Georgia Tech Center for Inclusive Design and Innovation

Best Practice for Writing Alternative Text for Complex Images

Presenter: Valerie Morrison, Ph.D.
E-Text Manager, CIDI

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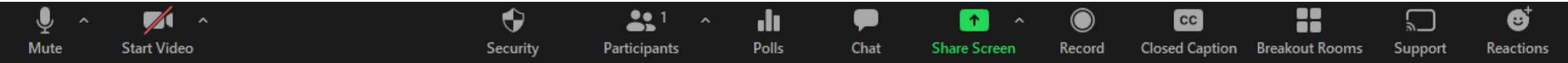

Georgia Tech – CIDI

- Research (disability-related)
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- Braille Services
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- Professional E-Text Producers
- Certified Assistive Technology Team
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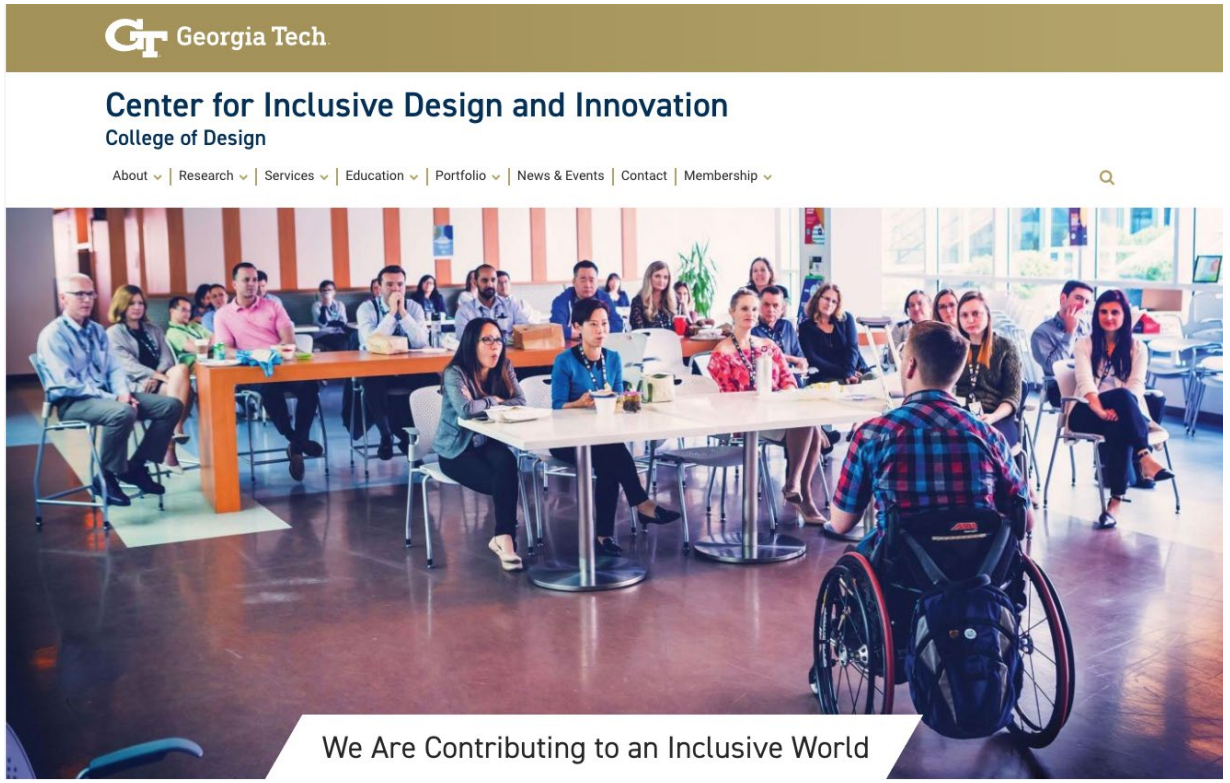
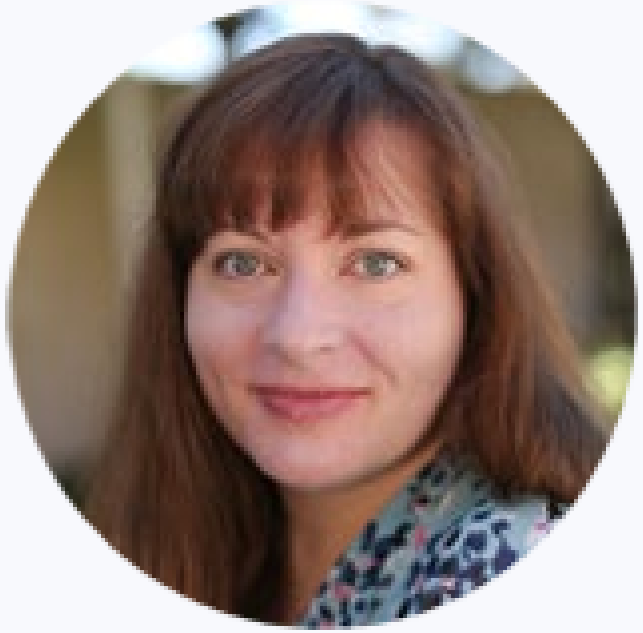


Today's Presenter

Valerie Morrison, Ph.D., E-Text Manager at CIDI

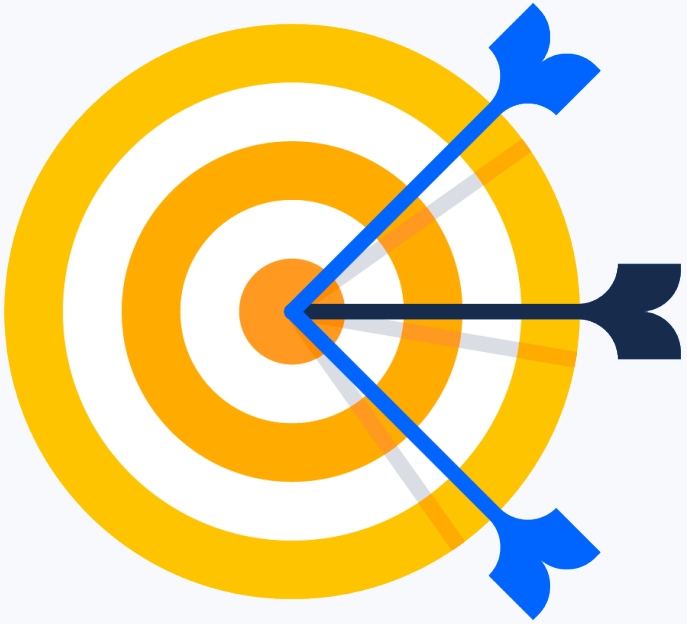


Valerie Morrison manages the E-Text department at CIDI, making accessible materials for individuals with print-related disabilities. She earned her doctorate in English Literature from the University of Georgia and served as an instructor of composition, contemporary poetry, American and British literature, and the postmodern novel.

Now, Valerie and her team find innovative ways to transform course materials quickly and affordably into a wide variety of accessible digital formats. Valerie and her team work with university staff, publishers, corporations, and state agencies to ensure the material they create and distribute will be accessible to those who rely on screen readers, text to speech software, or other assistive technology to access documents.

Goals for Today's Presentation

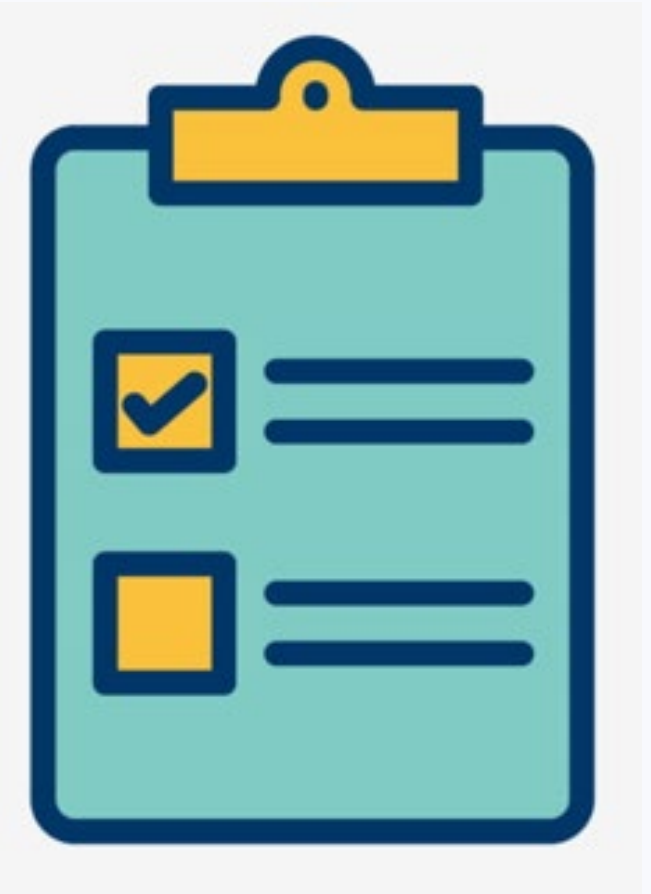
1. Review the basics of writing effective alternative text descriptions
2. Learn several editing strategies to optimize your image description
3. Explore some examples of complex images and STEM content.
4. Discuss how to approach describing works of art or images for tests, two of the most difficult instances of writing alt text.



Writing Alternative Text

General Tips

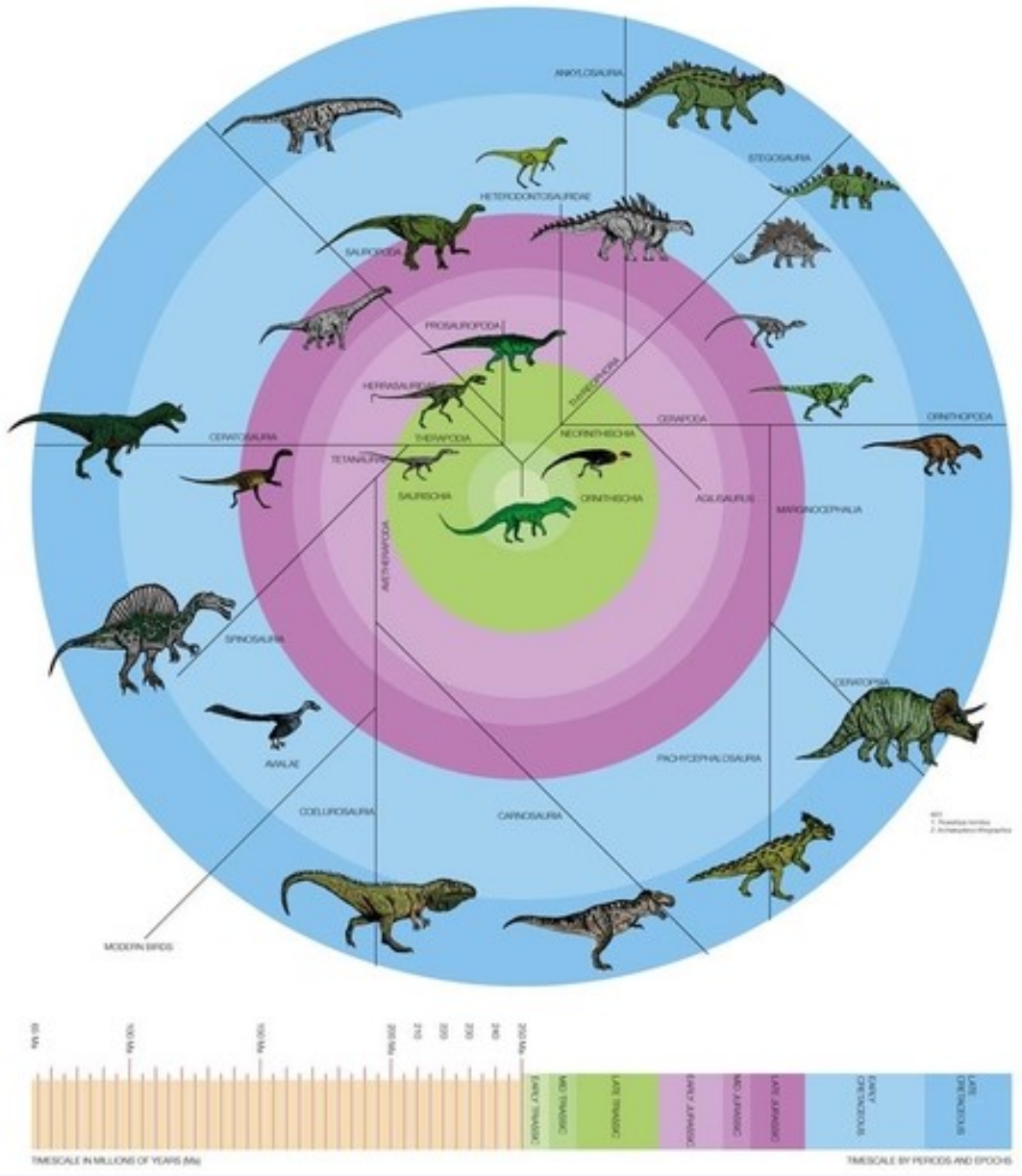
- Work from general to specific to provide a framework for the listener, keeping in mind that long descriptions may be cut off.
- Always use proper grammar, spelling, and punctuation, and do not include any hard line breaks in your image description.
- Provide information in multiple modalities if possible, such as adding captions for figures and tables.
- Try to reduce redundancy when possible. If the surrounding text describes the image, your description can be more brief.
- Always edit your alt text thoroughly, enlisting another person to QC your work if possible.



Complex Infographics

- Begin with an overview sentence describing the basic parts of the infographic.
- Work from general to specific, filling in the details as needed.
- Keep your description neutral and informative.
- Use proper grammar, spelling and punctuation.

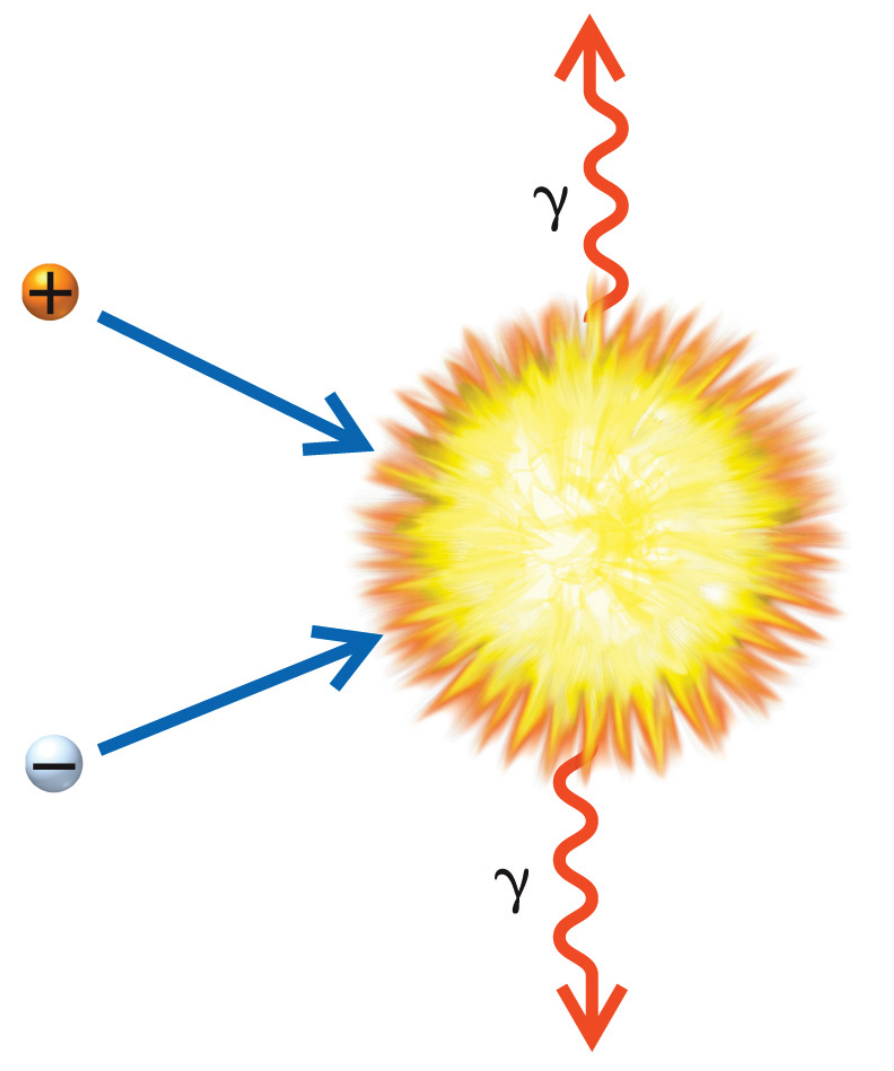
An infographic of the evolution of dinosaurs that includes a timeline of different eras, a phylogenetic tree, and illustrations of each dinosaur.



Focus on Meaning

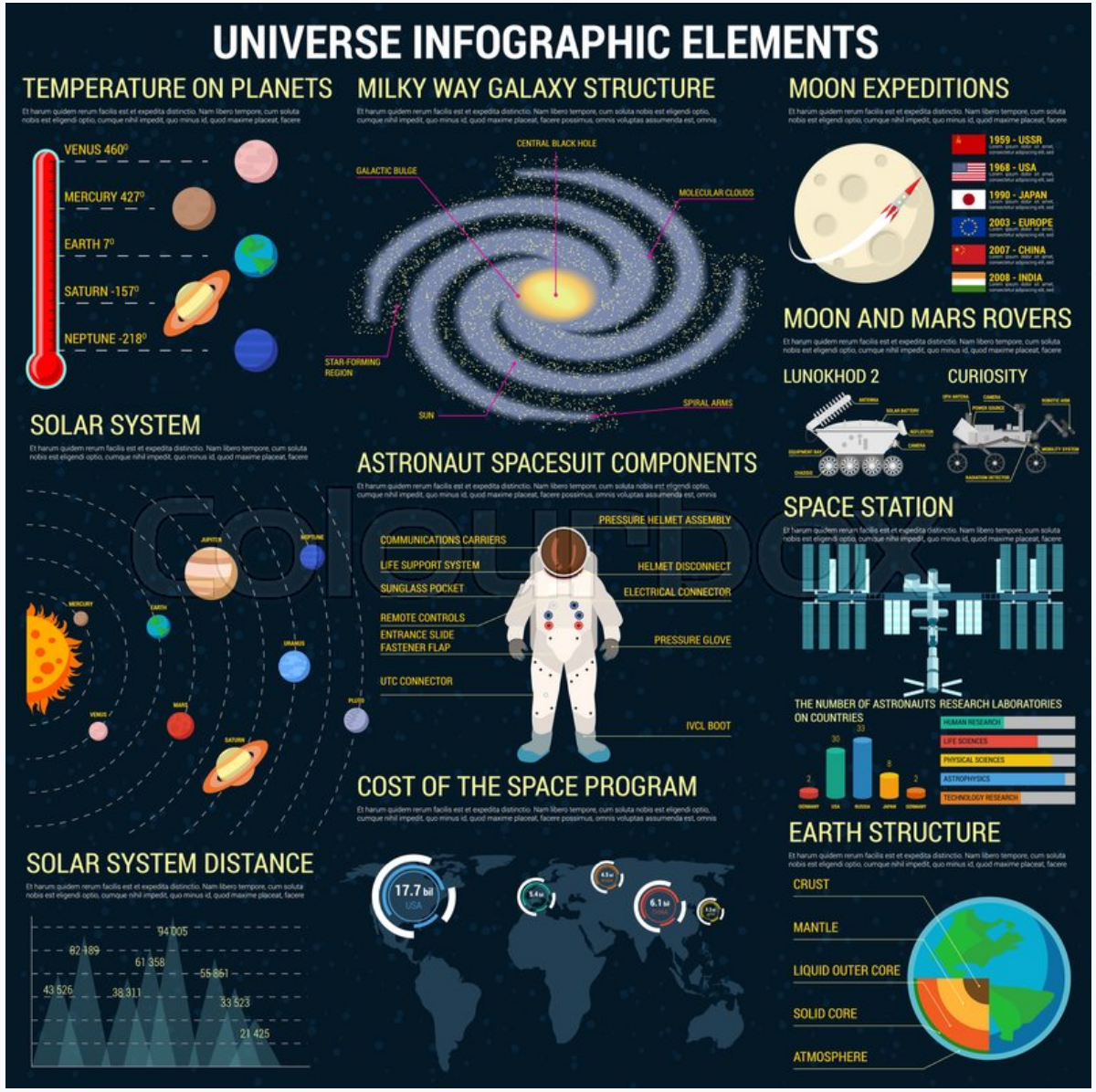
- Avoid the common mistake of spending your time describing the **appearance** of symbols rather than their **meaning**.

- Example: In this image, you would want to avoid describing “a ball labeled with a plus sign” and instead you should call it “a positron.” Avoid describing “a squiggly arrow labeled with a weird y” and instead call it “a gamma ray.”



Consider Cognitive Load

- Cognitive load, also referred to as Auditory Fatigue, is something to consider when describing images, so that you don't overwhelm the listener's working memory.
- The average person can remember 7 items at a time in their working memory.
- Simplifying and reducing alt text length also reduces auditory fatigue.



How to Edit Alternative Text

Use Clear and Concise Syntax

- Edit for clarity
- Simplify word choice
- Use parallel structure
- Spell out acronyms or symbols

Organize Information

- Work from general to specific to provide a framework
- Group like items and describe relationships
- Describe images by their similarities first, differences second
- Organize information in predictable ways

Reduce Redundancies

- Avoid repeating what is in a caption or the surrounding text
- Edit your description if it becomes wordy
- Integrate symbols or labels into your description, meaning describe the function of symbols, not the appearance of them

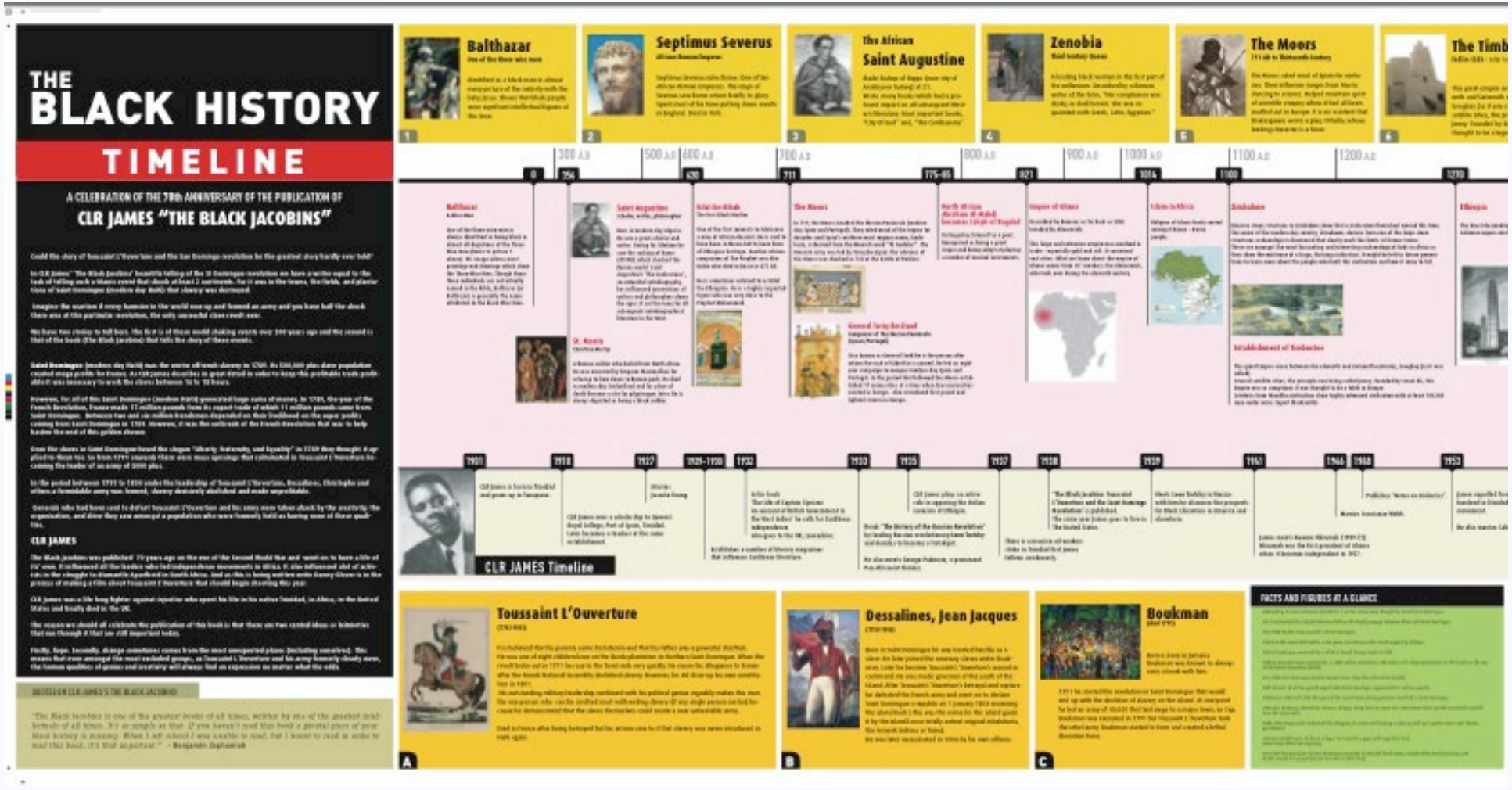
The Result?

- Reduce simultaneous mental tasks in working memory
- Increase ability to focus on new concepts
- Eliminate misunderstandings or confusion
- Decrease time and energy needed for understanding
- Allow for integration of new concepts into a mental model

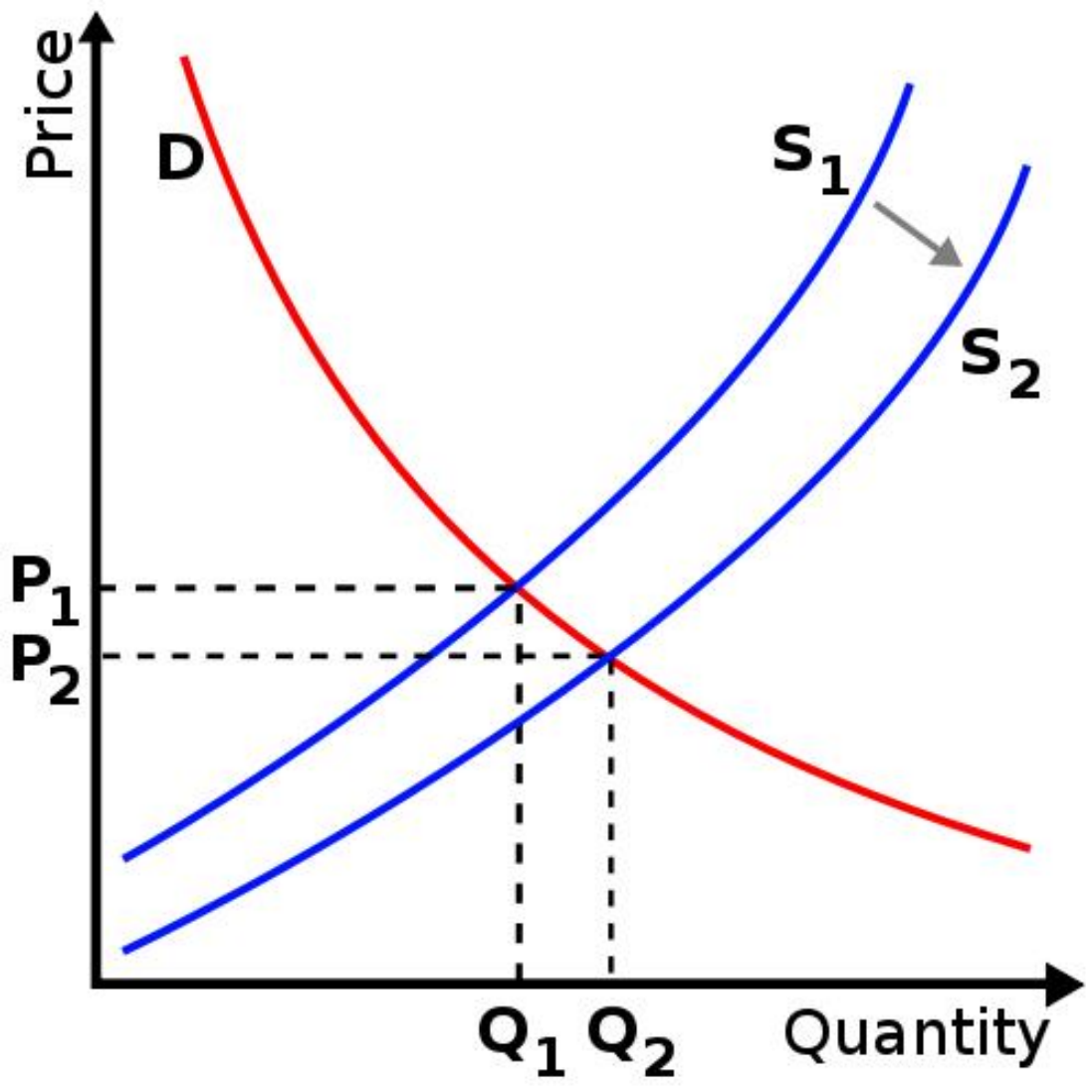
Complex Images and STEM Content

Timelines

- Begin with describing the range of the timeline and type of events listed.
- List events by date or convert into a numbered list by era.



Supply Demand Curves



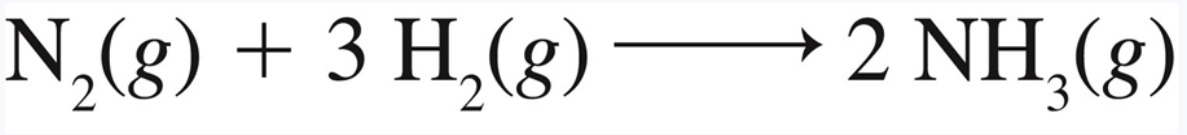
- Begin by describing the X and Y axes.
- Next describe the positively sloped curves, then the negatively sloped curve.
- Then note where these lines intersect.

Math and Chemistry Equations

$$t = \frac{(325 - 286) - 0}{\sqrt{\frac{(40)^2}{12} + \frac{(44)^2}{12}}} = 2.27$$

Brief: An equation.

Complex: Begin equation. T equals start fraction left parenthesis 325 minus 286 right parenthesis minus 0 over start root start fraction left parenthesis 40 right parenthesis squared over 12 end fraction plus start fraction left parenthesis 44 right parenthesis squared over 12 end fraction end root end fraction equals 2.27. End equation.



Brief: A chemical equation.

Complex: Begin equation. Gaseous Upper N 2 plus 3 gaseous Upper H 2 yields 2 gaseous Upper N Upper H 3. End equation.

Maps

Describe the areas, regions, and relevant details on the map plus any inset. Often the colors, shapes, or arrows on a map have no significance.

A map of oceanic exploration routes by Dias and de Gama circa 1500, during the reign of the Holy Roman Empire in Europe and the Ottoman Empire in northern Africa and the Middle East. Dias' route begins in Portugal and hugs the western coast of Africa, ending at the Cape of Good Hope. The route for de Gama also begins in Portugal, goes around the Cape of Good Hope, hugs the eastern coast of Africa, and crosses the Indian Ocean ending in India.

Brief versus Long Description

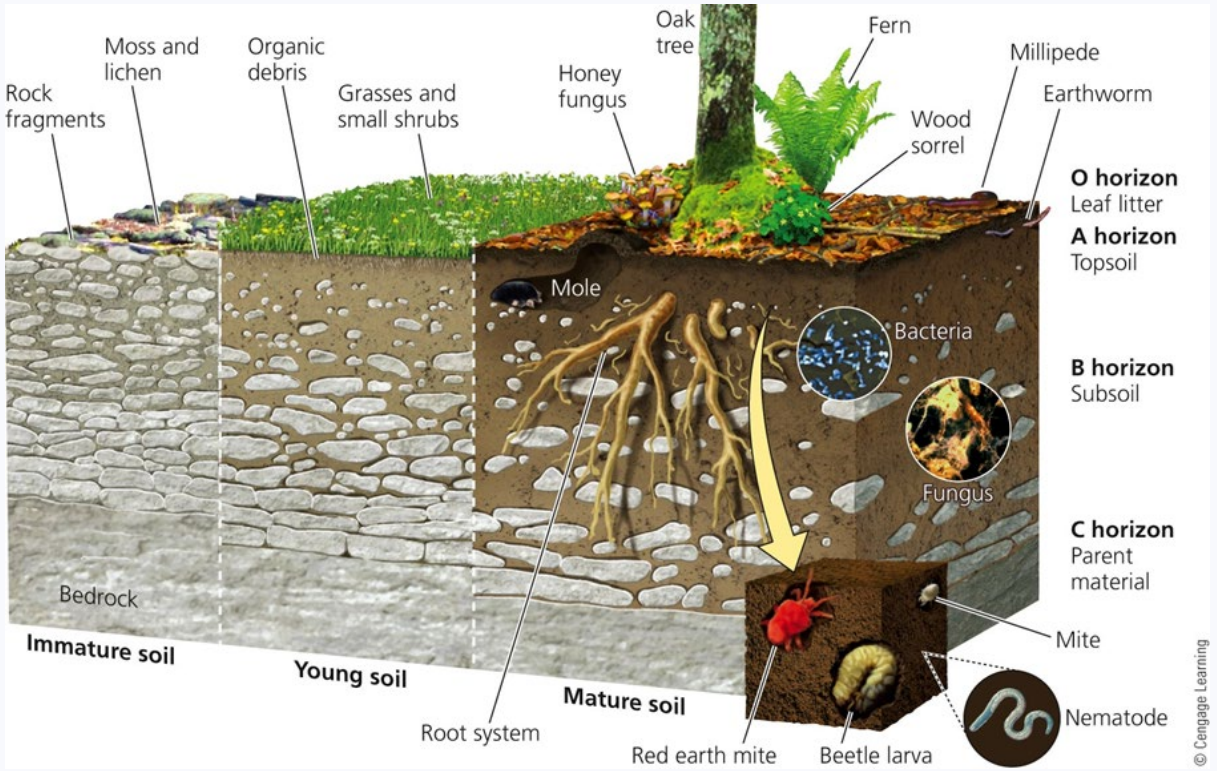
Brief: A map of Europe titled Areas of Industrial Concentration from 1870 to 1914. The map highlights Coal fields, Iron ore deposits, Industrial areas, Ports, Steel works, Oil wells, Cities with a population of 1 million or more, and international boundaries.

Long: A map of Europe titled Areas of Industrial Concentration from 1870 to 1914. The map highlights Coal fields, Iron ore deposits, Industrial areas, Ports, Steel works, Oil wells, Cities with a population of 1 million or more, and international boundaries. Coal fields, Iron ore deposits, and steel works are scattered throughout the continent. Oil wells are all in the eastern Austro-Hungarian Empire and Romania. Sweden has by far the largest iron deposit, Italy has the most steel works, Spain has the most coal fields, and Germany and Great Britain have the most industrial areas, with the Austro-Hungarian Empire right behind. Cities with a population of 1 million or more include Paris in France, Constantinople in the Ottoman Empire, Hamburg and Berlin in Germany, Vienna and Budapest in the Austro-Hungarian Empire, St. Petersburg and Moscow in Russia, and Glasgow, Manchester, Sheffield, Liverpool, Birmingham, and London in Great Britain. Most countries have two or fewer ports; Ireland and Sweden each have 3 ports; Germany and Russia each have 6; Spain and France each have 8; and Great Britain has 9.

Complex Diagrams

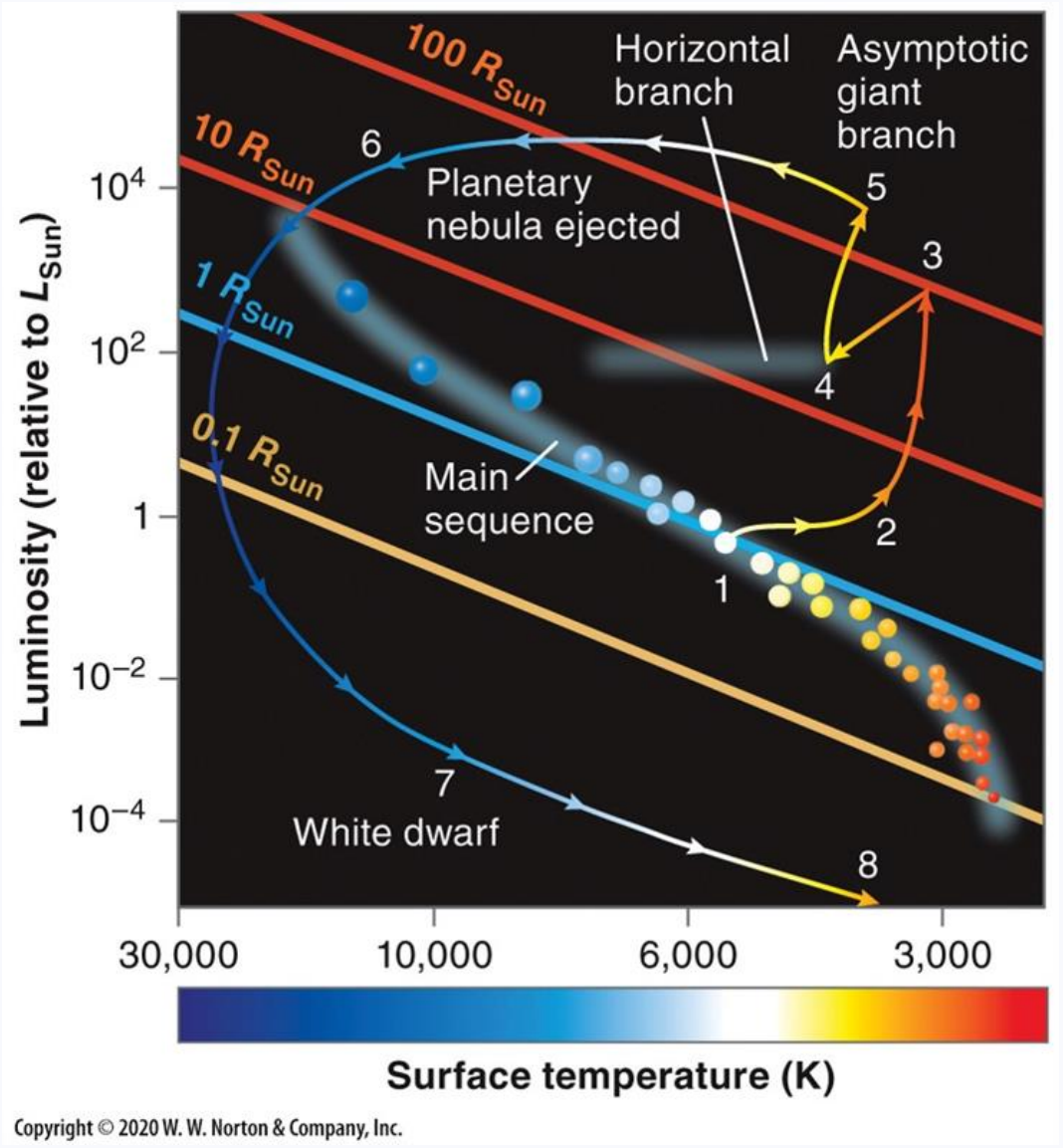
Brief: A diagram showing a cutout of soil formation in three stages: immature, young, and mature.

Long: A diagram showing a cutout of soil formation in three stages: immature, young, and mature. Immature soil includes a large layer of bedrock at the bottom, large rocks throughout the rest of the ground, and rock fragments near the surface. Moss and lichen can grow on this soil. Young soil has a smaller layer of bedrock at the bottom, fewer large stones above it, and organic debris near the surface. Grasses and small shrubs can grow on this soil. Mature soil has an even smaller bedrock layer called the C horizon parent material followed by the B horizon subsoil, followed by the A horizon topsoil, and lastly the O horizon leaf litter. Throughout the soil there are root systems, moles, bacteria, fungus, beetle larva, red earth mites, nematodes, and earthworms. On the surface there are honey fungus, oak trees, ferns, wood sorrels, and millipedes.



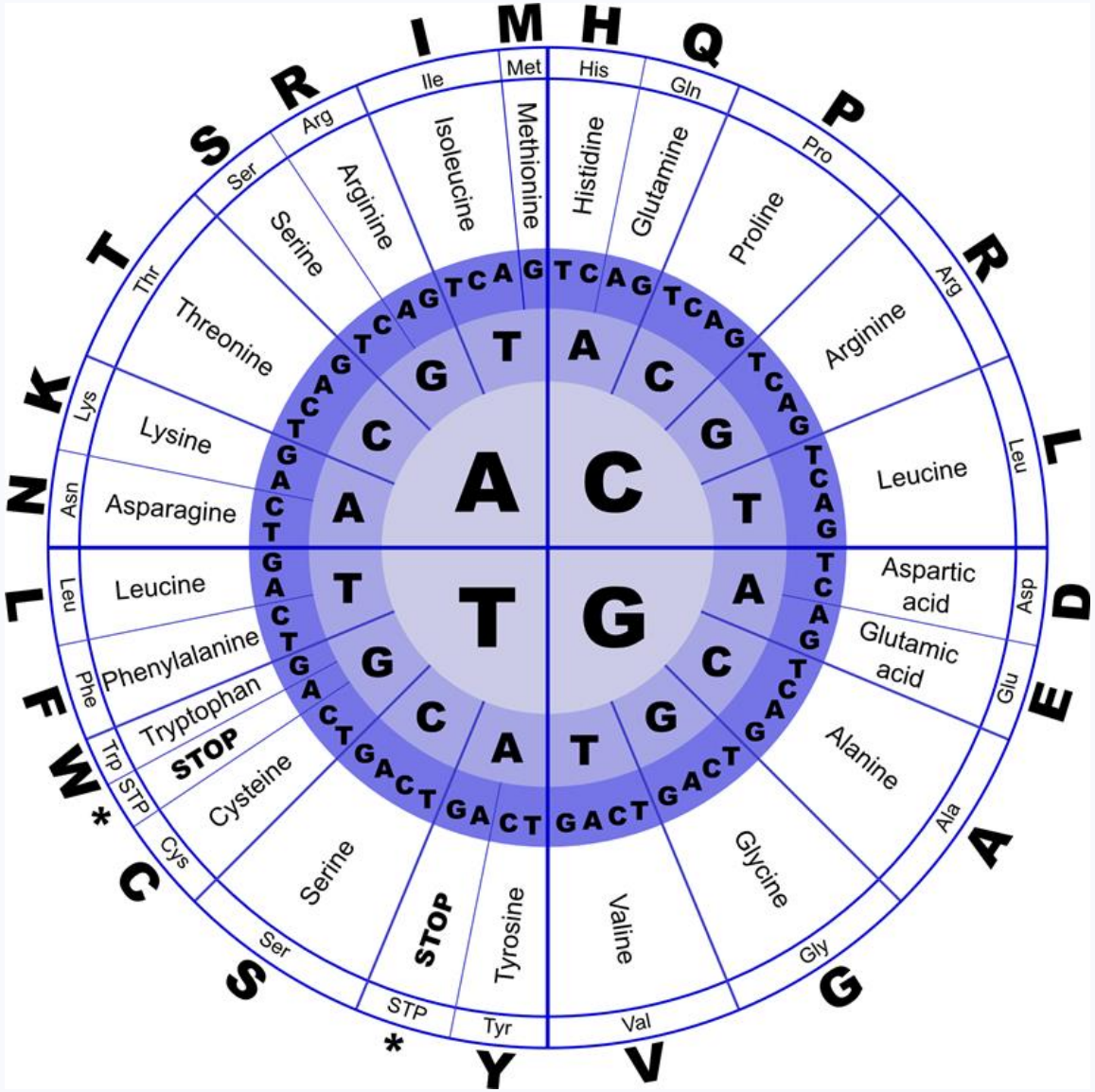
STEM Infographics for Education

Long Description: A Hertzsprung–Russell diagram with an 8-step evolution path marked. The diagram has decreasing surface temperature in Kelvin on the x axis, increasing Luminosity on the y-axis, a descending line for the main sequence with a steeper angle at the beginning and end of the line, diagonal descending lines marking solar radii, and a spectral class color spectrum across the bottom. Temperature ranges from 30,000 degrees to 2,500 degrees and luminosity ranges from 10 to the negative 4th power to 10 to the 4th power. A star at 1 luminosity, 1 solar radius, and about 5,500 degrees kelvin is step 1. The red giant branch leaves the main sequence at this point, decreasing in temperature until step 2, when it increases sharply in luminosity and size at step 3. Then it decreases in luminosity and size while increasing in temperature, to step 4 where it meets the horizontal branch. From here the asymptotic giant branch rises in size and luminosity while decreasing in temperature, to step 5: about 4,000 kelvin, over 100 solar radii, and 10 to the 3.5 power luminosity. Then planetary nebula are ejected, increasing in temperature while decreasing in size and very slightly increasing in luminosity, to step 6: about 15,000 kelvin, about 40 solar radii, and over 10 to the 4 power luminosity. Then it decreases in size and luminosity while staying high in temperature, to step 7 which is a white dwarf, and then decreases in temperature until ending at step 8, lowest size and luminosity at a temperature of about 3,500 kelvin.



Complex STEM Infographic

- This infographic is difficult to parse even for sighted individuals.
- Conversion into table format with column headers would be more accessible.
- See the next slide for what this information would look like presented in a table.



Converting Graphics to Table Form

- Providing this data in table form allows someone to tab through each column.
- A table title and table caption placed before the table would allow someone to decide if they need to listen to this data.

Amino Acid	Symbol	DNA Codons
Alanine	A	GCA; GCC; GCG; GCT
Cystenine	C	TGC; TGT
Aspartic Acid	D	GAC; GAT
Glutamic Acid	E	GAA; GAG
Phenylalanie	F	TTC; TTT
Glycine	G	GGA; GGC; GGG; GGT
Histidine	H	CAC; CAT
Isoleucine	I	ATA; ATC; ATT
Lysine	K	AAA; AAG
Leucine	L	CTA; CTC; CTG; CTT; TTA; TTG
Methionine (START)	M	ATG
Asparagine	N	AAC; AAT
Proline	P	CCA; CCC; CCG; CCT
Glutamine	O	CAA; CAG
Arginine	R	AGA; AGG; CGA; CGC; CGG; CGT
Serine	S	AGC; AGT; TCA; TCC; TCG; TCT
Threonine	T	ACA; ACC; ACG; ACT
Valine	V	GTA; GTC; GTG; GTT
Tryptophan	W	TGG
Tyrosine	Y	TAC; TAT
STOP	*	TAA; TAG; TGA

Describing Art and Test Questions

Describing a Work of Art

Brief description:

Sandro Botticelli's tempera painting "Primavera" from the late 1470s, currently on display in the Uffizi Gallery in Florence. This painting was originally commissioned for a marriage within the Medici family, and the mythological figures in this garden scene serve as an allegory for springtime and marriage.

Describing a Painting's Visual Impact

Description of the painting's visual impact:

A painting of a mythological scene in the Italian Renaissance style, featuring nine figures in an orange grove. At the center is Venus with Cupid flying overhead. To the right of Venus, a dark bluish winged figure with cheeks full as if blowing air reaches down to capture a woman. The woman wears a sheer dress as she runs away but looks over her shoulder, and a stream of flowers falls from her mouth. Next to her is a woman in a flower crown and floral print gown carrying flowers and scattering them, not noticing the chase and capture. To the left of Venus, the three Graces dance in a circle holding hands, and at the far left of the painting, Mercury in his winged boots reaches up, pointing a caduceus at low-hanging clouds.

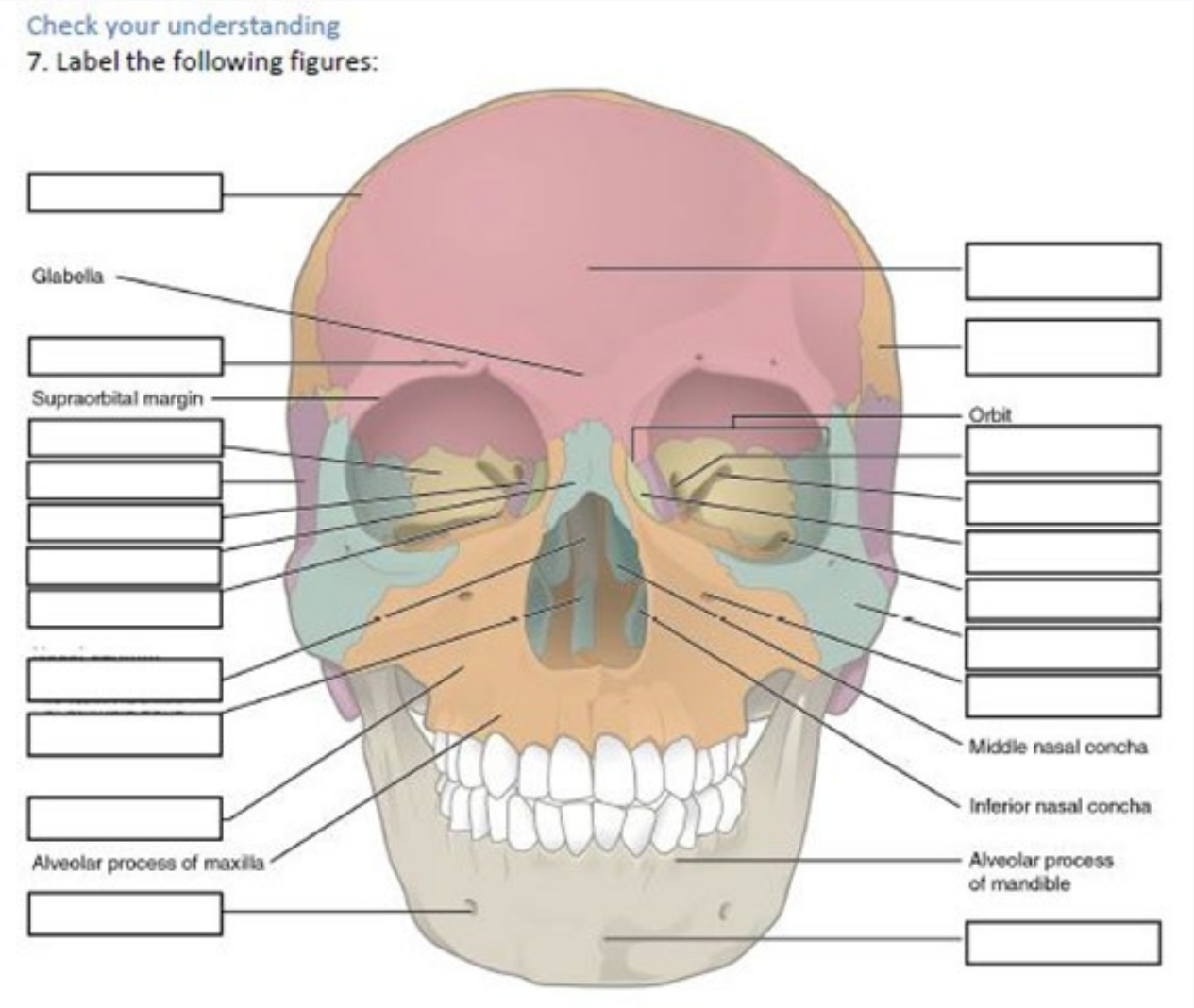
Considering Context and What to Include

For a more comprehensive description, consider your context and audience.

Focus your description on:

- The artist's style
- Color and composition
- Style of figures
- Allegorical meaning
- Artist's influence
- Historical context

Labelling Diagrams



Label the following figure.

Alternative assessments:

- List the bones of the skull from top to bottom, left to right, clockwise, by region, or by quadrant.
- Match each bone to a list of descriptions or functions.
- Rewrite question in essay format.
- Tactile graphic, thermoform, or skeleton model for classroom use.

Going Beyond the Figure Captions

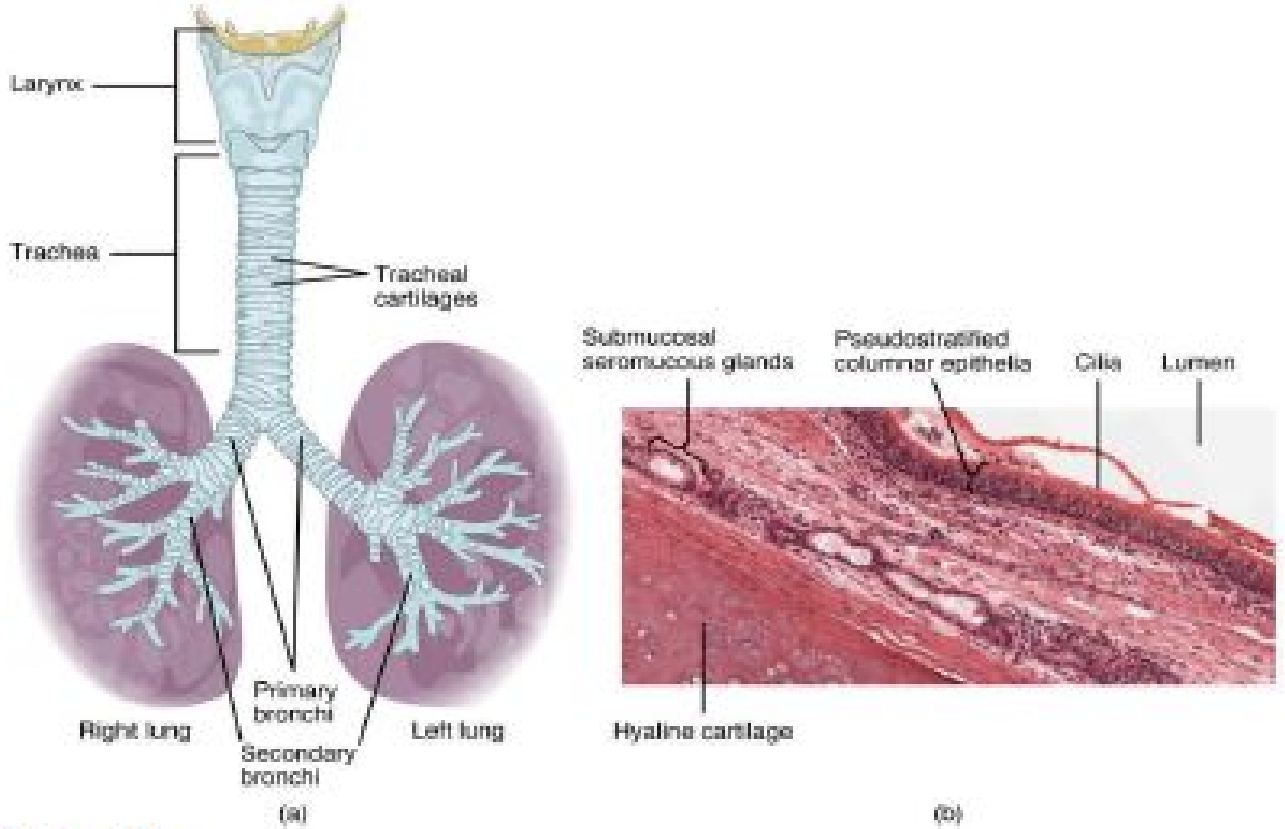


Figure 8. The Trachea

(a) The tracheal tube is formed by stacked, C-shaped pieces of hyaline cartilage. (b) The layer visible in this cross-section of tracheal wall tissue between the hyaline cartilage and the lumen of the trachea is the mucosa, which is composed of pseudostratified ciliated columnar epithelium that contains goblet cells. LM × 1220. (Micrograph provided by the Regents of University of Michigan Medical School © 2012)

Description: Two images, A and B, depicting an anatomical diagram of the trachea and a microscope image of the trachea. The diagram shows the larynx above the trachea, which is composed of tracheal cartilages. The tracheal tube splits into two primary bronchi, which split into secondary bronchi across the right and left lung. The microscope image shows lumen, cilia, pseudostratified columnar epithelia, submucosal seromucous gland, and hyaline cartilage in consecutive layers.

Relying on Labels Only

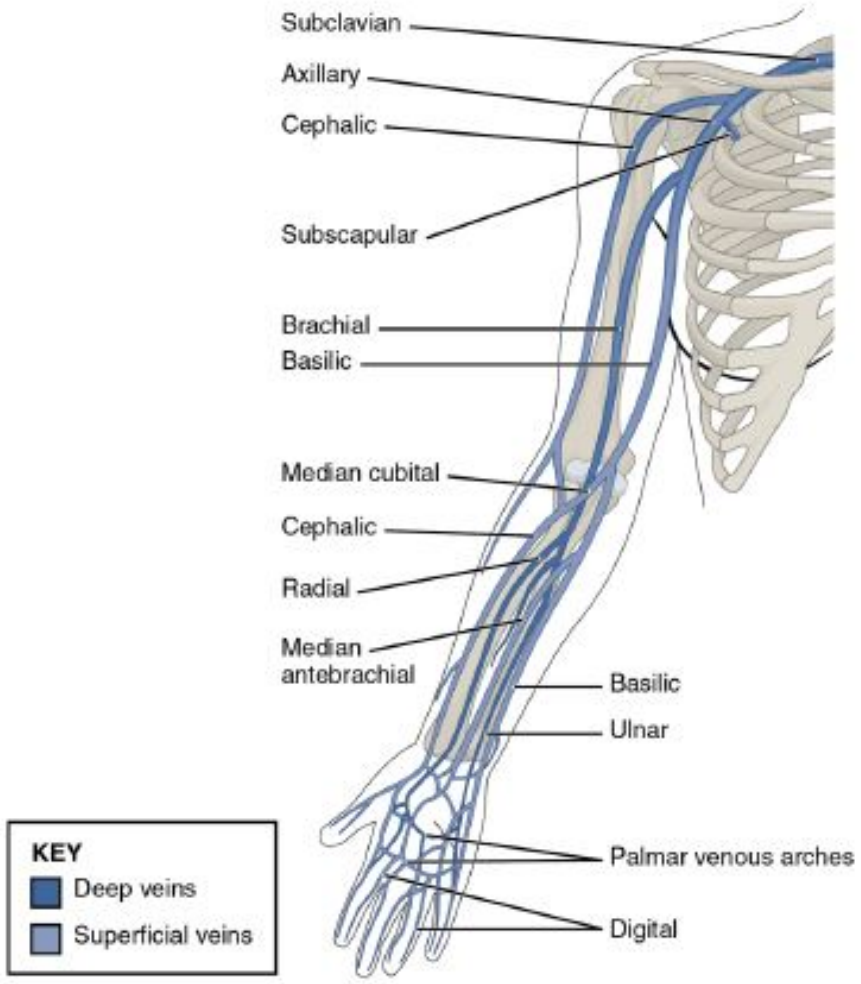


Figure 20.38 Veins of the Upper Limb This anterior view shows the veins that drain the upper limb.

Description: A diagram showing an anterior view of the veins of the clavicle and arm. There are deep veins and superficial veins. The deep veins are as follows: subclavian, axillary, cephalic, subscapular, brachial, radial, ulnar, and palmar venous arches. The superficial veins are as follows: basilic, median cubital, median antebrachial, and digital.

What's Missing: The spatial relations of these veins to one another, relative size of each vein, where in the body these veins occur, how they are all connected.

Deciding What to Focus On

These two images contain a lot of visual information. Consider the context and focus on providing one or more of the following:

- Names of structures
- Appearance or shape of structures
- Location of each bone on the skull
- Proximity to other structures

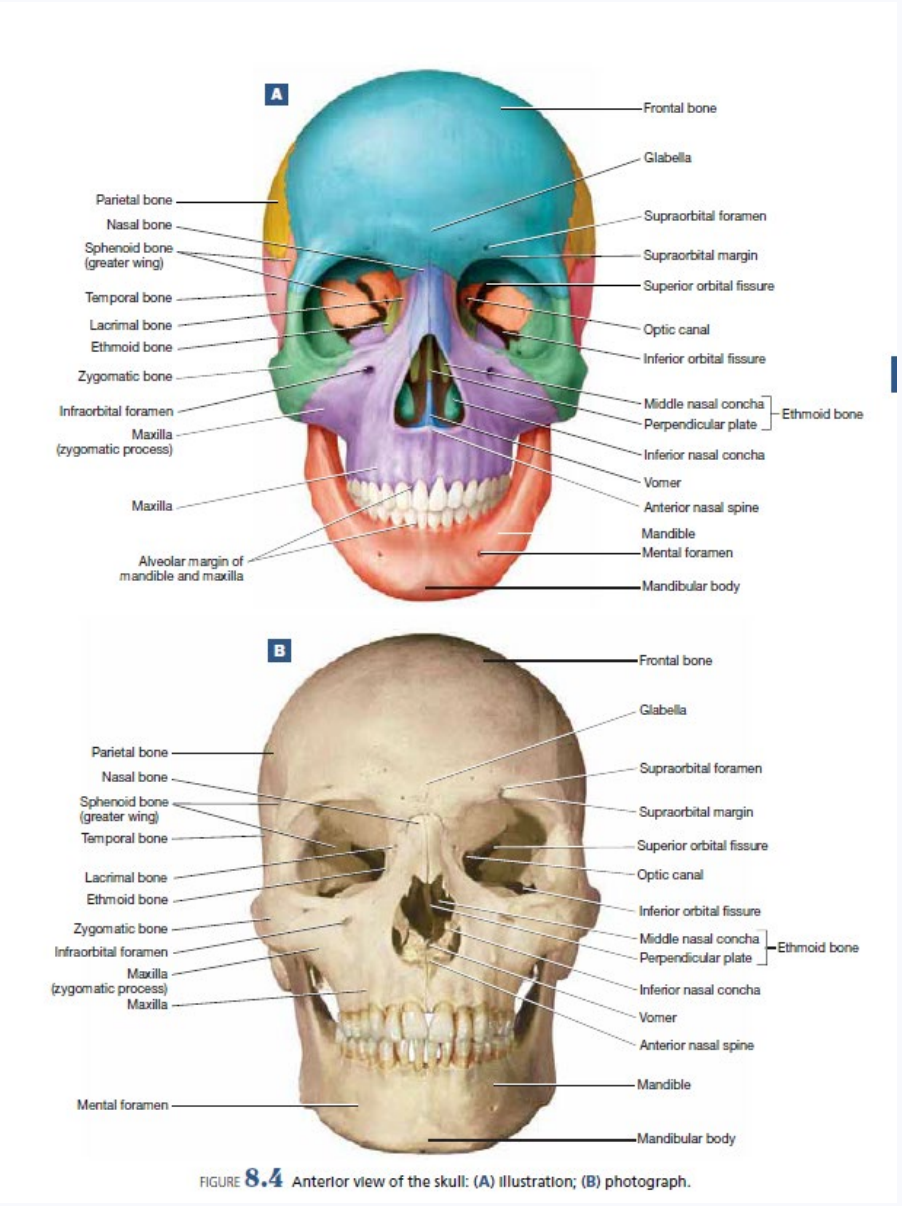


FIGURE 8.4 Anterior view of the skull: (A) illustration; (B) photograph.

Identification Questions

Identify each country by its silhouette.

Alternative assessments:

- Answering questions about the size or location of a country.
- Essay questions about a country's imports and exports.
- Tactile graphics or thermoforms that students can identify.

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Questions and Answers

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