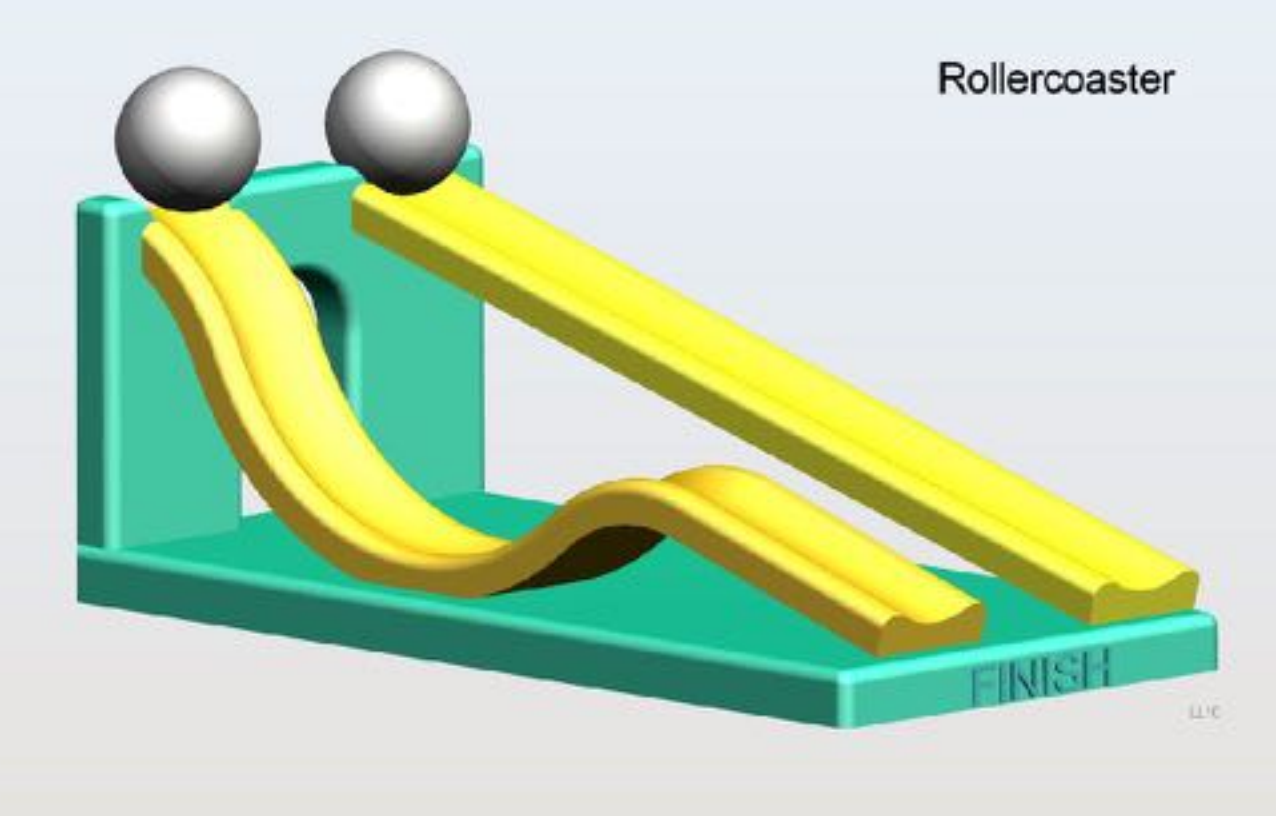
Technical riddles

A collection of technical riddles without answers.



Laurens van Lieshout

1st edition 2017

Introduction

In this paper, technical riddles without answers are presented.

Preface

From own experience I know finding the answers should not be too easy. *(The degree of enjoyment is proportional to the elapsed time.)* Therefore no answers are given.

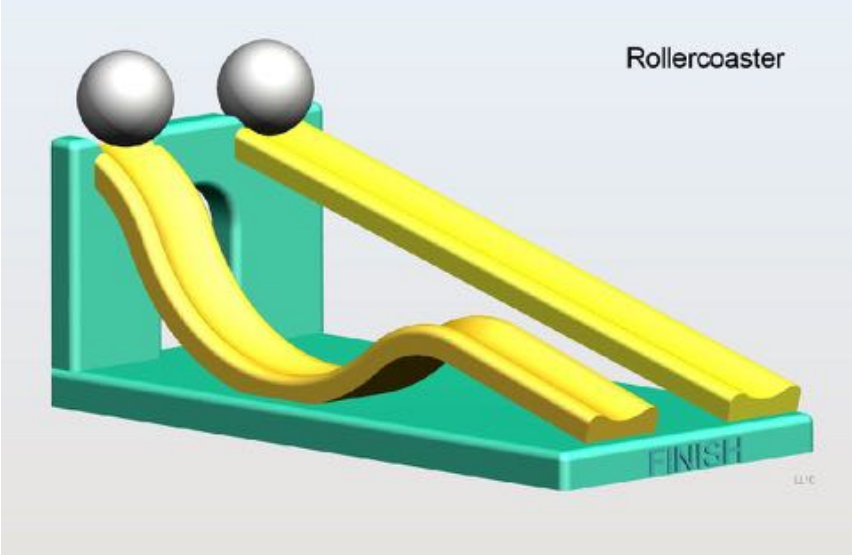
For the answers see the **EBUP book**: "**Technical riddles**" ISBN 9789463421195. In this book the riddles are in detail explained with many providing hyperlinks to resources for even more related subject.

Definition

Technical riddles are phenomenons that at first do not seem an logic explanation. To solve them you have to use your creativity and be able to think lateral.

Laurens van Lieshout 2017

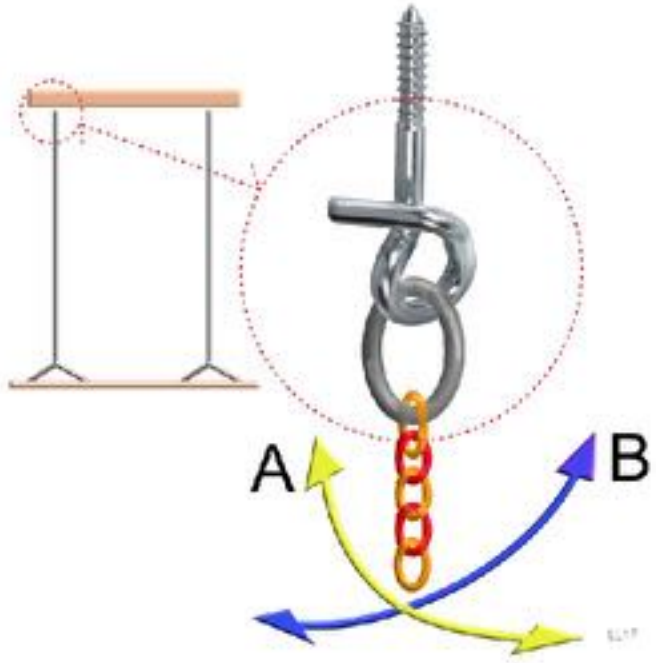
Rollercoaster



In the image you see a simplified rollercoaster. The steel balls have the same dimensions and the same mass. The only difference is the path the steel ball will follow.

The question for this technical riddle is as follows: Which ball will reach the Finish first?

Swing seat hook

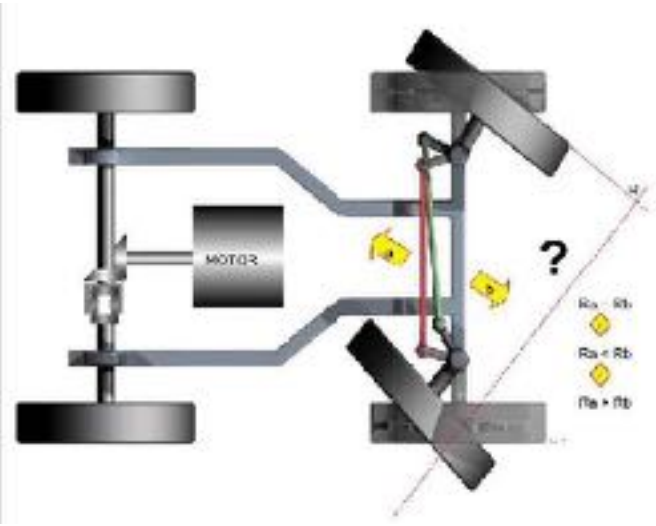


Suppose you need to mount a swing seat.

In the hardware store you have to buy two swing seat hooks. See picture.

In which position should the hook be mounted onto the beam to experience the minimum amount of wear. Is this in the A or B position?

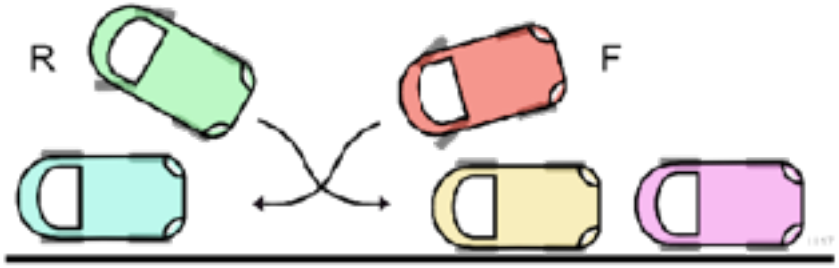
Ackermann steering principle.



In a vehicle the steering geometry is designed in such a way that both front wheels are using different trace circles with deferent radii but using the same point of origin. This principle is called the Ackerman geometry.

In a vehicle, are the front and rear turning circles equal if the vehicle in going forwards or backwards?

Parking



If you park a car in a small parking area you need to drive backward (rearward parking). Front parking is then impossible. Apparently there is a difference going forwards or going backwards.

Why is this?

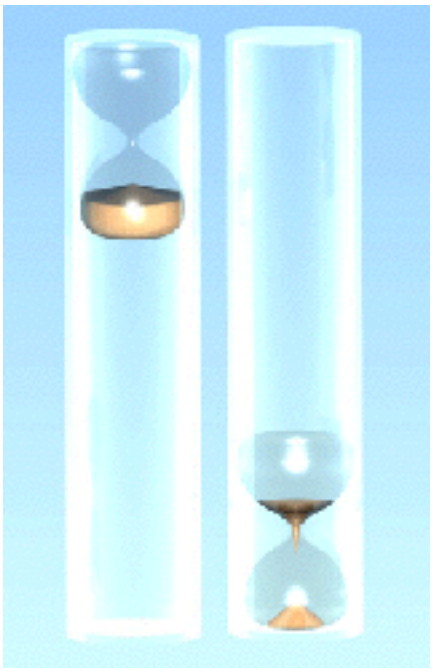
Space lift

To lift someone of 80 kg a force of (80 kg x 9.8 m/s2 =) 784 N is required.

To lift a person into space only a very small force is required.

Why is there no space elevator!

Hourglass



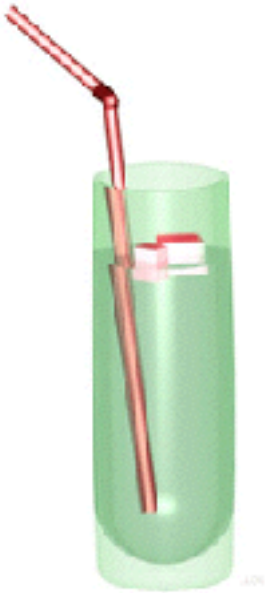
A closed cylinder is completely filled with water and inside the cylinder there is an hourglass floating at the top. Once the cylinder is rotated, the hourglass remains at the bottom for a while.

How is this possible? Why does it not immediately ascend the hourglass?

Candle

Can a candle, in an environment where is no gravity, (space ship) burn?

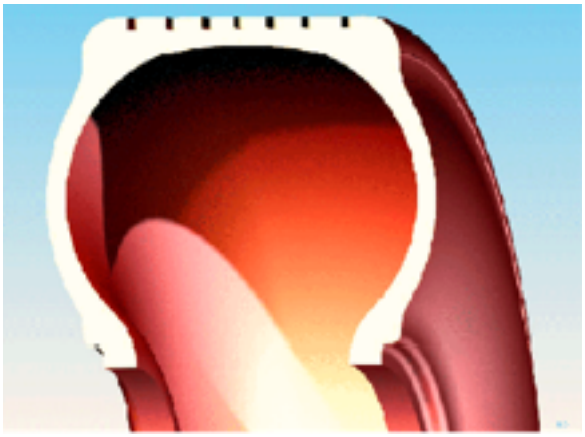
Water & Ice



Water has its greatest density at 4 ° C. Therefore ice floats on the water. Water is the only substance whose solid phase (ice) floats on the liquid phase (water)!

What would happen if ice would be heavier than water?

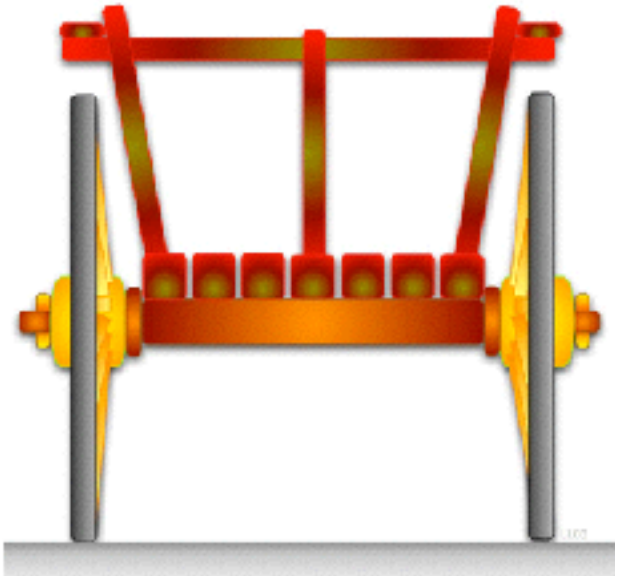
Rolling resistance



A wider tire has, at a constant tire pressure, a lower rolling resistance.

Why is this?

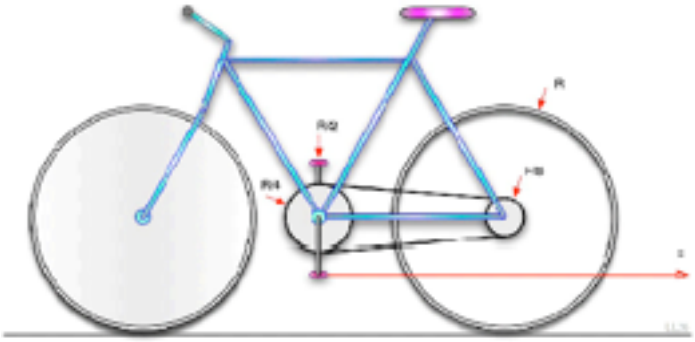
Horse car



On an horse cart the spokes are mounted asymmetrically in the wheel hub.

Why is this?

Bike



A rope is attached to a pedal of a bike. The pedal is put in the lowest position.

If you pull on the rope in the opposite driving direction of the bike, where will the bike go?

Balls

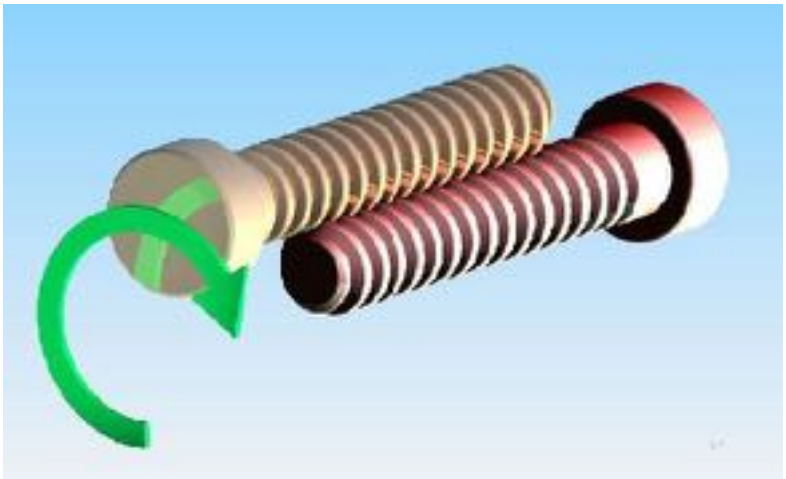
Given 3 balls.

Only the appearance and weight of the balls are exactly the same.

- Ball 1 is solid.
- Ball 2 is hollow.
- Ball 3 is filled with a liquid.

How can you determine without any tools what ball 1,2 and 3 is.

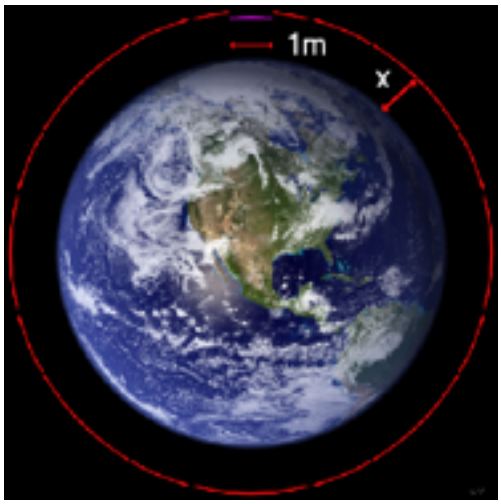
Bolts



Two identical bolts are placed together so that their helical grooves intermesh as shown in the figure. If you move the bolts around each other as you would twiddle your thumbs, holding each bolt firmly by the head so that it does not rotate and twiddling them in the direction shown.

Will the heads move inward, move outward, or remain the same distance from each other?

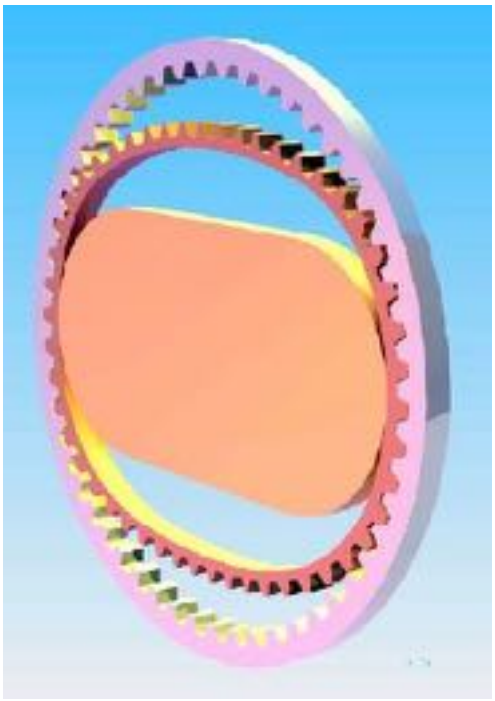
Rope



A rope is stretched around the earth.

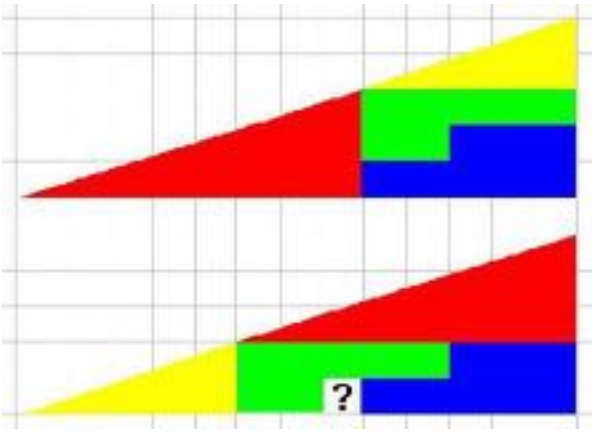
If the rope is extended by 1 meter, how much does the distance between the rope and the ground increase?

Harmonic drive



Can a "harmonic drive", with a difference of one tooth between the outside and the inner ring function?

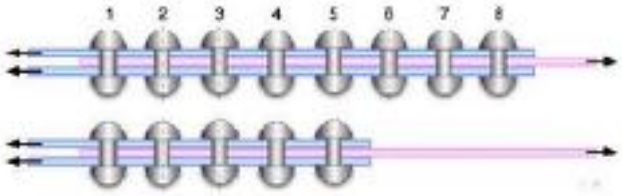
Wedge paradox



If the same triangles are arranged in a different way (see figure), a hole appears [?].

How is this possible?

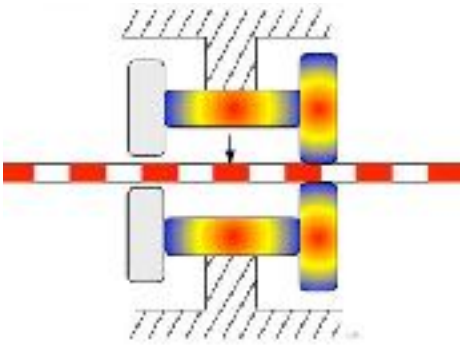
Rivet



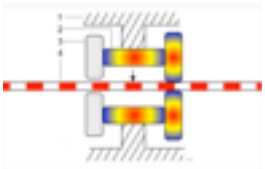
Which connection is stronger?

The connection with a row of 8 or the connection with a row of 5 rivets?

Piezoelectric motor



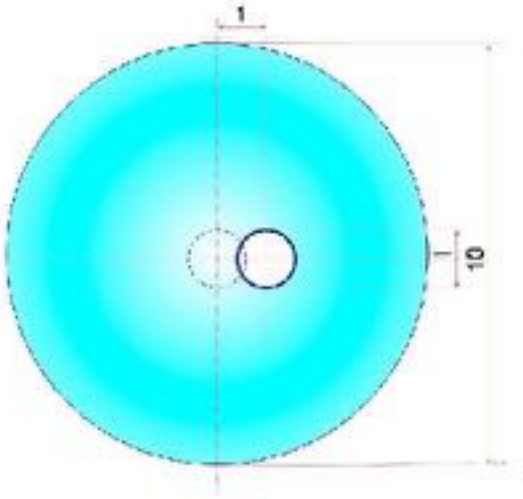
A piezoelectric motor or piezo motor is a type of electric motor based on the change in shape of a piezoelectric material when an electric field is applied. See animation.



Animation

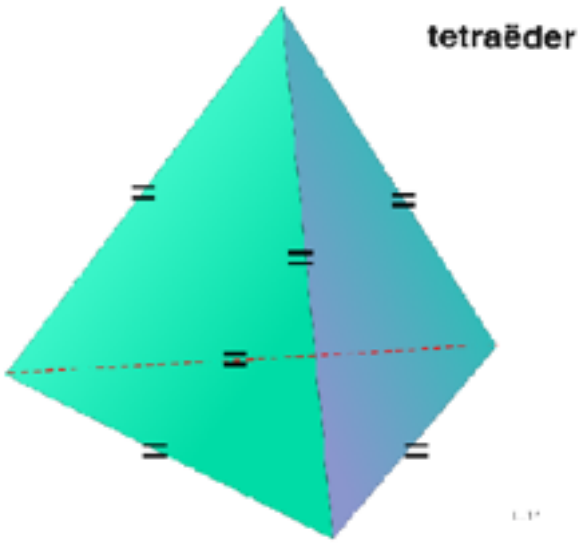
Which element is determining the maximum speed of a piezo motor?

Eccentric hole



In a wheel, an eccentric hole is present. How is it possible, to saw the wheel in only two pieces and glue it together, to re-position the hole exactly in the center of the wheel?

Constraining a tetraëder

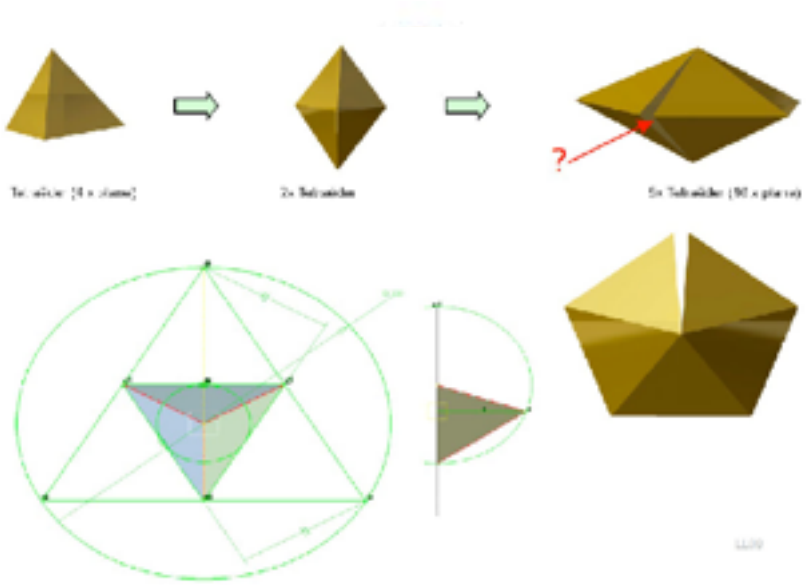


In a tetraëder (triangular pyramid) all sides are equal (=).

Is this tetraëder producible, in a solid modeling program, by using only one constraint*?

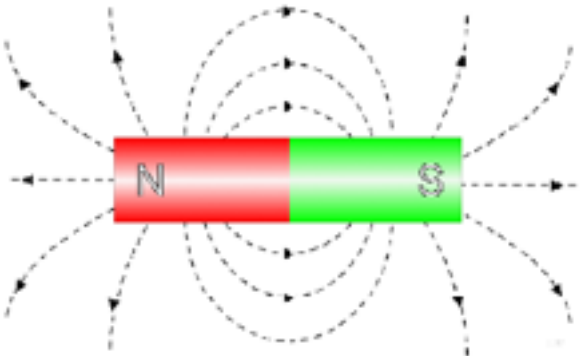
> **refers to demarcations of geometrical characteristics between two or more entities or solid modeling bodies.*

Ten faced shape



Why is a ten-level equal face shape not possible?

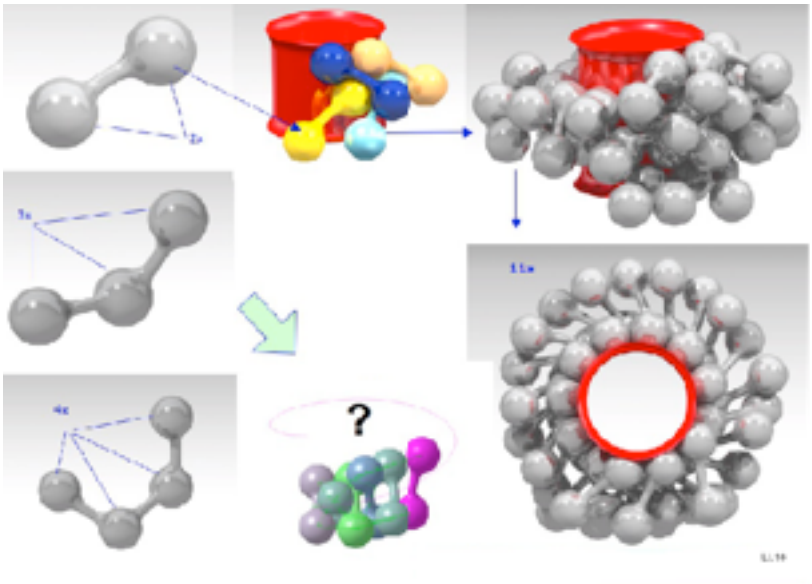
Magnet



Given two exactly equal looking bars. One bar is a magnet. The other bar is of a magnetizable material.

Is it possible to determine, without external tools, which bar is the magnet?

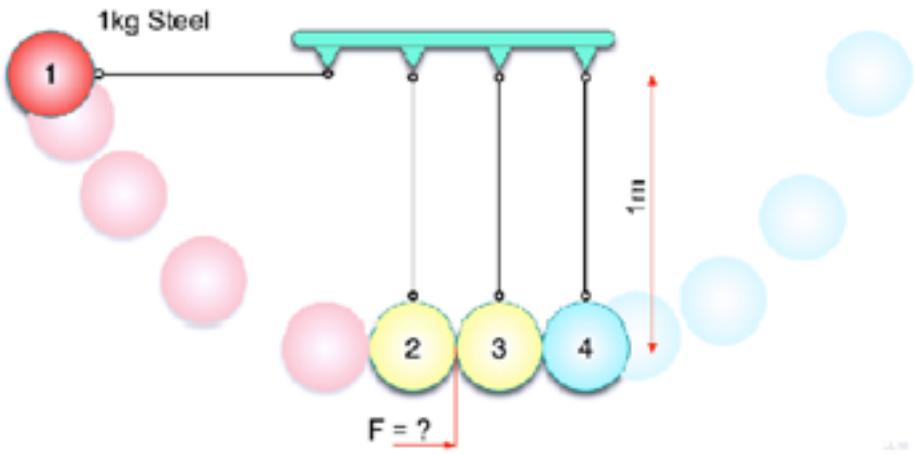
Molecular motor



In a moleculair motor a rotary element, made from proteins, is placed in an anchor-point. See the figure (artistic impression).

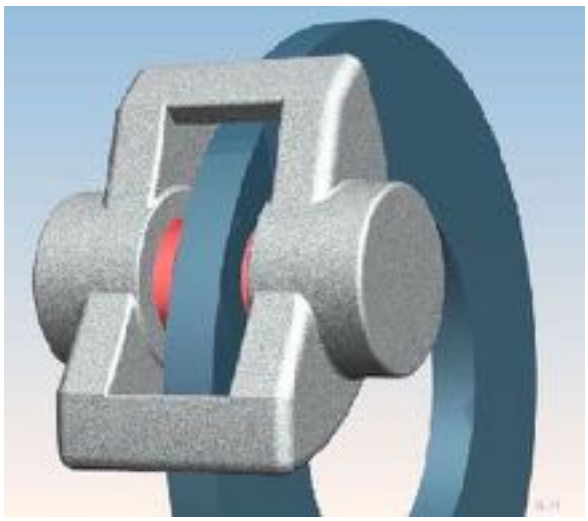
How does the mechanism work?

Newton’s cradle



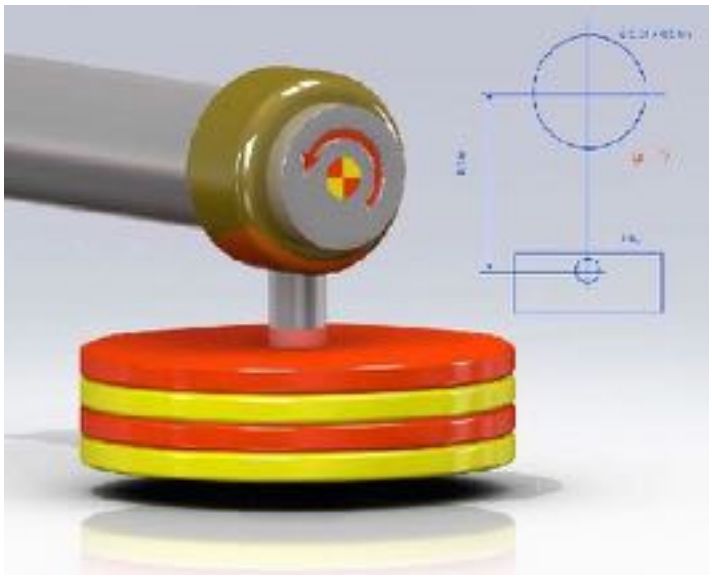
What is the acting force between the 2nd and 3rd balls?

Disc brake wear



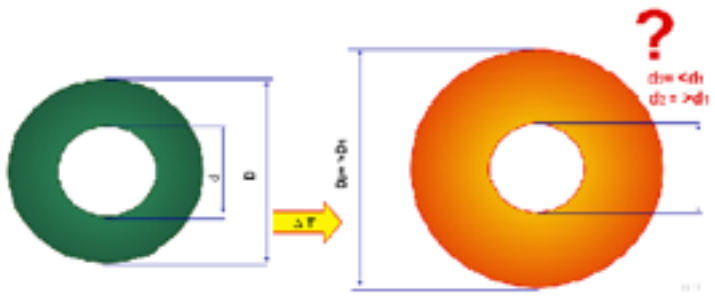
Does it make any difference, for the wearing of the wear-pads, if you brake hard or brake soft?

Stub axle friction



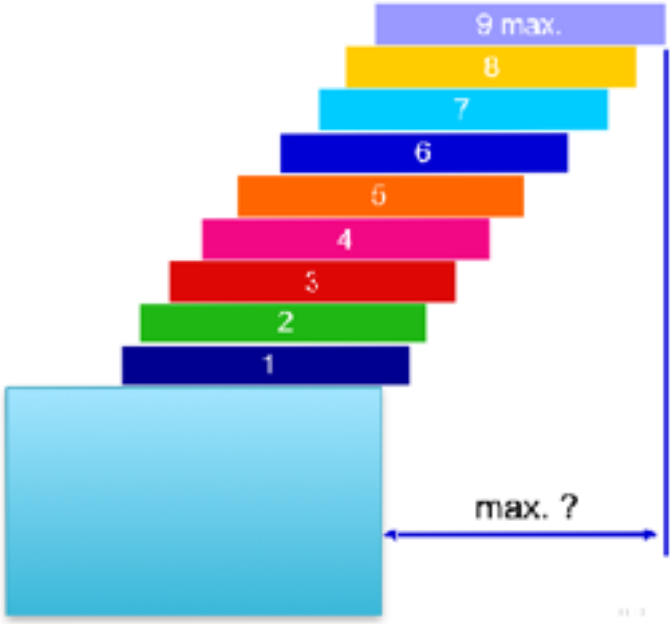
At what coefficient of friction does the counterweight always stay in position?

Washer



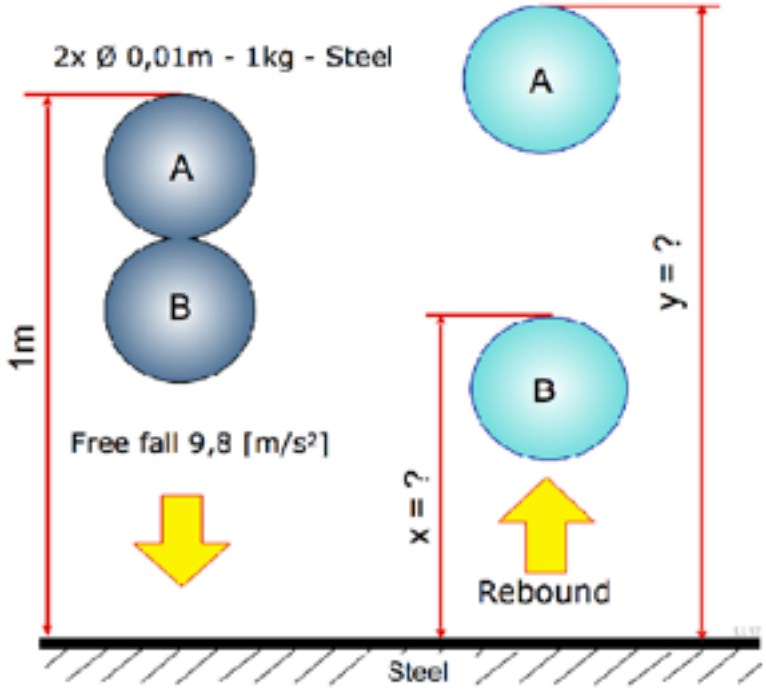
If a washer is heated, will the inner ring become larger or smaller?

Stacking



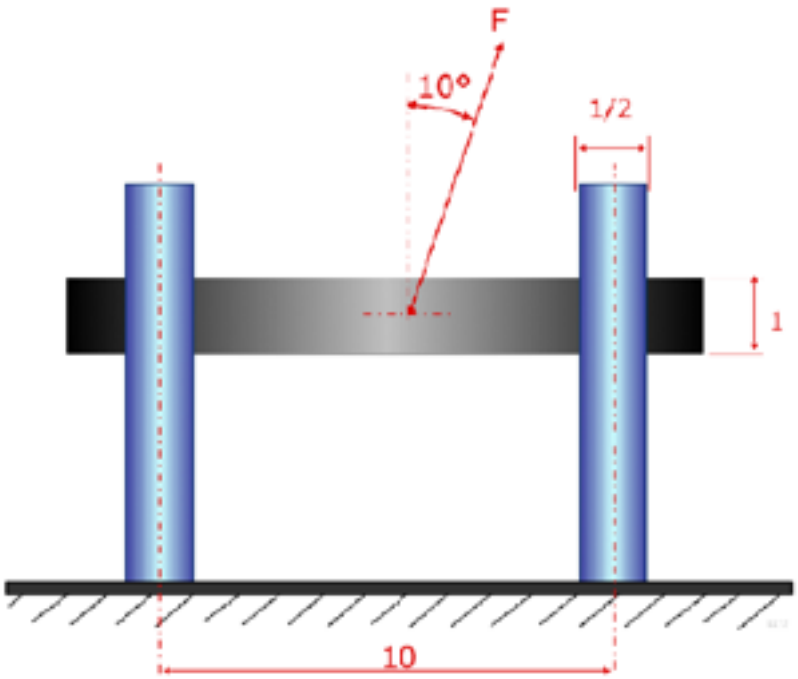
What is the maximum overhang of a stack of 9 blocks?

Bouncing Balls



Two equal balls, ball A and ball B, stick to each other during a free fall. Will the balls during the bouncing (rebound) stick together? Yes or no and why?

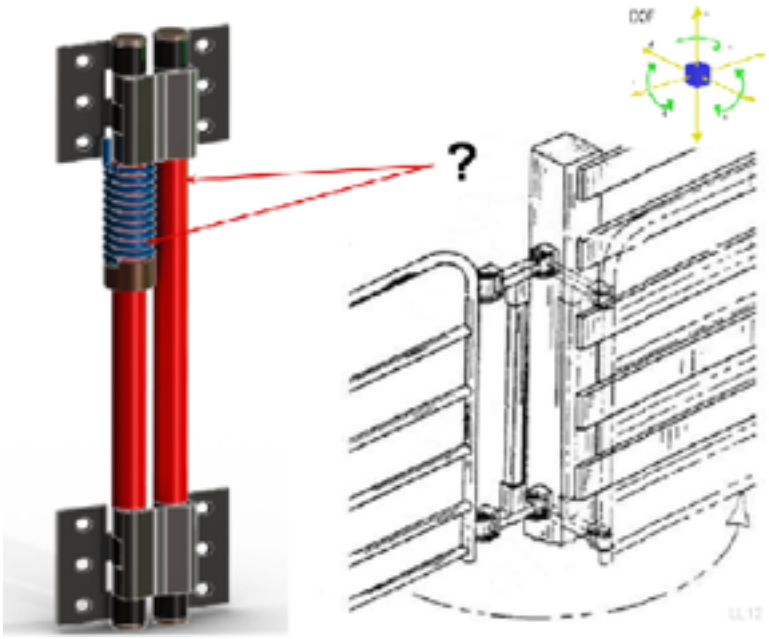
Jamming



In a linear guiding there is always a risk of jamming? What determines in this construction the jamming sensibility?

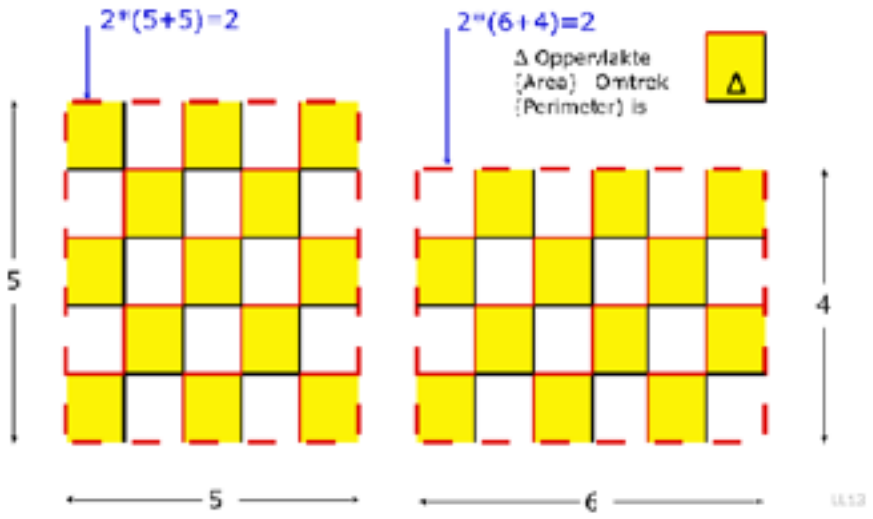
Is there a risk on jamming in the given example?

Double-hinge



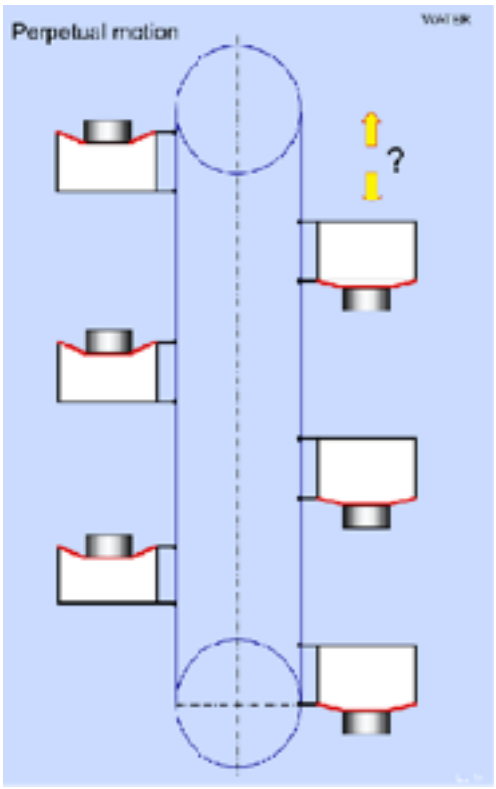
What is the function of the couple piece and the spring in a double-hinge?

Tile



For a tile pattern of 5x5 OR 6x4 tiles, the perimeter is exactly the same [20]. However, the surface difference is one tile. Why is the difference exactly one tile?

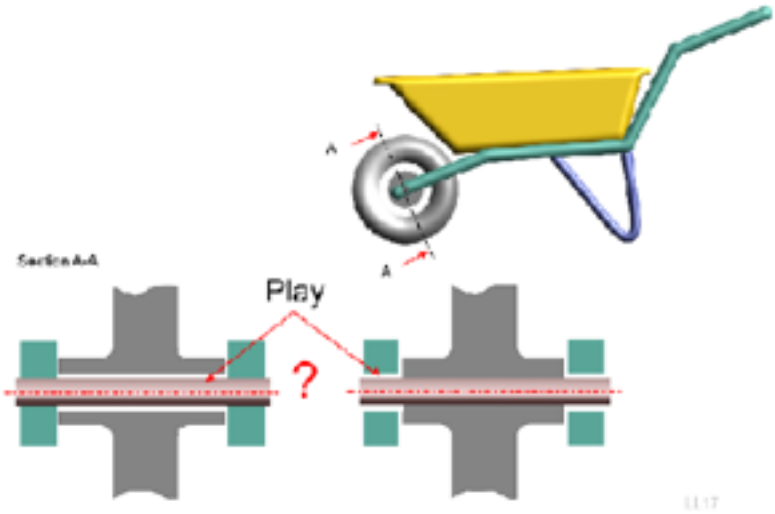
Archimedes balance mechanisme



A number, with a flexible membrane sealed and filled with air, reservoirs is secured to a chain drive. See figure. On the flexible membrane a heavy object is attached. The entire mechanism is immersed in water. On the left side the reservoirs have a smaller volume. The heavy object push the membrane down. On the other side of the mechanisme the heavy object in pulling onto the membrane. So the richt side the reservoirs have a bigger volume. According the Archimedes principle the lifting force (buoyant force) on the richt side shout be bigger then on the left side.

Will the mechanism, due to the buoyant force of the water, going to run?

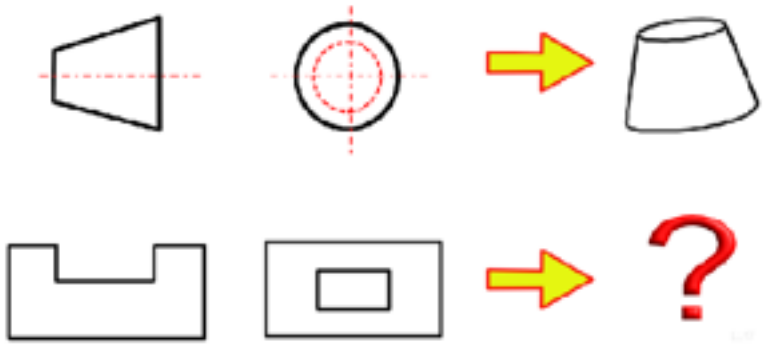
Wheelbarrow



In the wheelbarrow the wheel is rotating in the frame. To minimise wear, which design is preference:

- The left design. In this design the axle is fixed with respect to the frame or
- The right design. In this design the axle is fixed with respect to the wheel.

ISO Views



Using two views, it is possible to define a shape.

In the drawing, for example, the flattened cone is a result of the two on the top left given views.

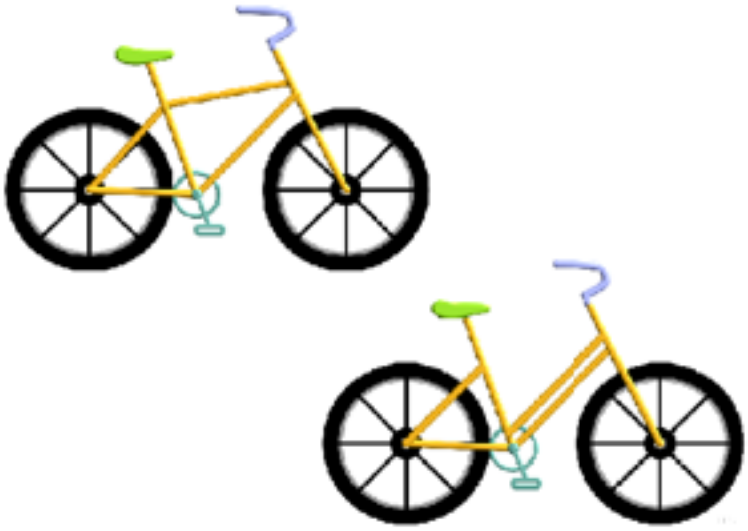
Which shape is the result of the two views given?

Kinematic self-alignment V-groove mount

In this self-alignment kinematic mount construction three V-grooves are used.

What is the maximum tilted angle, with respect to the horizontal, from this mount?

Dutch bike



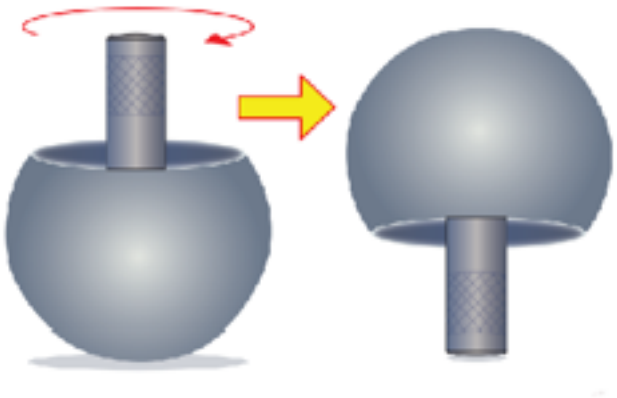
Which bike is using the least energy to drive?

The bike with the bar or the Dutch bike (Ladies model).

Spinning top

What stops a spinning top from falling over?

Tipple-Top toy

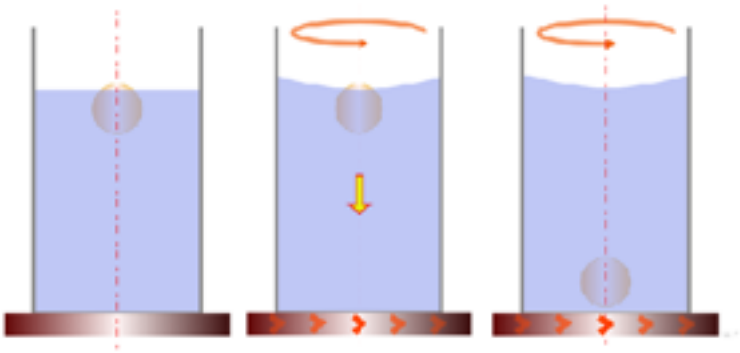


The Tipple-Top is a spinning tops toy. If spinning is initiated, the toy changes its orientation. It will tipple.

See the YouTube video: Tippe Top - The Spinning Top that flips itself over when it is spun!

Why is this?

Floating ball



A ball in a glass cylinder is just floating. If the glascilinder is rotating and the ball is #pushed to the bottom the ball will stay in this position. After stopping the rotation the ball wil floating to the surface.

See: Suppressing a floating ball YouTube

Why is this? Witch mechanism is suppressing the floating of the ball?

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