META-META Club

WORKBOOK · MODULE 4 OF 5

Real places from real data

Browser Worlds. OpenStreetMap streets and buildings, turned into geometry.

Pro studios | 2 lessons | ~2.8 h | 4-question practice quiz | Notes pages

IN THIS MODULE

Real places from real data

OpenStreetMap streets and buildings, turned into geometry.

#	LESSON	TYPE	TIME	DONE
4.1	OpenStreetMap to a street graph	LAB	75 min	☐
4.2	Extrude buildings and roads	LAB	90 min	☐

How to use this workbook

- Work through each lesson on metametaclub.com/learn, or listen to its narration, then use the page here to take notes.
- Tick the steps as you go, and write your answers under **Check yourself** before you look anything up.
- Do the practice quiz at the end, then mark it with the answer key on the last pages.
- Keep every **Ship it** piece. Together they become what you show.

Before you start

What do you already know about this, and what do you want to be able to make by the end?

LESSON 4.1 · LAB · 75 MIN

OpenStreetMap to a street graph

Pull real streets for a small area from OpenStreetMap, convert latitude and longitude into local metres and build a graph of junctions and road segments. That graph is the skeleton of a drivable world.

Key points

The data model

OpenStreetMap has **nodes** (points with lat/lon), **ways** (ordered lists of node ids, with tags like `highway=primary`) and relations. A street is a way.

The **Overpass API** lets you query OSM by area. The bounding box order is south, west, north, east.

Lat/lon to metres

Over a few blocks, the earth is flat enough. Pick a centre point, then use an equirectangular projection: east–west metres shrink by the cosine of the latitude.

Steps checklist

- [ ] Pick a small area, about 600 m across. The box below covers part of Nairobi CBD; swap in your own.
- [ ] Run the code in a module script and log the result.
- [ ] Draw each edge as a line to check the layout against the map.
- [ ] Credit the data: "© OpenStreetMap contributors". OSM data is under the ODbL.
- [ ] Cache the JSON to a file once it works. Don't hit Overpass on every reload.

Junctions are nodes with three or more neighbours. Filter `highway` values (`footway`, `service`) depending on whether you're driving or walking.

```
This lesson has code samples. They are printed in full in the lab handout (browser-worlds-lab-4-1.pdf)
and in the lesson on metametaclub.com/learn.
```

SHIP IT

A top-down line drawing of your area's street graph in Three.js, with the OSM credit on screen.

- [ ] Shipped. Link or file: _____

Check yourself

1. Why does east–west distance need `cos(latitude)`?

2. How do you find a junction in the graph?

3. Where does the credit line go?

LESSON 4.2 · LAB · 90 MIN

Extrude buildings and roads

Turn OSM building footprints into 3D blocks and street lines into road ribbons, then merge them into a few meshes so the scene stays fast. You'll reuse `project()` from the street graph lesson.

Key points

Footprints to blocks

A building in OSM is a closed way tagged `building`. Its nodes trace the outline.

Merging

Five hundred separate meshes means five hundred draw calls. `mergeGeometries` combines geometries that share a material into one, so the whole block of buildings costs one draw call.

Steps checklist

- [ ] Query buildings with the street query from the last lesson, swapping `"highway"` for `"building"`.
- [ ] Build footprints with the code below. Run roads through the same idea.
- [ ] Check `renderer.info.render.calls` before and after merging.
- [ ] Give main roads and side streets different widths using the `highway` tag.

`mergeGeometries` needs every geometry to have the same attributes, so merge buildings and roads separately. Ribbons leave small gaps at corners; a disc at each junction hides them.

```
This lesson has code samples. They are printed in full in the lab handout (browser-worlds-lab-4-2.pdf)
and in the lesson on metametaclub.com/learn.
```

SHIP IT

Your area as extruded blocks and roads, two draw calls for the city, with a screenshot and the OSM credit.

- [ ] Shipped. Link or file: _____

Check yourself

1. Where does building height come from, and what's your fallback?

2. Why merge geometries, and when can't you?

3. Which way is north in your scene?

PRACTICE QUIZ

Check your module

Circle one answer for each question. The answer key is on the next page.

1. In an Overpass bounding box, what is the coordinate order?

(A) north, east, south, west

(B) south, west, north, east

(C) lat, lat, lon, lon in any order

2. Why multiply east–west distance by cos(latitude)?

(A) Lines of longitude get closer together away from the equator

(B) To convert feet to metres

(C) To flip the scene upside down

3. How do you spot a junction in a street graph?

(A) A node with three or more neighbours

(B) Any node tagged building

(C) The first node of every way

4. What does mergeGeometries mainly save?

(A) Download size of the HTML

(B) Draw calls, by turning many meshes with one material into one

(C) Shadow quality

ANSWER KEY

Answers and why

1 · B south, west, north, east

Overpass bboxes are (south, west, north, east).

2 · A Lines of longitude get closer together away from the equator

A degree of longitude is shorter the further you are from the equator, so it scales by cos(latitude).

3 · A A node with three or more neighbours

Where three or more segments meet, a driver can choose a direction: that's a junction.

4 · B Draw calls, by turning many meshes with one material into one

One merged mesh is one draw call instead of hundreds.

NOTES

Build log and notes

SESSION	WHAT I MADE OR LEARNED	NEXT STEP