Using Image-J to Identify Animal Hand X-Rays   Name _____

1. Go to google and type in "image J", click the first link that comes up (it should be a .gov website), after the new page opens click **applets and webstart**
2. Next, go to **run image j as a applet**, and 2 small windows should pop up, one should look like the picture below and another is a regular webpage that says "image J applet" don't close either one until you are done!

Animals have many similar body structures: eyes, noses, paws... Though these structures may be similar, they may look different and are used for different purposes. Appearance is often related to function. This type of similar feature is called a homologous structure.

Objectives:
- To use Image J to analyze 10 different x-rays to determine which animals they belong to
- To understand homologous structures
- To understand how structure is related to function

How to use Image-J:
1**.** Open the applet found on the classroom website, follow instructions

2. The following tool bar will open for the program:
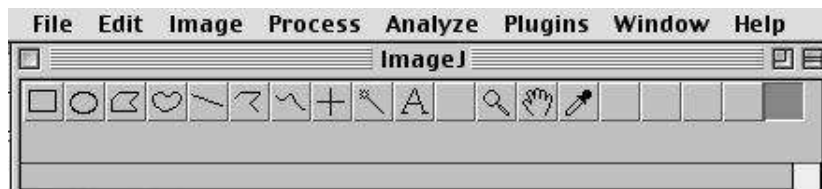
3. For each picture you MUST go to the program, click **open**, and select the file. You must do this each time with all 10 images. **Note: Open ImageJ first, then use the Open command from the File menu to open the photos that you will use. The photos <u>must </u>be opened by ImageJ in order for things to work.**

4. An x-ray is not a 3-D image, but you can use Image-J to adjust areas of light and dark or change the color to see more detail and the various layers of the "hand". You will also be able to better observe the outside, fleshy structures of the hands. These techniques may help you determine which animal is represented in the x-ray.

- To invert the light and dark areas on the image, click on Edit, then Invert.
- To adjust the brightness and contrast, click on Image, then Adjust, then Brightness/Contrast.
- To change the color scheme of the image, click on Image, then Lookup Tables, then choose a different color scheme from the list.
- You can zoom in on the image or pan around to different parts of the image using the magnifying glass icon or hand icon (pan).

If you want to undo a particular change to the image, simply click on Edit, then Undo.

Possible Animals

Lion

© TigerHomes.Org 2004

Sea Lion

Copyright © Mike Johnson

Beluga Whale

© Seapics.com

Macaque Monkey

© Noel Rowe, C. Kuntunidisz and J.M. Walker

Sun Bear

© Keenan Ward

Human

Owl

Corba Photos

Zebra

Hyena

Panda

© China Internet Information Center

PART I- Exploring the different possibilities

After all of the x-ray images are open, use the Image-J program to examine them. Each x-ray belongs to one of the animals on the previous page. The size of the x-ray is not related to the size of the animal.

Use the following table to make observations or answer yes/no to questions about each of the images:

Image #	1	2	3	4	5	6	7	8	9	10
Individual Fingers?										
Nails or claws?										
Shape of flesh covering?										
Bones thick in relation to length?										
How many fingers?										
All fingers same length?										
How many joints per finger?										

PART II- Finding the length and width in Image J

1. To find the length, make sure the **line tool** is selected, then click and drag in the picture to form a line from one
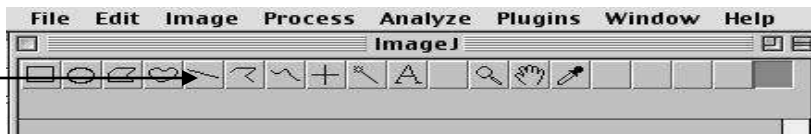
side of the bone to the other side (try to make sure you're consistently measuring the length and width from what you think is the same location on the different bones)

Question: What is it important to make sure that you're measuring from about the same location on the different bones? _____
_____
_____

2. Next, select **analyze,** then **measure** and record the **length** from the **length** column into the **data table** (then you can delete the box without saving by clicking the "x" button on the top left corner).

3. Use the line tool the same way to find the width, just make sure to measure consistently in the same locations in the different pictures.

4. Enter your data in the table on the next page.

Image #	1	2	3	4	5	6	7	8	9	10
Length										
Width										
Ratio (L/W)										

*The smaller the ratio, the more weight-bearing the animal is.

5. Next, use what you found out about the structure to think about the probable function of each "hand." Choose one of the following for each x-ray image:
- Flying
- Swimming
- Grasping/manipulating
- Walking/running

Image #	Probable Function
1	
2	
3	
4	
5	

Image #	Probable Function
6	
7	
8	
9	
10	

Use what you have observed about the x-rays and implied about the hand function to decide which x-ray belongs to each type of animal. You may want to use additional resources to find out more about some of the animals and their lifestyles before making your decisions. A list of hints is also provided for more information.

Image #	1	2	3	4	5	6	7	8	9	10
Animal										

Hints
- The sun bear is the smallest living bear. This bear has a deformity of the hand.
- Birds have hollow bones.
- Heavier animals have thicker bones to support the additional weight of the animal.
- Pandas appear to have an additional "thumb" which they use to strip leaves from bamboo.
- Macaques and humans are both primates, but only humans have opposable thumbs, while the macaque hand has more padding for swinging on tree limbs.
- More joints in the fingers indicate more ability to bend and move.