

Name: _____

FO-4313/6313
First Hour Exam, 2005

Formulae:

$$1. \quad RF = \frac{1}{S} = \frac{d}{D} = \frac{f}{(H-h)} \quad 2. \quad \frac{\delta h}{(H-h)} = \frac{d}{r} \quad 3. \quad \frac{\delta h}{(H-h)} = \frac{dp}{AP_b + dp}$$

1. Your mother is inquiring about this course that you are taking this semester. You begin by telling her; the name of the course is: _____ (2)

It is concerned with: _____ (3)

2. One of the basic foundations of this course is scale; Scale is defined as: _____ (5)

3. The two primary characteristics of an RF are:
a. _____ (5)
b. _____ (5)

4. When determining average scale of an aerial image by comparing image distance to ground distance for identifiable line segment lengths, what assumption is made concerning the elevation of the end points of the line (as in Equation 1 above)? _____ (5)

5. If the endpoints of an identifiable line segment are at drastically different elevations, what are two methods of calculating horizontal ground distance of the line segment?
1. _____ (5)
2. _____ (5)

6. Since an aerial camera is an angle recording device and the principal point (PP) is the geometric center of the film plane, we can use the fiducial marks to describe an x, y coordinate location relative to the PP; i.e. the PP is the origin of the x, y axis.

Points 1 and 2 are identified on a vertical aerial image of unknown scale taken with a camera of 152.4 mm focal length at an aircraft altitude of 10,000 ft (msl).

Point 1 is located at 1,000 ft of elevation at photo coordinates $-70/60, +90/60$ inches. Point 2 is located at 2,000 ft of elevation at photo coordinates $+90/60, -75/60$ inches. (Hint: draw the line from point 1 to 2 on the x, y axis using the PP as the origin.)

A. The R.F. scale at Point 1 is computed to be: _____ (4)

(4) Thus, the photo equivalent scale (PES) at Point 1 is: _____

B. Thus, the photo equivalent scale (PES) at Point 2 is: _____ (4)

C. The horizontal ground distance between Points 1 and 2 is: _____ ft (4)

D. If the N-S Fiducial (i.e. the y axis) has a magnetic bearing of $N3.5^{\circ}W$, the magnetic bearing of the line is: _____ (4)

7. Using the parallax bar (floating dot) instrument on a stereo pair where the flying height was 2,500 ft above average terrain elevation and the average distance between the PP and CPP was 0.2625 feet, the following parallax measurements were obtained:

Reading at top of object = 12.76 mm

Reading at bottom of object = 10.00 mm

The height of the object is _____ ft. (10)

8. Explain why it is difficult to distinguish between hardwoods and softwoods on an Ektachrome color image, but relatively easy on a Color Infrared image:

- _____ (5)
9. If an object located at 350 ft elevation measures 0.27 inches in length on an aerial photograph taken with a 76.2mm focal length and the same object is 540 ft in length on the ground:
- a. The RF scale of the photo at 350 ft is: _____ (5)
- b. If the aircraft maintained the same altitude, the RF scale of the photo at m.s.l. (mean sea level) would be 1: _____ (4)
- c. If the same object (0.27 in.), was located at m.s.l., it would have a **ground length** of _____ ft. (4)
10. On a single aerial image, a radial line is selected that passes over a longleaf pine tree whose base is located at 50 feet of elevation. What is the height of the tree if the photo scale is 1 inch equals 600 feet at the tree base elevation, the camera focal length is 6 inches, and the 60 scale on the engineer's scale is used to obtain the following measurements parallax measurements?
- Nadir to base of tree = 247 increments
Nadir to top of tree = 255 increments
- Height of tree = _____ ft. (9)
11. Your boss wants you to contract for new imagery that will allow him to see and measure wood duck boxes that are 12 x 12 inches in size. From your Spatial Technologies course you recall that the human eye can detect and measure objects that are 0.002 inches in size.
- A. The smallest scale allowed for the project will be _____ (4)
- B If the focal length of the aircraft camera is 209.55 mm and the average terrain elevation is 300 ft (m.s.l.), the aircraft altitude required to achieve the desired scale will be _____ (4)

Bonus: (10 points; all or none)

The top parallax reading necessary to track the 400 ft. contour line on imagery taken at a scale of 1:6,000 at sea level with a 152.4 mm focal length camera and average base distance of 88.9 mm if the base reading on the parallax instrument was 10.0 mm would be: _____ mm