Precalculus Unit 6 Homework—Law of Cosines and Area of a Triangle

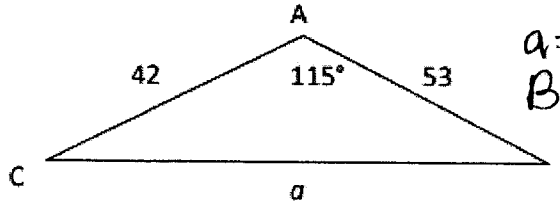
Solve each triangle. Round your answers to the nearest hundredth.

1. $A = 40°$, $b = 21$, $c = 32$ $a = 20.87$ $C = 99.69°$ $B = 40.31°$

2. $a = 27$, $b = 19$, $c = 23$ $A = 79.38°$ $C = 56.85°$ $B = 43.77°$

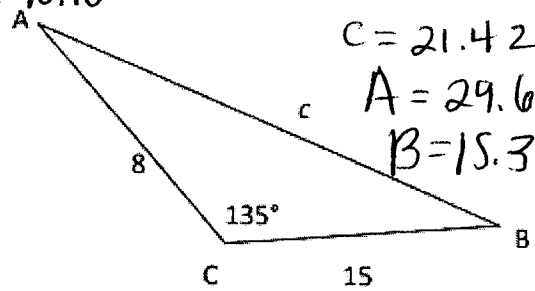
3. $a = 17$, $b = 26$, $C = 40°$ $c = 16.97$ $B = 99.90°$ $A = 40.10°$

4.



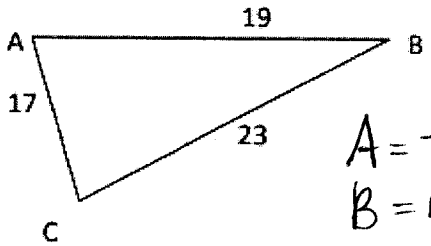
$a = 80.34$
$B = 28.28°$
$C = 36.72°$

5.



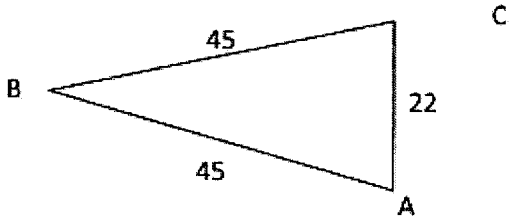
$C = 21.42$
$A = 29.69°$
$B = 15.31°$

6.



$A = 79.20°$
$B = 46.56°$
$C = 54.24°$

7.



$A = C = 75.85°$
$B = 28.30°$

8. Suppose a triangular playground has sides of lengths 475 ft, 595 ft, and 401 ft. What is the measure of the largest angle between the sides?

85.1°

9. A bicycle race follows a triangular course. The 3 legs of the race are, in order, 2.3 km, 5.9 km, and 6.2 km. Find the angle between the starting leg and the finishing leg.

71.8°

10. Mr. Smith and Ms. Powell walk from opposite ends of a city block to a point on the other side of the street where they are having a math convention. The angle formed by their paths is 25°. Ms. Powell walks 300 ft, while Mr. Smith walks 320 ft. How long is the city block?

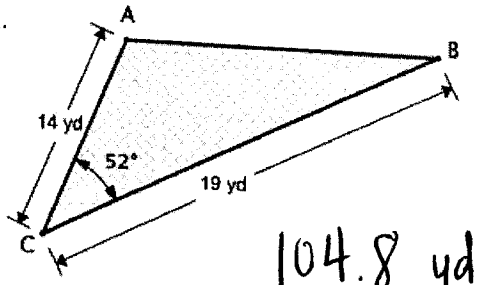
135.6 ft

11. Two planes leave city A, one heading straight for city B, and the other straight for city C. The angle formed between the planes is 18°. Estimate the distance between city B and city C.

AB = 939 km
AC = 882 km
290.4 km

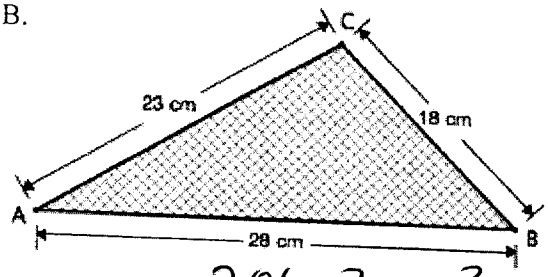
12. Find the area of each triangle.

A.



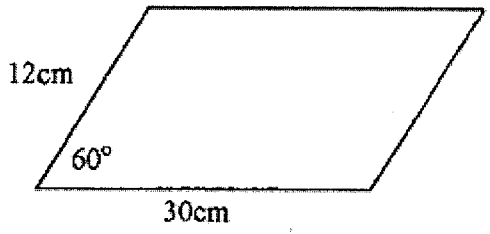
104.8 yd²

B.



206.3 cm²

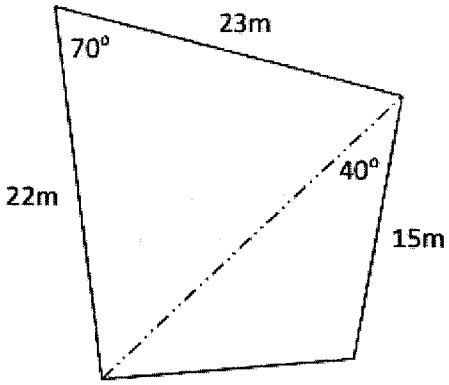
13. Find the area of the parallelogram.



$311.8\ cm^2$

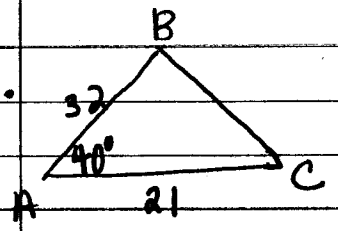
~~12~~ If an acre of land is valued at $700, find the value of the plot of land shown below..

14.



$62.66

1.



$a^2 = 21^2 + 32^2 - 2(21)(32)\cos 40^\circ$

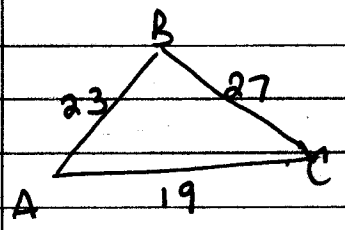
$a = 20.87$

$32^2 = 20.87^2 + 21^2 - 2(20.87)(21)\cos C$

$C = 99.69^\circ$

$B = 180^\circ - 99.69^\circ - 40^\circ = 40.31^\circ$

2.



$27^2 = 19^2 + 23^2 - 2(19)(23)\cos A$

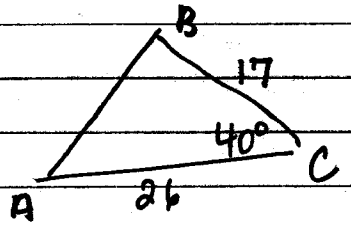
$-161 = -874\cos A$

$A = \cos^{-1}\left(\frac{161}{874}\right) = 79.38^\circ$

$\frac{\sin 79.38^\circ}{27} = \frac{\sin C}{23}$

$C = 56.85^\circ$ $B = 43.77^\circ$

3.



$c^2 = 17^2 + 26^2 - 2(17)(26)\cos 40^\circ$

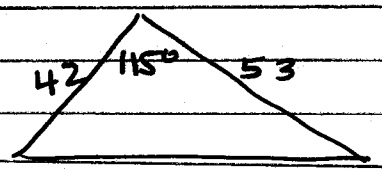
$c = 16.97$

$26^2 = 17^2 + 16.97^2 - 2(17)(16.97)\cos B$

$B = 99.90^\circ$

$A = 40.10^\circ$

4.



$a^2 = 42^2 + 53^2 - 2(42)(53)\cos 115^\circ$

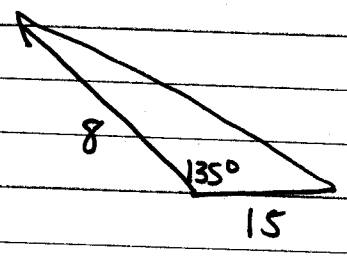
$a = 80.34$

$\frac{\sin 115^\circ}{80.34} = \frac{\sin B}{42}$

$B = 28.28^\circ$

$C = 36.72^\circ$

5.



$c^2 = 8^2 + 15^2 - 2(8)(15)\cos 135^\circ$

$c = 21.42$

$\frac{\sin A}{15} = \frac{\sin 135^\circ}{21.42}$

$A = 29.69^\circ$

$B = 15.31^\circ$

6. $23^2 = 17^2 + 19^2 - 2 \cdot 17 \cdot 19 \cos A$

$-121 = -646 \cos A$

$A = 79.20^\circ$

$\frac{\sin 79.20^\circ}{23} = \frac{\sin C}{19}$

$C = 54.24^\circ$

$B = 46.56^\circ$

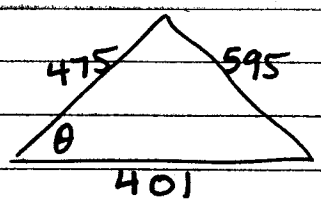
7. $45^2 = 45^2 + 22^2 - 2(45)(22)\cos A$

$A = 75.85^\circ$

$C = 75.85^\circ$

$B = 28.30^\circ$

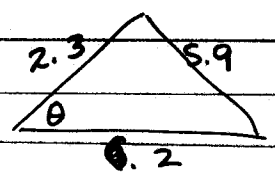
8.



$595^2 = 475^2 + 401^2 - 2(475)(401)\cos\theta$

$\boxed{\theta = 85.1^\circ}$

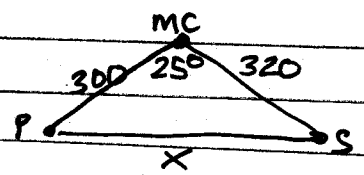
9.



$5.9^2 = 2.3^2 + 6.2^2 - 2(2.3)(6.2)\cos\theta$

$\boxed{\theta = 71.8^\circ}$

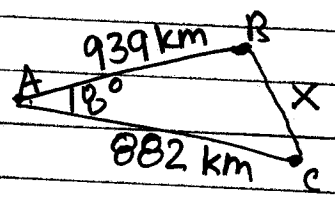
10.



$x^2 = 300^2 + 320^2 - 2(300)(320)\cos 25^\circ$

$\boxed{x = 135.6 \text{ ft}}$

*11.



$x^2 = 939^2 + 882^2 - 2(939)(882)\cos 18^\circ$

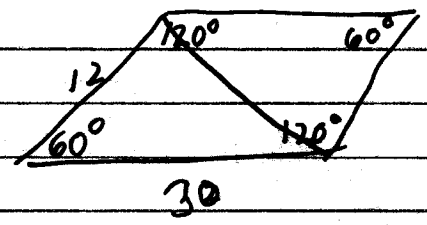
$\boxed{x = 290.4 \text{ km}}$

12. a) $A = \frac{1}{2}(14)(19)\sin 52^\circ = \boxed{104.8\ yd^2}$

b) $A = \sqrt{34.5(34.5-23)(34.5-19)(34.5-28)} = \boxed{206.3\ cm^2}$

$S = \frac{23+19+28}{2} = 34.5$

13.



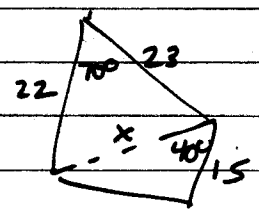
area of $\Delta = \frac{1}{2}\ 12(30)\sin 60^\circ$

parallelogram is 2 triangles

$\boxed{311.8\ cm^2}$

14. $\frac{1}{2}(22)(23)\sin 70^\circ = 237.74 m^2 + \frac{1}{2}(15)(25.824)\sin 40^\circ$

124.495



$x^2 = 22^2 + 23^2 - 2(22)(23)\cos 70^\circ$

$x = 25.824$

362.24 m^2

1 acre = 4046.86 m^2 $\rightarrow$ = .0895 acre

$\times 700$

$\boxed{\$62.66}$