Biology through Art

Drawing Cell Structures Lesson Plan

Brief description: This lesson plan assists instructors in bringing art assignments (e.g., drawing) into a biology course. The lesson focuses on the eukaryotic cell and its structures.

Grade level(s): 9-12, undergraduate college/university(lower and upper division).

Key topics: chloroplast, cytoskeleton, enzymes, lysosomes, RNAs, mitochondria, nucleus, nuclear membrane, plasma membrane, ribosomes, rough ER, smooth ER, Golgi apparatus

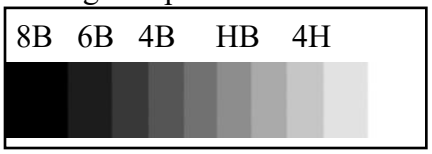
Materials

- Drawing paper: acid free, heavy weight
- Pencils (suggested): 2 soft/dark pencils (8B or 6B, 4B), 2 hard/light pencils (HB, 4H).
- Erasers (regular and kneaded) and blending tools ("stumps")
- Graphite transfer paper

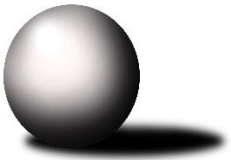
Lesson Instructions

Day 1 – Introduction to drawing tools

1. Construct a gradient by forming columns with each pencil, as shown in figure. Start with the darkest pencil (8B or 6B), and continue with 4B, HB, 4H.Sketch lines in one direction to form each column.
2. Using the blending tool, smear/smudge the graphite from left to right to produce a blended gradient from dark to light.
3. The regular eraser removes graphite entirely. The kneaded eraser gently removes layers of graphite for lightening.



Day 2 – Creating an 3D image



1. Lightly draw a circle (4H pencil).
2. Determine the direction of the light source; the illuminated area will have little to no graphite.
3. Use 8B or 6B pencil for the darkest areas; use the blending tool to smudge the graphite from dark to lighter areas.
4. Use 4B pencil for mid-tones; use HB and 4H for lighter areas. The blending tool is very useful for producing smooth tone gradients.
5. Use the erasers to remove or lighten graphite.
6. Enhance the 3D effect by creating a shadow on the opposite side of the light source.

Day 3 – Drawing a cell structure

1. Print out a cell structure on regular paper. As this will be used for tracing, the paper should be thin.
2. With the cell structure facing up, place graphite transfer paper with the dark side (graphite) facing down. Then place the drawing paper underneath the dark side of the transfer paper.
3. With 4H pencil, trace the outline of the cell. The pressure of the pencil will imprint graphite from the transfer paper onto the drawing paper.
4. After this initial tracing, use the pencils and blending tools to shade and blend the cell structure, following the shading and tones of the model image.

Assignment (example text)

As part of the class, you'll learn about different proteins and cell structures. You will be given instructions on how to draw three dimensional shapes. After some in-class practice, you will be given a cellular structure to draw and investigate. Produce a 3D drawing of the cell structure, using pencils and paper provided. Provide a caption for your drawing (20-50 words). Cite your resources for the caption (minimum: two credible resources). Citation text is not included in the caption word count. This assignment is worth _____.

Resources

Essentials of Cell Biology – Scitable by Nature Education.
https://www.nature.com/scitable/topic/cell-biology-13906536/

Materials can be purchased from *Amazon* (see example list below), Target/Walmart, art stores, or Daiso (in some cases).

Drawing (heavy weight paper) – Strathmore Medium Drawing Paper Pad, 8x10" (24 Sheets, ~$8)
Pencil 8B – Staedtler Mars Lumograph 8B (12 Pack, $10-12)
Pencil 6B – Staedtler Mars Lumograph 6B (12 Pack, $10-12)
Pencil 4B – Staedtler Mars Lumograph 4B (12 Pack, $10-12)
Pencil HB – Staedtler Mars Lumograph HB (12 Pack, $10-12)
Pencil 4H – Staedtler Mars Lumograph 4H (12 Pack, $10-12)
Blending stump - Jack Richeson (12-piece Set, ~$12)
Eraser set – Mr. Pen Eraser Set (9-piece set, ~$7)
Kneaded Eraser only – June Gold Kneaded Erasers, (18 Pack, ~$9)
Graphite Transfer Paper – ($4-10 for pack of 30-100 sheets)

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