Grade 7 Students Explore

Shapes & Designs: Two-Dimensional Geometry
Problem 2.3

2.3 The Bees Do It

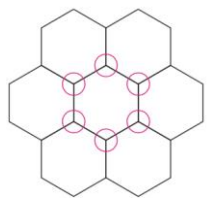
Polygons in Nature

Honeybees build nests called hives. A typical hive might be home for as many as 60,000 bees. Bees are small insects, but packing a hive with that many bees and the honey they make is tricky.

The honey is stored in a comb filled with tubes. The tops of those tubes cover the comb with a pattern of identical regular hexagons.

- Why do the bees form their honey storage tubes in the shape of hexagonal prisms?
- Why not some other shape?

The diagram below shows a pattern that uses regular hexagons to cover a flat surface without any gaps or overlaps.



Notice that three angles fit together exactly around any point in the beehive pattern. These patterns are called **tilings** or **tessellations** of the surface.

? What other regular polygons do you think can be used to tile a surface?

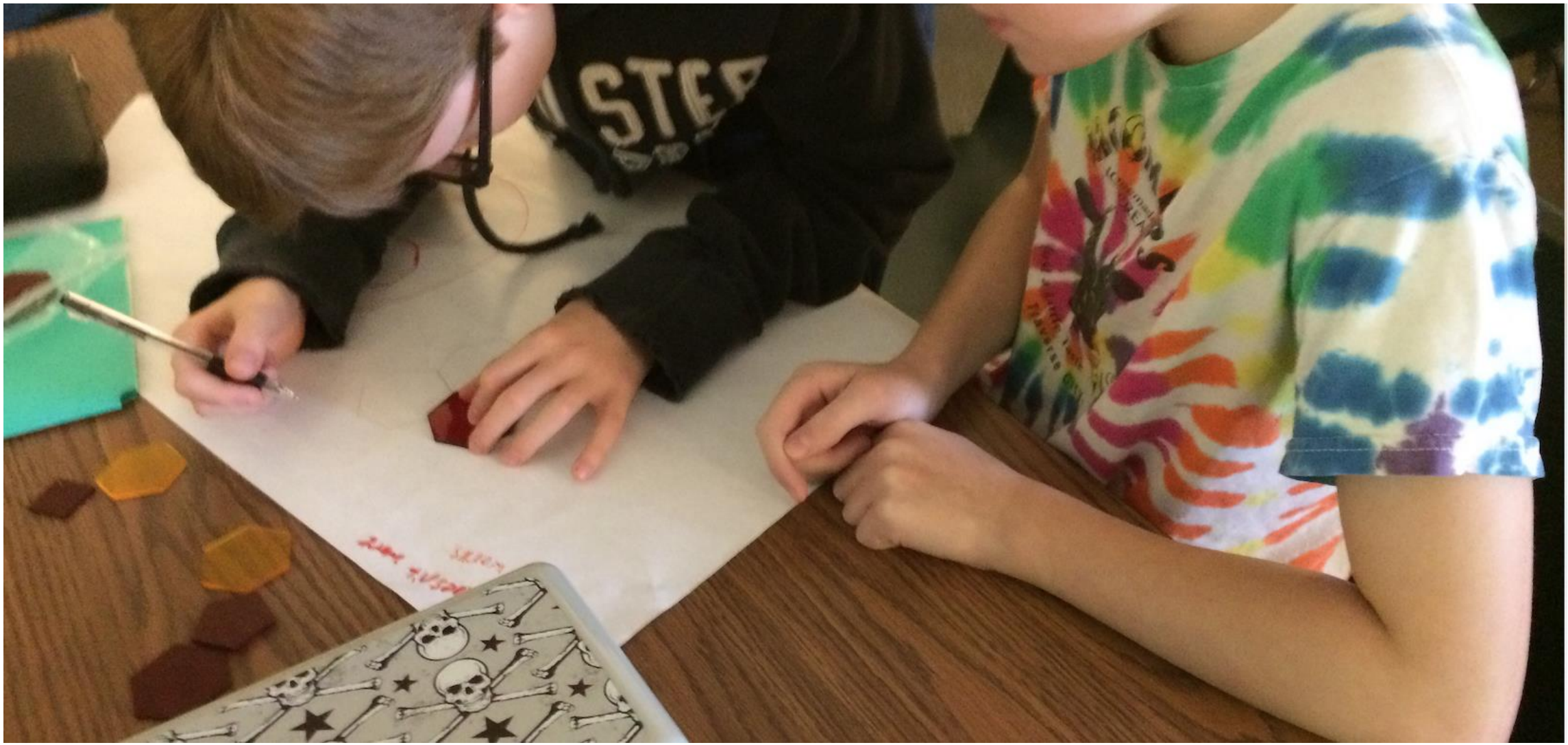
Shapes and Designs
Two-Dimensional Geometry

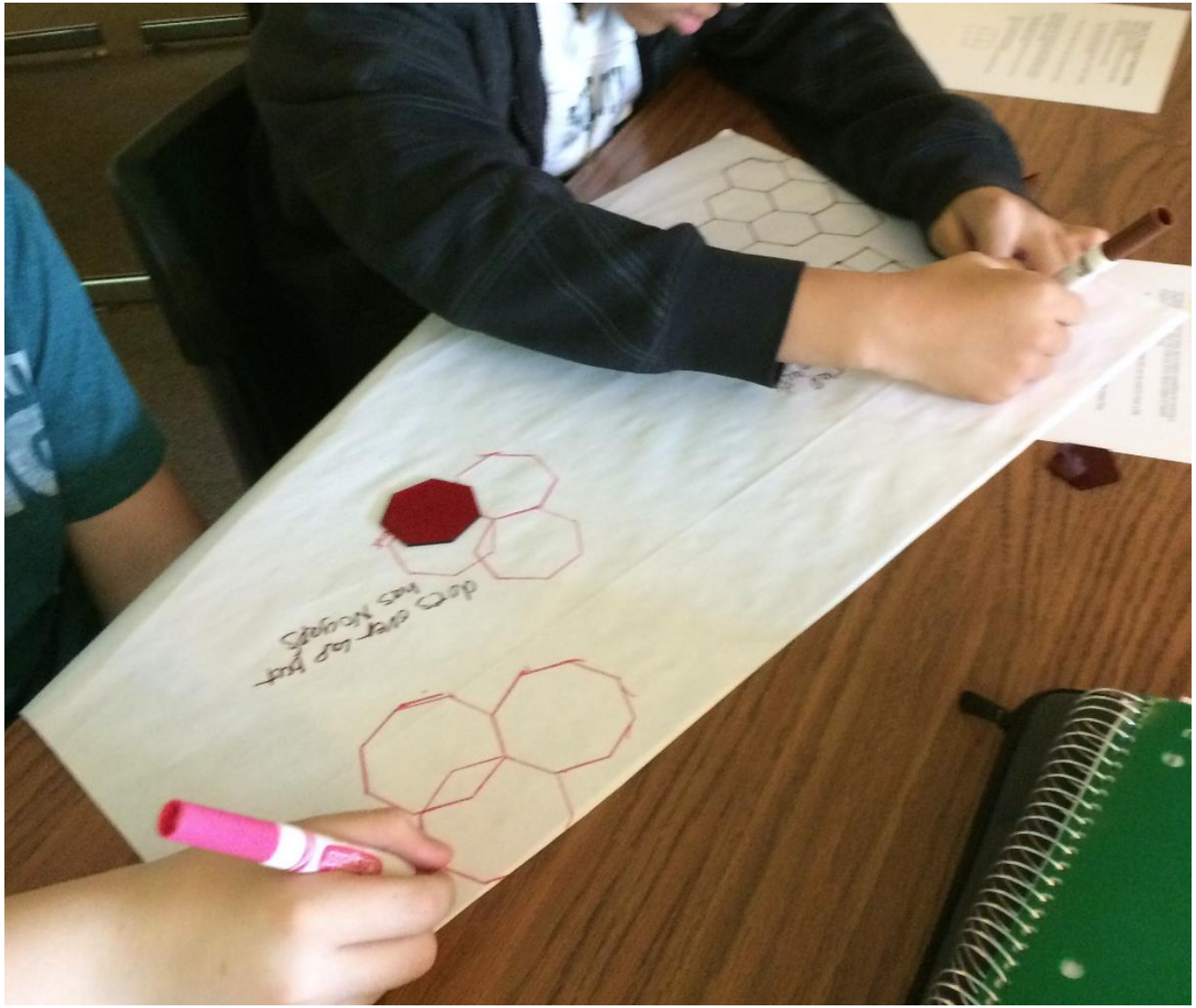
Launching Discussion

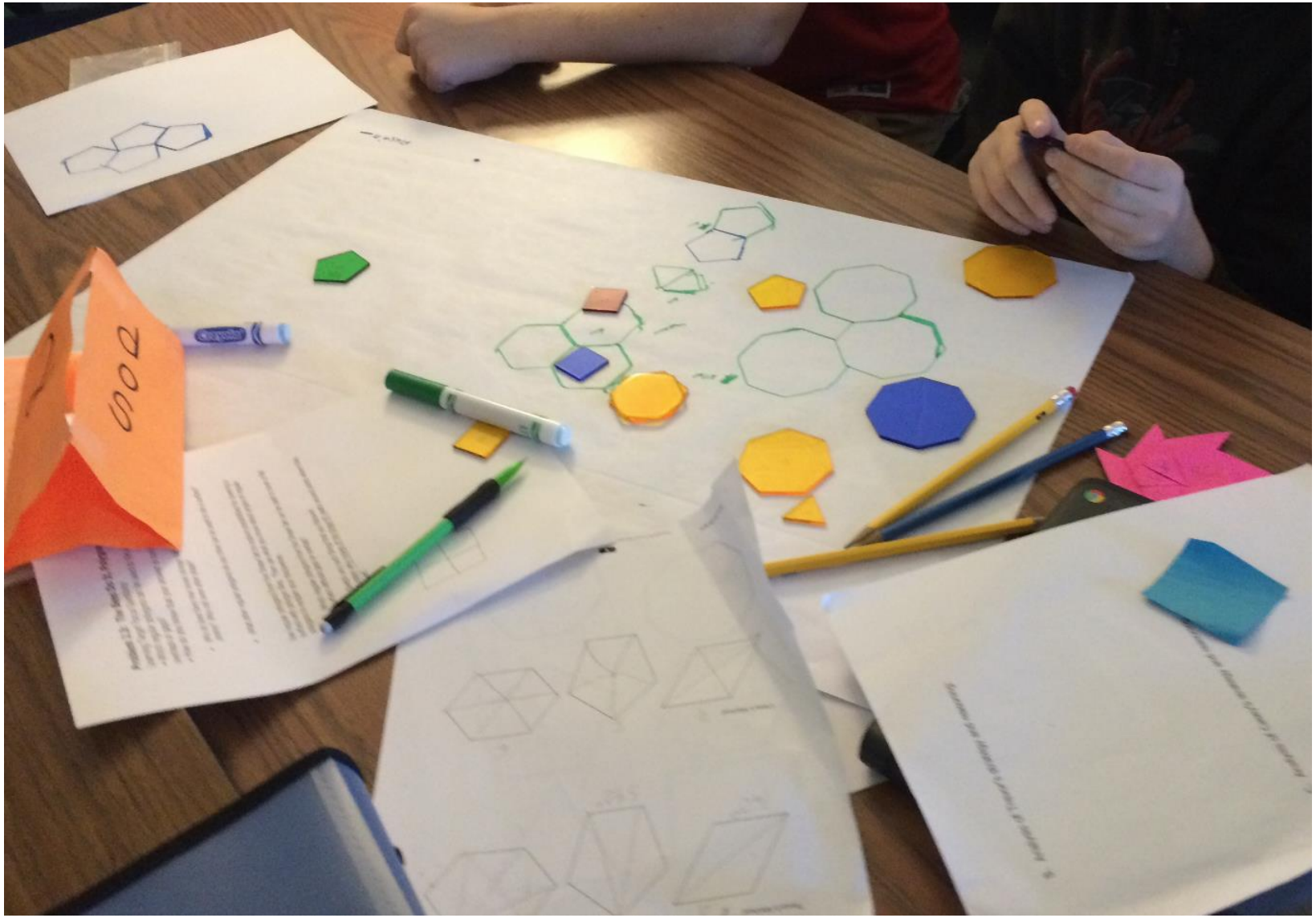
Which regular polygons will tile a flat surface with no gaps or overlaps?

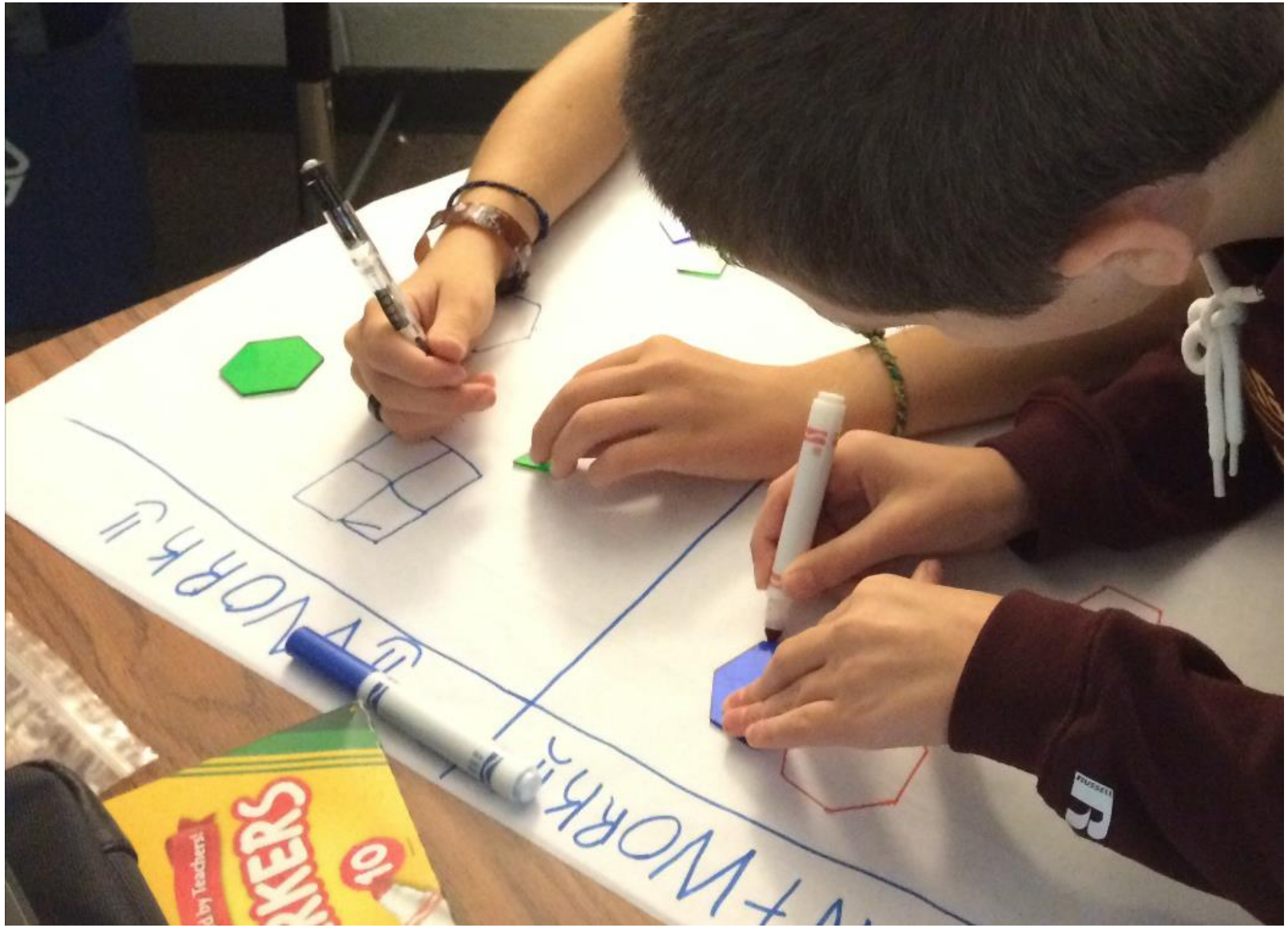
Which polygons will not do so?

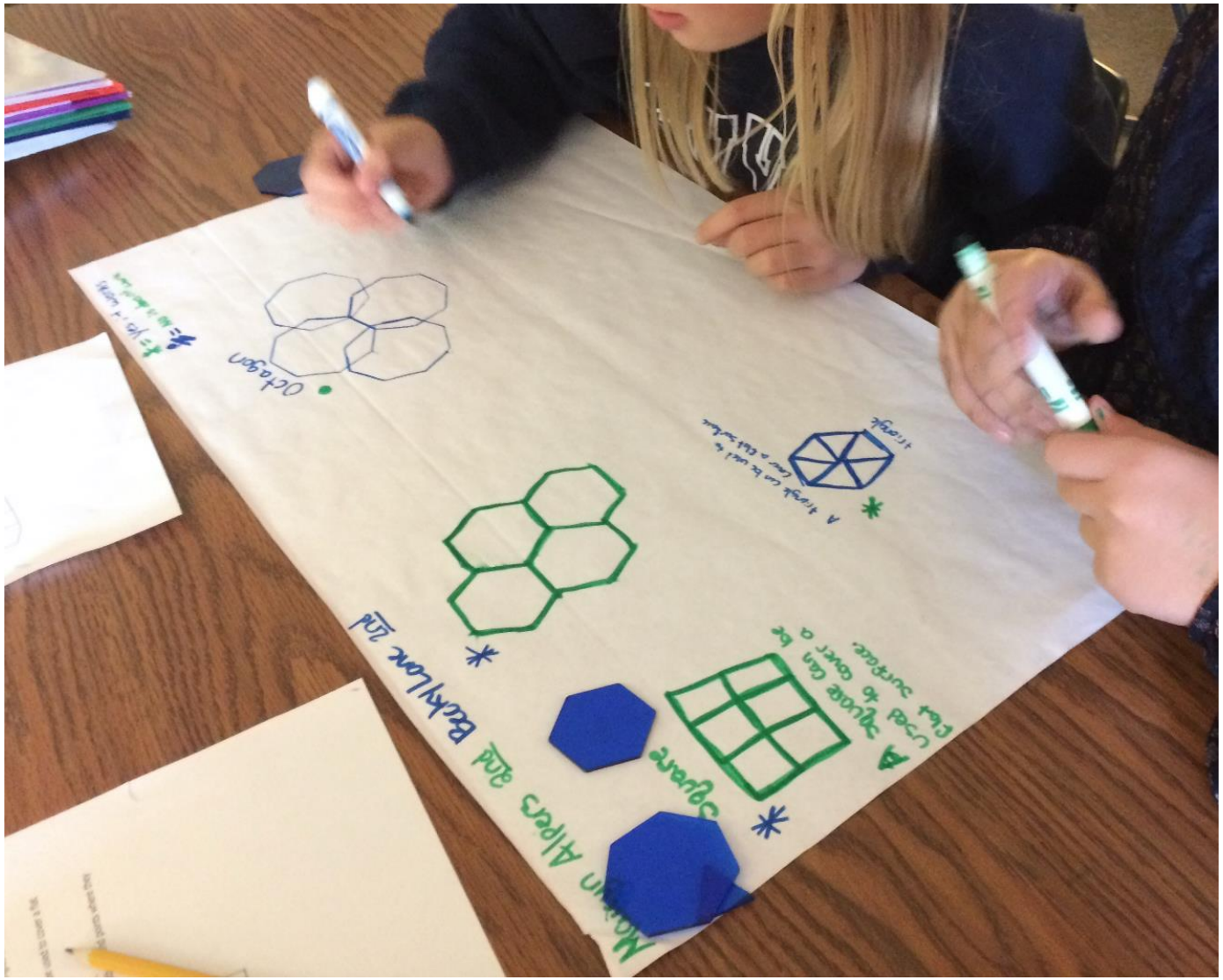
Why do some shapes tile and others do not?

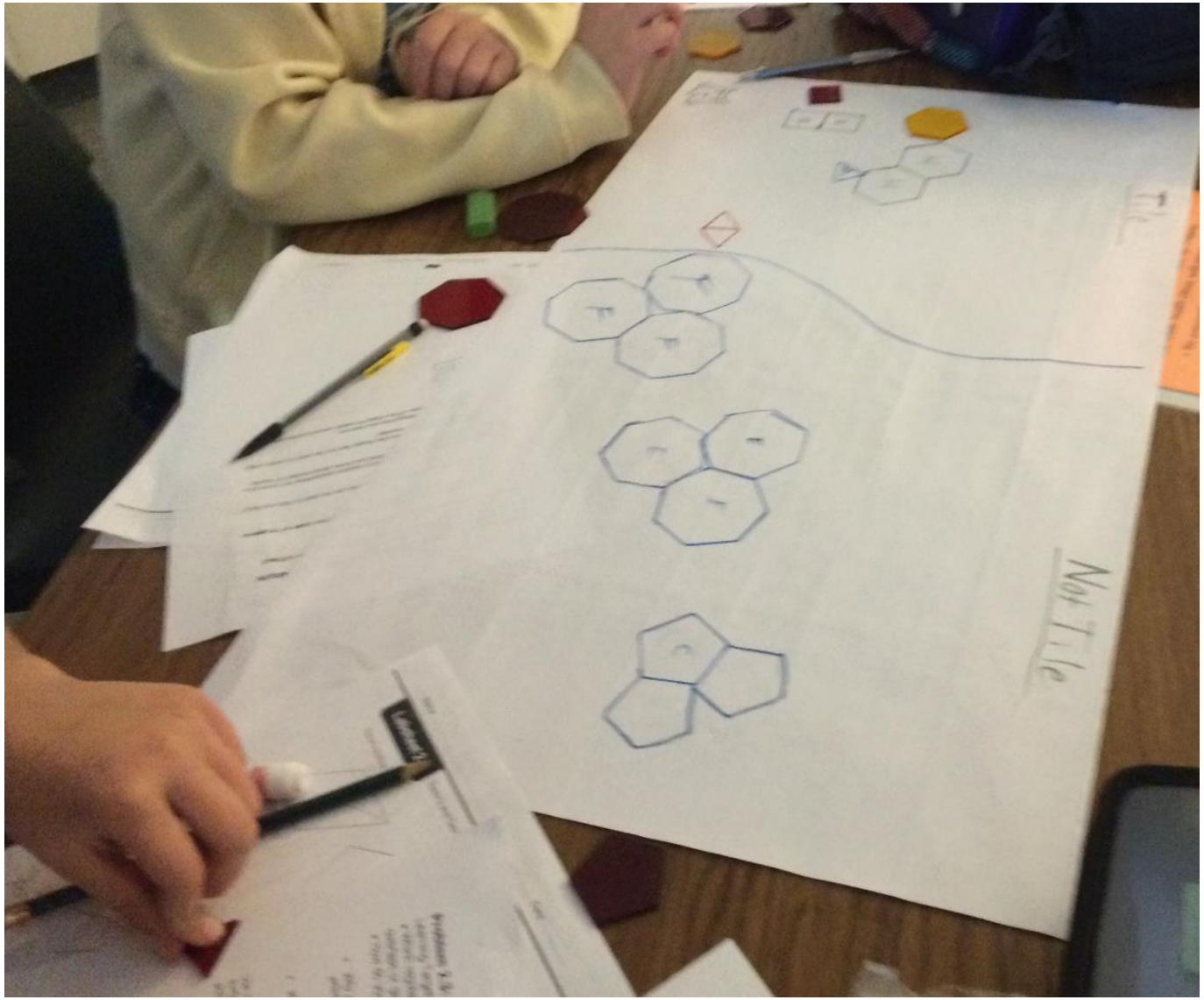


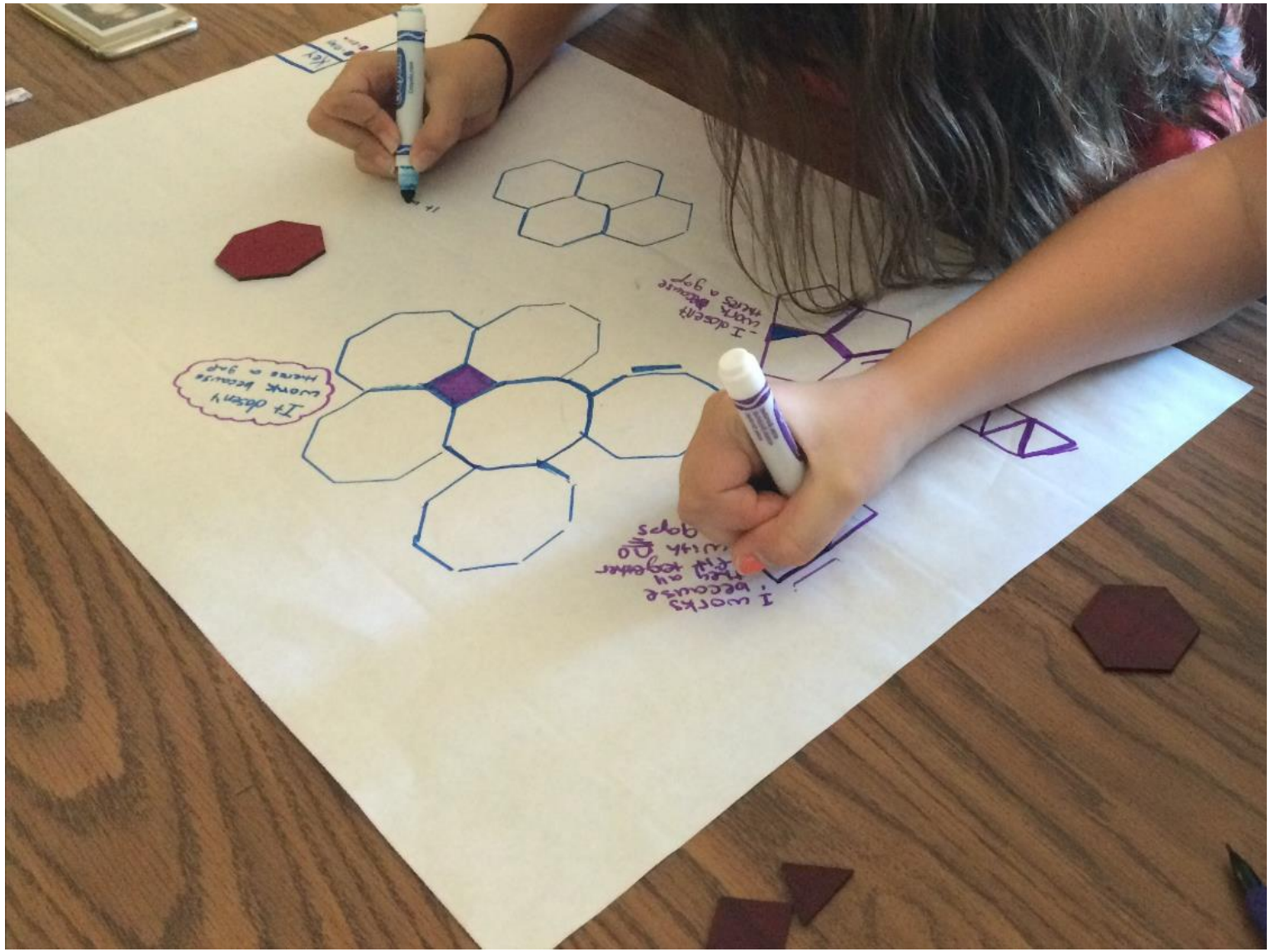


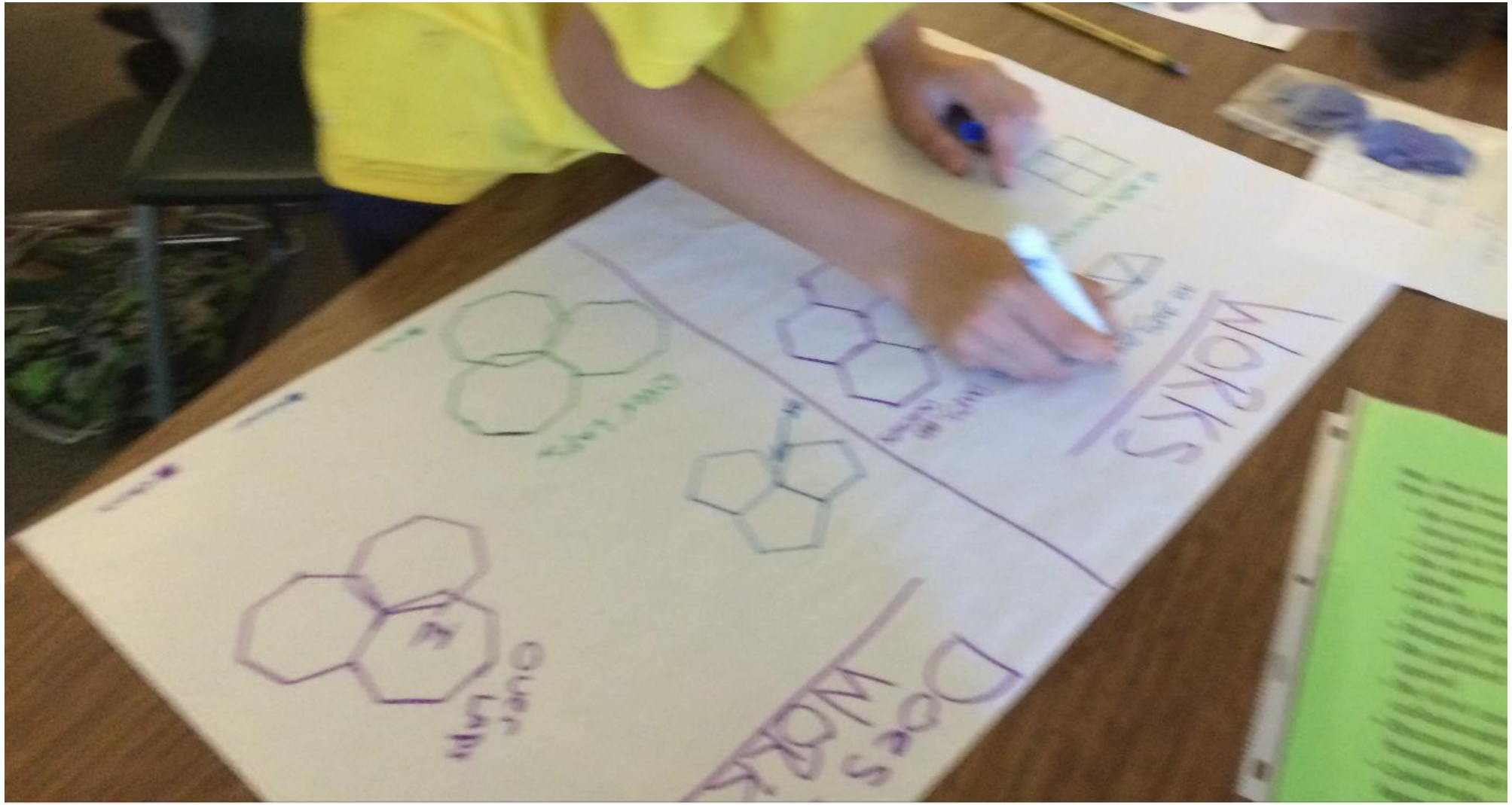


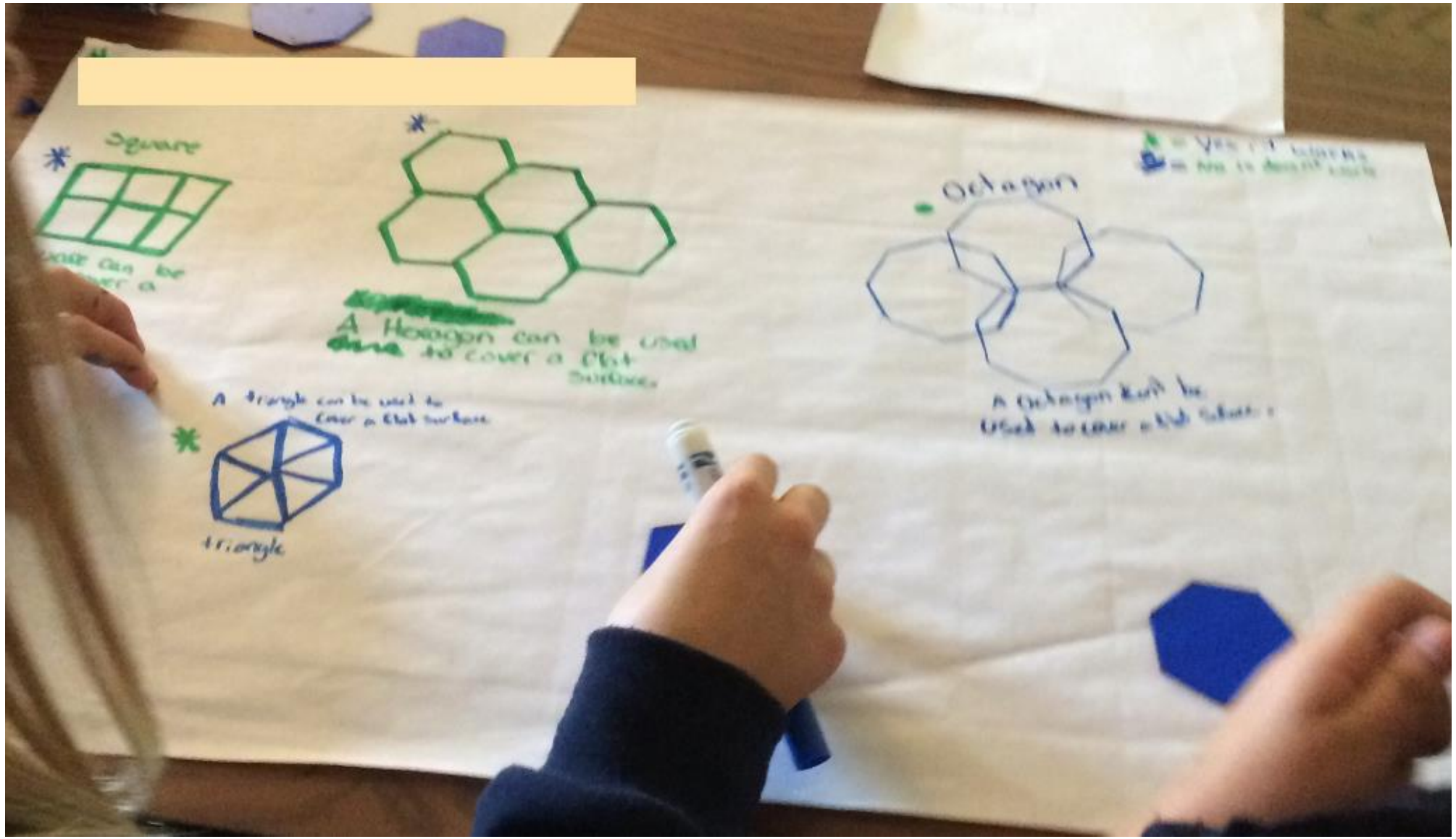












Summary Discussion

The next day in class, the teacher and the students summarized the Problem. The discussion focused on answering the following questions:

Which regular polygons can be used to tile a surface without overlaps or gaps?

How do you know your answer makes sense?