

TECHNOEarth

Teacher Guide

Lessons for Middle & High School Students: Grades 6-9



Technology Project using **Google Apps**

Design an interactive infographic about an environmental issue.

In this project, students become environmental stewards. They design an interactive infographic that informs the public about an important issue. The web-based publication will outline the cause, harmful effects, and solutions. It will also include a rotating slide deck that summarizes the stakeholders and highlights interesting facts. To engage viewers, a thematic map will pinpoint where the problem is happening. Upon completion, students will inspire others to get involved by sharing their findings at an Earth Keeper's Conference.

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TechnoEarth Overview

Introduction to TechnoEarth

In this project, students become environmental stewards. They design an interactive infographic that informs the public about an important issue. The web-based publication will outline the cause, harmful effects, and solutions. It will also include a rotating slide deck that summarizes the stakeholders and highlights interesting facts. To engage viewers, a thematic map will pinpoint where the problem is happening. Upon completion, students will inspire others to get involved by sharing their findings at an Earth Keeper's Conference.



Students complete the following:

- In session 1, students become environmental stewards. They prepare to create an infographic that informs the public about an important issue. To start, they study example publications to gain an understanding of the content and design elements. Next, they research a topic including cause, effects, interesting facts, location, stakeholders, and solutions. A reference list tracks sources of information. By the end of the session, students complete a checklist to verify they are ready to design their infographic.
- In session 2, students begin to build their infographic using Google Sites. They introduce an environmental issue, describe the cause, and illustrate harmful effects. An emphasis is placed upon conveying information concisely using catchy headings and simple clip art. Instructions direct students to chunk their data into sections using color and dividers.
- In session 3, students create a rotating slide deck using Google Slides. It will emphasize interesting facts and outline stakeholders. To start, students use a big number to highlight the scale of the problem. Next, they point out an important detail using colorful word art. Afterwards, they construct a diagram that summarizes who has a stake. Upon completion, the slide deck is inserted into the infographic and set to automatically play. Instantly the viewer should be able to grasp the scope of the environmental issue.
- In session 4, students produce a thematic map using Google My Maps. It will pinpoint locations where the environmental issue is happening. The places could be worst offenders, best stewards, disaster sites, at-risk regions, successful conservation projects, or legally protected areas. Each marker will display an interesting fact and a photo. The map will be inserted into the infographic allowing viewers to explore and learn about the topic.
- In session 5, students illustrate solutions to the environmental issues by designing their own icons using Google Drawings. Each image will be a simple representation made by combining shapes, word art, and cropped images. The original artwork will be inserted into the infographic with an explanation. A link to an advocacy group will invite viewers to get involved.
- In session 6, students raise awareness about an environmental issue. They publish their infographic using Google Sites. Afterwards, they share their infographic at an Earth Keeper's Conference.

Technology Integration Ideas

TechnoEarth is a cross-curricular unit that integrates Google applications into curriculum. In this project, learners become environmental stewards. They design an infographic about an important issue. The publication is shared with others to raise awareness. The activities blend technology into geography, science, language arts, and visual arts. Lessons are ideal for middle and high school students. Below are some suggestions for implementing TechnoEarth:

- *Information, Communication, and Technology Skills:* Teach this project as part of a technology course. The activities in TechnoEarth combine multiple Google applications to produce the infographic. This allows students to transfer their skills from one learning task to the next. It also demonstrates the practical use of each application and shows how they can be combined to produce a final product. Refer to their use:
 - Google Docs organizes environmental research
 - Google Sites produces the infographic by summarizing information in sections
 - Google Slides creates a rotating slide deck of interesting facts and stakeholders
 - Google Sheets charts data using a scorecard
 - Google My Maps pinpoints important locations on a customized map
 - Google Drawings illustrates a concept with the creation of an original icon
- *Geography:* Include TechnoEarth as part of a geography class. By creating an infographic about an environmental topic, students explore the connection between human activity and the natural environment. They summarize information about the cause, harmful effects, stakeholders, location, and solutions. This investigation fosters an understanding of the importance of stewardship and sustainability.
- *Science:* Use the lessons in TechnoEarth as part of an environmental unit. It could be integrated into many areas of study including biodiversity, energy, ecosystems, pollution, conservation, or water systems. The infographic demonstrates learning in a meaningful way.
- *Language Arts:* An emphasis in TechnoEarth is on research and communication skills. Support is given to boost students' search strategies, paraphrasing techniques, and ability to organize data. Interwoven through the activities are hints to convey a simplified message by combining text and images effectively.
- *Visual Arts:* Target visual arts learning outcomes with TechnoEarth. Graphic design is an important element of the lessons. Students apply their creativity to organize information and arrange content. Moreover, they use digital paint tools to produce original artwork.

Understand the Big Picture

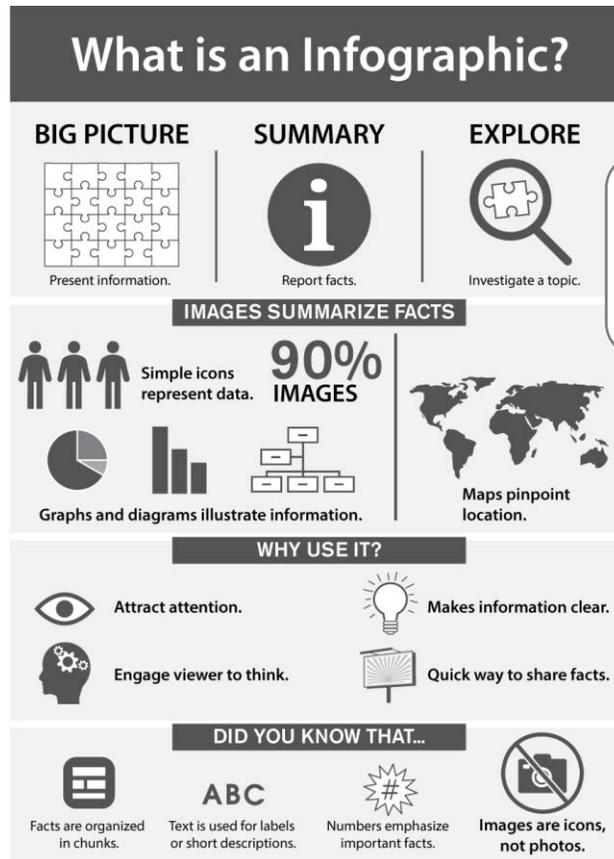
Not sure where to integrate TechnoEarth? There are three samples provided for this project including infographics about acid rain, coral bleaching, and the seal hunt. These web-based publications provide ideas on how you can include these activities in your curriculum.

Assignment 2 What is an Infographic?

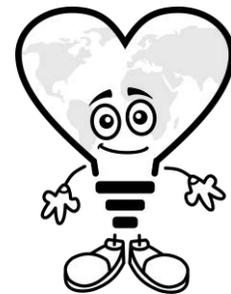
You are going to make an infographic that raises awareness about an environmental issue. Read to learn about this type of publication. Afterwards, view a sample to get ideas.

What Is an Infographic?

An infographic is a big picture that summarizes a topic. It is a one-page publication that presents **information** in a **graphic** way. Simple icons, symbols, maps, and charts combine to explain the data. Text is only used as labels or to briefly describe facts. The viewer explores the content by studying each section of cartoon-like images.



Your infographic will be *interactive*. The viewer will experience the information rather than just read it.



Why Use an Infographic?

An infographic is a simple but powerful way to communicate. There are many reasons to use it:

- catches the interest of the viewer
- outlines many facts in a compact space
- conveys data quickly using images
- informs without lots of written information
- engages the viewer to think about the topic because they must explore each part
- makes a complex issue easy to understand

Characteristics of an Infographic

▶ Visit <https://sites.google.com/view/aboutacidrain/home>

If the above link does not work, open the Samples List document in the TechnoEarth Resources>Earth>Samples folder.

CONTENT

1. How does human activity cause the problem?



2. What is a harmful effect or risk related to the issue?



3. Watch the rotating slide deck. List an interesting fact.



4. Click a map marker. List one place where the problem occurs.

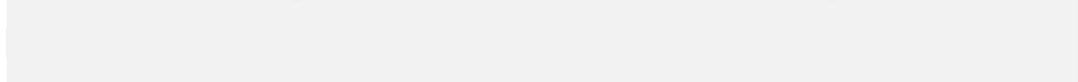


5. Find a solution to the problem. What is it?



DESIGN

6. Text is used for headings and to report brief facts. Which heading catches your attention?

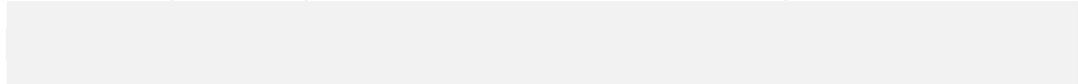


ABC

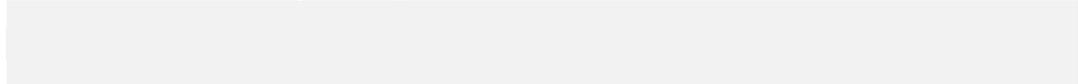
7. Simple images explain the data. What kind of images were used?



8. Numbers emphasize important facts. What number catches your attention?



9. Color should suit the topic. Why did the creator use the color theme?



10. Information is chunked into parts. How is the topic divided into sections?



Research Checklist

As an environmental steward your job is to inform people about an important issue.

Use the checklist to make sure you have the facts to create your infographic.

If you are missing something, complete your research.

My research...		✓
	Cause	
	describes the issue and connects human activity to the problem	
	Effect	
	lists two harmful effects or risks	
	Interesting Facts	
	outlines three facts that people will want to know	
	Stakeholders	
	identifies three businesses, organizations, or groups of people with a "stake"	
	Location	
	pinpoints at least two places related to the issue	
	Solutions	
	highlights at least two solutions	
	Sources	
	identifies a reputable organization or group and describes their activities	
	cites the website address for each site where information was found	

Assignment 8 What Are the Harmful Effects or Risks?

In this assignment, you explain the harmful effects of the environmental issue. A simple clip art will be used to represent each risk. The viewer should be able to understand the problem by looking at the image and reading the heading.



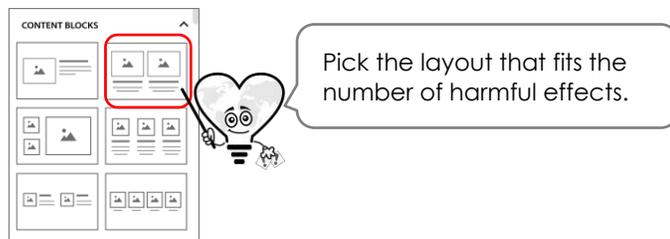
Example of *Effects* section.
Simple images represent each harmful effect.

Images should be:

- clip art, not a photo
- symbolic of the problem
- simple
- easy to see when small
- rectangle shape

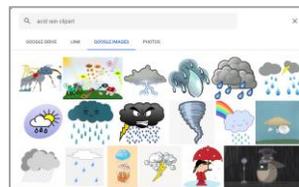
Use a Layout to Illustrate Harmful Effects

1. Open the *infographic* in Google Sites.
2. Click *Insert*. Under *Content Blocks*, pick a layout. It should include blocks of text.



Represent a Harmful Effect with an Image

3. ▷ Click the image box. Pick *Select image*.
- ▷ Click *Google Images*.
- ▷ Type **effect clipart** into the search box. Press ENTER.



▷ Pick an image you like. Click *Insert*.

▷ If you do not like the picture, click *Undo last action* . Pick another one.

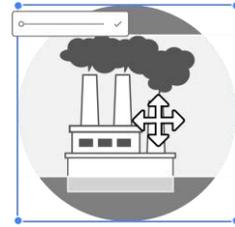
If you cannot find a symbol, try these ideas:

- hazard
- danger
- stop
- exclamation
- cancel
- sad face
- delete
- end
- caution
- warning
- poison



Crop the Image (Optional)

4. ▷ Resize the image in the frame.
- ▷ If the picture is too big, click *Crop*. 
 - Drag the slider. 
 - Reposition the image inside the frame. 
 - Click the check mark. 
- ▷ If the picture cannot be cropped to your liking, try removing the cropping:
 - Click *Uncrop*. 



Explain the Harmful Effect

5. ▷ Click inside the corresponding text box. Type the **Harmful Effect Name**.
- ▷ Click inside the second text box. Type a **brief description** of the damage or risk.



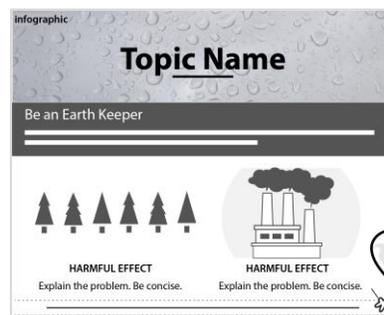
HARMFUL EFFECT

Explain the problem. Be concise.

Add the Remaining Harmful Effects Then Insert a Divider to Separate the Section

6. Apply your skills to complete the harmful effects.
7. Click *Insert*. Pick *Divider*.

A line will show at the bottom of the last section:



You can move  the divider above the section.

DESIGN TIPS

- Add a divider line both above and below the section.
- If your images are not transparent, you should keep the background white.
- To swap an image, click it two times slowly. Click . Pick *Replace image*, then *Select image*.
- Adjust the size of the picture by clicking the picture and dragging the sizing handles.

Sign Out

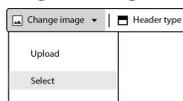
Session 2 Skill Review: Communicate with Images

An infographic uses images such as clip art, icons, or symbols to tell the viewer about a topic. Follow the instructions to design a publication about the harmful effects of clear cutting.

1. Create a new Google Sites document. 
2. Type **images** into document name box. 
3. Type **Clear Cutting** in the *Your page title* box. 
4. Click *Themes*. Select *Aristotle*. Pick a brown or green color to suit the topic.



5. An infographic uses simple clip art, not photos. Find a plain image for the banner:
 - a. Hover over the banner. Click *Change image*.  From the list pick *Select*.



- b. Select *Search*. Type **forest** in the search box. Click *Search*. 
- c. Pick *Clip art* from the Image filter.
- d. Pick a forest image you like. For example:



6. Add information about the cause:
 - a. From the Insert pane, select the first content block layout.



- b. In the first text box type the title **No Tree Left Standing!**
 - c. In the second text box type in the description:
Clear cutting removes all the trees from an area to save logging companies money.
7. When looking for images think of words that have a similar meaning. Illustrate the cause of *clear cutting*, which is *logging*:
 - a. Click the image box.  Pick *Select image*.  Click *Google Images*.
 - b. Search for clip art. Try **clear cutting** and **logging** as keywords. Which is better?
 - c. Pick an image that shows the cause of the problem. For example:

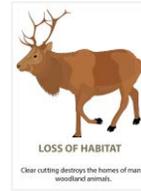


8. You will illustrate three harmful effects. From the Insert pane, select the fourth layout.



9. An image can be an object that relates to the fact.
Find an animal to illustrate the harmful effect *loss of habitat*:

- In the first text box type in the title **Loss of Habitat**.
- In the second text box type:
Clear cutting destroys the homes of many woodland animals.
- To illustrate the problem, find a clip art of a *moose, elk, or deer*.



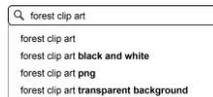
10. An image can be a symbol or sign.
Find a sign to illustrate the harmful effect *landslides*:

- In the first text box type in the title **Landslides**.
- In the second text box type:
Clear cutting can cause landslides which removes topsoil.
- To show this risk, use the search term **landslide sign**.



11. Google will make suggestions when you enter keywords.
Use this tip to illustrate the harmful effect of *slow regrowth*.

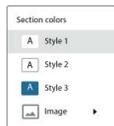
- In the first text box type in the title **Slow Regrowth**.
- In the second text box type:
Replanting trees often does not work as the seedlings die.
- Search for a clip art using the search term **forest**.
- View the other suggestions. This is called predictive text.



- Use a suggested keyword to find a suitable clip art.

12. Apply a color to the section background.

- Hover at the left side of the text box. Click *Section colors*. 
- Pick an option from the list:



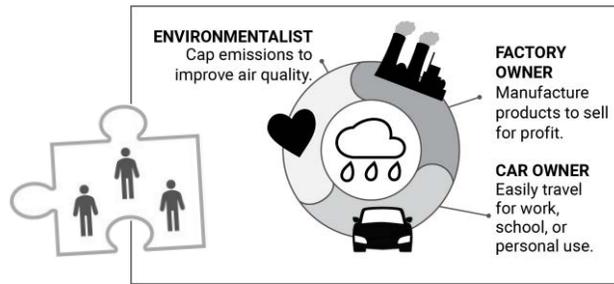
DESIGN TIPS

- To make the descriptions easier to read, select the text. Click the *Styles* arrow. Pick *Heading*.
- If your images are not transparent, you should keep the background white.
- To swap an image, click it two times slowly. Click . Pick *Replace image*, then *Select image*.

13. Sign out.

Assignment 12 Who Are the Stakeholders?

In this assignment, you add a diagram to the rotating slide deck. It will identify the stakeholders who have an interest in the issue. An organizer with text boxes will divide the information.



The diagram should:

- identify the stakeholder
- explain each "stake" in only a few words
- match the infographic's color scheme
- be easy to understand quickly

Example of Stakeholder slide.
To get ideas watch the stakeholder presentation.

Who are three stakeholders?

Insert a New Slide and Apply the Blank Layout

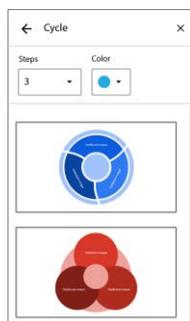
1. ▷ Open the *FACTS slide deck* in Google Slides.
 ▷ Select the last slide in the pane. Press the ENTER key to insert a new slide.



▷ Click *Layout*. Layout Select *Blank*.

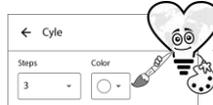
Choose a Diagram

2. ▷ From the *Insert* menu, select *Diagram*.
- ▷ Choose *Process*, *Relationship*, or *Cycle*. Look at the options.



- Pick a design that has two text boxes for stakeholder name and interest.
- Unwanted text boxes or extra shapes can be deleted.
- Click ← *Back* to view a different category.

▷ Change the *Steps* to the **number of stakeholders**. Pick a *Color*.



Try different colors and diagram options until you find the perfect one!

▷ Click on the diagram to place it on the slide. If you do not like it, click *Undo*.

Resize the Diagram to Fill the Slide

3. ▷ Click and drag around the diagram on the slide to select it.



▷ Drag the sizing handles to resize the diagram.



Add Information to the Diagram

4. ▷ In each main text box type the **Name of the Stakeholder**.

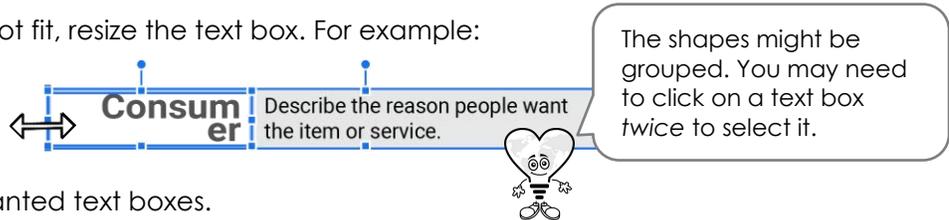
▷ In the joining text box describe the **stakeholder's interest**. How are they involved?

If there is no second text box, try these ideas:

- press ENTER to type on the next line
- draw a text box 

▷ Format the font size. IT CANNOT BE LESS THAN 24 points.

▷ If the text does not fit, resize the text box. For example:

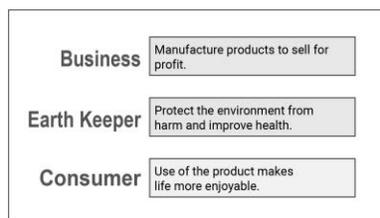


▷ Delete any unwanted text boxes.

Improve the Design of the Diagram

5. ▷ Use your skills to make the diagram look great:

- Fill the shape with color.  It should suit the topic and match the infographic.
- Apply a different font or size to the *stakeholder name*.
- Format text color. **A**

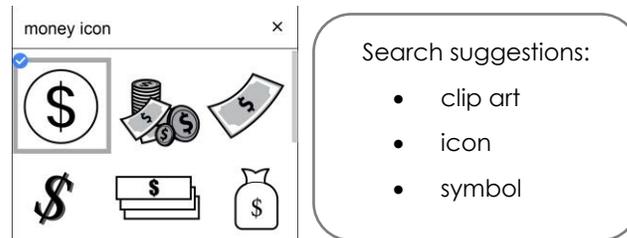
 to copy formatting from word to another.'" data-bbox="125 825 375 912"/>


Insert Icons to Represent Each Stakeholder (Optional)

6. ▷ Click *Insert image*. 

▷ Click *Search the web*. 

▷ In the search pane, type **stakeholder** or an object that shows what they gain.

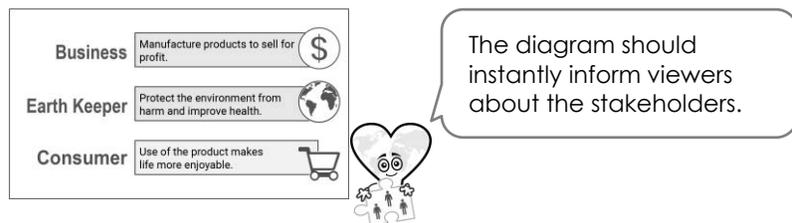


▷ Pick one you like. Click *Insert*.

▷ Use your skills to resize  and place  the image.

Complete the Diagram

7. Apply your skills to make the slide look great!



DESIGN IDEAS

- Change the slide background color.
- Resize  and move  the text boxes to fit the information.
- To swap an image, select *Replace image*. From the menu, click *Search the web*. 
- To recolor an image, select *Format options*. Pick *Recolor*. Select an option from the gallery.
- To create more space, move a stakeholder group. Now select all stakeholder groups. From the *Arrange* menu select *Distribute*. Pick *Vertically*  or *Horizontally*. 

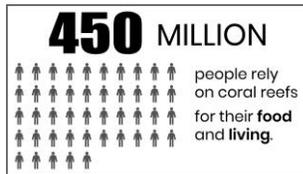
SELECTION TIPS

- Press the **TAB** key on the keyboard.
- If you cannot grab an object, from the *Arrange* menu, select *Ungroup*.

Sign Out

Session 3 Extension Activity: Inform with a Pictograph

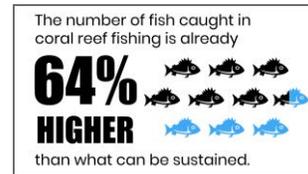
An infographic often uses a *pictograph* to communicate information. A pictograph is a graph that is made from pictures. Each image represents a value. It could be a fraction, ratio, percent, price, or other unit of measure. Create a slide that includes a pictograph.



key:  = 10 million people
depict the amount of things
copy and paste to show a group



key:  = one fifth
represent a fraction or ratio
recolor an image to show a value

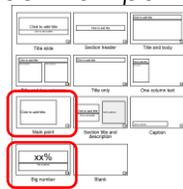


key:  = 10%
illustrate a percentage
crop an image to show a portion

Fact: _____

Key: _____ = _____
symbol unit of measure

1. Open the *slide deck* in Google Slides.
2. Select the last slide thumbnail.
3. Click the *New slide* arrow.  Select *Main point* or *Big number*.



4. Use your skills to describe the fact. Format the font , size , and style. **B**
5. Insert an image to represent the value.
 - a. Click *Insert image*. 
 - b. Click *Search the web*.  Type a **search word**.
 - c. Click on an icon you like. Click *Insert*.
 - d. Resize  and move  the icon .



To find simple images, add *clip art*, *symbol*, or *icon* to the search term.

6. Duplicate images to create a group:
 - a. Select the icon.
 - b. Press CTRL+D or choose *Duplicate*  from the Edit menu.
 - d. Repeat to add multiple images that represent the number.



To quickly make a group, select several icons. From the Arrange menu, select *Group*. Copy  and paste  the grouped icons.

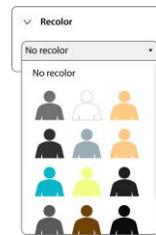
6. Align and distribute a row of images:
 - a. Place the first and last image where you want them on the slide.
 - b. Click and drag around the images to select them all.



- c. From the Arrange menu, click *Align*. Select *Top* , *Middle* , or *Bottom* .
- d. From the Arrange menu, click *Distribute*. Select *Horizontally*. .

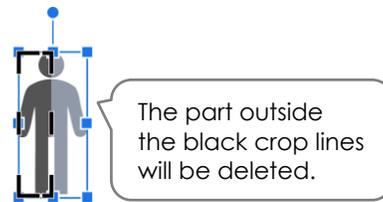


7. (Optional) Recolor an image:
 - a. Select the image(s) to be a different color.
 - b. Click *Format options*.
 - c. Click the *Recolor* arrow. Pick a color.



Recolor images to show a fraction, ratio, or percent.
For example: 60%

8. (Optional) Crop an image:
 - a. Select the image to be cropped.
 - b. Click *Crop image*.
 - c. Drag a handle to remove part of the shape.
 - d. Click *Crop image* again.



Crop an image to show a portion or part of a value.
For example: 65 thousand people

TIP: How to make an image two colors:

1. Copy and paste to make an extra image.
2. Crop the pasted shape.
3. Recolor the cropped shape.
4. Drag the cropped shape over top of another image.

Use the *Zoom* tool to magnify an image. Click on the image with the tool to enlarge it. To go back to the slide, right click the image. Or click the *Zoom* arrow and pick *Fit*.



Copy and then crop an image to show part of a percentage.
For example: 65%

9. Sign out.

Assignment 17 What Are Solutions?

In this assignment, you design an icon that illustrates a solution to the environmental issue using Google Drawings. You will apply your drawing skills to combine shapes, word art, and clip art.

What Is an Icon?

An icon is a simple drawing made from lines and shapes. It is used to express an idea more quickly than words.

Symbols or images used in icons should be universal. Most people must understand their meaning in the same way.

What Are Environmental Solutions?

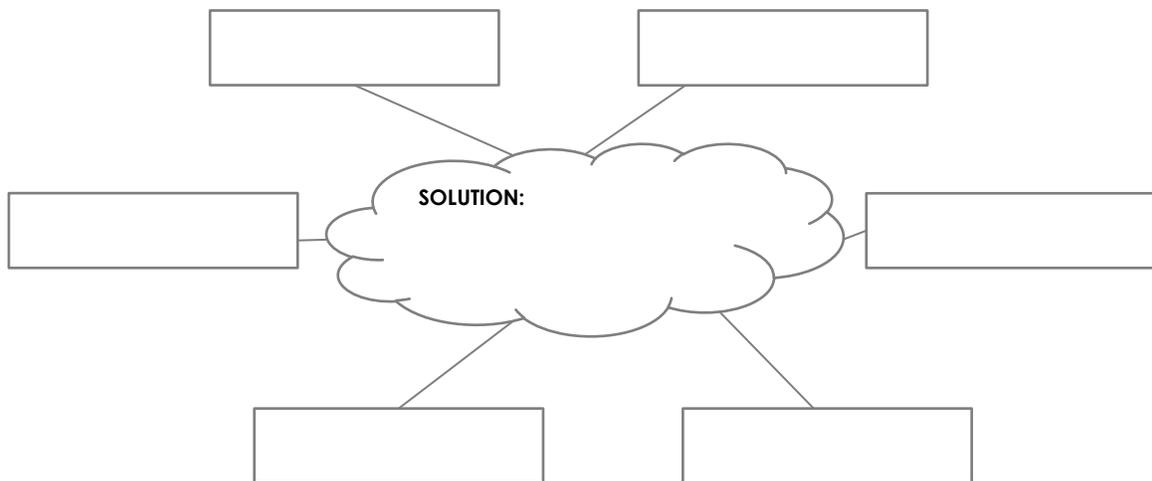
There are many types of solutions to environmental problems. They can be:



Brainstorm Ideas for the Icon Design

Refer to your Research Outline to select a solution to illustrate.

Brainstorm a list of objects related to the solution. Write each object's name in a box. When done, pick the object(s) you think most people will understand and use them in your icon design.



Create a Google Drawings and Change the Share Settings

- ▷ Sign into your Google account. Click **New**.
 - ▷ Click **More**. Select **Google Drawings**.
 - ▷ Replace *Untitled drawing* with **solution**.
 - ▷ Apply your skills to share. Give **Anyone with the link** the role of **Viewer**.

Set the Icon Size

- ▷ From the File menu select **Page setup**.
 - ▷ Pick **Custom**.
 - ▷ Type **2 x 2**. Select **Inches**. Click **Apply**.



Apply Your Skills to Design an Icon for a Solution

- Select a shape for the background:
 - Click **Shape**. Pick a category.
 - Draw a shape that fills the canvas.
 - Use your skills to format the fill and border of the shape.
- To design the icon combine shapes, Word art, and/or an image.

DESIGN TIPS

- *Swap it:* Right click on a shape. Pick **Change shape**.
- *Outline it:* Click **Format options**, Check **Drop shadow**. Pick **white**. Drag the **Transparency** and **Blur Radius** sliders to the left.
- *Combine it:* Select objects. From the **Arrange** menu, click **Group**.
- *Crop it:* Click the **Image mask** arrow. Select a shape. Click **Crop**.
- *Shadow it:* Click **Format options** and choose **Drop shadow**.

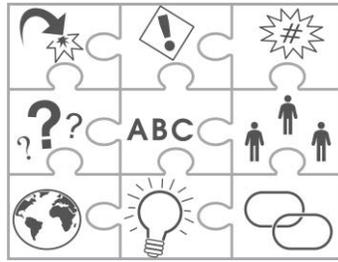


- Complete the checklist. Will viewers understand your icon?

	✓
The icon design is simple.	
The icon uses symbols that are easy to recognize.	
The meaning of the icon is clear in only a few seconds.	
The icon will match the infographic.	

Sign Out

Session 6 Review: Infographic Reflection



You are an environmental steward! In this project, you designed an infographic that summarized facts about an important topic. Answer questions about your infographic.

1. What was the most interesting discovery you had while researching the topic?

2. What part of the infographic are you most proud of making? Why?

3. If you had more time, what would you like to add to your infographic?

4. What was the most difficult part of this project? How did you overcome the challenge?

5. Which do you prefer, writing a report or designing an infographic? Why?

Infographic Rubric

	Needs Improvement Level 1	Good Level 2	Great Level 3	Excellent Level 4
Cause 	The cause is incomplete or missing.	The cause is described but lacks a connection to human activity.	The cause of the problem is described and forms a connection to human activity.	The cause of the problem is described concisely and forms a connection to human activity that is easily understood.
Effect 	Effect section is incomplete or missing. Images are not suitable or missing.	Two effects are described. Images illustrate the effects.	Two effects are described and show an understanding of the content. Images are icons that represent the data effectively.	Two effects are described concisely and show an understanding of the content. Images are icons that represent the data effectively and are well-formatted.
Facts 	Slide deck is incomplete or missing.	Slide deck includes two facts.	Slide deck includes two interesting facts that are compelling.	Slide deck includes two interesting facts that are compelling and eye-catching.
Stakeholder 	Stakeholder graphic organizer is incomplete or missing.	Involvement of 3 stakeholders is partially explained using a graphic organizer. Parts of the graphic are not easy to understand.	Involvement of 3 stakeholders is explained using a graphic organizer. Graphic is easy to understand.	Involvement of 3 stakeholders is briefly but thoroughly explained using a graphic organizer. Graphic is easy to understand and conveys a message quickly.
Thematic Map 	Map is incomplete or missing.	Map pinpoints places related to the issue, with a description, and photo. Some marker icons related to the topic.	Map accurately pinpoints places related to the issue, with a brief description, and photo. Marker icons are customized to relate to the topic.	Thematic map accurately pinpoints places related to the issue, with a brief well-phrased description, and relevant photo. Marker icons relate to the topic and express information visually.
Solutions 	Solution section is incomplete or missing.	Two solutions are identified with a link to an organization. Icons represent each solution.	Two solutions are explained with a link to a reputable organization. Icons are original and represent each solution.	Two solutions are clearly and concisely explained with a link to a reputable organization. Icons are original, high-quality, and represent the solution.
Organization 	Sections are not logically sequenced. Headings are unclear or missing.	Sections are logically sequenced. Some headings identify information clearly.	Sections are logically sequenced, and design elements divide information. Headings identify information clearly.	Sections are logically sequenced, and design elements divide information creatively. Catchy headings identify information and grab attention.
Purpose 	Infographic does not raise awareness about an environmental issue.	Infographic raises awareness about an environmental issue.	Infographic is informative and raises awareness about an environmental issue.	Infographic is informative, raises awareness about an environmental issue, and inspires action.

infographic

Acid Rain

We Have a Problem!

Our air is being poisoned. The main cause is industries that burn coal or other fossil fuels. The gas from smoke stacks combines with water in the air to form acid rain. Acid rain has lots of nitric and sulfuric acid. It is deadly!

Normal rai...
4.2
PH of acid rain



DAMAGED FORESTS



Acid rain that seeps into the ground removes nutrients from the soil. This makes it easier for insects or cold weather to damage trees.

TOXIC WATER



Acid rain changes the pH level of the water. This can cause aquatic wildlife such as insects or plankton to die.

FOG in polluted areas may be MORE ACIDIC than rain.
ACID FOG!



Acid Rain Map



Click the markers to explore the map.

EPA



ENVIRONMENTAL PROTECTION AGENCY

The EPA has the power to limit emissions of air pollutants coming from sources like chemical plants, utilities, and steel mills.

SOLAR ENERGY



A renewable energy source is solar power. It does not emit harmful toxins into the air which cause acid rain.

Sources