NUCCA

"Adjusting all the bones of the body with one lever"

	page
X-ray Analysis	1
Lateral	2
Nasium	4
Vertex	41
Biomechanics	49
Resources	57

This workbook was initially written by Dr. Kathy Doyle, D.C. in 1988. It was completely updated in 2005/06. Much new material has been added, including biomechanics and resources.

---Steve Danaher

NUCCA X-Ray Analysis

Nasium Film

Atlas plane line	a. APL. Find attachment points where posterior arch attaches to lateral masses. Mark lower points and draw across. b. Atlas Check Line. Find upper points, draw laterally from each point
Skull division	a. Mark squamosal sutures, and turn of skull (about 2" up). b. Center cephalometer on skull, mark three points c. Pivot cephalometer on lower point, and then work up, 1/4" at a time, marking midpoints of skull width. c. Re-center the cephalometer on top mark, and check your skull division going down. This is the "double pivot check".
Circles	a. Condyle: find articulation with C1 (bow tie), find 3" to 5" circle. b. Axis: (1) Mark outer edge of articulating surface. (2) Find spots just lateral to "para odontoid dips", move down and perpendicular to surface 1 1/2 sixteenths, and make 2nd pair of marks. Measure circle, between 4" and 12".
C2 center	a. Mark center of dens, at base. b. Mark bifurcation point of spinous (upside down Y). Helps to compare size and location with lateral film. c. Draw a line between, and mark midpoint.
Lower angle line	a. Find and mark fixed point, C7 best. Use midpoint of articular processes. b. Draw line from FP, through center of C2, up to APL.
Relate C2 to C1	Center the Relatoscope on C1, using the attachment points and the APL. Compare center of dens to C1, and spinous to C1.
Vertical Axis Line	Drawn up from fixed point, perpendicular to bottom of film.
Plane line	Compare APL to true horizontal plane line, 3/16" = 1" vector +/-.
Height vector factors	a. Plane line, see notes b. at/od: Compare C1 and dens misalignment, see notes. c. c/a: circle difference (round condyle down and axis up). d. angle: Upper and lower angles compared, see notes.

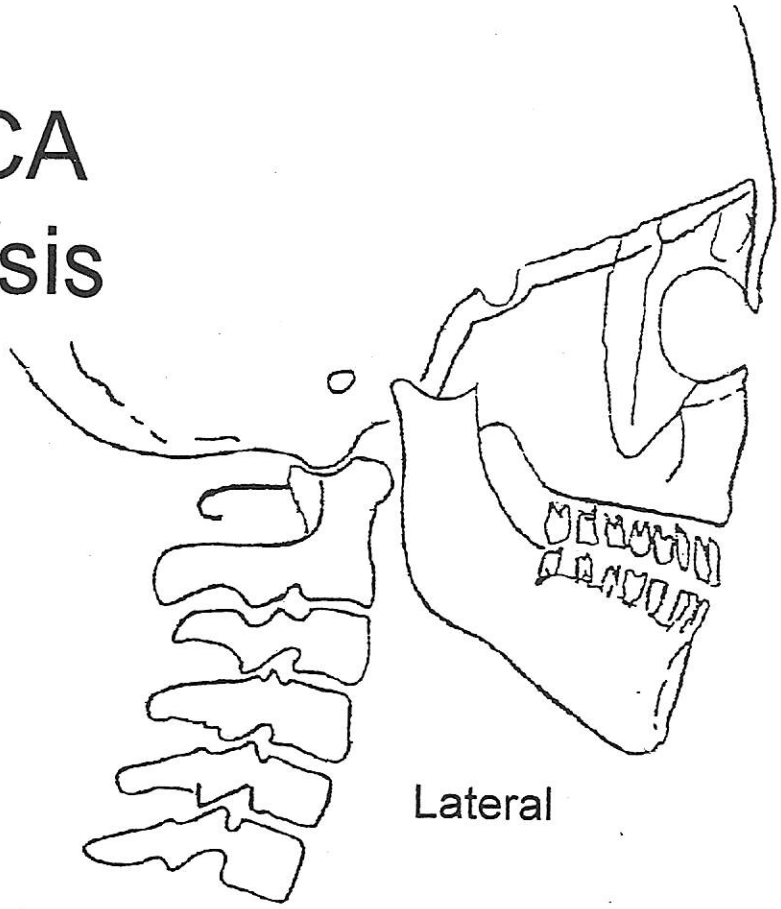
Lateral

Posterior arch attachments	Mark two spots so attachment points show up dense and discrete on nasium.
S line	Draw line through attachment points, compare to chart in book.

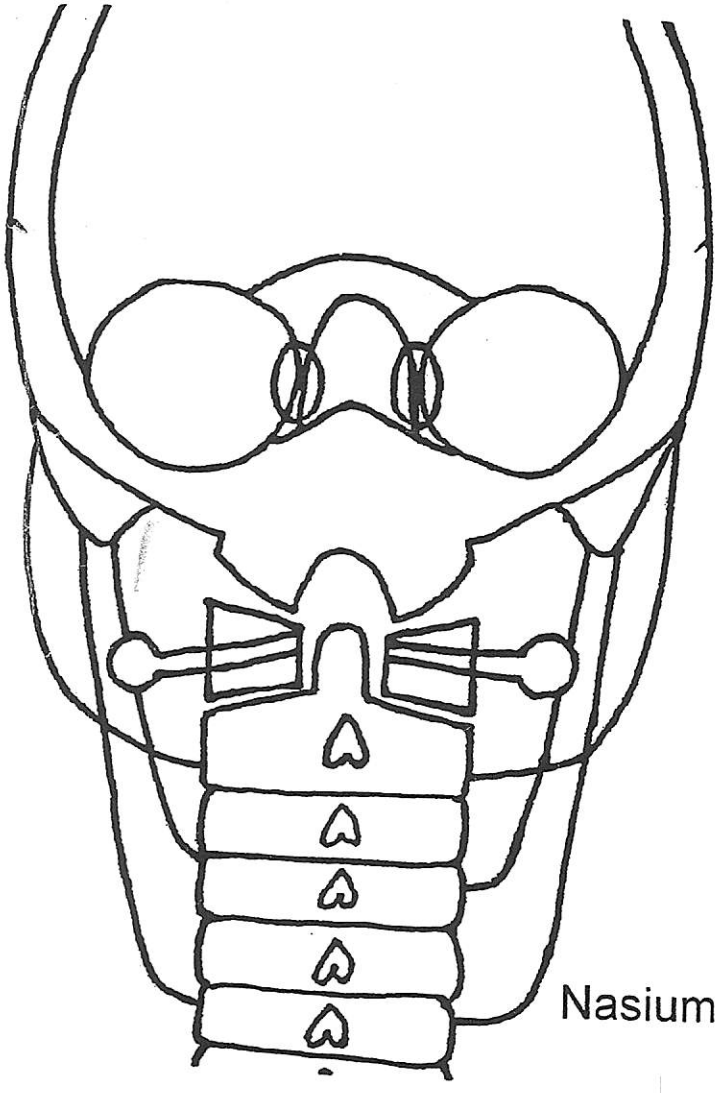
Vertex

Horizontal APL	a. Outline anterior edge of posterior portion of occipital condyles. Draw line across film, though marks on each condyle. b. Alternate: Mark center of atlas foramina, draw line across.
Vertical line	Referenced from edge of film (new method).
Measure angle	Measure on atlas laterality side, degrees off of 90° anterior or posterior.

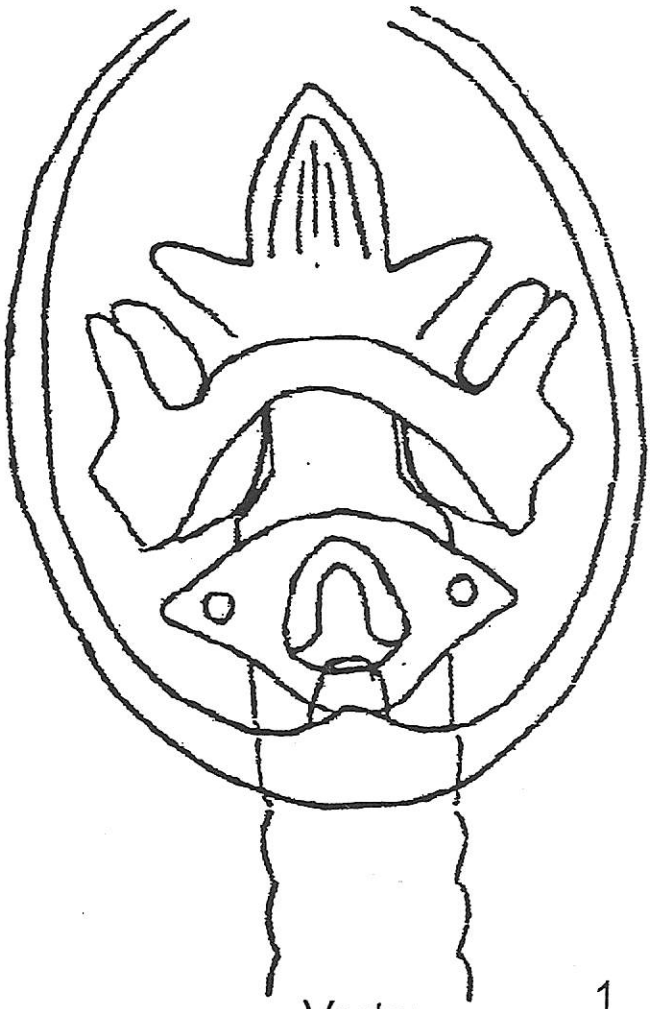
Basic NUCCA X-Ray Analysis



Lateral



Nasium



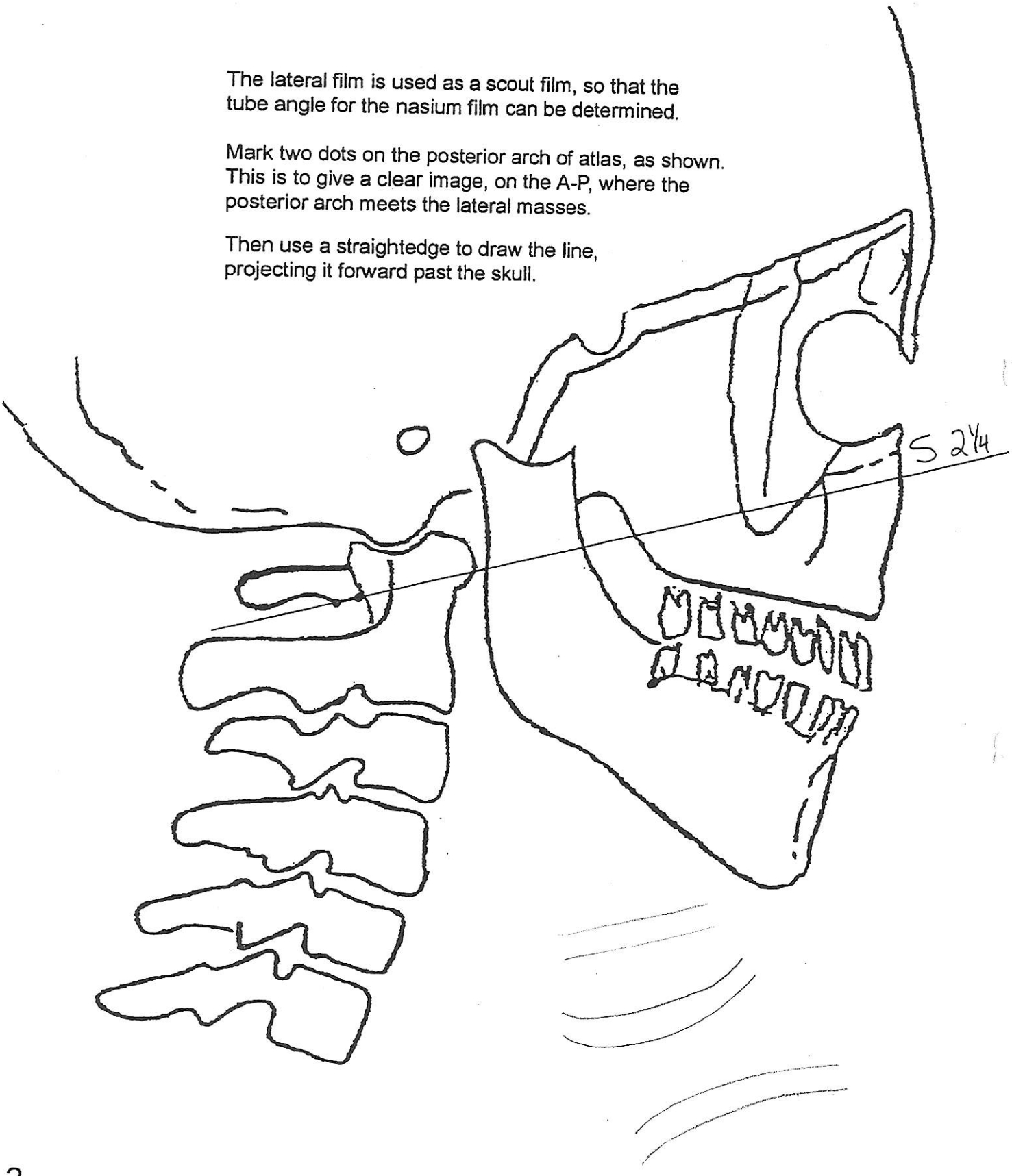
Vertex

The S-Line

The lateral film is used as a scout film, so that the tube angle for the nasium film can be determined.

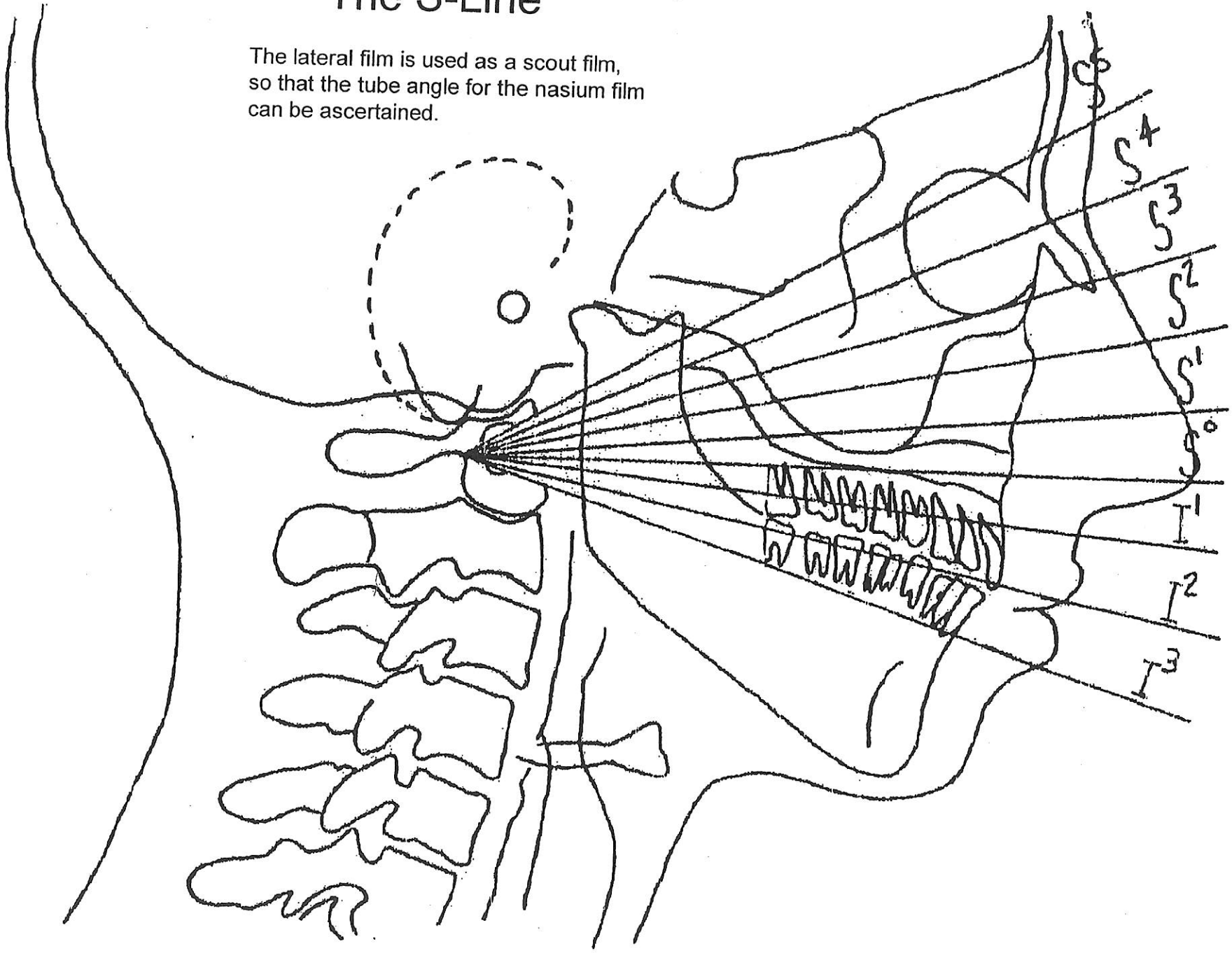
Mark two dots on the posterior arch of atlas, as shown. This is to give a clear image, on the A-P, where the posterior arch meets the lateral masses.

Then use a straightedge to draw the line, projecting it forward past the skull.



The S-Line

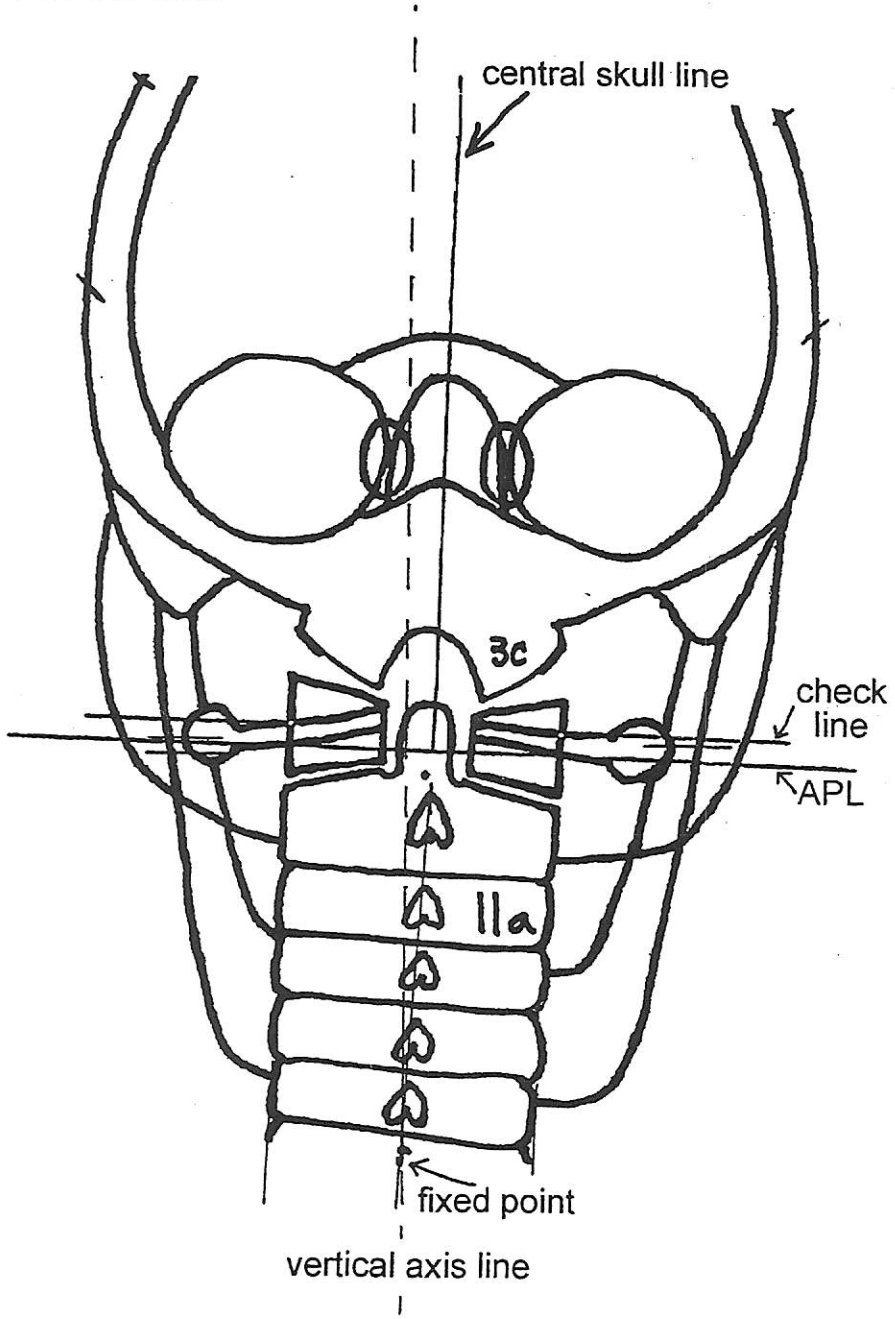
The lateral film is used as a scout film, so that the tube angle for the nasium film can be ascertained.



Nasium

The nasium film determines the height vector. There are a number of steps necessary for measurement and calculation of this vector. Provided the locations can be found on the film, the basic determination of the height vector is fairly easy. The steps are as follows:

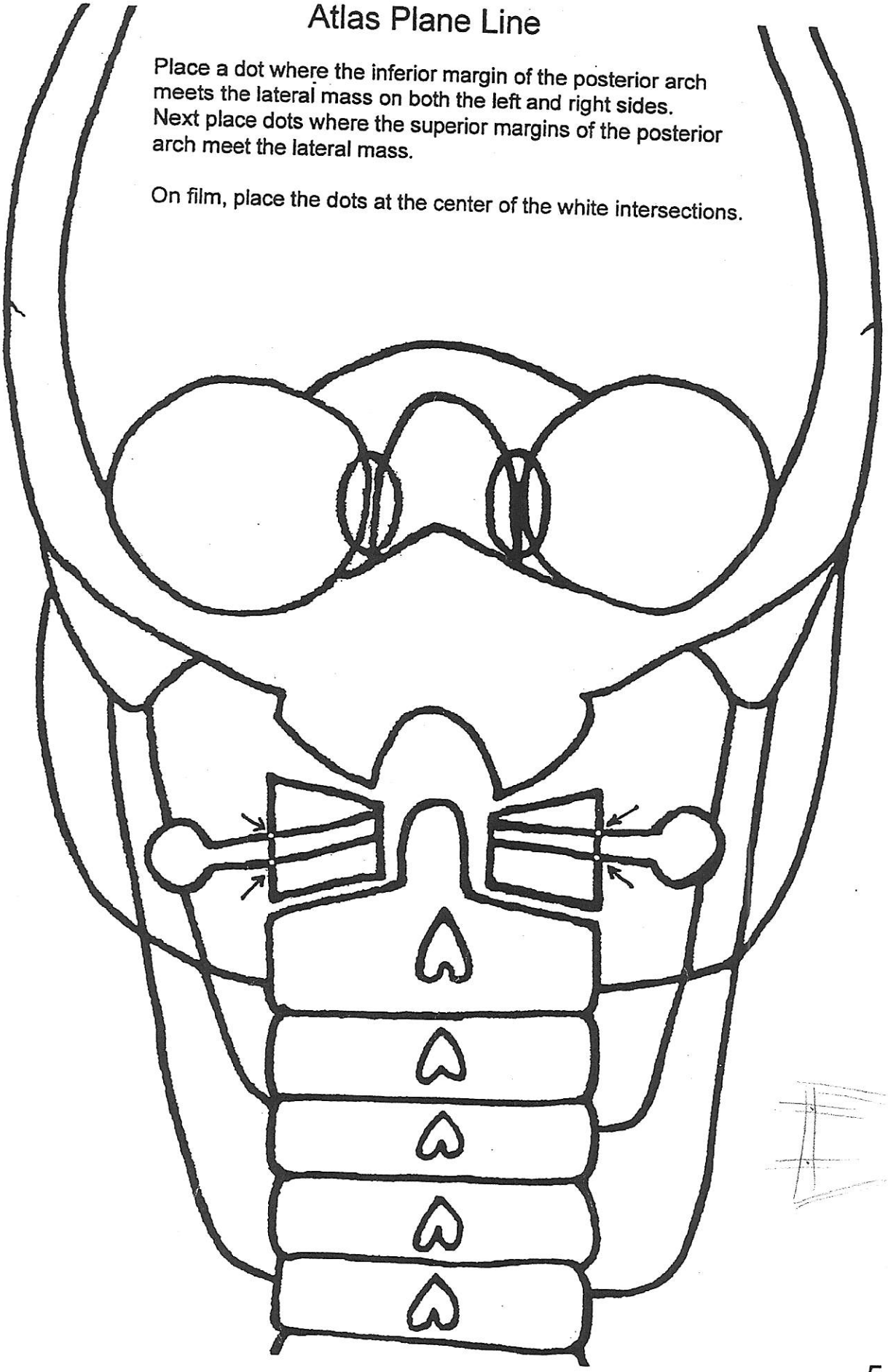
- Atlas plane line and check line
- Skull division, atlas laterality, and head tilt
- Condylar and axial circle measurement
- C2 body, dens, and spinous center and misalignment
- Fixed point, lower angle, and vertical axis line
- Horizontal plane line
- The Four Elements



Atlas Plane Line

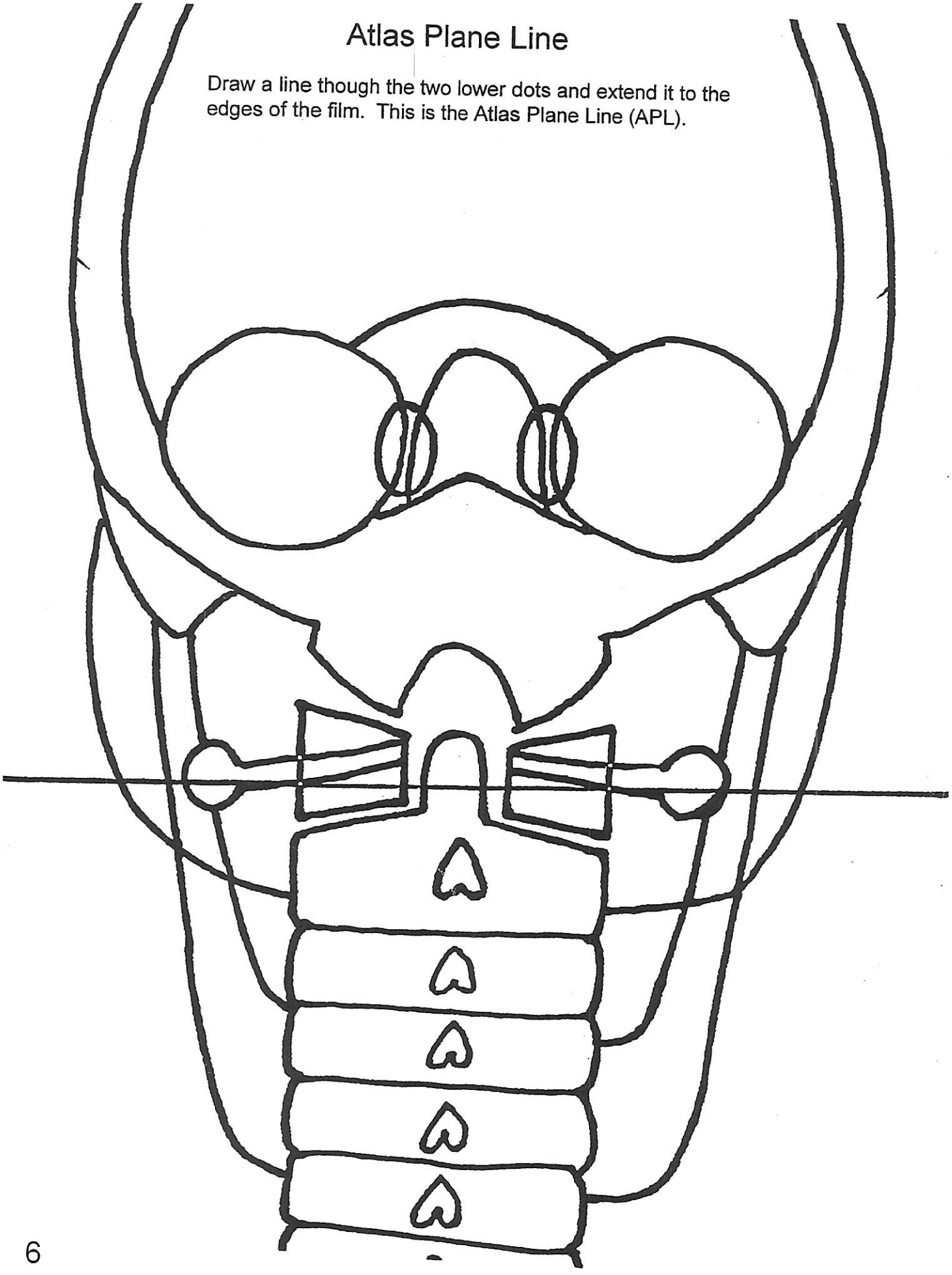
Place a dot where the inferior margin of the posterior arch meets the lateral mass on both the left and right sides. Next place dots where the superior margins of the posterior arch meet the lateral mass.

On film, place the dots at the center of the white intersections.



Atlas Plane Line

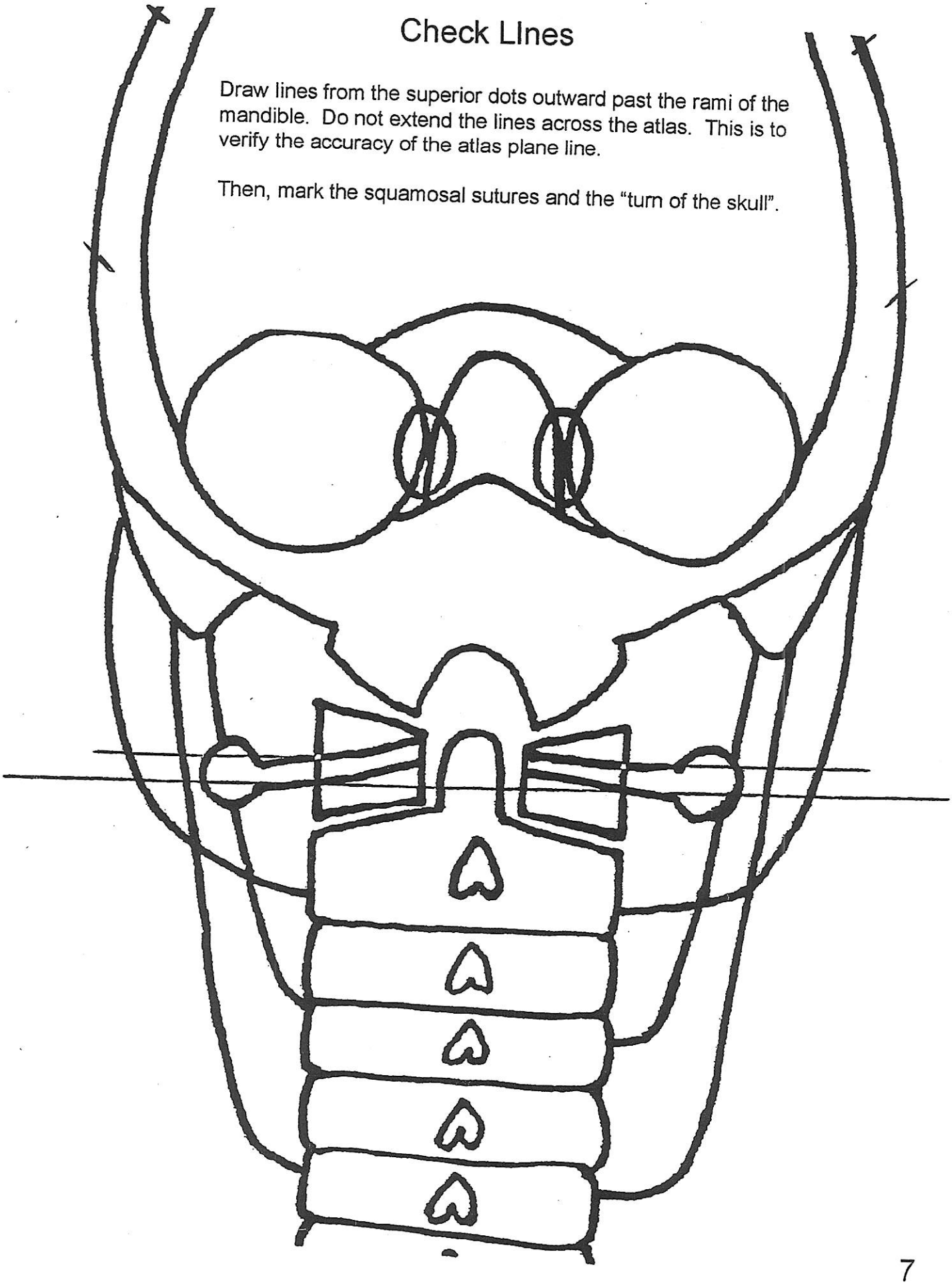
Draw a line though the two lower dots and extend it to the edges of the film. This is the Atlas Plane Line (APL).



Check LIne

Draw lines from the superior dots outward past the rami of the mandible. Do not extend the lines across the atlas. This is to verify the accuracy of the atlas plane line.

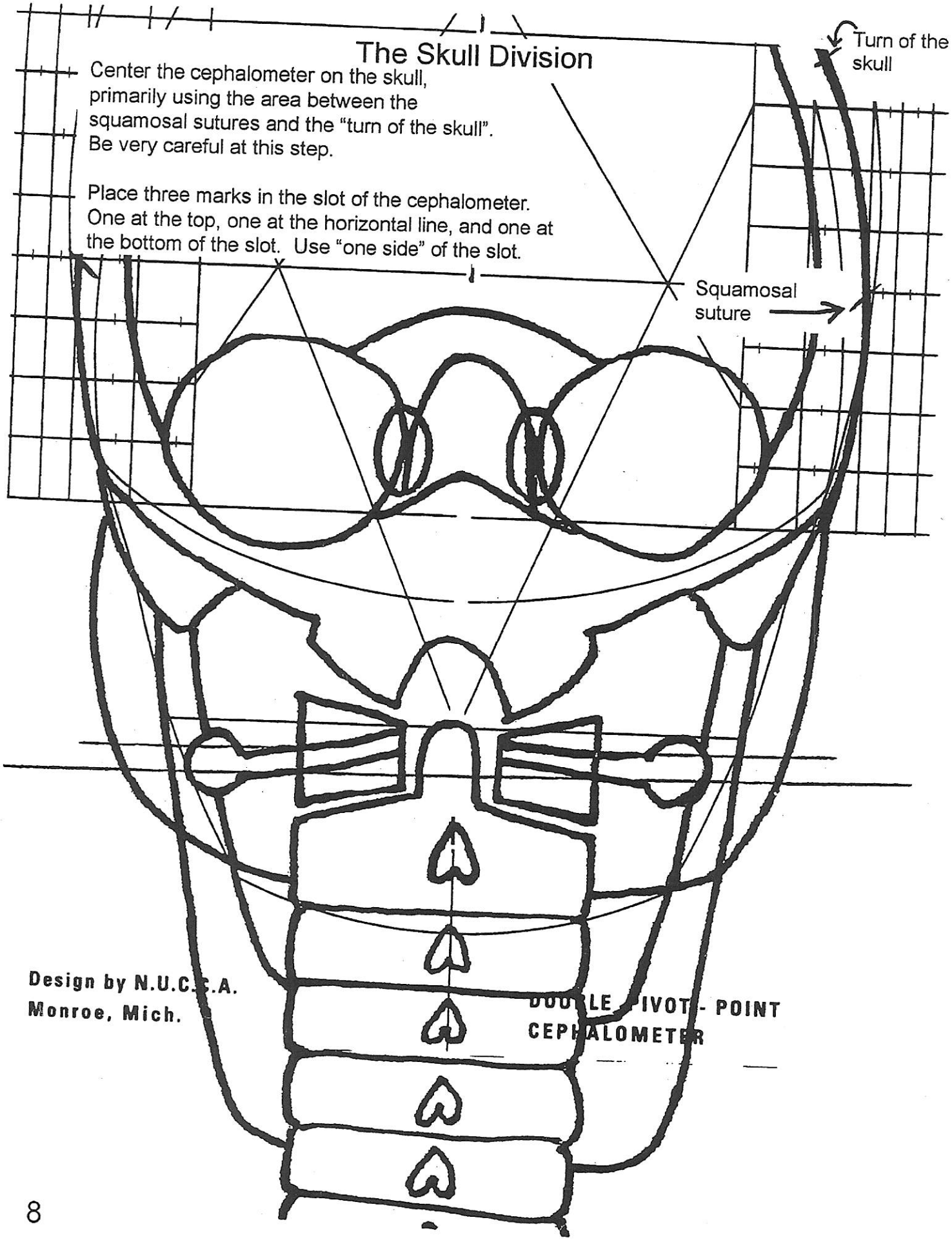
Then, mark the squamosal sutures and the "turn of the skull".

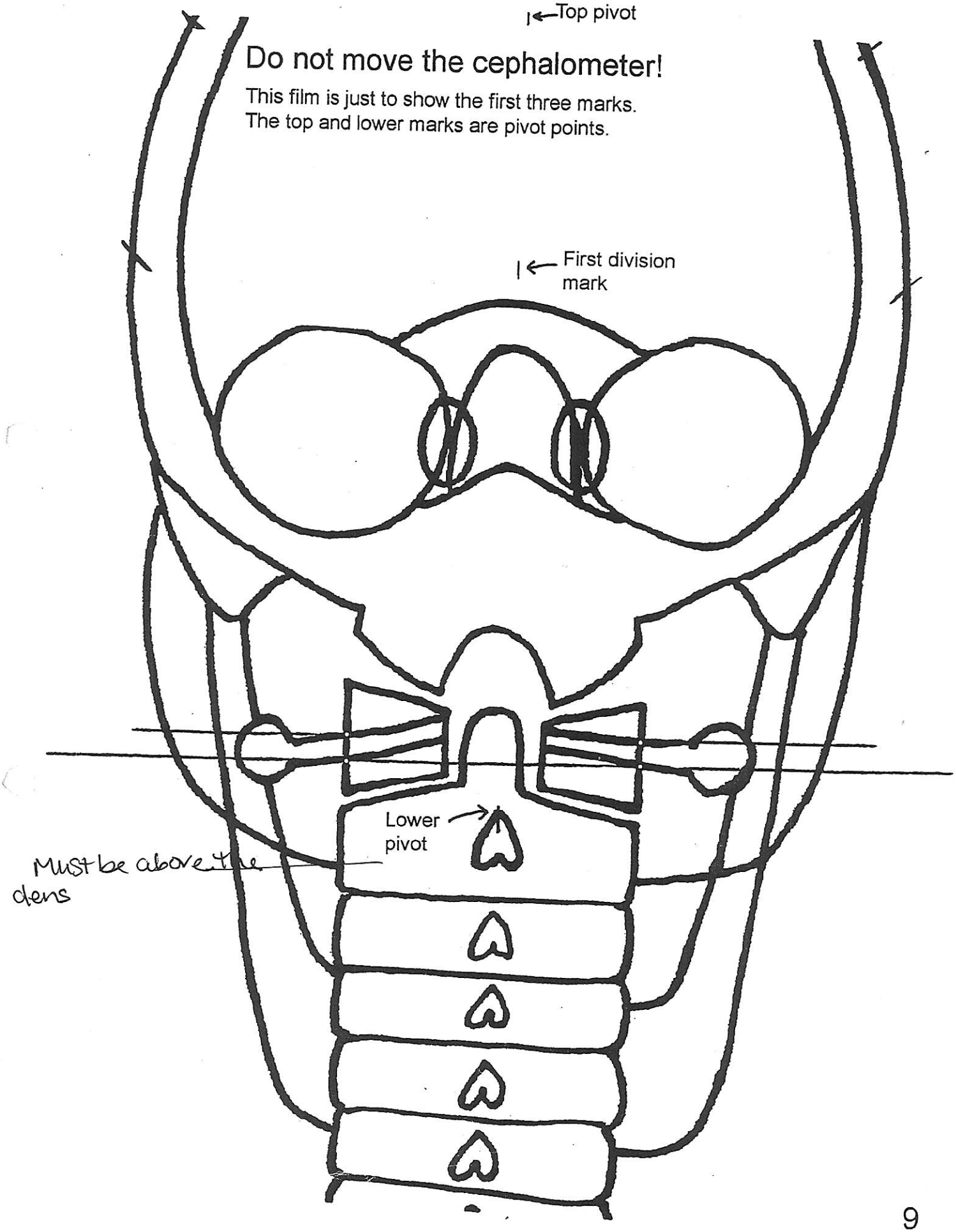


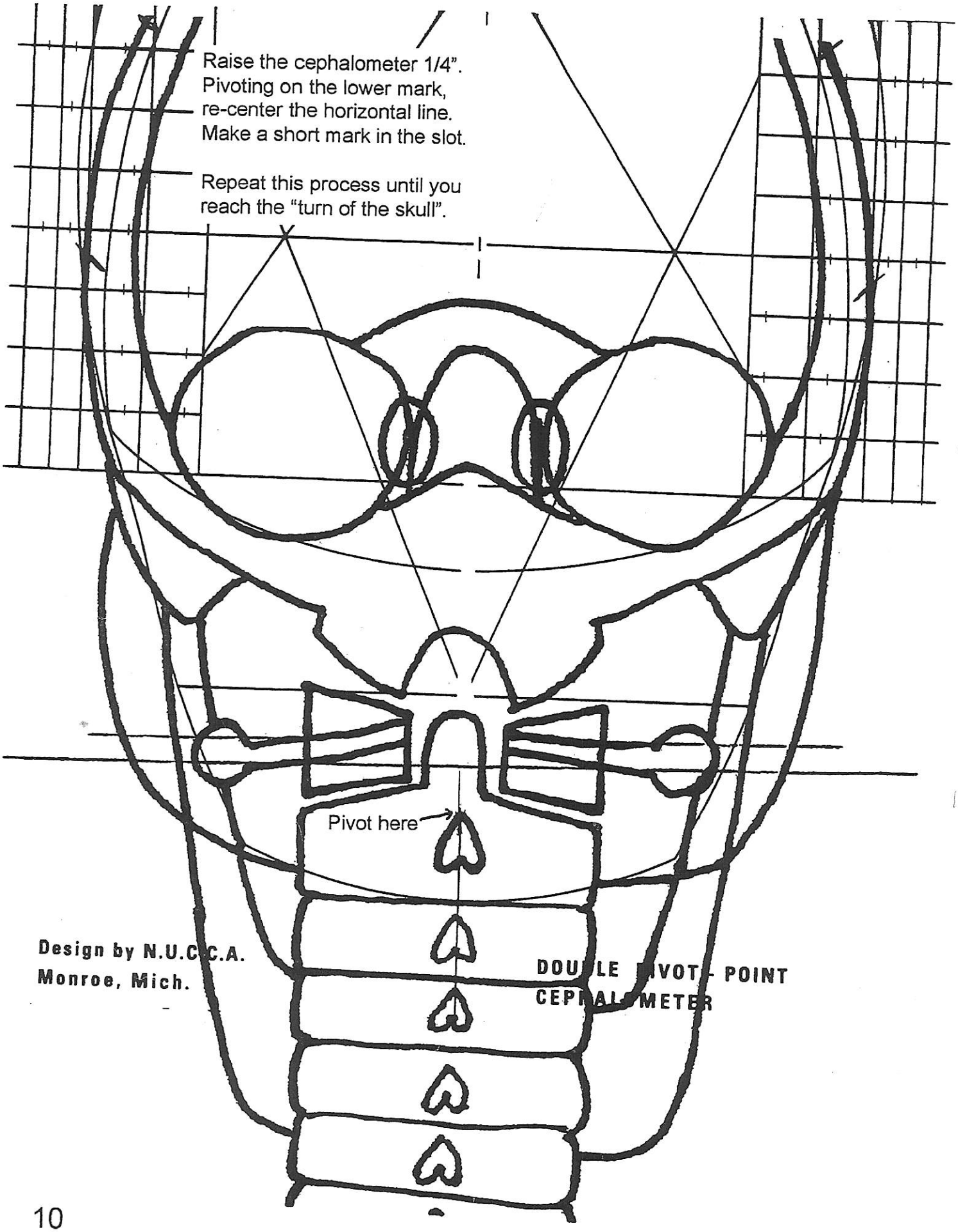
The Skull Division

Center the cephalometer on the skull, primarily using the area between the squamosal sutures and the "turn of the skull". Be very careful at this step.

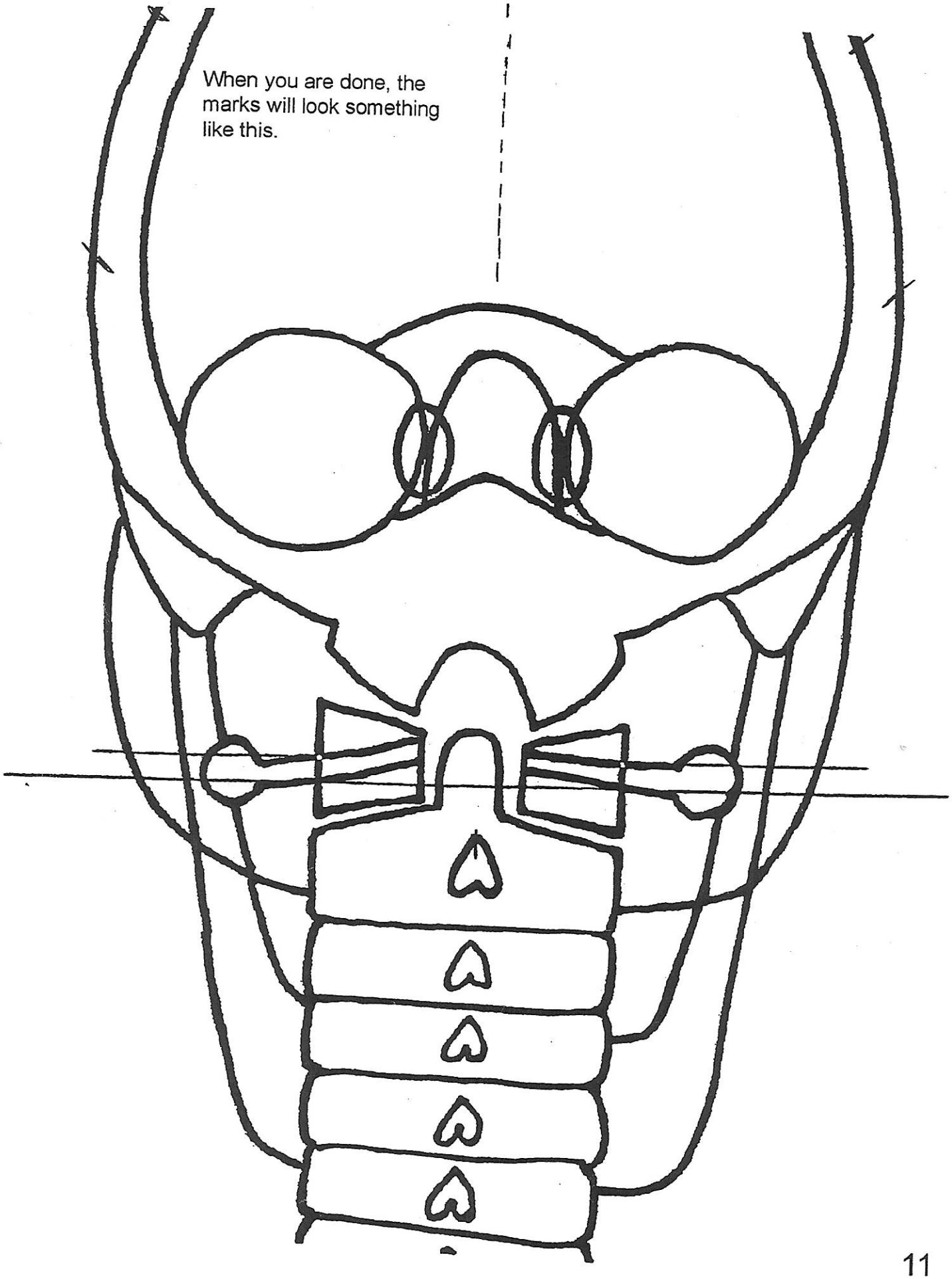
Place three marks in the slot of the cephalometer. One at the top, one at the horizontal line, and one at the bottom of the slot. Use "one side" of the slot.




Top pivot
Do not move the cephalometer!
This film is just to show the first three marks.
The top and lower marks are pivot points.
First division mark
Lower pivot
MUST be above the dens


Raise the cephalometer 1/4".
Pivoting on the lower mark,
re-center the horizontal line.
Make a short mark in the slot.
Repeat this process until you
reach the "turn of the skull".
Pivot here
Design by N.U.C.C.A.
Monroe, Mich.
DOUBLE PIVOT - POINT
CEPHALOMETER

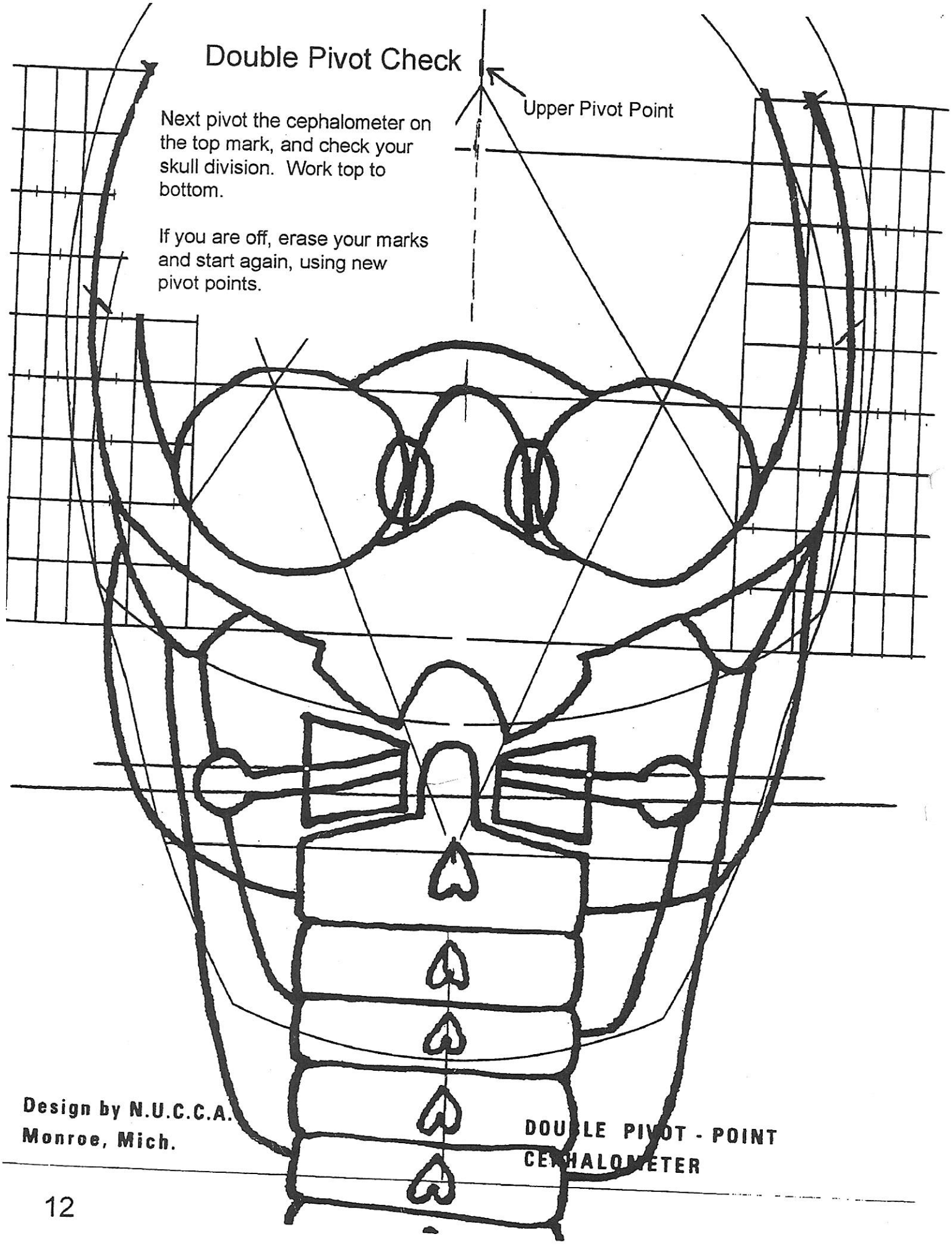
When you are done, the marks will look something like this.



Double Pivot Check

Next pivot the cephalometer on the top mark, and check your skull division. Work top to bottom.

If you are off, erase your marks and start again, using new pivot points.

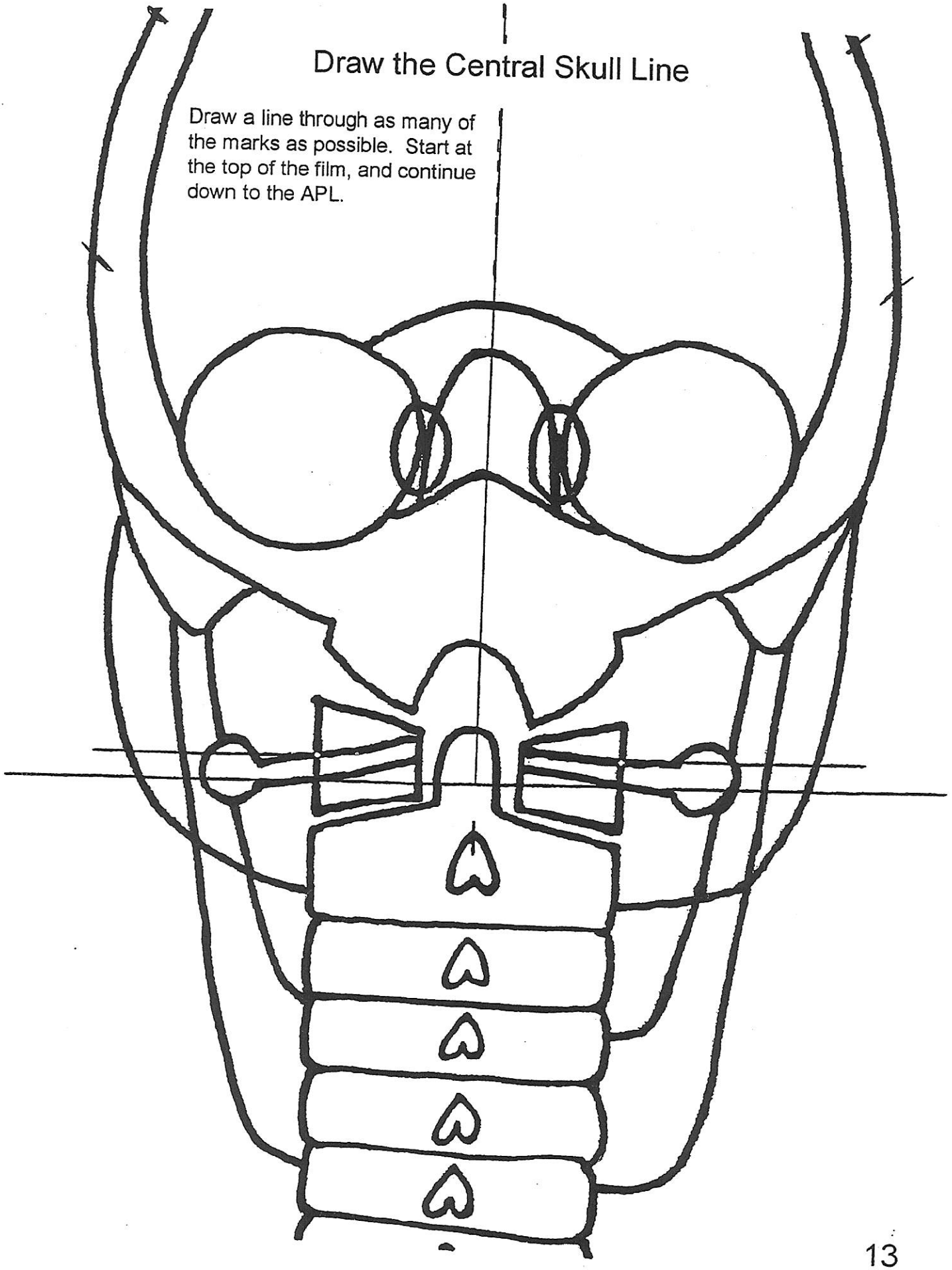


Design by N.U.C.C.A.
Monroe, Mich.

DOUBLE PIVOT - POINT
CEPHALOMETER

Draw the Central Skull Line

Draw a line through as many of the marks as possible. Start at the top of the film, and continue down to the APL.

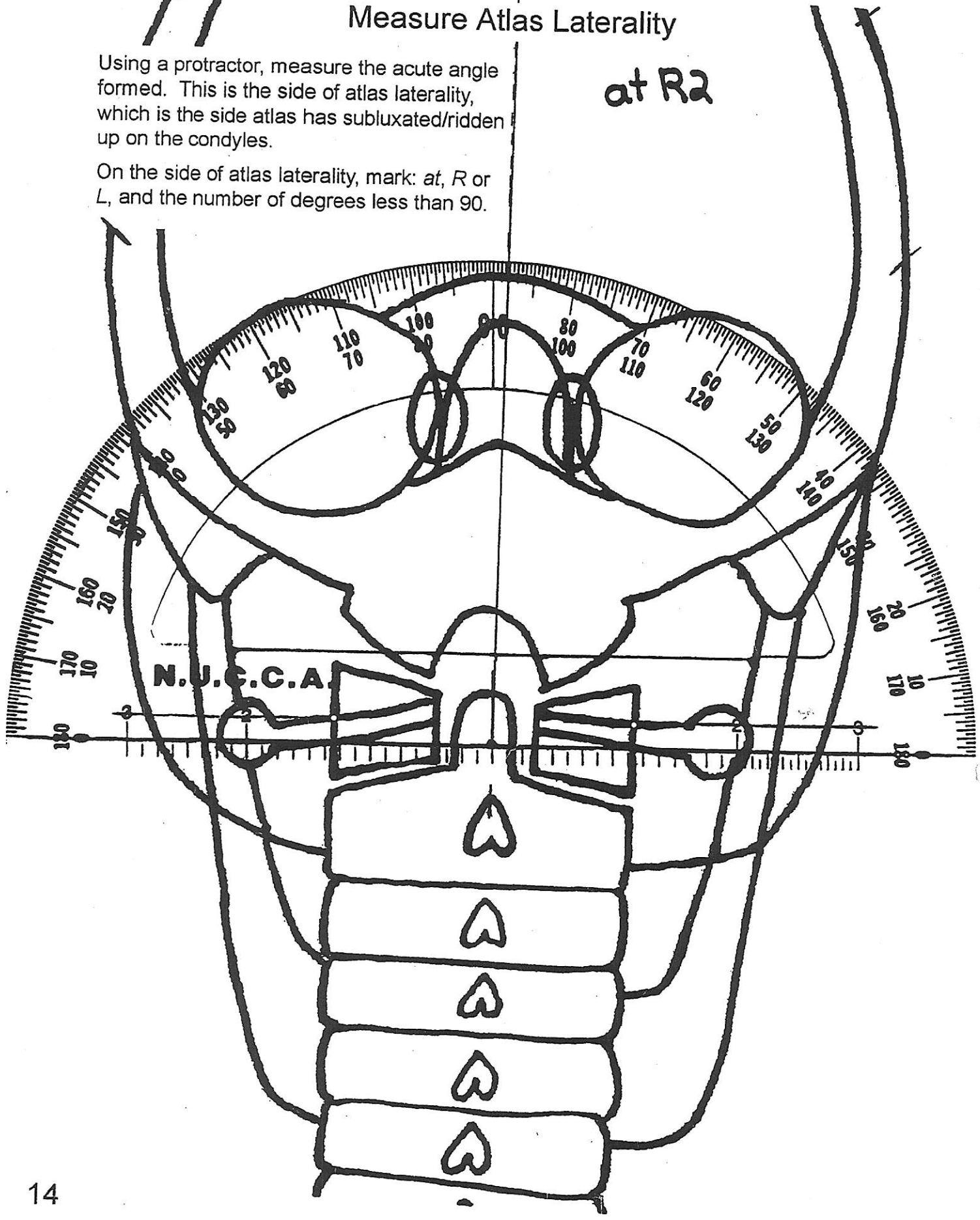


Measure Atlas Laterality

Using a protractor, measure the acute angle formed. This is the side of atlas laterality, which is the side atlas has subluxated/ridden up on the condyles.

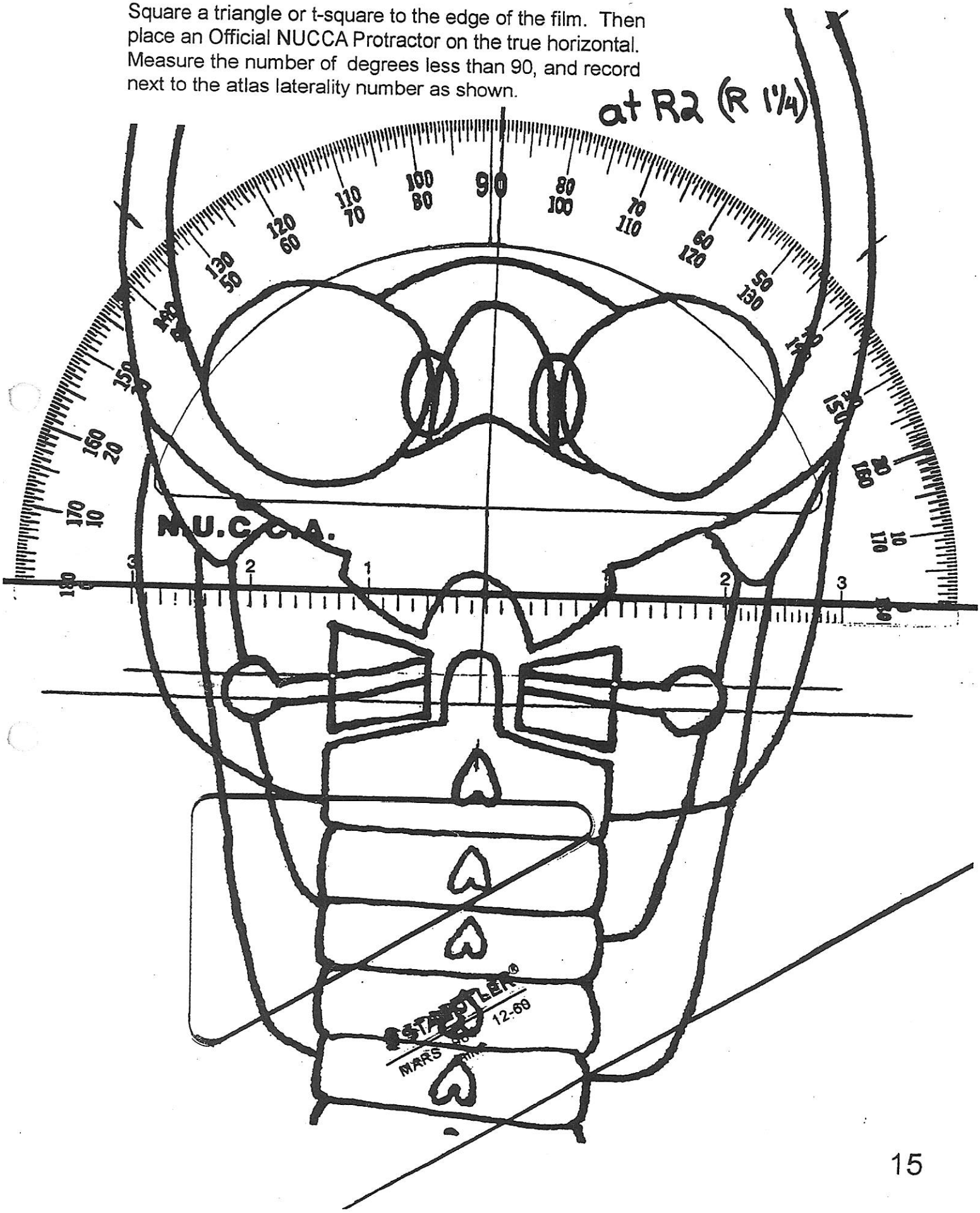
On the side of atlas laterality, mark: *at*, *R* or *L*, and the number of degrees less than 90.

at R2



Measure Head Tilt

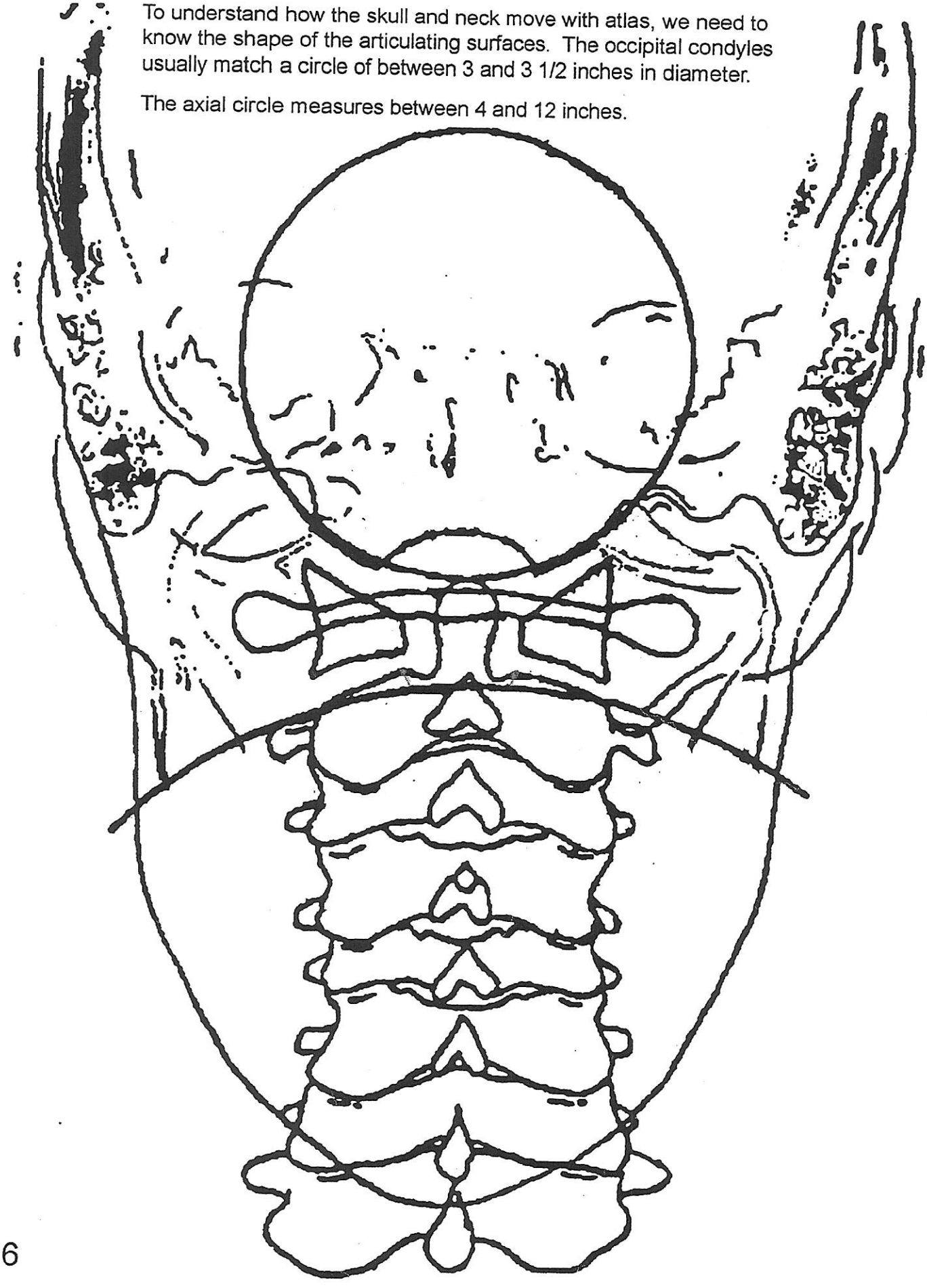
Square a triangle or t-square to the edge of the film. Then place an Official NUCCA Protractor on the true horizontal. Measure the number of degrees less than 90, and record next to the atlas laterality number as shown.



Condylar and Axial Circles

To understand how the skull and neck move with atlas, we need to know the shape of the articulating surfaces. The occipital condyles usually match a circle of between 3 and 3 1/2 inches in diameter.

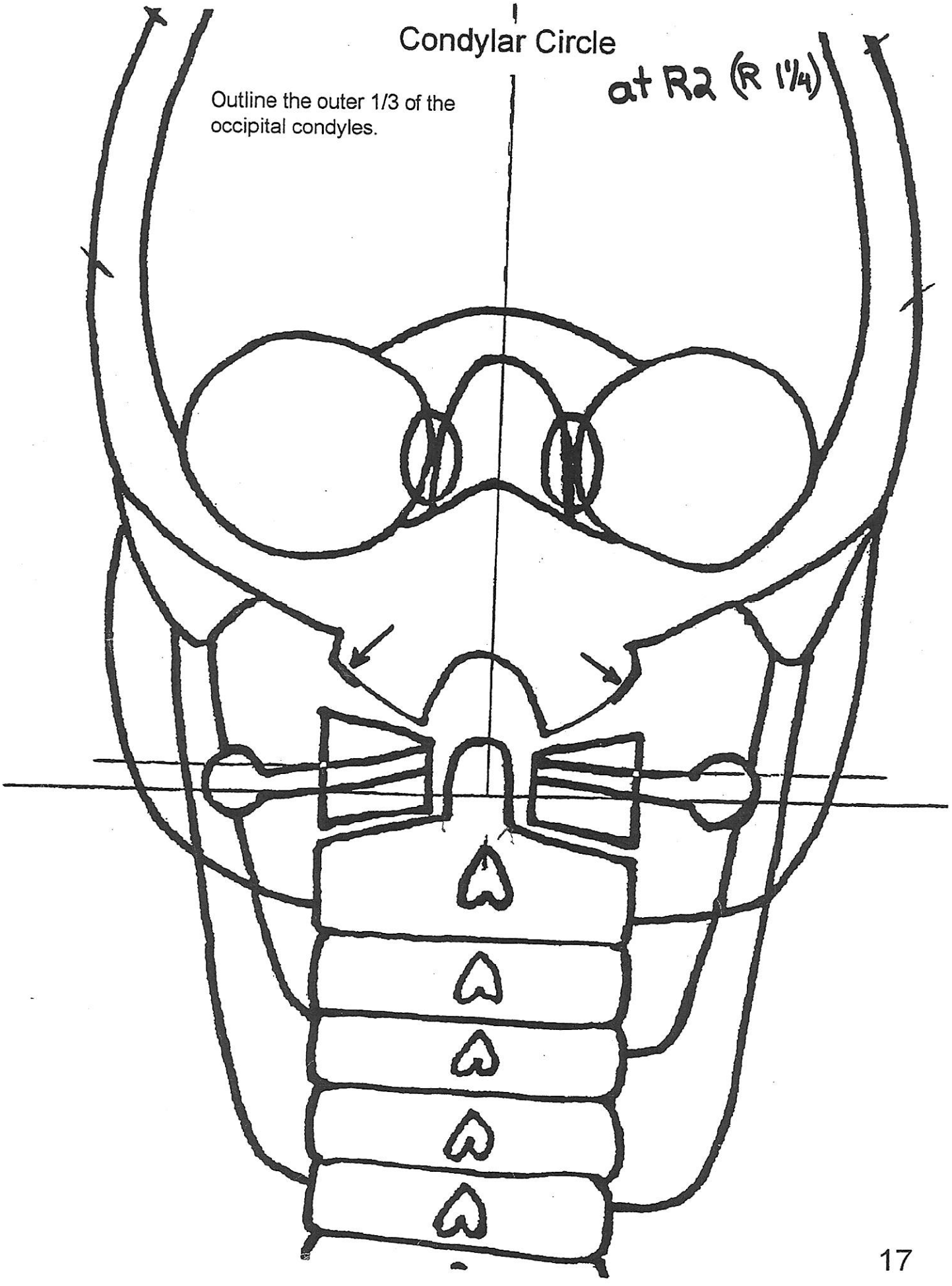
The axial circle measures between 4 and 12 inches.



Condylar Circle

at R2 (R 1¼)

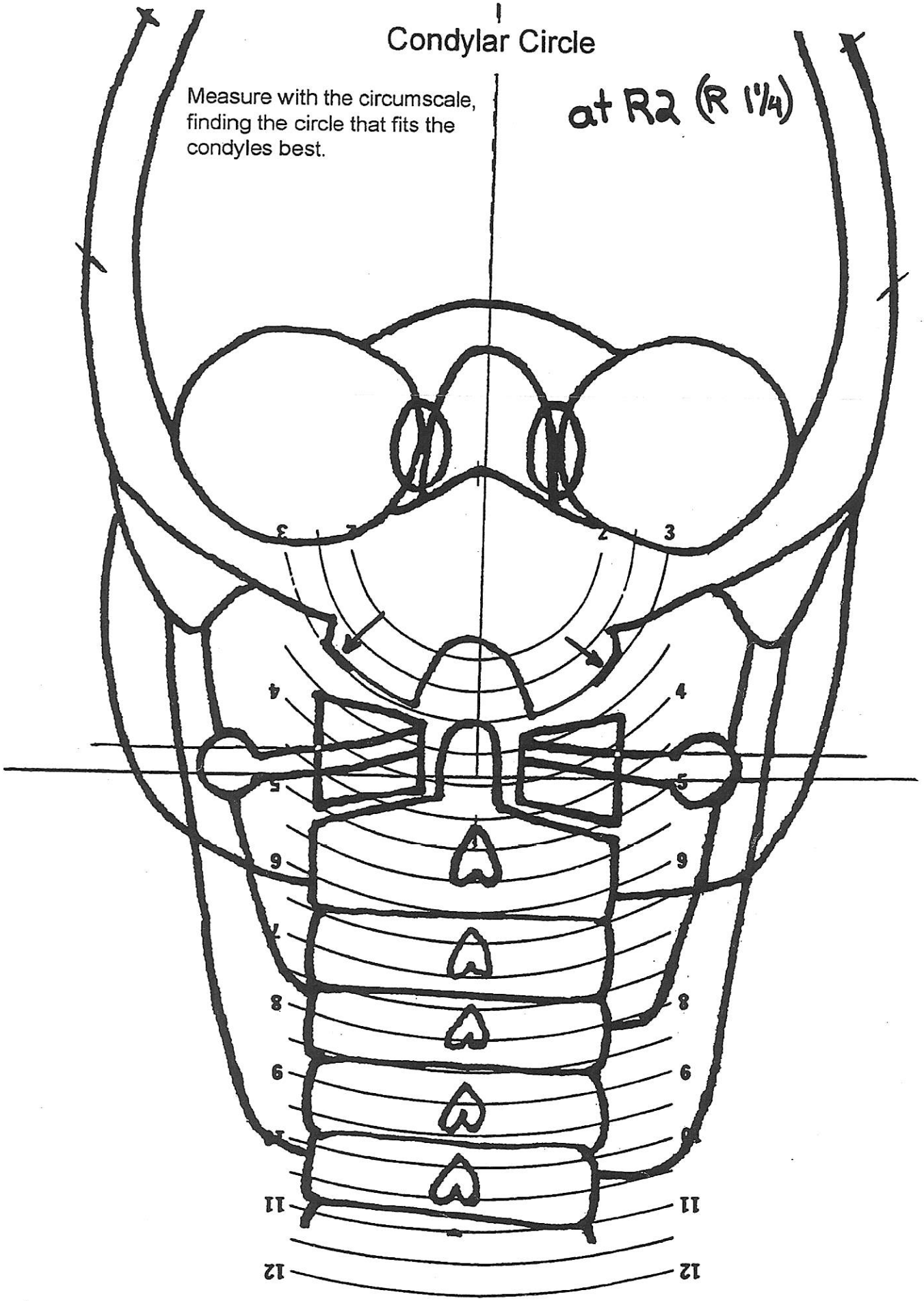
Outline the outer 1/3 of the occipital condyles.



Condylar Circle

Measure with the circumscale, finding the circle that fits the condyles best.

at R2 (R 1¼)



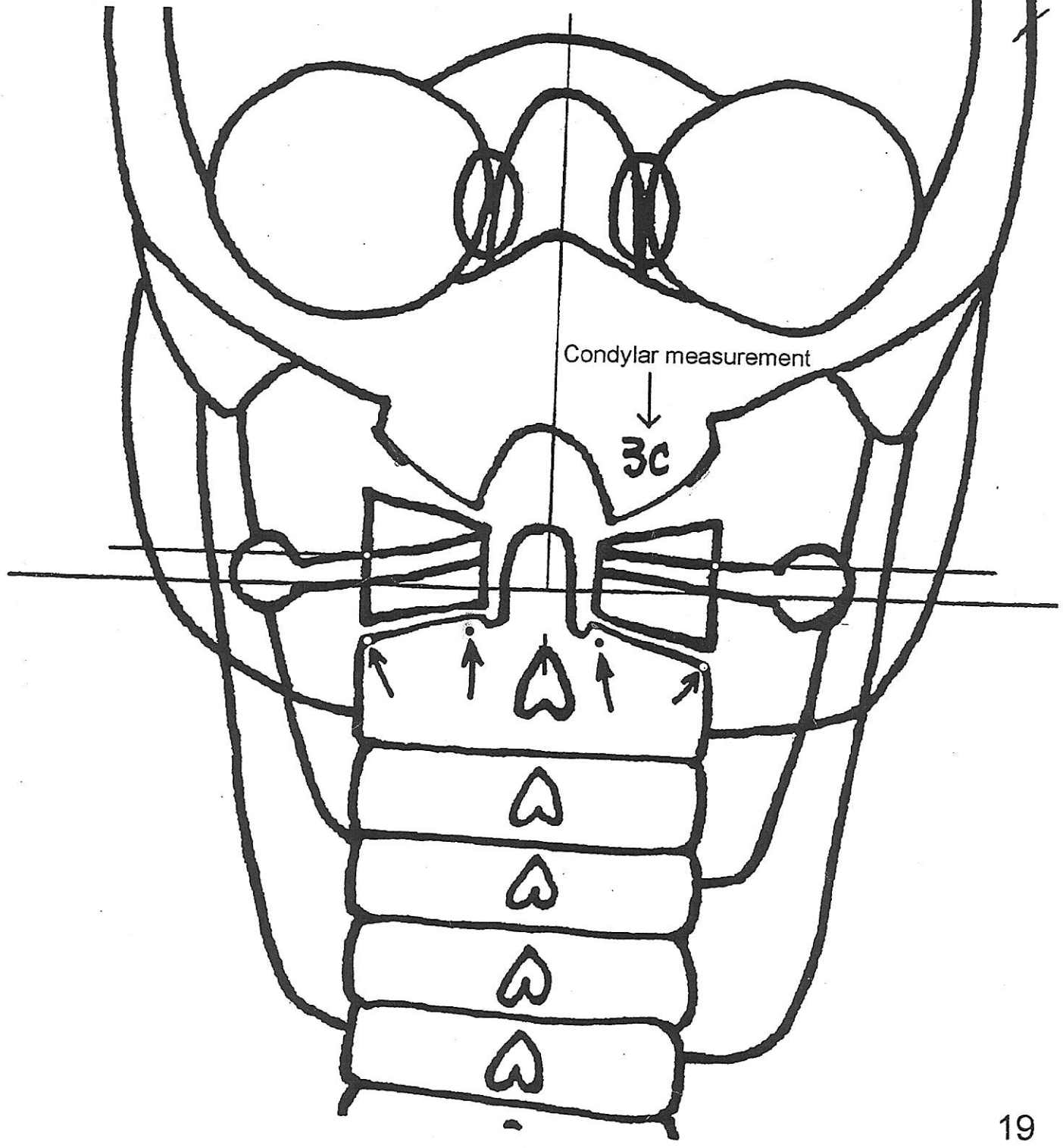
CIRCUMSCALE

Axial Circle

at R2 (R 1¼)

Write the condylar circle measurement above the APL on the side of laterality.

Then, just lateral to the "para-odontoid dips", measure down and perpendicular to the articulating surface one and a half 16th's (3/32" or 2.4 mm). Make a small mark. Also outline the superior, lateral surface of C2.



Axial Circle

at R2 (R 1¼)

Use the circumscale to find the best fit circle for the four marks.