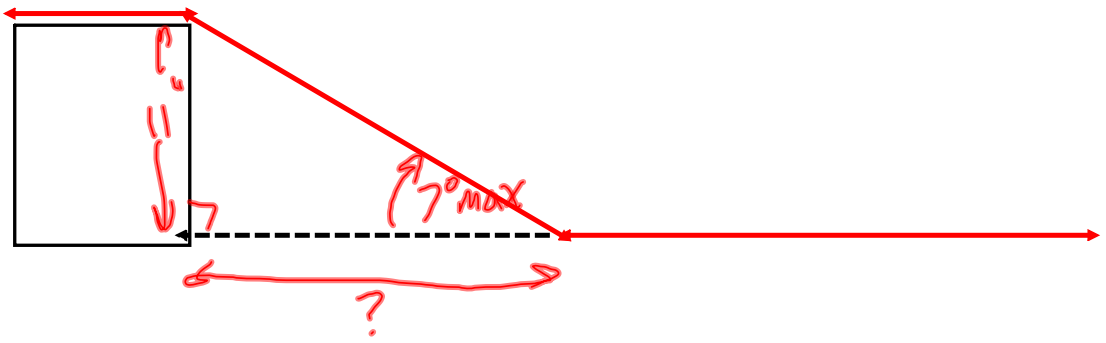


Welcome Back!



Investigation

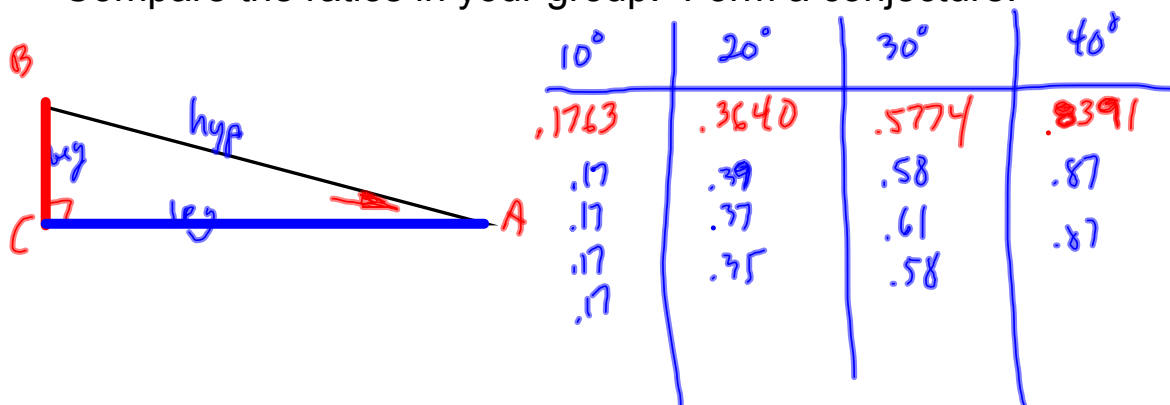
Each draw a right triangle with the assigned angle measure ($\angle A$)

Make it big enough to easily measure the side lengths

Measure the **legs** as **accurately** as possible

Calc the ratio $\frac{\text{leg opposite } \angle A}{\text{leg adjacent } \angle A}$ round to 2 decimal places

Compare the ratios in your group. Form a conjecture.

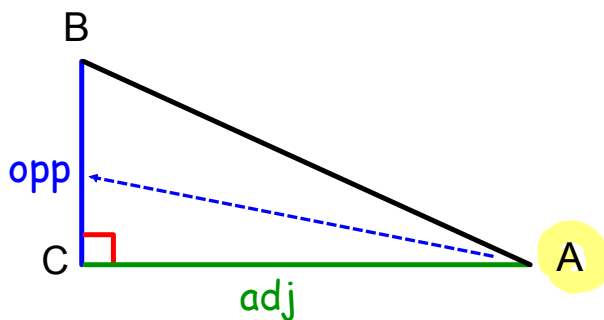


Defn: Tangent Ratio

The **tangent** of $\angle A$ is the **ratio**
of the length of the **opposite** leg
to the length of the **adjacent** leg.

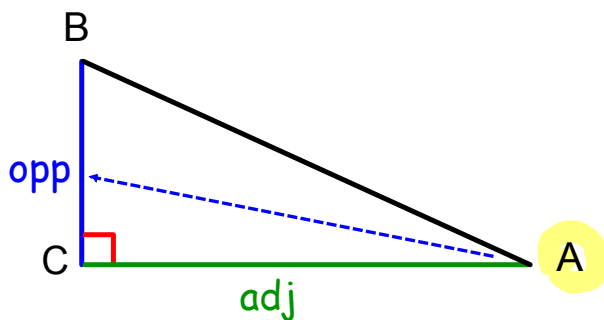
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$$\tan A = \frac{\text{opp}}{\text{adj}}$$



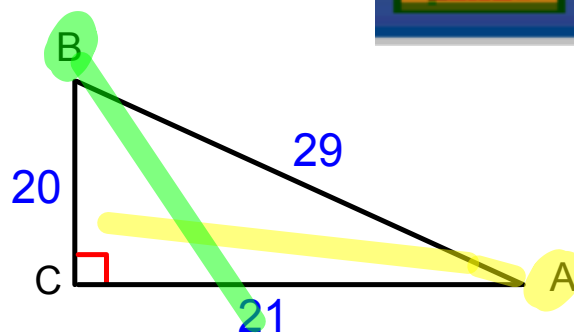
skip to next page for question



Example

$$1) \tan A = \frac{\text{opp}}{\text{adj}} = \frac{20}{21}$$

$$2) \tan B = \frac{\text{opp}}{\text{adj}} = \frac{21}{20}$$



2

Do you really get it?

What can you say about the *tan* of complimentary \angle 's?

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...they are reciprocals.

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What is (w/o using calc or table) $\tan 90^\circ$?

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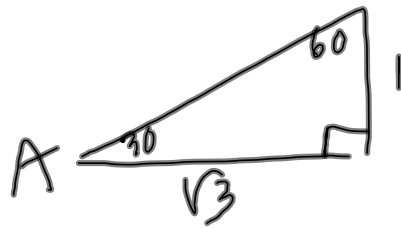
What can you say about the *tan* of complimentary \angle 's?

...they are reciprocals.

What is (w/o using calc or table) $\tan 90^\circ$?

...no such thing ... there is no opp leg.

$$\tan 30^\circ = .5774 = \frac{1}{\sqrt{3}}$$



$$\tan A = \frac{\text{opp}}{\text{adj}} = \frac{1}{\sqrt{3}}$$

Do you really get it?

What can you say about the \tan of complimentary \angle 's?

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What is (w/o using calc or table) $\tan 90^\circ$?

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Do pg 472, #1-3

① $\frac{1}{2}$; 2

② $\frac{2}{3}$; $\frac{3}{2}$

③ 1 ; 1

Example

To measure the height of a tree,
Alma walked 125 *ft* from the tree
and measured a 32° \angle from ground to the tree top.
Estimate the height of the tree.

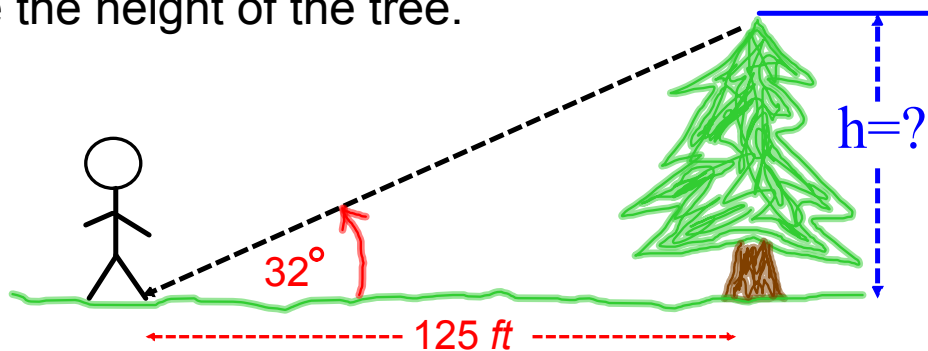
Example

To measure the height of a tree,
Alma walked 125 *ft* from the tree
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Estimate the height of the tree.

...draw yourself a picture...

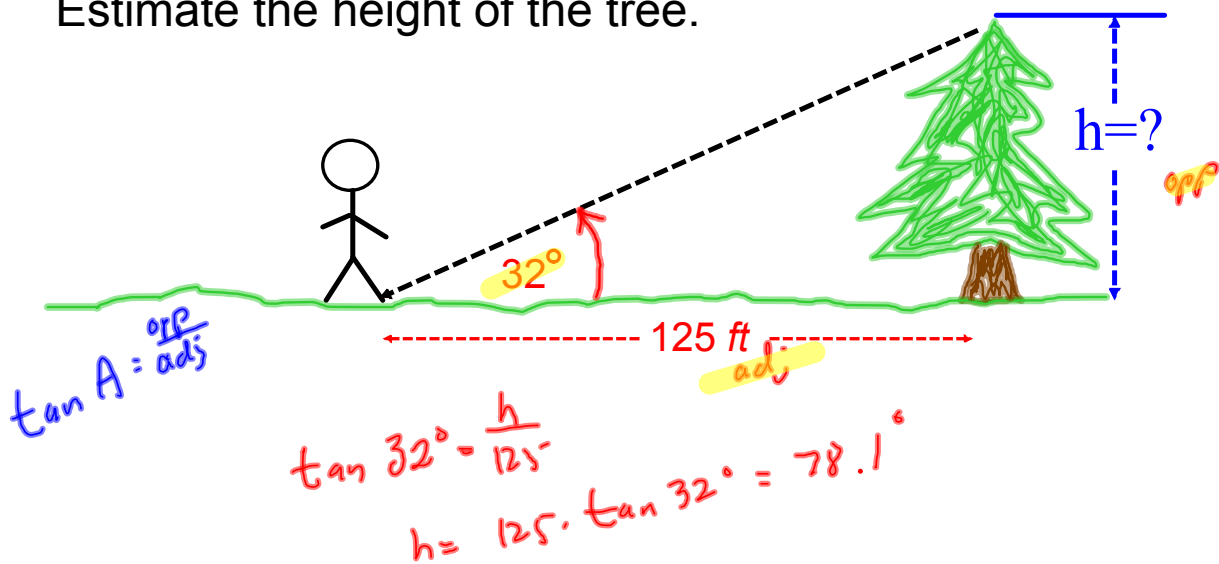
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Practice

Pg 472, # 4 - 9

④ 11.2 $\tan 43^\circ = \frac{x}{12}$

⑤ 12.3 $\tan 51^\circ = \frac{x}{10}$ or $\tan 39^\circ = \frac{10}{x}$
 $\frac{x \tan 39^\circ = 10}{\tan 39^\circ} = \frac{10}{\tan 39^\circ}$
 $x = \frac{10}{\tan 39^\circ}$

⑥ 14.4 $\tan 64^\circ = \frac{x}{7}$

⑦ 2.5 $\tan 23^\circ = \frac{x}{6}$ or $\tan 67^\circ = \frac{6}{x}$

⑧ 1.6 $\tan 37^\circ = \frac{x}{2.1}$

⑨ 21.4 $\tan 25^\circ = \frac{10}{x} \rightarrow x = \frac{10}{\tan 25^\circ}$

What if...

What if you knew the tangent ratio ...

...what angle produced it?

...in other words, the angle whose tan is x ?

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$$\tan = \frac{\text{opp}}{\text{adj}} = \frac{\sqrt{3}}{1}$$

What if...

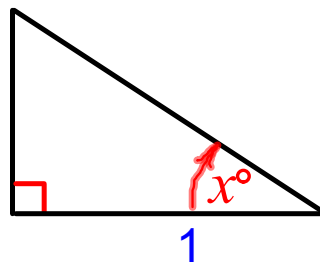
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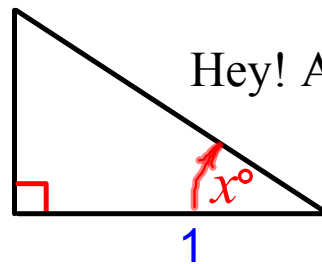
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Hey! A 30-60-90 Δ !

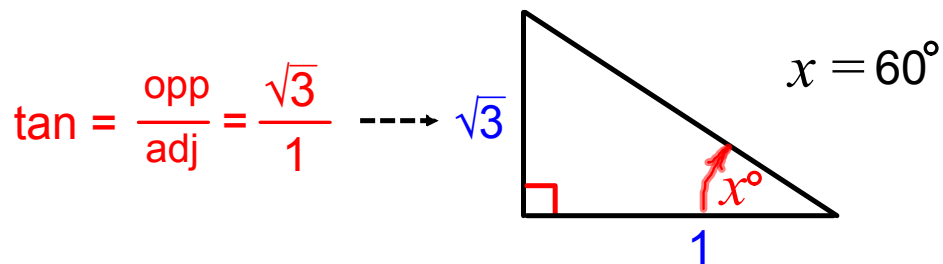
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Defn: Inverse tangent *arc tan*

$\tan^{-1}(x)$

↳ the measure of the angle whose tan is x .

Defn: Inverse tangent

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↳ **degrees!**

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→ **degrees!**

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\downarrow
 60°

Defn: Inverse tangent

$$\tan^{-1}(x) = \tan^{-1}\left(\frac{\text{opp}}{\text{adj}}\right)$$

Defn: Inverse tangent

$$\tan^{-1}(x) = \tan^{-1}\left(\frac{\text{opp}}{\text{adj}}\right) = \text{m}\angle$$

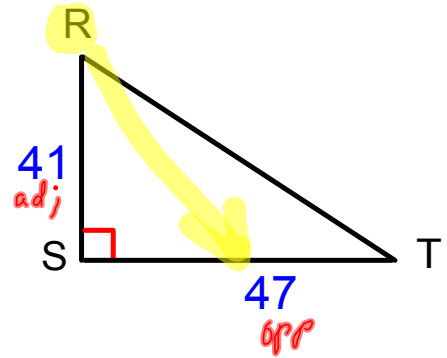
\uparrow \uparrow
degrees

$\tan^{-1}\left(\frac{\text{opp}}{\text{adj}}\right)$ = the measure of the angle whose tan is $\frac{\text{opp}}{\text{adj}}$

Example

Find $m\angle R$ to nearest 10^{th} of a degree.

$$\tan^{-1}\left(\frac{47}{41}\right) = 48.9^\circ$$



1

Practice

Pg 473, #11-13



What does this sign mean?



What does this sign mean?
...how steep the road is.



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What is the math term for
steepness of a line?



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How does slope relate to tan?

$$\text{slope} = \frac{\text{rise}}{\text{run}} = \frac{\text{opp}}{\text{adj}}$$



What does this sign mean?
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...it is the same!



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What is the measure of the \angle
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What is the measure of the \angle the road makes w/the ground?
 $18\% = \frac{18}{100}$



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$$\tan x = \frac{18}{100} \text{ so what is } x?$$



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$$\tan x = \frac{18}{100} \text{ so what is } x?$$

$$m\angle = \tan^{-1}\left(\frac{18}{100}\right) \approx 10.2^\circ$$

HW Problems

Pg 473, #1-22, 26-29, 31-43 odd, 53, 54

Pg 468, #1-11

