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Making Virtual Reality Your Own

Making Virtual Reality Your Own

DIY Google Cardboard VR Goggles

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Goals and Objectives

To make VR education accessible to a majority of users, it's important to focus on creating VR experiences for devices users already have and repurpose them into powerful tools for education. A phone most students have in their pockets and $2 creation of a headset devices — such as the Google Cardboard— should be enough to give students good VR experiences.

Learn by doing

It's a well-known fact that people learn best by doing; however, if you inspect modern education, you'll see how little learning actually happens by doing. Students are focused on reading instructions rather than using them in practice. VR in education provides an experience anchor to the instruction. With VR education, learners are inspired to discover for themselves. Students have an opportunity to learn by doing rather than passively reading.

Emotional reaction

Visceral reactions to what we are experiencing are fundamental to forming memories. VR in education makes it easy to engage students the whole time, making experiences memorable.

Develop creativity

Having virtual reality in education is useful not only for content consumption, but it's also great for content creation. By giving students powerful tools such as Tilt Brush, you help them boost their creativity.

Visual learning

A lot of people are visual learners — VR is really helpful for this group of learners. Instead of reading about things, students actually see the things they're learning about. Being able to visualize complex functions or mechanisms makes them easier to comprehend.

Florida Standards

- CTE-AATC.68.GENRL.03.04 Apply mathematical skills and construct a visual arts, performing arts, journalism and broadcasting project.
- WL.K12.AM.3.7 Exchange general information on a variety of topics outside fields of interest.
- G.K12.6.1.2c Learning Profile - Perform: Compare how components of learning preferences align with professionals in a field of study.
- G.K12.7.2.1cInventive Thinking - Perform: Create a product with defined rationale using multiple sources from varied fields or disciplines.

Course Outline/Overview

Where can we apply virtual reality in education? The answer is almost everywhere. VR creates an infinite set of possibilities that people can experience. Here are few types of experiences you can create with VR.

Virtual fields trips: VR technology can be used to engage students in topics related to geography, history, or literature by offering a deeply immersive senses of place and time. Simply imagine geography lessons where you can visit any place on the globe — this type of experience is much more enriching than just reading about it.

Google Expeditions is one good example of an app that's providing such an experience. Expedition is a library of field trips available for regular smartphone users. Each trip is comprised of VR panoramas, and trips vary from the Great Wall of China to Mars.

High tech training: One good example is the VR system used to help students in biology classes learn about the anatomy of the eye.

Lesson Plans and step-by-step guide in implementing

Materials Required:

- A piece of cardboard at least 22" (55.88cm) by 8.75" (22.23cm) the equivalent of a 2'X3' sheet of thin (2mm) corrugated cardboard. I have used a shoebox, pizza box, and the backing from a 3M chartpaper pad. .Corrugated cardboard sheet, preferably E Flute (corrugated cardboard comes in a variety of thicknesses called "flutes"), available at many art supply stores and online . For best results, you should look for strong, thin cardboard (sturdy shoe box rather than moving box). Minimum size: 8.75in (22cm) by 22in (56cm), and 0.06in (1.5mm) thickness

    The cardboard behind Cardboard

    The first step that's important (and can trip you up right off if you don't get it right) is choosing the type of cardboard to use. The Google

Cardboard site says you should use cardboard that has a thickness similar to that of a "sturdy shoe box." That sounded unhelpfully vague to me. Studying the official press photos showing the Cardboard viewer that Google gave away, it appeared to me that the cardboard is, indeed, thinner than the kind typically used for boxes for packaging computers, electronic gadgets or kitchen appliances, but sturdier and thicker than the rigid paperboard of the average shoebox. So I rummaged through the office's recycling bin until I found something that looked similar: a used take-out box for a large-sized pizza. The top of the lid had a small grease stain. It lightly smelled of olive oil. Otherwise, it was perfect: The bottom surface of the box had no stains, was not bent and was a large, smooth square.

- Two 2” (5.08cm) strips of 3/4” (1.91cm) wide Velcro
- Two Biconvex lenses (35mm focal length) a pair of 35mm focal length biconvex plastic lenses, less than a buck a set from China on ebay (if you don't mind the 3-4 week shipping times). Expect $6-8 a pair on Amazon.
- a tiny piece of dense foam/sponge (about .25 X .25 X .1 inch), like what some electronics come packed in.
- cutting tools. I recommend sharp scissors and/or a razor blade for straight/outside cuts or an Exacto knife for curves.
- glue
- a rigid metal edged ruler.
- a cutting board or mat is a wise option as a work surface.
- You'll also need access to a printer (and standard printer paper) to print out Google's templates.

Optional:

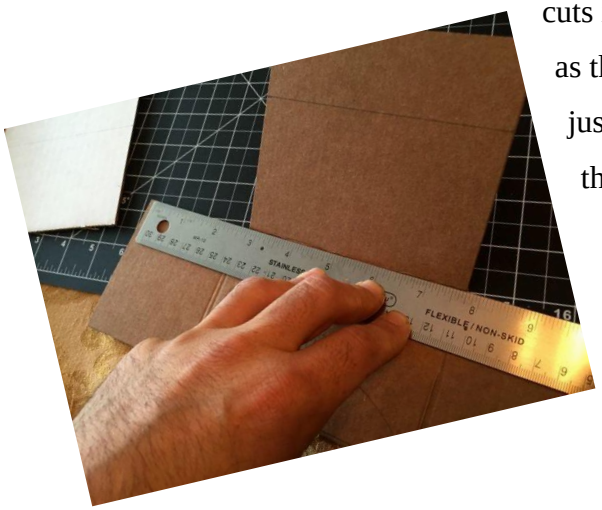
Scotch tape, some spray adhesive or contact cement, and you may also find that some super glue will come in handy.

Templates and tools

To start, you print the PDF templates for the Cardboard viewer parts onto three 8.5-x-11-in. paper sheets. It's broken up into three parts on the printouts, and you have to join them together into one. The second major template is for the part I'll christen the Lens Holder and the third is for the Vertical Divider.

At this point I realized that Google doesn't provide specific guidance or practical tips on how to use these templates to cut out the parts from the cardboard. So I had to think over what would be the best way to cut these parts out of my newly salvaged pizza box.

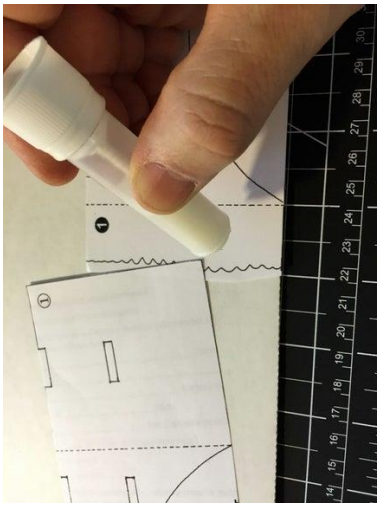
I found I needed five key tools: a ruler, masking tape, a glue stick and/or white glue, a utility knife and an X-Acto knife. I used the utility knife to make long cuts into the cardboard, while the X-Acto knife was for making cuts that required more precision (such as corners, curves or narrow slits) and for cutting out the template pieces. For me it was an absolute must to have both kinds of knives at hand, as well as the straight-edge ruler to help either knife make long, straight cuts into cardboard or paper. (Google refers to the print-out plans as the "scissor-cutting template," which I found laughable. After just a cursory glance, I could tell it would be impossible to cut them out precisely using most scissors.)



BE Safety aware with children and straight and x-ato knives. I usually do the cutting of the curved edges and/or train students to use it. Many art students have been trained. Maybe have a volunteer come in to assist.

Glue Template to Cardboard and Cut Outside Outlines Only.

Cutting and gluing the templates

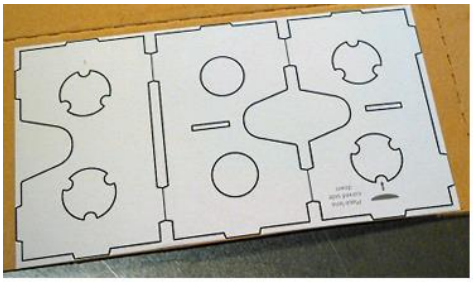


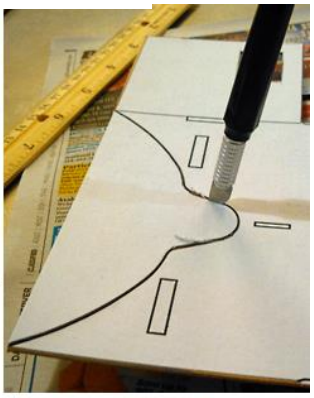
Cut out the templates. I strongly advise cutting the templates out from the paper sheets on a large, stable table surface that's protected with several sheets of newspaper. I cut both my templates and cardboard pieces upon a copy of a tabloid-format newsweekly that was folded open.

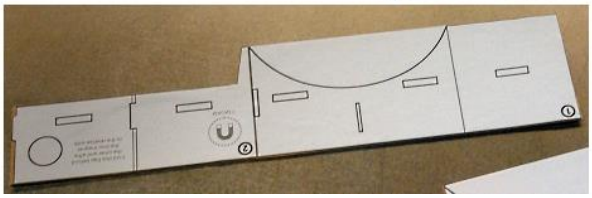
After carefully cutting out the templates with the scissors, I used the glue stick or lightly use white glue to paste them onto the bottom interior of the pizza box. The fully assembled template for the Viewer Case was longer than either the length or width of the pizza box. So I split this template into two, figuring that I could join the separate cardboard pieces with masking tape.

Cut out and glue the template pieces onto cardboard, noting the "grain" (corrugation) to maximize strength. A glue stick will let you peel the template off the cardboard at any point (like folding) and when you're done. You will end up with 2 large pieces, two small, and the button, as shown folded in step 2 below. Hold off on cutting out any of the inside pieces, like the lens holes.

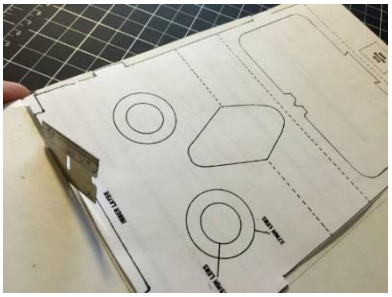
Cutting the cardboard





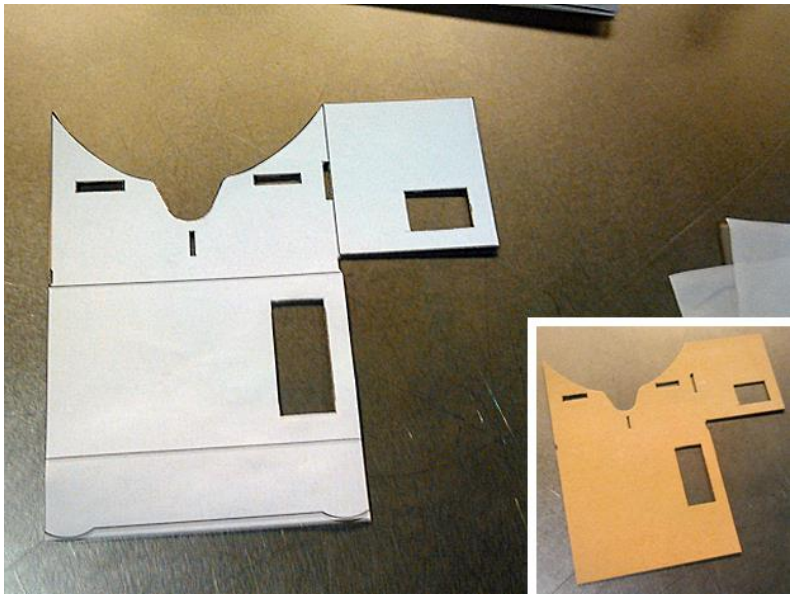


Once the templates are in place on the cardboard, it's time to cut the cardboard itself. I did not bother to cut out the interior openings (such as the circles and slits) of the paper templates before pasting them onto the cardboard, I also chose not to cut certain outer edge areas of the paper templates because these edges require more precision. I figured I could save the effort for when I needed to cut out the final cardboard pieces.



Using the X-Acto knife, I cut out the openings and cut away the curved edges. I did this by carefully stabbing through the template and cardboard, gently sawing a little along the path of the black lines, pulling out the X-Acto, stabbing through another part of the line, sawing, and so on. **Take your time when doing this.**

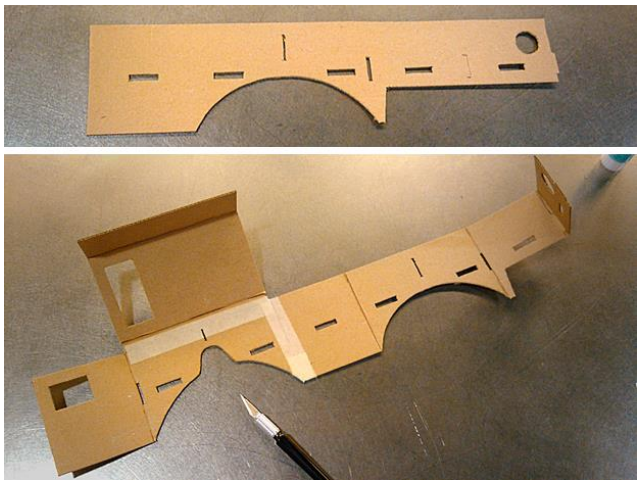
A shortcut when cutting the Viewer Case



Here is one of the two parts of the Viewer Case with the interior openings cut out and the curved edges finished. On the lower right is the same piece with the template paper peeled off.

Note that I ignored the two curved tabs at the bottom of the template. I squared off this flap with sharp corners and a straight line. Similarly, I cut out as rectangles what are depicted on the template as two rounded openings. Why? I figured these rounded designs were nonessential to the function of the viewer... and, to be quite honest, I was lazy and didn't want to cut these more elaborate paths into the cardboard.

Joining the pieces of the Viewer Case

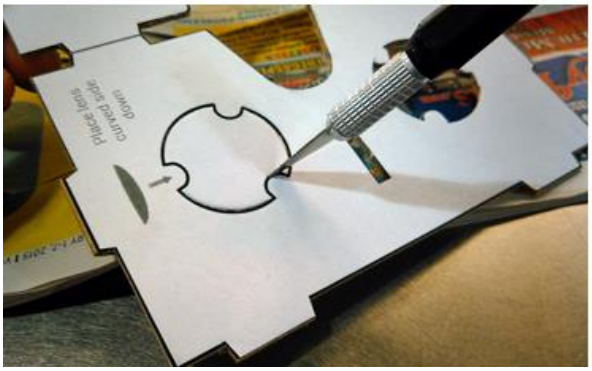


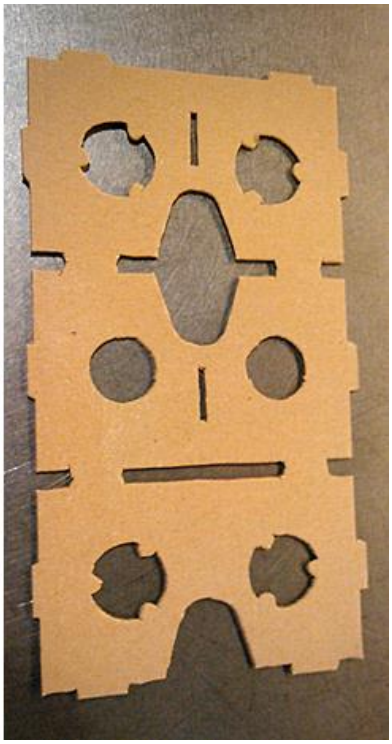
The photo shows the other half of the Viewer Case cut from the pizza box, with the template paper peeled away.

In the bottom photo, I joined the two pieces of the Viewer Case with masking tape -- that's the vertical strip of tape. The strip of masking tape that runs horizontally in this photo is where I made a mistake: I scored a line along the wrong path. So I used masking tape to strengthen the cardboard.

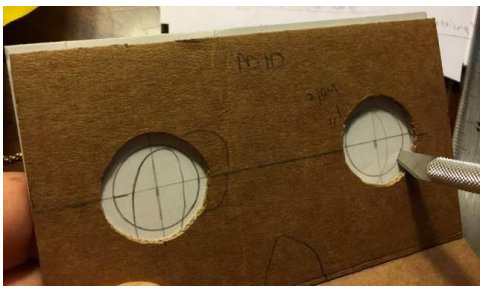
A tip for cutting the Lens Holder

Use the X-Acto to cut through the three outer curves first in these circular patterns (top left) and then cut the three inner curves next (bottom left). This will make removing these interior openings easier than trying to cut them out in a single clockwise or counter-clockwise path.

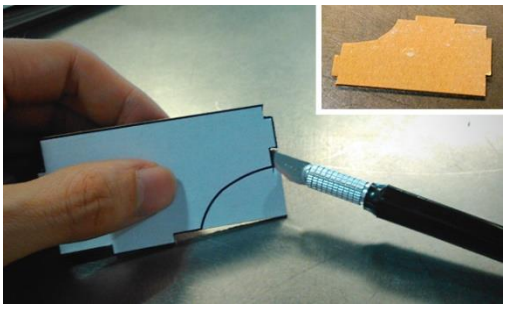




On the right is the Lens Holder fully cut out from the pizza box, without the template paper.



I suggest that you first cut the holes in the outermost layer and make sure those holes line up with the other layers while folded and assembled in their final position. Depending on the thickness of your cardboard and your transferring, measuring, and cutting skills, holes cut only from the templates while the cardboard pieces are flat may not line up when the layers are folded and put together.

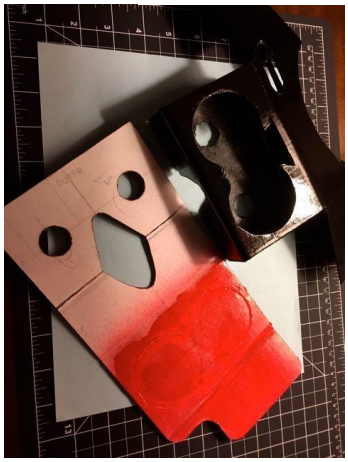


Cutting the last piece

The third and smallest piece of the Cardboard viewer is what I call the Vertical Divider. Here I'm carefully finishing up cutting its edges. In the upper right is what the finished piece looks like.

Fold Each Piece.

Gray lines marked on the template show where you make a fold on the corresponding cardboard part. So, using the X-Acto and ruler, I lightly scored these parts of the cardboard, folded out the cardboard along the scored line, and then folded it back in along the line. Score (lightly gouge) the folding lines using a metal edged ruler and a dull pencil or coin, then, pressing the edge of the ruler into the scored line, fold the cardboard toward you unless instructed to fold a piece under (like on the button).



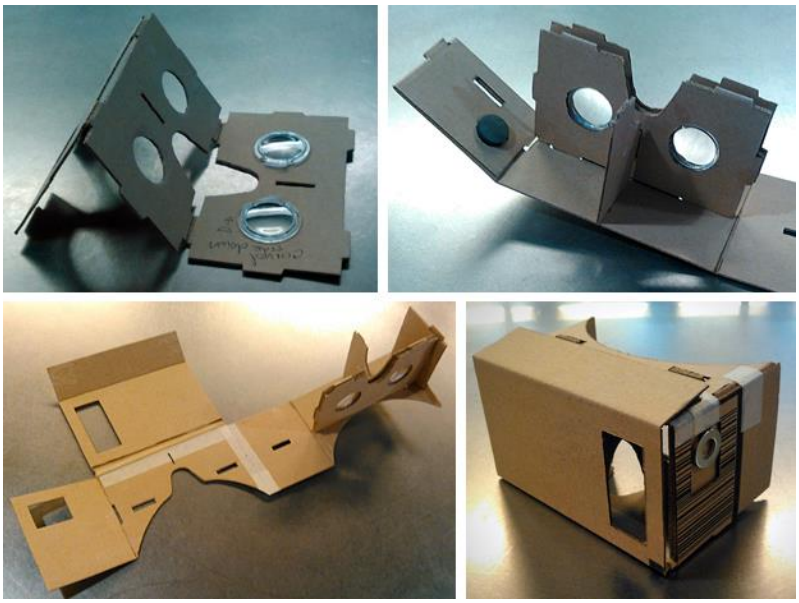
Option: Paint It Now!

If you want to paint your viewer, this stage is probably the best time, before gluing pieces together and inserting the lenses. It's better not to paint surfaces you'll be gluing; bare cardboard to cardboard surfaces set very quickly with white glue. If you don't paint it (I spray painted this one because I made it as a gift), put a piece of clear packing tape above the nose hole on the inside face. No matter how clean you think you or your friends are, you will end up with an oily stain from your forehead on the lens face of your viewer in no time. Tell everyone you made your viewer out of a used pizza box.

Putting it all together

Bringing the three pieces together is fairly straightforward: You insert the lenses into the Lens Holder (upper left photo), which you then fold upon itself like a flattened "N."

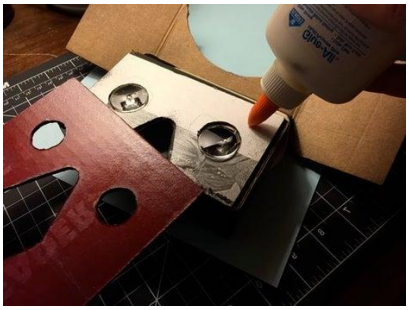
Next you place the tabs on the top of the Lens Holder (the edge opposite where the nose cutout is) into the corresponding slots on the Viewer Case. Then brace it all by



sliding the Vertical Divider's tabs into the appropriate slots on the other two pieces.
After that you just keep wrapping the Viewer Case around the Lens holder (lower left), inserting tabs into slots as you go along.
Google's official Cardboard kit included a piece of double-sided tape to hold the left flap of the Viewer Case into place, thus securing the entire thing together. But that fancy stuff is expensive! As you can see in the photo, I found the masking tape to be just as effective.

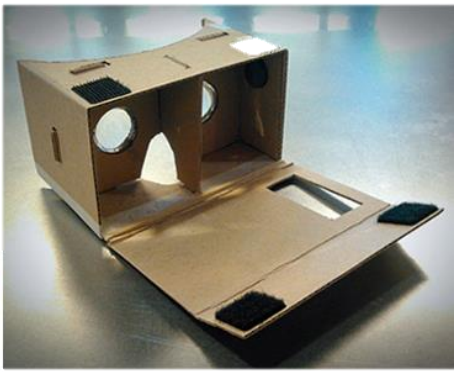
Insert Lenses

Once you have glued the inner (piece 3) and middle (2A) layers of the panels that will make up the lens face together and insert your lenses curved side forward (toward the phone face or inside of the viewer). Then glue the outer panel (1B) on, checking before the glue sets that they still match well when in their folded positions.



Final touches

To finish out my snazzy new Cardboard viewer, I added the Velcro and rubber band. The Velcro fasteners hold the viewer's "back door" in place once you've put a smartphone inside it (right photo). Each piece of Velcro has adhesive; just peel off the backing and stick it on.
The rubber band is used to keep your smartphone from slipping out of the viewer. You stretch it across the fold that acts as a hinge for the door (also shown in the right photo). One side of the smartphone rests against it, and the rubber material is supposed to provide extra friction to prevent the device from sliding out when you're moving the viewer around.



Using the viewer

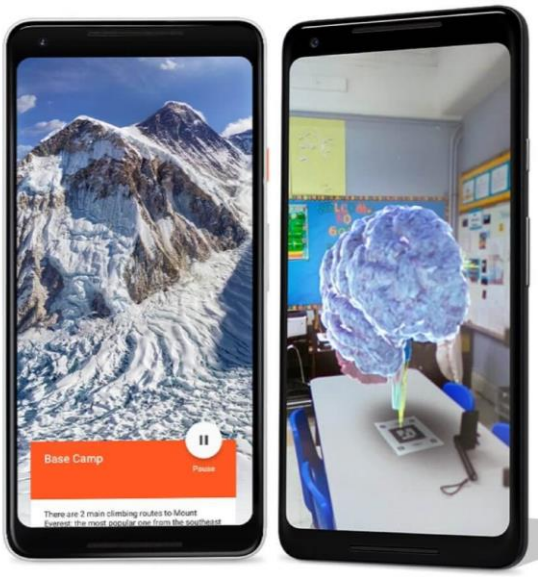
I tested out my contraption with a friend's Samsung Galaxy S5 stuck inside it. This is one of a handful of Android phones that are fully compatible with the required Cardboard hardware specs.

I ran the official Cardboard app on the Galaxy S5. The demos with this app worked: I found myself looking at 3D stereographic environments and objects through my repurposed pizza box. Mission accomplished!

Google Expeditions

https://edu.google.com/products/vr-ar/expeditions/?modal_active=none

With the Expeditions app, classrooms have no boundaries



With VR and AR, teachers are no longer limited by the space of the classroom. VR lets you explore the world virtually while AR brings abstract concepts to life—allowing teachers to guide students through collections of 360° scenes and 3D objects, pointing out interesting sites and artifacts along the way.

Minimal setup for maximum engagement

It's never been easier to take your students on an adventure of a lifetime in VR or AR. Download the free app to explore more.

Hundreds of adventures for the classroom

Expeditions explore history, science, the arts, and the natural world. Whether you're roaming with dinosaurs or taking a look at Renaissance sculptures, there's something amazing to explore for every subject.

Unique experiences within reach

The Expeditions app and Cardboard viewer and Cardboard Camera were built to bring immersive experiences to as many schools as possible.

Inspiring students' creativity and imagination

By helping your students visualize information in a new way, you can positively impact their ability to retain information.

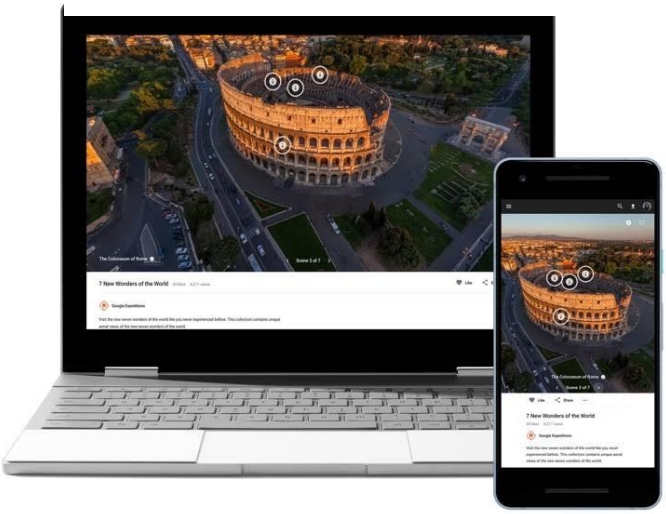
VIRTUAL REALITY

Take your students on virtual field trips

If you could take your students anywhere in the world—where would you take them? From Mount Everest to the Louvre, there are over 900 VR Expeditions https://docs.google.com/spreadsheets/d/1uwWvAzAiQDueKXkxvqF6rS84oae2AU7eD8bhxzJ9SdY/edit#gid=0in the Expeditions app for you and your class to explore.

What you need to experience VR:

Expeditions app
Mobile device or Chrome OS
Optional: Cardboard or Daydream viewer

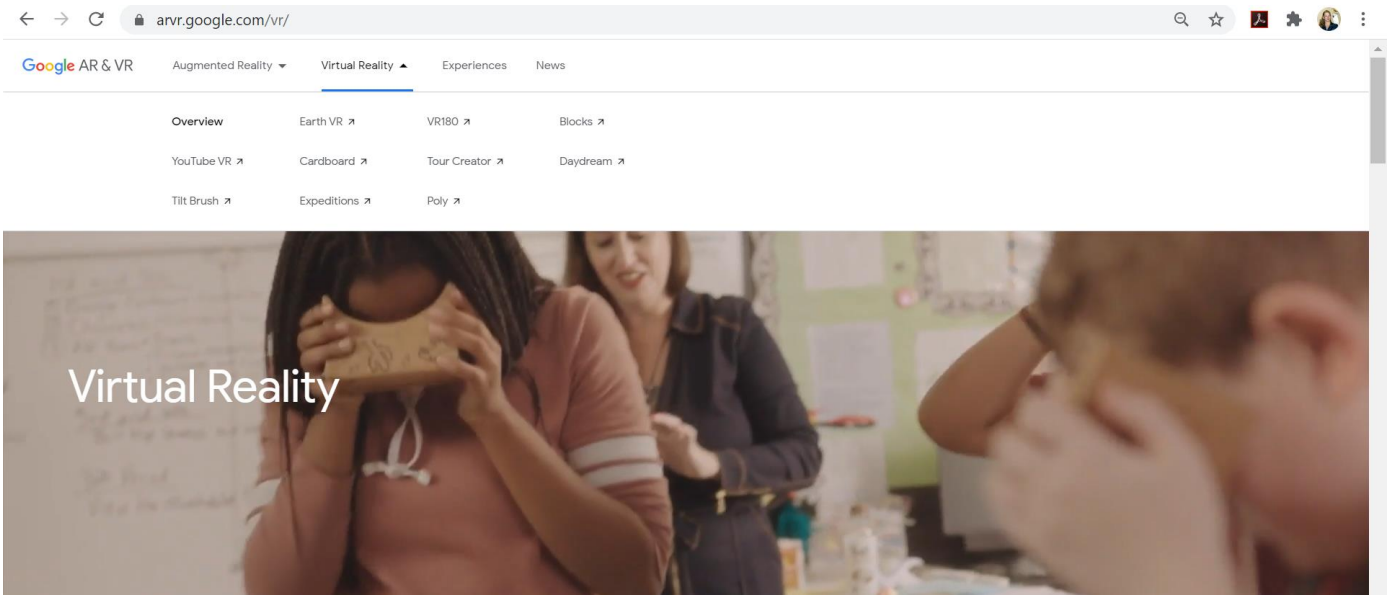


Create your own virtual adventures

With Tour Creator, teachers can build virtual field trips or empower students to create their own immersive tours. You can create a virtual reality tour using your own 360° or 180° photos or images from Street View directly in the browser

Create a virtual tour https://arvr.google.com/tourcreator/

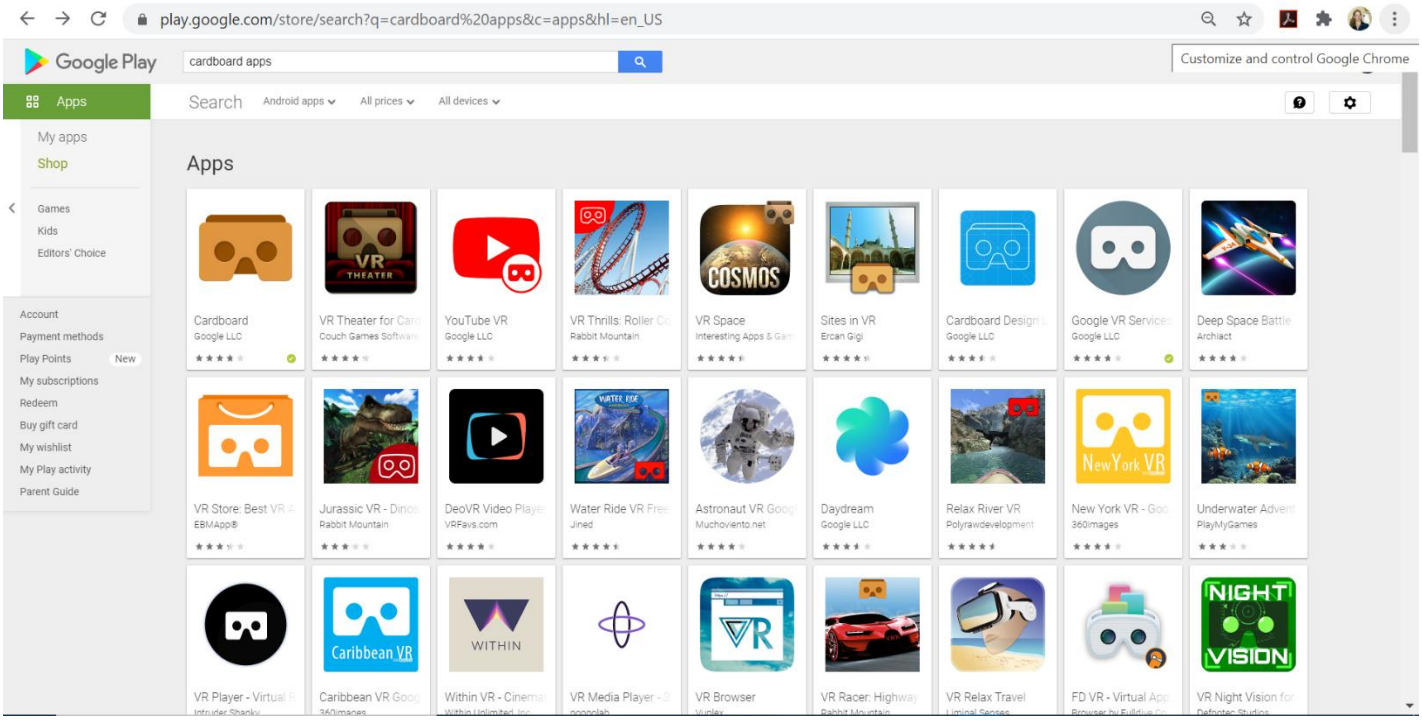
Google VR https://arvr.google.com/vr/

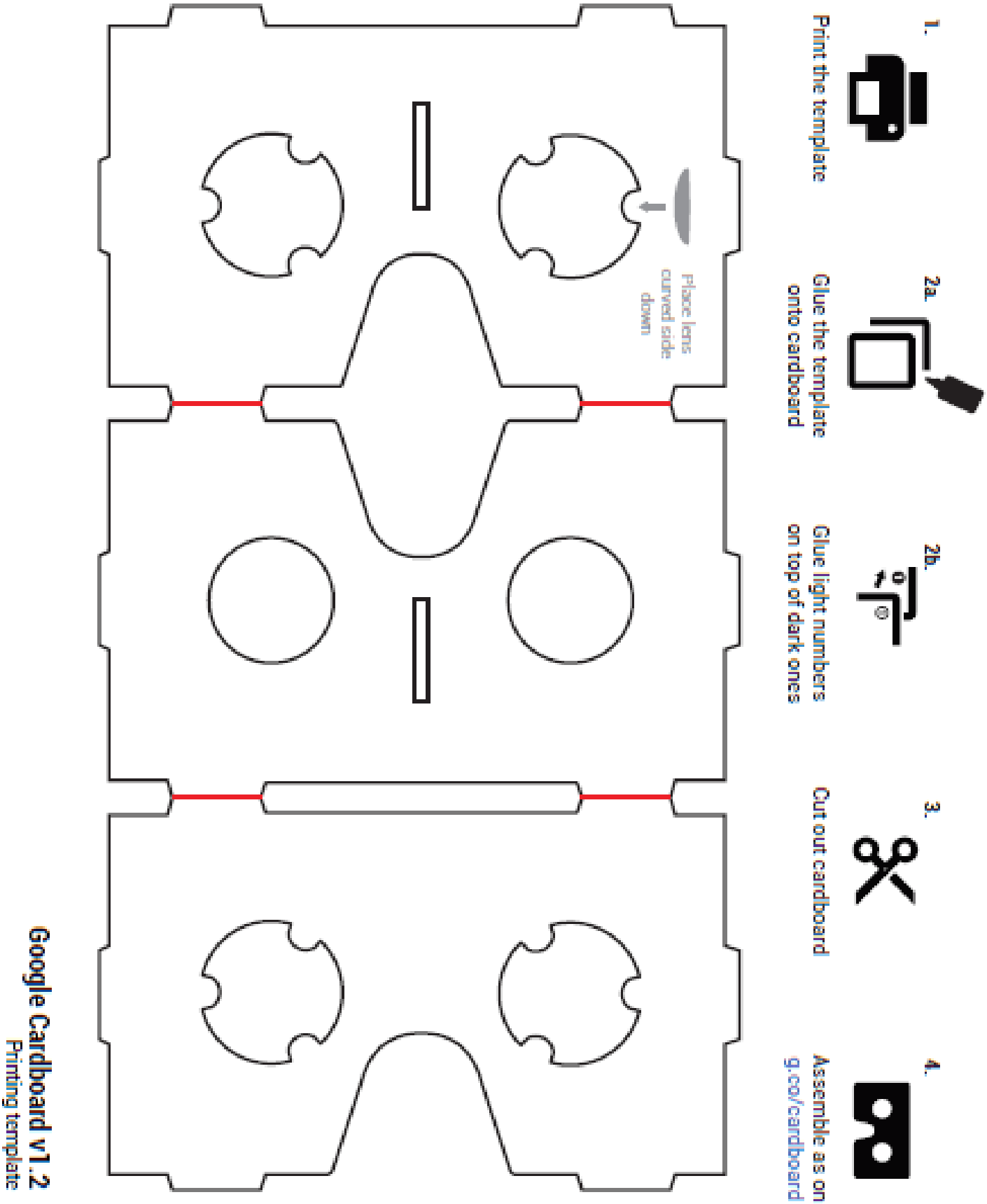


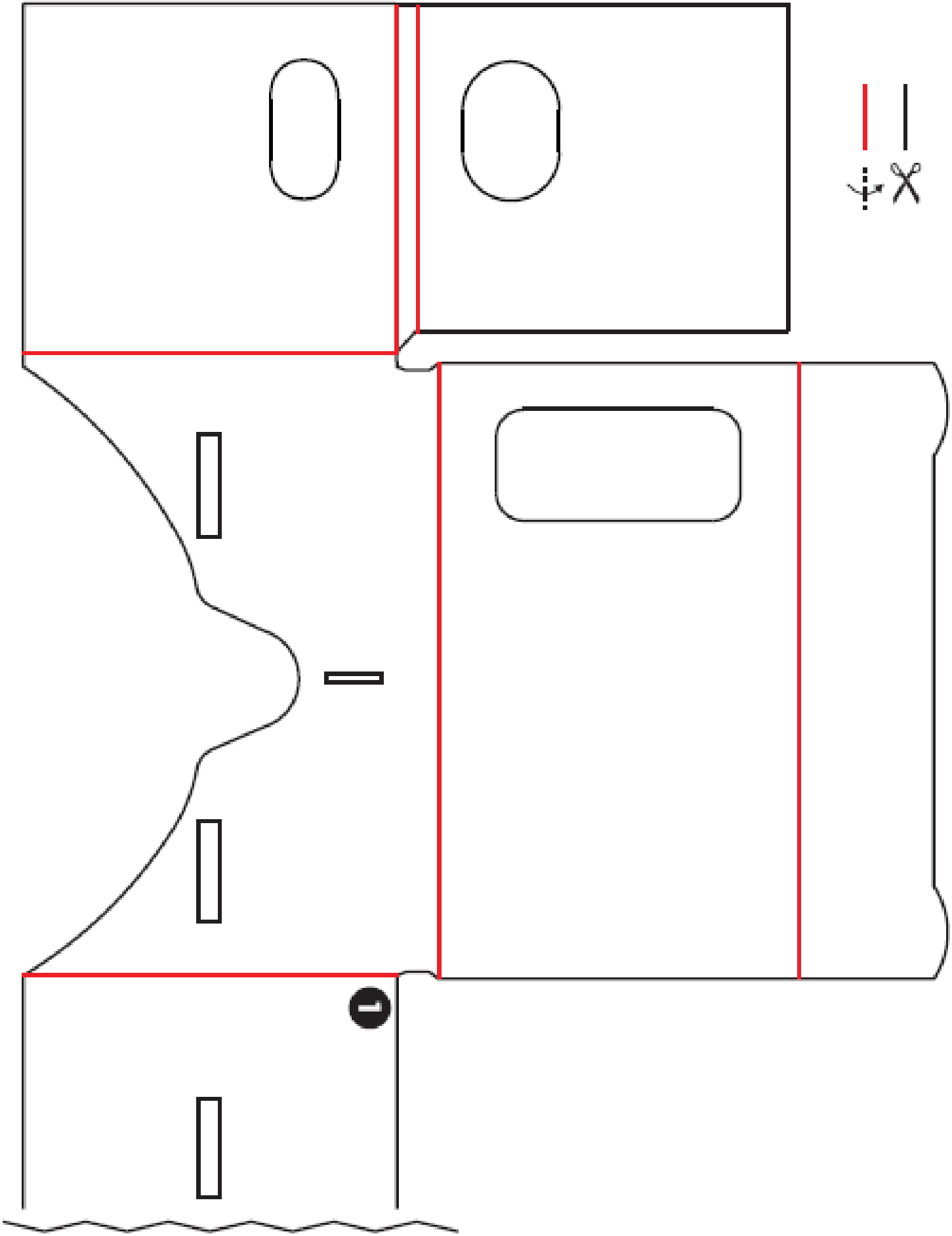
Google Earth VR https://arvr.google.com/earth/

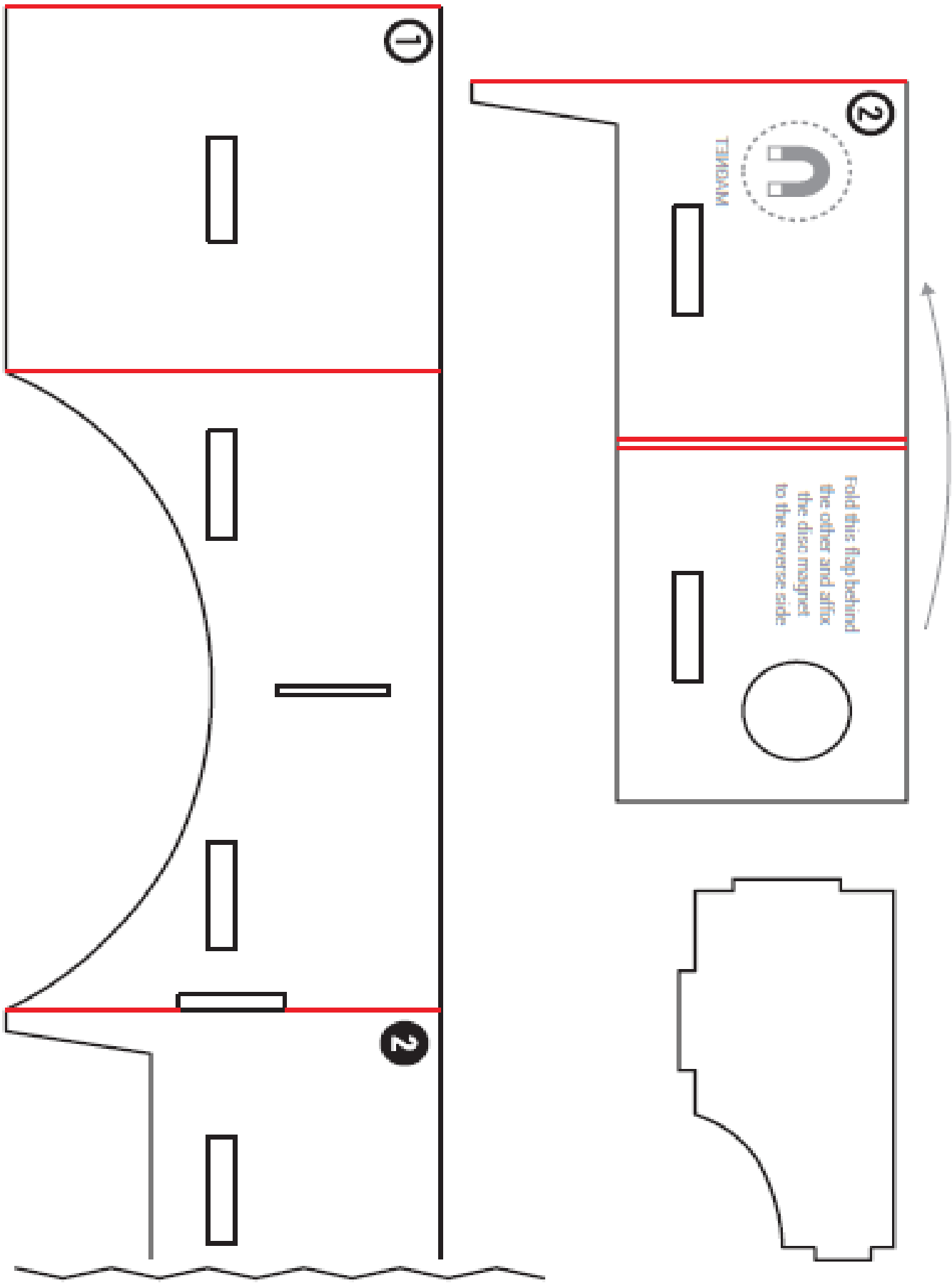
Google Apps (just a few shown)

https://play.google.com/store/search?q=cardboard%20apps&c=apps&hl=en_US




1.
Print the template
2a.
Glue the template onto cardboard
2b.
Glue light numbers on top of dark ones
3.
Cut out cardboard
4.
Assemble as on g.co/cardboard
Place lens curved side down
Google Cardboard v1.2
Printing template

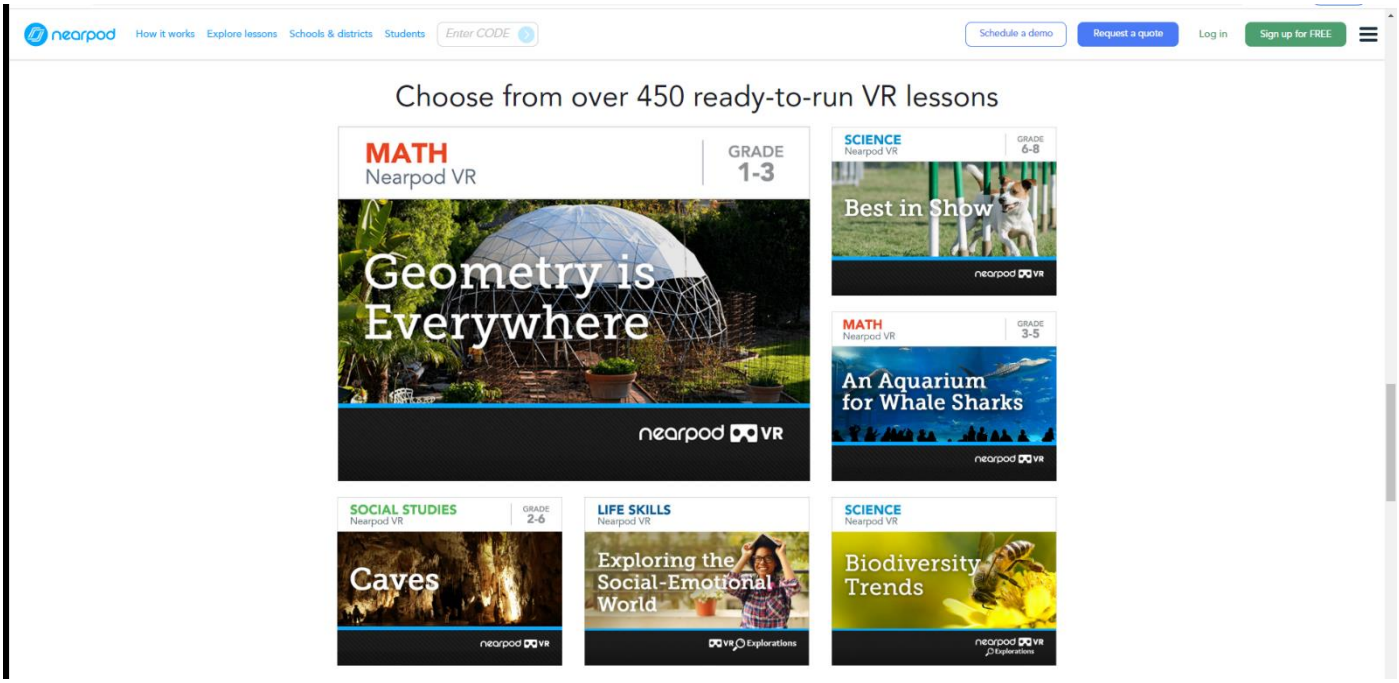



1
2
2
MAGNET
Fold this flap behind the other and affix the disc magnet to the reverse side

Nearpod VR Apps

https://nearpod.com/nearpod-vr

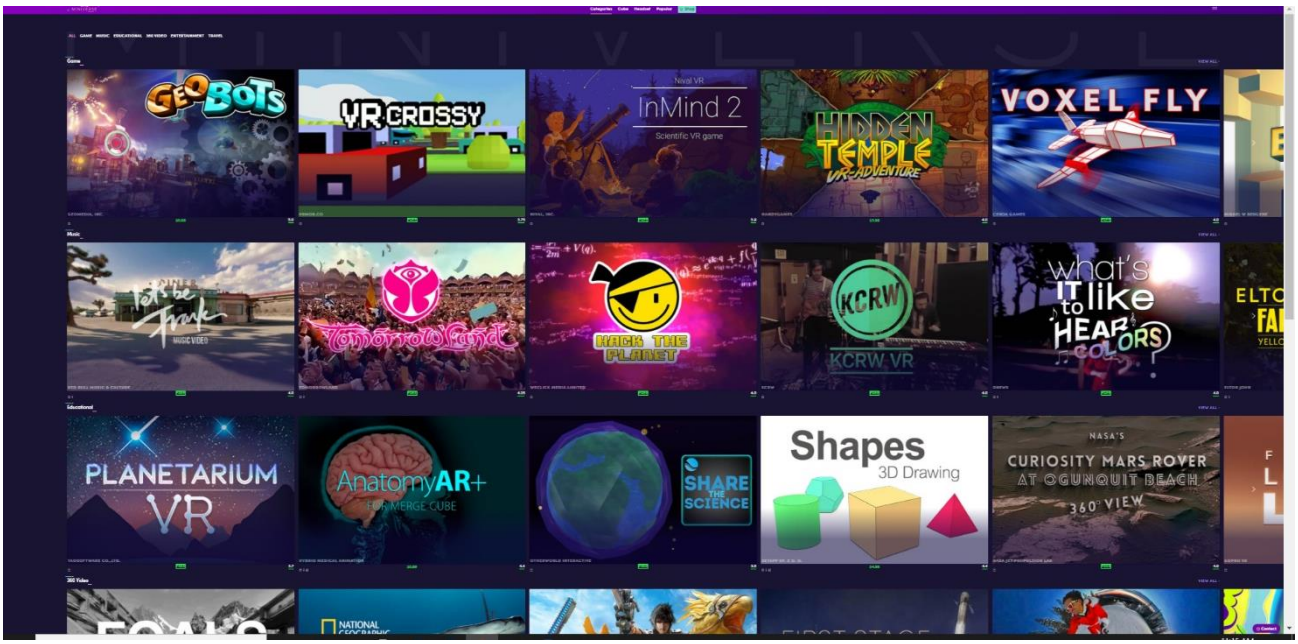
Nearpod VR works on any device. Whether you have iPads, Chromebooks, Macs or PCs in your classroom- Nearpod VR works on any device. Our VR headsets make the experience more immersive, but is not required to experience the Virtual Field Trips. Students LOVE Virtual Field Trips! Imagine taking your students to the Taj Majal, The Pyramids of Giza, the Washington Monument or the Great Wall of China. All from the comfort of your classroom. We have a distort licen se

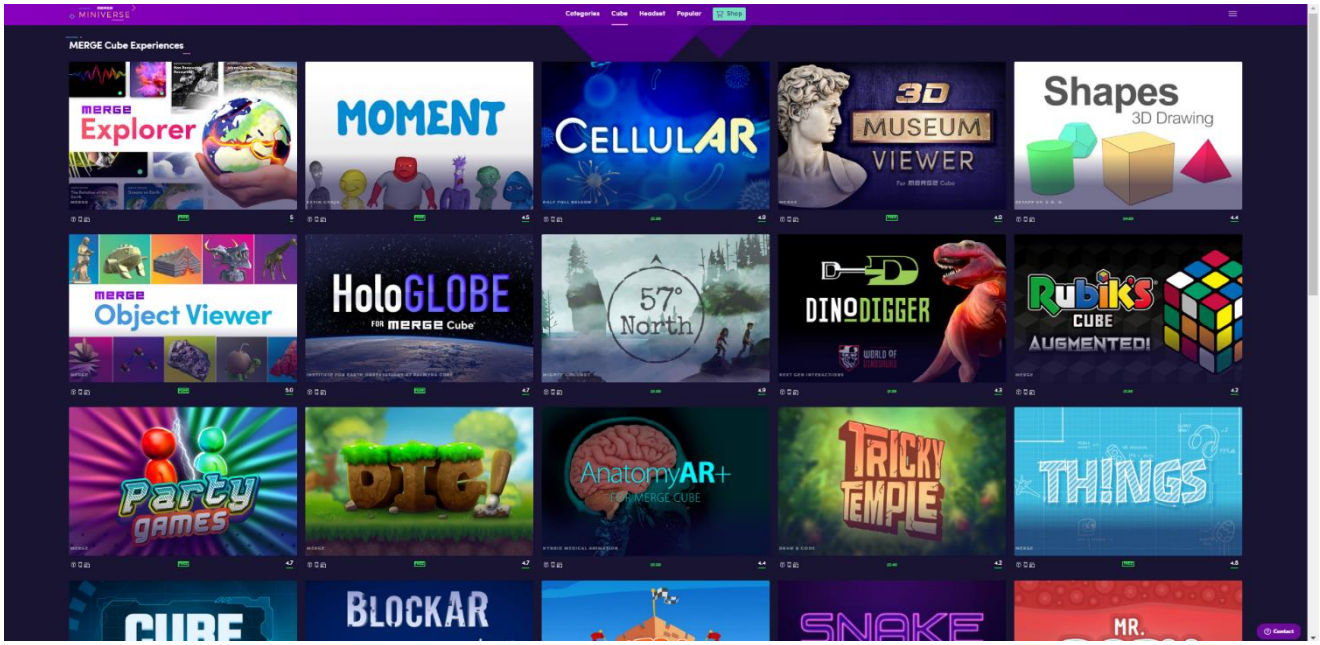


Merge Cube Apps (just a few shown)

https://miniverse.io/cube?cr=2205 Apps – some free some lost cost DIY merge cube below

https://mergeedu.com/ Educational site Teaching Aids & Simulations $$$





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