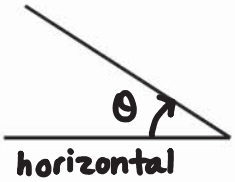
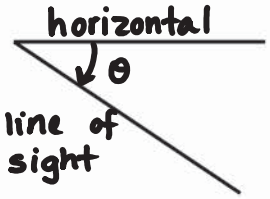
2.1- 2.5 Using the Sine, Cosine and Tangent Ratios to Calculate Lengths

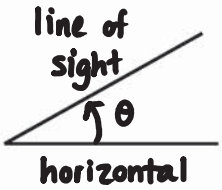
Vocabulary



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

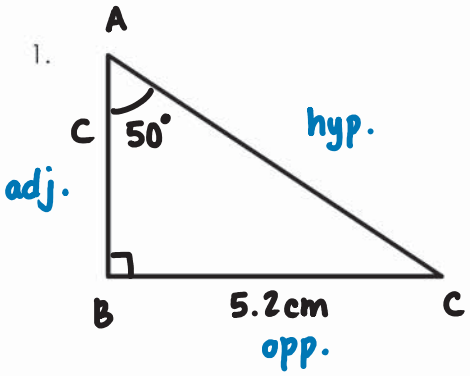


angle of depression : An angle formed between the horizontal through eye level and a line of sight to a point **below** eye level.



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

1.



Find the length of c to the nearest tenth.

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

$\frac{\div \tan 50^\circ}{1} = \frac{5.2}{c}$ ×

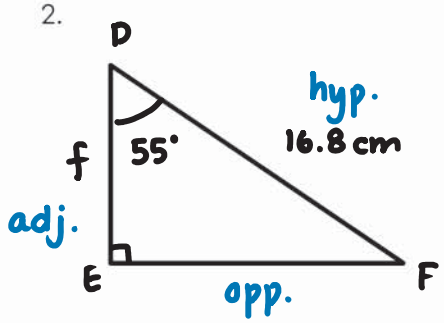
$c = \frac{(1)(5.2)}{\tan 50^\circ}$

$= \frac{5.2}{1.1918}$

$= 4.363$

$c = 4.4\text{cm}$

2.



Find the length of f to the nearest tenth.

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

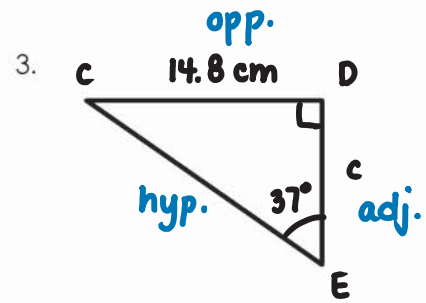
$\frac{\cos 55^\circ}{\div 1} = \frac{f}{16.8}$ ×

$f = \frac{(16.8)(\cos 55^\circ)}{1}$

$= \frac{(16.8)(0.5736)}{1}$

$= 9.636$

$f = 9.6\text{ cm}$

3. 

Find the length of c to the nearest tenth.

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

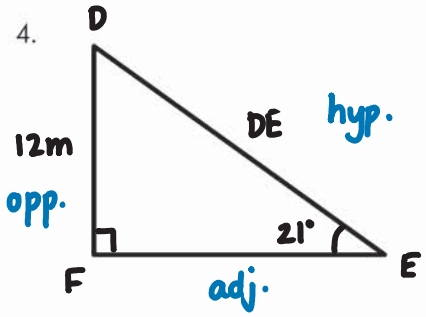
$\frac{\tan 37^\circ}{1} = \frac{14.8}{c}$ (÷, ×)

$c = \frac{(1)(14.8)}{\tan 37^\circ}$

$= \frac{14.8}{0.7536}$

$= 19.640$

$c = 19.6\text{cm}$

4. 

Find the length of DE to the nearest tenth.

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

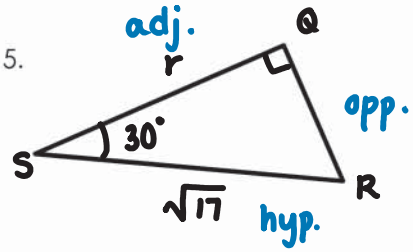
$\frac{\sin 21^\circ}{1} = \frac{12}{DE}$ (÷, ×)

$DE = \frac{(1)(12)}{\sin 21^\circ}$

$= \frac{12}{0.3584}$

$= 33.485$

$DE = 33.5\text{ m}$

5. 

Find the length of r to the nearest hundredth.

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

$\frac{\cos 30^\circ}{1} = \frac{r}{\sqrt{17}}$ (÷, ×)

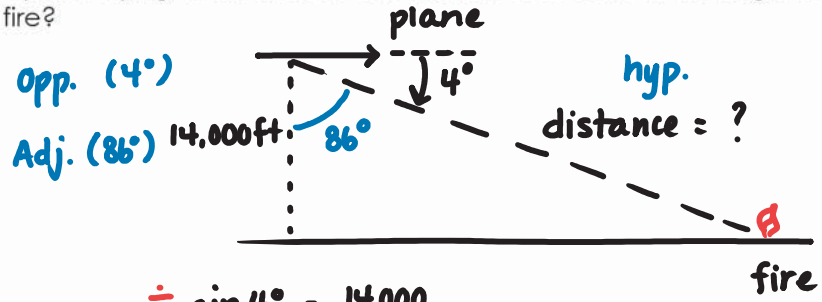
$r = \frac{(\sqrt{17})(\cos 30^\circ)}{1}$

$= \frac{(4.1231)(0.8660)}{1}$

$= 3.5707$

$r = 3.57$

6. A plane flying at an altitude of 14, 000 ft sees a fire at an angle of depression of ~~2°~~ 4°. How far is the fire?



$\frac{\sin 4^\circ}{1} = \frac{14000}{H}$ (÷, ×)

$H = \frac{(1)(14000)}{\sin 4^\circ} = \frac{14000}{0.06976} = 200698.2\text{ ft}$

$H = 200700\text{ ft}$ (or 200698 ft)

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