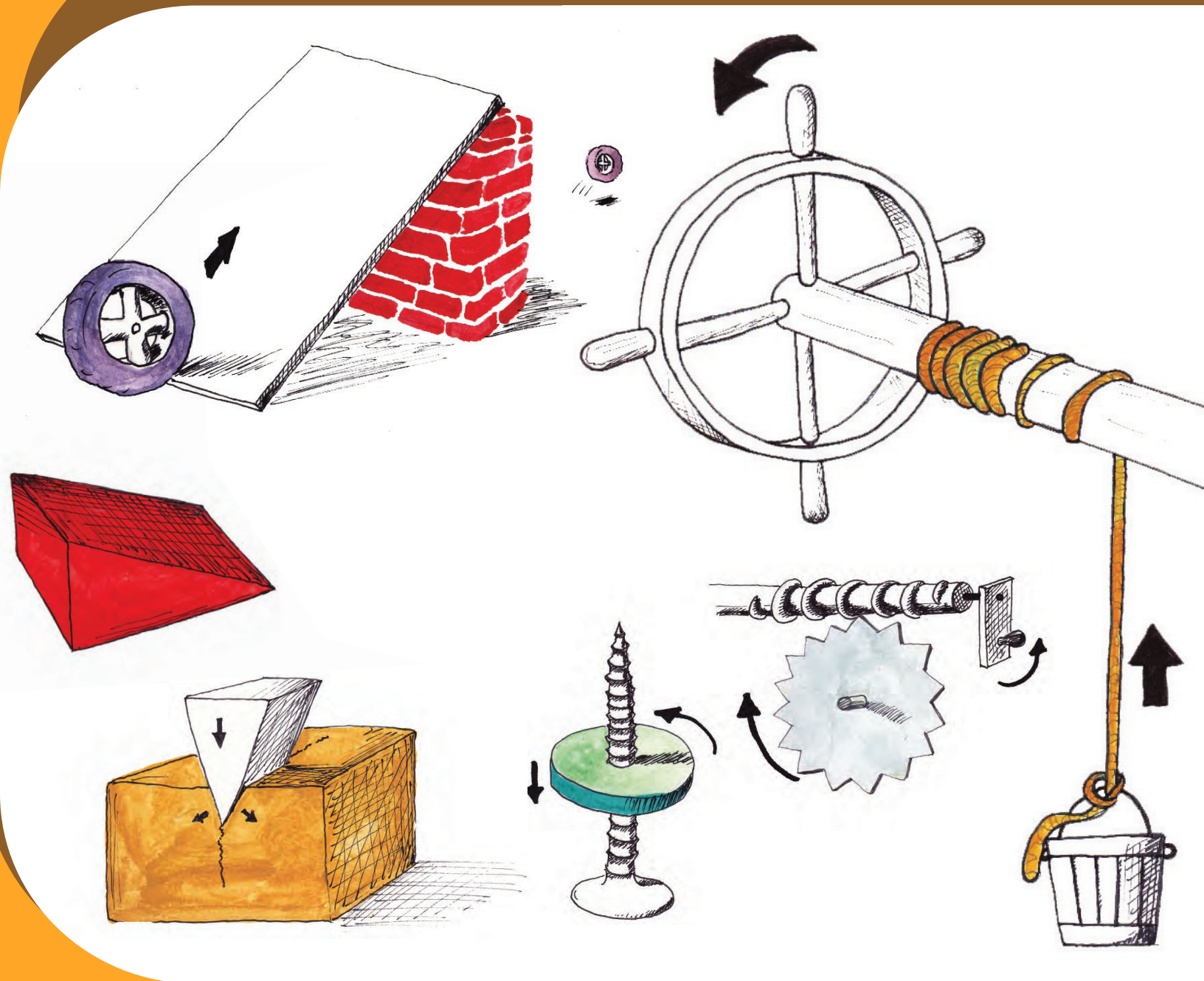
Simple Machines 2nd GRADE



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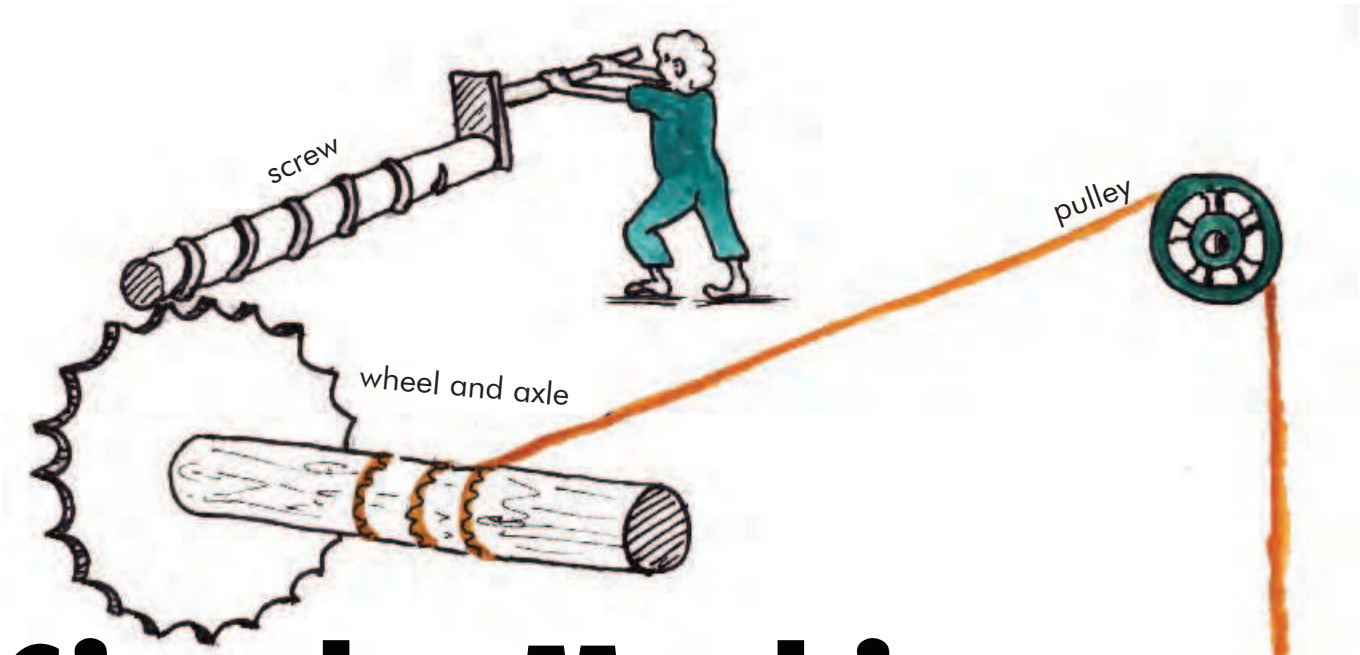
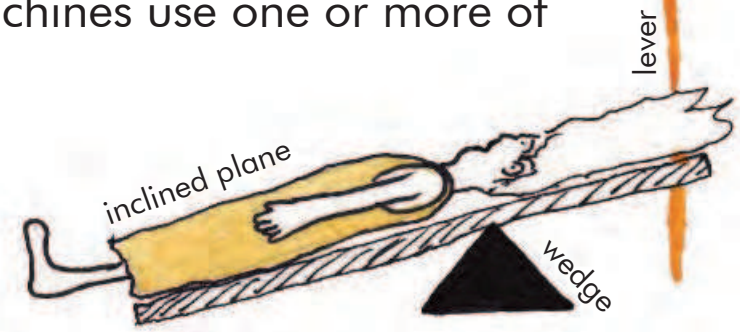


Simple Machines

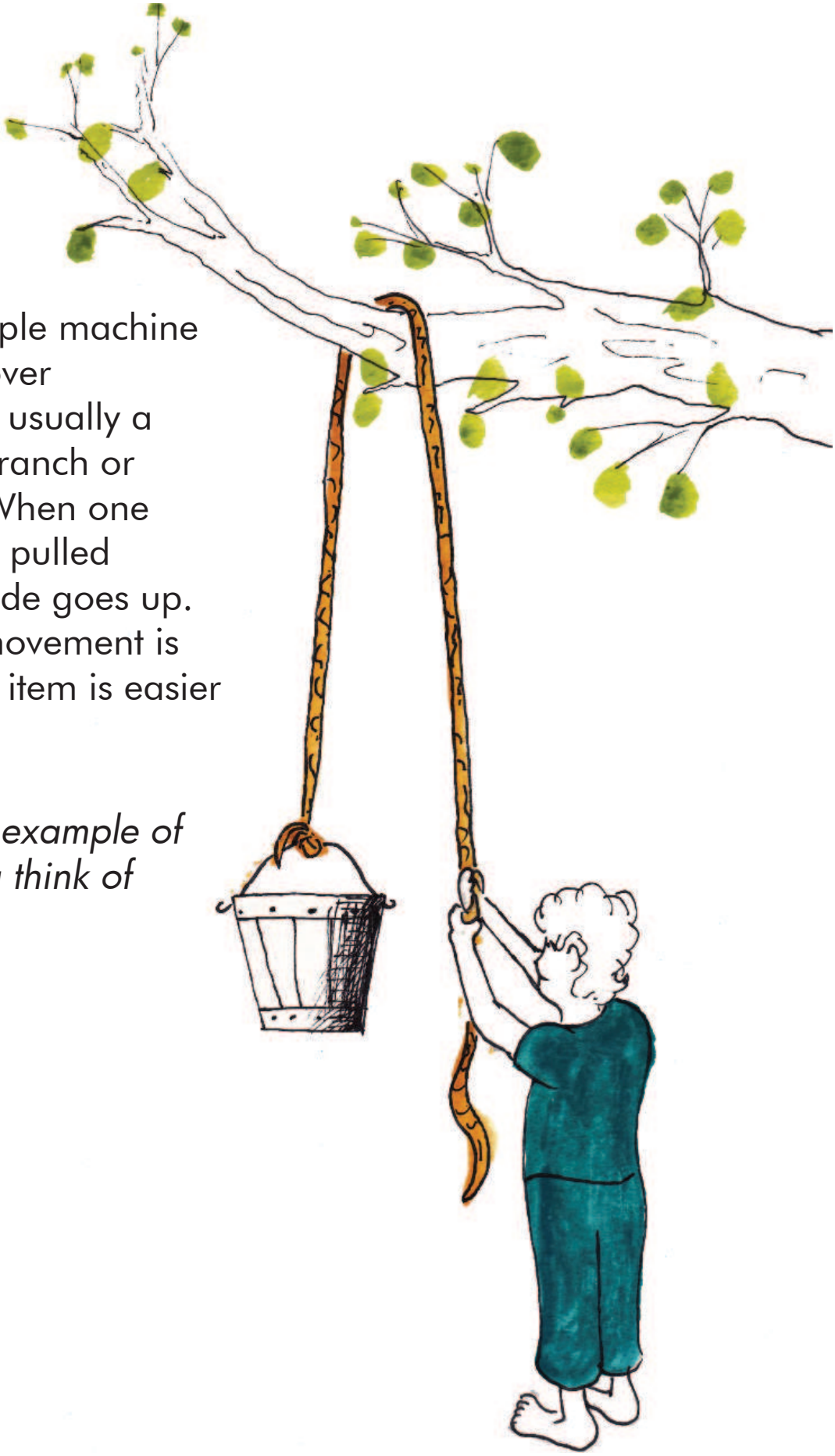
In ancient Greece a scientist named Archimedes came up with the idea that there are simple machines which can be used to make work easier. These machines could change the direction of movement and could lessen the amount of work needed for moving things. Later, scientists and artists like Galileo and Da Vinci advanced this idea and came up with the six simple machines we have today: pulley, screw, wheel & axle, lever, wedge, and inclined plane. Almost all modern machines use one or more of these six simple machines.



Pulley

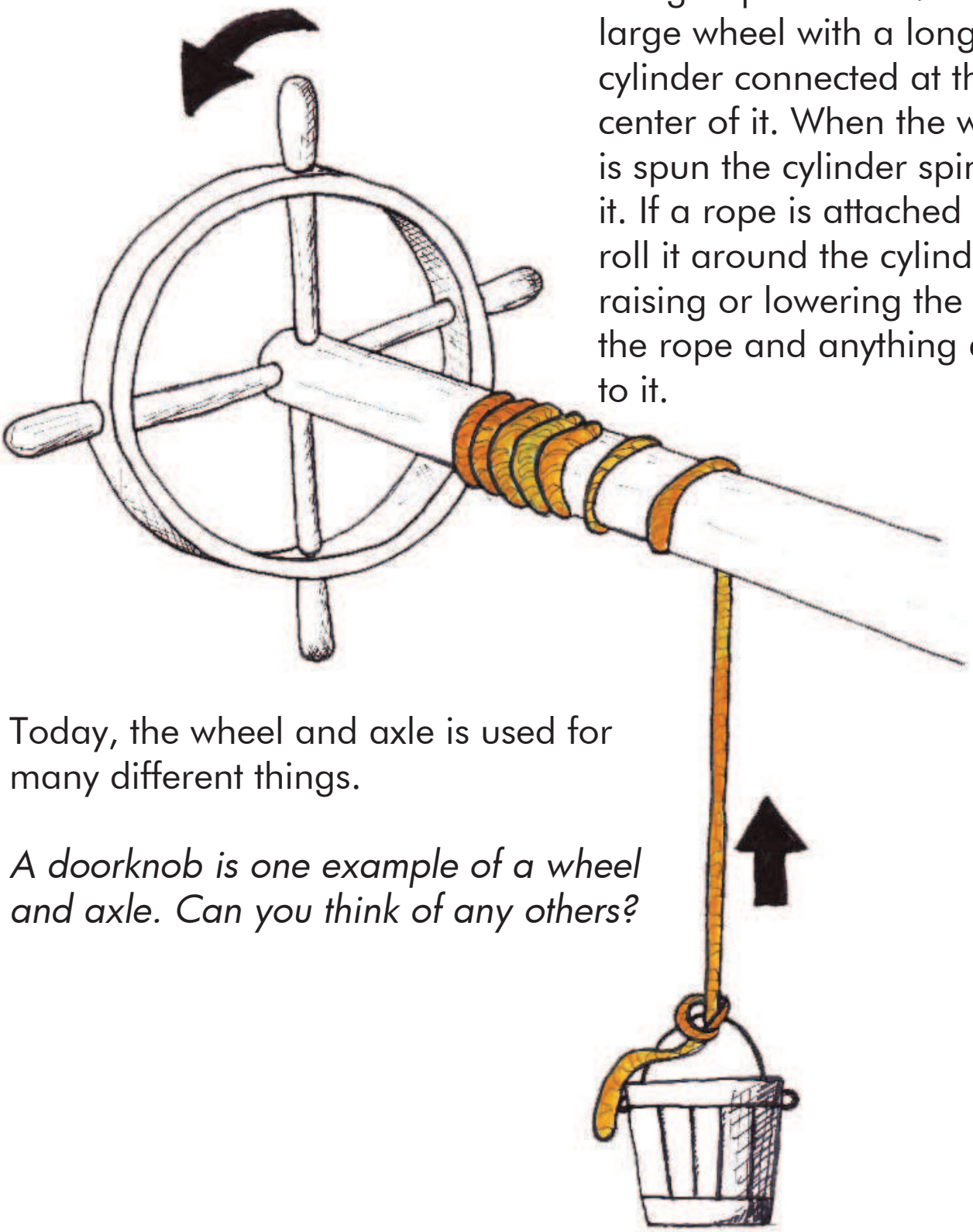
A **pulley** is a simple machine that uses a rope over something round, usually a wheel, or a tree branch or whatever works. When one side of the rope is pulled down, the other side goes up. The direction of movement is changed, and the item is easier to lift.

A flagpole is one example of a pulley. Can you think of any others?



Wheel & Axle

The **wheel and axle** is a machine used to help make lifting objects easier. It is a large wheel with a long cylinder connected at the center of it. When the wheel is spun the cylinder spins with it. If a rope is attached it will roll it around the cylinder, raising or lowering the end of the rope and anything attached to it.



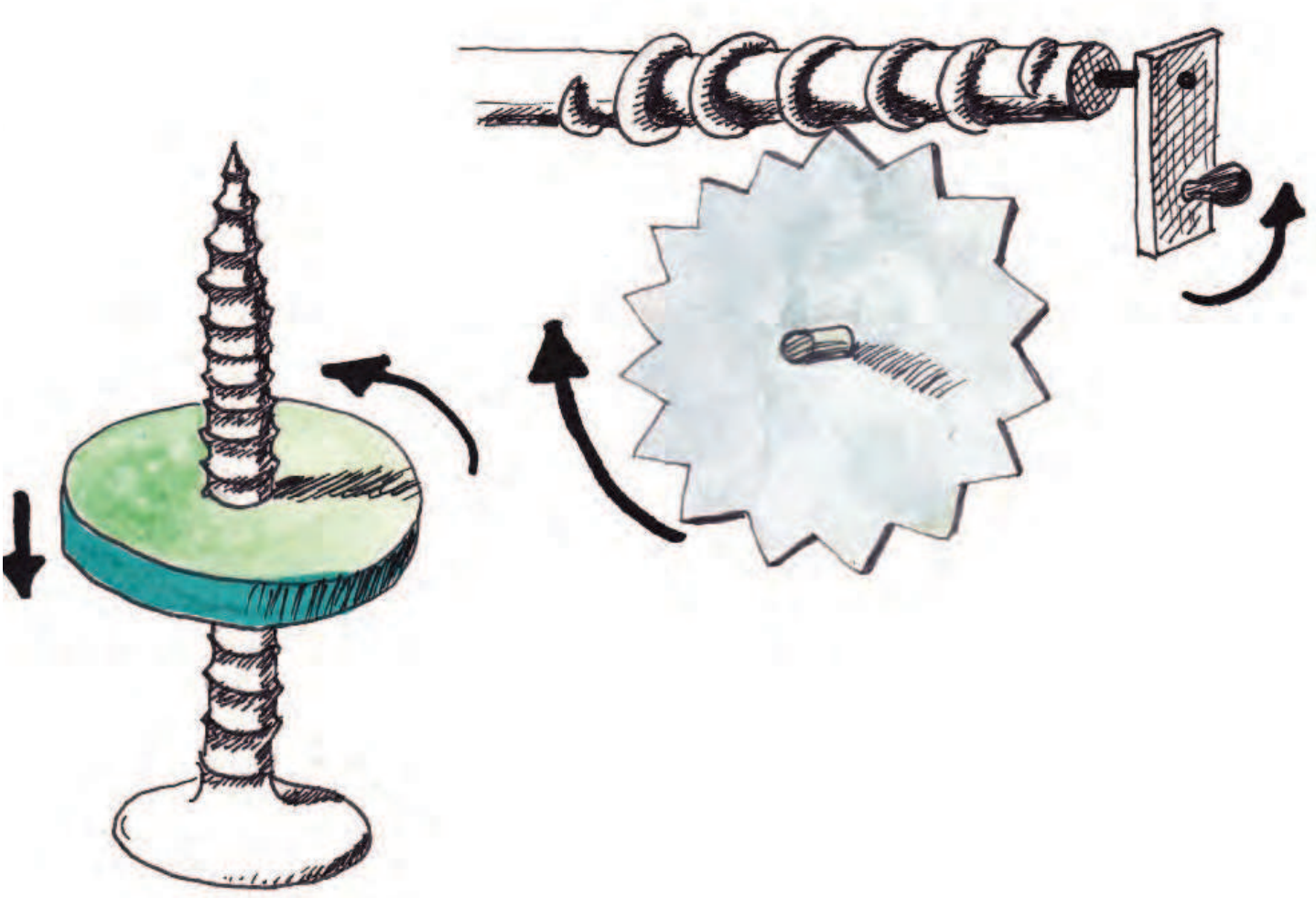
Today, the wheel and axle is used for many different things.

A doorknob is one example of a wheel and axle. Can you think of any others?

Screw

A **screw** is a cylinder with threads spiraling down it. A screw turns a twisting motion into straight motion. When a screw is turned into wood the wood is moved up or down in a straight line along the screw and is stopped by the head.

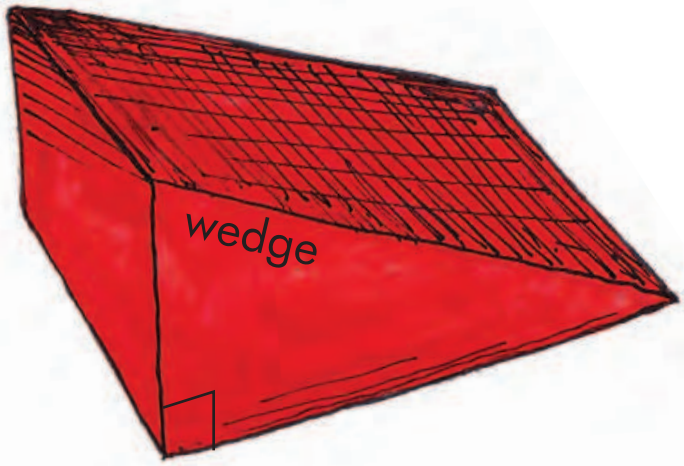
A corkscrew is one example of a screw. Can you think of any others?

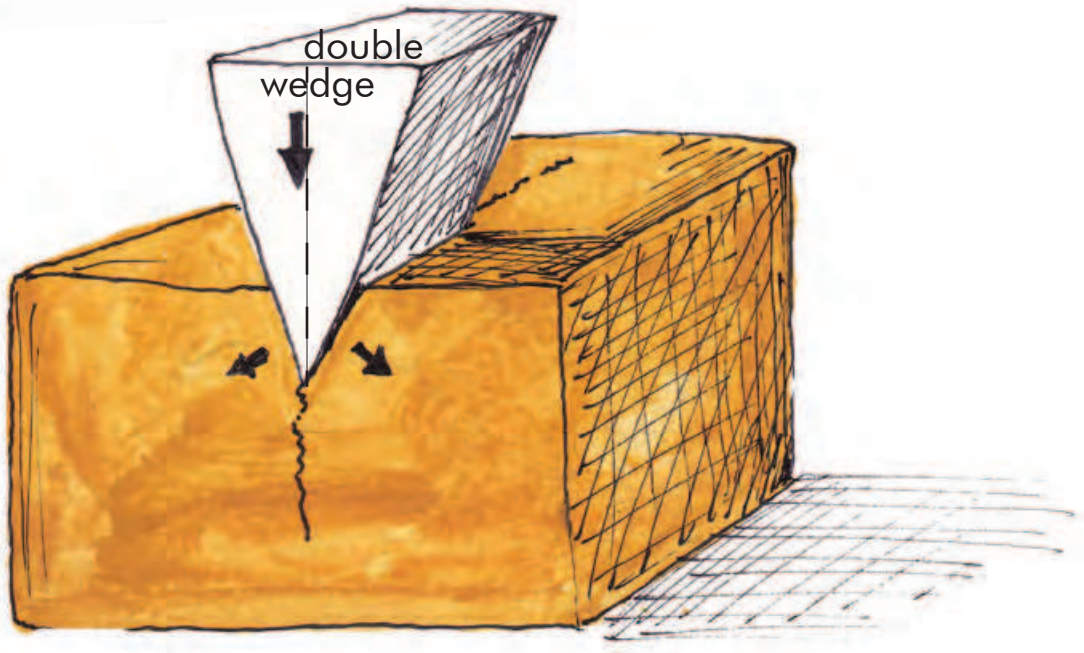


Wedge

A **wedge** is a triangle shaped machine. It can be used to stop or hold things in place. When a wedge is pushed under a door, the diagonal edge pushes up against the bottom of the door and holds it still. A **double-wedge** is also triangle shaped, but it is used to split wood or separate things. When the triangle is pushed down, its two sides push out diagonally.

A door stopper is one example of a wedge, and an axe is one example of a double-wedge. Can you think of any others?

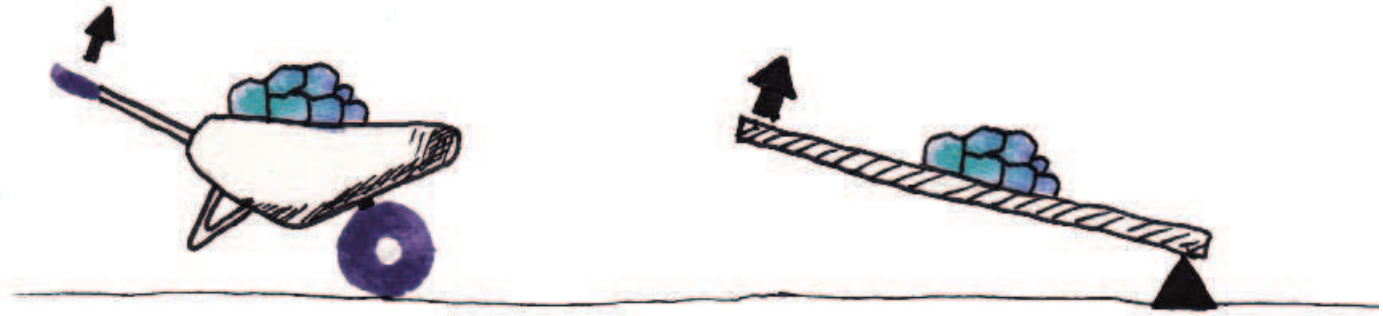


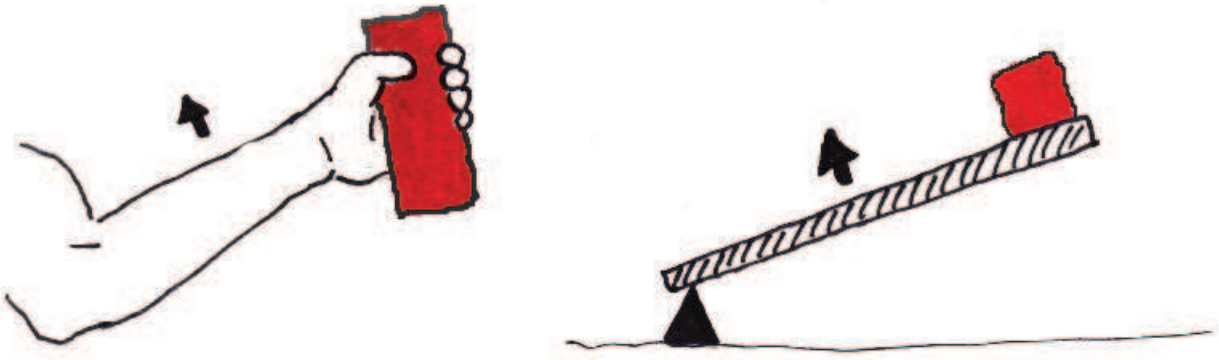


Lever

A **lever** is a machine with a board over a fulcrum. By changing how much of the board is on each side of the fulcrum, it can be made more difficult or easier to lift a weight. If you push down on the long side, it will be easier to life something on the short side.

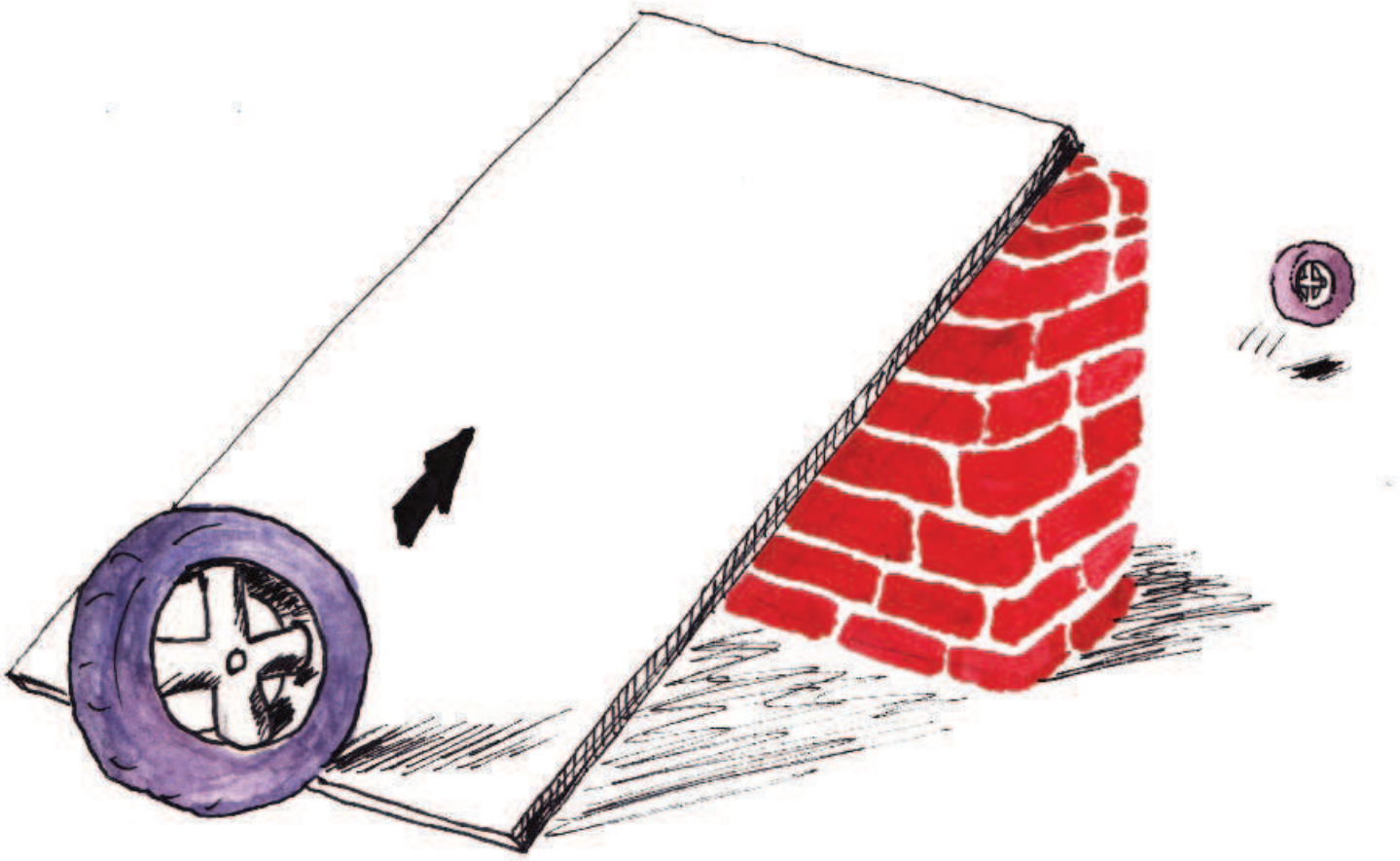
Below are three different kinds of levers. Can you find the fulcrum in each one?





Inclined Plane

An **inclined plane** is a board that sits at an angle to the ground. It is used to help raise or lower objects more easily by allowing them to move diagonally instead of up and down.

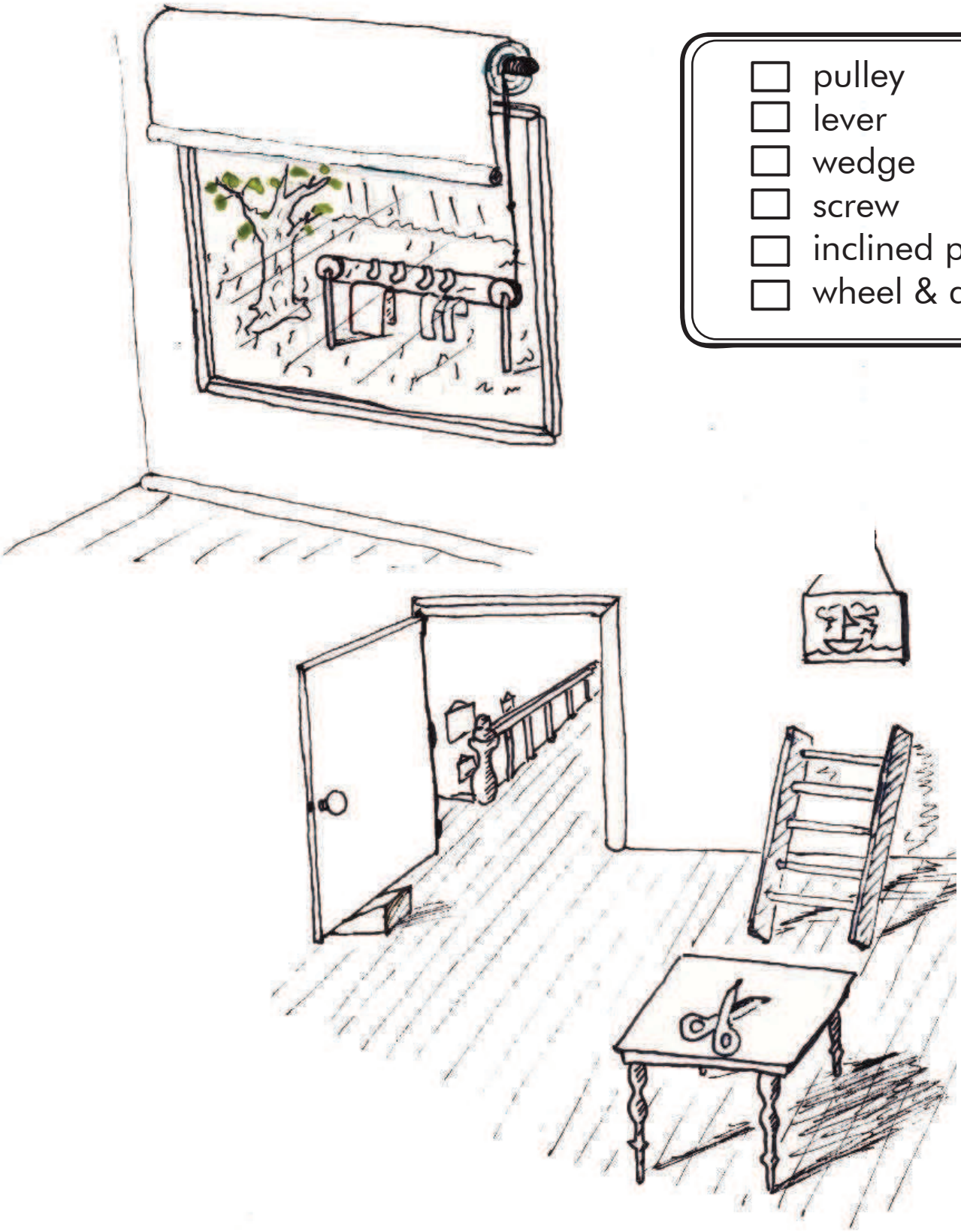


A wheelchair ramp is one example of an inclined plane. Can you think of any others?

Find The Simple Machines

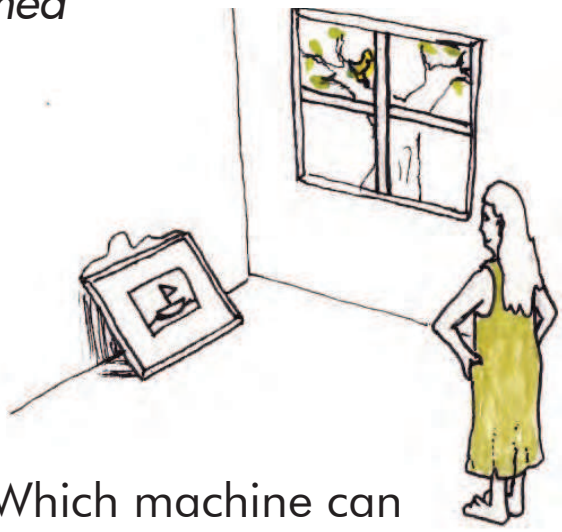
Find and color the six simple machines in these bedroom scenes.

- ☐ pulley
- ☐ lever
- ☐ wedge
- ☐ screw
- ☐ inclined plane
- ☐ wheel & axle



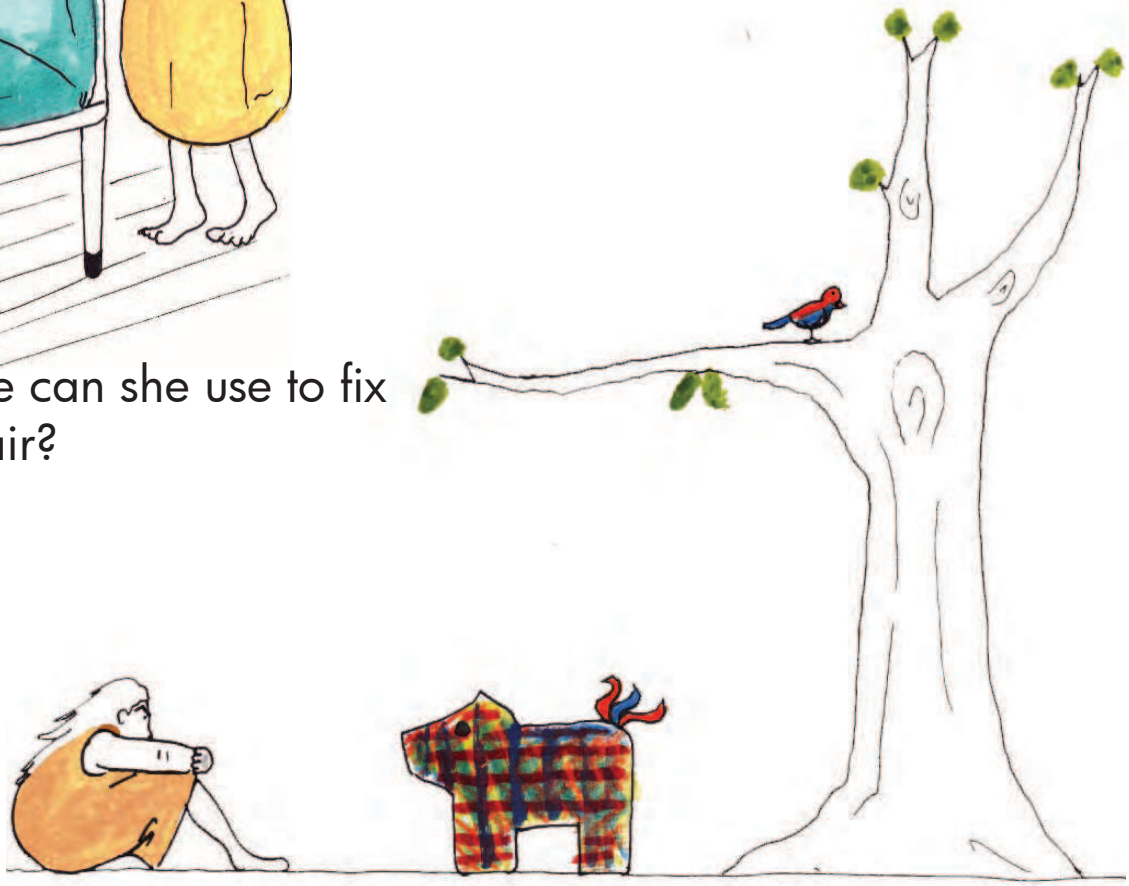
Using Simple Machines

Which of the six simple machines could Alice use to solve each problem? *Hint: the six simple machines are: pulley, lever, wedge, screw, inclined plane, and wheel & axle.*



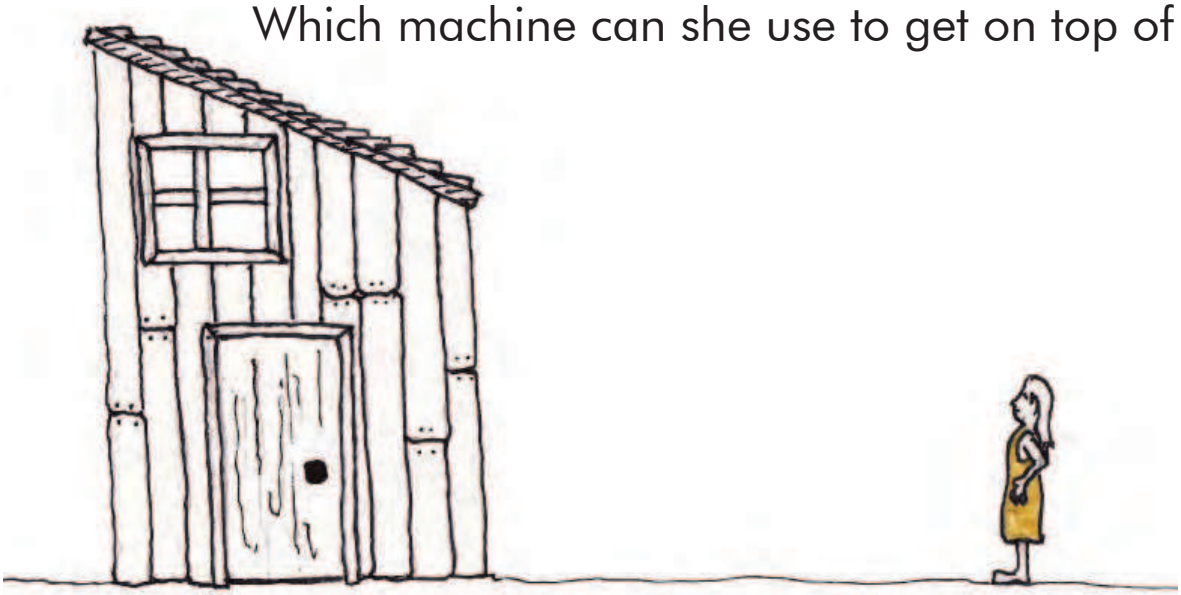
Which machine can she use to hang the picture?

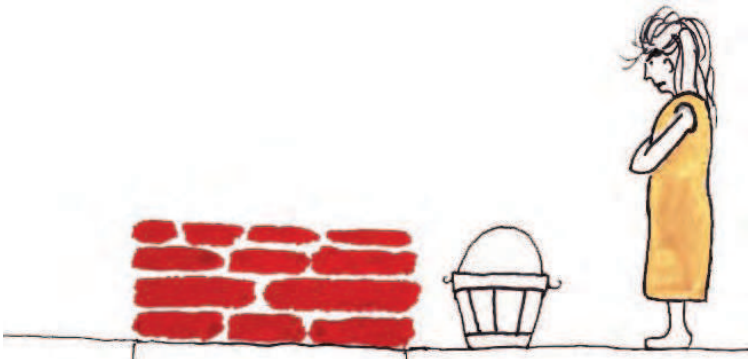
Which machine can she use to fix the wobbly chair?



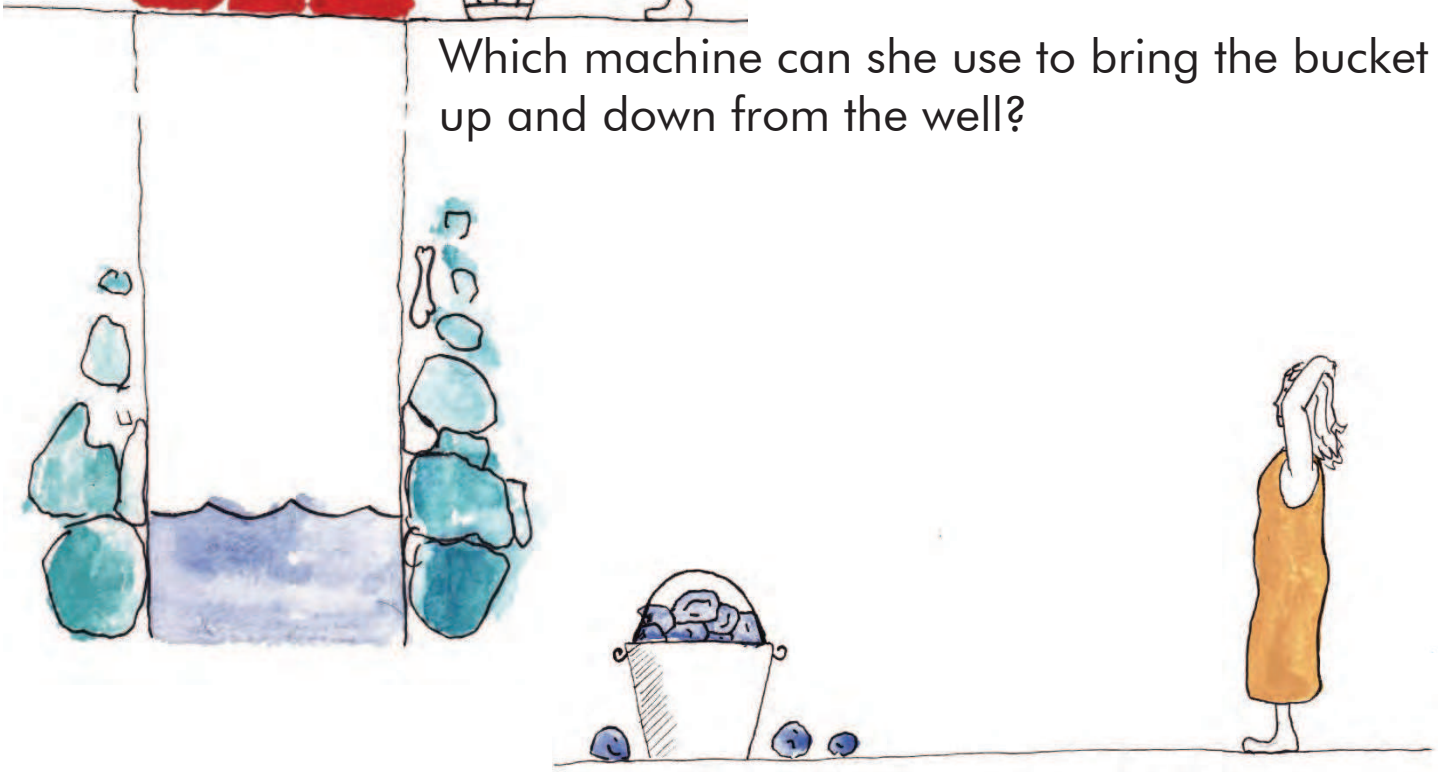
Which machine can she use to lift the piñata up in the air?

Which machine can she use to get on top of the garage?





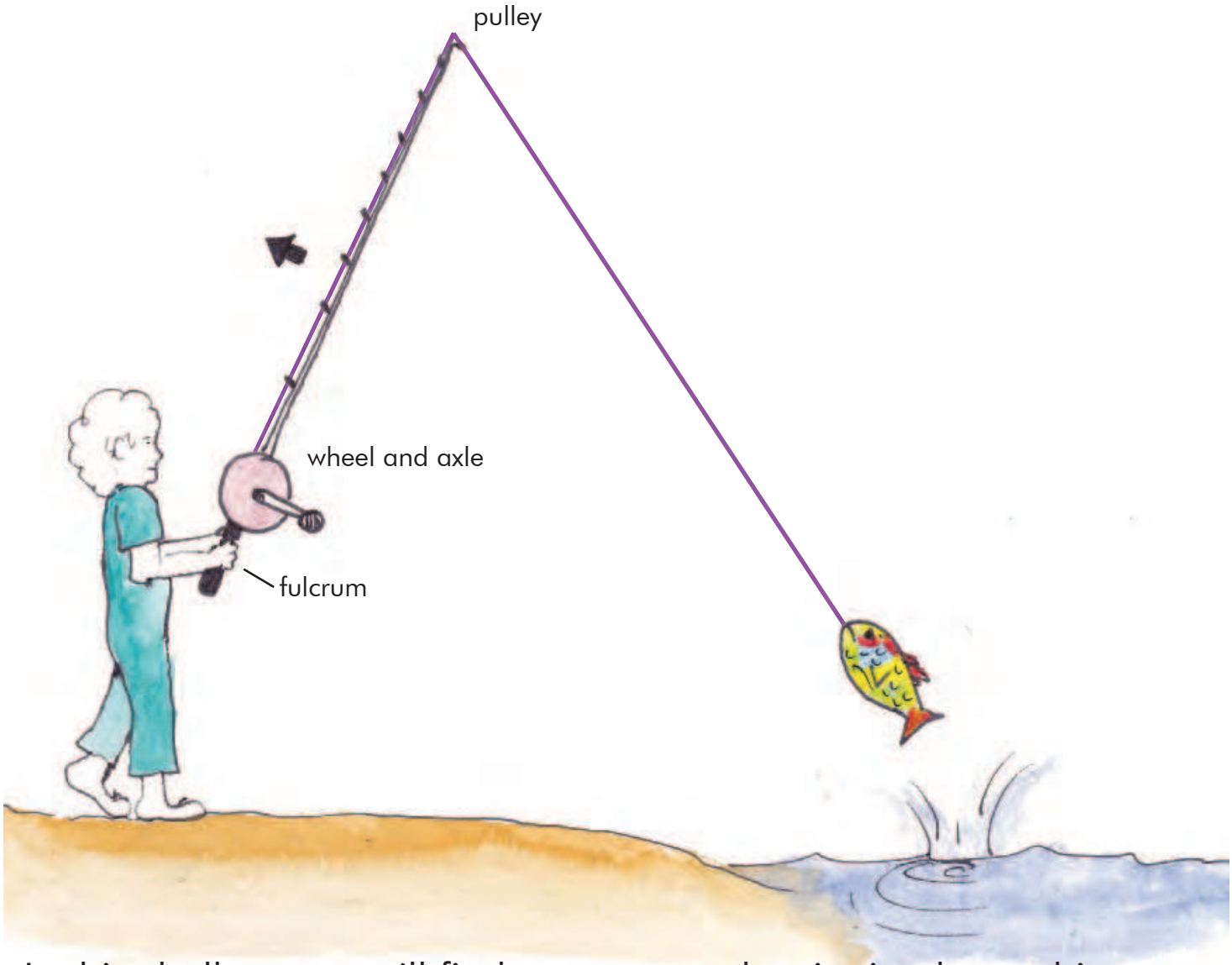
Which machine can she use to bring the bucket up and down from the well?



Which machine can help her get the heavy bucket of rocks off the ground?

Compound Machines

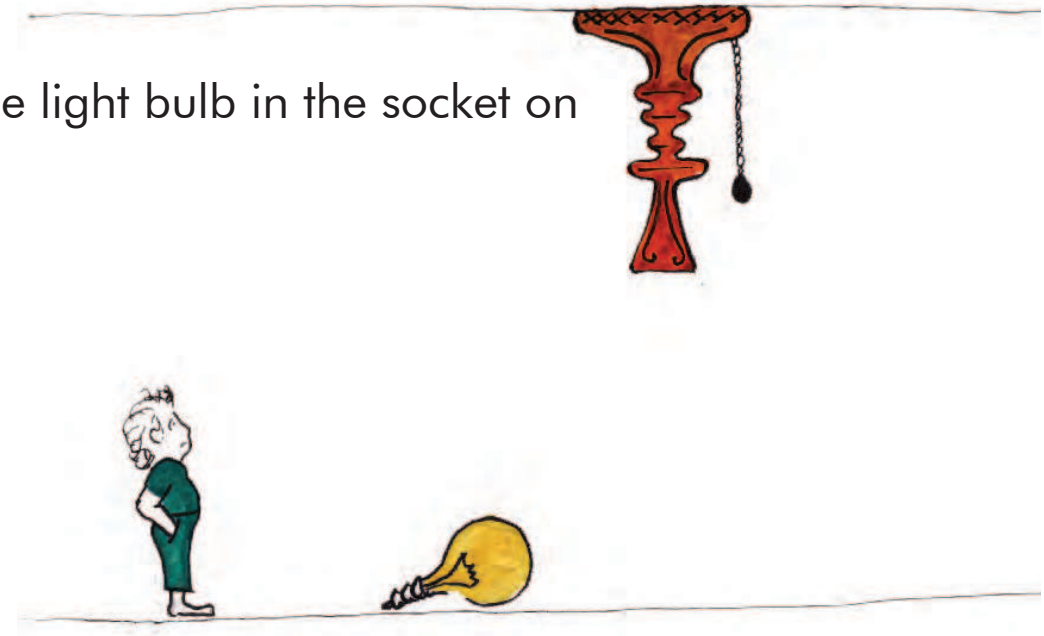
Simple machines can work together to help solve more complicated tasks. In the example below, a boy uses a fishing pole to catch a fish. He reels in the line with a **wheel and axle** and pulls it up with a **lever**, all with the help of a **pulley** supporting the line.



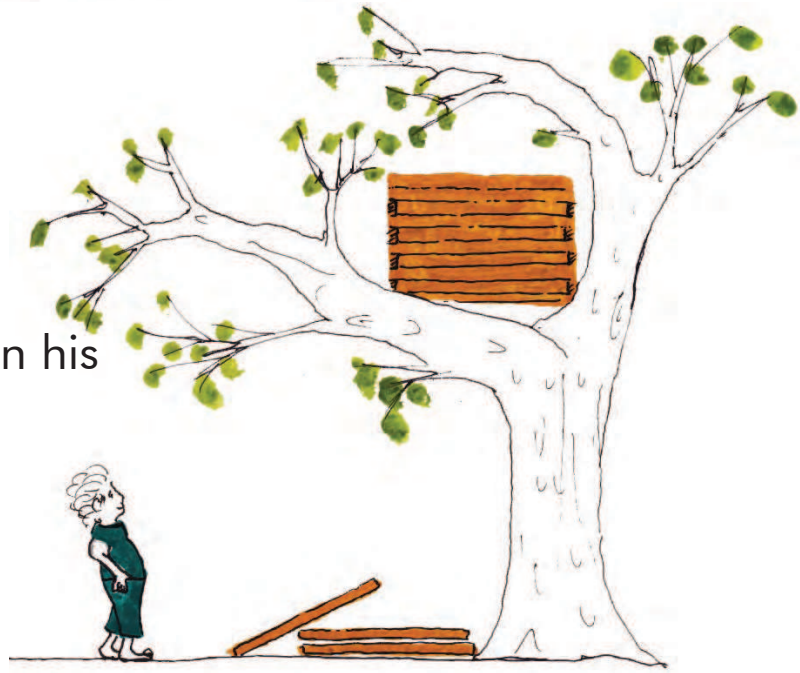
In this challenge, you'll find ways to use the six simple machines together, creating one compound machine that makes work easier. *HINT: the six simple machines are: pulleys, levers, wedges, screws, inclined planes and wheel & axles.*

On a separate sheet of paper redraw each scene using at least 3 simple machines to help the boy complete each task.

Help the boy put the light bulb in the socket on the ceiling.



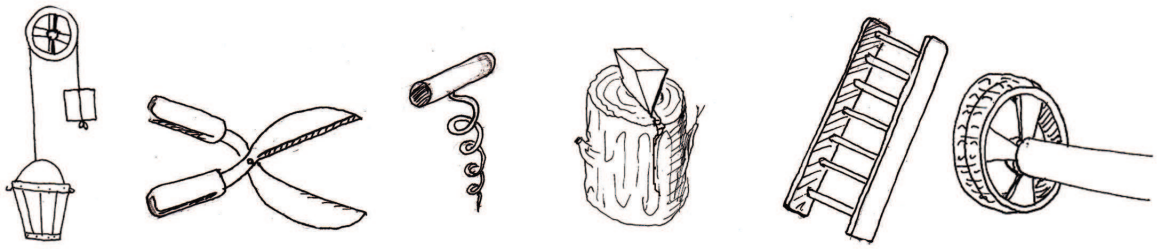
Help the boy put a roof on his tree house.



Help the boy put rock A on top of rock B to make a wall.

Scavenger Hunt!

Find all the simple machines to complete the checklist and win the hunt! Find the items listed in each section. Write down what they are and what kind of machine they are.



In The House

Find three simple machines around your house.

In The Garden

Find three simple machines that are used in the garden or the backyard.

In School

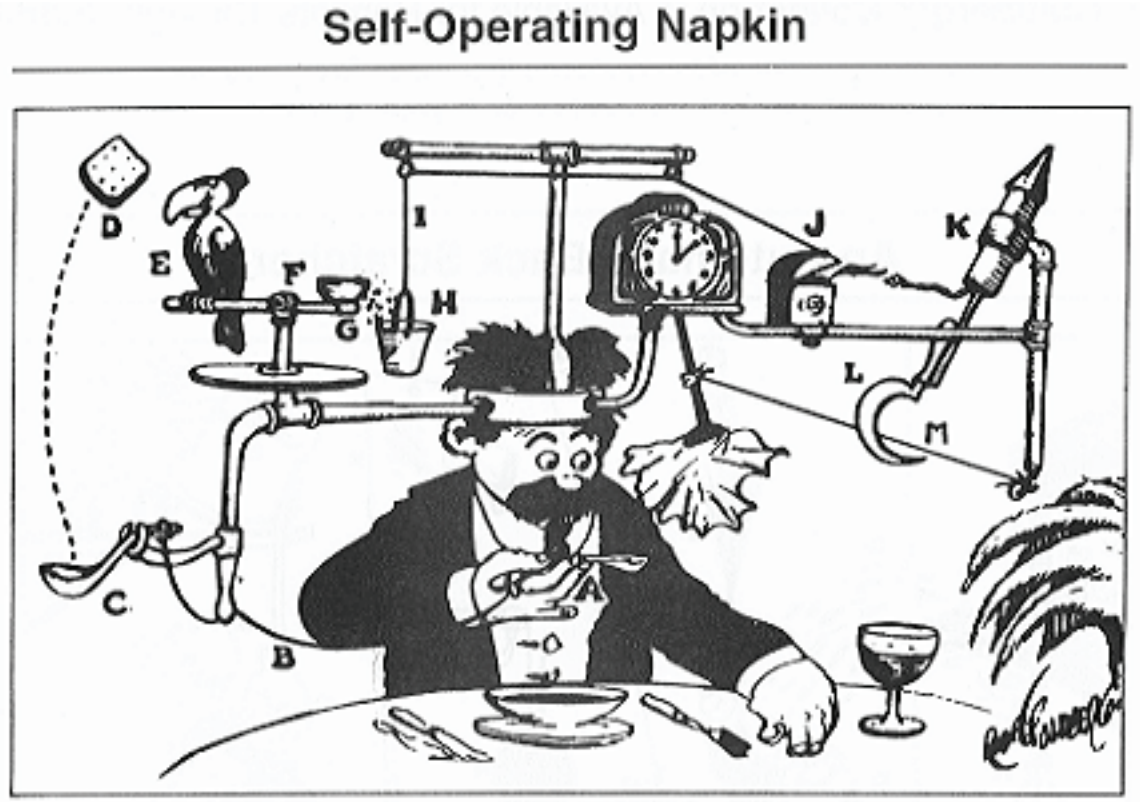
Find three simple machines that you see or use everyday in school.

On The Street

Find three simple machines that you pass while walking down the street.

Rube Goldberg's Machines

Rube Goldberg was an American cartoonist in the early 1900s. He became famous making cartoons like the one below. In them a simple or silly task is accomplished in an extremely complicated and humorous way. His machine for a self-operating napkin uses a parrot, alarm clock and fireworks!



Rube Goldberg's Self-Operating Napkin from 1915

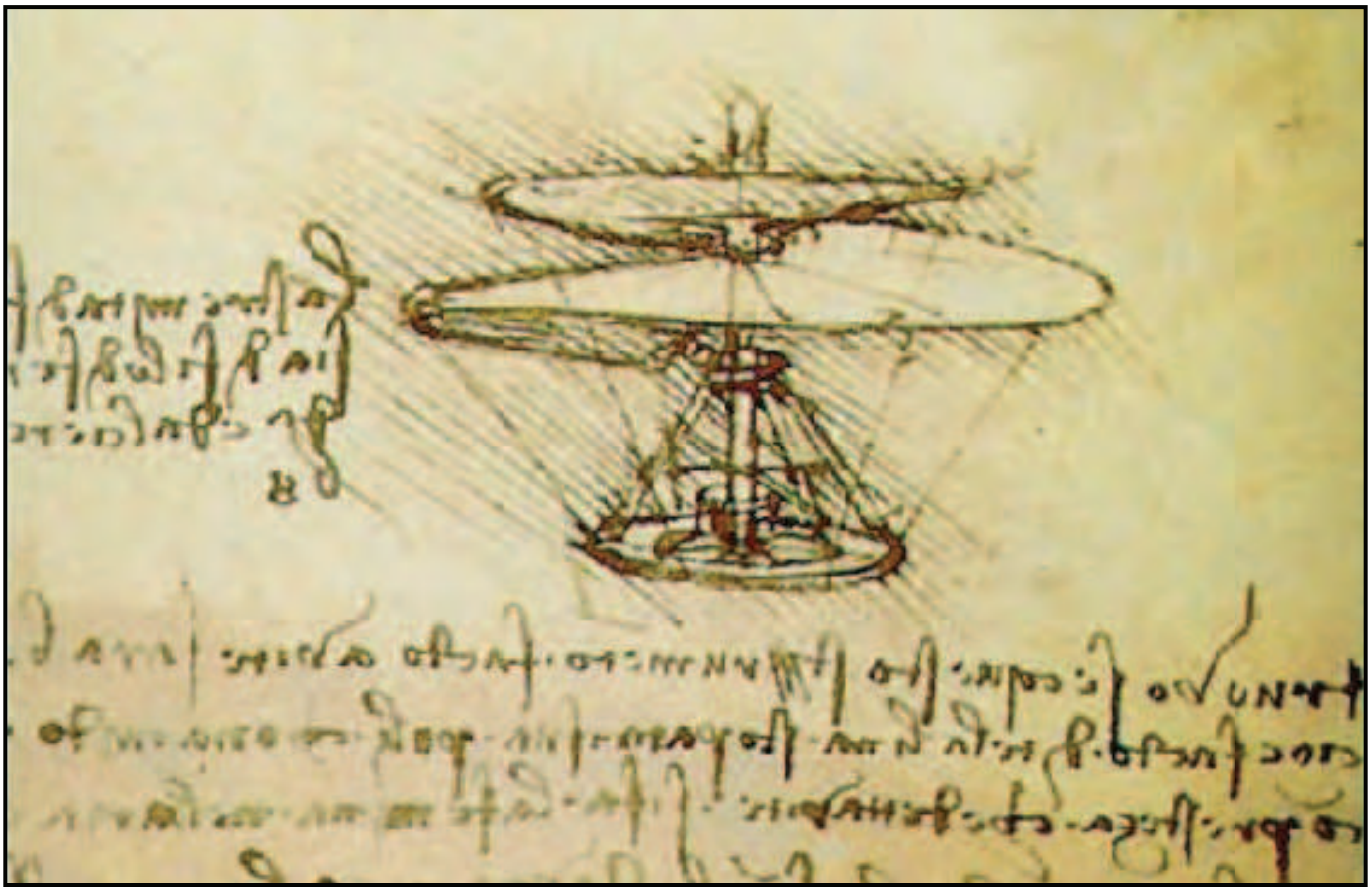
Using the six simple machines (pulley, lever, wedge, screw, inclined plane and wheel & axle) can you make your own **Rube Goldberg machine?** Think of an everyday task you would like to accomplish, and make a machine for it using all six of the simple machines.

Da Vinci's Machines

Leonardo Da Vinci was one of the great artists of the Renaissance, but he was also one of the greatest thinkers and scientists. Da Vinci made more sketches of inventions and scientific diagrams in his lifetime than he did paintings.

The invention below is a helicopter drawn by Da Vinci in the 1500s. The helicopter's propeller is a screw. When it is turned the air is forced down and the helicopter is, in theory, lifted up.

Can you come up with any inventions using some of the simple machines? Draw your ideas on the next sheet of paper.



DRAWN BY:

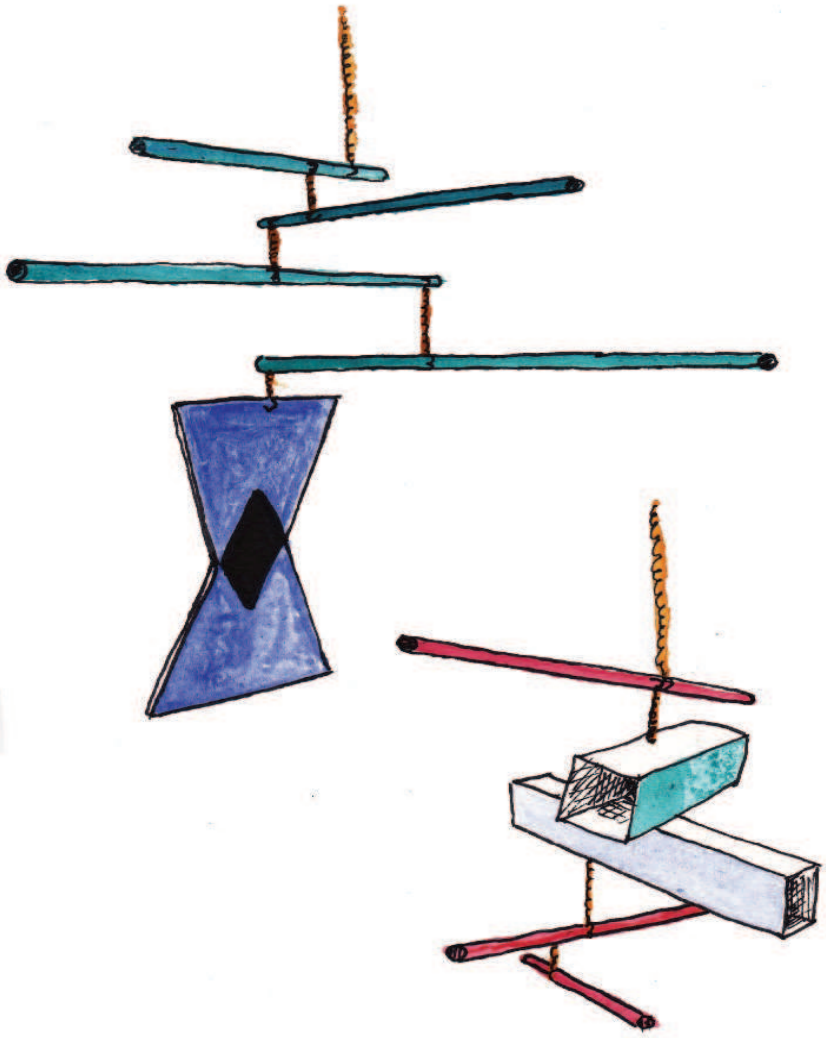
NOTES:

PROJECT NAME:

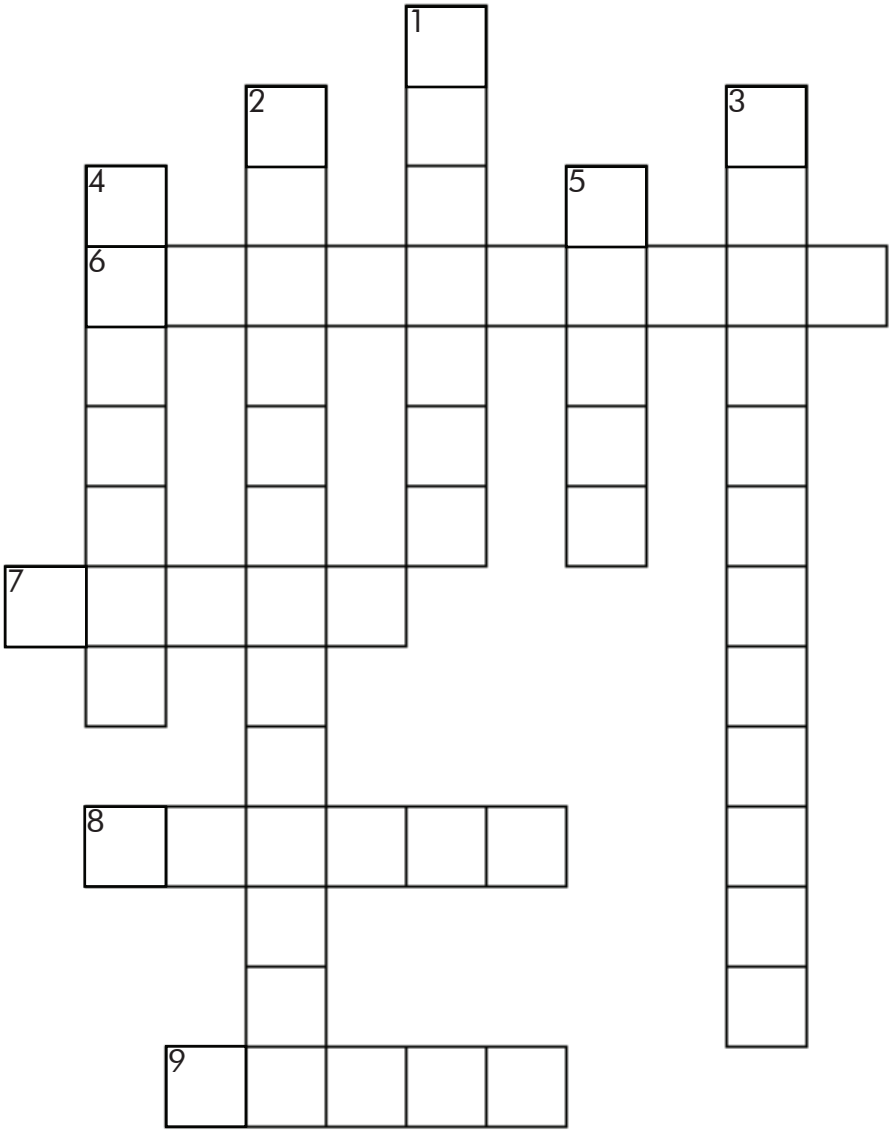
Munari's Machines

Bruno Munari was an Italian designer in the 1900s. In the 1930s and 1940s he became most famous for making what he called, "useless machines". They were cardboard cut-outs of different colors and shapes, held up by sticks and string. The simple machine he used was the lever, and all the levers were held in balance by equal weight distribution. What is most interesting about his machines is that when a breeze blows through, the pieces rotate to reveal new shapes and colors.

Try to make your own useless machine! All you need is some string, sticks and paper or cardboard.



Simple Machines Crossword



Across

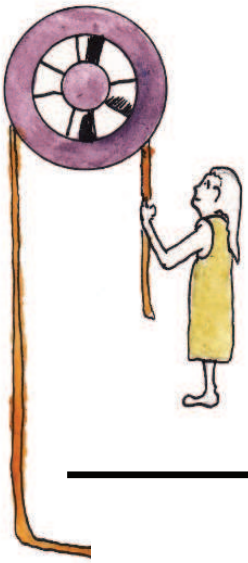
6. The Greek philosopher who first came up with idea of simple machines
7. A machine shaped like a spiral that changes a twisting motion into straight motion
8. A machine made of a rope and something round; when one side is pulled down the other goes up.
9. A machine that is a board over a fulcrum

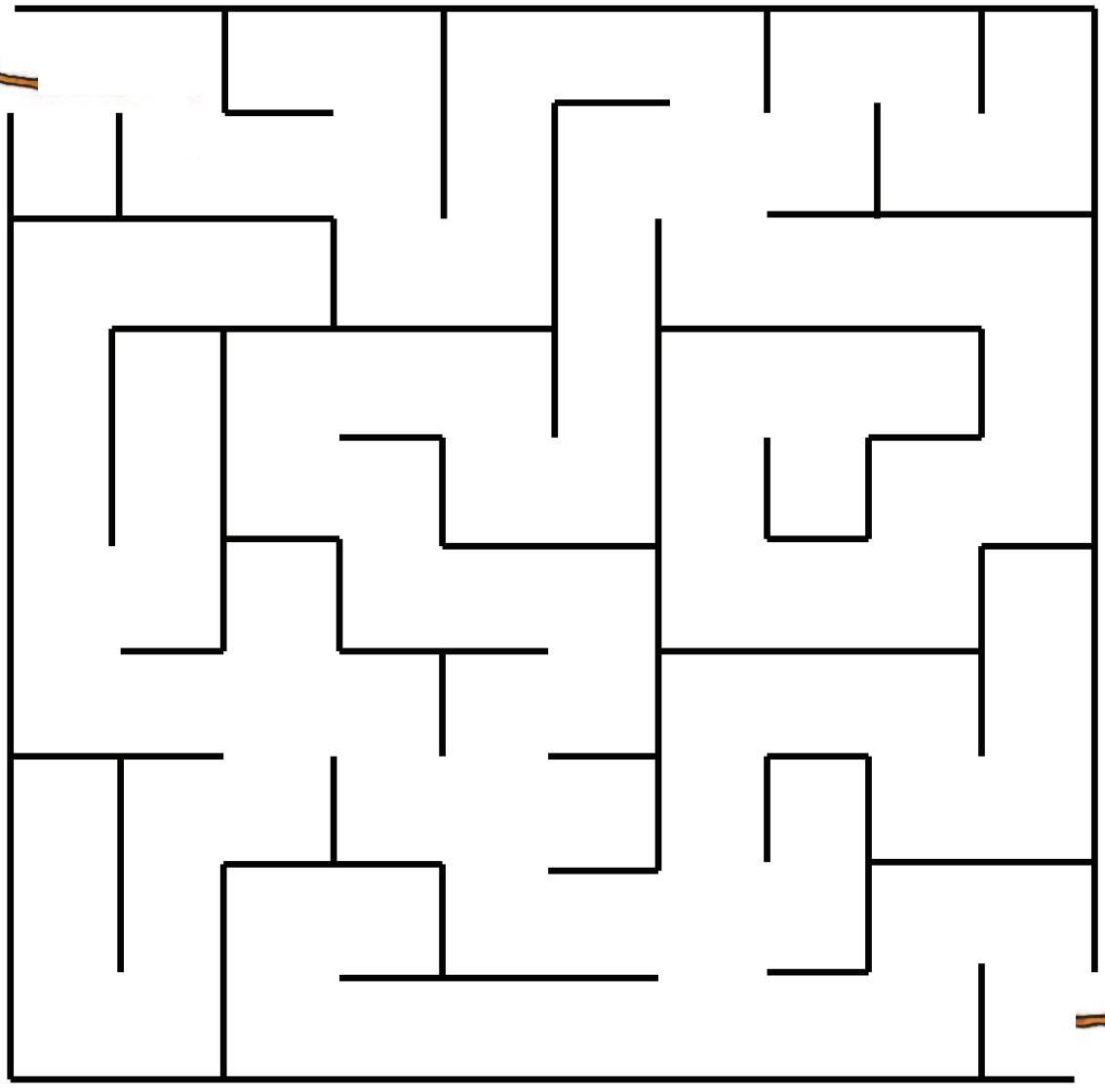
Down

1. A Renaissance scientist that helped advance the idea of simple machines
2. A machine that allows vertical motion to be turned into diagonal motion
3. A machine that helps in lifting things by changing a twisting motion into up and down motion
4. A Renaissance artist that used simple machines in many of his inventions
5. A triangle shaped machine that transfers motion to its two diagonal sides

Maze

Connect the ends of the rope to help the girl raise the boy through the maze





Word Search

wheel and axle Bruno Munari lever wedge screw
inclined plane pulley Da Vinci Archimedes simple machines
useless machines Galileo fulcrum

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Great job!

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