Pre-Calculus: Unit 3 Review

Practice problems: find the missing angles and/or sides of the following triangles:

	a	b	c	A	B	C
1.	4	5	8	24.15°	30.76°	125.09°
2.	4	4.61	4.84	50°	62°	68°
3.	X	14	62	X	88°	X
4.	12.86	10	18.79	40°	30°	110°
5.	19	10.81 or 3.92	18	78.15° or 101.85°	33.85° or 10.15°	68°
6.	31.03	46	61	29.71°	47.29°	103°
7.	43	29.52	19	56.67°	35°	88.33°

For the following problems, find the area of the triangle with given information.

8. $A = 27°, b = 5, c = 8$
   9.08 units^2

9. $C = 122°, b = 18, a = 29$
   221.34 units^2

10. $a = 4, b = 5, c = 7$
    9.80 units^2

11. $a = 64.8, b = 49.2, c = 24.1$
    511.71 units^2

Know how to derive the formulas for area, law of sines, and law of cosines.

Solve application problems.

12.

Hinged Rulers Problem: Figure 9-7q shows a meterstick (100-cm ruler) with a 60-cm ruler attached to one end by a hinge. The other ends of both rulers rest on a horizontal surface. The hinge is pulled upward so that the meterstick makes an angle θ with the surface.

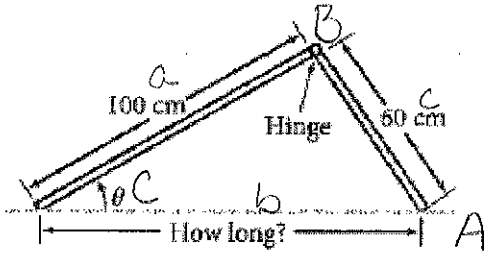


Figure 9-7q

a. Find the two possible distances between the ruler ends if $\theta = 20°$. 143.26 cm or 44.66 cm

b. Show that there is *no* possible triangle if $\theta = 50°$. Assume hinge is 90° angle.

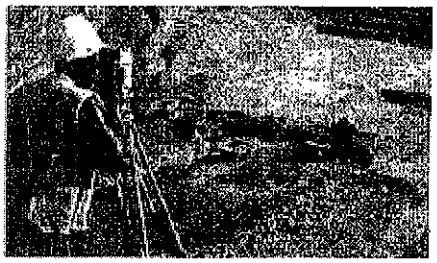
c. Find the value of θ that gives just *one* possible distance between the ends. $\theta = 36.87°$

13.

Surveying Problem 1: A surveyor measures the three sides of a triangular field and gets lengths 114 m, 165 m, and 257 m.

a. What is the measure of the largest angle of the triangle? 133.35°

b. What is the area of the field? 6838.92 m^2



14.

Surveying Problem 2: A field has the shape of a quadrilateral that is *not* a rectangle. Three sides measure 50 m, 60 m, and 70 m, and two angles measure 127° and 132° (Figure 9-7r).

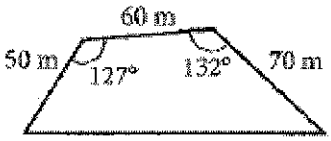


Figure 9-7r

a. By dividing the quadrilateral into two triangles, find its area. 4476.38 m^2

b. Find the length of the fourth side. 137.46 m

c. Find the measures of the other two angles.

58.05° and 42.95°

10/1/14

Unit 3 Study Guide

1. $4^2 = 5^2 + 8^2 - 2(5)(8)\cos A$

$16 = 89 - 80\cos A$

$-73 = -80\cos A$

$A = \cos^{-1}\left(\frac{73}{80}\right)$

$A = 24.15°$

$\frac{\sin 24.15}{4} = \frac{\sin B}{5}$

$B = \sin^{-1}\left(\frac{5\sin 24.15°}{4}\right)$

$B = 30.76°$

$C = 180° - 24.15° - 30.76°$

$C = 125.09°$

2. $A = 180 - 62 - 68$

$A = 50°$

$\frac{b}{\sin 62°} = \frac{4}{\sin 50°}$

$b = \frac{4\sin 62°}{\sin 50°}$

$b = 4.61$

$\frac{c}{\sin 68} = \frac{4}{\sin 50}$

$c = \frac{4\sin 68}{\sin 50} = 4.84$

3. ambiguous

$\frac{\sin C}{62} = \frac{\sin 88}{14}$

$\sin C = \frac{62\cdot\sin 88}{14}$

$\sin C = 4.43$

impossible - triangle doesn't exist

4. $\frac{a}{\sin 40°} = \frac{10}{\sin 30°}$

$a = \frac{10\sin 40°}{\sin 30°}$

$a = 12.86$

$C = 180 - 40 - 30$

$C = 110$

$\frac{c}{\sin 110°} = \frac{10}{\sin 30°}$

$c = \left(\frac{10\sin 110°}{\sin 30°}\right)$

$c = 18.79$

5. ambiguous

$\frac{\sin A}{19} = \frac{\sin 68}{18}$

$A = \sin^{-1}\left(\frac{19 \sin 68^\circ}{18}\right)$

$A = 78.15^\circ$ or $180 - 78.15 = 101.85^\circ$

$B = 180 - 78.15 - 68$ or $B = 180 - 101.85 - 68$

$B = 33.85^\circ$ $B = 10.15^\circ$

$\frac{b}{\sin 33.85} = \frac{18}{\sin 68}$ or $\frac{b}{\sin 10.15^\circ} = \frac{18}{\sin 68}$

$b = 10.81$ $b = 3.42$

6. not ambiguous
already obtuse

$\frac{\sin B}{46} = \frac{\sin 103}{61}$

$\sin B = \frac{46 \sin 103}{61}$

$B = 47.29^\circ$

$A = 180 - 47.29 - 103$

$A = 29.71$

$\frac{a}{\sin 29.71} = \frac{61}{\sin 103}$

$a = 31.03$

7. $b^2 = 43^2 + 19^2 - 2(43)(19)\cos 35°$

$b^2 = 871.51$

$b = 29.52$

$\frac{\sin A}{43} = \frac{\sin 35}{29.52}$

$A = 56.67°$

$C = 180 - 56.67 - 35$

$C = 88.33°$

8. $\text{Area} = \frac{1}{2}(5)(8)\sin(27°)$

$\text{Area} = 9.08$

9. $\text{Area} = \frac{1}{2}(18)(29)\sin(122°)$

$\text{Area} = 221.34$

10. $S = \frac{1}{2}(4+5+7)$

$S = 8$

$A = \sqrt{8(8-4)(8-5)(8-7)}$

$A = 9.80$

11. $S = \frac{1}{2}(64.8+49.2+24.1)$

$S = 69.05$

$A = \sqrt{69.05(69.05-64.8)(69.05-49.2)(69.05-24.1)}$

$A = 511.71$

12. $\frac{\sin A}{100} = \frac{\sin 20^\circ}{60}$

$A = 34.75^\circ$ or $A = 180 - 34.75^\circ = 145.25^\circ$

$B = 125.25^\circ$ or $B = 14.75^\circ$

$\frac{b}{\sin 125.25} = \frac{60}{\sin 20}$ or $\frac{b}{\sin 14.75} = \frac{60}{\sin 20}$

$b = 143.26$ or $b = 44.66$

b. $\frac{\sin A}{100} = \frac{\sin 50}{60}$

$\sin A = \frac{100 \sin 50}{60}$

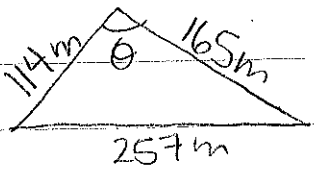
$\sin A = 1.27$

sine cannot be more than 1, no triangle exists

c. $A = 90^\circ$

$\frac{\sin 90^\circ}{100} = \frac{\sin \theta}{60}$

$\theta = 36.87^\circ$

13. 

$257^2 = 114^2 + 165^2 - 2(114)(165)\cos\theta$

$66049 = 40221 - 37620\cos\theta$

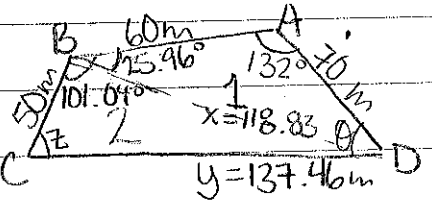
$25828 = -37620\cos\theta$

$\theta = \cos^{-1}\left(\frac{25825}{-37620}\right)$

$\theta = 133.35°$

b. $A = \frac{1}{2}(114)(165)\sin(133.35°)$

$A = 6838.92\ m^2$

14. 

$Area_1 = \frac{1}{2}(60)(70)\sin(132) = 1560.60$

$Area_2 = \frac{1}{2}(50)(118.83)\sin(101.04) = 2915.77$

$\boxed{Area = 4476.38\ m^2}$

$x^2 = 60^2 + 70^2 - 2(60)(70)\cos 132°$

$x^2 = 14120.70$

$x = 118.83$

$\frac{\sin B}{70} = \frac{\sin 132}{118.83}$

$B = 25.96°$

c. $\frac{\sin z}{118.83} = \frac{\sin 101.04°}{137.46}$

$z = 58.05°$

$\theta = 360 - 127 - 132 - 58.05$

$\theta = 42.95°$

b. $y^2 = 50^2 + 118.83^2 - 2(50)(118.83)\cos(101.04°)$

$y^2 = 18896.10$

$\boxed{y = 137.46\ m}$