WEEK Two The Teachable Machine

Week 2: Training Your Own AI with Teachable Machine (TM)

Hello AI trainers! This week we move from playing with AI to actually training our own AI models using Google's Teachable Machine. This free, no-login tool allows students to build simple machine learning models that classify images. We will begin with 2D shapes, helping students see how AI learns from examples they provide.

Theme: *Understanding how AI learns from labelled examples & why balanced, clear data matters.*
Anchor Tool: Google Teachable Machine (Image option only). Use a computer or laptop with webcam.
Core Concept: *AI does not 'understand'; it learns patterns from training data. The quality of the data determines the quality of the predictions. Garbage in = garbage out.*

Timings: *45-60mins per day*

1. AI doesn't "understand", it predicts
Teachable Machine doesn't see or hear like we do. It looks at tiny parts of pictures, sounds, or movements and makes a best guess.

2. AI needs clear, labelled examples
It learns from the examples you give it. If you show it cats and dogs, you must label them clearly. The clearer the examples, the better it learns.

3. You are the teacher
Each time you add examples and train, you're teaching the AI how to tell things apart. Your work makes the model smarter.

4. It works in probabilities
When you test it, the AI gives a score. For example, it might say, "I'm 80% sure this is a cat, 20% sure it's a dog."

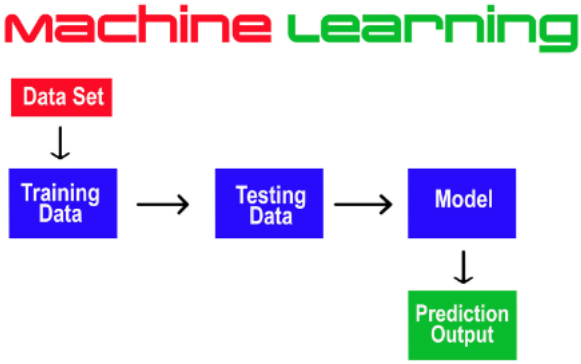
5. Mistakes reveal how AI thinks
If the AI gets it wrong, that shows how it's thinking. It's not like a human brain, it's just copying patterns. Mistakes help you see what it still needs to learn.

Day 1 – What is Machine Learning? What does it mean to Train?

Goal: *Introduce the idea of training data and testing data.*

1. CLASS DISCUSSION: Ask: "What does it mean to train?"
Use examples (training a dog, practising spelling, learning a sport).
Connect this to AI: "We train AI by giving it examples, just like we practise."
Do you think you can teach an AI?

2. DISCUSS diagram of the machine learning process
Show the Machine Learning Process
Dataset = examples
Training = practice
Model = AI's trained brain
Prediction = AI's guess
Testing = checking learning with new data
Use metaphor: "Like practising spelling words then doing the test.



3. WATCH Teachable Machine Tutorial 1: Gather

4. DEMONSTRATE Google Teachable Machine
On Teachable Machine, create 2 classes (rectangle vs triangle).
Add 50 labelled images per class (teacher demo).

5. STUDENT HANDS-ON Activity
Step 1 – Shape Creation
Each child chooses either: Triangle: equilateral, 3 sides of 7 cm
or a Rectangle: 5 cm × 10 cm. They draw their shape accurately on coloured paper. They cut out their shape carefully. (resource template at the end for 2D shapes for younger grades.)

6. DATA COLLECTION
Teacher demonstrates how to label classes (click the pencil icon, name one "Rectangle," the other "Triangle"). A few students, one at a time, hold their shape up to the laptop camera.
HOLD the Record button to capture images.
COLLECT about 100 images per shape, per student.
SHOW RESULTS live on the Electronic Whiteboard (EWB).
TARGET 800 images total (400 triangles, 400 rectangles). Similar numbers for each class.

Day 1 – What is Machine Learning? cont

7. WATCH

[Teachable Machine Tutorial 2: Train](#) ***(1m)***

8. Train the Model

Press Train Model. Do not leave the webpage until training finishes.

9. WATCH ***Teachable Machine Tutorial 3: See if it Works & Export*** ***(1m)***

10. TEST THE MODEL

Select a few students to hold their shapes to the camera.
Check the preview window: does the AI correctly identify the shape?
Discuss the percentage likelihoods shown (e.g., “70% triangle, 30% rectangle”).

11. TEACHER DEMOS saving project to google drive, label it **Rectangles & Squares-TM**.
Using the hamburger menu on the top left of the screen.

12. GUIDED REFLECTION

Ask students:“Did the AI know what a rectangle was?” (No, it just learned patterns).
“Why did we need to give it examples?” (So it could find patterns).“Why do we test it?” (To check if it learned.)

IF TIME PERMITS As an extension, students write a short **Flow Writing** reflection (from Week One strategy) describing what surprised them about how the AI ‘learned’ shapes.”

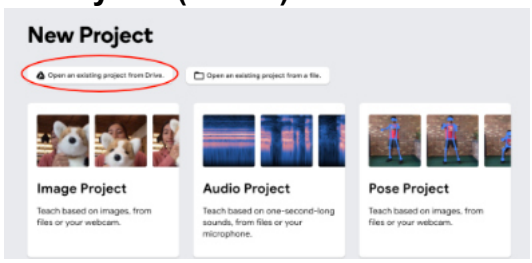
CORE UNDERSTANDING:

AI learns through training data. Testing shows how well it has learned. Training examples guide its learning and testing checks if it can apply that learning to new situations.

Day 2 – Test how well the Model Performs.

Goal: *Students test how Teachable Machine recognises shapes and learn that AI guesses from patterns in data, not human understanding.*

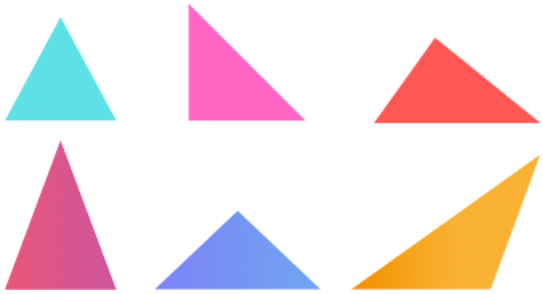
1. WATCH [Teachable Machine 2.0:](#) Making AI easier for everyone (2mins)



2. LOAD Rectangles & Squares-TM from google drive.

3. TEST Some Triangles and Rectangles.

4. WHAT will happen if I put a different kind of triangles & rectangles in front of the viewer? What other kinds of triangles are there? (scalene, isosceles, right angle, acute triangle, obtuse triangle). What other types of rectangles are there? (different lengths of sides, special case all sides equal - a square)



5. STUDENT HANDS-ON Activity

Step 1 – Shape Creation

Students chooses different types of triangle or rectangle to create, to test the **Teachable Machine.** Students draw their shape accurately, colour it in a variety of ways. They cut out their shape carefully.(resource template at the end for different rectangles & triangles.)

6. TEST the Model

Students to hold their shapes to the camera on the laptop. Check the preview window: does the AI correctly identify the shape?

7. DISCUSS the percentage likelihoods shown (e.g., “70% triangle, 30% rectangle”). Does the AI actually know what a triangle is?” (No, it spotted patterns.) Why didn’t it always get 100% right?” (It’s guessing from data, not thinking like us.)

8. TRICK the AI Add a trick shape (like a diamond or trapezoid) to test how the AI reacts. This shows how it struggles with things it wasn’t trained on.

9. EXTENSION if you’re up for it! Label your triangles and rectangles. And discuss which shapes the Teachable Machine guessed correctly. What were the percentages for the different types of triangles. Record the results in a table.

CORE UNDERSTANDING:

AI predictions depend on varied examples. The more diverse the data, the more accurate its guesses. Limited or repetitive examples restrict what it can recognise.

Day 3 – Create and Test Your Own Teachable Machine

Goal: Students will work in pairs to create and train their own Teachable Machine models with two chosen 2D shapes. They will learn how AI uses examples to make predictions, test its accuracy, and explore how AI responds to unfamiliar objects.

1. SHAPE SELECTION
In pairs, students choose 2 different 2D shapes (e.g., square, triangle, rectangle, oval, heart). For each shape, create 4 versions (different sizes, types, or colour.)

2. DATA COLLECTION (Image Capture)
Students open Teachable Machine on laptops/computers.
For Shape 1: take 100 varied images (different positions, angles, lighting, backgrounds).
Repeat for Shape 2.
Total dataset = 400 images per shape = 800 images overall.
Label each shape clearly when uploading images.

3. TRAIN THE MODEL
Press Train Model in Teachable Machine. Wait for training to finish.

4. TEST YOUR MODEL
Students hold up their created shapes in front of the camera. Check the percentage likelihoods shown in the preview window.
Record results in a table in Word.

5. TRICK THE AI
Students show the AI an object it was not trained on (e.g., a pencil, book, banana).
Record: this in the table. Did the AI get it right?

Shape/Object Tested	AI % Guess	Correct / Incorrect
Triangle 1	85% Triangle, 15% Rectangle	Correct
Triangle 2	95% Triangle, 15% Rectangle	Correct
Triangle 3	93% Triangle, 15% Rectangle	Correct
Triangle 4	98% Triangle, 15% Rectangle	Correct
Pentagon 1	70% Rectangle, 30% Triangle	Correct
Pentagon 2	81% Rectangle, 30% Triangle	Correct
Pentagon 3	97% Rectangle, 30% Triangle	Correct
Pentagon 4	95% Rectangle, 30% Triangle	Correct
Banana (Trick Object)	60% Rectangle, 40% Triangle	Incorrect

6. SAVE
Students save their trained models to Google Drive (optional).

7. DISCUSS results as a class: Did the AI always get it right? What made it confused? How could more or better data improve accuracy?

8. EXTENSION
Students design and test a third class (extra shape). Compare whether the model accuracy changes with 3 shapes instead of 2.

CORE UNDERSTANDING:
Balanced datasets matter. When one class has many more or less examples than another, the AI becomes biased. Reliability improves when data is balanced and varied.

Day 4 - Choose, Train, Test: Your Own Teachable Machine

Goal: *Students decide two appropriate classroom categories, collect images, train a Teachable Machine model, test it, then export and share a TensorFlow.js model link with a short written explanation.*

1. WATCH Teachable Machine 2.0: Making AI easier for everyone ***(2mins)***

2. DISCUSS What makes a good dataset? Balance, variety, backgrounds, lighting.

3. CHOOSE 2 classes: Start simple (e.g. “cats vs pencils” demo, fruit vs classroom objects, letters vs numbers).

4. PLAN IMAGES Aim for 400 varied images per class. Balance counts.

5. COLLECT Students photograph items from multiple angles, distances, backgrounds.

6. LABEL each class.

7. TRAIN Press Train Model and wait.

8. TEST Hold up new examples, observe percentages, note correct/incorrect.

9. REFLECT Why did it get some wrong? How could data improve it?

10. EXTENSION Add a third class or “trick the AI” with a novel object and record outcomes.

11. EXPORT (student instructions) Open your trained project → Export Model tab.
Choose TensorFlow.js. Select Upload (shareable link) → click Upload my model.
Copy the shareable link.

12. CREATE a Google Doc titled “Cats and pencils TM” (or another title that suits your project), paste the link into the document.

13. EXPLAIN What your Teachable Machine does. What images you used & how many per class. How you varied data (angles, lighting, backgrounds)
Two observations from testing (percentages, mistakes, surprises.)

14. REFLECTION Students record a Flow Writing reflection about their project: what worked, what didn’t, and what they might try next.

NOTE SUCCESS CRITERIA and Export instructions are in the reference section.

CORE UNDERSTANDING:
AI models can be exported and shared. Sharing allows others to test, evaluate and learn from your work, showing how AI projects can move beyond the classroom.

Lesson 5 – Sharing & Explaining Your Teachable Machine

Goal: *Students demonstrate and explain their Teachable Machine models to the class, reflecting on how they collected data and how well their model performs.*

1. STUDENTS in pairs open the link to their Teachable Machine (saved in their Word document from Lesson 4).

2. TEACHER projects each link for the class to view.

3. STUDENT DEMONSTRATIONS
Each student group presents their model and explains: What their Teachable Machine does (e.g., "It recognises rocks and paper").
WHAT images were used & how many per class.
HOW they varied data (angles, lighting, backgrounds, distance).

4. SHARING OBSERVATIONS
Students present at least two key observations from testing, for example:
Accuracy percentages (how confident the model was).
Mistakes (when it got something wrong).
Surprises (unexpected results).

5. CLASS DISCUSSION
Compare results between students.
Discuss what helped improve accuracy (e.g., more images, better variety, clear shapes).

6. REFLECTION
Students record a **Flow Writing** reflection about their project: what worked, what didn't, what inspired them, what was tricky, and what they might try next.

7. EXTENSION
Students create a screen recording of their Teachable Machine in action.
Import the recording into iMovie (or another video editor).
Add a short narration: "This is my Teachable Machine. It works by… You use it to…"
Share final video with the class or upload to their Google Drive.

CORE UNDERSTANDING
Explaining your AI model helps others understand how data choices affect outcomes.
Reflecting on accuracy, errors and surprises makes you a better designer of AI systems.

MISSON – If You're Up For It - 1 week

Goal: *Students extend their understanding of AI by exploring new Teachable Machine modes (images, sounds, poses) or creating more complex models with additional categories in an area of personal interest.*

AFTER completing Lesson 5, students who want to go further can take on this Mission:

1. EXPLORE the Teachable Machine website for more ideas and inspiration.

2. DESIGN a new Teachable Machine using more categories (e.g. not just two shapes, but 3-5 different things).

3. TRY using different modes in an area of interest.
Options to Explore
Images – Train a model to classify images using files or your webcam.
Sounds – Train a model to classify audio by recording short sound samples.
Poses – Train a model to classify body positions using files or by striking poses in your webcam.

OPPORTUNITY FOR AGENCY
This Mission gives students choice and ownership. They decide which mode (images, sounds, poses) to explore, how many categories to include and what topic interests them. By designing their own project, students practice curiosity, independence and creativity while applying what they've learned.

COMPLETION TIME This could be a week long project. Also could be completed at home as The Teachable Machine is **FREE** and requires no login. Students who are 'up for it" can bring their TM's and understandings into the classroom for others to enjoy, perhaps making a screen recording and adding and explanation in iMovie.

CORE UNDERSTANDING
AI is flexible. It can learn from images, sounds and poses, showing its wide applications. Exploring new modes develops curiosity, independence, and creativity in AI design.

Week 2 – Teachable Machine: NSW Syllabus Outcomes

This table links the activities from Week 2 with NSW K–6 syllabus outcomes across English, Mathematics and Science & Technology for stage 2.

Learning Area	NSW Syllabus Outcome	Application in Lesson
English	EN2-1A – communicates effectively using considered language	Explaining Teachable Machine projects to peers and teacher (Day 5).
English	EN2-2A – plans, composes and reviews a range of texts	Flow Writing reflections on AI learning (Days 1 & 4).
English	EN2-11D – responds to and composes texts that express views	Written Google Doc explanations of AI models (Day 4).
Mathematics	MA2-15MG – manipulates, identifies and sketches 2D shapes	Drawing and testing shapes for training AI (Days 1–3).
Mathematics	MA2-1WM – uses appropriate terminology to describe and link concepts	Using terms like triangle, rectangle, scalene, acute, etc. (Day 2).
Mathematics	MA2-18SP – collects and organises data, and interprets information	Recording AI predictions and percentages in tables (Days 2–3).
Science & Technology	ST2-2DP-T – selects and uses materials, tools and digital technologies	Using Teachable Machine to create models (Days 1–4).
Science & Technology	ST2-4WS – investigates by posing questions, making predictions and gathering data	Testing AI with new and trick objects (Days 2–3).
Science & Technology	ST2-2DP-T – describes how digital systems represent data	Understanding AI recognises patterns from labelled examples (all week).

TEACHER TIPS

Keep it safe: Teachable Machine can be used without logging in. Ensure webcams are used appropriately.

Integration: Link to Mathematics (shapes, data), Science & Technology (digital systems), and **English: (**reflection writing).

Differentiation: Younger students can work with simple shapes and fewer examples; older students can extend with more classes and testing.

Takeaway: Students experience first-hand how AI is built, tested, and improved.

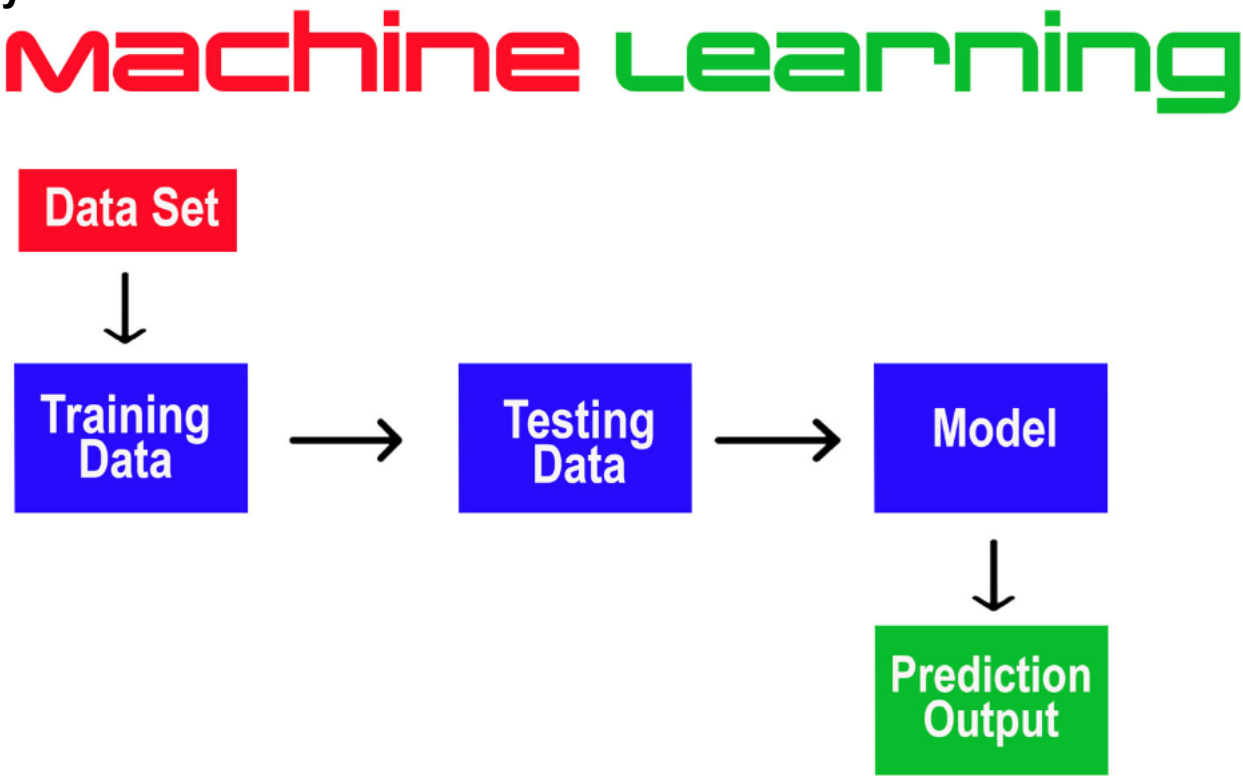
Takeaway for teachers:

AI doesn't have to be intimidating. Quick, Draw! is a safe, fun entry point that helps students understand AI as a

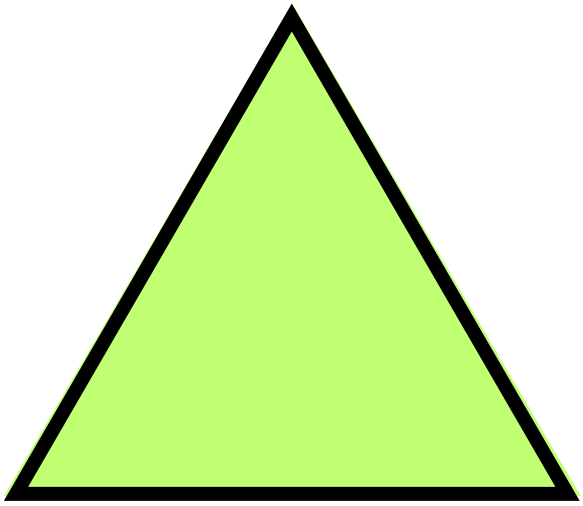
Week 2 Teachable Machine: Summary

Day	Goal	Key Activity	Core Understanding
Day 1	Introduce training & testing data	Create rectangles vs triangles model, collect 800 images	AI learns through training data. Testing checks how well it has learned.
Day 2	Test how well the model performs	Students test with different triangles/rectangles & trick shapes.	AI predictions depend on varied examples. More diversity improves accuracy.
Day 3	Create and train your own TM	Pairs choose 2 shapes, collect 800 images total, test & trick the AI.	Balanced datasets matter. Uneven or repetitive examples reduce reliability.
Day 4	Independent choice of categories	Students choose categories (e.g. fruit vs objects), train & export model	AI models can be exported and shared so others can test and evaluate them.
Day 5	Share and explain your model	Students demonstrate models, explain data & testing observations	Explaining your AI helps others see how data choices affect results.
Mission	Extend understanding of AI applications	Explore new modes (images, sounds, poses), create complex models	AI can learn from images, sounds, and poses, showing its broad applications.

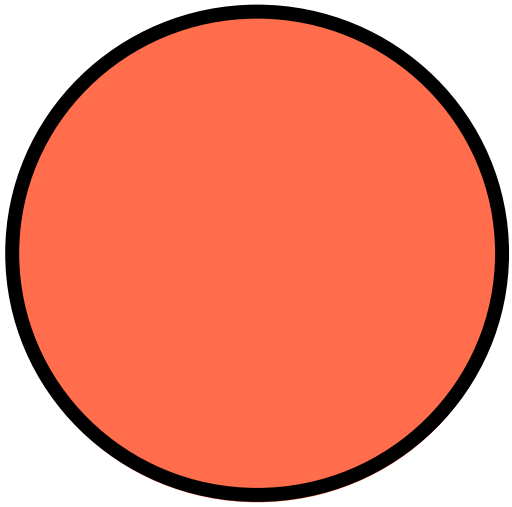
Day 1



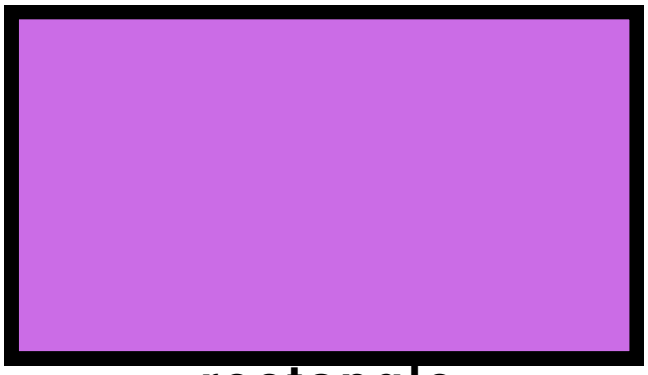
Day 2



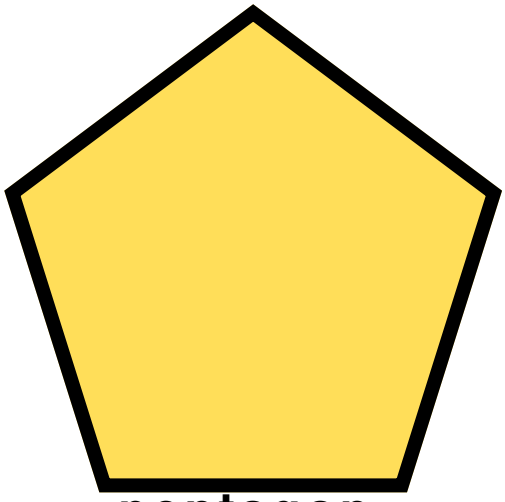
triangle



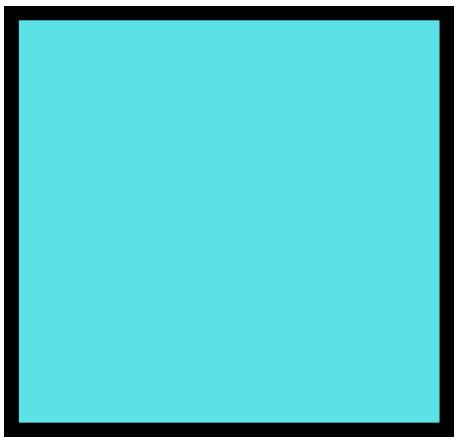
circle



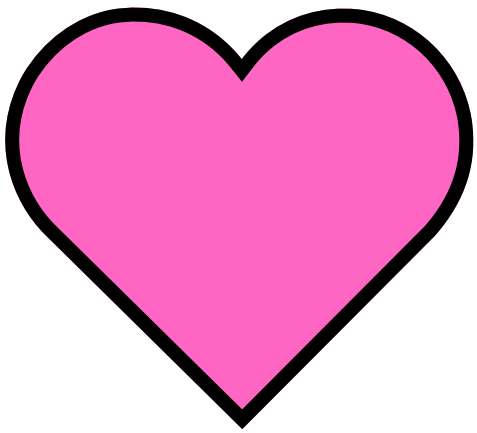
rectangle



pentagon

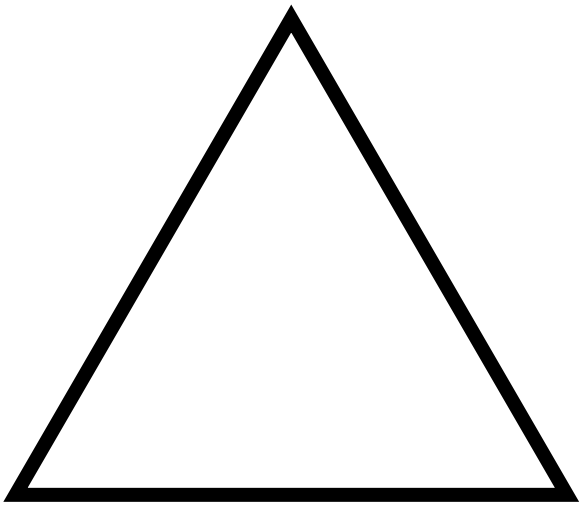


square

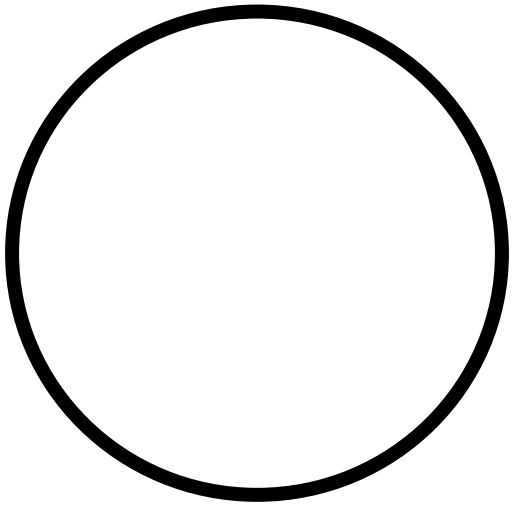


heart

Day 2

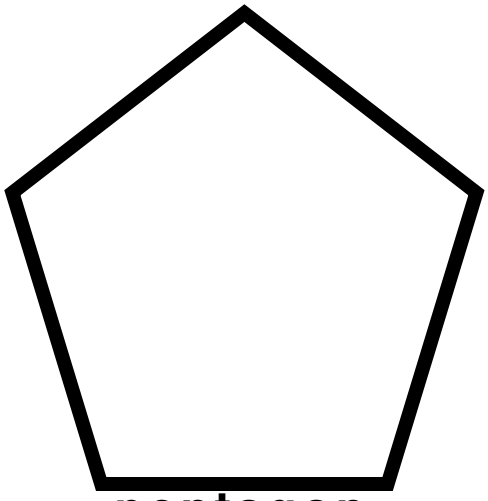


triangle

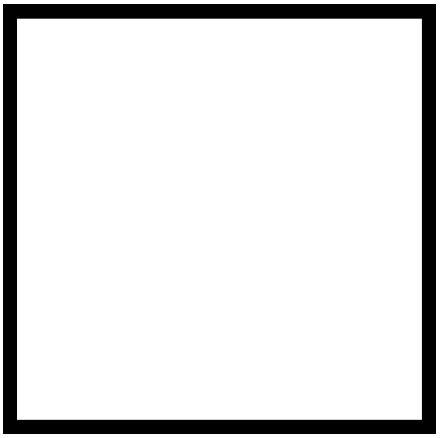


circle

rectangle



pentagon



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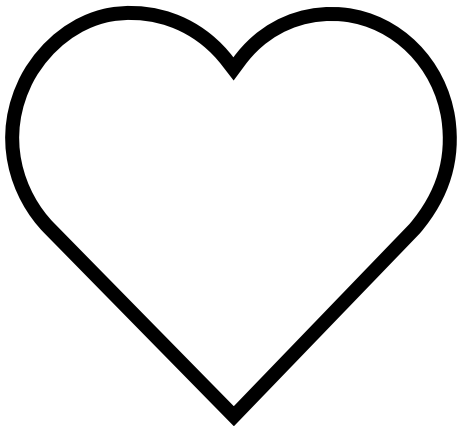
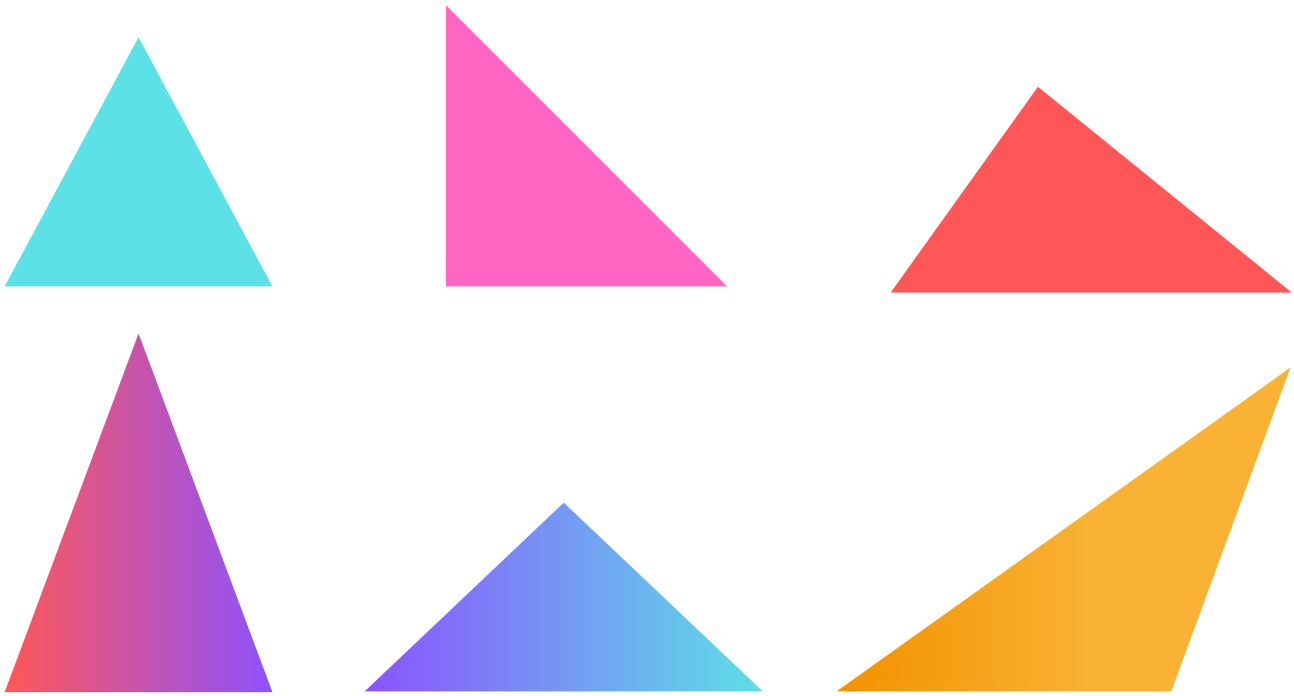


heart

Day 3 - Different types of Rectangles

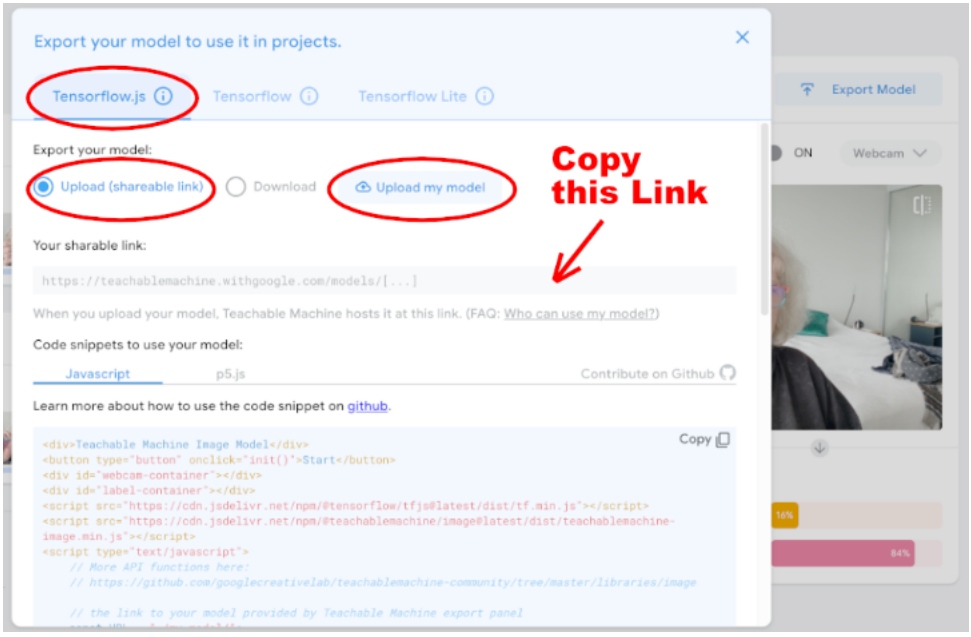
Different types of Triangles



Day 4

Export - Student Instructions

In your trained project goto the Export Model tab.
Choose TensorFlow.js.
Select Upload (shareable link) → click Upload my model.
Copy the shareable link.
Create a Google Doc titled “Cats and pencils TM” (use the title that best suits your TM),), paste the link, and add:
What your Teachable Machine does
What images you used and how many per class
How you varied data (angles, lighting, backgrounds)
Two observations from testing (percentages, mistakes, surprises)



Success Criteria	Achieved (✓)
I collected balanced, varied images for two classes	
I trained and tested my model and recorded results	
I exported a TensorFlow.js link and shared it	
I explained clearly what my model does and how I built it	