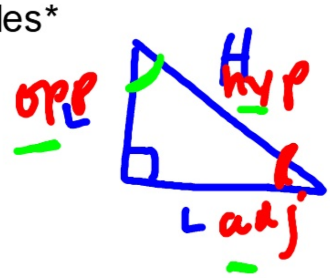
Trig 5.2

Find the values of trig ratios
for acute angles*

right triangle



leg

hypotenuse

adjacent next to

opposite not next to

trigonometric ratio

sine

cosine

tangent

Song: SohCahToa!

Theta Θ

*Geometry Ch. 14

reciprocal $\frac{2}{5} \rightarrow \frac{5}{2}$

cosecent

secant

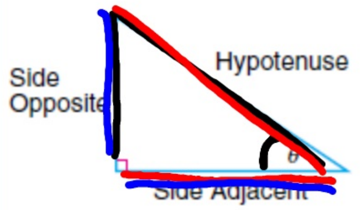
cotangent

special angles

cofunctions

θ = variable

	Words	Symbol	Definition
Trigonometric Ratios	sine θ	sin θ	$\sin\theta = \dfrac{\text{side opposite}}{\text{hypotenuse}}$
	cosine θ	cos θ	$\cos\theta = \dfrac{\text{side adjacent}}{\text{hypotenuse}}$
	tangent θ	tan θ	$\tan\theta = \dfrac{\text{side opposite}}{\text{side adjacent}}$



SOH-CAH-TOA is a mnemonic device commonly used for remembering these ratios.

$$\sin\theta = \frac{\text{opposite}}{\text{hypotenuse}} \qquad \cos\theta = \frac{\text{adjacent}}{\text{hypotenuse}} \qquad \tan\theta = \frac{\text{opposite}}{\text{adjacent}}$$

SOHCAHTOA!

(Handel's Hallelujah Chorus)

Soh Cah Toa!
Soh Cah Toa!
Learn it, and use it!
Soh Cah Toa!

Sine is opposite over hypotenuse.
Soh Cah Toa
Soh Cah Toa
Learn it, and use it!

Cosine is adjacent over hypotenuse.
Soh Cah Toa
Soh Cah Toa
Learn it, and use it!

Tangent is opposite over adjacent!
Soh Cah Toa
Soh Cah Toa

SOH CAH TOA!

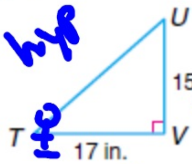
$15^2+17^2=h^2$

$514=h^2$

5. Find the values of the sine, cosine, and tangent for $\angle T$.

$\sqrt{514}\approx 22.7$

hyp



opp

adj

514

2 257

$$\sin T = \frac{15}{\sqrt{514}}\cdot\frac{\sqrt{514}}{\sqrt{514}} = \frac{15\sqrt{514}}{514}$$

$$\cos T = \frac{17}{\sqrt{514}} = \frac{17\sqrt{514}}{514}$$

$$\tan T = \frac{15}{17}$$

EXACT: Fraction (and/or radical) vs APPROX: decimal form (round off)

$18^2 + x^2 = 33^2$

$x^2 = 765$

765

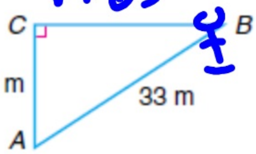
5 153

3 51

3 17

$\sqrt{765} = 3\sqrt{85}$

1 Find the values of the sine, cosine, and tangent for ∠B.



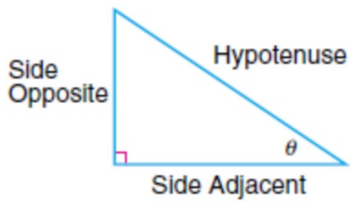
$\sin B = \frac{18}{33} = \frac{6}{11}$

$\cos B = \frac{3\sqrt{85}}{33} = \frac{\sqrt{85}}{11}$

$\tan B = \frac{18\sqrt{85}}{3\sqrt{85}\sqrt{85}} = \frac{18\sqrt{85}}{255} = \frac{6\sqrt{85}}{85}$

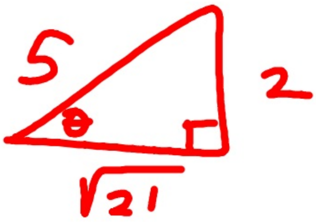
New:

	Words	Symbol	Definition
$\sin = \frac{o}{h}$ **Reciprocal** $\cos = \frac{a}{h}$ **Trigonometric Ratios** $\tan \frac{o}{a}$	cosecant θ	csc θ	$\csc\theta = \frac{1}{\sin\theta}$ or $\frac{\text{hypotenuse}}{\text{side opposite}}$
	secant θ	sec θ	$\sec\theta = \frac{1}{\cos\theta}$ or $\frac{\text{hypotenuse}}{\text{side adjacent}}$
	cotangent θ	cot θ	$\cot\theta = \frac{1}{\tan\theta}$ or $\frac{\text{side adjacent}}{\text{side opposite}}$



These definitions are called the reciprocal identities.

6. If $\sin\theta = \frac{2}{5}$, find $\csc\theta$. $= \frac{5}{2}$



$x^2 + 2^2 = 5^2$

$\sqrt{x^2} = \sqrt{21}$

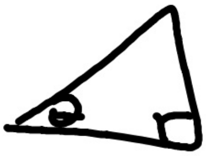
$\pm$

7. If $\cot\theta = 1.5$, find $\tan\theta$. $\cancel{\frac{1}{1.5}}$ $= \frac{2}{3}$

$\frac{a}{o}$

$\downarrow$

$\frac{3}{2}$



8. Find the values of the six trigonometric ratios for $\angle P$.

$\sqrt{364} = 2\sqrt{91}$

$6^2 + x^2 = 20^2$

$36 + x^2 = 400$

$x^2 = 364$

364
4 91
2 2 7 13

$\sin P = \frac{6}{20} = \frac{3}{10}$

$\csc P = \frac{10}{3}$

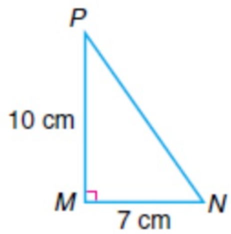
$\cos P \frac{2\sqrt{91}}{20} = \frac{\sqrt{91}}{10}$

$\sec P = \frac{10}{\sqrt{91}} = \frac{10\sqrt{91}}{91}$

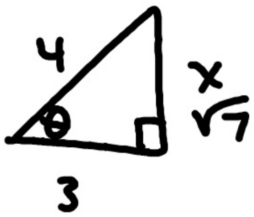
$\tan P \frac{6}{2\sqrt{91}} = \frac{3}{\sqrt{91}}\ \frac{3\sqrt{91}}{91}$

$\cot P = \frac{\sqrt{91}}{3}$

4 **Find the values of the six trigonometric ratios for $\angle P$.**



3 a. If $\cos\theta = \frac{3}{4}$, find $\sec\theta$. $= \frac{4}{3}$



$3^2 + x^2 = 4^2$

$9 + x^2 = 16$

$x^2 = 7$

b. If $\csc\theta = 1.345$, find $\sin\theta$. $= \frac{1}{1.345}$

$1\frac{345}{1000}$

$1\frac{69}{200}$

$\frac{269}{200}$

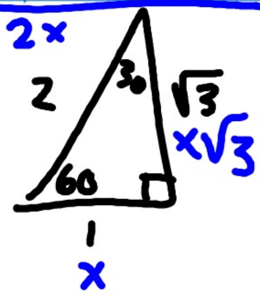
$= \frac{200}{269}$

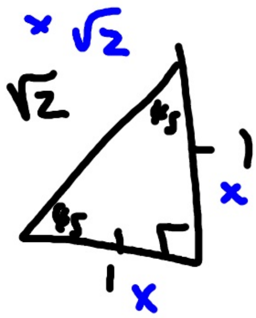
p. 287

θ	$\sin\theta$	$\cos\theta$	$\tan\theta$	$\csc\theta$	$\sec\theta$	$\cot\theta$
30°	$\frac{1}{2}$	$\frac{\sqrt{3}}{2}$	$\frac{\sqrt{3}}{3}$	2	$\frac{2\sqrt{3}}{3}$	$\sqrt{3}$
45°	$\frac{\sqrt{2}}{2}$	$\frac{\sqrt{2}}{2}$	1	$\sqrt{2}$	$\sqrt{2}$	1
60°	$\frac{\sqrt{3}}{2}$	$\frac{1}{2}$	$\sqrt{3}$	$\frac{2\sqrt{3}}{3}$	2	$\frac{\sqrt{3}}{3}$

Special angle (exact)

Must know these, will talk strategies tomorrow.





5.2 10-22 all