

## Grade 11 College Math

Lesson: 7 - 2Unit: GeometryTopic: Investigate Geometric Shapes

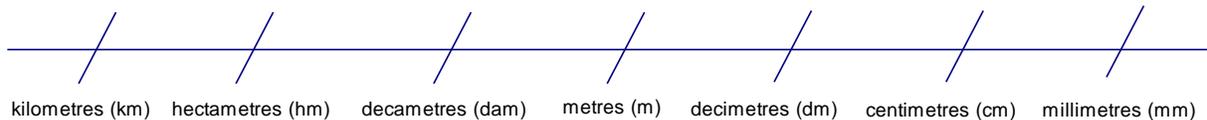
✚ *homework check:* FCM 11 p. 294 # 1 – 12

✚ *note:* Investigating Geometric Shapes and Figures

The Golden Ratio is believed to represent a ratio that is very pleasing to the eye. This ratio is the basis of many buildings in ancient history, like the Greek Parthenon and the Roman Coliseum. The Golden Ratio is the ratio of length to width of 1.618 : 1 . By using this ratio, artists tricked patrons into finding their art pleasing to the eye.

Mathematicians used tessellations to trick the eye. A tessellation (or tiling pattern) is a pattern that repeats to cover a plane without overlapping or leaving gaps. Cell phone towers might be thought like a tessellation. Each tower must cover enough area in order for service to be consistent without overlapping to lower costs for the company.

Sometimes when working with units, we might have to change measurements so that they are in the same units. To do this, we need to remember the scale and the direction of change. In the metric system, metres change by multiples of ten depending on which way you move.



For example, change the following to the desired units.

a)  $33 \text{ cm} = \underline{\hspace{2cm}} \text{ m}$   
 $100\text{cm} = 1\text{m}$   
 $\frac{33}{100} = 0.33$   
 $33\text{cm} = 0.33\text{m}$

b)  $1.032 \text{ m} = \underline{\hspace{2cm}} \text{ mm}$   
 $1\text{m} = 1000\text{mm}$   
 $1.032(1000) = 1032$   
 $1.032\text{m} = 1032\text{mm}$

c)  $5 \text{ cm}^2 = \underline{\hspace{2cm}} \text{ mm}^2$   
 $1\text{cm}^2 = 10 \times 10\text{mm}^2$   
 $= 100\text{mm}^2$   
 $5(100) = 500\text{mm}^2$

d)  $2.4 \text{ cm}^2 = \underline{\hspace{2cm}} \text{ m}^2$   
 $1\text{m}^2 = 100 \times 100\text{cm}^2$   
 $= 10000\text{cm}^2$   
 $\frac{2.4}{10000} = 0.00024\text{m}^2$

Using the Golden Ratio,

- a) determine whether the given geometric shape is pleasing to the eye.
- b) if the ratio is not acceptable, determine the necessary width.

a rectangle with length of 24 cm and width of 17 cm

$$\frac{24}{17} = \\ = 1.4117647$$

which does not fall into the golden ratio

$$\frac{24}{x} = \frac{1.618}{1} \\ 1.618x = 24(1) \\ x = \frac{24}{1.618} \\ x = 14.8\text{cm}$$

A golden rectangle would have dimensions 24 cm by 14.8 cm.

✚ **homework assignment: Golden Ratios Assignment**

**Golden Ratios Assignment**

You will need a ruler for this assignment. Be sure to measure carefully and in the units asked. All answers can be rounded to the nearest hundredth place (two decimals).

**1. Change each measurement into the new desired unit.**

- a) 35 mm = \_\_\_\_\_ cm                      b) 1.4 cm = \_\_\_\_\_ mm
- c) 5.3 km = \_\_\_\_\_ cm                      d) 2.3 km = \_\_\_\_\_ mm
- e) 4.7 dm = \_\_\_\_\_ cm                      f) 3.6 hm = \_\_\_\_\_ cm
- g) 5 dam = \_\_\_\_\_ m                      h) 5.8 cm = \_\_\_\_\_ hm

**2. Change each square unit given into the new desired unit.**

- a)  $3 \text{ cm}^2 = \text{_____ mm}^2$                       b)  $1.7 \text{ m}^2 = \text{_____ km}^2$
- c)  $49 \text{ hm}^2 = \text{_____ cm}^2$                       d)  $4.7 \text{ cm}^2 = \text{_____ m}^2$
- e)  $0.00375 \text{ dm}^2 = \text{_____ m}^2$                       f)  $1.3665 \text{ m}^2 = \text{_____ dam}^2$

**3. For each of the following,**

- i) Determine whether the given shape is pleasing to the eye.**  
**ii) If the ratio is unacceptable, determine the necessary width.**

a) Length = 27.3 cm, width 16.9 cm

b) Length = 0.39 m, width = 0.24 m

c) Length = 453 mm, width = 294 mm

d) Length = 1 025 cm, width = 750 cm

e) Length = 1.7 mm, width = 0.99 mm

4. For each of the following,  
 i) Carefully measure the given shape.  
 ii) Determine if the ratio falls within the golden ratio.

