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Designing Effective Tactile Displays Using the Tactile Graphics Kit

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Learning Objectives

- Complete a plan for creating a meaningful and relevant tactile graphic using the Tactile Graphics Kit.
- Correlate tactile graphics design guidelines with tools from the Tactile Graphics Kit.
- Apply effective strategies to enhance readability and comprehension of tactile graphics when using the Tactile Graphics Kit.
- Utilize the Tactile Graphics Kit to successfully integrate braille keys and labels in a tactile graphic

Purpose and Importance of Tactile Graphics

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Purpose of Tactile Graphics

- Tactile graphics provide access to illustrative information through touch
- **Tactile graphicacy**: Ability to interact with, comprehend, analyze, and produce tactile graphics or raised line drawings
- Requires:
  - Fine motor sensitivity and dexterity
  - Efficient use of carefully constructed knowledge
  - Variety of tactile-cognitive strategies

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Importance of Tactile Graphics

- Tactile graphics are a focus for attention and perception
- Natural destination for conversation and social interaction
- Invite and motivate children's curiosity and active engagement
- Promote academic and personal success
- Necessary component of every educational program

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Textbooks

- Textbooks and other commercially produced materials are essential resources
- Created for a general audience from a distance
- Typically provided by professional transcribers
- Do not usually have a direct, personal connection to students

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Teacher-Created Classroom Materials

- Teacher-created materials are invaluable connections between students, teachers, peers, and learning
- TVIs, O&M instructors, and other specialists play a vital role in providing individualized educational materials, including tactile graphics

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Tactile Graphics Production Methods

- Collage
- Microcapsule/Swell-Form
- Thermoform
- Drawing software with embosser or digital tactile display
- Drafting (Draftsman, Quick Draw paper, or Tactile Doodle)
- **Tooled**

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Which of These Methods Have You Used?

- Collage
- Microcapsule/Swell-Form
- Thermoform
- Drawing software with embosser or digital tactile display
- Drafting (Draftsman, Quick Draw paper, or Tactile Doodle)
- Tooled
- All of the above!

Introduction to Tooled Graphics

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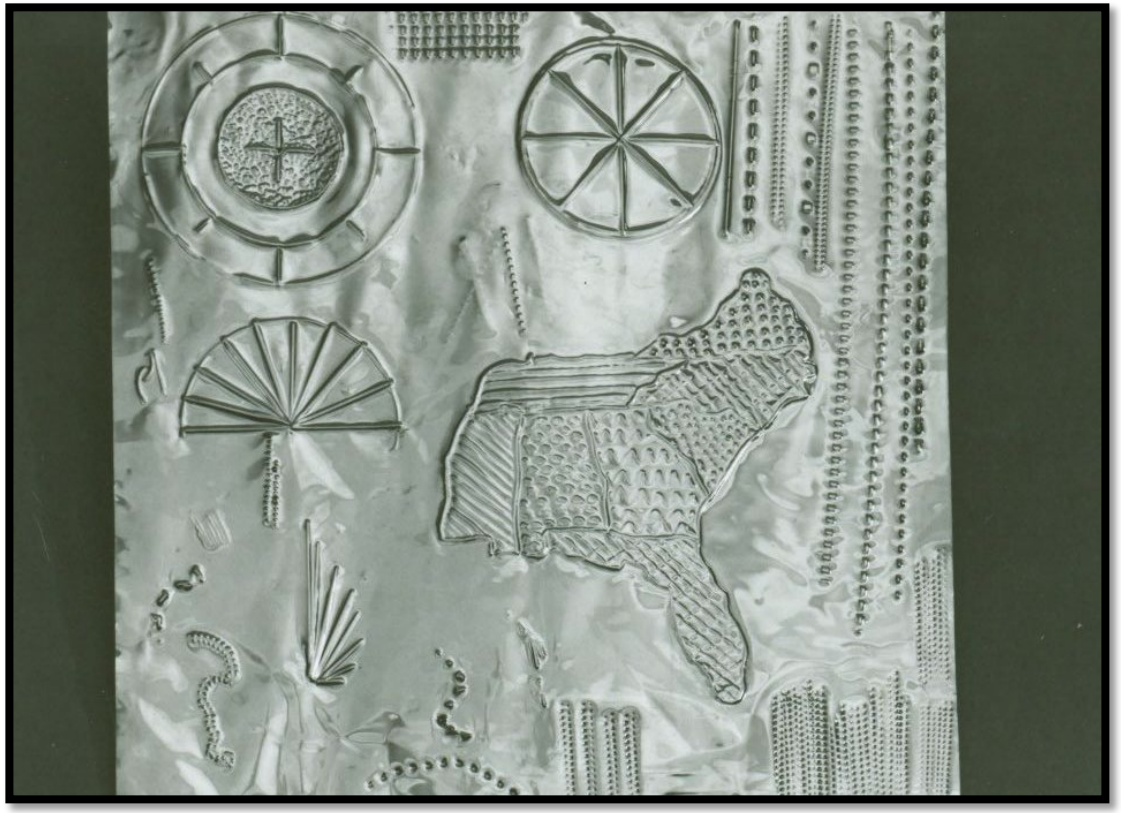
What is a Tooled Graphic?

- Raised-line image drawn by hand
- Created on paper, aluminum, or other semi-durable materials
- Requires a collection of specialized tools that can be purchased individually from craft shops and online shopping sites, or collectively as a kit

Advantages of Tooled Graphics

- Sturdy and capable of multiple uses in both school and home environments
- Readily available method that can be utilized at any time
- Skills can be independently developed, practiced, and refined
- Graphics can be thermoformed for increased durability and longevity



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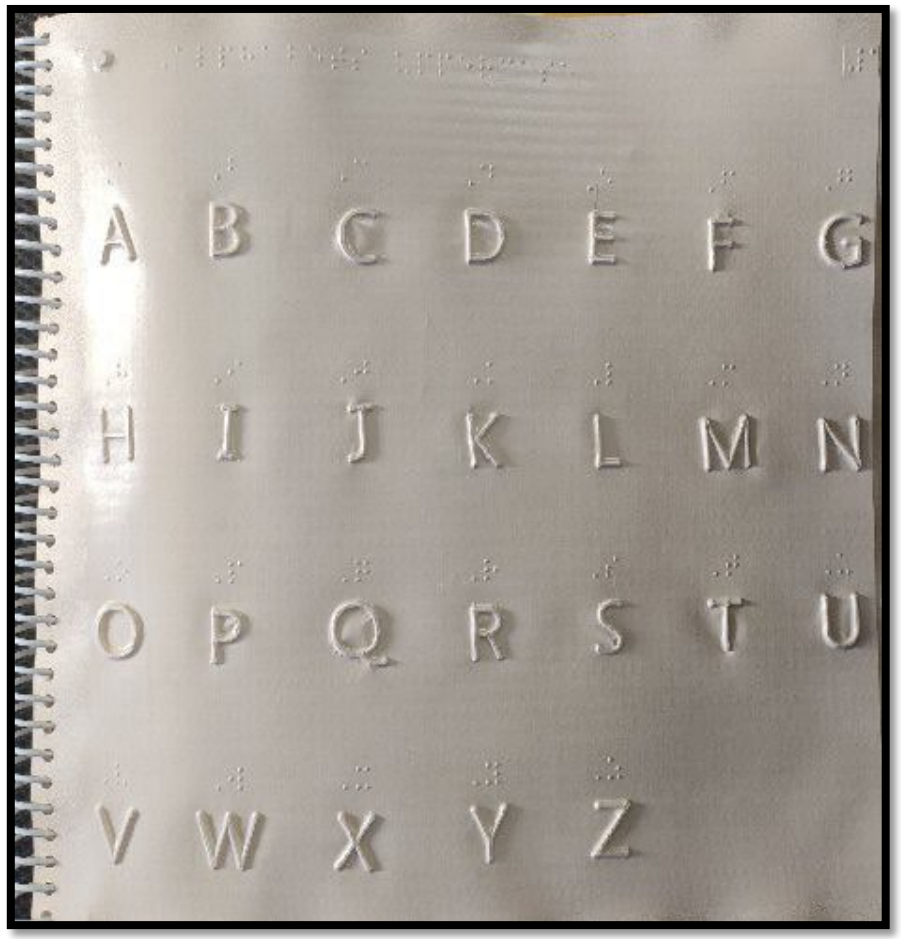
Graphics You Can Create Using Tools

- Maps (academic and navigational)
- Graphs and charts
- Math and science diagrams
- Language arts graphic organizers
- Pictorial representations
- Student artwork
- **What else?**



Materials Commonly Used in Tooled Graphics

- Aluminum foil sheets, braille paper, or overhead projector sheets
- Slate and stylus (for labels) and braille eraser
- Spur, tracing, and embossing wheels
- Ballpoint pens and stencil tools
- Metal tongs with embossed shapes
- Rubber mat

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Elements of a Tactile Graphic Display

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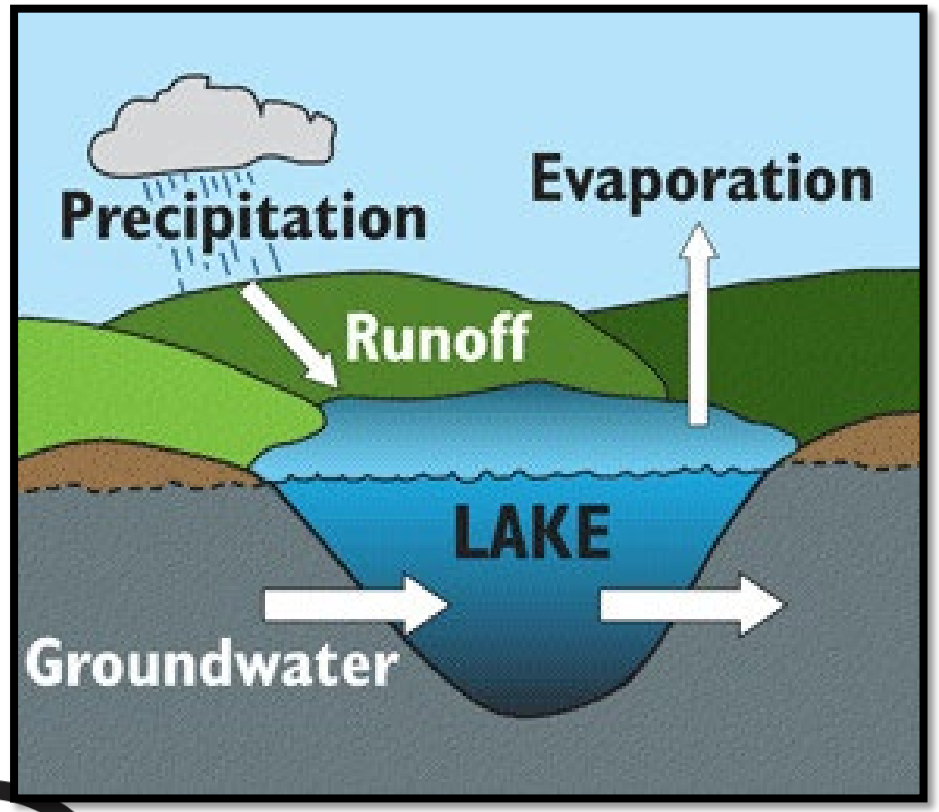
Areal Symbols



- Significant region or area in a print or tactile graphic
  - States or provinces in a map
  - Stripe or shape in a flag
  - Layer of soil in a classification diagram
  - Lake or grove of trees

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Linear Symbols (Lines)

- Any linear information in a graphic
  - Rivers and geographic boundaries
  - Historical routes
  - Pathways in an electrical circuit
  - Parts of an angle or length to be measured
- Can be straight, curved, or outline

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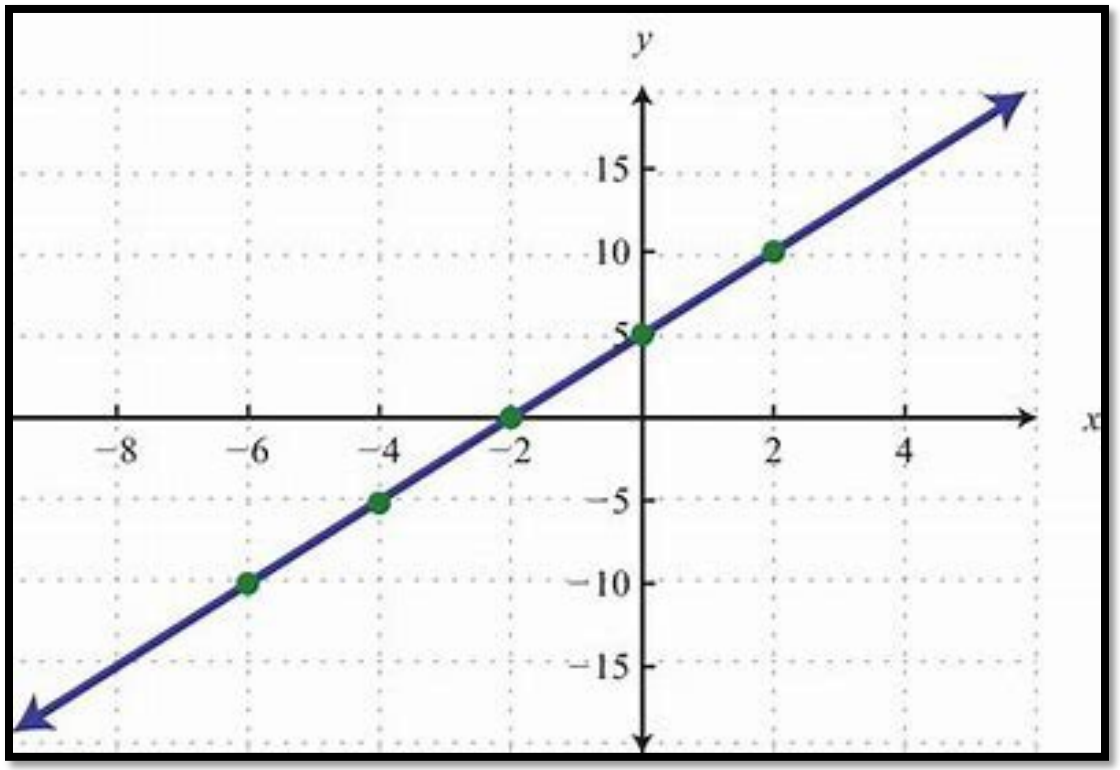
Point Symbols (Points)



- Specific place or point on a graphic
  - Location of a city
  - Bus stop or house on a map
  - Oil well or copper mine
  - Point in a line graph
  - Small organ in an anatomy diagram

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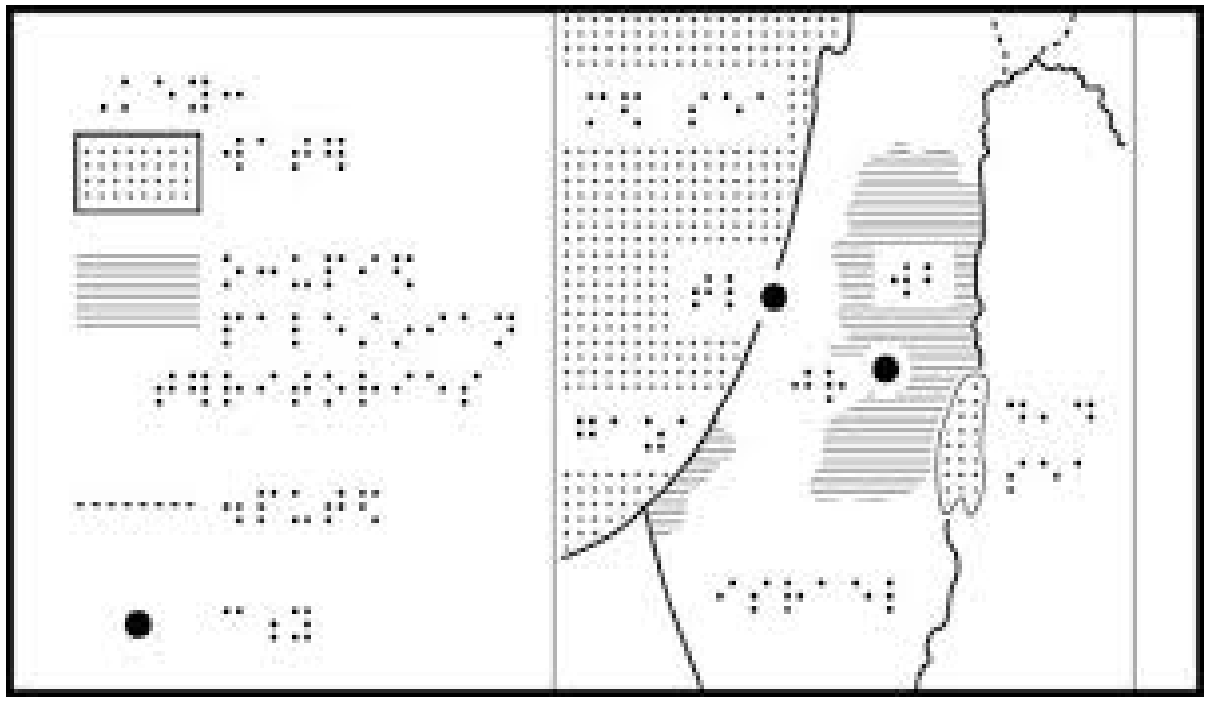
Labels

- Any braille text that is used in a tactile graphic
- Can be literal or symbolic
- Full labels are used when possible
- Keyed labels (alphabetic or numeric) are used when necessary



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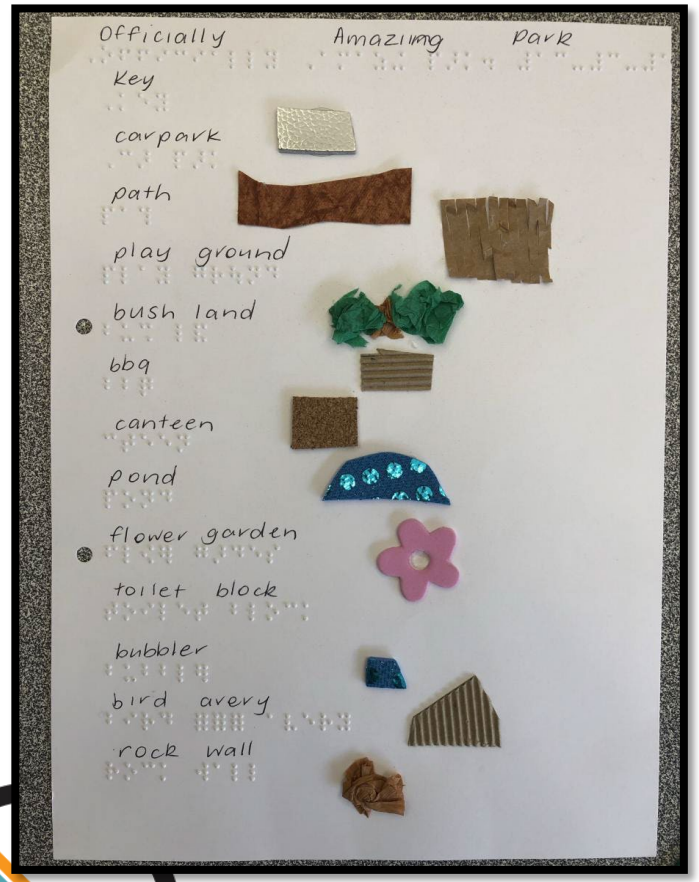
Legends and Keys



- Legends are included wherever they appear in the print
  - May require altering to fit the needs and symbols of the tactile graphic
- Special keys are included to define areas and point, line, and braille symbols used in the tactile graphic

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Check Your Knowledge!

Which of these is an example of a point in a tactile graphic?

- Ocean
- Post office
- Highway
- Grassy field

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Tactile Graphics Kit (TGK) by APH

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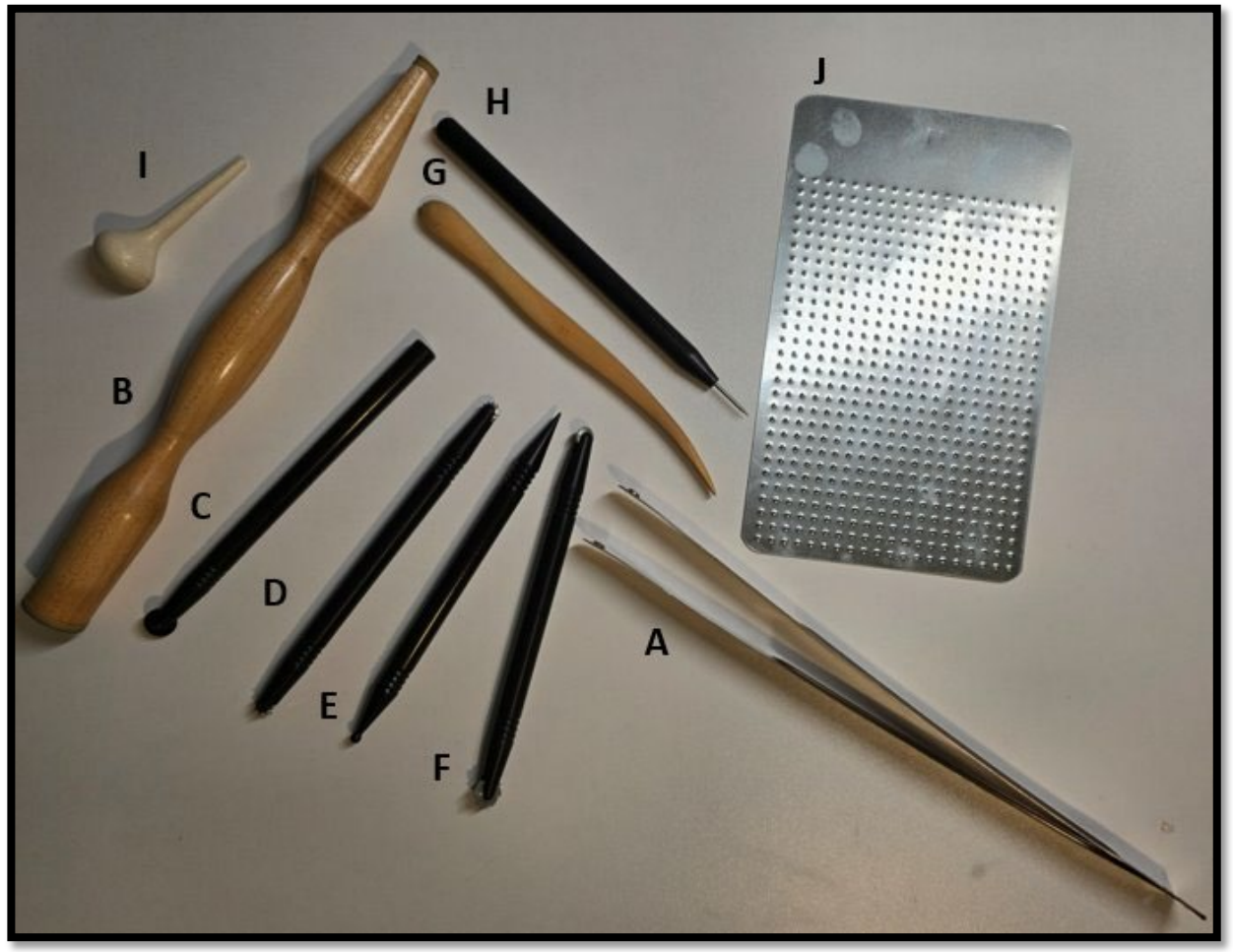
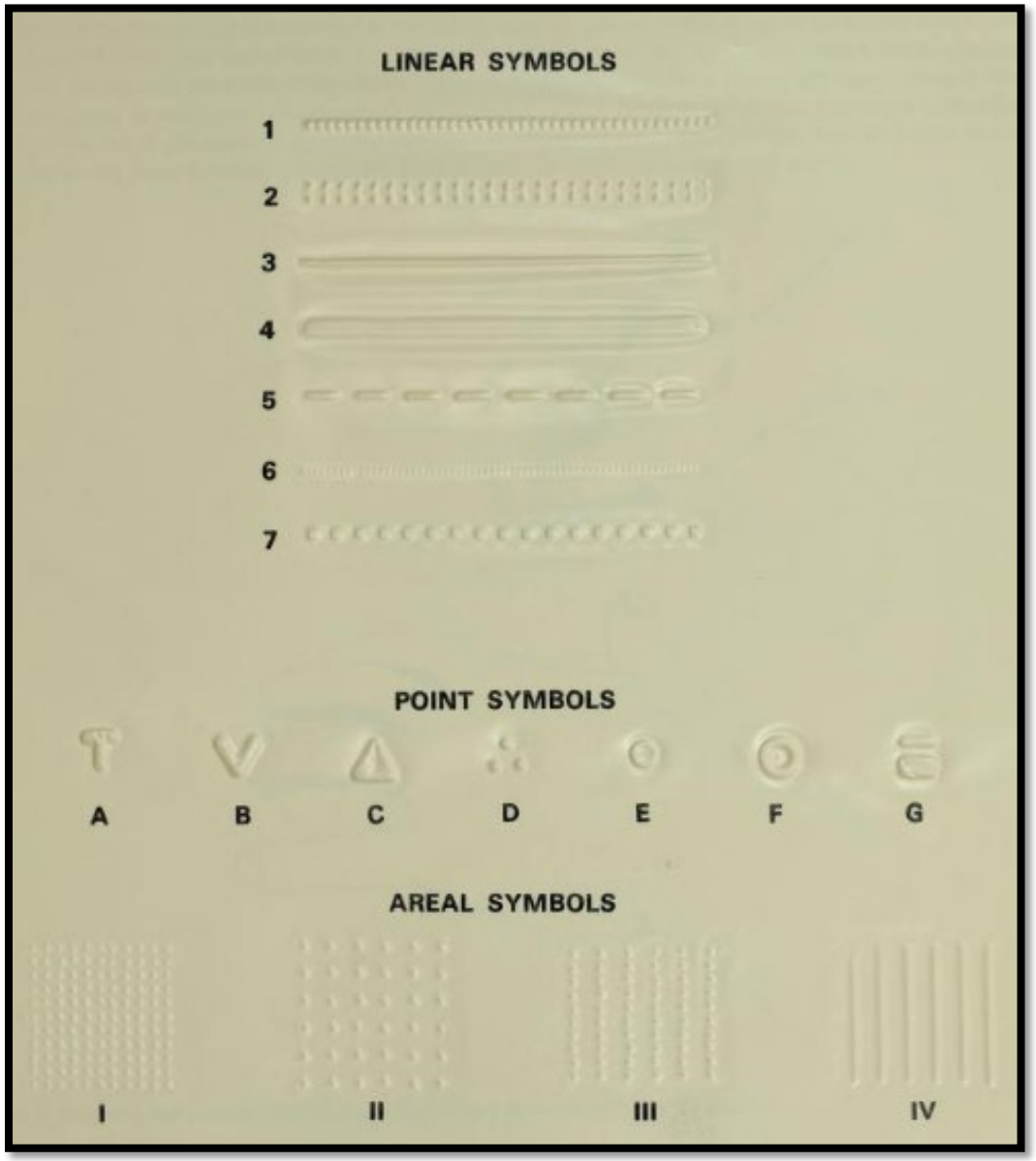


Kit Components

APH Tactile Graphics Kit Manual: Figure 4



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Tongs

- Metal tongs are used with a hammer to create point symbols
- The TGK includes seven pairs of tongs (labeled A-G)
- Allow you to create seven different point symbols

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Hammer

- The hammer is used as a blunt instrument to strike the tongs and create point symbols
- The hammer is also used to emboss areal patterns
- The TGK includes one wooden hammer with a small end for small patterns and a large end for large patterns

Roller Tool

- The roller tool is a smooth tracing wheel with a rolling disk
- Used to fill in areal patterns close to lines
- The TGK includes one roller tool

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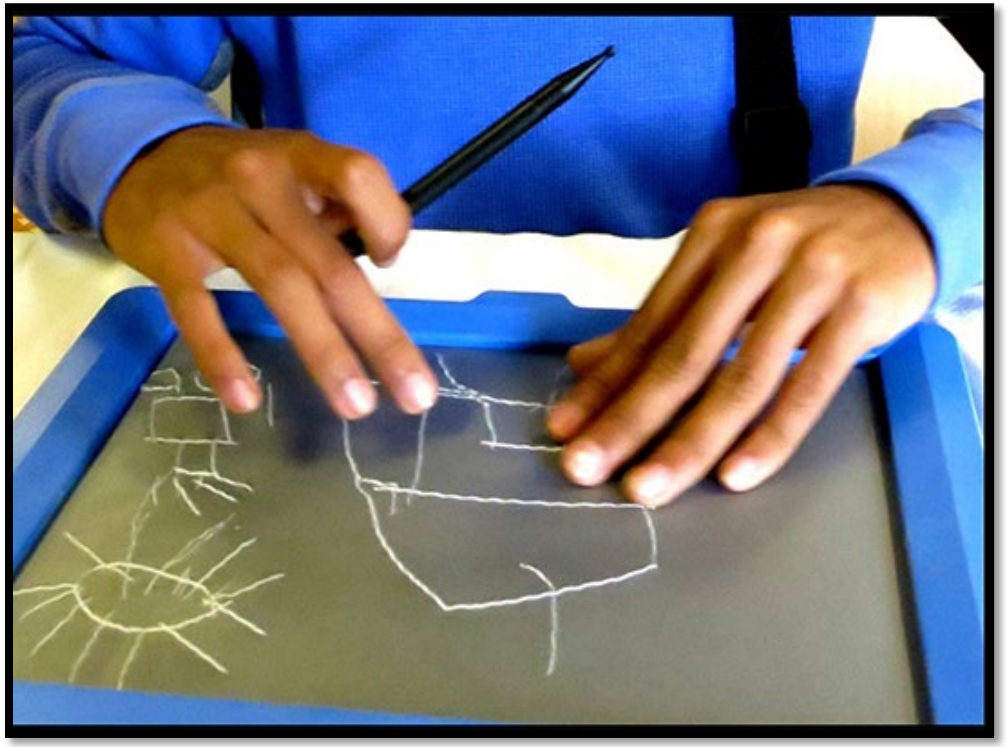
Line Tools



- Line tools are handled like pencils
  - Varying ends, stationary or rotating
  - Used to make different types of lines
- The TGK includes three line tools, capable of creating at least seven lines
  - One line tool features two unique stationary ends (pictured)
  - Two line tools each feature two unique jagged (toothed) rolling disks

Line Sharpening Tool

- The line sharpening tool makes lines more raised and tactually distinct
- The TGK includes one wooden line sharpening tool

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Vent Tool

- The plastic vent tool has a sharp metal end that pokes tiny holes in an aluminum sheet preparatory to thermoforming
- The TGK includes one vent tool

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Wooden Eraser

- The wooden eraser is a typical braille eraser
- The large end is used to scrub away areas of the graphic that were mistakenly embossed
- The TGK includes one wooden eraser

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Plate (areal pattern)

- An areal pattern plate is a metal sheet featuring an embossing texture that can be used to represent an area
- The TGK includes four areal pattern plates with different dotted and lined textures

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Other Tools in the TGK

- Slate and Stylus
- Ruler
- Rubber Pad
- Aluminum Foil Squares
- Tool Punch

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Check Your Knowledge!

What is an areal plate used for?

- Point symbols
- Lines
- Significant textured region
- Braille labels

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First Steps in Creating a Tooled Graphic: Things to Know

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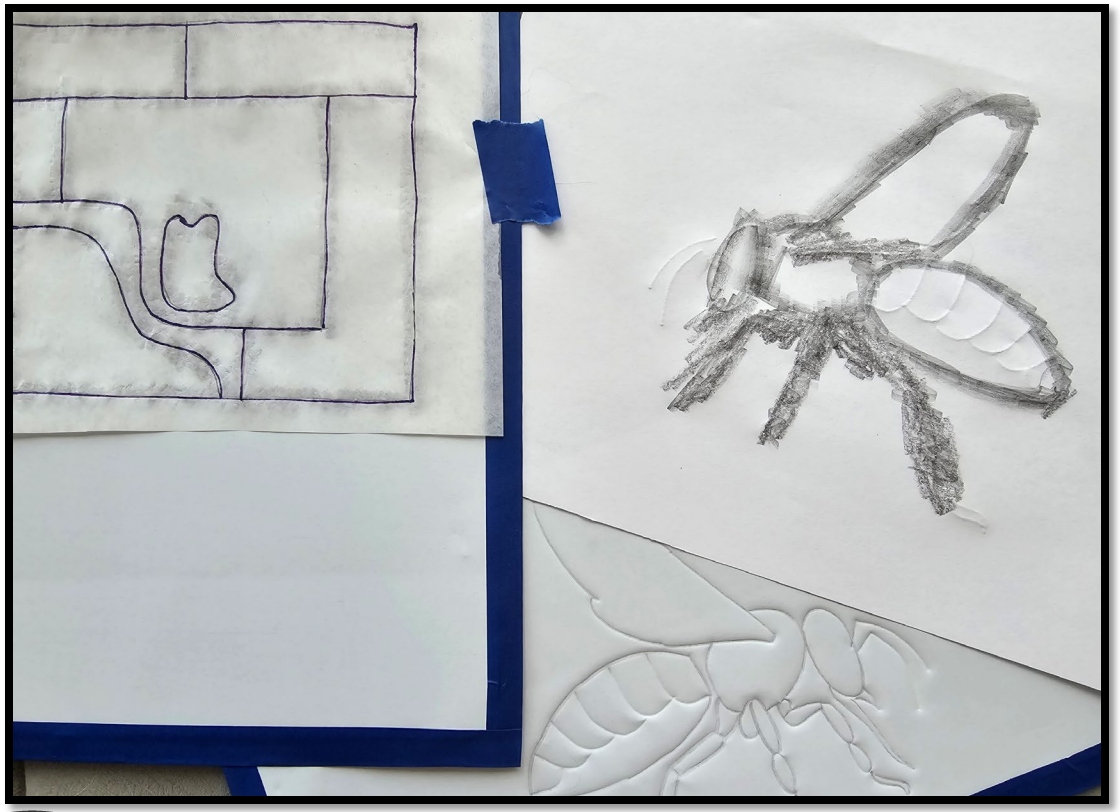
Copying the Print Graphic onto the Foil



- Draw the graphic freehand on paper
  - OR place tracing paper over the image and trace
  - OR have a copy of the graphic
  - Remember, it is a mirror image!
- Use carbon paper or add graphite (i.e., pencil) to the back of the image
- Place paper onto white side of foil and tape down
- Trace only essential features!

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Erasing

- Use the large end of wooden eraser
- Lay the foil shiny side up on a smooth, hard surface
- Scrub the area to be erased vigorously

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Braille

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Braille Labeling

- Whenever possible, emboss braille cells DIRECTLY into the foil with a slate and stylus
- Place other relevant braille text before or after the image
    - **Before** is preferred for clarity and ease of use

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Labeling Tips

- It is best not to use lead lines for labels
- **If you do need lead lines:**
  - Use Line 6
  - At least ½ inch long
  - No closer than 1/8 inch to element
  - Any primary graphic line "wins" over a lead line

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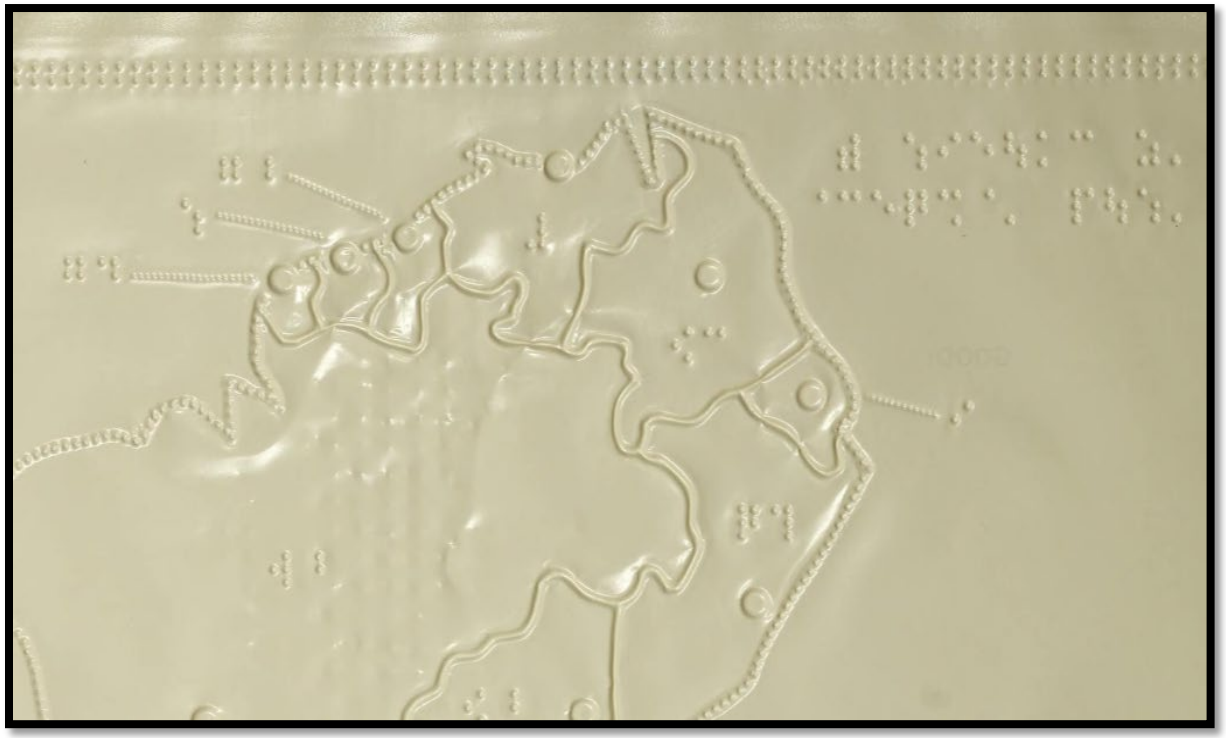
Labeling Tips (continued)

- Orient braille horizontally so that it can be read naturally
- Avoid braille labels in textured areas
- Emboss a line (dots 2-3-5-6) across the entire top margin of the page



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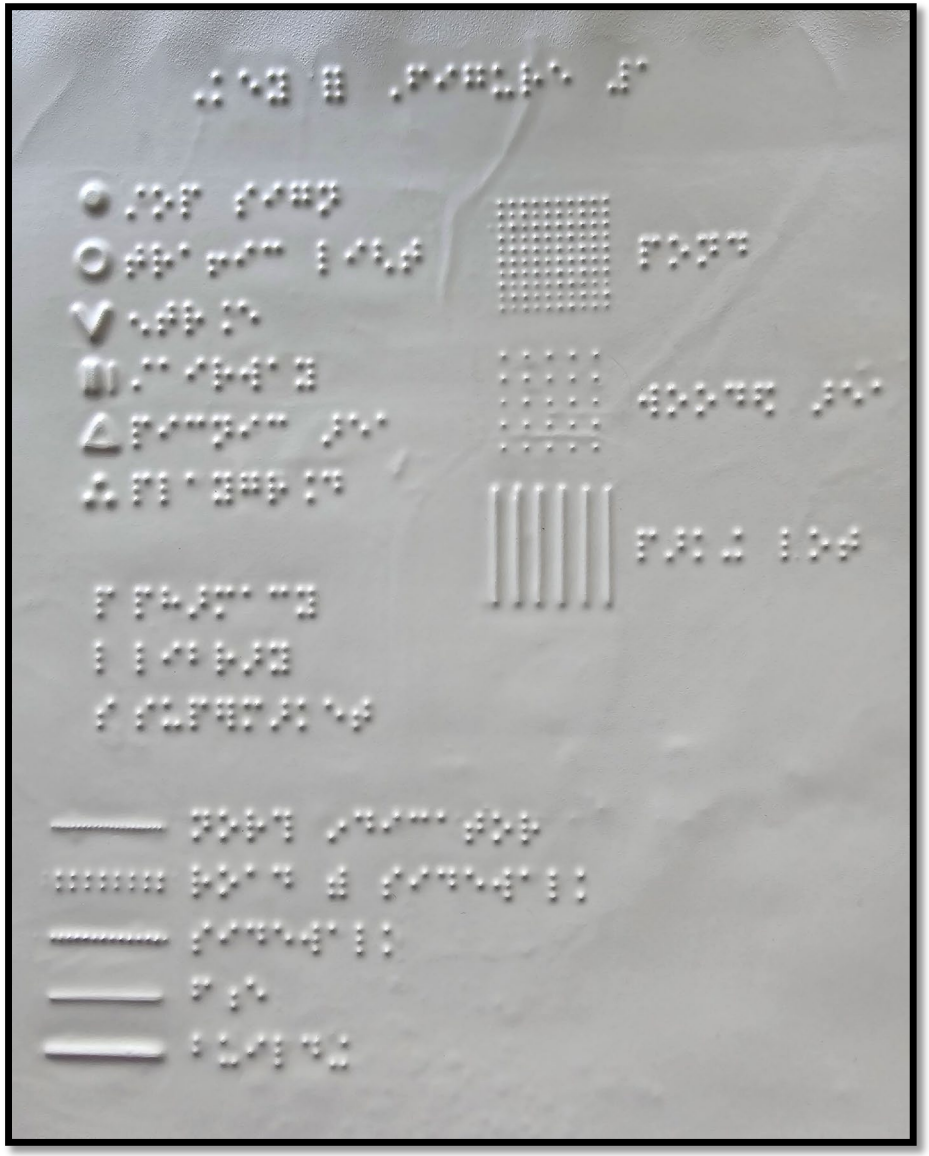
Key

- Use braille list format (1-3 cell indentation)
- Labels/symbols in left column
- Meanings in right column
- Use sample of tactile symbol
- Place the word "key" at the top in cell 5



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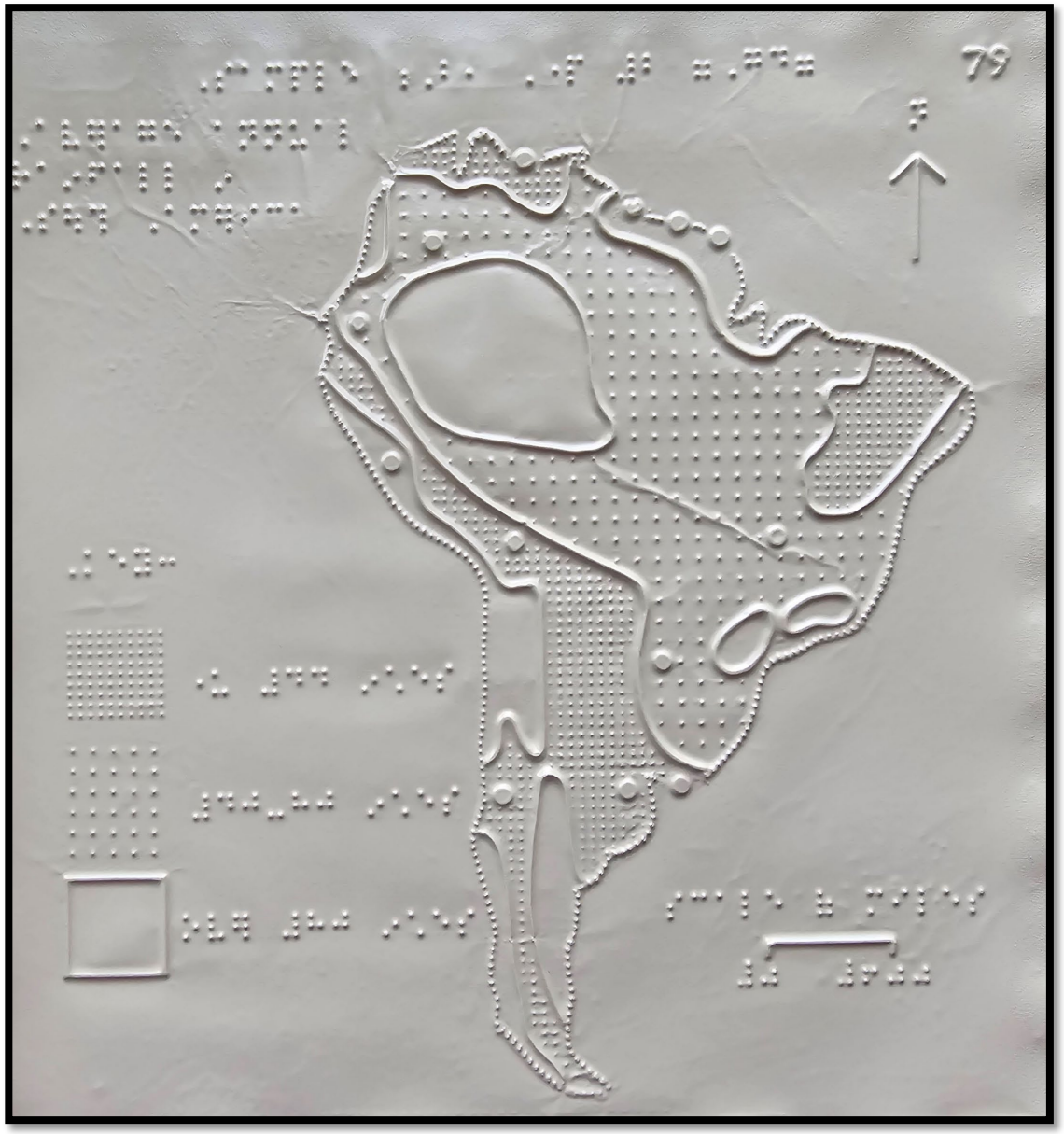
Key (continued)

- Don't use box lines to enclose the key
  - These could be interpreted as parts of the key itself
- Group the symbols in the key by category or symbol type
  - **Example**: points at the top, lines in the middle, and areal patterns at the bottom



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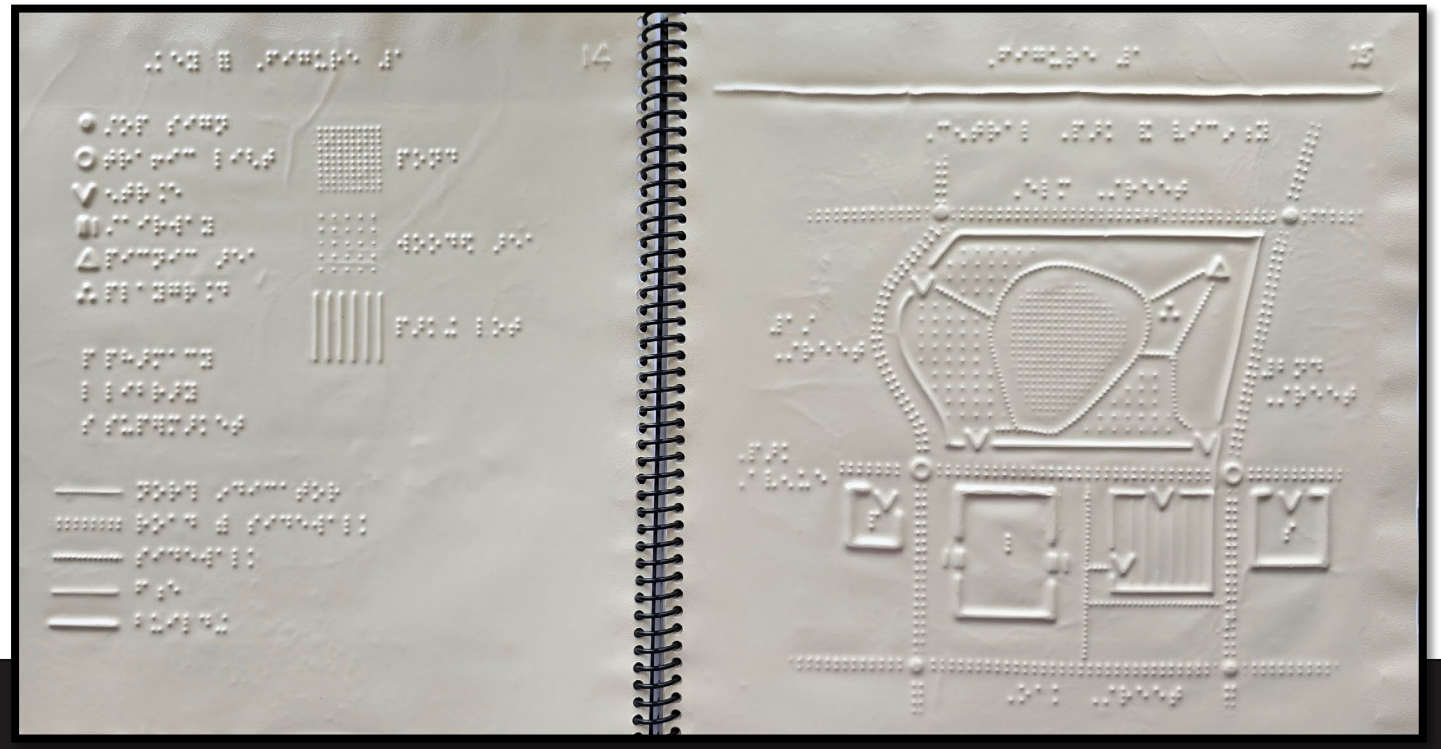
Key Placement

- Place at the bottom of the graphic page if room allows
- An additional key page is located on the page that faces the graphic



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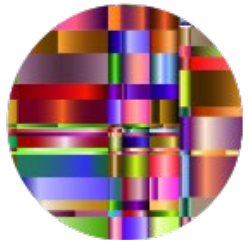
Check Your Knowledge!

About how big is 1/8-inch?

A. Length of half a paper clip
B. Thickness of two quarters and a dime
C. Width of a small caterpillar
D. Diameter of a penny



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Points and Lines

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Embossing Point Symbols in the Foil

- Place the rubber mat on a hard, flat surface
- Place the foil "white side up" on top of the rubber mat
- "Sandwich" the foil with the tong of your choice
    - Keep the raised symbol DOWN!
- Strike the head of the tong with the large end of the wooden hammer

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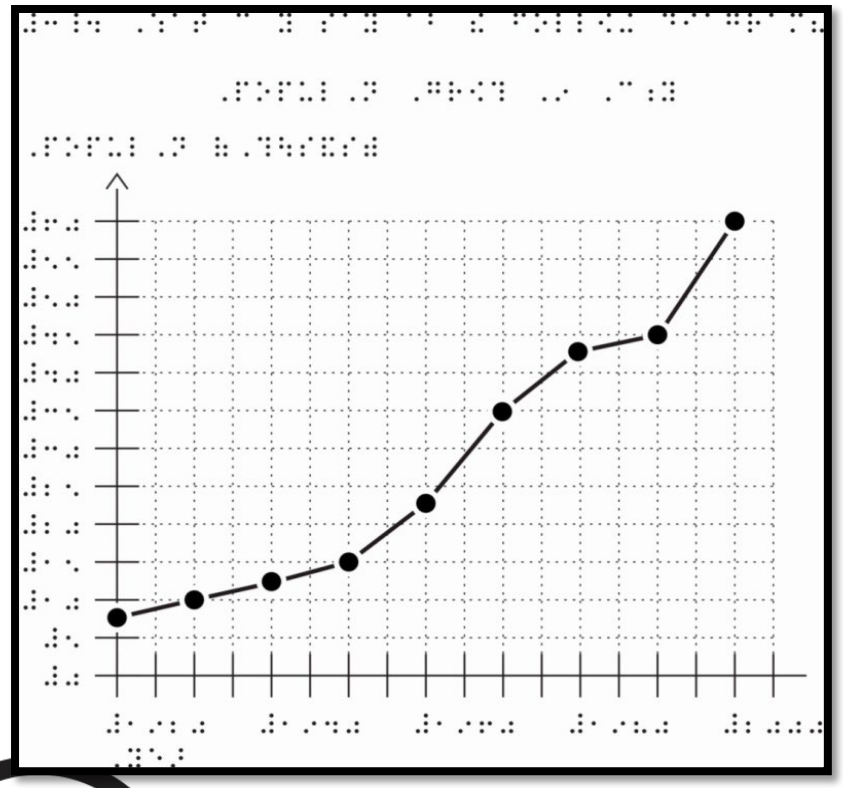
Point Guidelines



- Use points to represent objects or locations
- Ensure there is at least 1/8-inch space when placing a point next to a line or embedding in an areal pattern
- Orient point symbols A-D as they appear in Figure 4
- Orient point symbol G to provide mobility cues
  - Thin line is down, thick line is up

Embossing Lines in the Foil

- Place the rubber mat on a hard, flat surface
- Place the foil "white side up" on top of the rubber mat
- Hold the line tool like a pencil
- Roll the tool over one of the penciled lines you want to emboss
  - Push the tool away from you
- Emboss solid lines before dotted lines

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General Purpose Lines: Line Tool D

- Line 1: Single-dotted line
  - Apply pressure to the foil to perforate with the teeth of the wheel
  - This is easiest for tight turns
- Line 2: Double-dotted line
  - Again, apply pressure to the foil to perforate with the teeth of the wheel

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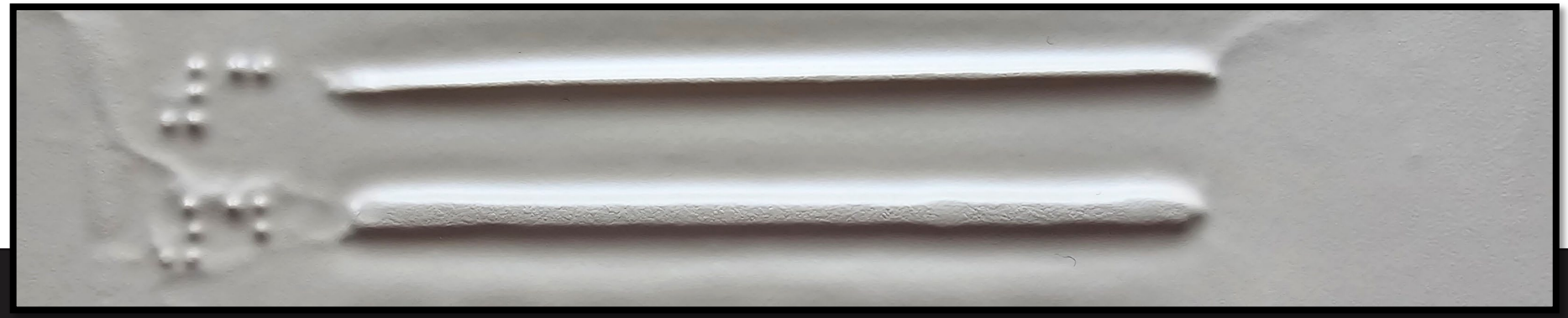
General Purpose Lines: Line Tool E

- Line 3: Thin solid line and Line 4: Wide solid line
  - Two ends of the same tool
  - Use a 45-degree angle for both
  - Use consistent pressure and a smooth, continuous motion
  - Do NOT puncture the foil
  - Line 3 is easiest for tight turns



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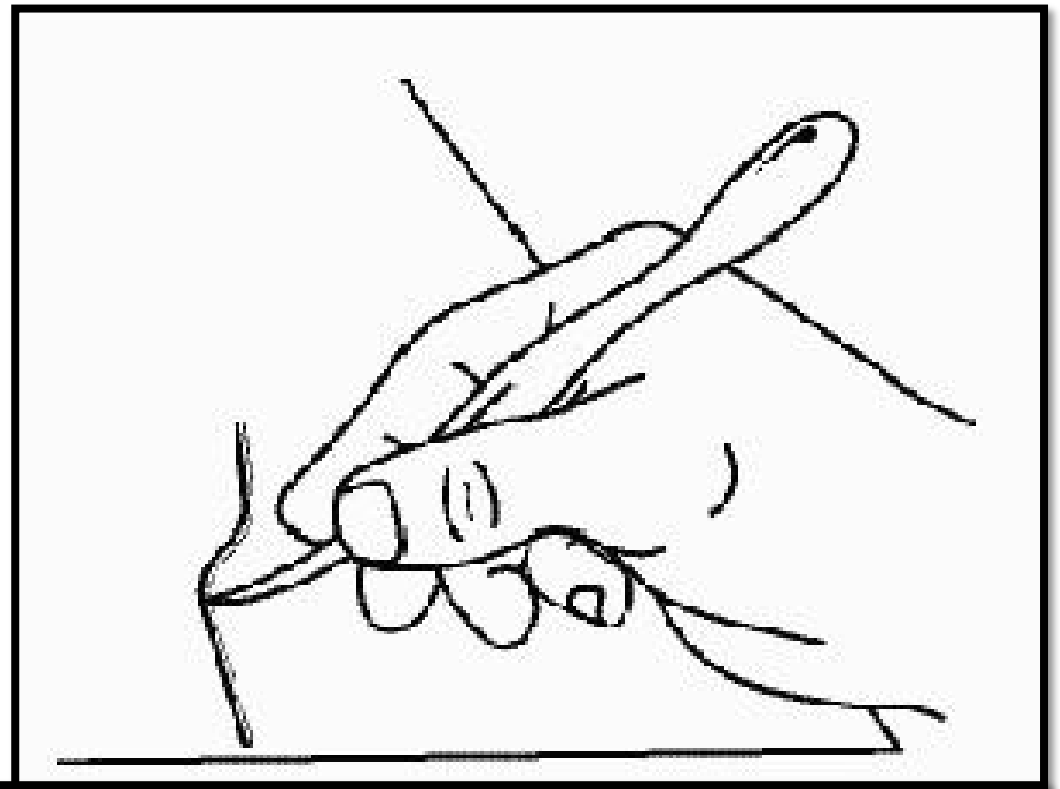
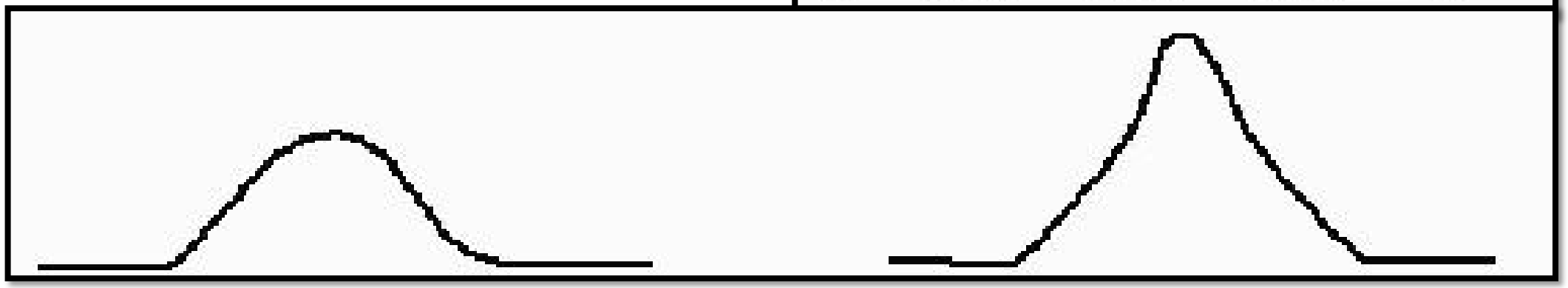
General Purpose Lines: Line Tool E (continued)

- Line 5: Thin dashed line
  - Made with the same end that makes Line 3
  - Make ¼-inch long dashes separated by 1/8-inch blank spaces
    - A typical cookie is about ¼-inch thick
  - Don't perforate the foil!

Line Sharpening





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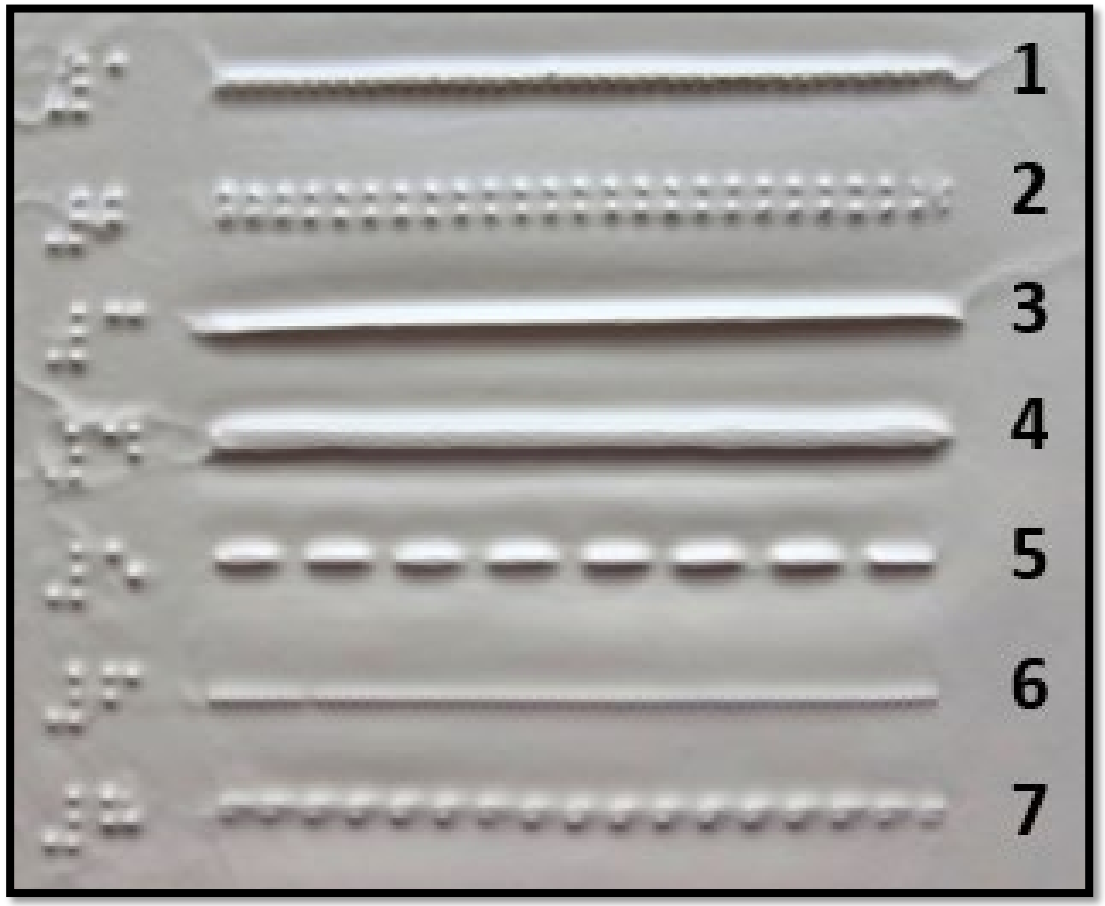
Special Purpose Lines: Line Tool F

- Line 6: Fine dotted line
  - Acts as a guideline or lead line, connecting specific features of a display with braille labels
  - Can be used for grid lines (vertical and horizontal)
  - Use light pressure
  - Do not perforate the foil



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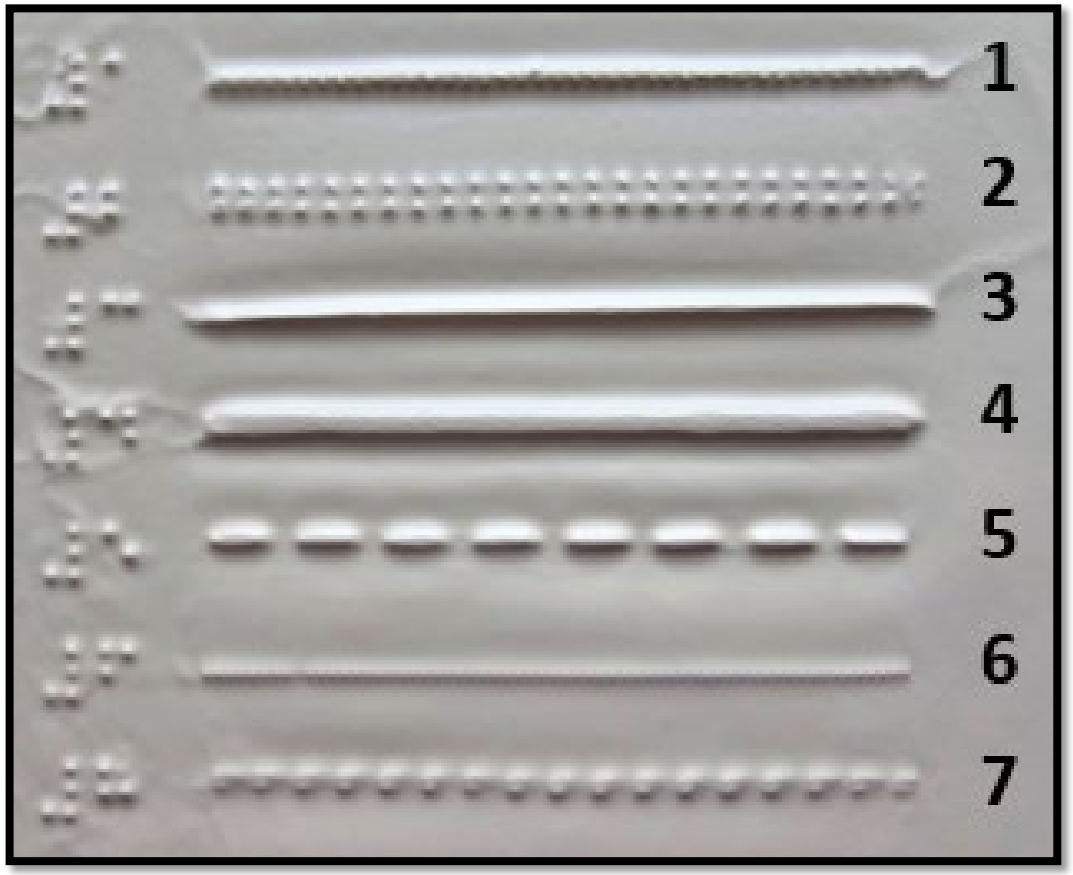
Special Purpose Lines: Line Tool F (continued)

- Line 7: Directional line
  - One direction is smooth ("correct" direction)
  - One direction is rough
  - Line 7 is used in place of the traditional arrowhead symbol
  - Use heavy pressure so that the teeth bite into the metal



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Constructing an Arrow

1. Wings of the arrow at 45° angles
2. Wings 1/4 inch (6 mm) in length
3. Bisecting line at least 1/2 inch (13 mm) in length
4. Only one type of line, either solid or dotted, for the entire arrow

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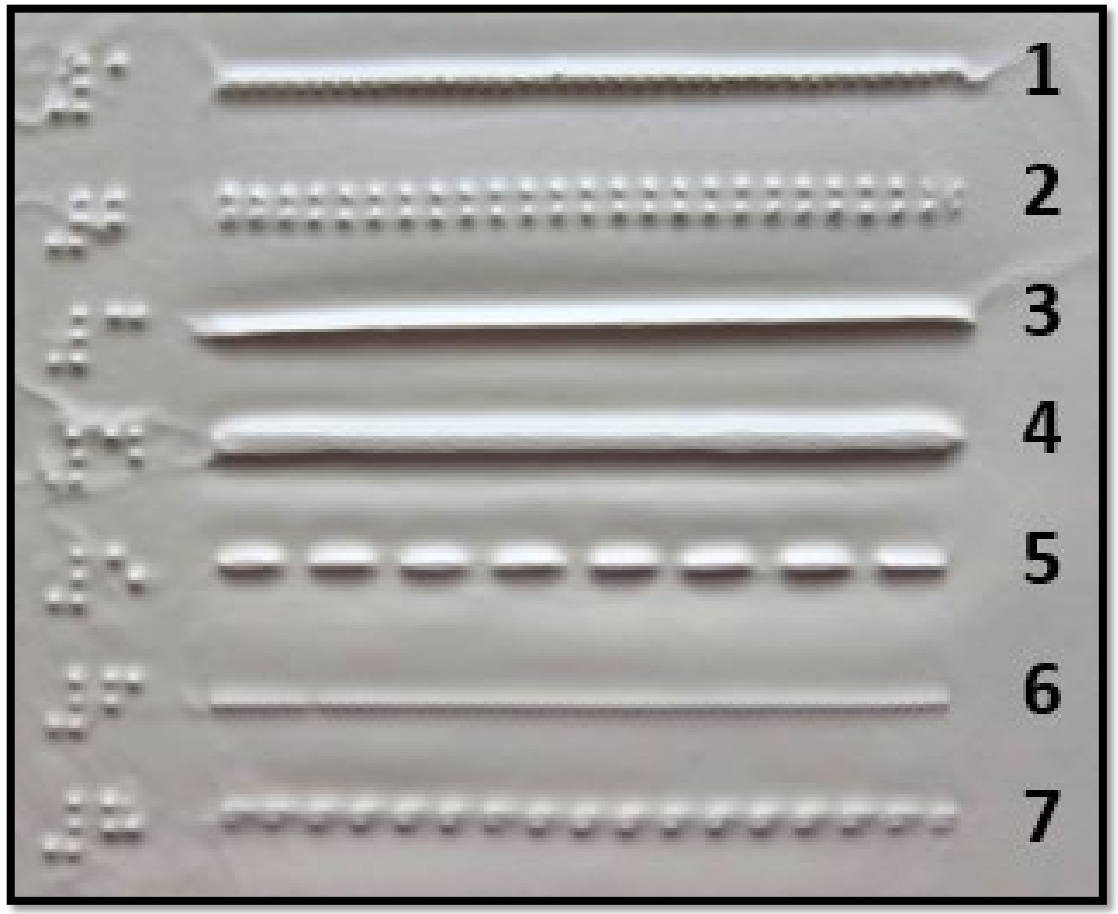
Reducing Line Complexity

- Avoid using all seven lines in one graphic
- If there are only two lines, use one solid and one discontinuous line
- Examples of good line pairs:
  - Lines 1 and 3, Lines 1 and 4
  - Lines 2 and 4, Lines 2 and 3
- Dotted lines stand out the most
  - Make line 1 or 2 the prominent line

Priority of Lines When Creating a Graphic

1. Line 1
2. Line 3
3. Line 2 or Line 4
4. Line 4 or Line 2
5. Line 5
6. Line 6
7. Line 7



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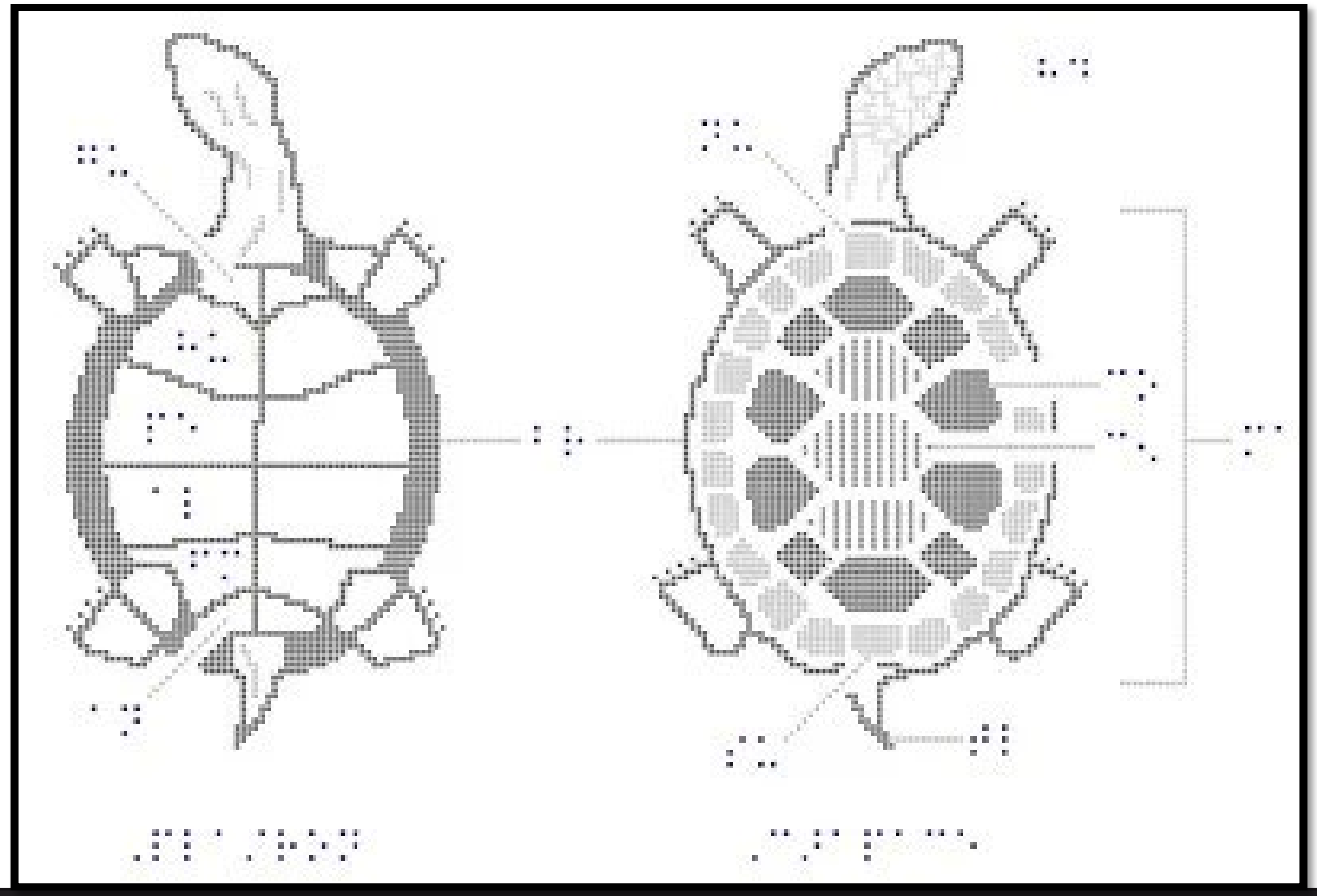
Additional Line Pointers

- When lines intersect, break one of the lines just enough to allow the other line to pass through
- Leave 1/8-inch spacing between an areal pattern and a line that appears in it
- Never make a line less than ½-inch in length (Line 7 should be no shorter than 1 inch)
- Keep spacing between lines 1/8-inch or more

Example: Using Lead Lines and Areal Patterns



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Check Your Knowledge!

How many linear symbols can be created with line tools in the TGK?

- 3
- 4
- 7
- 10

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Areas

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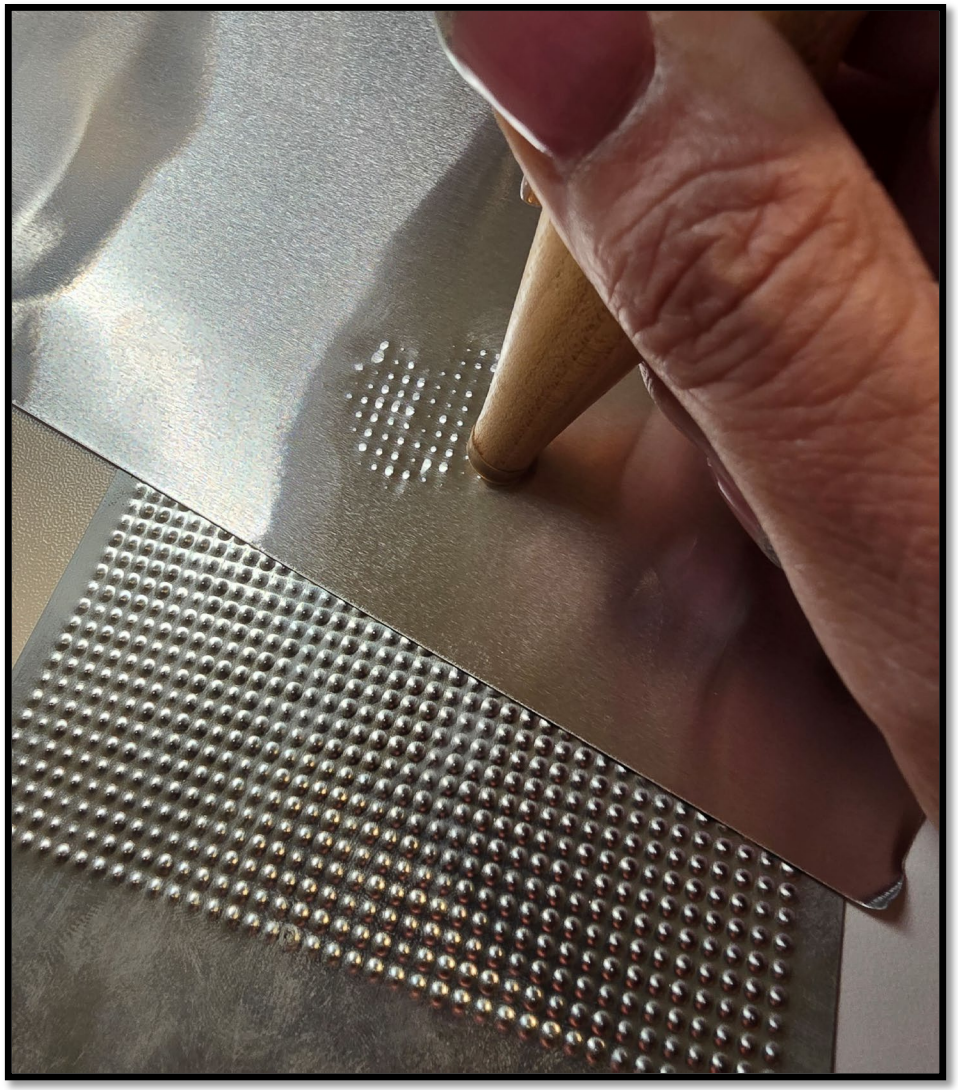
Embossing Areal Patterns

- Place the rubber mat on a hard, flat surface
- Place the foil SHINY side up on top of the rubber mat
- Place the areal plate under the area you want to emboss
- Grasp the wooden hammer and STRIKE the foil repeatedly within the outlined area
- Use the large end for large areas and the small end for small areas



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Using the Roller Tool

- The roller tool is used for embossing small areas
- Assists with embossing the exact contours (outer edges) of outlined areas

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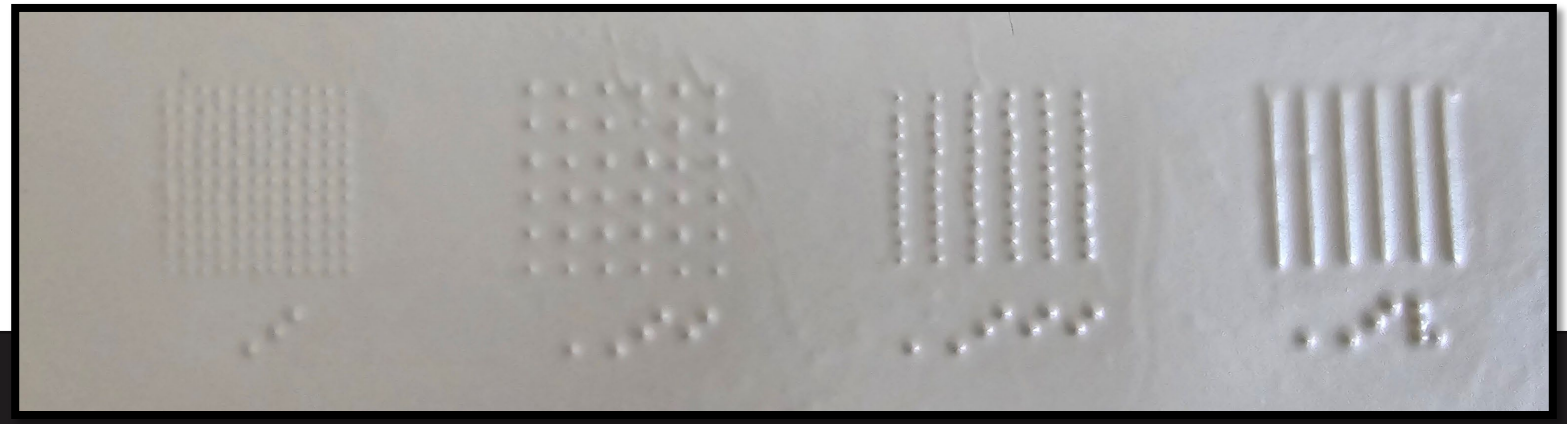
Areal Pattern Guidelines

- Use areal patterns sparingly
- The area must be larger than ½-inch square, but at least 1 inch is better
- Pattern I is for smaller areas
- If two patterns are needed:
  - Pattern I and either III or IV
  - Pattern II and either III or IV



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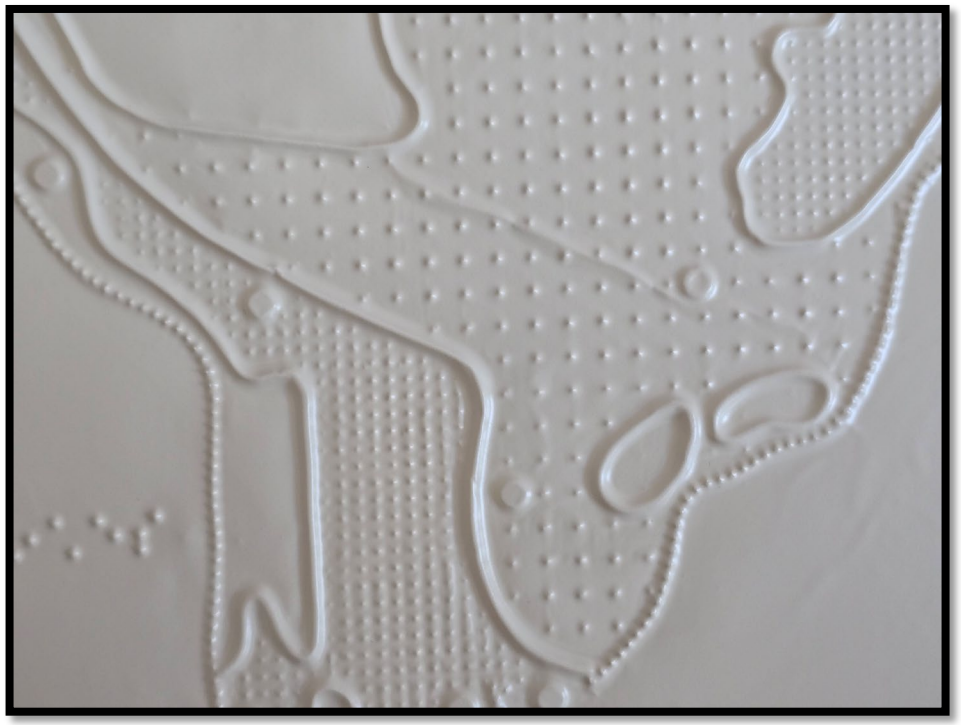
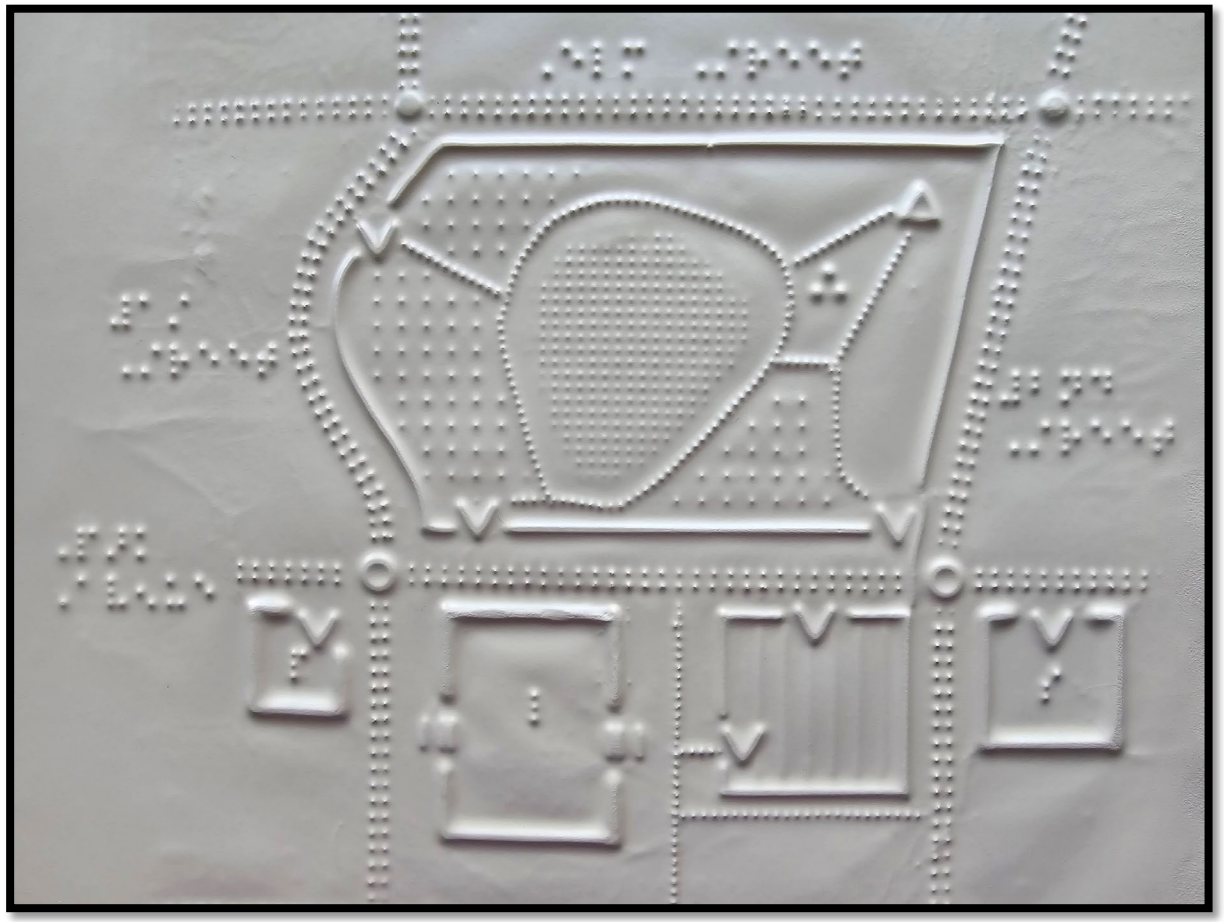
Areal Pattern Guidelines (continued)



- Use solid lines with dotted patterns, and dotted lines with solid patterns
- Use a line to separate two patterns that are next to each other
- Orient Patterns III and IV with the lines running perpendicular to the bottom of the page

Example: Using Multiple Areal Patterns



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Check Your Knowledge!

What is the minimum size for an areal pattern?

- 1/8-inch square
- ¼-inch square
- ½-inch square
- 1-inch square

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Graphs and Helpful Tips/Tools

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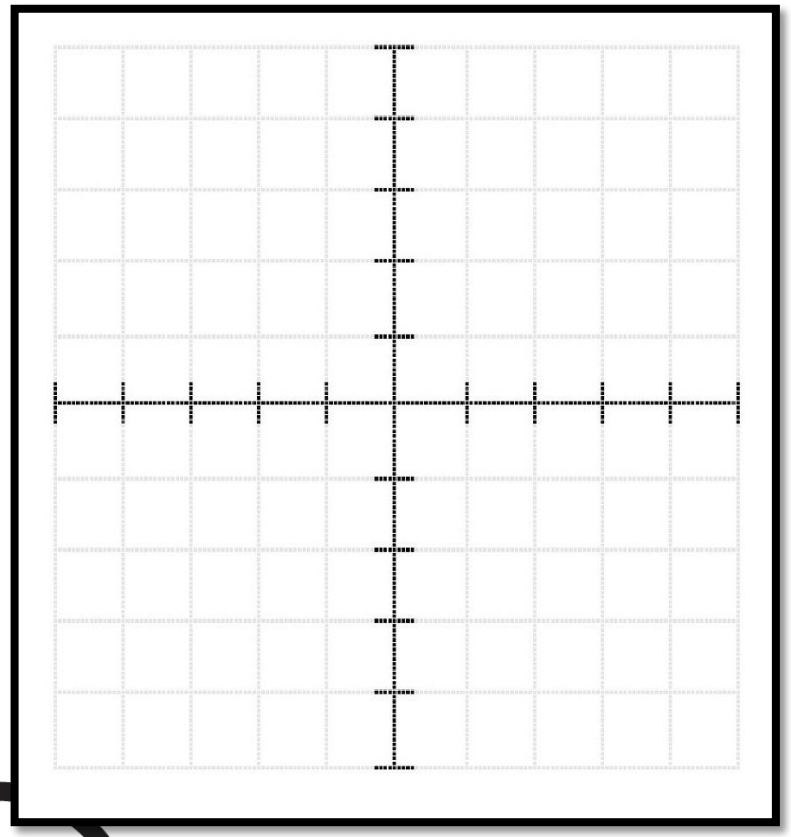
Graphs



- Make grid lines with Line 6, but omit when possible
- Use Line 4 for graph axes (X and Y)
- Place a large dot (Point Symbol E, large dot) at the intersection of the two axes

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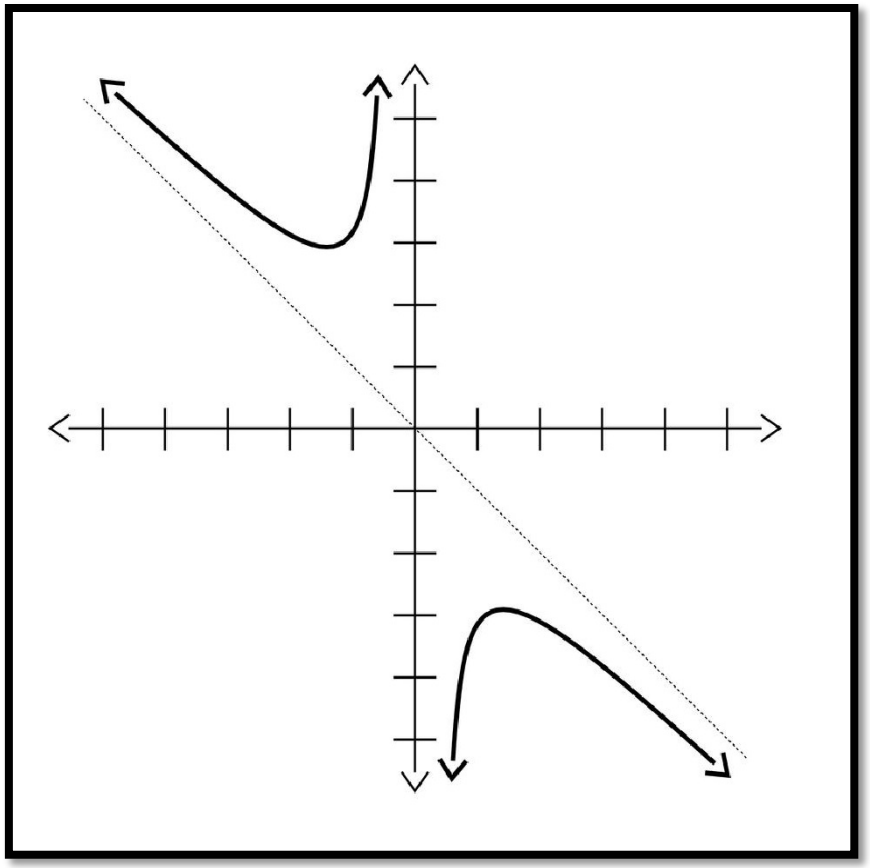
Graphs (continued)

- Space unit markers at equal intervals
  - Minimum ½-inch spacing
  - Markers ¼-inch in length
  - Line 4 is used to make unit markers
  - If no grid lines, extend the unit markers ¼-inch on both sides of axes line
- No more than two or three curves on one graph



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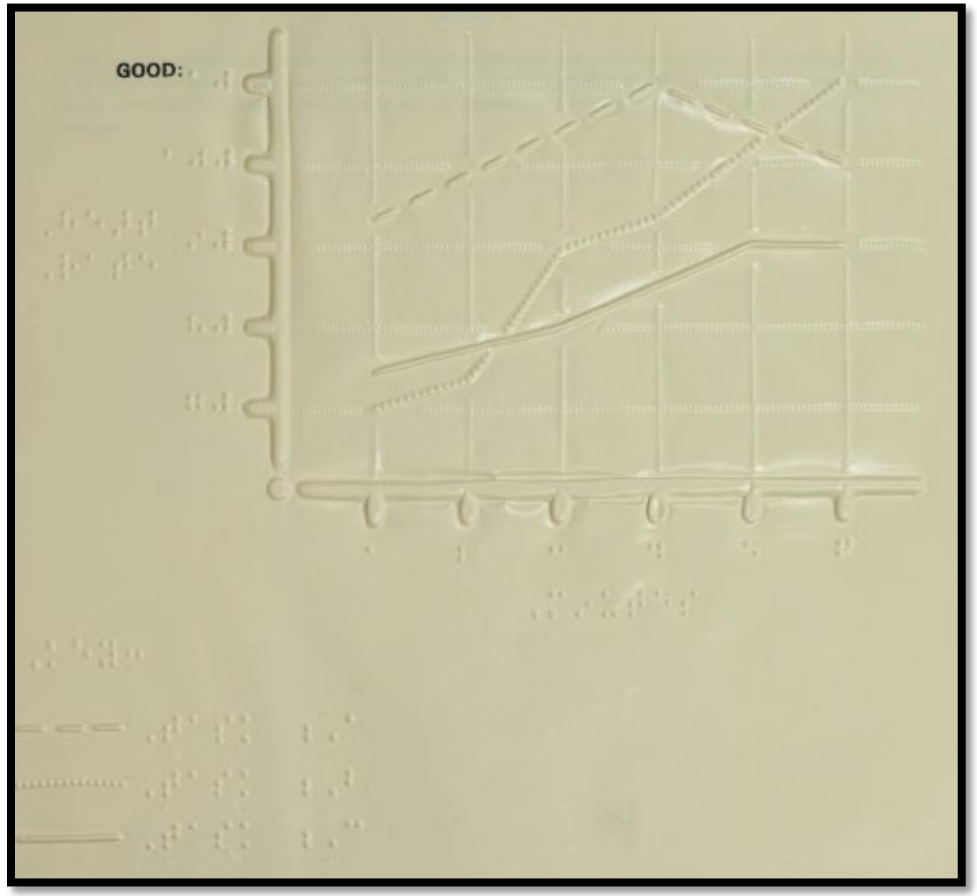
Tooled and Thermoformed Graph



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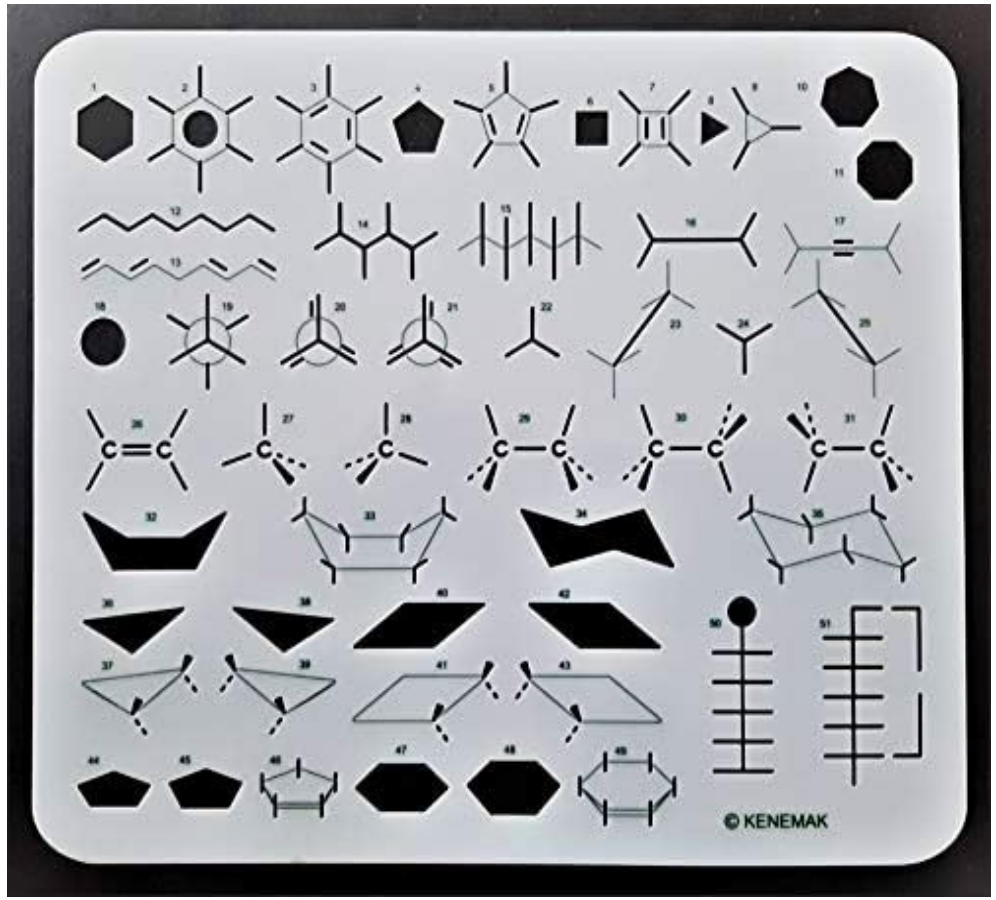
Helpful tips

- Plastic templates can be used for geometric configurations
- Protractors make exact angles
- Compasses are helpful for circles
- Cut foil down to smaller pieces and glue onto braille paper
- Cover sharp edges of aluminum with washi, masking, or painter's tape



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Other Tools You Might Like to Have ...

- Tool Holder
- Carbon Paper
- Washi Tape
- Tactile Compass for Math and Art
- Braille-Large Print Protractor
- Stencil Set
- Tactile Graphic Line Slate
- APH Tactile Shape Slate … coming soon!
- Painter's Tape
- **What else?**

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Check Your Knowledge!

Which line number should you use if you include grid lines?

- Line 1
- Line 4
- Line 6
- Line 8

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Questions?

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References

- Amick, N.S., Corcoran, J.M., Hering, S., & Nousanen, D. *Tactile Graphics Kit Guidebook.* American Printing House for the Blind (APH).
- Pather, A., Marshall, B., O'Day, A., Osterhaus, S., & Spence, D. (2022) *Guidelines and Standards for Tactile Graphics.* Braille Authority of North America (BANA).

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Upcoming Webinar!

- Decoding Digital Graphic Design
- August 29, 2024, 2:00 pm Eastern
- Explore the world of digital graphic design in the production of tactile graphics
  - PIAF (Pictures in a Flash)
  - PageBlaster
  - PixBlaster
  - Dynamic tactile devices like the Monarch

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Designing Effective Tactile Displays Using the Tactile Graphics Kit

Leanne Grillot, Senior Director of Outreach Services

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