

PUTTING SCIENCE TO WORK

PIN TUMBLER LOCK

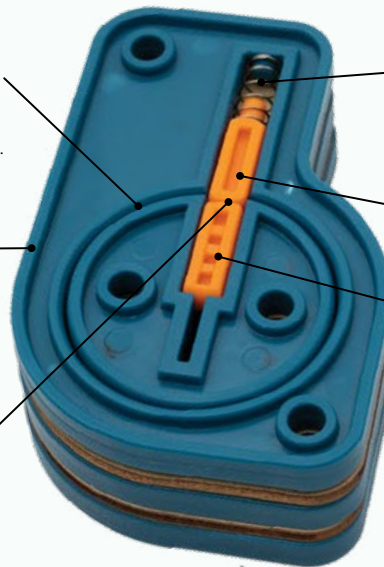
Many lock boxes stay safely shut unless you use the right key to open them. This simple-yet-effective security is thanks to the **pin tumbler lock** you built.

A pin tumbler lock contains a rotating cylinder nested inside an outer case. The cylinder and case are held in place by the pins. The pins stick down into the cylinder and prevent it from moving, which keeps the lock... well, locked.

The rotating cylinder is also called the **plug**. For the lock to open, the plug has to be able to turn within the outer case.

In your lock, the **outer case** is made of the three stacked plates you bolted to your lock box.

The break between the plug and the case is called the **shear line**.

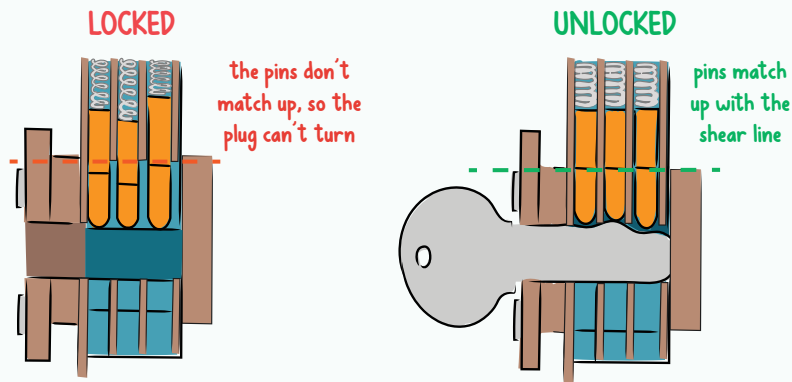


The **springs** push the pins down and stop them from sliding around.

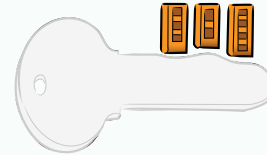
The **driver pins** sit on top of the key pins.

The **key pins** (inside the plug) are different lengths.

To get the **plug** to turn and open the lock, you have to make the break between the **driver pins** and the **key pins** match up with the **shear line**. That's exactly what the bumps on the key do!



Each pin is a different length to match the bumps on the key, and the key has a unique set of bumps to match the lock. That's why you can't use just any key — with the wrong key, the pins won't line up right.



So without the right key, the lock can't be opened... or can it? To open a pin tumbler lock, you just have to move the pins into the right place while turning the plug. The key is one way to do that, but with the right tools, you can actually move each pin individually and pick the lock. Sounds simple, but it's easier said than done. That's why locksmiths spend years mastering the art of lockpicking — and why it's important to hold onto your key!



Pin tumbler locks are the most common kind of lock today. You can find them in everything from doors to cabinets to padlocks. If you have a key that looks like this, it probably goes with a pin tumbler lock!

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DESIGN CHALLENGE

SECRET
SAFE

Locks are great, but what if you want something a little more secret? Try creating a tricky way to conceal, secure, or disguise your stuff in a DIY safe!



You'll need...

stuff from your
recycling bin

craft knife
or utility knife

hot glue

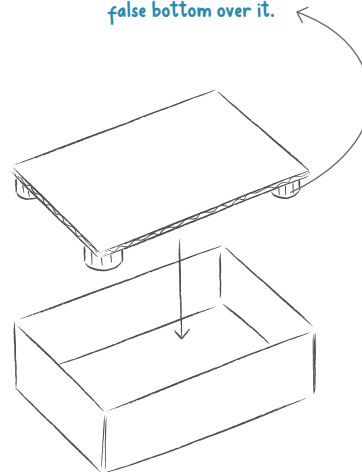
stuff to
keep safe

Design questions:



1. Do you want a latch or lock to make your safe hard to open?
2. Can you hide or disguise your safe as something else, so no one will think to look inside?
3. What if opening your safe was like solving a puzzle, so only a specific sequence of actions could crack it?

For example, to make a box with a false bottom, glue bottle cap feet to a piece of cardboard. Put your stuff in the box, then place the false bottom over it.



Get inspired

by these designs,
or invent your own.

Try cutting a **simple latch** out of cardboard. Turning the handle will turn the latch and open the drawer.



A **book safe** can keep something hidden in plain sight, and it's a good use for a damaged book (like this one).



You have to slide the lid along a **zig-zag path** to open this puzzle box.



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what you made!

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