Mapping in the Cloud   Name_____

SCALE MANIPULATIONS

The purpose of this exercise is to provide practice in a wide variety of scale manipulations. Information is included to aid in the calculations. If you have difficulty on individual questions, feel free to ask questions; when you finish, review each problem carefully. Use a calculator.

Part I. Scale conversions

1.   Change the following to English and metric verbal scales:

1:200,000,000   1 in.: _____ mi.; 1 cm: _____ KM

1:600,000   1 in.: _____ mi.; 1 cm: _____ KM

1:10,000,000   1 in.: _____ mi.; 1 cm: _____ KM

1:23,678   1 in.: _____ mi.; 1 cm: _____ KM

2.   A map on which 1 inch represents 5 miles has a metric scale of 1 cm: _____ KM

3.   Recall that in the metric system, 1 mm = 1/10 cm, 1 cm = 1/100 m, 1 Km = 1000 m. At a scale of 1:50,000, how many meters are represented by 1 cm?

_____ meters

How many feet are represented by 1 inch at that scale?   _____ feet

Is this scale larger or smaller than 1 in : 1 mi?   _____

4.   Change the following to RF's and verbals:

	(RF)	(alternate verbal)
6 inches : 1 mi.;	_____;	1 cm _____ m.
1 inch : 20 mi.;	_____;	1 cm _____ KM
1 cm : 5 KM;	_____;	1 in. _____ mi.
1 cm : 50 m.;	_____;	1 in. _____ feet
5 cm : 1 Km.;	_____;	1 in. _____ feet

5.   How long should a graphic scale be on a 1:50,000 map if it is to represent 2 miles? (A graphic scale is sometimes called a bar scale.) The answer should be greater than 2.

_____ inches

Part II. Finding scales based on available information

1.   One degree is about 69 miles. However, the distance for a degree of latitude varies from 69 miles at the equator to 0 at the poles. The 60° line of latitude is half the length of the equator. In other words, at 60° N, the distance between each degree of longitude is ½ the distance at the equator, or 34.5 miles. Ten degrees would be 690 miles at the equator and 345 miles at 60°. On a map, 10° at the equator and at 60° is represented with the same distance: 1.09". What are the following scales:

The E-W scale at 0º is _____ (round to the nearest million)

The E-W scale at 60° is _____ (round to the nearest million)

2.   The rectangular Land Survey System, used in the midwest and other parts of the U.S., divides land area into <u>Townships</u> of 6 x 6 miles (36 sq. mi.) which in turn are divided into <u>Sections</u> of one square mile (640 acres), quarter-quarter sections (40 acres), and so on. A Township is 6 miles on a side. A section is 1 mile. If a section on a map is 4.2 inches, what is the scale of the map?

RF _____

1 in.: _____ mi.

If a township is .5 x .5 inches, what is the scale?

RF _____

1 in.: _____ mi.

Part III. LINEAR CONVERSIONS:

1.   Fill in the blanks

<u>RF</u>	<u>English verbal</u>		<u>metric verbal</u>	
1 : 63,360	1 in: _____	mi.	1 cm: _____	KM
1: _____	1 in: 3.2	mi.	1 cm: _____	KM
1: _____	1 in: _____	mi.	1 cm: 10 KM	
1 : 100,000,000	1 in: _____	mi.	1 cm: _____	KM
1: _____	1 in: 150	mi.	1 cm: _____	KM

1: _____   1 in: _____ mi.   1 cm: 1,500   KM

_____

2. Two points are separated by 4.32 inches on a 1:20,000 map. What is the distance
    between them in miles? In KM?

3. The distance between two cities on a map is 8.61 cm and you know the actual distance
    between them is 84 miles. What is the scale of the map?

4. The length of the Nile River is 4,149 miles. What would be its length in inches on a
    1:16,000,000 map?

_____

Part IV. AREAL CONVERSIONS

1. On an air photo with a 1:10,000 scale, a cornfield measures 1.75 x 2.25 inches. What is
    the area of the cornfield in square miles? In acres? (1 sq. mi. = 640 acres)

A. Square inches on the map: _____

B. Compute the relationship between sq. inches and sq. miles:

    a. 1 in. : _____ miles

    b. 1 sq. in. _____ sq. miles

C. Compute square miles for the cornfield:

    a. Multiply the result of Step A times the result of Step B.

                        Answer: _____

2. What is the area in sq. KM?

        A. Convert dimensions to cm:

            a. 1.75 in x 2.54 = _____
            b. 2.25 in x 2.54 = _____

B. Square cm on the map: _____

C. What is the relationship between sq. cm. and sq. KM on the map:

   a. 1 cm : _____ KM

   b. 1 sq. cm: _____ sq. KM

D. What is the square KM for the cornfield:

   a. Multiply the result of Step B times the result of Step C.

   Answer: _____