LESSON 166

1. $14^2 = 6^2 + x^2$

$x^2 = 160$

$x = 4\sqrt{10}$

2. A

3. no; $(2\sqrt{15})^2 \neq 7^2 + 3^2$

4. obtuse; $12^2 > 6^2 + 10^2$

5. A 45-45-90 triangle has sides in the ratio 1:1:$\sqrt{2}$.
So, $a = 5$ and $b = 5\sqrt{2}$.

6. A 30-60-90 triangle has sides in the ratio 1 : $\sqrt{3}$: 2.
So, $a = 4\sqrt{3}$ and $b = 2(4) = 8$.

7. $\sin\theta = \frac{3}{5}$ $\cos\theta = \frac{4}{5}$ $\tan\theta = \frac{3}{4}$

8. $\sin\theta = \frac{2\sqrt{2}}{3}$ $\cos\theta = \frac{1}{3}$ $\tan\theta = 2\sqrt{2}$

9.

	30°	45°	60°
sin	$\frac{1}{2}$	$\frac{1}{\sqrt{2}} = \frac{\sqrt{2}}{2}$	$\frac{\sqrt{3}}{2}$
cos	$\frac{\sqrt{3}}{2}$	$\frac{1}{\sqrt{2}} = \frac{\sqrt{2}}{2}$	$\frac{1}{2}$
tan	$\frac{1}{\sqrt{3}} = \frac{\sqrt{3}}{3}$	1	$\sqrt{3}$

10. sin 53° = 0.79863… ≈ 0.7986
cos 53° = 0.60181… ≈ 0.6018
tan 53° = 1.32704… ≈ 1.327

11. The sine of an acute angle is equal to the cosine of its complement. The cosine of an acute angle is equal to the sine of its complement.
sin 25° = cos(90° − 25°) = cos 65°
cos 25° = sin(90° − 25°) = sin 65°

12. x° and y° are complementary. The sine of an acute angle is equal to the cosine of its complement.
sin y° = cos x° = 5/13

13. The tangent of an acute angle is the reciprocal of the tangent of its complement.
tan y° = 3

14. $\sin 68° = \frac{15}{a}$ and $\tan 68° = \frac{15}{b}$

$a \sin 68° = 15$ $b \tan 68° = 15$

$a = \frac{15}{\sin 68°}$ $b = \frac{15}{\tan 68°}$

$a \approx 16.2$ $b \approx 6.1$

15. A, D, E

16. $\tan\theta = \frac{27}{12}$

$\theta = \tan^{-1}(27/12)$

$\theta \approx 66°$

17. $AB = \sqrt{5^2 + 10^2} = \sqrt{125} \approx 11.2$

$m\angle A = \tan^{-1}(10/5) \approx 63.4°$

$m\angle B \approx 180 - 90 - 63.4 = 26.6°$

18. $m\angle A = 180 - 90 - 75 = 15°$

$AC = 20 \sin 75° \approx 19.3$

$BC = 20 \cos 75° \approx 5.2$

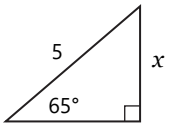
19. included angle = 180 – 41 – 72 = 67°

area = $\frac{1}{2}ab \sin\theta = \frac{1}{2}(16)(11) \sin 67° \approx 81$

20 ~ 22. *Diagrams are not drawn to scale.*

20. $x = 5 \sin 65° \approx 4.5$

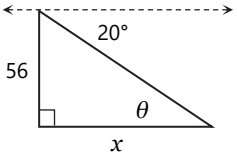
The top of the ladder reaches about 4.5 m high.



21. $\theta = 20°$

$x = 56 / \tan 20° \approx 153.9$

The boat is about 153.9 ft away from the lighthouse.



22. h = 50000 – 10000
= 40000 feet

x = 10 miles x 5280 feet
= 52800 feet

$\theta = \tan^{-1}(h/x) \approx 37°$

The angle of depression is about 37 degrees.