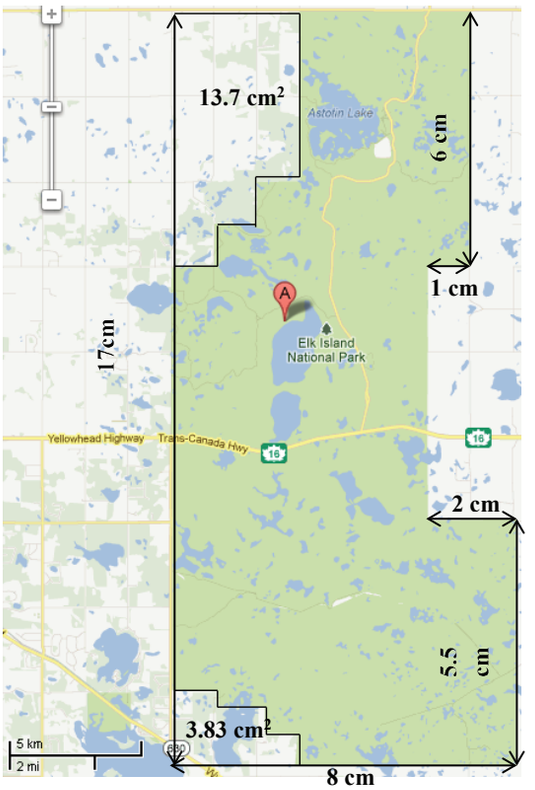
Lesson 5.3 Scale Factors, Areas, Surface Areas, and Volume

Coach's Corner – IV

1. Elk Island National Park is located in the eastern prairies of Alberta. It is protected land that is reserved for wild animals and nature to grow and thrive. The scale for this map is approximately 3 cm for every 5 km or 2 cm for every 2 miles.



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   a. Determine the dimensions of the largest length and largest width of the park in kilometres and in miles.

17 cm in length

5 km = 3 cm

$$\frac{x}{17} = \frac{5}{3}$$
$$3x = 85$$
$$\frac{3}{3}x = \frac{85}{3}$$
$$x \doteq 28.3 \text{ km}$$

2 cm = 2 miles
so, 1 cm = 1 mile
17 cm = 17 miles

8 cm in length
5 km = 3 cm

$$\frac{x}{8} = \frac{5}{3}$$
$$3x = 40$$
$$\frac{3}{3}x = \frac{40}{3}$$
$$x \doteq 13.3 \text{ km}$$

2 cm = 2 miles
so, 1 cm = 1 mile
8 cm = 8 miles

The dimensions of the largest length and largest width of the park are approximately 28.3 km by 13.3 km or 17 mi by 8 mi.

b. Calculate the total area of the park, in cm^2, as represented on the map. Recall that the area formula for a rectangle is $A = l \times w$.

$$\text{Total area} - \text{unshaded areas} = \text{park area}$$
$$(17\text{ cm} \times 8\text{ cm}) - [(13.7\text{ cm}^2) + (3.83\text{ cm}^2) + (6\text{ cm} \times 1\text{ cm}) + (5.5\text{ cm} \times 2\text{ cm})] = \text{park area}$$
$$(136\text{ cm}^2) - [(13.7\text{ cm}^2) + (3.83\text{ cm}^2) + (6\text{ cm}^2) + (11\text{ cm}^2)] = \text{park area}$$
$$136\text{ cm}^2 - 34.53\text{ cm}^2 = \text{park area}$$
$$101.47\text{ cm}^2 = \text{park area}$$

2. Draw a reduction of each of the following objects given the designated scale factor. Determine the length of the reduction, in centimetres.

a. Golf putter, 75 cm in length, scale factor: $\frac{1}{25}$.

$$k = \frac{\text{scale length}}{\text{original}}$$
$$\frac{1}{25} = \frac{\text{scale length}}{75\text{ cm}}$$
$$\frac{1 \cdot 75\text{ cm}}{25} = \text{scale length}$$
$$3\text{ cm} = \text{scale length}$$

Note: Either a 3 cm drawing of a golf putter or just a line that is 3 cm long is acceptable for full marks.

b. House boat, 21 metres in length, scale factor: $\frac{1}{150}$.

Convert 21 metres to centimetres.

$$\frac{x}{21\text{ metres}} = \frac{100\text{ cm}}{1\text{ metre}}$$
$$x = 21 \cdot 100$$
$$x = 2100\text{ cm}$$

$$k = \frac{\text{scale length}}{\text{original}}$$
$$\frac{1}{150} = \frac{\text{scale length}}{2100\text{ cm}}$$
$$\frac{1 \cdot 2100\text{ cm}}{150} = \text{scale length}$$
$$14\text{ cm} = \text{scale length}$$

Note: Either a 14 cm drawing of a house boat or just a line that is 14 cm long is acceptable for full marks.

Please complete *Lesson 5.3 Game On!*, *Unit 5 Time Out*, *Final Review Assignment*, and *Check Point* located in *Workbook 5B*.