Chapter 11
Notes for Instructors

Content

Geometry is the focus of this chapter. This chapter really emphasizes reading and writing. Students must be able to read and understand the definitions and theorems in this chapter. For example, lots of my students had difficulty with the questions about regular polygons because they did not understand that the set of regular polygons is a proper subset of the set of polygons. They simply were not reading their textbook carefully. Moreover, I think you should be very particular about students' writing in this chapter. They should say what they mean. For example, an angle is not 35°, but the measure of an angle can be 35°.

You will probably need at least two and a half weeks for this chapter. I really like section 11.4 because I think it is a lot of fun, but your main focus should be the first three sections of this chapter. Do section 11.4 if you have time.

Manipulatives and Technology

In the Mathskellar, we have compasses, rulers, and protractors. We also have th pattern blocks discussed in 18 and 19 of Section 11.2. I don't believe the textbook discusses Polydron, but my students found these manipulatives to be incredibly useful.

I didn't have time to incorporate any computer programs into my lessons, but you could certainly develop some nice exercises using Wingeom (another free program from Peanut Software), POV-Ray (a free program found at `http://www.povray.org/`), or a Logo type program such as the one found at `http://www.sonic.net/%7Enbs/webturtle/`. **Notes and Suggestions:**

Notes on Section 11.1: *Figures in the Plane*

- Students should understand that lines to have corresponding and alternate interior angles for *any* two lines and a transversal of these lines. The lines do not need to be parallel. Many students confuse these definitions with the Corresponding Angles Property and the Alternate Interior Angles Theorem.

- The exercise at the bottom of page 668 about the sum of the measure of the interior angles of a triangle was very valuable for my class. I simple cut out a whole bunch of different types of triangles using the paper cutter and scrap paper. I tried to make sure that I had scalene triangles and right triangles and obtuse triangles and acute triangles. Every student had three or four different triangles. It took me about 5 minutes to prepare this activity and was well worth it.

- I think the theorem on page 669 should say that the sum of the measure of the *interior* angles of a triangle is 180°. I think it is important to be specific since we could also discuss the exterior angles of a triangle or the central angles if the triangle is equilateral.

- I really like problem 14 in Section 11.1. Parts (c) and (d) are very tricky for students. For example, they will need to realize that the hour hand is not on the 4 at $4:30$.

Notes on Section 11.2: *Curves and Polygons in the Plane*

- Given a specific polygon, students should be able to verify the angle sum formulas given in this section by triangulating the polygon and writing a valid argument based on the triangulation.
- Students should understand Table 11.3. Specifically, they should recognize that every square is a rhombus, a rectangle, and a parallelogram. (According to the textbook, a square is also a trapezoid, but this varies from book to book.)
- Students should be able to draw an equiangular polygon that is not equilateral.
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- Students should not say that a circle measures 360°. It would be better to say that the total turn of a circle is 360°. (The next chapter focuses on measurement, so I think it is best to be specific right now since a circle has perimeter and area and turn.)

Notes on Section 11.3:*Figures in Space*

- Polydron are very helpful in this section. I think it would be very helpful to make the Nets shown in Table 11.4. These can be used to discuss Euler's formula and to prepare students for the surface area discussion in the next chapter.
- The polyhedral Power Solids and Polydron were very useful for exploring Euler's formula.
- If students know how many faces meet at a vertex of a regular (or semi-regular) polyhedron, then they should be able to use a net for the polyhedron to verify Euler's formula.
- Students should be able to verify Euler's formula for a specific polyhedron.
- Students should be able to verify Euler's formula for an n-gonal prism and an n-gonal pyramid. This will test their skills from the functions chapter.
- You can get lots of nice 3-D pictures for tests and quizzes from Wingeom. Open Wingeom. Go to `Window` → `3-dim`. Then go to `Units` → `Polyhedral` or `Units` → `Surface`. You can turn off any labels that may appear by going to `View` → `Labels` → `Individual...` and choosing "no mark" and unchecking the box beside "show label." If you want to include the picture in a LaTeXfile see the Peanut Instructions I have included with this documentation. If you would like to paste the picture in another document (such as a Word document), go to `File` → `Copy to clipboard`, then you should be able to paste the picture into your document.

Notes on Section 11.4:*Networks*

- This section is optional.
- I put masking tape on the floor of my classroom to model Königsberg.

Worksheets

I have included two worksheets with this documentation.