5.1: Primary and Reciprocal Ratios

Right Angle Triangles

From a given angle, we can name the sides of a right angle triangle:

**Adjacent** is the side that touches the angle. **Opposite** is the side that does not touch the angle.

**\*Note:** The opposite and adjacent sides depend on the angle! If we look at the same triangle but a different angle, the opposite and adjacent sides will be different, but the Hypotenuse always stays the same!

# Primary Trigonometric Ratios

# In a right triangle, the angles and the lengths of sides are related by certain ratios:



“**Solve**” a triangle means find the missing angles and sides. Use your math tools:

Trig ratios SOH CAH TOA, Pythagorean Theorem \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Sum of Angles in a Triangle is \_\_\_\_\_\_

**Example 1:** For the triangle below, find x

|  |  |
| --- | --- |
|  |  |

a) sin x b) cos x c) tan x

**Example 2:** Find the side length



**Primary Trig ratios**

$\sin(θ) =\frac{opp}{hyp}$ $\cos(θ)=\frac{adj}{hyp}$ $\tan(θ) =\frac{opp}{adj}$

**Reciprocal Trig Ratios**

 $cosecant θ=\frac{1}{\sin(θ)}$ $secant θ=\frac{1}{\cos(θ)}$ $cotangent θ=\frac{1}{\tan(θ)}$

Calculators don’t have reciprocal trig buttons, so if you to evaluate $\sec(20°)$ = $\frac{1}{\cos(20°)}$

**Example 3:**

a) Determine csc $θ$, sec $θ $and cot $θ$



b) Calculate $θ$ to the nearest degrees.

 **Example 4:** Solve the triangle. (ROUNDING: Angles nearest degree, Sides one decimal place)



**Reciprocal Trig Ratios**

1. Find csc B.

a) sin B = 0.9781 b) sin B = 0.4067 c) B = 37° d) B = 103°

1. Find sec C.

a) cos C = 0. 4848 b) cos C = 0.9272 c) C = 81° d) C = 112°

1. Find cot D.

a) tan D = 2.0503 b) tan D = 0.2493 c) D = 42° d) D = 121°

1. Find the desired ratios.

a) sin A b) cos B

29

A

C

B

21

20

c) csc A d) sec A

e) csc B f) cot B

1. From #4, what do you notice about sin A and cos B? What do you notice about sec A and csc B? Will this always be true? Why or why not?

Solutions:

1. a) 1.0224 b) 2.4588 c) 1.6616 d) 1.0263 2. a) 2.0627 b) 1.0785 c) 6.3925 d) –2.6695

3. a) 0.4877 b) 4.0112 c) 1.1106 d) –0.6009 4. a) 21/29 b) 21/29 c) 29/21 d) 29/20 e) 29/20 f) 21/20

5. they are the same, same, yes

**Homework:** Handout, p. 280 #1,2,4,5iv,6,8b,9,10, 14,15