Dr. Pogo

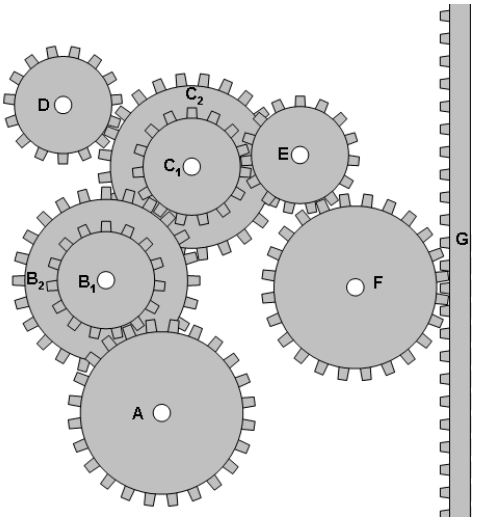
Mechanical Drawing — Assigned on March 3, 2025

Assignment #5: Animations In PowerPoint

Due on March 24, 2025. This is a three week assignment that requires about 4 hours! You get an extra week because of spring break… we'll make up the "missing" two hours on the next assignment.
Submit a single Powerpoint document to the Google Drive. You must have exactly 3 slides.
The "assignments" page has an .mp4 video showing my "solution".

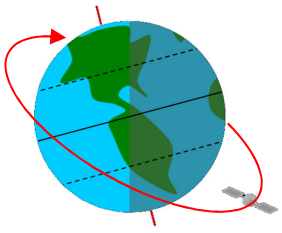
1. Draw a top-view map of a planet orbiting its sun. You are required to include the following animation features:
    a. The background (outer space) is black.
    b. The planet orbits the sun in a counter-clockwise circle with a period of 10 seconds.
    c. The planet rotates counter-clockwise around its own axis, as seen from above the north pole. The planet must have some apparent geography so that this rotation is visible. This planet should have 4 "days" per year.
    d. The half of the planet opposite the sun must be shaded (night time). You should still be able to see the geography features, but now they'll be much darker than the daylight side.
    e. There must be a "gravity" arrow that moves with the planet but is always aimed at the sun.
    f. The sun should have a two-part corona. One part simply rotates counter-clockwise once per "year". The other part rotates clockwise once per year, and also pulses in size 4 times per year.

2. Draw a gear system that looks more or less like the following. The basic elements can be copied from the "Gears template" on the assignments homepage, so you can focus on animation rather than drawing. The following animations, all lasting 20 seconds, are required:



    a. Gear A rotates 450° counter-clockwise.
    b. The other gears rotate cleanly with each other so that the teeth mesh smoothly (i.e., no overlapping). You'll have to carefully place each gear, and determine the correct angular displacement (including sign) for each gear. Recall the gear equation: $N_1\omega_1 = N_2\omega_2$, where N is the number of teeth for each gear.
    c. Gears B_1 and B_2 are "welded" together, so they have the same angular velocity and the same axis as each other.
    d. Gears C_1 and C_2 are welded together, too.
    e. Rack G should move continuously vertically upwards so that its teeth mesh smoothly with gear F. The rack should never disappear from sight during the 20 second animation. Hint: you'll need more than one of the basic "rack" elements.

3. You are to draw the Earth as seen from the side. The sun is assumed to be *far* to the left of the slide.



    a. The earth must be tilted somewhere in the neighborhood of 20°. The right side should be shaded but visible (night time).
    b. Outer space is black.
    c. The continents should move such that the earth has the *appearance* of rotation. A single day should be about 5 seconds. The animation should last about 4 animated days (20 seconds). Hint: the sun rises in the east.
    d. An artificial satellite should orbit the earth at an angle of somewhere around -30° (see the red arc on this sketch). The red arc itself should *not* be present. The period of the orbit should be about 8 seconds (or 1.6 animated "days").
    e. The satellite should appear to go behind the earth for part of each orbit. Hint: see the "wipe" versions of appear/disappear. Do your best here… it's too hard to get this "perfect".
    f. At the end of the animation (i.e., 20 seconds), the satellite should *stop* in its current position, which is not its starting position.