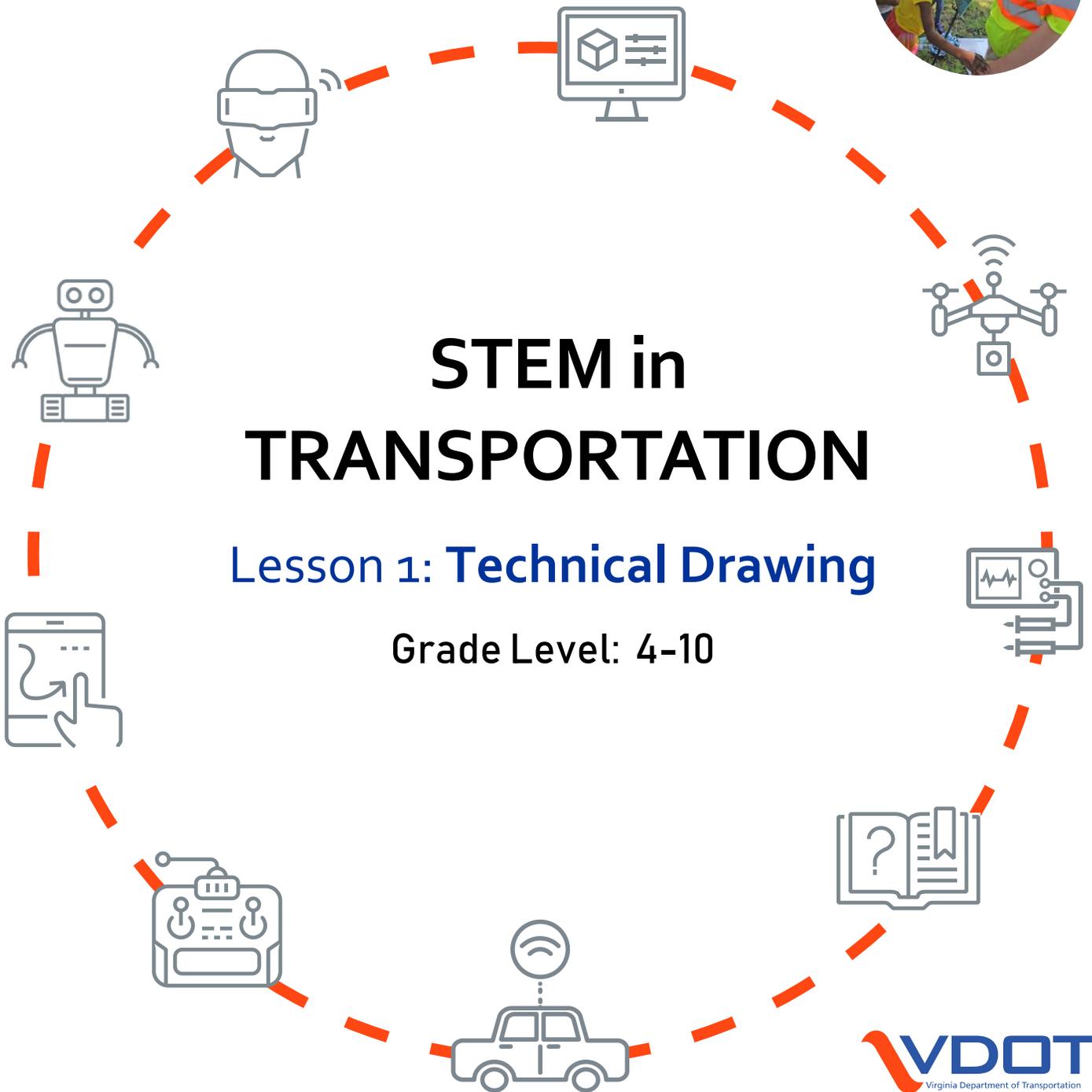




STEM FOR STUDENTS DRIVE IT HOME



STEM in TRANSPORTATION

Lesson 1: Technical Drawing

Grade Level: 4-10

Technical Drawing

Background Knowledge

As we prepare students to be innovators in the world, they will need to know how to communicate design ideas effectively. Even in the age of digital design, 2D drawings are still useful in communicating design ideas and details. Knowing how to create a 3D object from a 2D drawing (3D visualization) is a critical skill. Most individuals recognize its usefulness when following illustrated assembly instructions for furniture and other structures. Engineers, architects, tradesmen, and others use 2D technical drawings to communicate how different parts of an object look and how they go together. Doctors use flat x-ray images to determine the severity and direction of bone breaks. Clothing designers, landscapers, and even game developers use 2D drawings when communicating designs in their work environments.

In this lesson, students will explore technical drawing terminology and build 3D structures by interpreting 2D diagrams.

Procedure

1. Begin by asking students how they can communicate a design to others. Some common answers might be drawings, pictures, describing it, models, etc. Explain how drawings are still important in conveying design details in many situations.
2. Introduce the terms associated with technical drawings.
3. Demonstrate with a simple figure, how to look at a structure from the 3 different views (top, front, side). You can use can foods stacked in a simple configuration or other objects that are simple to draw (blocks, boxes, etc.).
4. Show students how to identify and draw the front, top, and side view of the simple structure. A demo of this can be found here: <https://www.youtube.com/watch?v=SdLegfoMXNA>
5. Arrange the items in a new way and have the students draw the front, top, and side views on a sheet of paper (graph paper can be useful here).
6. Give each student 20 KEVA™ planks and a set of cards that have varying difficulties of challenges on them.

STANDARDS OF
LEARNING
MATH: 8.8

Objective

Students will:

- Investigate
- Utilize common objects to practice making and interpreting 2D & 3D drawings

Materials

- Pencil
- Graph paper
- KEVA™ planks
- 2D / 3D cards

Time: 60-90 minutes

7. Have the students look at the front, top, and side views on the cards and try to build the 3D structure based off those views (the 3D photo solution is on the back of each card).
8. Have the students build their own structure with the KEVA™ planks and draw the top, front, and side views for that structure. They can then give a classmate their drawing and see if they can build the structure intended.

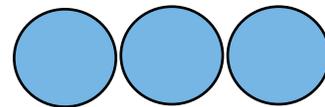
Alteration

If KEVA™ planks are not available, use the available slide presentation to introduce technical drawing and complete the drawing activity using common household items. Legos™ or other building blocks can also be used for the hands on activity.

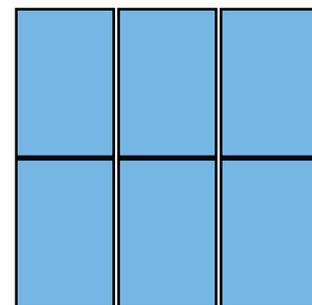
Photo of a simple can arrangement



Top View



Front View



Side View



Terminology

Orthographic drawings: drawings that show different two-dimensional views of objects, together providing full detail of the object's features

Front view: This object view usually shows the length and height of an object as seen looking straight on.

Side view: This object view usually shows the width and height of an object.

Top view: This object view usually shows the length and width of an object and is what you see when looking down onto an object

Drafter: A person who creates a technical drawing

Scale: What a unit of measure on a drawing represents in real life (ex: 1" = 15')

Technical drawing: A precise and detailed drawing of an object, as employed in architecture or engineering

CAD (Computer-Aided Design): These computer programs allow drafting technicians to create drawings digitally

Dimensions: These tell the size of an object (length, width, height, diameter, radius)

Revision: An update or change to a drawing

3D (three-dimensional): an image that shows three dimensions of an object (length, height, and depth)

2D (two-dimensional): an image that shows two dimensions of an object

Extension

More complex technical drawing terms and concepts can be found here:

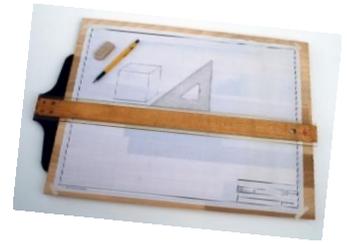
<https://quizlet.com/179069837/cad-technical-drafting-terms-and-definitions-flash-cards/>

Careers to Explore

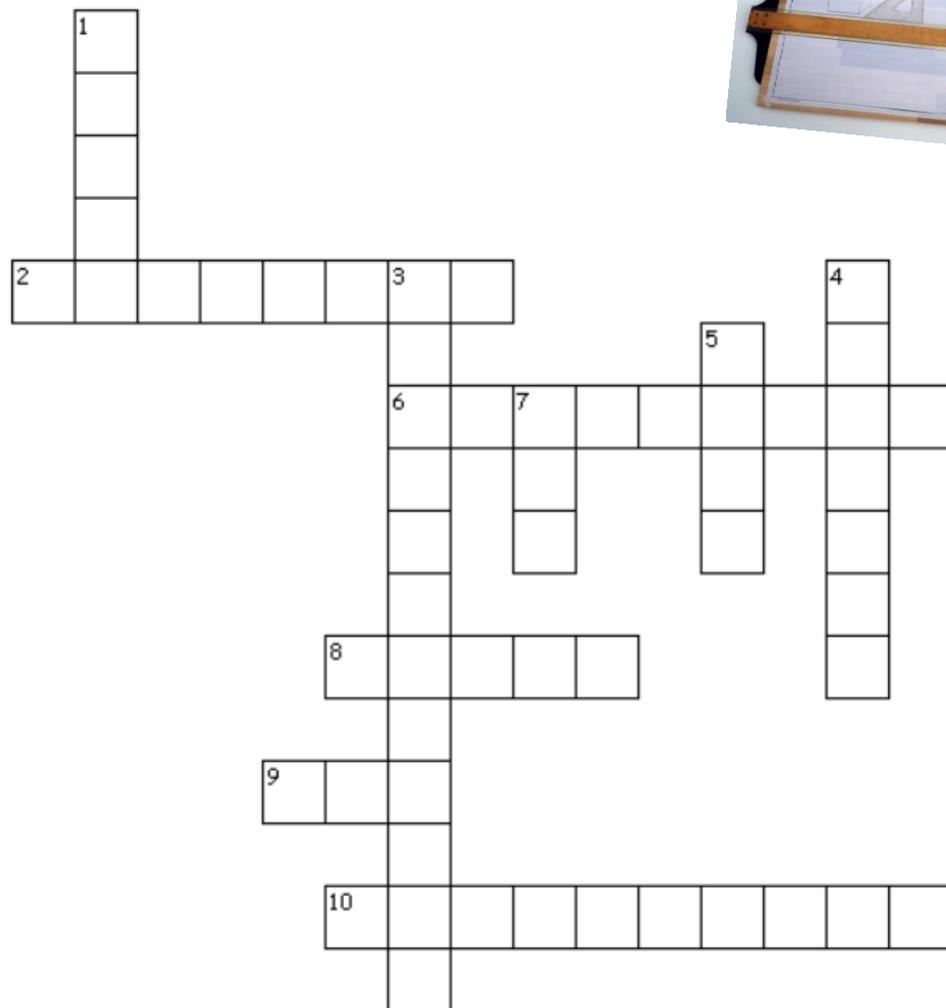
- Draftsman
- Architect
- Engineer
- Industrial Designer



Technical Drawing



WORD
Orthographic
technical
front
side
top
CAD
drafter
dimensions
scale
revision



Across

- An update or change to a drawing
- A precise and detailed drawing of an object, as employed in architecture or engineering
- This object view usually shows the length and height of an object as seen looking straight on.
- This object view usually shows the length and width of an object and is what you see when looking down onto an object from above.
- These tell the size of an object (length, width, height, diameter, radius, etc.).

Down

- This tells what a unit of measure on a drawing represents in real life (ex: 1" = 15').
- These drawings show different two-dimensional views of objects, together providing full detail of the object's features.
- A person who creates a technical drawing
- This object view usually shows the width and height of an object.
- These types of computer programs allow drafting technicians to create drawings digitally.