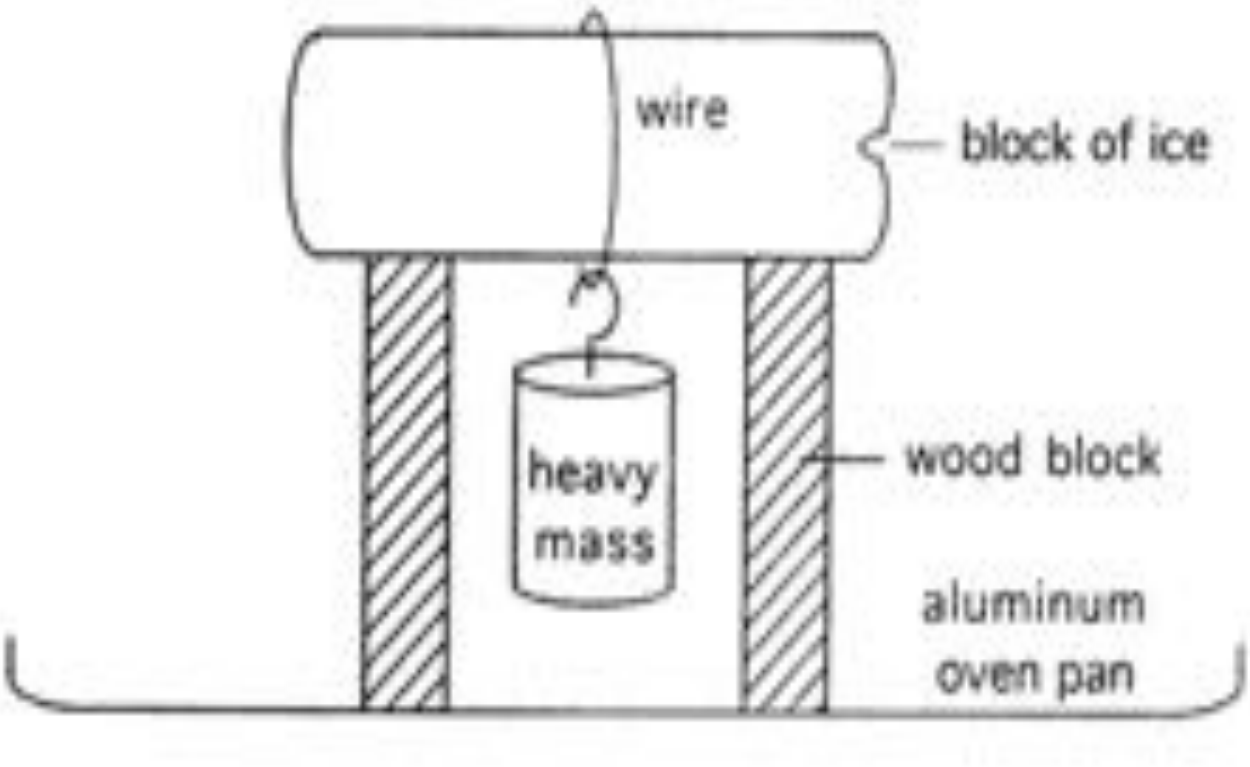


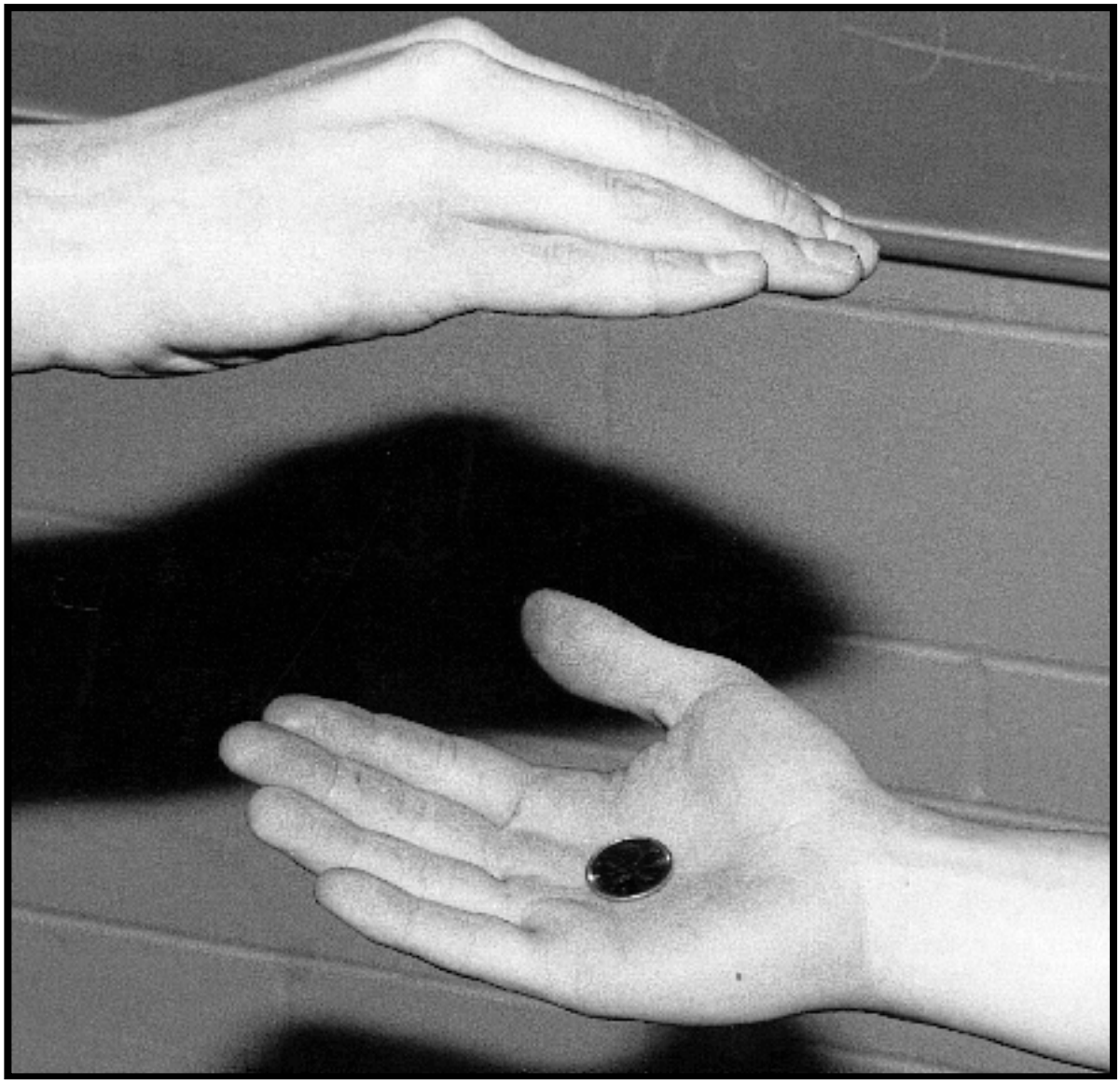
Figure 1

Try This Yourself!

1. Prepare a block of ice by filling a clean, used 1-litre milk carton with water and leaving it in the freezer overnight.
2. Mount the block of ice horizontally between two supports, in a manner similar to that in **Figure 1**.
3. Tie a thin piece of iron or brass wire around the block and hang a heavy object from the wire. Several kilograms of mass should be used.
4. Leave the heavy mass hanging on the wire as long as possible and observe what the wire does to the ice over a period of several hours.

A strong gravitational force pulls down the thin wire, so the wire exerts a high pressure on the ice below it. The high pressure has the effect of melting the ice below the wire. As soon as the wire passes through some ice, the water above the wire re-freezes, since the pressure is now ‘off’. This process is called **regelation**. Regelation occurs when a skate passes over a sheet of ice, and when you pack a snowball with pressure from your hands.

How Fast Can You React?



Challenge!

Your friend has a loonie sitting in the middle of the open palm of his hand. He says you can have the loonie if you can grab it out of his hand before he can pull away his hand. Can you do it?

Think Physics!

It is tempting to simply reach for the coin and try to grab it with your fingers. A faster way is to place your open hand above his, and quickly drop your hand down on his hand. The coin will tend to remain where it is (INERTIA!), so it will momentarily be in mid-air, in your own hand, and you can grab it!

Inertia and Your Seat Belt

Objects that have **mass** have a property we call **inertia**. Because of inertia, objects that are still, tend to remain still; objects that are moving tend to keep moving, at the same speed and in whatever direction they were moving. The more massive an object is, the more inertia it has. A school bus is harder to speed up, harder to slow down, and harder to turn around a corner than an ordinary car. This is because it has much more mass, and therefore much more inertia than an ordinary car.

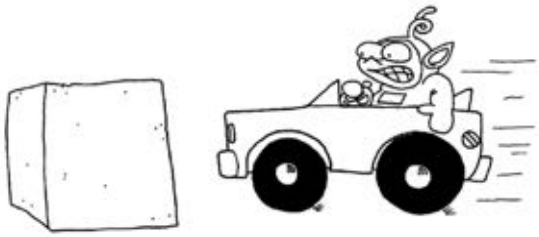


Figure 1

You Need

1 toy car with toy passengers
1 roll of masking tape

What to Do

1. Place a toy human figure on the front seat of an open toy car. This is your 'passenger'. (**Figure 1**.)
2. Let the car move forward at a steady speed. Does the passenger stay in place?
3. Place a heavy obstacle (a book?) in the path of the car so that the car comes to a very sudden stop.
4. When the car is brought to a sudden stop, what happens to the passenger?
5. Attach the passenger securely to the toy car with a 'seat belt', made of masking tape.
6. Let the car collide again with the heavy obstacle. What happens to the passenger this time?

Think About It!

1. When the toy car came to a sudden stop, what happened to the passenger with no seat belt?

2. If the toy car was a real car, and you were a passenger, how could you prevent this from happening to you?

3. Why is it a good idea to wear a seat belt when you are in a moving car?

When you wear a seat belt, you attach yourself to the car, which has much more inertia (mass) than you have. When subjected to a strong unexpected force, as in a collision, you will accelerate with the car instead of out of it.

This is a good time to explain why a driver should slow down when driving on icy roads. Many drivers think that because they can get up to high speed on icy roads, they can also stop quickly! Not so! With almost no friction between your tires and the road, the inertia of your vehicle will cause you to keep sliding no matter how hard or how often you press on the brakes, and no matter whether you have 4-wheel drive or 2-wheel drive!

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