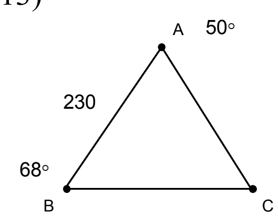
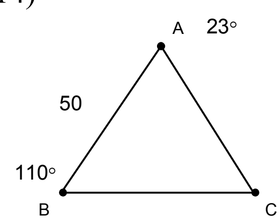
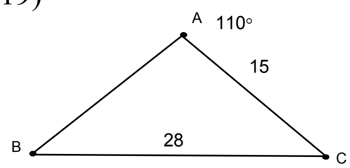
Answer Key 14

6.5: 3, 4, 5, 10, 13, 14, 19, 20
6.6: 3, 4, 5, 11, 13, 14, 15, 25
7.1: 13-18, 37, 39, 42, 50, 64

6.5

3) $\angle C = 180^\circ - \left(98.4^\circ + 24.6^\circ\right) = 57^\circ$ $\frac{\sin 57^\circ}{x} = \frac{\sin 98.6^\circ}{376}$ $x = 376\frac{\sin 57^\circ}{\sin 98.6^\circ} \approx 318.92$	4) $\angle C = 180^\circ - \left(37.5^\circ + 28.1^\circ\right) = 114.4^\circ$ $\frac{\sin 114.4^\circ}{x} = \frac{\sin 37.5^\circ}{17}$ $x = 17\frac{\sin 114.4^\circ}{\sin 37.5^\circ} \approx 25.43$
5) $\angle C = 180^\circ - \left(52^\circ + 70^\circ\right) = 58^\circ$ $\frac{\sin 58^\circ}{26.7} = \frac{\sin 52^\circ}{x}$ $x = 26.7\frac{\sin 52^\circ}{\sin 58^\circ} \approx 24.81$	10) $\angle B = 180^\circ - \left(100^\circ + 30^\circ\right) = 50^\circ$ $\frac{\sin 50^\circ}{2} = \frac{\sin 30^\circ}{BC} = \frac{\sin 100^\circ}{AB}$ $BC = 2\frac{\sin 30^\circ}{\sin 50^\circ} \approx 1.305$ $AB = 2\frac{\sin 100^\circ}{\sin 50^\circ} \approx 2.571$
13)  $\angle C = 180^\circ - \left(50^\circ + 68^\circ\right) = 62^\circ$ $\frac{\sin 62^\circ}{230} = \frac{\sin 68^\circ}{AC} = \frac{\sin 50^\circ}{BC}$ $AC = 230\frac{\sin 68^\circ}{\sin 62^\circ} \approx 241.5$ $BC = 230\frac{\sin 50^\circ}{\sin 62^\circ} \approx 199.5$	14)  $\angle C = 180^\circ - \left(23^\circ + 110^\circ\right) = 47^\circ$ $\frac{\sin 47^\circ}{50} = \frac{\sin 110^\circ}{AC} = \frac{\sin 23^\circ}{BC}$ $AC = 50\frac{\sin 110^\circ}{\sin 47^\circ} \approx 64.24$ $BC = 50\frac{\sin 23^\circ}{\sin 47^\circ} \approx 26.71$

19) 	$\frac{\sin 110^\circ}{28} = \frac{\sin \angle B}{15}$ $\angle B = \sin^{-1}\left(\frac{15\sin 110^\circ}{28}\right) \approx 30.22^\circ$ $\angle C = 180^\circ - \left(110^\circ + 30.22^\circ\right) \approx 39.78^\circ$ $AB = \frac{28\sin 39.78^\circ}{\sin 110^\circ} \approx 19.07$

20) Note that this is an SSA problem

$$\frac{\sin 37^\circ}{30} = \frac{\sin \angle C}{40}$$

$$\angle C = \sin^{-1}\left(\frac{40\sin 37^\circ}{30}\right) \approx 53.36^\circ$$

$$\angle B = 180^\circ - \left(37^\circ + 53.36^\circ\right) \approx 89.64^\circ$$

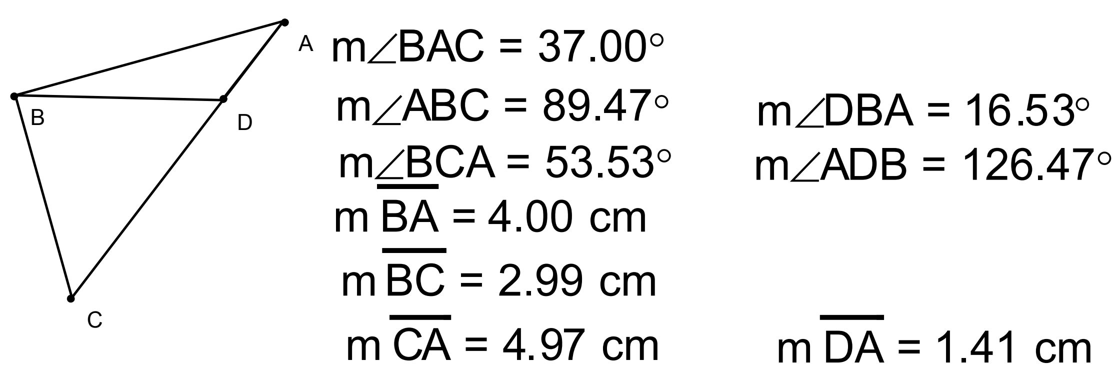
$$AC = \frac{30\sin 89.64^\circ}{\sin 37^\circ} \approx 49.85$$

But $\angle B$ can also be $180^\circ - 53.36^\circ = 126.64^\circ$

$$\angle C = 180^\circ - \left(37^\circ + 126.64^\circ\right) = 16.36^\circ$$

$$AD = \frac{30\sin 16.53^\circ}{\sin 37^\circ} \approx 14.04$$

Note: the angles and lengths below are inaccurate in the last decimal and the lengths are 1/10th the problems values



6.6

3) $x^2 = 21^2 + 42^2 - 2 \cdot 21 \cdot 42\cos 39^\circ$ $x = \sqrt{21^2 + 42^2 - 2 \cdot 21 \cdot 42\cos 39^\circ} \approx$ 28.88	4) $x^2 = 15^2 + 18^2 - 2 \cdot 15 \cdot 18\cos 108^\circ$ $x = \sqrt{15^2 + 18^2 - 2 \cdot 15 \cdot 18\cos 108^\circ} \approx$ 26.76
5) $x^2 = 25^2 + 25^2 - 2 \cdot 25 \cdot 25\cos 140^\circ$ $x = \sqrt{25^2 + 25^2 - 2 \cdot 25 \cdot 25\cos 140^\circ} \approx$ 46.98	11) $AB = \sqrt{10^2 + 18^2 - 2 \cdot 10 \cdot 18\cos 120^\circ} =$ $\sqrt{424 + 180} = \sqrt{604} \approx 24.58$ $\frac{\sin 120^\circ}{\sqrt{604}} = \frac{\sin \angle A}{18}$ $\angle A = \sin^{-1}\left(\frac{18\sin 120^\circ}{\sqrt{604}}\right) \approx 39.37^\circ$ $\angle B = 180^\circ - \left(120^\circ + 39.37^\circ\right) \approx 20.63^\circ$
13) $c = \sqrt{3^2 + 4^2 - 2 \cdot 3 \cdot 4\cos 53^\circ} \approx 3.25$ $\frac{\sin 53^\circ}{3.25} = \frac{\sin \angle A}{3}$ $\angle A = \sin^{-1}\left(\frac{3\sin 53^\circ}{3.25}\right) \approx 47.49^\circ$ $\angle B = 180^\circ - \left(53^\circ + 47.49^\circ\right) \approx 79.51$	14) $a = \sqrt{60^2 + 30^2 - 2 \cdot 60 \cdot 30\cos 70^\circ} \approx 57.17$ $\frac{\sin 70^\circ}{57.17} = \frac{\sin \angle B}{60}$ $\angle B = \sin^{-1}\left(\frac{60\sin 70^\circ}{57.17}\right) \approx 80.47^\circ$ $\angle C = 180^\circ - \left(70^\circ + 80.47^\circ\right) \approx 49.53$
15) $20^2 = 25^2 + 22^2 - 2 \cdot 25 \cdot 22\cos \angle A$ $\angle A = \cos^{-1}\left(\frac{20^2 - 25^2 - 22^2}{-2 \cdot 25 \cdot 22}\right) \approx 49.87^\circ$ $\angle B = \cos^{-1}\left(\frac{25^2 - 20^2 - 22^2}{-2 \cdot 20 \cdot 22}\right) \approx 72.88^\circ$ $\angle B = 180^\circ - \left(49.87^\circ + 72.88^\circ\right) \approx 57.25^\circ$	25) $\frac{\sin\theta}{138} = \frac{\sin 38^\circ}{110}$ $\theta = \sin^{-1}\left(\frac{138\sin 38^\circ}{110}\right) \approx 50.57^\circ$

7.1

13) $$\frac{\sin x \sec x}{\tan x}=\frac{\frac{\sin x}{\cos x}}{\frac{\sin x}{\cos x}}=1$$	14) $$\frac{\cos x \sec x}{\cot x}=\frac{\frac{\cos x}{\cos x}}{\frac{\cos x}{\sin x}}=1\cdot\frac{\sin x}{\cos x}=\tan x$$
15) $$\frac{\sin t+\tan t}{\tan t}=\frac{\sin t}{\frac{\sin t}{\cos t}}+1=\cos t+1$$	16) $$\frac{1+\cot A}{\csc A}=\frac{1+\frac{\cos A}{\sin A}}{\frac{1}{\sin A}}=\frac{\sin A+\cos A}{\sin A}\cdot\frac{\sin A}{1}=$$ $\sin A+\cos A$
17) $\cos^3 x+\sin^2 x\cos x=\cos x\left(\cos^2 x+\sin^2 x\right)=$ $\cos x$	18) $\sin^4\alpha-\cos^4\alpha+\cos^2\alpha=$ $\left(\sin^2\alpha-\cos^2\alpha\right)\left(\sin^2\alpha+\cos^2\alpha\right)+\cos^2\alpha=$ $\sin^2\alpha-\cos^2\alpha+\cos^2\alpha=\sin^2\alpha$

37)

$\cos(-x)-\sin(-x)=\cos(x)+\sin(x)$

$\cos(-x)=\cos(x)$ -> even function property

$\sin(-x)=-\sin(x)$ -> odd function property

$\cos(-x)-\sin(-x)=\cos(x)+{}^{-}\sin(x)$-> substitution

$\cos(x)+{}^{-}\sin(x)=\cos(x)-\sin(x)$ -> additive inverse

39) $\tan\theta+\cot\theta=\sec\theta\csc\theta$ $$\tan\theta+\cot\theta=\frac{\sin\theta}{\cos\theta}+\frac{\cos\theta}{\sin\theta}=$$ $$\frac{\sin^2\theta+\cos^2\theta}{\cos\theta\sin\theta}=\frac{1}{\cos\theta\sin\theta}=\sec\theta\csc\theta$$	42) $$\frac{\cos x}{\sec x}+\frac{\sin x}{\csc x}=1$$ $$\frac{\cos x}{\sec x}+\frac{\sin x}{\csc x}=\frac{\cos x}{1/\cos x}+\frac{\sin x}{1/\sin x}=$$ $\cos^2 x+\sin^2 x=1$
50) $\cot^2 t-\cos^2 t=\left(\cot^2 t\right)\left(\cos^2 t\right)$ $$\cot^2 t-\cos^2 t=\frac{\cos^2 t}{\sin^2 t}-\cos^2 t=$$ $$\left(\frac{1}{\sin^2 t}-1\right)\cos^2 t=$$ $$\left(\frac{1-\sin^2 t}{\sin^2 t}\right)\cos^2 t=\left(\frac{\cos^2 t}{\sin^2 t}\right)\cos^2 t=$$ $\left(\cot^2 t\right)\left(\cos^2 t\right)$	64) $$\frac{\sin x+\cos x}{\sec x+\csc x}=\sin x\cos x$$ $$\frac{\sin x+\cos x}{\frac{1}{\cos x}+\frac{1}{\sin x}}=\frac{\sin x+\cos x}{\frac{\sin x+\cos x}{\sin x\cos x}}=$$ $$\left(\sin x+\cos x\right)\frac{\sin x\cos x}{\sin x+\cos x}=\sin x\cos x$$