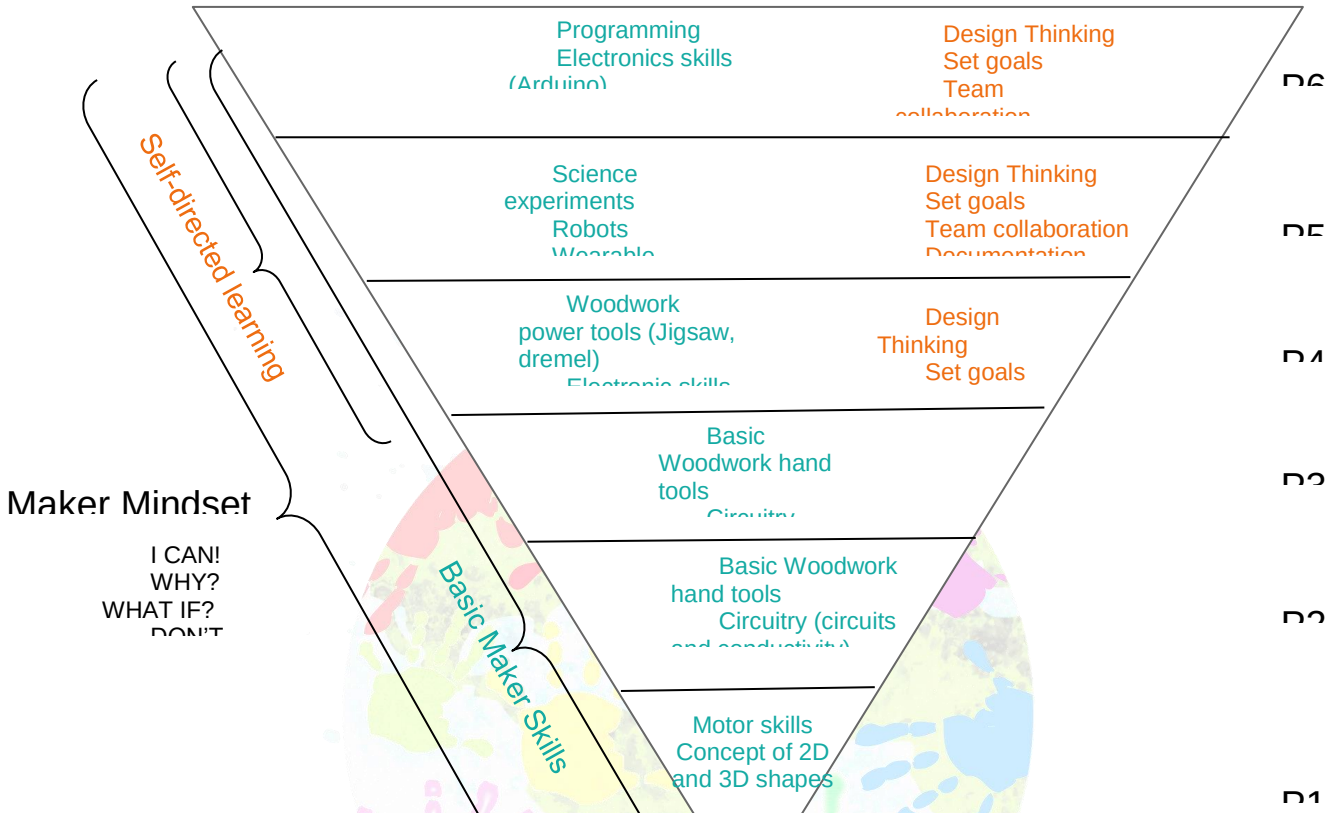
MakerBay

The Mission Covenant Church Holm Glad No. 2 Primary School: Learning by Doing Program

2nd Term Making Class Curriculum (2016 - 2017)

	Lesson 1-8 (6, 7, 8, 9, 14, 21, 22, 23/2)	
P6	Marble Machine *Theme: Force & Motion*	Integrated with P6 general study curriculum on the concept of force and motion. Students will participate in the global spaghetti challenge to build a unique marble machine which fulfill the criteria (such as minimal 4 elements of a pivot, 3 types of energy conversion, a gear set and run in cycles). Students can get bonus point on creativity or additional elements i.e. music, art, materials usage etc.
	Lesson 1-6 (28/2, 2/3, 6-9/3)	
P4, 5	Light it up! *Theme: Basic circuitry & safe wiring*	This module is integrated with the design class and school GS curriculum. Students designed a lamp shade in design class then come to the Making class to build the lamp circuit and base. Upon finishing the module, students will learn about the basic circuitry and safe wiring of a table lamp. They can also design and build a customized wooden lamp stand.
	Lesson 1-4 (二信：11, 15, 16, 18/5) (二望：22, 23, 25, 29/5)	
P2	Squishy Circuits *Theme: Circuitry*	Students tinker with conductive and insulating play dough to learn the basics of electrical circuits in a fun, hands-on way. They will also make their own dough with the provided recipes. The squishy circuit allows students to bring their creations come to life as they light them up with LEDs, make noises with buzzers, and spin with the motor.

Maker Education Curriculum Overview



Module 1: Marble Machine

Module 1	Integrated with P6 general study curriculum on the concept of force and motion. Students will participate in the global spaghetti challenge to build a unique marble machine which fulfill the criteria (such as minimal 4 elements of a pivot, 3 types of energy conversion, a gear set and run in cycles). Students can get bonus point on creativity or additional elements i.e. music, art, materials usage etc.
Class Level	P6
Objectives	● Explore the physics concept of force, torque, equilibrium and friction ● Appreciate the iterative process ● Learning by teaching (create a TED-Ed lesson) ● Engage in the global TED-Ed community
Skills and competencies	● Project planning skills ● Problem solving skills ● Collaboration Skills ● Presentation skills ● Basic video production skills
Activities *Always assign 10 mins before the end of class for cleaning	Lesson 1 ● Introduce the challenge ● Project overview ● Set Goals ● Form groups -- 5 min ● Set up community platform -- 30 min Lesson 2 ● Filming workshop for beginner (planning for create a TED-Ed lesson) -- 60 mins ● Research & Design -- 30 mins Lesson 3 ● Purchase materials (outing: MakerBay & nearby hardware shop) Lesson 4* ● Building -- 60 mins ● Young Maker TV: students share what they learnt -- 15 mins Lesson 5*

	• Building -- 60 mins • Young Maker TV: students share what they learnt -- 15 mins Lesson 6* • Building -- 60 mins • Young Maker TV: students share what they learnt -- 15 mins Lesson 7 • Prepare presentation • TED-Ed lesson: Physics of Marble Run • Video Editing Lesson 8 • Presentation & Consolidation
Documentation	Student made video (max. 10 min)
Materials/ Equipments	• MakerBench tools • Metal wires • Soldering iron • Scrap wood • Students' get their own materials (budget: $30/student)
Grouping	Group work , 4-5 students/ group
Instructors	Maria (MakerBay), Gigi (HG2PS)
Facilitator to student ratio	1:10
Role of facilitator	Give advises on students' projects Ask questions E.g. "In what ways might these materials make?" Help them set goals and track progress Make time for reflection
Resources	• Marble run simulation game - http://www.marblerun.at/ • Inspire and amaze - https://www.youtube.com/watch?v=IvUU8joBb1Q • How to make a marble machine - https://feltmagnet.com/crafts/HowToBuildAMarbleMachine • Marble run that make music - https://www.youtube.com/watch?v=KFPdLECjSQw • Magnets and marbles - https://www.youtube.com/watch?v=QQ9qs-5lRKc

Module 2: Light it up!

Module 2	Students work in a group to build a wind powered system that is able to produce as much electricity as possible for a city
Class Level	P5
Objectives	• Learn about the basic circuitry • Learn basic of safe wiring of a table lamp • Design a table lamp stand using basic woodwork skills • Design a lampshade •
Skills and competencies	• Can-do spirit • Problem solving skills
Activities	Lesson 1 • Project overview • Safety induction • Draw circuit diagram • Practice stripping wire Lesson 2 • Open the lid of plug and switch and examine closely • Know the anatomy of 3 cords cable • Assembling lamp circuit Lesson 3 • Plugging in! Circuit testing • Design lamp base Lesson 4 • Build the base Lesson 5 • Finish building the base • Put the circuit and base together Lesson 6 • Reflection & consolidation

<table>
<tr><td>Documentation</td><td colspan="2">Photos of the table lamps</td></tr>
<tr><td>Materials/ Equipments</td><td>Safety Equipments
Safety goggles
Gloves
Lamp Stand design
scrap wood (wooden board and rod)
saws
screwdriver
screws
hand drills
Double side tapes
Any recycling materials (optional)</td><td>Wiring of Lamp
Socket
Line switch
13A Plug (in UK, Hong Kong, Singapore)
3W Light bulb (recommend LED as it is less hot, thus more safe to let students to handle)
18/3 wire lamp cord (1m per student)
Test pen/Neon Testing Screwdriver or multimeter
Electrical tape
Screwdriver
PPT / Video
You can get these in home repair stops, hardware stores or online retailers.</td></tr>
<tr><td>Grouping</td><td colspan="2">5-6 students/ group</td></tr>
<tr><td>Instructors</td><td colspan="2">Maria, Kit, Volunteer x 2 (MakerBay)
Yin, Xin Yi (HG2PS)</td></tr>
<tr><td>Facilitator to student ratio</td><td colspan="2">1:6 (ideal) , 1:10</td></tr>
<tr><td>Role of facilitator</td><td colspan="2">Facilitator’s Guide</td></tr>
<tr><td>Resources</td><td colspan="2"></td></tr>
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Module 3: Squishy Circuits

Module 4	Students tinker with conductive and insulating play dough to learn the basics of electrical circuits in a fun, hands-on way. They will also make their own dough with the provided recipes. The squishy circuit allows students to bring their creations come to life as they light them up with LEDs, make noises with buzzers, and spin with the motor.
Class Level	P2
Objectives	• Develop maker mindset (I can! Why? What if? Don't give up, try again!) • Develop problem solving skills • Set it free for creativity • Tinker and experiment
Skills and competencies	• Develop a maker mindset • Design skills
Activities	Lesson 1 • Making conductive & insulated play dough Lesson 2 • Tinkering with squishy circuit Lesson 3 • Tinkering with squishy circuit Lesson 4 • Make a project with the play dough
Documentation	
Materials/ Equipments	• Flour • Lemon/ orange juice • Distilled water • Vegetable oil • Salt • Food coloring • Cooking pan • Batteries • Mini motors • Buzzers • LEDs

Grouping	Individual work
Instructors	Maria, Kit (MakerBay)
Facilitator to student ratio	1:10
Role of facilitator	Inspirator
Resources	Squishy circuits -http://squishycircuits.com/