

Angles and Ratios

Unit # 5: Trigonometry

Lesson # 1: Geometry and Proportions

The origins of geometry lie in 3 greek words:

TRI	GONO	METRY
3	angle	measurement

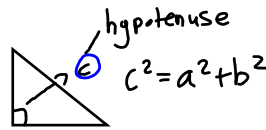
also known as the study of triangles.

Relevance: engineers, economics, surveying, energy development etc...

Recall:

a) **Pythagorean Theorem**

- find an unknown side length



b) **Angle Sum of a Triangle Theorem**

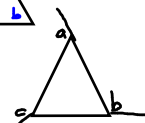
(AST)

$$a + b + c = 180^\circ$$



c) **Sum of Exterior Angles of a Triangle**

$$a + b + c = 360^\circ$$



d) **Exterior Angle of a Triangle Theorem**

(EAT)

$$a = b + c$$



e) **Isosceles Triangle Theorem**

(ITT)

$$b = c$$



f) **Equilateral Triangle**



$$a = b = c \quad 60^\circ$$

g) **Complementary Angle Theorem**

(CAT)

$$a + b = 90^\circ$$



h) **Supplementary Angle Theorem**

(SAT)

$$a + b = 180^\circ$$



i) **Opposite Angle Theorem**

(OAT)

$$a = b$$



j) **Parallel Line Theorems**

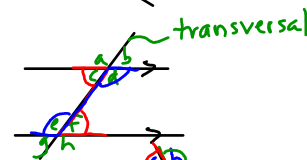
(PLT)

i) **Alternate Angles (Z)**

PLT-Z

$$c = f$$

$$d = e$$



ii) **Corresponding Angles**

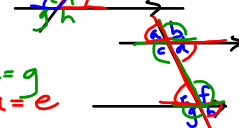
PLT-F

$$d = h$$

$$c = g$$

$$b = f$$

$$a = e$$

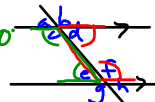


iii) **Co-Interior Angles**

PLT-C

$$c + e = 180^\circ$$

$$d + f = 180^\circ$$



k) **Congruency:**

Figures are congruent if they are the same shape and size.

The relationship is true if all corresponding sides and angles are equal.

are equal in length and angle.

(\cong) or (\simeq)

Angles and Ratios

Ratios and Proportions:

Definitions:

a) **Ratio:**

compares 2 or more quantities of the [redacted]

b) **Proportion:**

when 2 or more ratios are equivalent, they form a **proportion** (equal ratios)

Ratios:

ex: students to teachers

$$900 : 33$$

$\div 3$ each term

$$300 : 11$$

$$(900 \times 2 \neq 33 \times 2) \quad 1800 : 66$$

A ratio can be written as 3 : 4 **OR** $\frac{3}{4}$ (2-term ratio)

Proportion: $6 : 8 = 3 : 4$ **OR** $\frac{6}{8} = \frac{3}{4}$ **OR** $\frac{6}{3} = \frac{8}{4}$

Example # 1: Solve for x.

a) $\frac{10}{20} = \frac{50}{x}$

$$10x = 50(20)$$

$$\frac{10x}{10} = \frac{1000}{10}$$

$$x = 100$$

b) $\frac{2}{3} = \frac{x}{7}$

$$\frac{3x}{3} = \frac{14}{3}$$

$$x = \frac{14}{3}$$

c) ~~scribble~~

Angles and Ratios

Example # 2: Solve for the unknowns.

a) $5 : 7 : 9 = x : y : 18$

$$\frac{5}{x} = \frac{7}{y} = \frac{9}{18}$$

$$\frac{7}{y} = \frac{9}{18}$$

$$\frac{9y}{9} = \frac{126}{9}$$

$$y = 14$$

$$\frac{5}{x} = \frac{9}{18}$$

$$\frac{9x}{9} = \frac{90}{9}$$

$$x = 10$$

Example # 3:

Susan and Larry agree to share the profits from a garage sale in the ratio of 4 : 3. The total profit made was \$630. How much did each person receive?

$$S : L : T = S : L : T$$

$$4 : 3 : 7 \quad S : L : 630$$

$$\frac{4}{S} = \frac{7}{630}$$

$$7S = 630(4)$$

$$\frac{7S}{7} = \frac{2520}{7}$$

$$S = 360$$

$$\text{Larry} = 630 - 360$$

$$= 270$$

∴ Susan made \$360 & Larry \$270.

Pg. 442 # 1abc

440 # 1-5, 6de, 8

448 # 1abc, 3, 6