# Today's Plan:

***Learning Target (standard)***: I will find the area of oblique triangles.

***Students will***: Complete practice problems over previous concepts at the boards, put up homework problems on the board and make necessary corrections to their own work, take notes over new material and complete practice problems over new concepts.

***Teacher will***: Provide practice problems over previous concepts, check homework problems for accuracy and provide students feedback, describe and provide examples of new concepts and assign students assessment problems over new concepts.

***Assessment***: Board work, homework check and homework assignment

***Differentiation***: Students will work at the board, go over and correct homework at their seats, actively engage in lecture over new concepts, practice new concepts with the aid of other students and the teacher and complete homework assignment.

# p.546 #26,28,30,32,34

$26a)227.56 miles$

$b)149.7^{\circ}$

$28a)26.4^{\circ}$

$b)40.8 hours$

$30a)42.6 ft$

$b)38.6 feet$

$c)85.1^{\circ}$

$32)b \approx 501.28 ft$

$a \approx 518.4 ft$

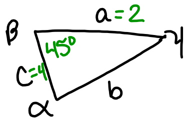
$34)241.33 ft$

Friday - TEST on Triangles

Monday - Application TEST

Solve each triangle:

$\beta = 45°$
$a = 2$
$c = 4$




SAS

$b^2 = a^2 + c^2 - 2ac\cos\beta$

$b^2 = (2)^2 + (4)^2 - 2(2)(4)\cos 45°$

$b^2 = 4 + 16 - 11.3137$

$b^2 = 8.6863$

$b = 2.947$

$a^2 = b^2 + c^2 - 2bc\cos\alpha$

$(2)^2 = (2.947)^2 + 4^2 - 2(2.947)(4)\cos\alpha$

$4 = 8.6865 + 16 - 23.576\cos\alpha$

$-20.6865 = -23.576\cos\alpha$

$\cos\alpha = .8774$

$\alpha = \cos^{-1}(.8774)$

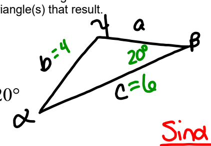
$\alpha = 28.665°$

$\gamma = 180° - 45° - 28.665°$

$\gamma = 106.335°$

Determine whether the given information results in one, two, or no triangles. Solve any triangle(s) that result.

$b = 4$
$c = 6$
$\beta = 20°$




SSA

$\frac{\sin\beta}{b} = \frac{\sin\gamma}{c}$

$\frac{\sin 20°}{4} = \frac{\sin\gamma}{6}$

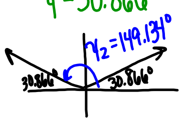
$4\sin\gamma = 6\sin 20°$

$\sin\gamma = \frac{6\sin 20°}{4}$

$\sin\gamma = 0.5130$

$\gamma = \sin^{-1}(0.5130)$

$\gamma = 30.866°$




$\alpha_1 = 180° - 20° - 30.866°$

$\alpha_1 = 129.134°$

$\frac{\sin\alpha_1}{a_1} = \frac{\sin\beta}{b}$

$\frac{\sin 129.134°}{a_1} = \frac{\sin 20°}{4}$

$a\sin 20° = 4\sin 129.134°$

$a_1 = \frac{4\sin 129.134°}{\sin 20°}$

$a_1 = 9.072$

$\alpha_2 = \beta + \gamma_2 = 20° + 149.134° < 180°$

$\alpha_2 = 10.866°$

2 triangles

$\frac{\sin\alpha_2}{a_2} = \frac{\sin\beta}{b}$

$\frac{\sin 10.866°}{a_2} = \frac{\sin 20°}{4}$

$a_2 \sin 20° = 4\sin 10.866°$

$a_2 = \frac{4\sin 10.866°}{\sin 20°}$

$a_2 = 2.205$

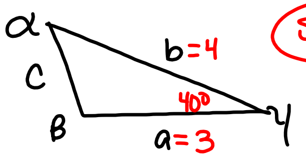
| | |
|---|---|
| $\gamma_1 = 30.866°$ | $\gamma_2 = 149.134°$ |
| $\alpha_1 = 129.134°$ | $\alpha_2 = 10.866°$ |
| $a_1 = 9.072$ | $a_2 = 2.205$ |

Solve the triangle:

$a = 3$

$b = 4$

$\gamma = 40°$




SAS

$c^2 = a^2 + b^2 - 2ab\cos\gamma$

$c^2 = 3^2 + 4^2 - 2(3)(4)\cos 40°$

$c^2 = 9 + 16 - 24(.7660)$

$c^2 = 25 - 18.3851$

$c^2 = 6.615$

$c = 2.572$

$b^2 = a^2 + c^2 - 2ac\cos\beta$

$4^2 = 3^2 + (2.572)^2 - 2(3)(2.572)\cos\beta$

$16 = 9 + 6.615 - 15.432\cos\beta$

$0.385 = -15.432\cos\beta$

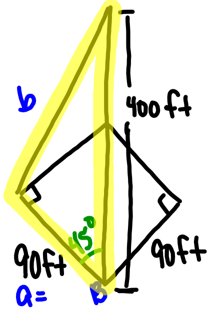
$\cos\beta = -0.0249$

$\beta = 91.430°$

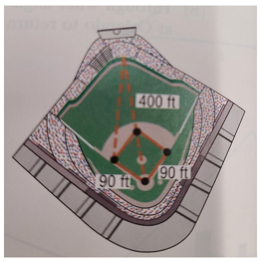
$\alpha = 180° - 40° - 91.430°$

$\alpha = 48.570°$

The distance from home plate to dead center of Wrigley Field is 400 feet. How far is dead center to third base?




SAS




$b^2 = a^2 + c^2 - 2ac\cos\beta$

$b^2 = 90^2 + 400^2 - 2(90)(400)\cos 45°$

$b^2 = 8100 + 160000 - 72000(.7071)$

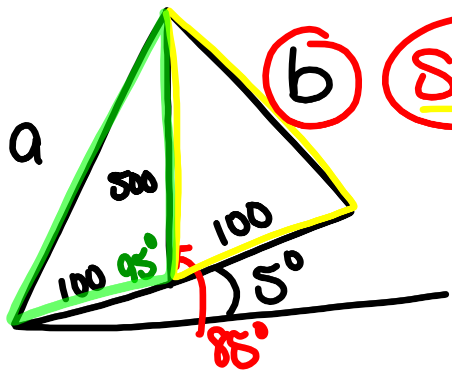
$b^2 = 168100 - 50911.2$

$b^2 = 117188.8$

$b = 342.328$ ft

32)

SAS




b

SAS

$b^2 = 500^2 + 100^2 - 2(500)(100)\cos 85°$

$b = 501.28$ ft

$a^2 = 100^2 + 500^2 - 2(100)(500)\cos 95°$

$a = 518.4$ ft

Total Length $= a + b$

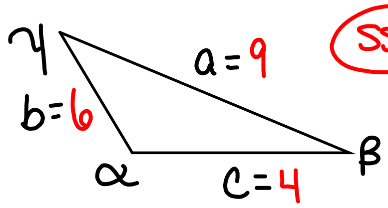
1019.7 ft

Solve the triangle:

$a = 9$

$b = 6$

$c = 4$




SSS

$a^2 = b^2 + c^2 - 2bc\cos\alpha$

$9^2 = 6^2 + 4^2 - 2(6)(4)\cos\alpha$

$81 = 36 + 16 - 48\cos\alpha$

$29 = -48\cos\alpha$

$\cos\alpha = -.6042$

$\alpha = 127.169°$

$b^2 = a^2 + c^2 - 2ac\cos\beta$

$6^2 = 9^2 + 4^2 - 2(9)(4)\cos\beta$

$36 = 81 + 16 - 72\cos\beta$

$-61 = -72\cos\beta$

$\cos\beta = 0.8472$

$\beta = 32.089°$

$\gamma = 180° - 127.169° - 32.089°$

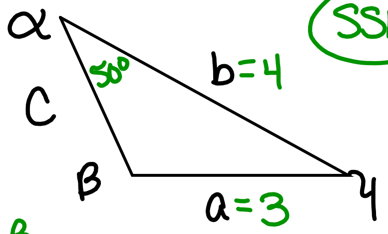
$\gamma = 20.742°$

Solve the triangle:

$a = 3$

$b = 4$

$\alpha = 50°$




SSA

$$\frac{\sin\alpha}{a} = \frac{\sin\beta}{b}$$

$$\frac{\sin 50°}{3} = \frac{\sin\beta}{4}$$

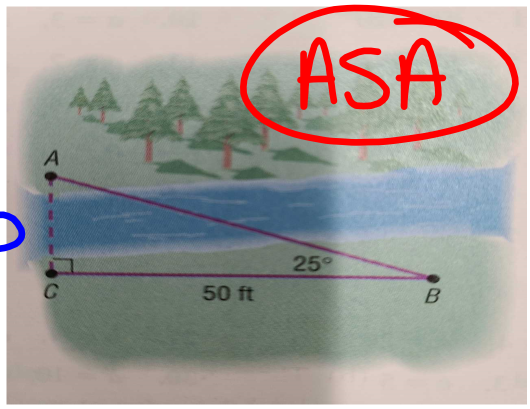
$$3\sin\beta = 4\sin 50°$$

$$\sin\beta = \frac{4\sin 50°}{3}$$

$$\sin\beta = 1.0214 > 1$$

no triangle

Find the distance from A to C across the river.



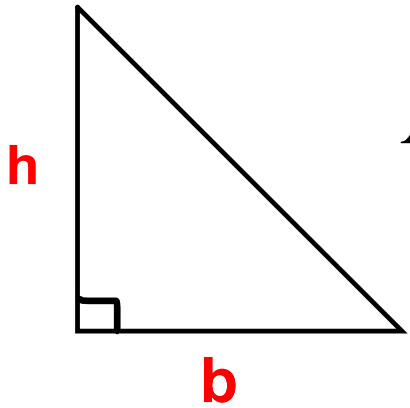

b

$$\tan 25° = \frac{b}{50}$$

$$b = 50\tan 25°$$

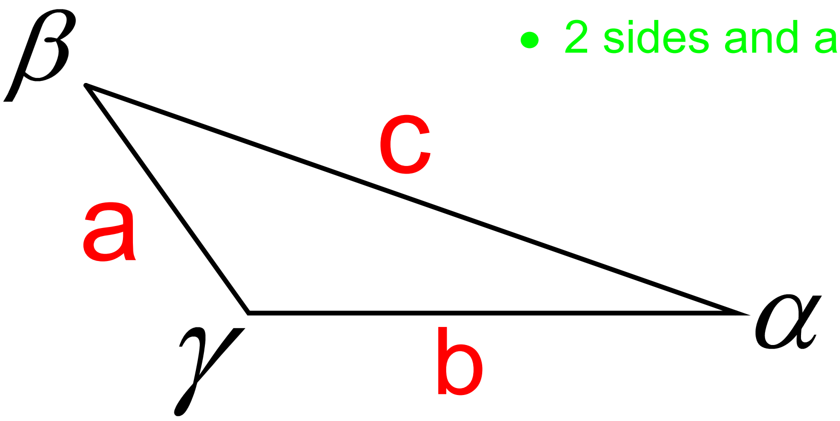
$$b = 23.315 \text{ ft}$$

Area of triangles:




$$A = \frac{1}{2}bh$$

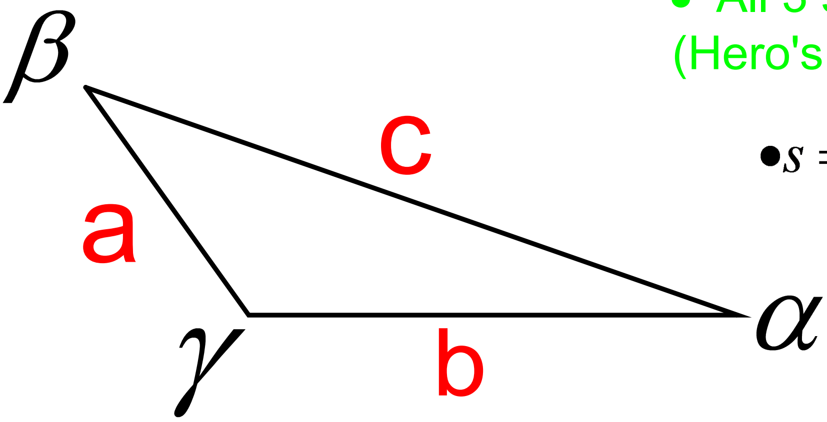
Area of oblique triangles:




- 2 sides and an included angle

- $\frac{1}{2}ab\sin\gamma$
- $\frac{1}{2}bc\sin\alpha$
- $\frac{1}{2}ac\sin\beta$

Area of oblique triangles:

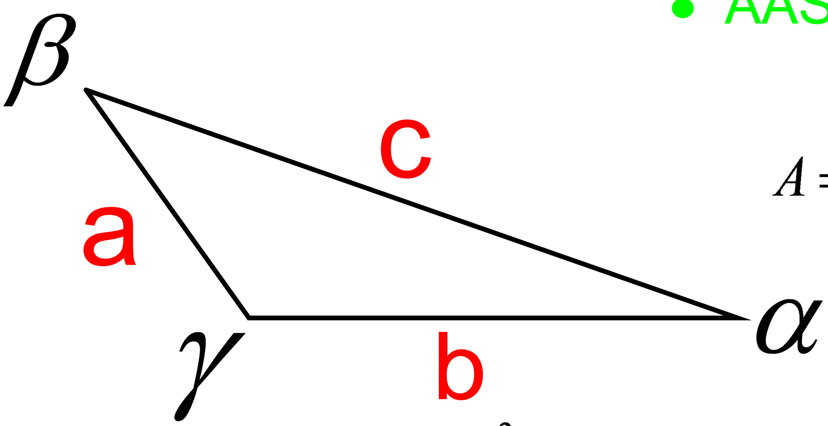



- All 3 sides (Hero's Formula)

- $s = \frac{1}{2}(a+b+c)$

$$A = \sqrt{s(s-a)(s-b)(s-c)}$$

Area of oblique triangles:




- AAS condition

$$A = \frac{a^2 \sin\beta \sin\gamma}{2\sin\alpha}$$

$$A = \frac{b^2 \sin\alpha \sin\gamma}{2\sin\beta}$$

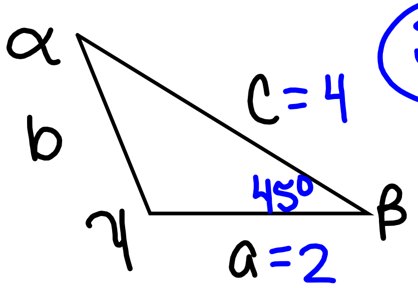
$$A = \frac{c^2 \sin\alpha \sin\beta}{2\sin\gamma}$$

Find the area of the triangle:

$a = 2$

$c = 4$

$\beta = 45°$




SAS

$$A = \frac{1}{2} ac \sin \beta$$

$$= \frac{1}{2}(2)(4)\sin 45^\circ$$

$$= 4\left(\frac{\sqrt{2}}{2}\right)$$

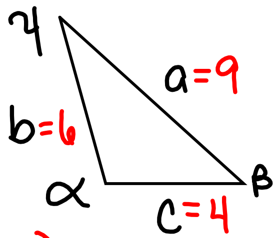
$$A = 2\sqrt{2}\ u^2$$

Find the area of the triangle:

$a = 9$

$b = 6$

$c = 4$




SSS

$$S = \frac{1}{2}(a+b+c)$$

$$= \frac{1}{2}(9+6+4)$$

$$= \frac{1}{2}(19)$$

$$S = \frac{19}{2}$$

$$A = \sqrt{s(s-a)(s-b)(s-c)}$$

$$= \sqrt{\frac{19}{2}\left(\frac{19}{2}-9\right)\left(\frac{19}{2}-6\right)\left(\frac{19}{2}-4\right)}$$

$$= \sqrt{\frac{19}{2}\left(\frac{1}{2}\right)\left(\frac{7}{2}\right)\left(\frac{11}{2}\right)}$$

$$= \sqrt{\frac{1463}{16}}$$

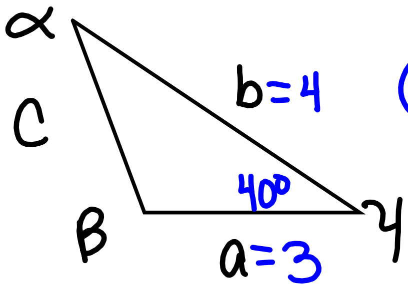
$$A = \frac{\sqrt{1463}}{4}\ u^2$$

Find the area of the triangle:

$a = 3$

$b = 4$

$\gamma = 40°$




SAS

$$A = \frac{1}{2}ab\sin\gamma$$

$$= \frac{1}{2}(3)(4)\sin 40°$$

$$= 6(.6428)$$

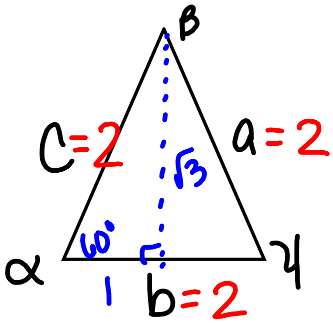
$$A = 3.857\,u^2$$

Find the area of the triangle:

$a = 2$

$b = 2$

$c = 2$




SSS

$$A = \frac{1}{2}bh$$

$$= \frac{1}{2}(2)(\sqrt{3})$$

$$A = \sqrt{3}\,u^2$$

$$S = \frac{1}{2}(a+b+c)$$

$$= \frac{1}{2}(2+2+2)$$

$$= \frac{1}{2}(6)$$

$$S = 3$$

$$A = \sqrt{S(S-a)(S-b)(S-c)}$$

$$= \sqrt{3(3-2)(3-2)(3-2)}$$

$$= \sqrt{3 \cdot 1 \cdot 1 \cdot 1}$$

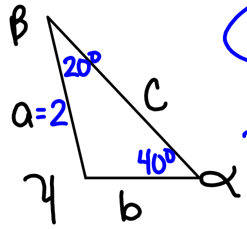
$$A = \sqrt{3}\,u^2$$

Find the area of the triangle:

$\alpha = 40°$

$\beta = 20°$

$a = 2$




AAS

$\gamma = 180° - 40° - 20°$

$\gamma = 120°$

$$A = \frac{a^2 \sin\beta \sin\gamma}{2\sin\alpha}$$

$$= \frac{2^2 \sin 20° \sin 120°}{2 \sin 40°}$$

$$= \frac{4(.3420)(.8660)}{2(.6428)}$$

$$A = 0.922 \text{ u}^2$$

# Assignment:

p.552 #2-24 even, 34-40 even

* Draw ALL appropriate diagrams and write the formula used! *