Human Brain and Senses Lab Notebook

Table of Contents

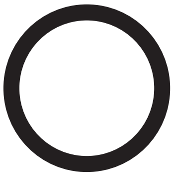
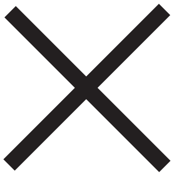
Name ____________________

Period ____________ Date ____________

MIRROR, MIRROR

1. Write your name while looking only in the mirror. Do not look at your pencil directly. Write it so that you can read it in the mirror.

2. Copy each of these figures in the boxes beside them. Try it three times. Do not erase anything.

A.				
B.				
C.				
D.				
E.				

Name ______________________________

Period __________ Date __________________

MNEMONICS: MEMORY HELPERS

Did you ever have to remember something difficult? You could have used a trick called a **mnemonic device** (pronounced nee•MON•ic) to help your brain remember. Mnemonic devices use associations, which remind you of whatever it is you need to remember.

See if you can invent a way to remember the following:

1. The colors of the rainbow: red, orange, yellow, green, blue, indigo, violet.
2. The planets of the Solar System, in order from the Sun: Mercury, Venus, Earth, Mars, Jupiter, Saturn, Uranus, Neptune, Pluto.
3. How to spell a tough word: accommodate, February, liaison, nuisance, and so forth.
4. A combination on a lock.
5. The English alphabet.
6. Musical notes of the treble clef that fall on the lines: E, G, B, D, and F.
7. How to change clocks at daylight savings time.
8. How many days in each month of the year.
9. When Columbus sailed to the Americas.
10. Make up a mnemonic for something you need to remember in another class.

Name ____________________

Period __________ Date ______________

EYE EXAM

Front view of eyes	Side view of eye

Observations and questions about eye structure and function

____

____

____

____

____

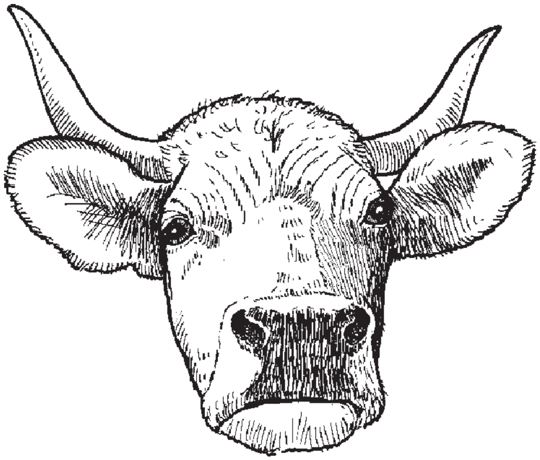
____

____

____

____

COW-EYE EXAM

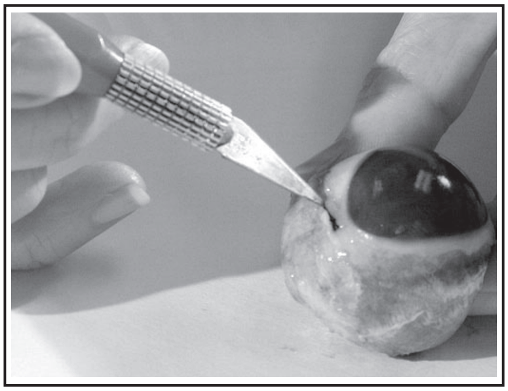


- **Observe external anatomy.**
- **Examine the pupil.**
- **Examine the cornea.**
- **Examine the muscles and fat.**
- **Examine the optic nerve.**
- **Remove the fat and muscles.**
- **Examine the eyeball.**

COW-EYE DISSECTION A

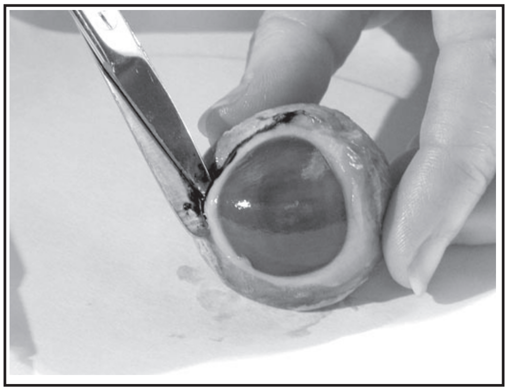
1. Pierce the sclera at the edge of the cornea.

- What do you notice as the eye is cut?



2. Cut around the cornea.

- What happens as you cut around the edge of the cornea?
- What structures can you see as the eye is opened?



3. Investigate the cornea.

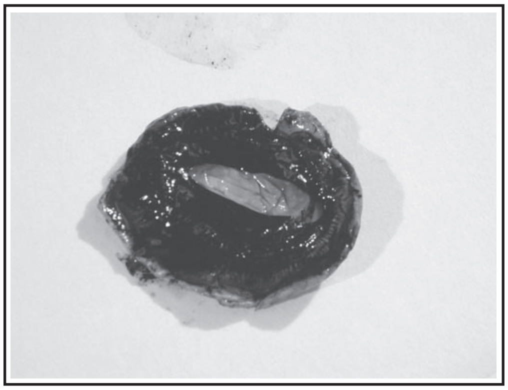
- What do you notice about the cornea?
- How would you describe it?
- What happens when you try to poke your finger through it?

4. Observe the aqueous humor.

- Can you find any liquid just inside the cornea?
- What happens to it when the eye is cut open?

COW-EYE DISSECTION B

5. Investigate the pupil and iris.

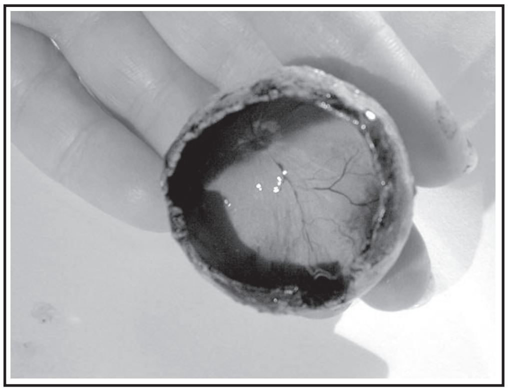


- How would you describe the iris? The pupil?
- What shape are they?

6. Investigate the lens and vitreous humor.

- Describe the lens and the vitreous humor.
- What happens when you look through the lens to read a word?

7. Investigate the retina.



- Describe the retina.
- Where is the retina attached to the back of the eye?
- How does this correspond to the location of the optic nerve?

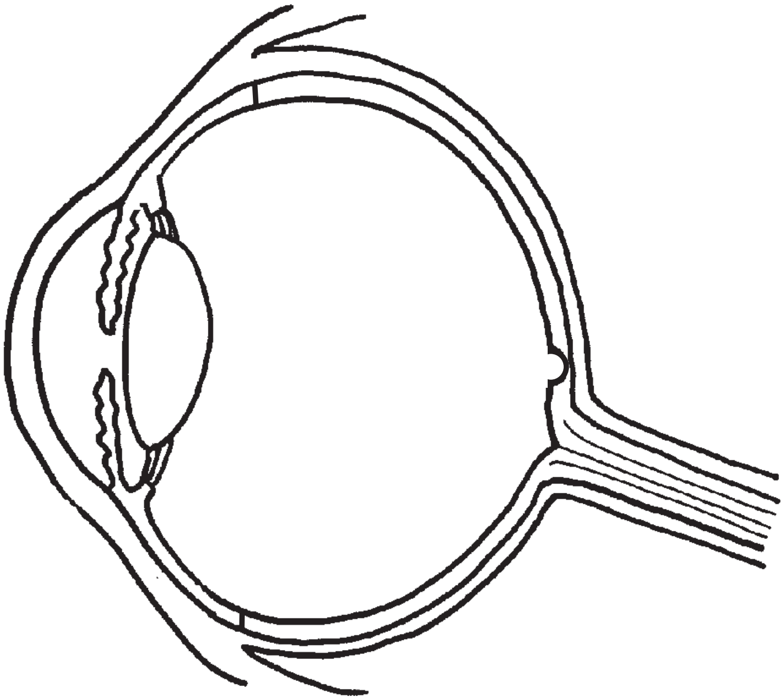
8. Investigate the tapetum.

- What are the characteristics of the tapetum?
- Where is the tapetum in relation to the retina?

Name ______________________________

Period ___________ Date ________________

DIAGRAM OF THE EYE



Name ________________________

Period __________ Date ______________

EXPLORING LENSES

Work with a partner. Answer these questions.

1. Describe looking through a lens at something that is close to the lens.

2. Describe looking through a lens at something that is far away from the lens.

3. What did you find out about the shape of a lens?

4. What did you find out about how to use a lens?

Name ______________________________

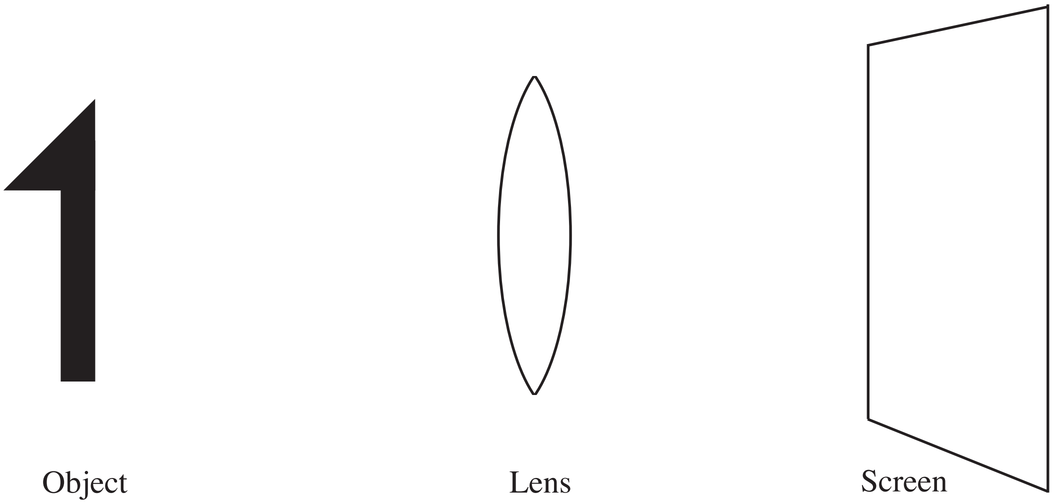
Period ____________ Date ________________

LIGHT THROUGH A LENS

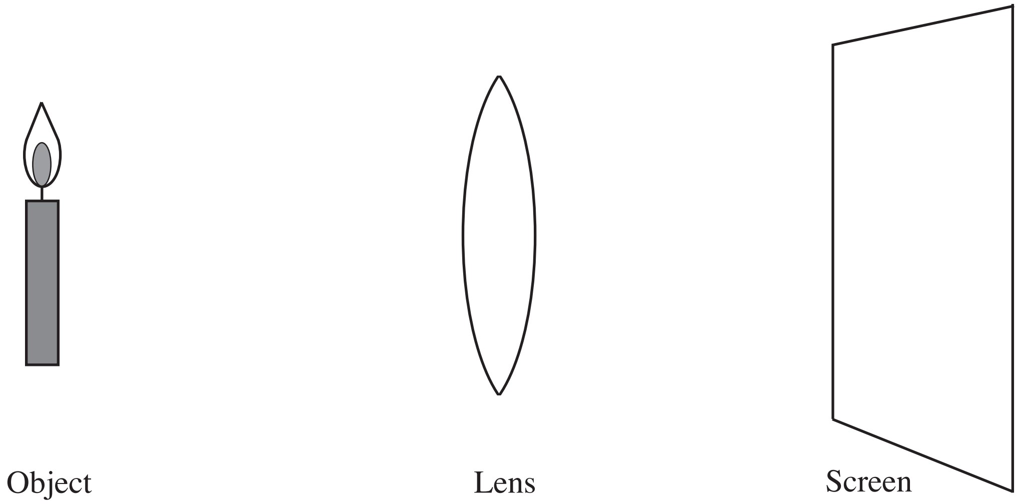
Light Rules

- Light always travels in straight lines. It keeps going in a straight line until it hits something.
- When light hits the curved surface of a lens, it passes through, but not straight through. Lenses bend the direction the light is traveling.

Part 1: Draw lines to show how the arrow image gets turned upside down.



Part 2: Draw lines to show how the candle image gets turned upside down.

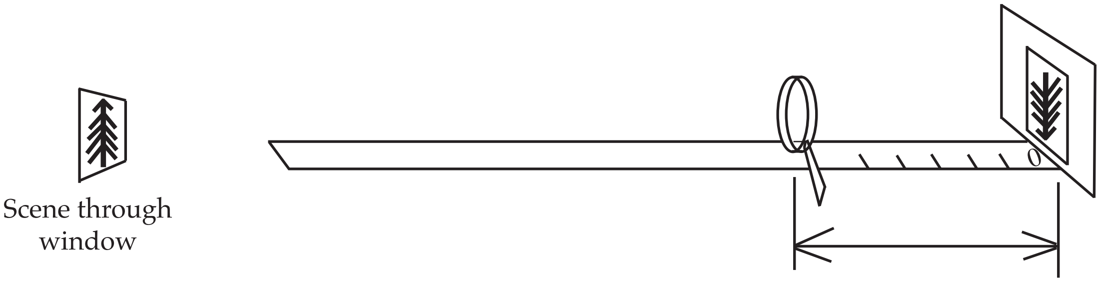


Name ______________________________

Period ____________ Date ______________

INVESTIGATING IMAGE FOCUS DISTANCE

Image focus distance is the distance from the lens to the screen when the image is in focus.



Measure the image focus distances for the lenses and lens systems described below and record them in the chart.

Lens	Image focus distance
Camera lens	
One hand lens	
Camera lens and hand lens	
Two hand lenses	

1. The curvature of the hand lens is greater than the curvature of the camera lens. What is the relationship between the curvature of a lens and the image focus distance?

____

____

____

2. What are two things you might do to make the image focus distance *shorter* in a camera?

____

____

____

____

Name ______________________________

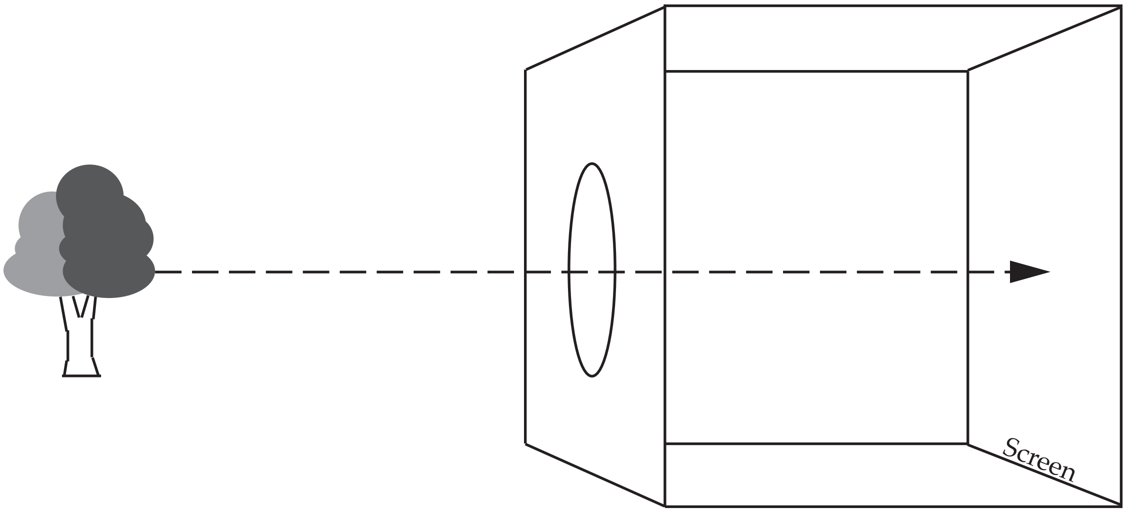
Period __________ Date ______________

RESPONSE SHEET—LENSES

A student drew the diagram below to show how a camera obscura works. She also wrote a couple of sentences to explain her drawing.

The tree emits a ray of light. It travels through the camera lens, then to the screen.

Do you think this student drew a complete and accurate diagram? Do you think she included a good explanation? If you think this student's work is good, leave it as it is. If you think you can do a better job, add to the diagram and write a better explanation to show what you know about a camera obscura.



USING THE ANGLE FINDER FOR FIELD OF VISION

These are the roles and responsibilities for each team member when using the angle finder to measure field of vision.

Subject is the person whose field of vision is being tested.

- Hold the angle finder to your forehead just above your eyes, like a visor.
- Look *only* at the red focus point directly in front of you.
- Do *not* glance to the side. If you do, you will have to repeat the test.
- Record your field-of-vision angles on the *Field-of-Vision Angles* sheet.

Chooser selects the vision card to be used in the tests.

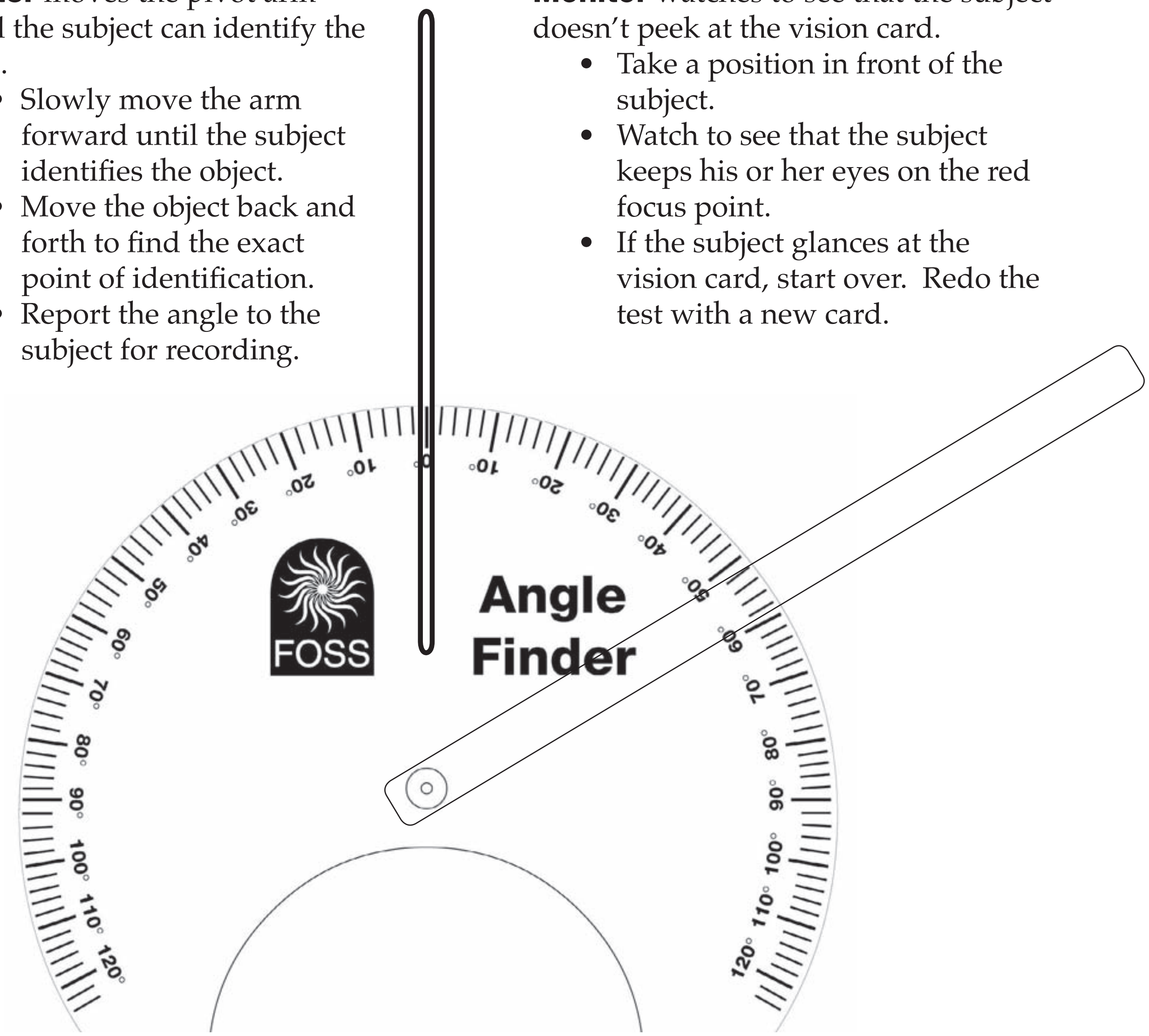
- Stand behind the subject.
- Move the pivot arm to a position behind the subject's head.
- Put a color card or letter card into the slot at the end of the pivot arm.

Tester moves the pivot arm until the subject can identify the card.

- Slowly move the arm forward until the subject identifies the object.
- Move the object back and forth to find the exact point of identification.
- Report the angle to the subject for recording.

Monitor watches to see that the subject doesn't peek at the vision card.

- Take a position in front of the subject.
- Watch to see that the subject keeps his or her eyes on the red focus point.
- If the subject glances at the vision card, start over. Redo the test with a new card.



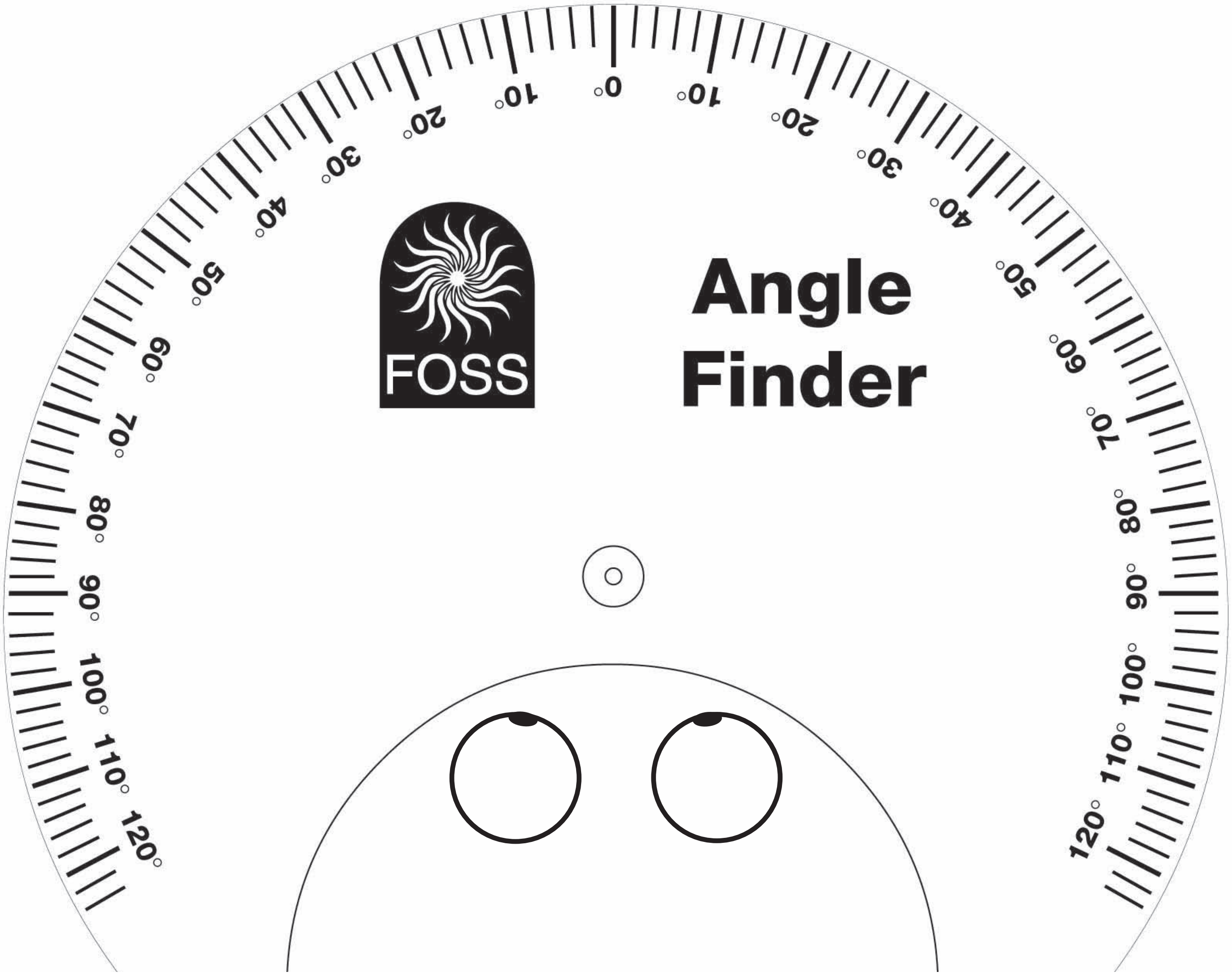
Name ______________________________

Period ____________ Date ________________

FIELD-OF-VISION ANGLES

Record the angle at which you first see an object, identify a color, or read a letter.

Eye	**Angle at which object is first seen**	**Angle at which color is first identified**	**Angle at which letters can first be read**
Right			
Left			



FOSS Human Brain and Senses Course

Name ______________________________

Period ___________ Date _________________

COLOR-BOX ANALYSIS

Part 1: Draw a picture of the shapes in the two color boxes. Label the colors of the shapes and the background.

Color box A	Color box B

Part 2: Score 1 for each color and shape you identified correctly; score 0 for each color and shape you identified incorrectly.

Color box A

Object description	Color score	Shape score
Background		■

Color box B

Object description	Color score	Shape score
Background		■

Name ______________________________

Period ___________ Date _________________

RETINA REVIEW

1. When you see an object out of the corner of your eye, or at the edge of your field of view, where do you think the image is focused on your retina?

2. What type of receptor cells would you expect to find there?

3. If you see an object out of the corner of your eye, will it appear clear, detailed, and in bright color? Why or why not?

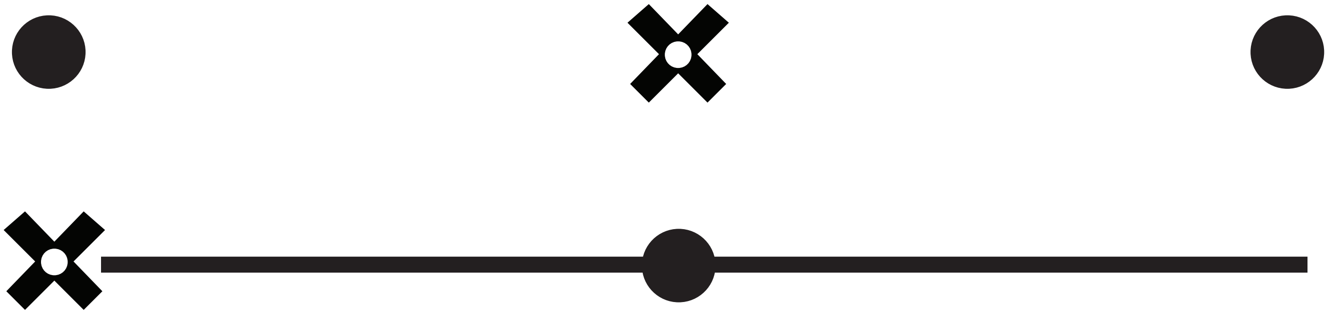
4. Why is it useful to have peripheral vision?

5. The spot in the center of the retina where there are many cones is called ____________

6. This area of the retina is also called the zone of acuity, because our vision there is particularly acute, or sharp. Why?

7. If you stare at the Sun, you can burn a hole in the fovea. What would the world look like if you did this? Why would this be hard to deal with?

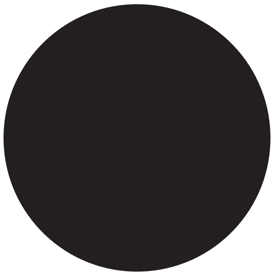
BLIND-SPOT CHALLENGES



Use this sheet and materials of your own design to investigate the ten challenges posed below. Write answers to at least five of the challenges. Record your procedures and findings in your science journal. Be sure to report:

- What you did
- What you observed
- An explanation for your observations

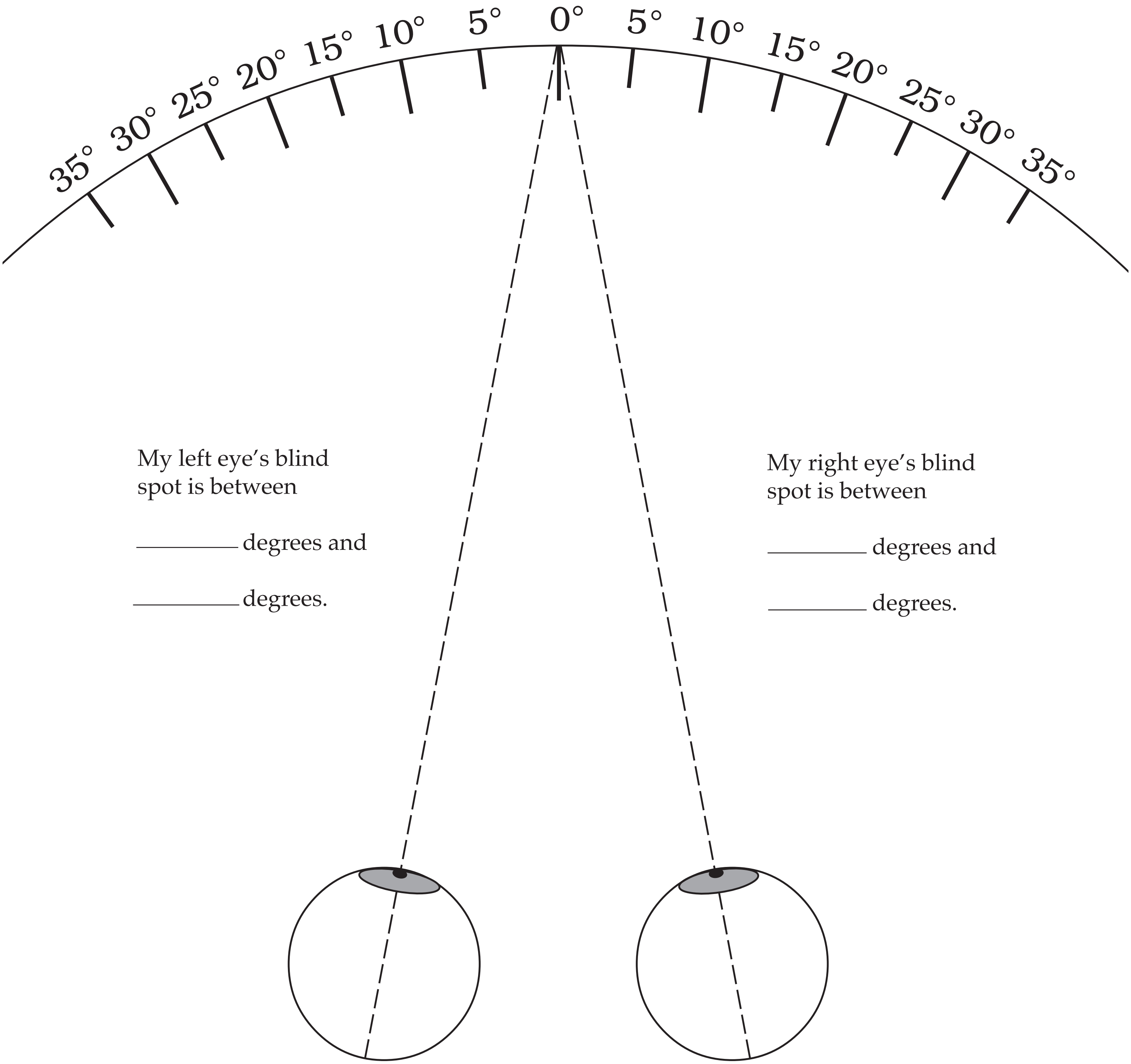
1. Can you make each dot disappear into one of your blind spots?
2. Can you make the dots blink on and off—right, left, right, left?
3. Can you make both dots disappear at the same time (eyes open)?
4. Can you look at the X in the first row and make the big dot below disappear?
5. What happens to the line when the dot is in your blind spot?
6. How big is your blind spot at close viewing distance (25 cm)?
7. How big is your blind spot at arm's length (60 cm)?
8. Can you make your thumb disappear in your blind spot?
9. Can you make your partner's head disappear in your blind spot?
10. Can you make it look like you have a hole through your hand?



Name ______________________________

Period __________ Date ______________

BLIND-SPOT ANGLES



My left eye's blind spot is between

________ degrees and

________ degrees.

My right eye's blind spot is between

________ degrees and

________ degrees.

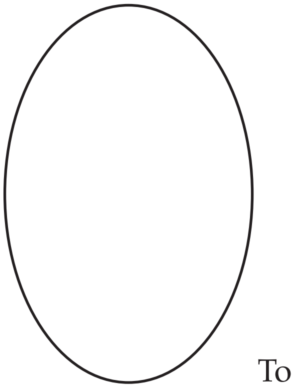
Name ______________________________

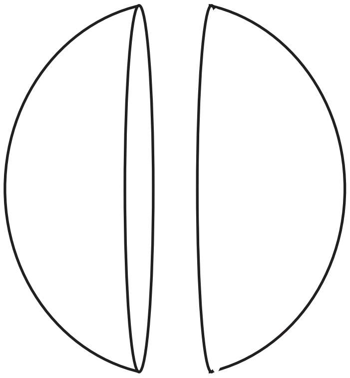
Period ___________ Date ________________

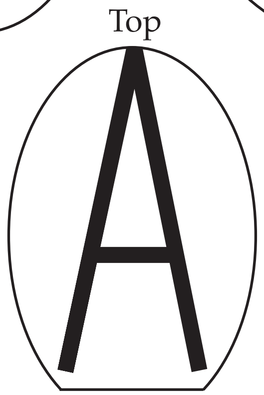
WHAT’S IN A LETTERHEAD?

People have brains inside their heads. “Letterheads” have letters of the alphabet inside their heads. Make a letterhead as follows:

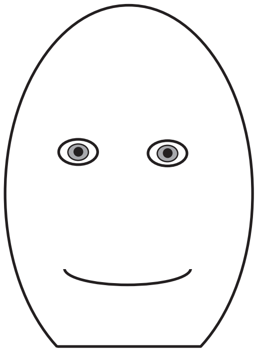
1. Divide your lump of clay into two equal parts.
2. Shape the two pieces into the two halves of a little clay head.
3. Roll the small piece of modeling clay of another color into a thin snake about 2–3 mm in diameter.

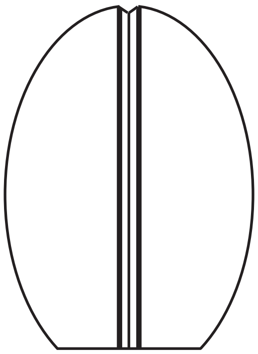






4. Use the clay snake to make a large capital letter. Stick it to one of the flat surfaces.
5. Carefully press the two halves together with the letter inside. Remember which end is the top. Flatten the bottom a bit.
6. Make a little face on one side of your letterhead.
7. Make a groove on the back of your letterhead from top to bottom.





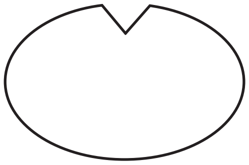
To reconstruct the letter in your letterhead, record the size and position of the marks found on each slice. Use information from your *Letterhead Layout Sheet.*

Slice 1				
Slice 2				
Slice 3				
Slice 4				
Slice 5				
Slice 6				
Slice 7				
Slice 8				
Slice 9				
Slice 10				

This letter is ____ This letter is ____ This letter is ____ This letter is ____

LETTERHEAD LAYOUT SHEET

Name ______________ Period ______________ Date ______________

Top of head		Top of head
	1	
	2	
	3	
	4	
	5	
	6	
	7	
	8	
	9	
	10	
Chin		Chin

Lay the slices of your letterhead in the left column of boxes. Make sure the notch in the slice is at the top of each box.

Draw a picture of each slice of your letterhead in the right column of boxes.

BRAIN-BOX IMAGE A

Image reproduced with permission from the Digital Anatomist Program, University of Washington.

BRAIN-BOX IMAGE B

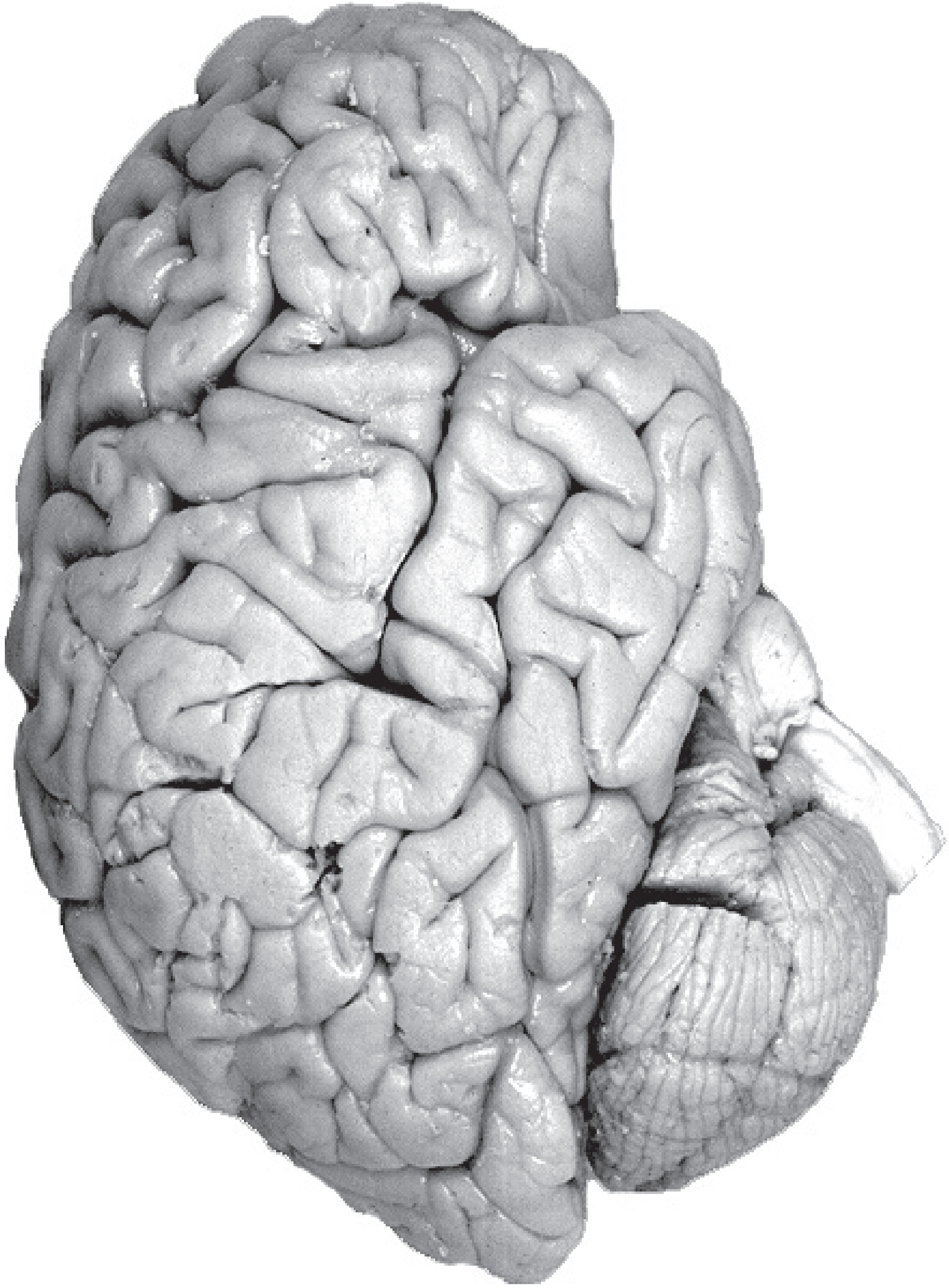


Image reproduced with permission from the Digital Anatomist Program, University of Washington.

BRAIN-BOX IMAGE C

Image reproduced with permission from the Digital Anatomist Program, University of Washington.

BRAIN-BOX IMAGE D

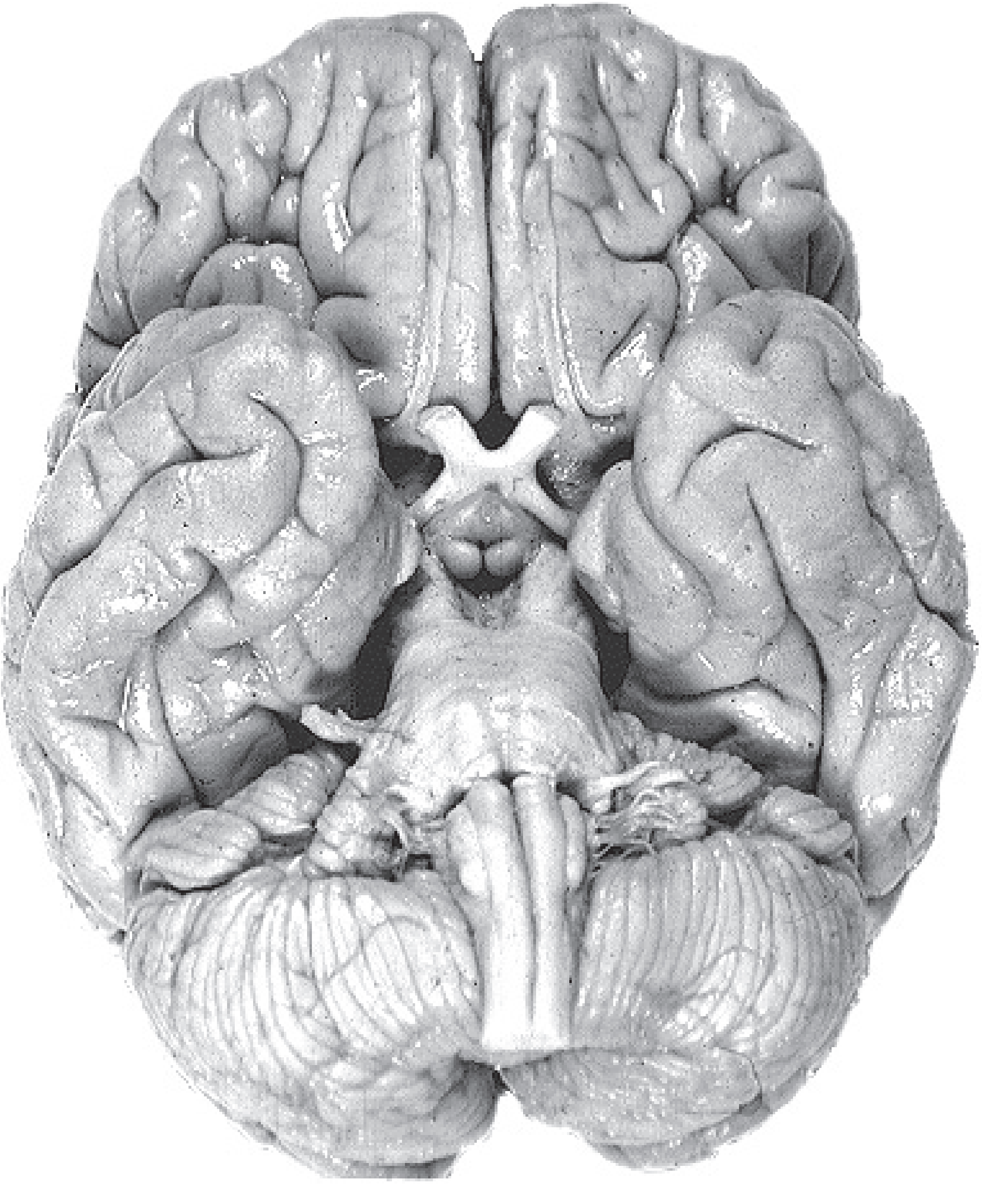


Image reproduced with permission from the Digital Anatomist Program, University of Washington.

BRAIN-BOX IMAGE E

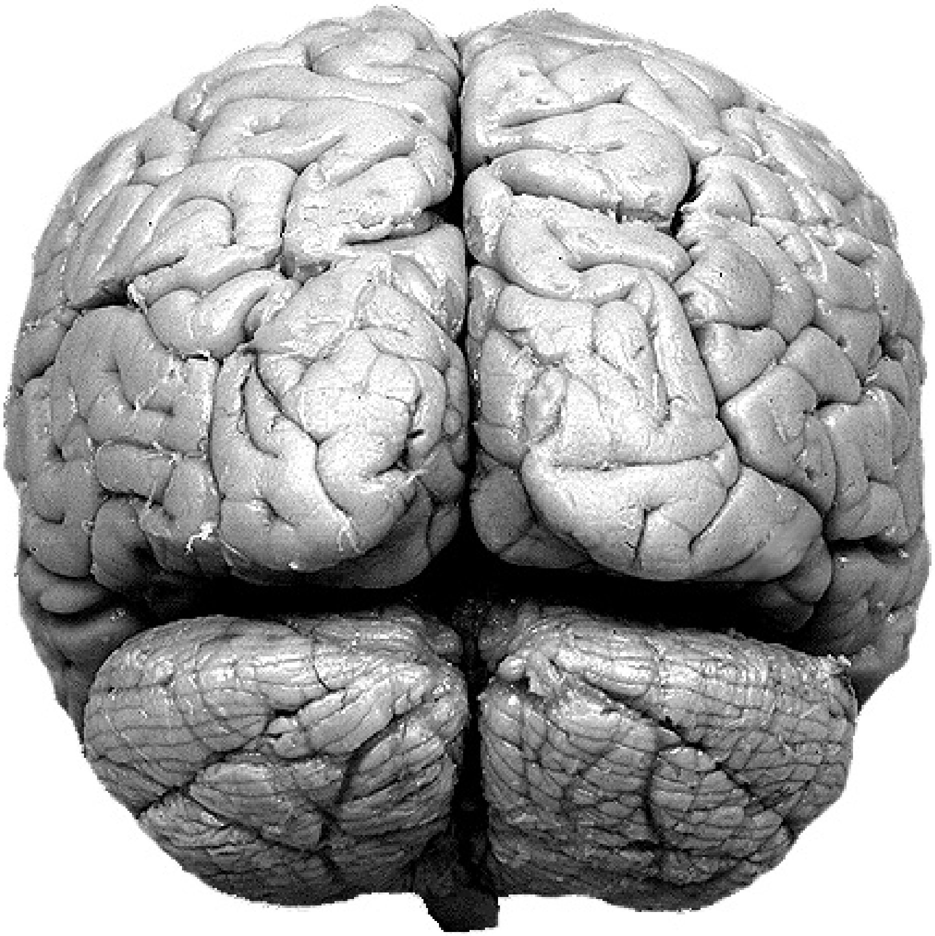


Image reproduced with permission from the Digital Anatomist Program, University of Washington.

BRAIN-BOX IMAGE F

Image reproduced with permission from the Digital Anatomist Program, University of Washington.

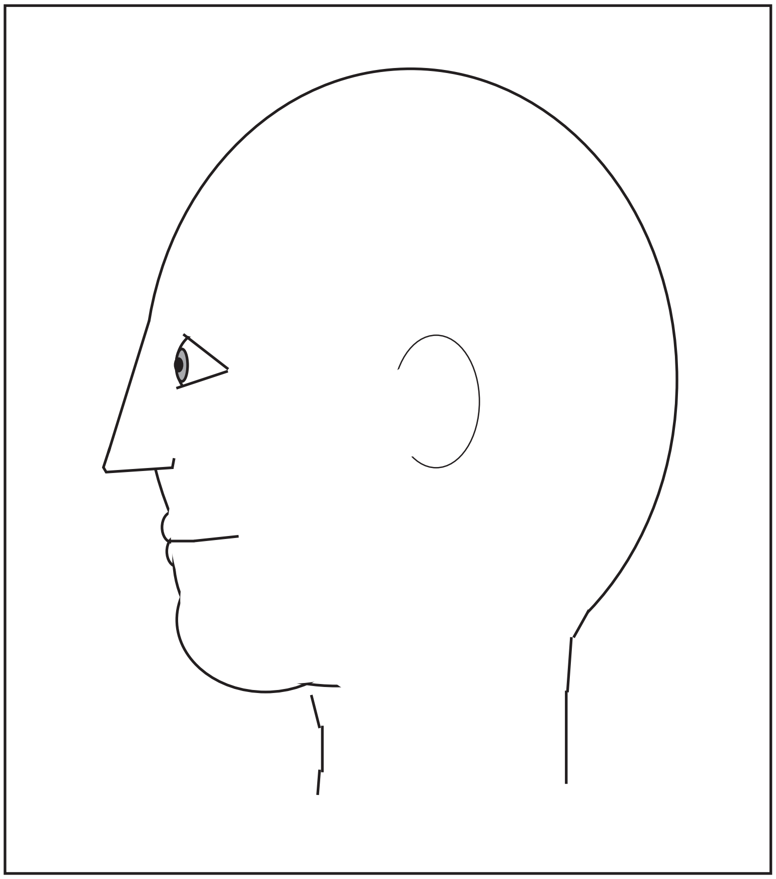
Name ______________________________

Period __________ Date ______________

LOOKING AT THE BRAIN

Part 1: Where is your brain?

1. Tape your profile photo in the space to the right.
2. Tape a piece of tracing paper over the picture.
3. Use a pencil to draw your brain on the tracing paper.



Part 2: Brain parts

1. Select one of the MRI brain images and draw it here.
2. Label as many parts of the MRI as you can.

FOSS Human Brain and Senses Course

Name ____________________

Period __________ Date __________

BRAIN QUESTIONS

Part 1: Work alone. What questions do you have about the brain? Write at least five questions. Use the back of this page if you have more questions.

1. ____________________

2. ____________________

3. ____________________

4. ____________________

5. ____________________

Part 2: Work with your partner. Discuss and compare brain questions. Decide which four questions are the most interesting or important. Write those questions here.

My partner is ____________________

Our four questions are

1. ____________________

2. ____________________

3. ____________________

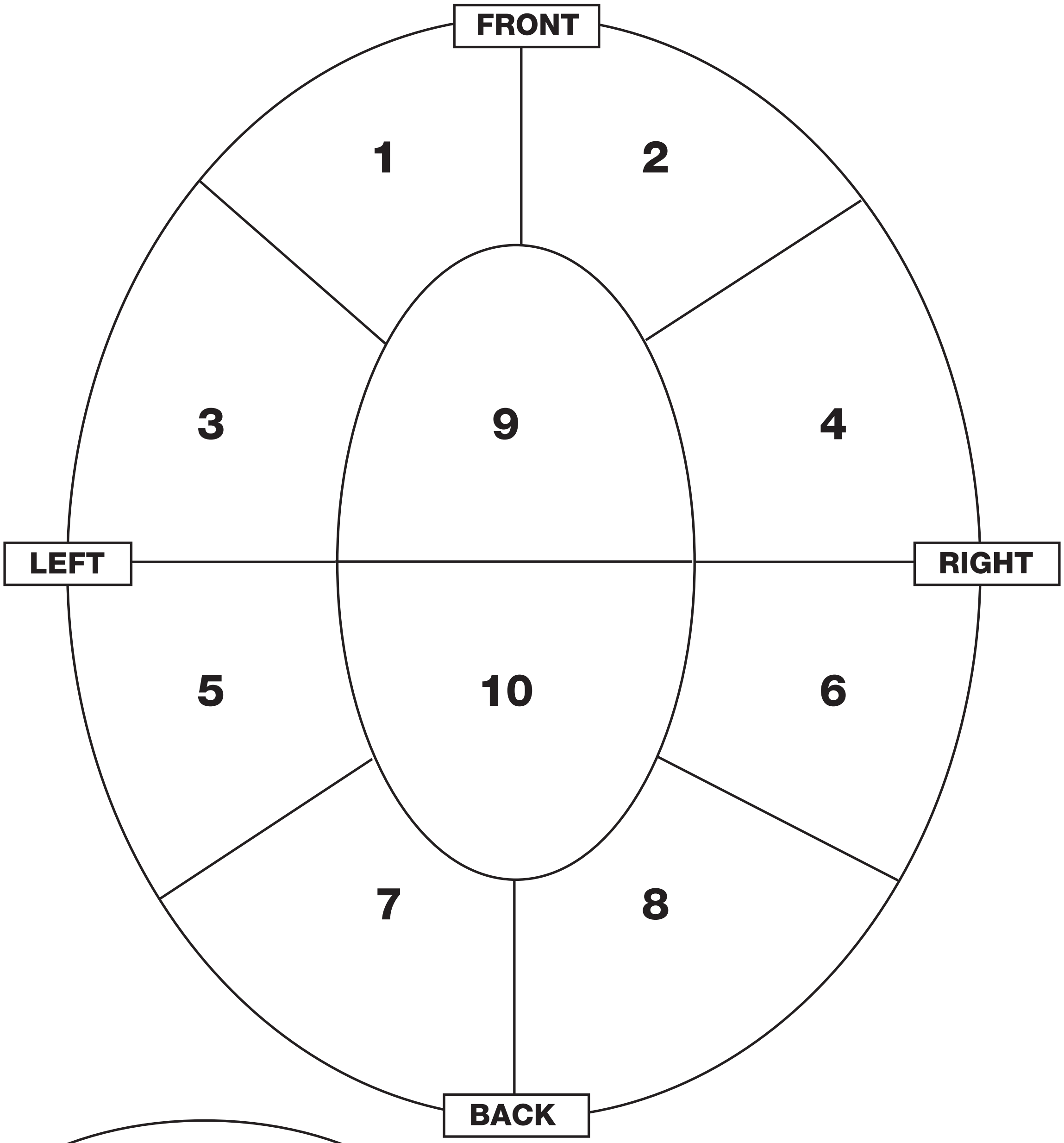
4. ____________________

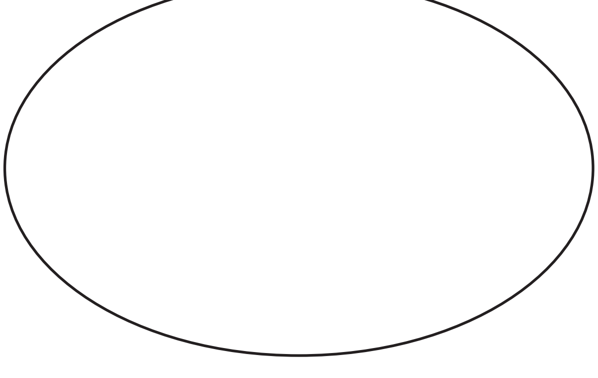
Name ______________________________

Period __________ Date __________________

EEG COLOR MAP

Elapsed time after stimulus ____________





Left side view of the brain

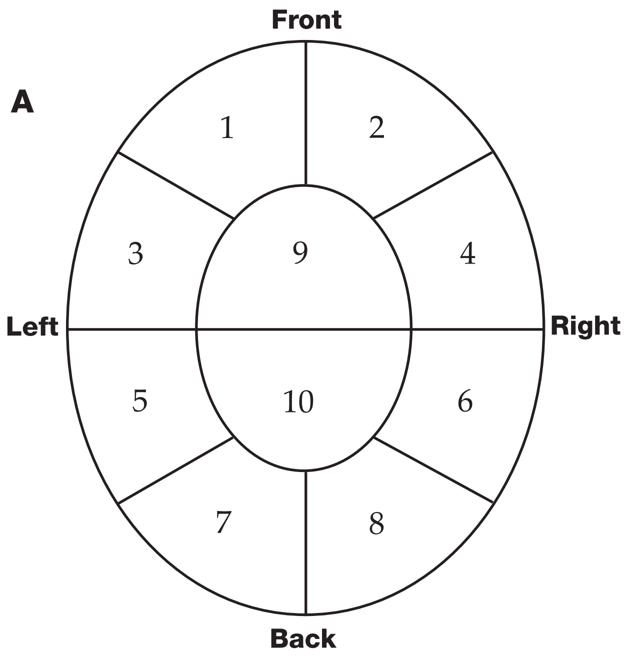
COLOR KEY	21 to 30	Red	☐
	16 to 20	Orange	☐
	11 to 15	Yellow	☐
	6 to 10	Green	☐
	0 to 5	Blue	☐

Name ______________________________

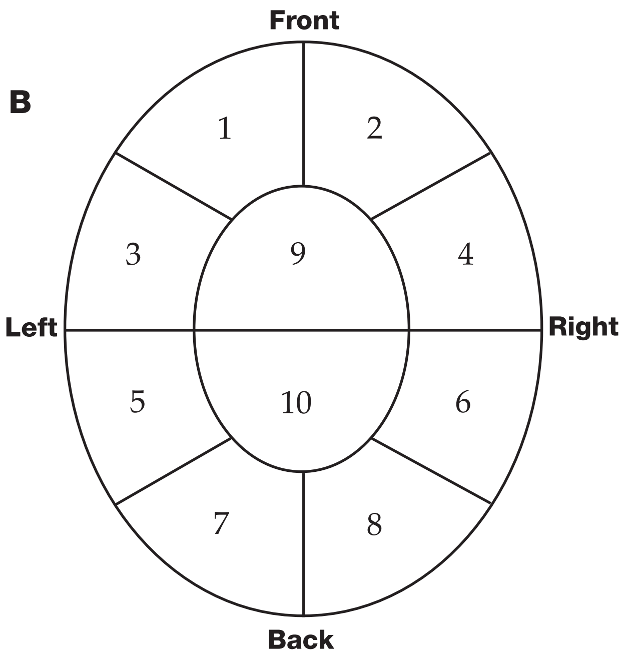
Period __________ Date __________________

EEG BRAIN-ACTIVITY MAPS

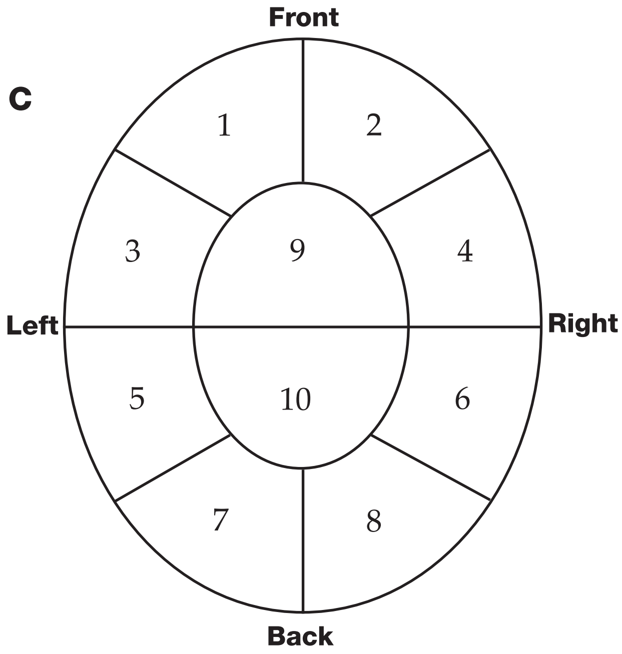
A



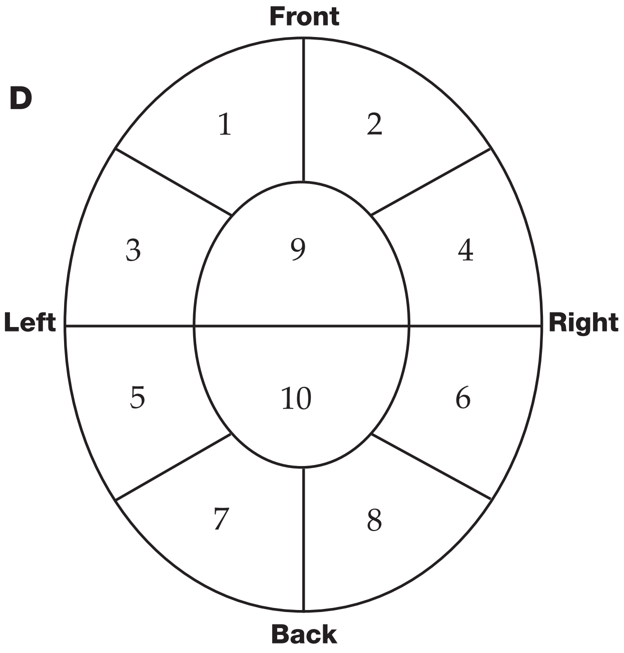
B



C



D



COLOR KEY	**21 to 30**	**Red**	☐
	16 to 20	**Orange**	☐
	11 to 15	**Yellow**	☐
	6 to 10	**Green**	☐
	0 to 5	**Blue**	☐

Name ____________________

Period __________ Date ______________

IMAGING-TECHNIQUE QUESTIONS

1. Which techniques for brain scans are used to study what the brain looks like?

2. Which techniques for brain scans are used to study brain-activity levels?

3. Which technique would you use if you wanted to get a rough idea of the structure of the brain and you didn't have much money? Why?

4. Which technique would you use if you wanted to get a detailed picture of exactly what the cerebellum looks like? Why?

5. Which technique would you use if you wanted to look at brain activity on the surface of the cerebrum? Why?

6. Which technique would you use if you wanted to study brain-stem activity? Why?

Name ____________________

Period __________ Date ____________

FOCUS QUESTIONS ON *THE STORM WITHIN*

1. What symptoms did the boy in the video have? How did his disorder affect his life?

2. What did it feel like to the boy when he had a seizure?

3. What procedure did the doctors recommend to provide some relief for the boy?

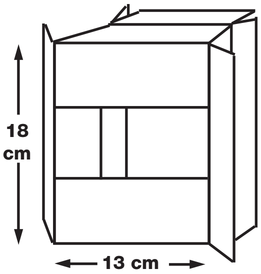
4. How many surgeries did the boy have?

5. What challenges did the boy face after the surgeries?

6. Is it easier for a child or an adult to recover from this kind of procedure? Why?

7. How did the doctors use MRIs in their work?

DEPTH-PERCEPTION THEATER

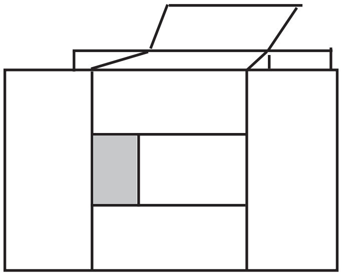


Materials

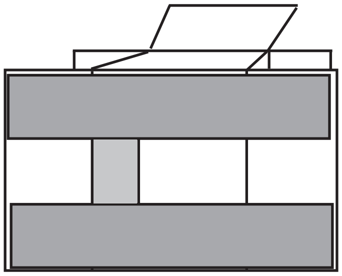
1 Cardboard box
2 Pieces of cardboard
4 Binder clips

Assembly

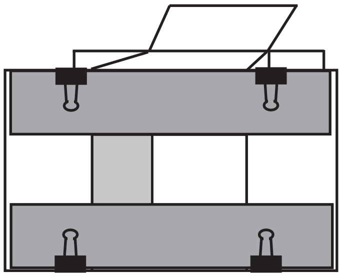
1. On one end of the box, fold the two small flaps in and the two large flaps out.



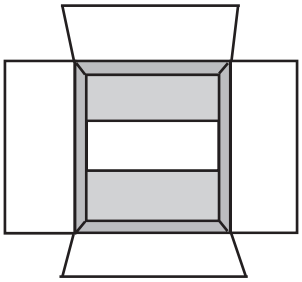
2. Position the two pieces of cardboard as illustrated.



3. Hold the cardboard pieces in place with four binder clips in the locations indicated. Flip the clip handles so they lie flat against the cardboard.



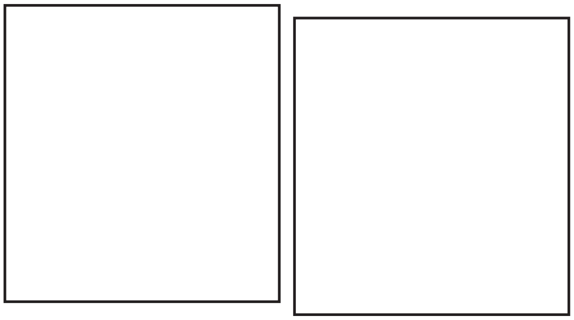
4. Turn the finished theater around and look into the box and out the large window in the back.



MAKING THE STRAW SUPPORTS

Materials

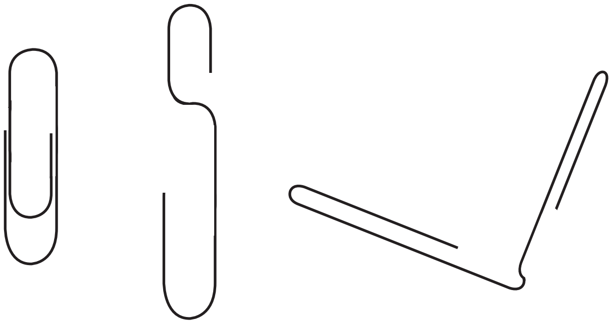
1 3 × 5 index card
1 Jumbo paper clip
1 Regular paper clip
1 Jumbo straw
1 Slim straw
- Scissors
- Tape



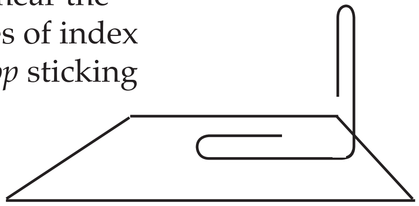
Assembly

1. Cut an index card in half.

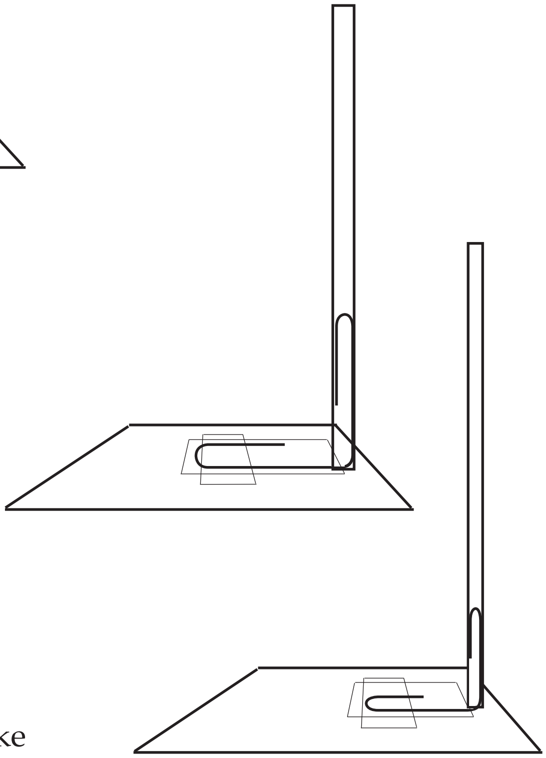
2. Reshape a *jumbo* paper clip so that the two loops form a right angle.



3. Position the paper clip near the edge of one of the pieces of index card with the *smaller loop* sticking up.



4. Tape the paper clip to the card.



5. Cut the jumbo straw to the same length as the thin straw. Slide the straw over the paper clip.

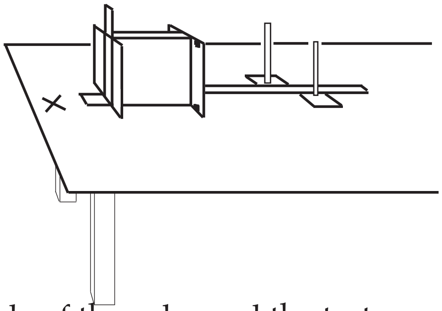
6. Repeat the process using a *regular* paper clip to make a support for the thin straw.

Name ________________________________

Period ____________ Date ________________

INVESTIGATING DEPTH PERCEPTION

Setup for the investigation



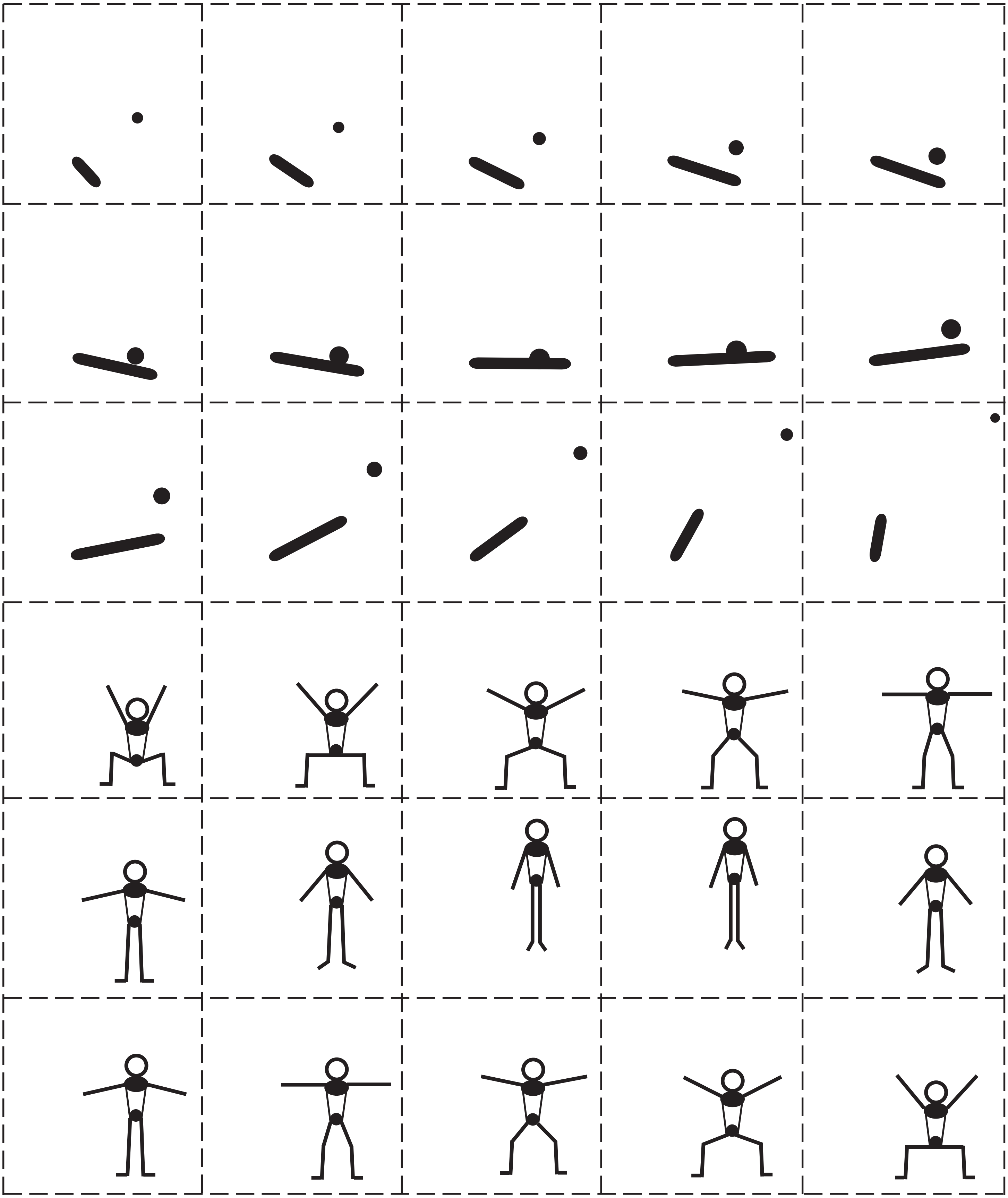
1. Set up the depth-perception theater about 10 cm back from the edge of your desk. Tape it there.
2. Center your ruler behind the window with the 0 end right up against the back of the window. Tape it there.
3. Place your marker straw (the big straw) on the left side of the ruler and the test straw (the thin straw) on the right side of the ruler.

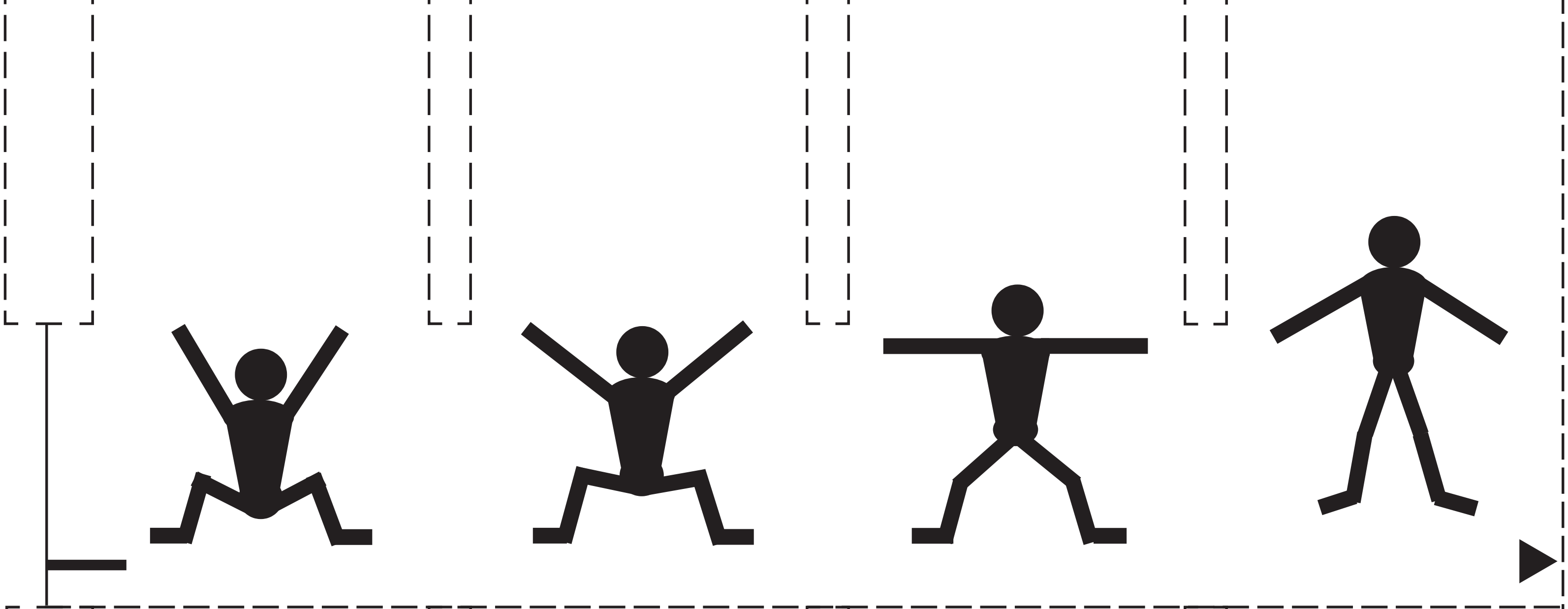
Investigating depth perception

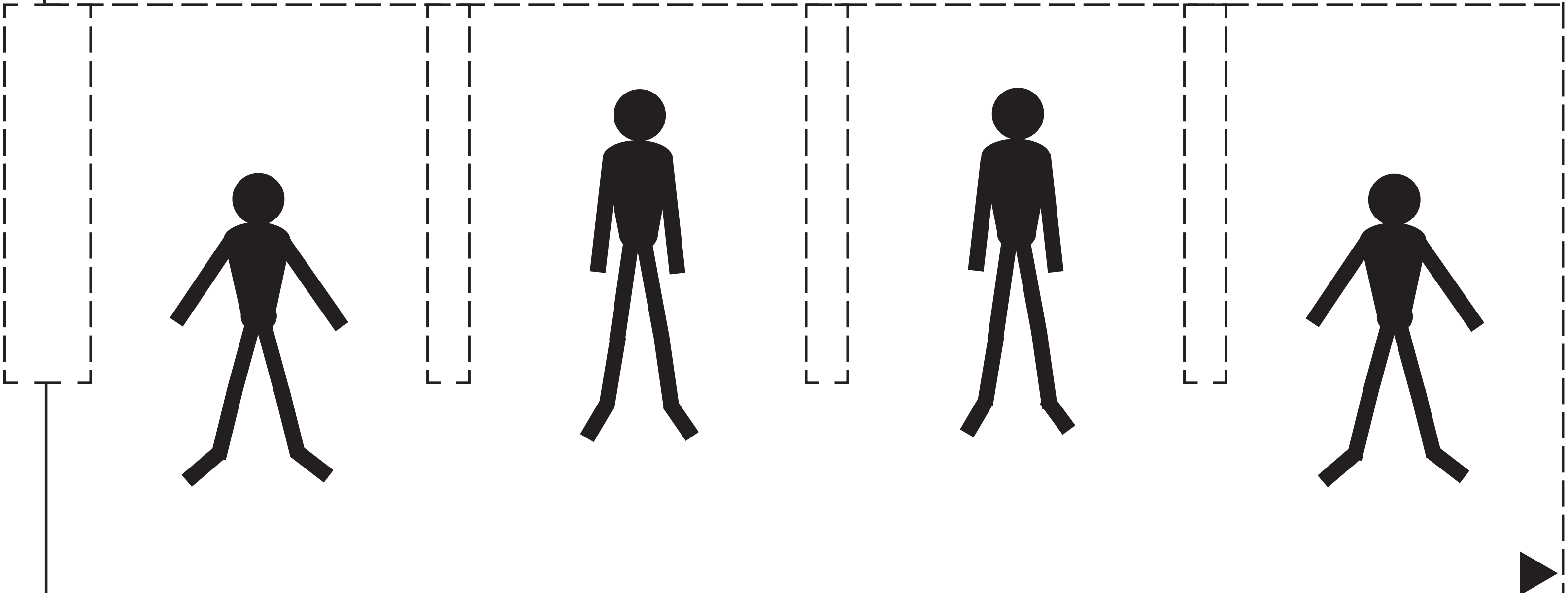
1. The subject puts his or her chin on the edge of the desk (at the X) and looks through the window. (It may be necessary to get down on the floor.)
2. The subject closes his or her eyes while the examiner moves the marker straw to some position along the ruler, between 0 and 30 cm.
3. While looking through the window, the subject reaches around and moves the test straw until it is the same distance from the subject as the marker straw.
4. Repeat this process three times with the subject using **two eyes**, and then three more times with the subject using **only one eye**.
5. After each trial check the difference in distance between the two straws. Record the difference in distance in the appropriate columns below.

	One eye **Distance between the two straws**	**Two eyes** **Distance between the two straws**
Trial 1		
Trial 2		
Trial 3		
Average		

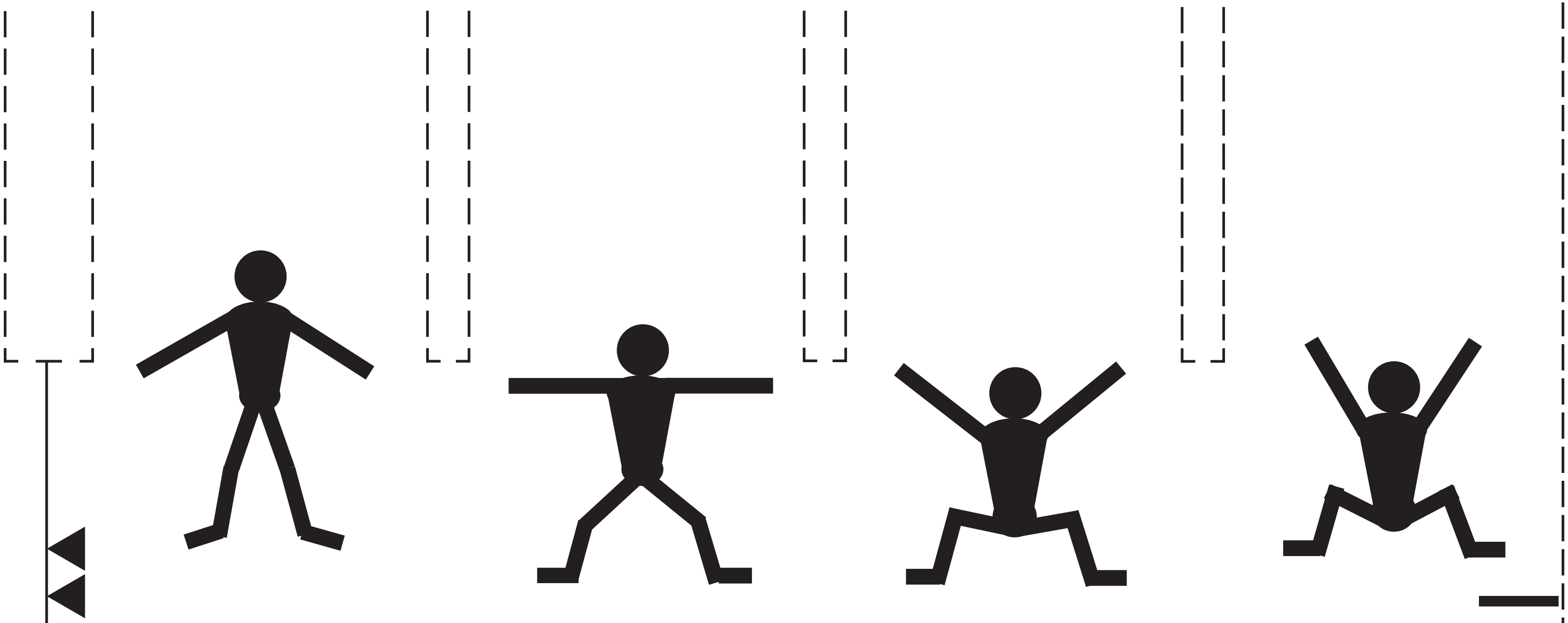
FLIP-BOOK IMAGES

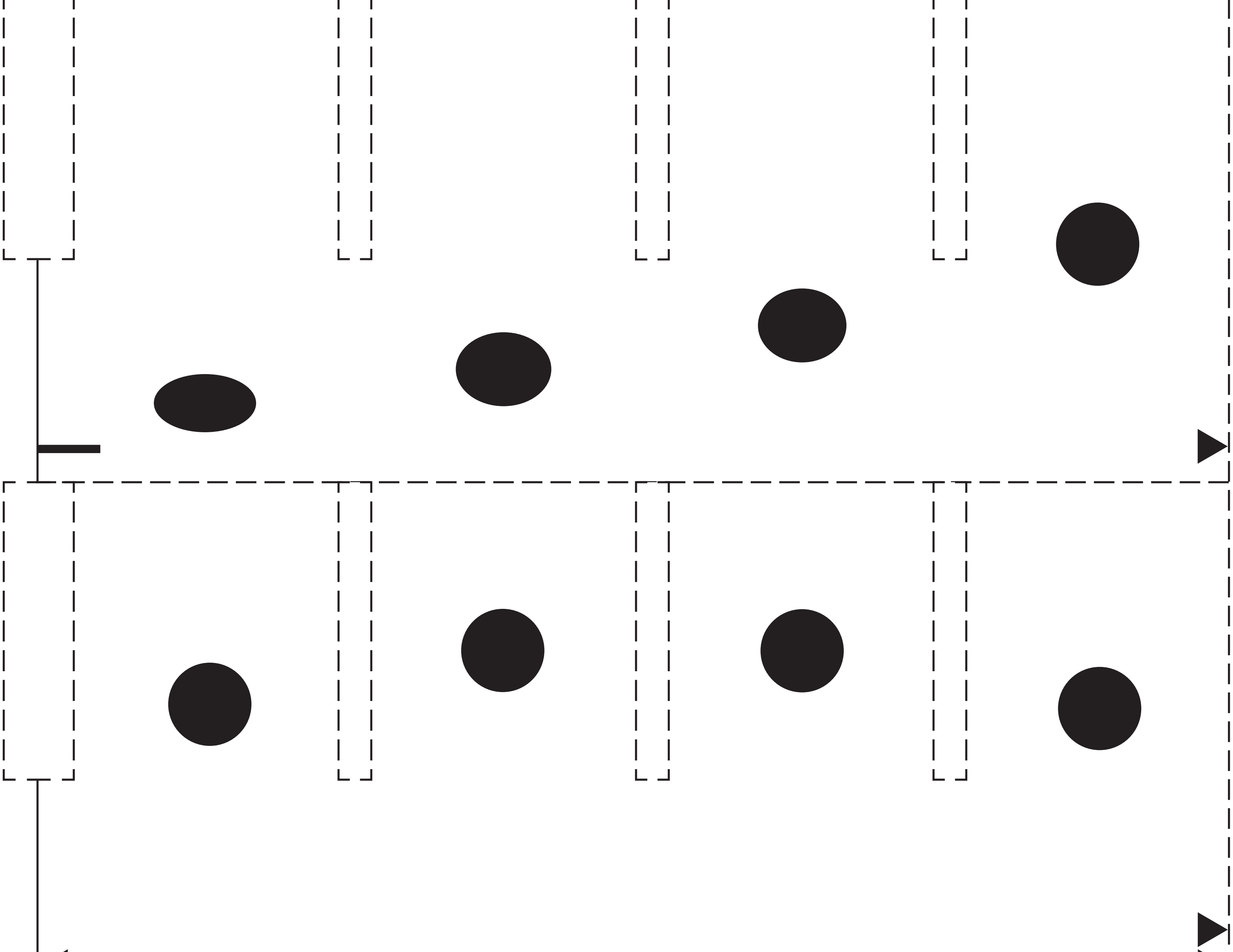




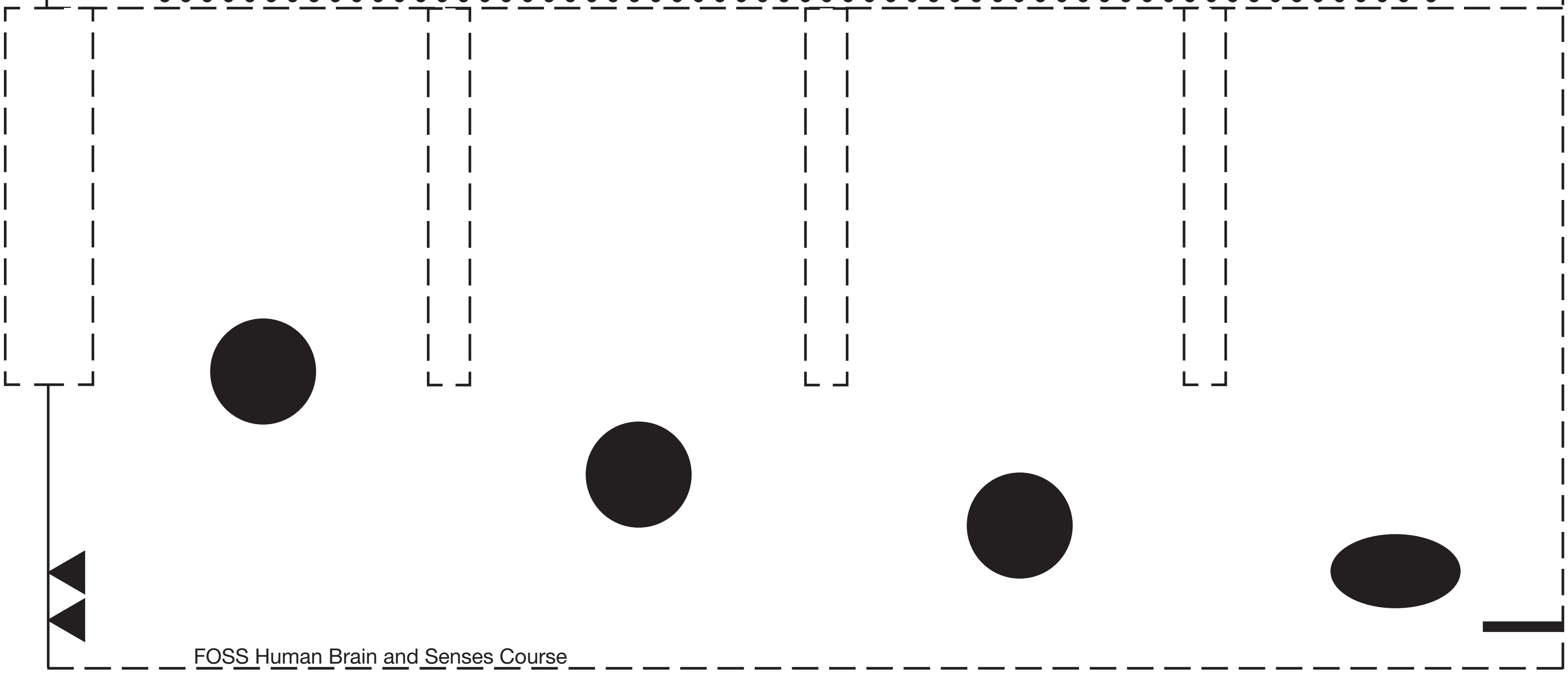


ZOETROPE IMAGES A

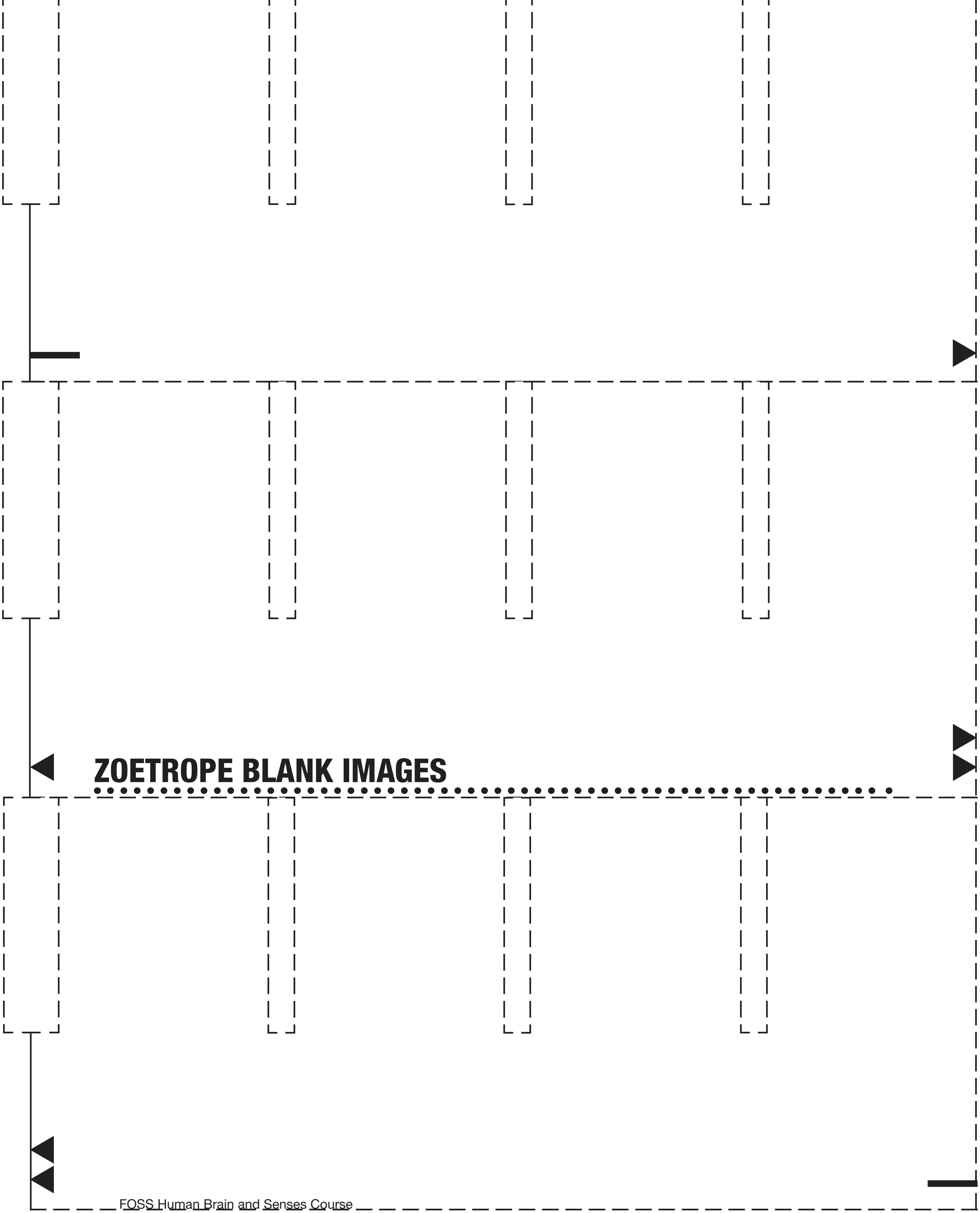




ZOETROPE IMAGES B



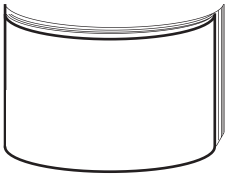
ZOETROPE BLANK IMAGES



FLIP-BOOK TIPS

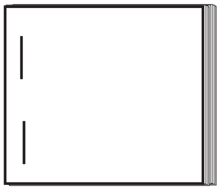
1. For the best flipping action, try to get the right-hand edge of the stack ever-so-slightly tapered, so that page 2 sticks out just a little past page 1, page 3 just a little past 2, and so on through the stack.

2. To do this, square up the right edge of the stack. Grip the right and left sides of the stack between your thumbs and index fingers. Bend the edges of the stack down. While the stack is bent, let go with your left hand, continuing to hold tightly on to the right side. The right side of the stack will be slightly tapered.



3. Another trick to improve the flip action is to put a square of index card or file folder on the bottom of the stack for a stiffer backing.

4. Staple the little book in two places on the left side.



CONSTRUCTING A ZOETROPE

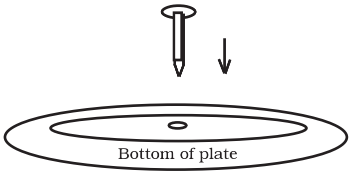
Materials for the zoetrope construction

1	Paper plate	•	Scissors
1	Paper fastener	•	Tape
1	Thin straw	•	Image strip
1	Paper clip		

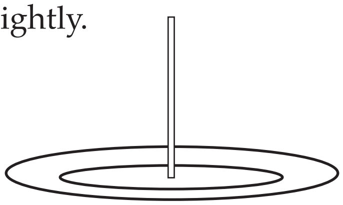
Building the zoetrope turntable

1. Open a paper clip so one wire is sticking out.

2. Balance a paper plate on the paper clip to find the exact center.
3. CAREFULLY poke a hole through the center of the paper plate.
4. Insert a paper fastener through the hole from the bottom.

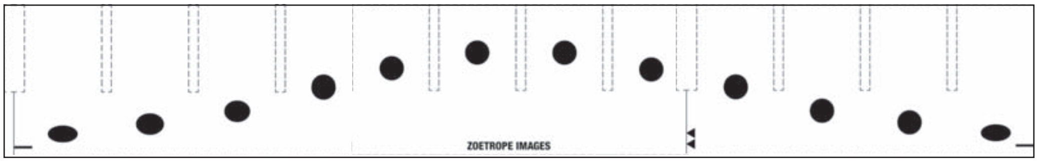


5. Turn the plate over and open the arms of the paper fastener slightly.
6. Slide a thin straw over the two arms of the paper fastener.



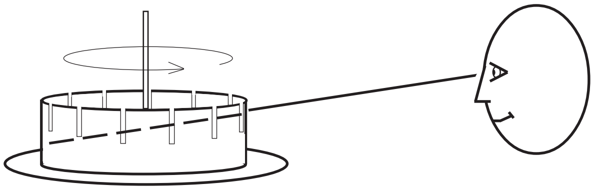
Building the image strip

1. Cut the *Zoetrope Images A* or *B* sheet on the dashed lines to make three strips of images.
2. Cut out and discard the little rectangles outlined with dashed lines.



3. Tape the three strips together, matching the arrow points.
4. Tape the long strip into a loop with the images on the inside.

Using the zoetrope



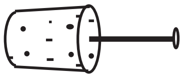
1. Center the image loop on the plate.
2. Tape it in a couple of places.
3. Spin the system and look through the slots.

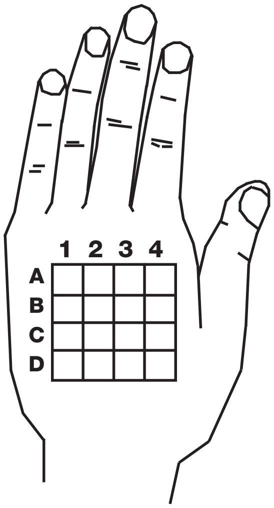
PRESSURE TEST

Overview of the pressure test

1. You will test the pressure sensitivity of your partner's hand in 16 different locations.
2. The test locations will be the centers of the 16 squares in a 4 cm × 4 cm grid drawn on the back of his or her hand with a ballpoint pen.
3. Pressure will be applied with the head of a tiny nail.

Setup for the investigation





1. Work with a partner.
2. Push the sharp end of a nail about 1 cm into a small cork.
3. Draw 4 cm × 4 cm grids in the middle of the back of each other's hands. Label the grid 1–4 across the top and A–D along the side.
4. Open your *Lab Notebook* to page 83, *Recording Pressure Data*.
5. Each student will have a turn being the subject and the tester.

Investigating pressure

1. The subject puts his or her hand flat on the desk.
2. The subject closes his or her eyes or looks away.
3. The tester touches the head of the nail to the center of each square, one by one, starting with square 1-A.
4. The subject calls out each time he or she feels the touch.
5. The tester records a Y in the appropriate grid square on the subject's data sheet each time he or she responds accurately to being touched. The tester records an N in the appropriate grid square each time the subject fails to respond to being touched.
6. When all 16 of the grid squares have been tested and the data recorded, the partners swap roles and repeat the process.

	1	2	3	4
A	**Y**	**Y**	**Y**	
B				
C				
D				

Name ______________________________

Period __________ Date __________________

RECORDING PRESSURE DATA

	1	2	3	4
A				
B				
C				
D				

COLD TEST

Overview of the cold test

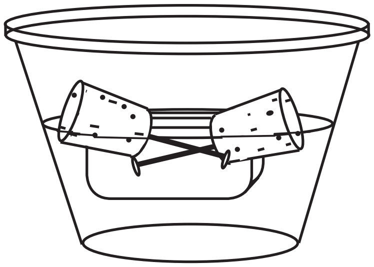
1. You will test the cold sensitivity of your partner’s hand in 16 different locations.

2. The test locations will be the centers of the 16 squares in a 4 cm × 4 cm grid drawn on the back of his or her hand.

3. You will test each square twice in rapid succession—once with an ice-cold nail head and once with a room-temperature nail head.

4. Sometimes the cold nail head will be applied first, and sometimes it will be second. The tester will say something like “Is this the cold one... or is *this* the cold one?”

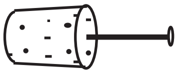
5. The tester will record Y or N to indicate whether the subject could perceive cold in that grid square.



Setup for the investigation

1. Work with a partner.

2. Push the sharp end of four nails about 1 cm into four small corks. Put three of the nails in a cup of ice water; keep one dry.



3. Open your *Lab Notebook* to page 89, *Data—Pressure, Cold, and Pain.*

Investigating cold

1. The subject puts his or her hand flat on the desk.

2. The subject closes his or her eyes or looks away.

3. The tester removes one of the nails from the ice water and dries it on a paper towel. The tester then touches the first grid square with the heads of the two nail heads, one at a time—the cold one and the room-temperature one. The order should not always be the same. Return the cold probe to the ice water after using it, and select and dry a new cold probe for testing the next grid square.

	1	2	3	4
A	**Y**	**Y**	**Y**	
B				
C				
D				

4. The subject reports whether the first or second probe felt cold.

5. The tester records a Y in the subject’s book if he or she reported correctly, and an N if the subject was wrong.

6. When all 16 of the grid squares have been tested and the data recorded, the partners swap roles and repeat the process.

PAIN TEST

Overview of the pain test

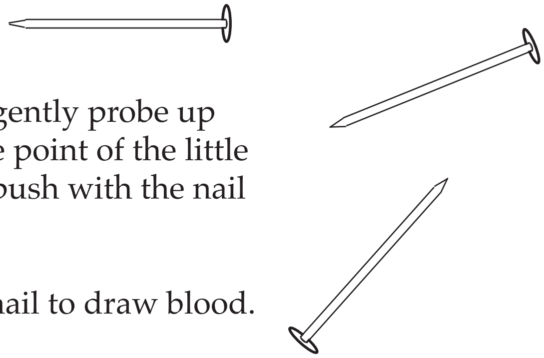
1. You will test the pain sensitivity of your own hand in 16 different locations.

2. The test locations will be the centers of the 16 squares in the 4 cm × 4 cm grid drawn on the back of your hand.

3. Each square will be tested once with the point of the little nail.

4. Record Y or N to indicate whether or not you sensed pain in each grid square.

Setup for the investigation



1. To familiarize yourself with the feeling of pain, gently probe up and down the back of your index finger with the point of the little nail. This will help you figure out how hard to push with the nail when you test the back of your hand.

2. Remember: Never push hard enough with the nail to draw blood.

3. Record your own data on the *Data—Pressure, Cold, and Pain* sheet.

Investigating pain

1. Put your hand flat on the desk.

2. Put the point of the nail in the center of the first grid square and press with modest force.

3. If you feel a sharp little pain, record a Y in the corresponding grid square on the record sheet; if you do not feel a sharp little stab of pain, record an N on the sheet.

Name ____________________

Period __________ Date __________

DATA—PRESSURE, COLD, AND PAIN

	1	2	3	4
A				
B				
C				
D				

Sensitivity to pressure

	1	2	3	4
A				
B				
C				
D				

Sensitivity to cold

	1	2	3	4
A				
B				
C				
D				

Sensitivity to pain

1. Is there one kind of receptor on the back of your hand that senses pressure, cold, and pain? What is your evidence?

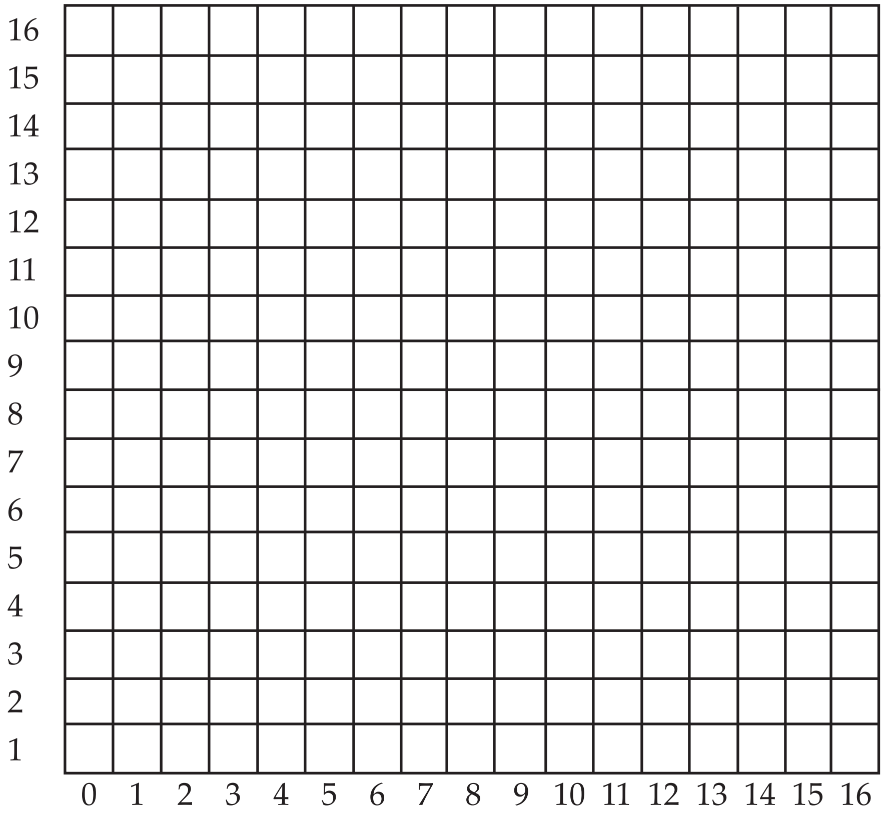
2. What sensation is your hand most sensitive to? What is your evidence?

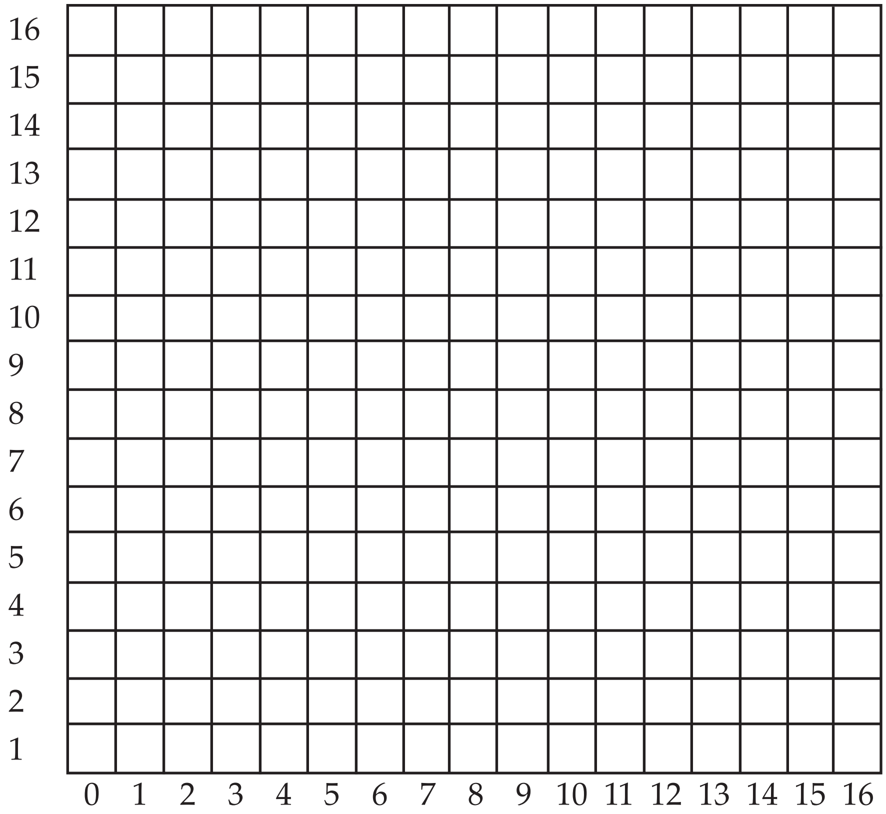
3. If there are different receptors for the different touch sensations, what kind of sensors do you think might be most numerous? What kind might be least numerous? What is your evidence?

Name ____________________

Period __________ Date ____________

HISTOGRAMS





Name ______________________________

Period __________ Date ________________

TOUCH-RECEPTOR QUESTIONS

Part 1

1. Are there any grid squares that have no pressure receptors in the center? __________

   No cold receptors? ________________ No pain receptors? ________________

2. What is the average number of grid squares that have

   - a pressure receptor in the center? ____________________
   - a cold receptor in the center? ____________________
   - a pain receptor in the center? ____________________

3. What is the most common number of grid squares with pain receptors in the center?

4. Does anyone in our class have pain receptors in all of his or her squares?

Part 2

5. Do any of the squares have all three types of receptors in the center?

6. Are there differences in pain or cold receptors between girls and boys?

Part 3

7. What is the average distance between pain receptors?

8. Are there only three types of sensation (pressure, cold, and pain) on our hands?

9. Are there more touch receptors on bigger hands?

10. How does the distribution of receptors on the hand compare with the distribution of receptors on other parts of the body?

PRESSURE-RECEPTOR SIZE TEST

Overview of the pressure-receptor size test

1. You will test your partner's ability to identify two probes applied at the same time.
2. You will test random locations on the back of his or her hand, sometimes pressing with two probes and sometimes pressing with only one probe.
3. The tester will *record each time the pressure is applied with two probes*—no recording is done when pressure is applied with only one probe.
4. The tester records a Y if the subject correctly identifies two probes, and an N if the subject identifies two probes as one. Again, no recording when only one probe is used.
5. The investigation continues until the tester has collected ten pieces of data.
6. Each person will be tested twice, once with the two probes set 1 cm apart, and once with the two probes set 4 cm apart.

Setup for the investigation

1. Reshape a jumbo paper clip into a double probe. Adjust the distance between the two probes to 1 cm.

2. The tester has his or her partner's *Lab Notebook* open to page 97, *Feeling Two Points*.

Investigating pressure-receptor size

1. The subject puts one hand flat on the desk, eyes closed.

2. The tester sets the probe distance to 1 cm.

3. The tester presses the probe onto the back of the subject's hand with moderately firm pressure for a second. The tester can press with either one probe wire or both.

4. The subject reports that he or she sensed one or two probes.

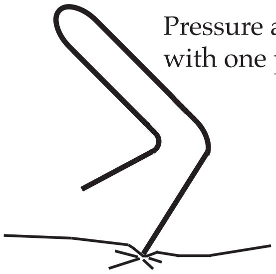
5. If the pressure was applied with *two probes*, the tester records a Y if the subject identified the two probes correctly, or an N if the subject identified the two probes as one.

6. If the pressure was applied with one probe, nothing is recorded.

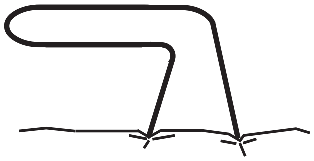
7. Continue until ten pieces of data have been recorded.

8. Reset the probe distance to 4 cm and collect ten more pieces of data.

9. Swap roles with your partner and repeat the investigation.



Pressure applied
with one probe



Pressure applied
with two probes

Name ______________________________

Period ____________ Date ________________

FEELING TWO POINTS

Record subject responses for ten tests with two probes.
Record a Y (yes) for a correct response and an N (no) for a wrong response.

Back of hand

Two probes at 1 cm

1	2	3	4	5	6	7	8	9	10

Total number of correct responses __________

Back of hand

Two probes at 4 cm

1	2	3	4	5	6	7	8	9	10

Total number of correct responses __________

Fingertip

Two probes at 1 cm

1	2	3	4	5	6	7	8	9	10

Total number of correct responses __________

Fingertip

Two probes at 4 cm

1	2	3	4	5	6	7	8	9	10

Total number of correct responses __________

Upper arm

Two probes at 1 cm

1	2	3	4	5	6	7	8	9	10

Total number of correct responses __________

Upper arm

Two probes at 4 cm

1	2	3	4	5	6	7	8	9	10

Total number of correct responses __________

Back of neck

Two probes at 1 cm

1	2	3	4	5	6	7	8	9	10

Total number of correct responses __________

Back of neck

Two probes at 4 cm

1	2	3	4	5	6	7	8	9	10

Total number of correct responses __________

Name ______________________________

Period __________ Date __________________

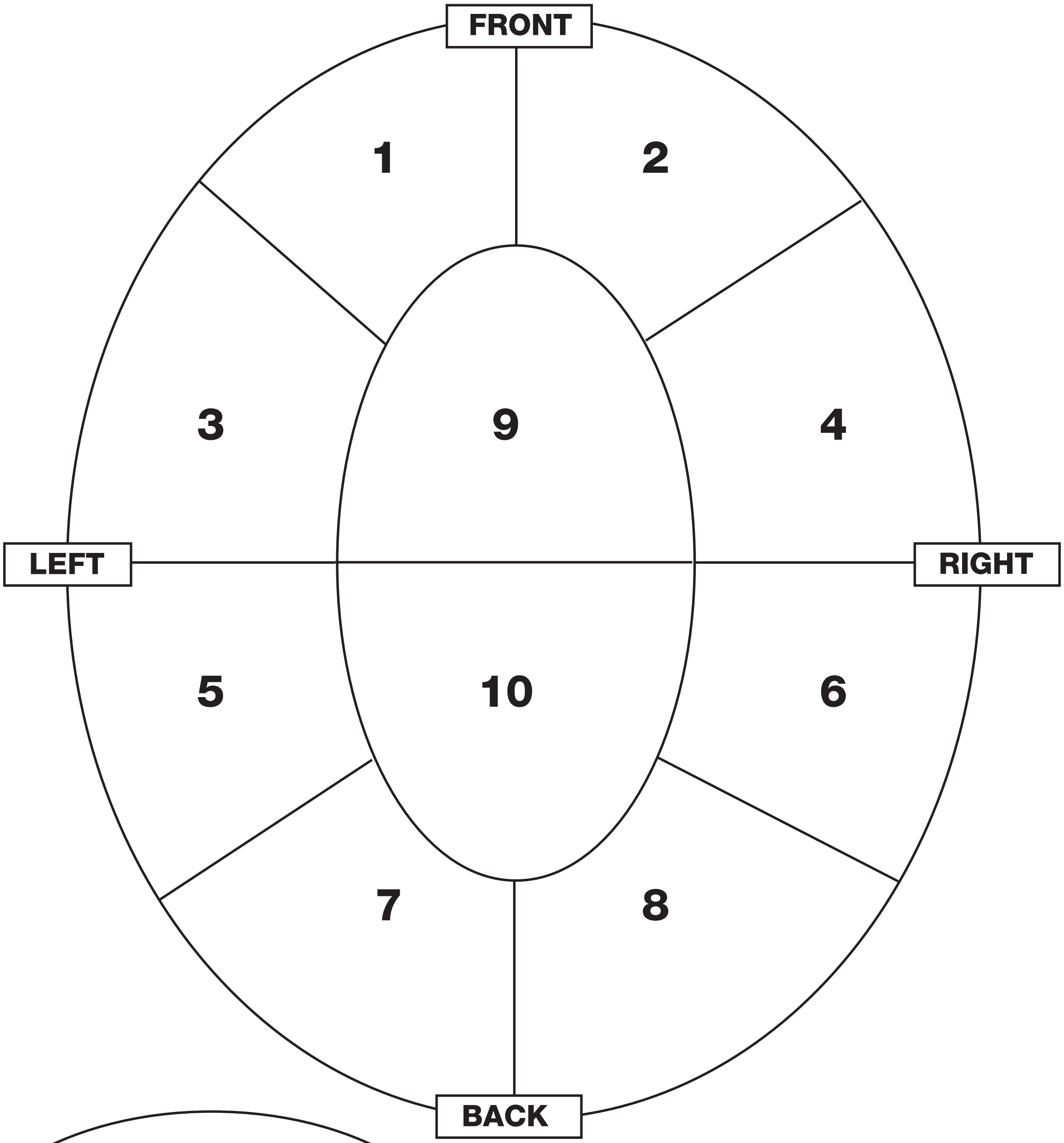
GRAPH PAPER

Name ______________________________

Period __________ Date _________________

EEG COLOR MAP

Elapsed time after stimulus ____________



Left side view of the brain

COLOR KEY	**21 to 30**	**Red**	☐
	16 to 20	**Orange**	☐
	11 to 15	**Yellow**	☐
	6 to 10	**Green**	☐
	0 to 5	**Blue**	☐

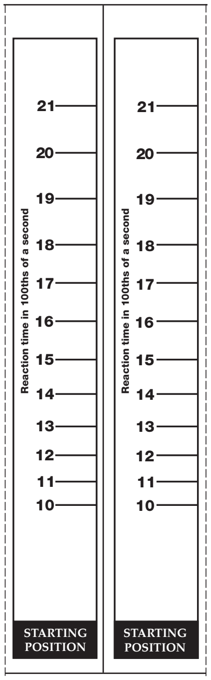
Name ____________________

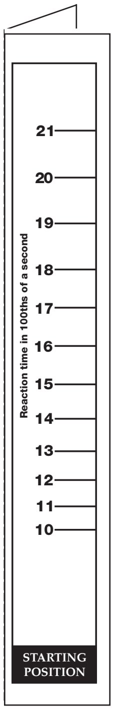
Period __________ Date __________

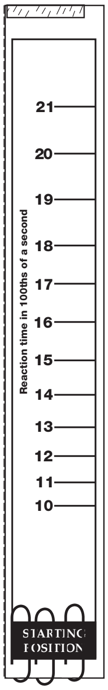
MAKING AND USING THE REACTION TIMER

Making a reaction timer

1. Each person makes a reaction timer.
2. Cut on the central dashed line to remove one reaction timer from page 105. Trim on the other dashed line.
3. Fold the reaction timer in half on the solid line. Tape the top edge together.
4. Attach three paper clips along the bottom edge.





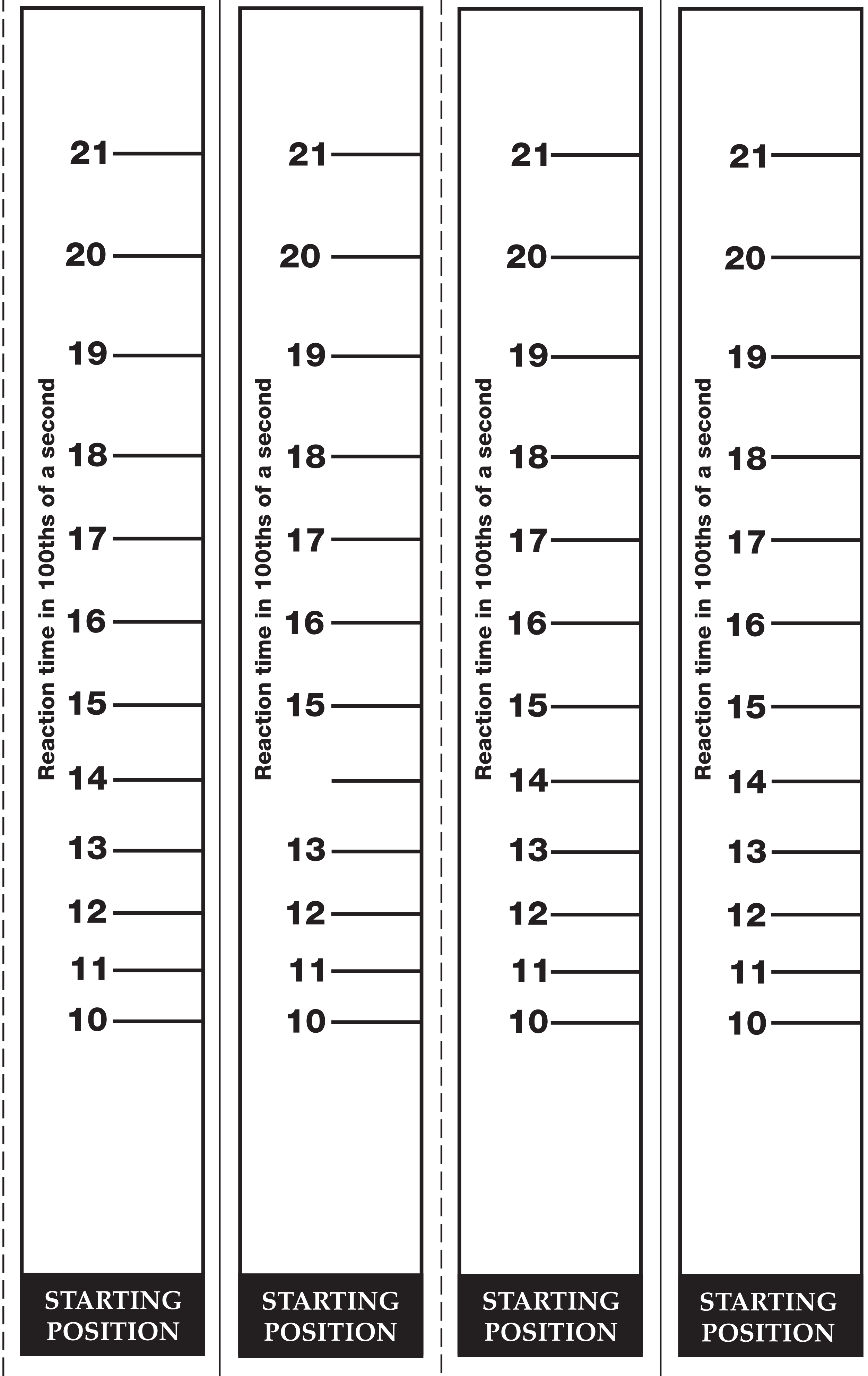


Testing reaction time

1. Your partner will hold your reaction timer in front of you.
2. Hold your hand so that your index finger and thumb are 7 cm apart. Keep your finger and thumb motionless over the starting position on the reaction timer.
3. Your partner will release the reaction timer.
4. As soon as the reaction timer begins to fall, catch it.
5. Write the number 1 on the reaction timer to show where your finger was when you caught it.
6. Repeat four more times. Number the new catch points 2, 3, 4, and 5. If you did not catch the timer on an attempt, write that number at the top of the timer.
7. When you are finished, switch roles.
8. Calculate the reaction times listed below.

My average reaction time	
My group's average reaction time	
Our class's average reaction time	

REACTION TIMER

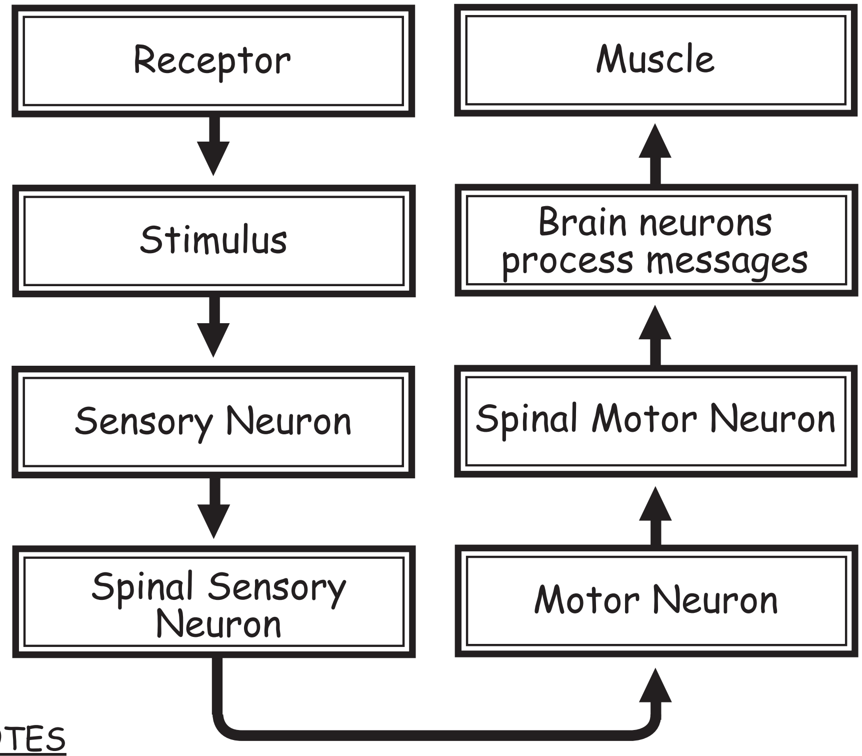


Name ______________________________

Period __________ Date ________________

RESPONSE SHEET—SENDING A MESSAGE

Students in Ms. B's class played the neuron relay game. One student drew a diagram and wrote some notes in her journal to help her remember the sequence of transmission.



NOTES

As you can see in the diagram, the messages to and from the brain must follow a very complicated path. Electrical neurotransformers help the message get from one neuron to the next.

Do you think this student accurately recorded the sequence? Is there anything you would change? Use the facing page if you need more room.

Name ____________________

Period __________ Date __________

MATCHING TONES

Investigating tones

1. Work in a group of four.
2. Two people will have one set of bottles; the other two people will have the other set of bottles.
3. Place the cardboard between the two sets of bottles. Teams shouldn't see each other's bottles.
4. The first pair should play a tone by striking one of the glass bottles with the wooden mallet.
5. The second pair responds by striking one of their bottles to match the tone.
6. If you are the responding team, record how many tries it takes you to match the tone correctly.
7. Repeat five times, then switch roles.

Trial number	Number of tries for success
1	
2	
3	
4	
5	

Questions

1. Were you able to match tones on the first try? Did you get more accurate with practice?

2. How did you determine which bottle to try? What does this tell you about sound?

Name ____________________________

Period __________ Date ______________

SMELL IDENTIFICATION

Investigating smell

1. Remove the cap from a numbered canister. Smell the cotton without touching it.
2. Describe and identify the scent, if you can, by its number.
3. Do this for canisters 1 to 10 only.

Scent number	Description of scent	Identity of scent
1		
2		
3		
4		
5		
6		
7		
8		
9		
10		
11		

Questions

1. After you have recorded your results for canisters 1–10, smell canister 11. This smell matches one of the others. Which one do you think it is? ____________

2. Which scents seemed most similar? Why do you think they are hard to tell apart?

3. Make your own combinations of two scents by holding two containers near your nose. Which two smell the best together, and why?

Name

Period Date

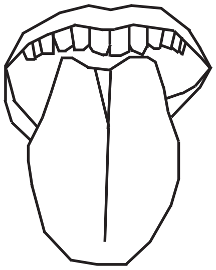
TONGUE MAPPING

Investigating taste

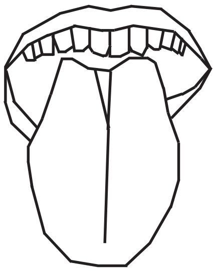
1. Make a map that shows the areas of the tongue that taste four different tastes.

   salt (salt water), **sweet** (sugar water), **sour** (vinegar), **bitter** (tonic water)

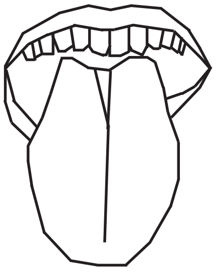
2. Two people work together. One is the tester and the other is the subject.
3. **Tester**: Squirt a tiny amount (a few drops) of one solution into a small paper cup. Don’t let the subject see which solution you selected. Dip one end of a cotton swab in the liquid. Remember which solution you are using.
4. **Subject:** Open your mouth and stick out your tongue. Keep your tongue out until the tester is through with a solution.
5. **Tester:** Touch the swab gently to a small area on the tip, right side, left side, back, and center of the subject’s tongue. Touch only a small area at a time, but test every part.
6. **Tester:** Record what the subject tastes for each area. Draw an X *in the subject’s book* on the part of the tongue where the subject could correctly identify the taste.
7. Have the subject rinse out his or her mouth with water between tests.
8. After you have tested and recorded all four tastes, switch roles.



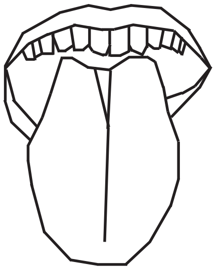
Salt



Sweet



Sour



Bitter

Questions

1. Which areas of the tongue are most sensitive for

   sweet? salt?

   sour? bitter?

2. Are there any parts of the tongue that seem to have no taste receptors?
3. Are there any parts of the tongue that seem to have all four types of receptors?

SENSORY RESEARCH GUIDELINES

Your group is a sensory research team. Together you will find answers to the questions in the four research areas below. Each member of your team will concentrate on one research area.

Reference Materials. You can use reference materials from your *Human Brain and Senses Resources* book, the *FOSS Human Brain and Senses* CD-ROM, your classroom resource center, the library, and the World Wide Web to conduct your research. You should use at least five different sources of information, only one of which may be an encyclopedia.

Research Report. When everyone in your team has completed the research on his or her question, you will work together to prepare a report. Each group member is expected to contribute to the written report.

Classroom Presentation. All members of your team will participate in the class presentation. The purpose of the presentation is to help other people in your class understand what you learned about your research sense. Remember, most of your classmates will be researching a different sense. Think about what helps you to learn best, and try to do the same things in your presentation.

Creative Elements. Consider visual aids like charts or diagrams to show the parts of the body and how the brain receives the information. Your group may want to act out a skit, make a video, or write a rap song about how the sense works. Use your imagination! Do whatever you think would help the other students in your class learn what you found out about your research sense.

RESEARCH AREAS. Each member of the group researches all of the questions in **ONE** area.	
Research Area 1. What is the anatomy of your research sense? What part of your body captures, concentrates, transforms, or directs a stimulus from the environment to a receptor for this sense? Where are the receptors located in this system? What does the body part look like? Explain how these parts work together to capture the stimulus and get it to the receptor. Include a diagram of all the parts.	**Research Area 3.** What is the neural pathway for your research sense? What tools and techniques did scientists use to figure out the pathway? How does the sensory information get to the brain, and what part of the brain processes the information? What is a typical response to the information, and how is the response delivered to the body?
Research Area 2. How does the receptor (or receptors) for your research sense work? What form of energy comes into the receptor from the environment, and what form of energy leaves the receptor? Are all receptors in your research sense the same, or do some respond to different specific environmental stimuli?	**Research Area 4.** What happens when your research sense goes bad? What part or parts of the sensory system can break down? What are the consequences of this sensory disability? What are the most common causes of sensory failure, and what can be done to prevent or correct the damage?
In addition...you should report the one thing that you found out about your research sense that you found most interesting.	

Name ____________________

Period __________ Date __________

SENSORY SUMMARY SHEET A

	Vision	Touch
Anatomy of a Sense • What part of the body receives the stimulus? • Where are the receptors in this system? • How do these parts work together?		
Sensory Receptors • How does the receptor work? • What form of energy comes into the receptors; what form goes out? • Are all receptors the same?		
Neural Pathway • What is the neural pathway for the sense? • How do scientists study the pathway? • What part of the brain processes the information?		
Sensory Breakdown • What are the common causes of sensory failure? • What are the consequences? • How can you prevent or correct the damage?		

Name ____________________

Period __________ Date ____________

SENSORY SUMMARY SHEET B

Hearing	Taste	Smell

ASSESSMENT GENERAL RUBRIC

4	**The answer or task is completed correctly and demonstrates understanding of concepts and connections beyond the mastery level.**
3	***Mastery Level.*** **The question or task is complete and correct. All important information is included in the answer.**
2	**The answer or task has essentially correct elements; there are only minor mistakes, or minor pieces of information left out.**
1	**The answer or task contains related information, but has significant mistakes or misconceptions.**
0	**The student does not respond to the question or task, or gives an answer that has nothing to do with what was asked.**

NOTES

NOTES

NOTES

NOTES

NOTES

NOTES