p.347

(#9)   ⌒AA

$$\frac{t}{1.2} = \frac{10.7}{4.2}$$

t

1.2m

6.5m   R   4.2m C

(#7b)

A
6
D   .4   E
x
B   10   C

∠ADE = ∠ABC   [PLT-F]
∠DAE = ∠BAC   same angle

△ADE ⌒ △ABC   [AA]

$$\frac{10}{4} = \frac{AB}{6}$$

$$6\left(\frac{10}{4}\right) = \left(\frac{6+x}{6}\right)6$$

$$15 = 6+x$$
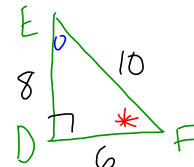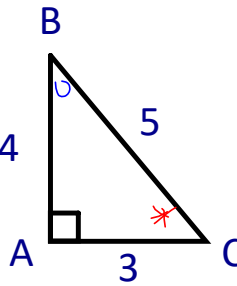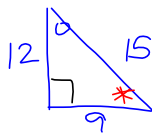$$15-6 = x$$
$$9 = x$$

6.3 Primary Trig Ratios

Let's explore...
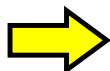
- Create a triangle ΔDEF similar to:

B
4 | 5
A — 3 — C
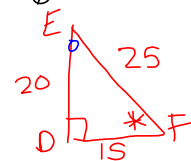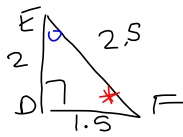
- Calculate each of the following ratios for your triangle:

$$\frac{DE}{DF} = \frac{8}{6}$$

$$= 1.333$$

$$\frac{DE}{EF} = \frac{8}{10} \quad \frac{20}{25} \quad \frac{12}{15} \frac{4}{5}$$

$$= 0.8$$

$$\frac{DF}{DE} = \frac{6}{8} \quad \frac{15}{20} \quad \frac{9}{12} \quad \frac{3}{4}$$

$$= 0.75$$

- What do you notice?

⟹ Everyone has the same ratios!

AND

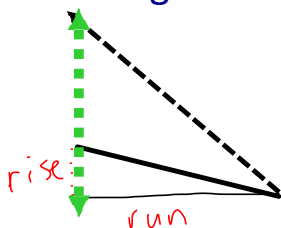$$\frac{AB}{AC} \doteq 1.33 \qquad \frac{AB}{BC} = 0.8 \qquad \frac{AC}{AB} = 0.75$$

B
rise
A — run — C
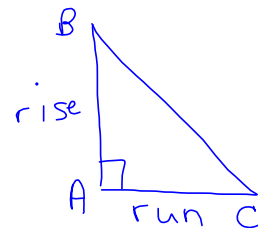
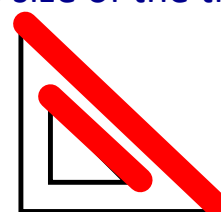The ratio $\dfrac{AB}{AC}$ represents the **slope** of line segment BC.

The slope of a line depends on the angle it makes with the horizontal. The greater the angle, the bigger the slope. Why?

$$Slope = \frac{rise}{run}$$

rise ↑

rise | run

The slope of a line does not depend on the size of the triangle. It depends on the ratio of sides.
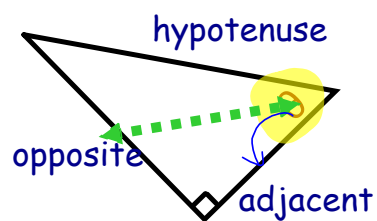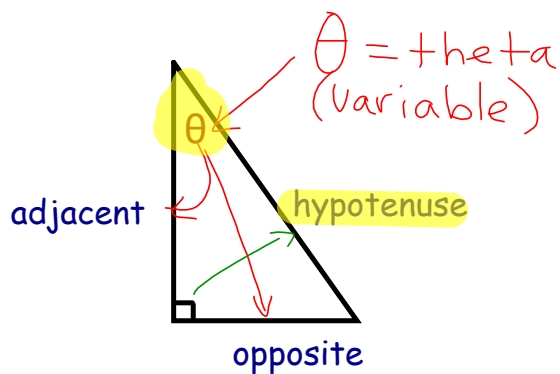
Trigonometric ratios are based on sides, relative to a given angle.
↳ ratios of sides in a triangle

hypotenuse: the side across from the right angle.
opposite: the side *across* from a given angle θ.
adjacent: the side that is *beside* a given angle θ.

θ = theta
(variable)

θ

adjacent

hypotenuse

opposite
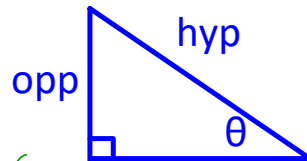
hypotenuse

opposite

adjacent

hypotenuse

opposite

adjacent

In __right triangles__, trigonometry relates the measures of sides to the measure of an angle.

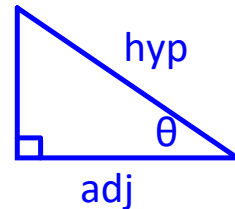**The Sine Ratio**

$\theta = $ an angle

$$\sin \theta = \frac{\text{opposite}}{\text{hypotenuse}}$$
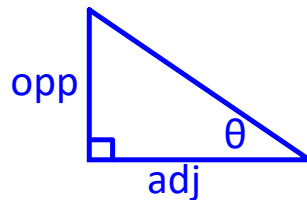
side lengths

The Cosine Ratio

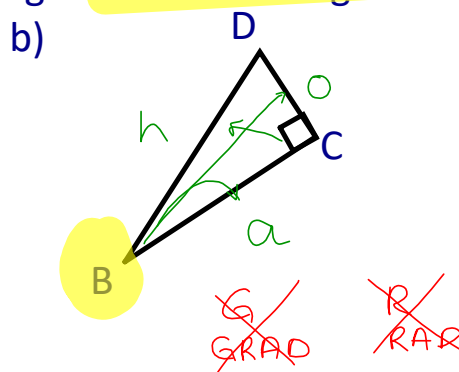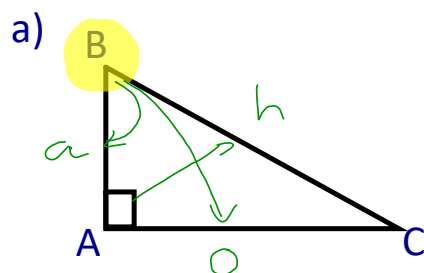$$\cos \theta = \frac{\text{adjacent}}{\text{hypotenuse}}$$

The Tangent Ratio

$$\tan \theta = \frac{\text{opposite}}{\text{adjacent}}$$

SOH-CAH-TOA

Sine   Opposite   Hypotenuse   Cosine   adj   hyp   tan   opp   adj

<u>Ex. 1</u> Label the sides (o,a,h) of each triangle in terms of angle B.

a)

B

a

h

A
O

C

b)

D

h

O

C

a

B

$\cancel{G}$/GRAD $\cancel{R}$/RAR

<u>Ex. 2</u> Determine the value for the following ratios to four   D
decimal places, using your calculator.   DEG

a)   sin 47⁰ $\frac{opp}{hyp}$

$\doteq \underline{0.7314}$

0.7314 \ 1
      47

b) tan 72⁰ $\frac{opp}{adj}$

$\doteq \underline{3.0776}$

3.0776
      72°
      1

c) cos 12⁰
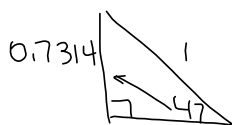
$\doteq 0.9781$

<u>Ex. 3</u> Determine the angle measure, to the nearest degree, for
the following trig ratios.

a)   sin θ = $\underline{0.5432}$ $\frac{opp}{hyp}$

$\theta = \sin^{-1}(0.5432)$

0.5432 \ 1
      θ

$\theta \doteq 33°$

b) $\tan A = \dfrac{3}{4}$

$A = \tan^{-1}\left(\dfrac{3}{4}\right)$

$A \doteq 37°$

90
   27
80

c) $\cos\theta = \dfrac{8}{9}$ $\frac{adj}{hyp}$
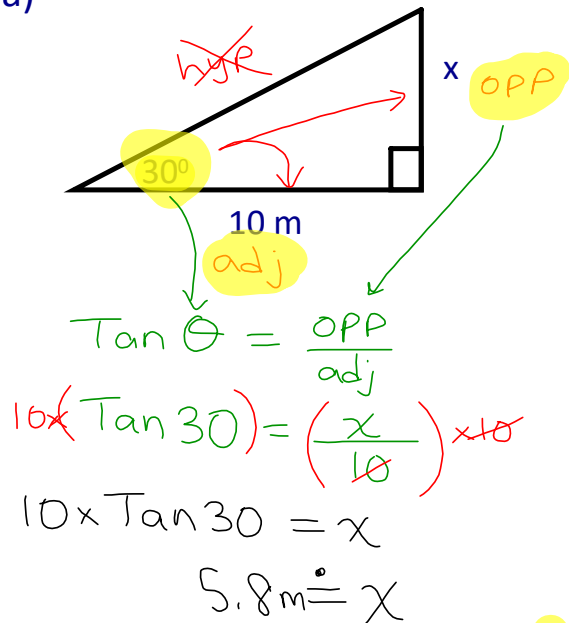
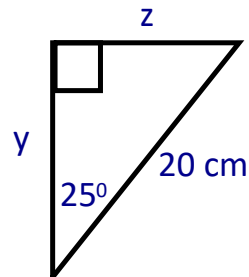$\theta = \cos^{-1}\left(\dfrac{8}{9}\right)$

$\theta = 27°$

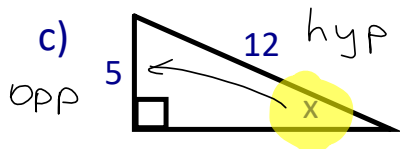18
   27
16

9
   27
8
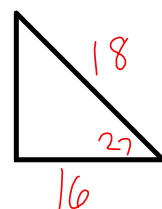
<u>Ex. 4</u> Solve for the unknowns.

a)

hyp (crossed out)

x OPP

30⁰

10 m

adj

$$\text{Tan } \theta = \frac{OPP}{adj}$$

$$10 \times (\text{Tan } 30) = \left(\frac{x}{10}\right) \times 10$$

$$10 \times \text{Tan } 30 = x$$

$$5.8 m \doteq x$$

b)

z

y

25⁰

20 cm

d)

y

x

52⁰

40⁰

30 cm

c)

12 hyp

5

OPP

x

SOH

$$\text{Sin } \theta = \frac{OPP}{hyp}$$

$$\text{Sin } x = \frac{5}{12}$$
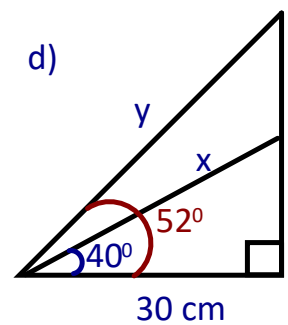
$$x = \text{Sin}^{-1}\left(\frac{5}{12}\right)$$

$$x \doteq 25°$$

Homework

p. 362 # 1b, 3ce, 4eh, 5d, 7cd

p. 372 # 3fg, 4fg, 6e, 7k, 10ad, 11cf

WENDEL ENJOYED MAGIC SCHOOL BUT HE WAS HAVING A LITTLE TROUBLE IN HIS TRICKONOMETRY CLASS.

Attachments

SOH CAH TOA Demo.gsp

Boat on the River - Act 1.mov

Boat on the River - Act 3.mov