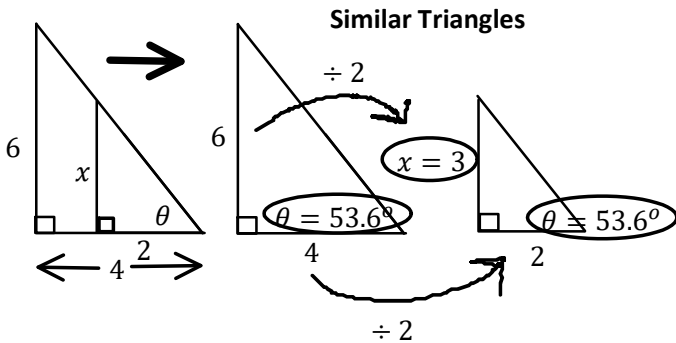# M10 - 3.0 - Trig SOH CAH TOA Notes

Choose part of **SOH CAH TOA** that has 2 pieces of info we have, and one we want.

① Find x & θ

Draw with a protractor and a ruler!

Similar Triangles

÷ 2

$x = 3$

$\theta = 53.6^o$

$\theta = 53.6^o$

÷ 2

$\frac{6}{4} = \frac{x}{2}$ Equal Fractions

$2 \times 6 = x \times 4$ Cross Multiply

$12 = 4x$

$\frac{12}{4} = \frac{4x}{4}$

$3 = x$

$tan\theta = \frac{6}{4} = \frac{3}{2} = 1.5$

$\theta = \tan^{-1}(1.5)$

$\theta = 56.3^o$

Degree Mode

Calculator

$sin35 = 0.57$

$tan\theta$: is a function that tells you the ratio of the : slope $= \frac{rise}{run}$ and allows you to find the angle.
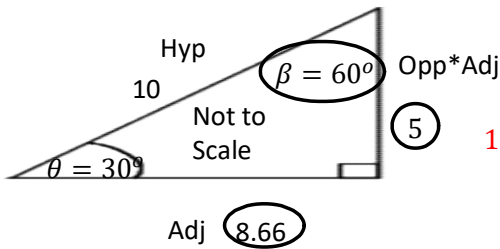
---

② Solve for Numerator/Denominator/Angle

Hyp

$\beta = 60^o$ Opp*Adj

10

5

Not to Scale

$\theta = 30^o$

Adj   8.66

$sin\theta = \frac{opp}{hyp}$

$sin30 = \frac{opp}{10}$

$10 \times sin30 = \frac{opp}{10} \times 10$

$opp = 5$

$sin30 = \frac{5}{10} = \frac{1}{2}$ ✓

$tan\theta = \frac{opp}{adj}$

$tan30 = \frac{5}{adj}$

$adj = \frac{5}{tan30}$

$adj = 8.66$

$a^2 + b^2 = c^2$

$5^2 + 8.66^2 = 10^2$

$100 = 100$
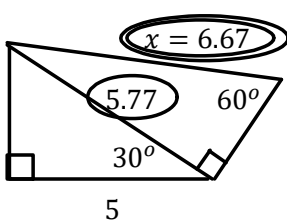
$cos\beta = \frac{adj}{hyp}$

$cos\theta = \frac{5}{10}$

$\theta = cos^{-1}(0.5)$

$\theta = 60^o$

$30^o + 60^o = 90^o$

---

③ Solve for x.

$x = 6.67$

5.77 60°

30°

5

$cos\theta = \frac{adj}{hyp}$

$cos30 = \frac{5}{h}$

$h = \frac{5}{cos30}$

$h = 5.77$

$sin\theta = \frac{opp}{hyp}$

$cos60 = \frac{5.77}{x}$

$x = \frac{5.77}{sin60}$

$x = 6.67$

⑤

How high is the Cliff

x

50m

60°

$tan60 = \frac{x}{50}$

$50 \times tan60 = \frac{x}{50} \times 50$

$x = 86.6 \ m$

④

5.4

15°

x

2

20

$tan15 = \frac{opp}{20}$
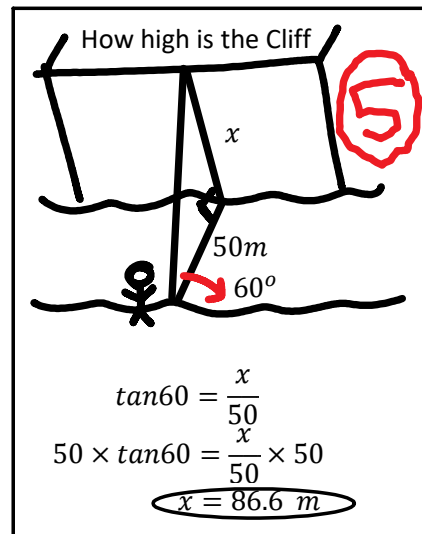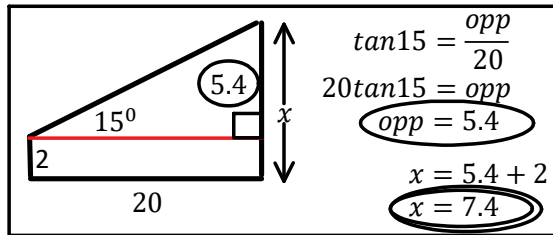
$20tan15 = opp$

$opp = 5.4$

$x = 5.4 + 2$

$x = 7.4$

---

⑥ Draw a vertical line : (Altitude)

5   opp   x   9.1

4.53

65° 29.86^o θ

10

$adj = 2.11$ $10 - 2.11 = 7.89$

$sin65 = \frac{opp}{5}$

$5sin65 = opp$

$opp = 4.53$

$cos65 = \frac{adj^*}{5}$

$5cos65 = adj$
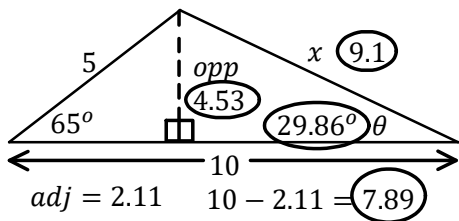
$adj = 2.11$

$tan\theta = \frac{4.53}{7.89}$

$\theta = \tan^{-1}\left(\frac{4.53}{7.89}\right)$

$\theta = 29.86^o$
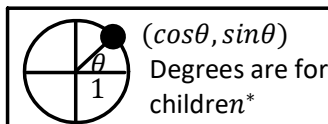
$cos29.86 = \frac{7.89}{x}$

$x = \frac{7.89}{cos29.86}$

$x = 9.1$

Taylor Series Calc!

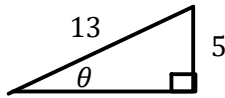$sinx = 1 - \frac{x^3}{3!} + \frac{x^5}{5!} - \frac{x^7}{7!} \ldots$

$(cos\theta, sin\theta)$

Degrees are for children*

M10 - 3.0 - Trig SOH CAH TOA Notes

(7) $sin\theta = \dfrac{5}{13}, tan\theta = ?$

Draw a triangle!

$sin\theta = \dfrac{opp}{hyp}$

$tan\theta = \dfrac{opp}{adj}$

$\boxed{tan\theta = \dfrac{5}{12}}$

$a^2 + b^2 = c^2$
$5^2 + b^2 = 13^2$
$25 + b^2 = 169$
$-25 \qquad -25$
$b^2 = 144$
$\sqrt{b^2} = \sqrt{144}$
$\boxed{b = 12}$

(8) Find Area

5m, 3.35 h, 42°, 10m

$let\ h = height$

$sin42 = \dfrac{h}{5}$
$5sin42 = h$
$\boxed{h = 3.35}$

$A = \dfrac{bh}{2}$
$A = \dfrac{10 \times 3.35}{2}$
$\boxed{A = 16.73\ m^2}$

(9) Solve for x:
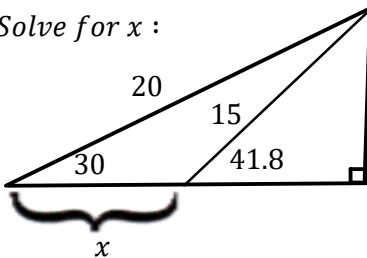
$sin30^o = cosx^o$

hyp, 60°, opp, 30°, adj

$sin30^o = cosx^o$
$\dfrac{opp^*}{hyp} = cos60^o$

$x = 90 - 30$
$\boxed{x = 60}$

(10) Solve for x:

20, 15, 30, 41.8, x

$x = 17.32 - 11.18$
$\boxed{x = 6.14}$

Redraw!

20, 30
$\boxed{adj = 17.32}$

$cos30 = \dfrac{adj}{20}$
$20cos30 = adj$
$\boxed{adj = 17.32}$
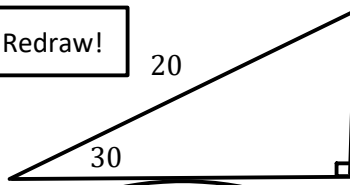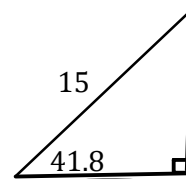
15, 41.8
$\boxed{adj = 11.18}$

$cos41.8 = \dfrac{adj}{15}$
$15cos41.8 = adj$
$\boxed{adj = 11.18}$

(11) $let\ y = small\ horizontal$

15, x, 30, 41.8, 20, y

30, x

15, x, 41.8, y
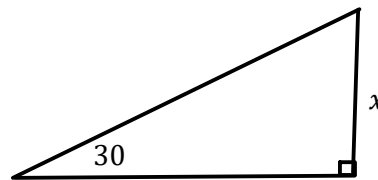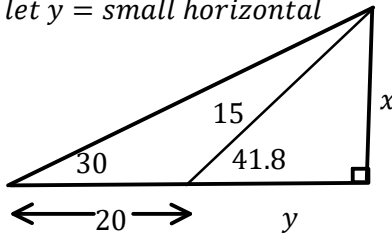
$tan30 = \dfrac{x}{y + 20}$

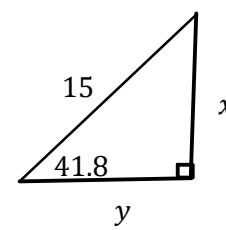$0.577 = \dfrac{0.894y}{(y + 20)}$

$0.577(y + 20) = 0.894y$
$0.577y + 11.547 = 0.894y$
$-0.577y \qquad\quad - 0.577y$
$\dfrac{11.547}{0.317} = \dfrac{0.317y}{0.317}$
$\boxed{y = 36.42}$

$tan41.8 = \dfrac{x}{y}$
$ytan41.8 = x$
$x = 0.894y$

Exact value would be tough!

$x = 0.894(36.42)$
$\boxed{x = 32.56}$

(12) Think outside the box!

70°, 40°, 15, 21, x

ConNotes3 Page 2