Lesson 6A

1. $\cos 25º16' = \dfrac{5,280}{D}$

$D\cos 25º16' = 5,280$

$D = \dfrac{5,280}{\cos 25º16'}$

$D \approx 5,838.77 \text{ ft}$

2. $\tan 25º16' = \dfrac{M}{5,280}$

$M = (5,280)(\tan 25º16')$

$M \approx 2,492.09 \text{ ft}$

3. $\csc\theta = \dfrac{2\sqrt{31}}{4} = \dfrac{\sqrt{31}}{2}$

4. $\sec\theta = \dfrac{2\sqrt{31}}{6\sqrt{3}} = \dfrac{\sqrt{31}}{3\sqrt{3}} = \dfrac{\sqrt{31}\sqrt{3}}{3\sqrt{3}\sqrt{3}} = \dfrac{\sqrt{93}}{9}$

5. $\cot\theta = \dfrac{6\sqrt{3}}{4} = \dfrac{3\sqrt{3}}{2}$

6. $\csc\alpha = \dfrac{\sqrt{93}}{9}$

7. $\sec\alpha = \dfrac{\sqrt{31}}{2}$

8. $\cot\alpha = \dfrac{2\sqrt{3}}{9}$

9. $\sin\theta = \dfrac{4}{2\sqrt{31}} \approx .3592$

10. $\cos\theta = \dfrac{6\sqrt{3}}{2\sqrt{31}} \approx .9333$

11. $\tan\theta = \dfrac{4}{6\sqrt{3}} \approx .3849$

12. $\sin\alpha = \dfrac{6\sqrt{3}}{2\sqrt{31}} \approx .9333$

13. $\cos\alpha = \dfrac{4}{2\sqrt{31}} \approx .3592$

14. $\tan\alpha = \dfrac{6\sqrt{3}}{4} \approx 2.5981$

15. $\arcsin .3592 \approx 21.05º$

16. $\arcsin .9333 \approx 68.96º$

17. $\tan 54.6º = \dfrac{B}{12}$

$B = (12)(\tan 54.6º) \approx 16.89$

$\sin 35.4º = \dfrac{12}{A}$

$A\sin 35.4º = 12$

$A = \dfrac{12}{\sin 35.4º} \approx 20.72$

$\alpha = 90 - 35.4º = 54.6º$

18. $\sin 61º = \dfrac{D}{59}$

$D = (59)(\sin 61º) \approx 51.6$

$\cos 61º = \dfrac{C}{59}$

$C = (59)(\cos 61º) \approx 28.6$

$\alpha = 90º - 29º = 61º$

19. $\tan 47.34º = \dfrac{F}{100}$

$F = (100)(\tan 47.34º)$

$F \approx 108.52$

$\sin 42.66º = \dfrac{100}{E}$

$E\sin 42.66º = 100$

$E = \dfrac{100}{\sin 42.66º} \approx 147.57$

$\alpha = 90º - 42.66º = 47.34º$

20. $\tan 41.54º = \dfrac{G}{47}$

$G = (47)(\tan 41.54º) \approx 41.64$

$\cos 41.54º = \dfrac{47}{H}$

$H\cos 41.54º = 47$

$H = \dfrac{47}{\cos 41.54º} \approx 62.79$

$\alpha = 90º - 41º32'10" = 48º27'50"$

$\theta \approx 41.54º$

Lesson 6B

1. $15°30' = 15.5°$

   $\sin 15.5° = \dfrac{7.3}{X}$

   $X = \dfrac{7.3}{\sin 15.5°} \approx 27.32$ ft
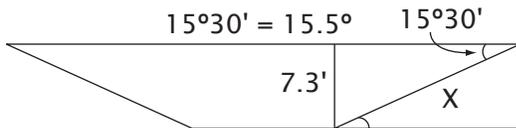
2. $29°3' \approx 29.05°$

   $\tan 29.05° = \dfrac{B}{110}$

   $B = (110)(\tan 29.05°)$

   $B \approx 61.1$ ft
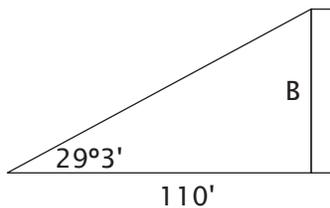
3. $\csc \theta = \dfrac{11}{4.6} = \dfrac{110}{46} = \dfrac{55}{23}$

4. $\sec \theta = \dfrac{11}{10}$

5. $\cot \theta = \dfrac{10}{4.6} = \dfrac{100}{46} = \dfrac{50}{23}$

6. $\csc \alpha = \dfrac{11}{10}$

7. $\sec \alpha = \dfrac{11}{4.6} = \dfrac{110}{46} = \dfrac{55}{23}$

8. $\cot \alpha = \dfrac{4.6}{10} = \dfrac{46}{100} = \dfrac{23}{50}$

9. $\sin \theta = \dfrac{4.6}{11} \approx .4182$

10. $\cos \theta = \dfrac{10}{11} \approx .9091$

11. $\tan \theta = \dfrac{4.6}{10} = .4600$

12. $\sin \alpha = \dfrac{10}{11} \approx .9091$

13. $\cos \alpha = \dfrac{4.6}{11} \approx .4182$

14. $\tan \alpha = \dfrac{10}{4.6} \approx 2.1739$

15. $\arcsin .4182 \approx 24.7°$

16. $\arcsin .9091 \approx 65.4°$

17. $\tan 72° = \dfrac{K}{12}$

    $K = (12)(\tan 72°)$

    $K \approx 36.93$

    $\sin 18° = \dfrac{12}{J}$

    $J = \dfrac{12}{\sin 18°} \approx 38.83$

18. $\sin 29° = \dfrac{M}{59}$

    $M = (59)(\sin 29°)$

    $M \approx 28.60$

    $\cos 29° = \dfrac{L}{59}$

    $L = (59)(\cos 29°)$

    $L \approx 51.60$

19. $\sin 23° = \dfrac{10.25}{N}$

    $N \sin 23° = 10.25$

    $N = \dfrac{10.25}{\sin 23°} \approx 26.23$

    $\tan 67° = \dfrac{P}{10.25}$

    $P = (10.25)(\tan 67°)$

    $P \approx 24.15$

20. $2\sqrt{13} \approx 7.21$

    $\tan \theta \approx \dfrac{7.21}{6}$

    $\arctan \theta \approx 1.2017$

    $\theta \approx 50.23°$

    $\alpha \approx 90° - 50.23°$

    $\alpha \approx 39.77°$

    $\sin 39.77° = \dfrac{6}{Q}$

    $Q = \dfrac{6}{\sin 39.77°}$

    $Q \approx \dfrac{6}{.6397}$

    $Q \approx 9.38$

Lesson 6C

1. $\tan 43º = \dfrac{C}{120}$

   $C = (120)(\tan 43º)$

   $C \approx 111.90$ ft

2. $\tan 38º = \dfrac{B}{120}$
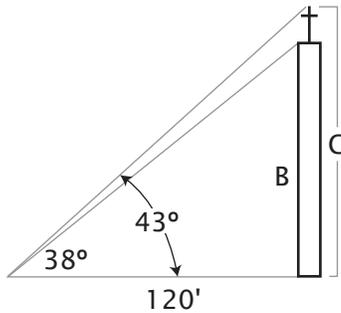
   $B = (120)(\tan 38º)$

   $B \approx 93.75$ ft

   height of cross:

   $111.90 - 93.75 = 18.15$ ft

3. $\csc\theta = \dfrac{15}{7.1} = \dfrac{150}{71}$

4. $\sec\theta = \dfrac{15}{13.2} = \dfrac{150}{132} = \dfrac{25}{22}$

5. $\cot\theta = \dfrac{13.2}{7.1} = \dfrac{132}{71}$

6. $\csc\alpha = \dfrac{15}{13.2} = \dfrac{150}{132} = \dfrac{25}{22}$

7. $\sec\alpha = \dfrac{15}{7.1} = \dfrac{150}{71}$

8. $\cot\alpha = \dfrac{7.1}{13.2} = \dfrac{71}{132}$

9. $\sin\theta = \dfrac{7.1}{15} \approx .4733$

10. $\cos\theta = \dfrac{13.2}{15} = .8800$

11. $\tan\theta = \dfrac{7.1}{13.2} \approx .5379$

12. $\sin\alpha = \dfrac{13.2}{15} = .8800$

13. $\cos\alpha = \dfrac{7.1}{15} \approx .4733$

14. $\tan\alpha = \dfrac{13.2}{7.1} \approx 1.8592$

15. $\arcsin .4733 \approx 28.25º$

16. $\arcsin .8800 \approx 61.64º$

17. $\sin 40º = \dfrac{R}{25}$

    $R = (25)(\sin 40º)$

    $R \approx 16,07$

    $\cos 40º = \dfrac{S}{25}$

    $S = (25)(\cos 40º)$

    $S \approx 19,15$

    $\alpha = 90º - 40º$

    $\alpha = 50º$

18. $\alpha = 90º - 36,2º$

    $\alpha = 53,8º$

    $\tan 53,8º = \dfrac{U}{88}$

    $U = (88)(\tan 53,8º)$

    $U \approx 120,24$

    $\sin 36,2º = \dfrac{88}{T}$

    $T\sin 36,2º = 88$

    $T = \dfrac{88}{\sin 36,2º} \approx 149,00$

19. $\alpha = 90º - 51,9º$

    $\alpha = 38,1º$

    $\tan 38,1º = \dfrac{W}{150}$

    $W = (150)(\tan 38,1º)$

    $W \approx 117,62$

    $\sin 51,9º = \dfrac{150}{V}$

    $V\sin 51,9º = 150$

    $V = \dfrac{150}{\sin 51,9º} \approx 190,61$

20. $7^2 + X^2 = \left(\sqrt{95}\right)^2$

    $49 + X^2 = 95$

    $X^2 = 46$

    $X = \sqrt{46}$

    $X \approx 6.78$

    $\tan\theta = \dfrac{6.78}{7}$

    $\tan\theta \approx .9686$

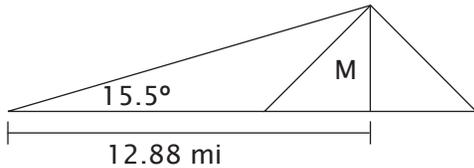 $\theta = \arctan .9686$

    $\theta \approx 44.1º$

    $\alpha = 90 - 44.1º = 45.9º$

Lesson 6D

1. $\tan 15.5° = \dfrac{M}{12.88}$

   $M = (12.88)(\tan 15.5°)$

   $M \approx 3.57$ mi

2. $\tan 64.75° = \dfrac{B}{60.7}$

   $B = (60.7)(\tan 64.75°)$

   $B \approx 128.7$ ft
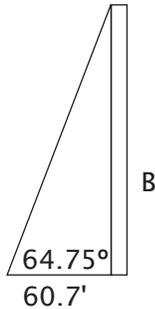
3. $(18.33)^2 + X^2 = 25^2$

   $336 + X^2 = 625$

   $X^2 = 289$

   $X = 17$

   $\csc\theta = \dfrac{25}{17}$

4. $\sec\theta = \dfrac{25}{18.33} = \dfrac{2500}{1833}$

5. $\cot\theta = \dfrac{18.33}{17} = \dfrac{1833}{1700}$

6. $\csc\alpha = \dfrac{25}{18.33} = \dfrac{2500}{1833}$

7. $\sec\alpha = \dfrac{25}{17}$

8. $\cot\alpha = \dfrac{17}{18.33} = \dfrac{1700}{1833}$

9. $\sin\theta = \dfrac{17}{25} = .6800$

10. $\cos\theta = \dfrac{18.33}{25} = .7332$

11. $\tan\theta = \dfrac{17}{18.33} \approx .9274$

12. $\sin\alpha = \dfrac{18.33}{25} = .7332$

13. $\cos\alpha = \dfrac{17}{25} = .6800$

14. $\tan\alpha = \dfrac{18.33}{17} \approx 1.0782$

15. $\arcsin .6800 \approx 42.84°$

16. $\arcsin .7332 \approx 47.16°$

17. $2^2 + 2.24^2 = Y^2$

    $4 + 5.00 = Y^2$

    $9 = Y^2$

    $Y = 3$

    $\cos\theta = \dfrac{2}{3} \approx .6667$

    $\theta = \arccos .6667 \approx 48.19°$

    $\alpha = 90 - 48.19° = 41.81°$

18. $\tan 40.8° = \dfrac{A}{10.5}$

    $A = (10.5)(\tan 40.8°)$

    $A \approx 9.06$

    $\sin 49.2° = \dfrac{10.5}{Z}$

    $Z\sin 49.2° = 10.5$

    $Z = \dfrac{10.5}{\sin 49.2°} \approx 13.87$

    $\alpha = 90° - 49.2° = 40.8°$

19. $\tan 29.07° = \dfrac{C}{56}$

    $C = (56)(\tan 29.07°)$

    $C \approx 31.13$

    $\cos 29.07° = \dfrac{56}{B}$

    $B\cos 29.07° = 56$

    $B = \dfrac{56}{\cos 29.07} \approx 64.07$
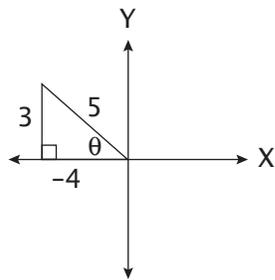
    $\alpha = 90° - 29.07° = 60.93°$

20.

$$\tan\theta = \frac{10}{14}$$

$$\tan\theta \approx .7143$$

$$\theta = \arctan .7143 \approx 35.54º$$

$$\alpha = 90º - 35.54º = 54.46º$$

$$10^2 + 14^2 = D^2$$

$$100 + 196 = D^2$$

$$296 = D^2$$
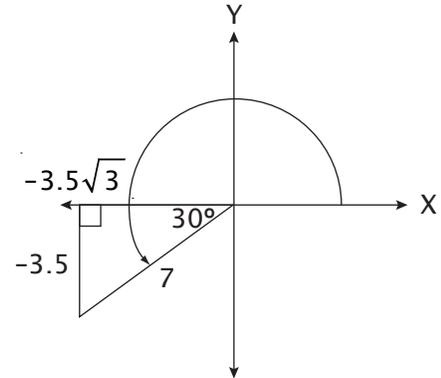
$$\sqrt{296} = D^2$$

$$D \approx 17.20$$

Lesson 7A

1. $-330º = $ I, $30º$
2. $-130º = $ III, $50º$
3. $130º = $ II, $50º$
4. $\cos 300º = $ IV, $60º$, $\frac{1}{2}$
5. $\sin 405º = $ I, $45º$, $\frac{\sqrt{2}}{2}$
6. $\tan 120º$, II, $60º$, $-\sqrt{3}$
7. $(-4, 3)$

$$\sin\theta = \frac{3}{5} \qquad \csc\theta = \frac{5}{3}$$

$$\cos\theta = \frac{-4}{5} \qquad \sec\theta = \frac{5}{-4}$$

$$\tan\theta = \frac{3}{-4} \qquad \cot\theta = \frac{-4}{3}$$

8.

hyp	θ	ref	quad	sinθ	cosθ	tanθ
7	210º	30º	III	$\frac{-1}{2}$	$\frac{-\sqrt{3}}{2}$	$\frac{\sqrt{3}}{3}$

9.

hyp	θ	ref	quad	sinθ	cosθ	tanθ
$7\sqrt{2}$	225º	45º	III	$\frac{-\sqrt{2}}{2}$	$\frac{-\sqrt{2}}{2}$	1

10. $\alpha = 90º - 18º = 72º$

$$\sin 18º = \frac{9}{Y}$$

$$Y \sin 18º = 9$$

$$Y = \frac{9}{\sin 18º} \approx 29.1$$

$$\tan 72º = \frac{X}{9}$$

$$X = (9)(\tan 72º)$$

$$X \approx 27.7$$

4. $\dfrac{3}{10} = \dfrac{X}{9}$

$X = \dfrac{27}{10} = 2.7$

round to 3 and add:

.8584

Honors Lesson 4

1. $4X^2 - 9Y^2 = (2X + 3Y)(2X - 3Y)$

2. $8X^3 - Y^3 = (2X - Y)(4X^2 + 2XY + Y^2)$

3. $(2X^3 + 2X^2) + (3X + 3) =$

    $2X^2(X + 1) + 3(X + 1) =$

    $(2X^2 + 3)(X + 1)$

4. $a^6 - b^3 = (a^2 - b)(a^4 + a^2b + b^2)$

5. $Y^4 - 8Y^2 + 12 =$

    $W^2 - 8W + 12 =$

    $(W - 6)(W - 2) =$

    $(Y^2 - 6)(Y^2 - 2)$

6. $64r^3 + 8w^3 = (4r + 2w)(16r^2 - 8rw + 4w^2)$

    $\qquad = 8(2r + w)(4r^2 - 2rw + w^2)$

7. $(B^3 + 2B^2) - (3B + 6) =$

    $B^2(B + 2) - 3(B + 2) =$

    $(B^2 - 3)(B + 2)$

8. $X + 5\sqrt{X} + 6 =$

    $W^2 + 5W + 6 =$

    $(W + 2)(W + 3) =$

    $(\sqrt{X} + 2)(\sqrt{X} + 3)$

Honors Lesson 5

You may have factored some of these in a different order, but your results should be the same.

1. $\dfrac{X^2Y^3}{X^2 - 4X - 5} \times \dfrac{2X^2 - 13X + 15}{XY^3} =$

    $\dfrac{XX\!\!\!\diagdown Y^3}{(X + 1)(X\!\!\!\diagdown 5)} \times \dfrac{(2X - 3)(X\!\!\!\diagdown 5)}{XY^3} =$

    $\dfrac{X}{(X + 1)} \times \dfrac{(2X - 3)}{1} = \dfrac{X(2X - 3)}{X + 1} = \dfrac{2X^2 - 3X}{X + 1}$

2. $\dfrac{4X^2 - 4}{X^2 + 4X - 5} \div \dfrac{X^3 + 2X^2}{3X + 15} =$

    $\dfrac{(2X + 2)(2X - 2)}{(X + 5)(X - 1)} \times \dfrac{3(X + 5)}{X^2(X + 2)} =$

    $\dfrac{4(X + 1)(X\!\!\!\diagdown 1)}{(X\!\!\!\diagdown 5)(X\!\!\!\diagdown 1)} \times \dfrac{3(X\!\!\!\diagdown 5)}{X^2(X + 2)} =$

    $\dfrac{12(X + 1)}{X^2(X + 2)}$

3. $\dfrac{X - 3}{-X^2 + 4X - 3} = -\dfrac{X - 3}{X^2 - 4X + 3} =$

    $-\dfrac{X\!\!\!\diagdown 3}{(X - 1)(X\!\!\!\diagdown 3)} = -\dfrac{1}{X - 1} = \dfrac{1}{1 - X}$

4. $\dfrac{2 - X}{X^3 - 8} = -\dfrac{X\!\!\!\diagdown 2}{(X\!\!\!\diagdown 2)(X^2 + 2X + 4)} =$

    $\dfrac{-1}{X^2 + 2X + 4}$

5. $\dfrac{a^{2X} - b^{2X}}{a^X + b^X} = \dfrac{(a^X + b^X)(a^X - b^X)}{(a^X + b^X)} = a^X - b^X$

6. $\dfrac{X^{2n} + 1}{1 - X^{4n}} \times \dfrac{1 - X^2}{X^{2n} + 1} \times \dfrac{X^{4n} - 1}{X + 1} =$

    $\dfrac{1}{1 - X^{4n}} \times \dfrac{1 - X^2}{1} \times \dfrac{X^{4n} - 1}{X + 1} =$

    $\dfrac{-1}{X^{4n} - 1} \times \dfrac{X^2 - 1}{-1} \times \dfrac{X^{4n} - 1}{X + 1} =$

    $\dfrac{-1}{1} \times \dfrac{(X + 1)(X - 1)}{-1} \times \dfrac{1}{X + 1} =$

    $\dfrac{-1}{1} \times \dfrac{X - 1}{-1} \times \dfrac{1}{1} = X - 1$

Honors Lesson 6

$\tan 60^\circ = \dfrac{1.6}{X}$

1. $1.7321 = \dfrac{1.6}{X}$

    $1.7321X = 1.6$

    $X = .9237 \text{ m}$
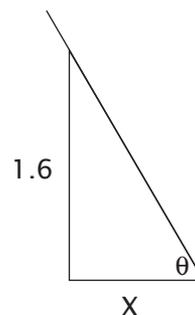
2. $\tan\theta = \dfrac{1.6}{1} = 1.6$

$\theta \approx 58°$

3. $\tan\theta = \dfrac{16}{20}$

$\tan\theta = .8000$

$\theta = 38.7°$

4. done

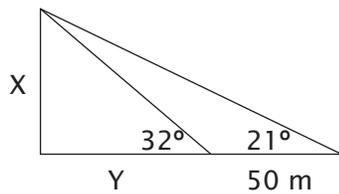5. $\tan 32° = \dfrac{X}{Y}$ $\tan 21° = \dfrac{X}{Y+50}$

$.6249 = \dfrac{X}{Y}$ $.3839 = \dfrac{.6249Y}{Y+50}$

$X = .6249Y$ $(Y+50)(.3839) = .6249Y$

$.3839Y + 19.195 = .6249Y$
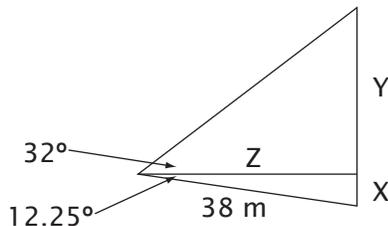
$19.195 = .241Y$

$Y = 79.65$ meters

X

32°   21°

Y   50 m

6. $12°15' = 12.25°$

$\sin 12.25° = \dfrac{X}{38}$ $\tan 12.25° = \dfrac{8.06}{Z}$ $\tan 32° = \dfrac{Y}{37.13}$

$.2122 = \dfrac{X}{38}$ $.2171 = \dfrac{8.06}{Z}$ $.6249 = \dfrac{Y}{37.13}$

$X = 8.06$ m $.2171Z = 8.06$ $Y = 23.20$ m

$Z = 37.13$ m

32°

12.25°

Z

38 m

Y

X

$Y + X = 23.20 + 8.06 = 31.26$ m

Honors Lesson 7

1. The angle of elevation from the ponds is the same as the angle of depression from the top of the mountain. (alternate interior angles)

$\tan 24° = \dfrac{350}{Y}$ $\tan 35° = \dfrac{350}{X}$

$.4452 = \dfrac{350}{Y}$ $.7002 = \dfrac{350}{X}$
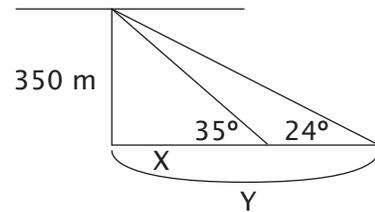
$.4452Y = 350$ $.7002X = 350$

$Y = 786.2$ m $X = 499.9$ m

$Y - X = 786.2 - 499.9 = 286.3$ m

There is more than one way to draw and solve many of these problems. Depending on the level of accuracy needed, you may also chose to round later in your calculations.

You can review significant digits in Algebra 1 or Honors for Algebra 2 .

350 m

35°   24°

X

Y

2. $42°30' = 42.5°$

$36°45' = 36.75°$

Adding an extra line 22 m above the ground is helpful here. It creates a rectangle with height 22 length X.

$\tan 36.75 = \dfrac{Y}{X}$ $\tan 42.5 = \dfrac{Y+22}{X}$

$.7467 = \dfrac{Y}{X}$ $.9163 = \dfrac{Y+22}{X}$

$X = \dfrac{Y}{.7467}$ $.9163X = Y+22$

$.9163(\dfrac{Y}{.7467}) = Y+22$

$1.2271Y = Y+22$

$.2271Y = 22$

$Y = 96.9$ m

$Y + 22 = 96.9 + 22 = 118.9$ m above the ground

Y

22 m

X

42.5°

36.75°

22 m

X