# Amazing Mazes

| Grade Levels | Subjects | Type | Author |
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| 2, 3, 4, 5, 6, 7, 8 | Mathematics, Technologies | Lesson Plan | Mandi Dimitriadis (Dip T) |

**Description**

Building 3D mazes is a great way for students to explore spatial concepts, solve problems and build structures within design constraints provided. It is an ideal design challenge to adapt to different age groups and ability levels.

In this lesson, students design and 3D print a maze that can be used with a 3mm ball bearing.

| Task | Activity | Resources |
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| Step 1.<br>What is a maze? | Ask students when and where they have seen mazes before. They might talk about mazes in puzzle books, physical mazes at playgrounds and fun parks, historical mazes in castles or games they have played where they have rolled a ball through a maze. Write these examples on the whiteboard. | Whiteboard and markers |
| Step 2.<br>Not all mazes are created equal! | Show students the engagement video included in this lesson plan. Ask students to share their observations of the mazes in the video. What do they notice about the mazes? What do they have in common? What unique features do some mazes have? What shapes and angles are often found in mazes? What are mazes used for? Are they all just for fun? What materials are mazes made from? What design features do they notice? What sorts of decisions do maze designers make? Which maze looks the trickiest? Why? Ask students to think about what makes mazes tricky and what makes them fun. Write a list on the whiteboard of student's suggestions. For example, twists and turns, dead-ends, tunnels and stairs, sharp angles, surprises hidden in the maze. | Class video<br>https://youtu.be/I_5VHyzQI3A<br><br>Whiteboard markers |

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| Step 3.<br>Plan your maze | Explain to students that they are going to design a maze that will be made into a 3D printed puzzle that a 3mm ball bearing can be rolled through. Pass a few 3mm ball bearings around the class, so that students get to know its size. Provide graph paper for students to sketch their maze designs. As students are planning their mazes, remind them to include some of the features that make mazes tricky and fun from the list on the whiteboard. | 3mm ball bearings<br>Graph paper and pencils for drawing and planning maze designs. |
| Step 4.<br>Design your 3D maze | Students use Makers Empire's Blocker Module to design their maze in 3D. Provide opportunities for students to see each other's maze designs and give each other feedback. Remind students to leave a gap bigger than 3mm in all paths of their maze so that the ball bearing can easily run through it. The grid lines on the Blocker Module's design plate form 1mm squares. | Devices with Makers Empire 3D design software installed |
| Step 5.<br>Print your maze | Once students have completed their maze designs, select the designs in the Teachers Dashboard and download the .stl files. Open the .stl files in your 3D printer's software and print each design. Insert a 3mm ball bearing into the maze. Cut a piece of clear plastic to fit the maze and secure with clear glue or sticky tape. | 3D printer and filament<br>3mm ball bearings Pieces of clear plastic or perspex (over-head projector transparencies work well)<br>Glue or clear sticky tape. |
| Step 6.<br>Challenge a friend | Students challenge each other to solve their maze puzzles and evaluate their designs. Who has made the trickiest maze? Why? What has worked well? What could make the maze more successful? More fun or trickier? | 3D printed mazes |