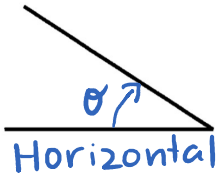
1.3 Finding Lengths

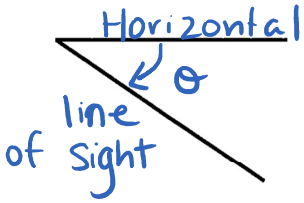
Wednesday, June 15, 2022 1:14 PM

1.3 Using the Sine, Cosine and Tangent Ratios to Calculate Lengths

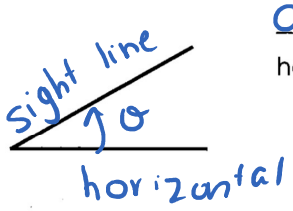
Vocabulary



angle of inclination: An acute angle formed between a line or line segment and the horizontal.



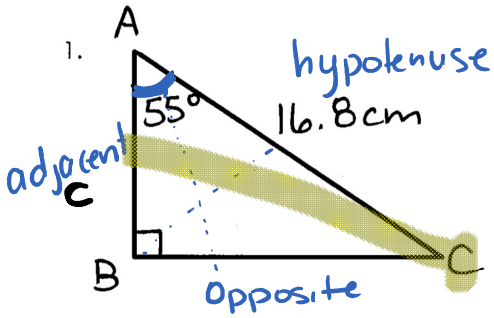
angle of depression: An angle formed between the horizontal through eye level and a line of sight to a point **below** eye level.



angle of elevation: An angle formed between the horizontal through eye level and a line of sight to a point **above** eye level.

EXAMPLE 1: Find the length of the indicated side to the nearest tenth.

1.



Find the length of c to the nearest tenth.

~~SOH~~ CAH TOA

$\cos\theta = \frac{A}{H}$

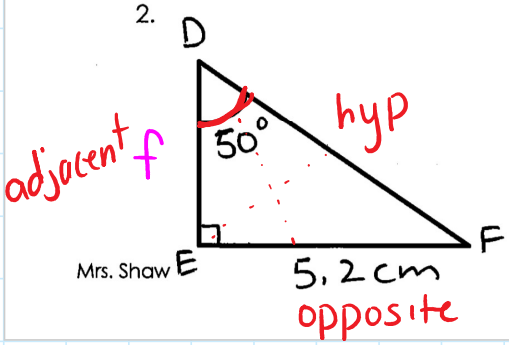
$\cos 55^\circ = \frac{c}{16.8}$

$16.8(\cos 55^\circ) = \left(\frac{c}{16.8}\right)16.8$

$16.8(0.5736) = c$

$c = 9.6$

2.



Find the length of f to the nearest tenth.

~~SOH~~ CAH TOA

$\tan\theta = \frac{O}{A}$

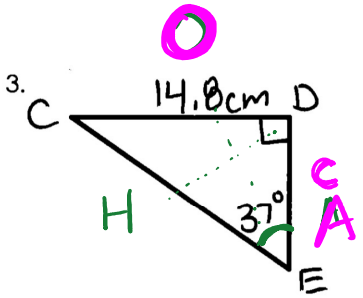
$f(\tan 50^\circ) = \left(\frac{5.2}{f}\right)f$

$\frac{f(\tan 50^\circ)}{\tan 50^\circ} = \frac{5.2}{\tan 50^\circ}$

$f = \frac{5.2}{\tan 50^\circ} = \frac{5.2}{1.1918}$

$f = 4.4$

3. Find the length of c to the nearest tenth.

3. 

Find the length of c to the nearest tenth.

SOH CAT TOA

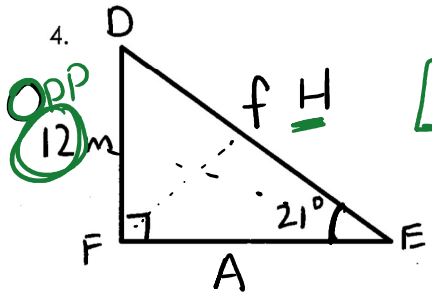
$\tan\theta = \frac{O}{A}$

$\tan 37° = \frac{14.8}{c}$

$c\tan 37° = 14.8$

$\frac{c\tan 37°}{\tan 37°} = \frac{14.8}{\tan 37°}$

$c = \frac{14.8}{\tan 37°} = \frac{14.8}{.7536} = 19.6$

4. 

Find the length of DE to the nearest tenth.

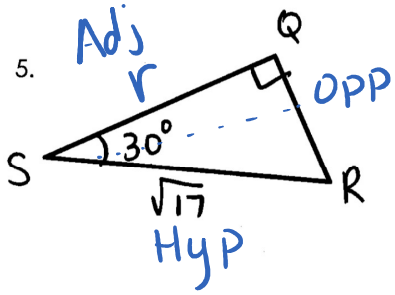
SOH CAH TOA

$\sin\theta = \frac{O}{H}$

$f\sin 21° = 12$

$\frac{f\sin 21°}{\sin 21°} = \frac{12}{\sin 21°}$

$f = \frac{12}{\sin 21°} = \frac{12}{.3584} = 33.5$

5. 

Find the length of r to the nearest hundredth.

SOH CAH TOA

$\cos\theta = \frac{A}{H}$

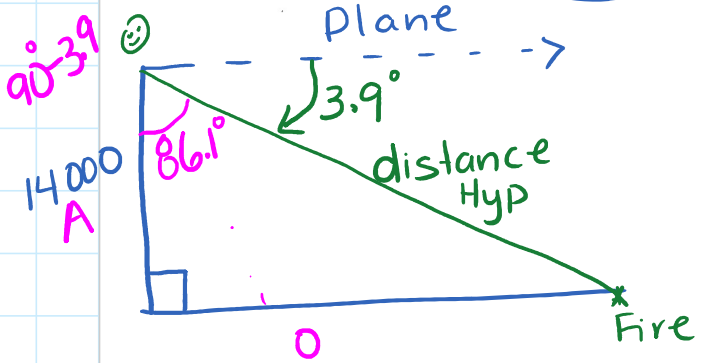
$\sqrt{17}\cos 30° = \frac{r}{\sqrt{17}}\sqrt{17}$

$(\sqrt{17})(\cos 30°) = r$

$(4.1231)(.8660) = r$

$r = 3.57$

6. A plane flying at an altitude of 14, 000 ft sees a fire at an angle of depression of 3.9°. How far is the plane from the fire?



SOH CAH TOA

$\cos\theta = \frac{A}{H}$

$d\cos 86.1 = \frac{14000}{d}d$

$\frac{d\cos 86.1}{\cos 86.1} = \frac{14000}{\cos 86.1}$

$d = \frac{14000}{\cos 86.1} = \frac{14000}{.0680}$

$d = 205\,882.35$ ft

Practice: p.82 #4ab, 6, 8, 9a, 10 ; p.101 #6, 7, 9, 10