

## Unit 6 Review

Name KEY

Remember to study your quiz, homeworks, and notes! All formulas will be provided on the test.

### Law of Cosines:

Use when... SAS and SSS

### Law of Sines:

Use when... ASA, AAS, (you have 2 angles)

Check for a second answer when.... ambiguous (SSA)

Area of a SAS triangle:  $A = \frac{1}{2}ab\sin C$

Area of a SSS triangle:  $A = \sqrt{s(s-a)(s-b)(s-c)}$

How to find semi-perimeter:  $\frac{a+b+c}{2}$  (half of perimeter)

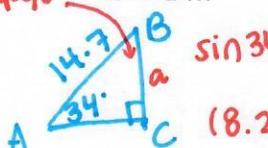
For #1-2,  $m\angle C = 90^\circ$ . Solve each triangle. Round angle measures to the nearest degree and sides to the nearest tenth.

SOM CAH TOA

$$180 - 34 - 90 = 56^\circ$$

$$m\angle A = 34^\circ$$

$$c = 14.7$$



$$(8.2)^2 + b^2 = (14.7)^2$$

$$\begin{aligned} m\angle A &= 34^\circ & a &= 8.2 \\ m\angle B &= 56^\circ & b &= 12.2 \\ m\angle C &= 90^\circ & c &= 14.7 \end{aligned}$$

$$a^2 + b^2 = c^2$$

$$2. \quad m\angle A = 46^\circ$$

$$a = 18$$

$$B \quad \tan 46^\circ = \frac{18}{b}$$

$$180 - 46 - 90 = 44^\circ$$

$$A \quad 46^\circ \quad B \quad 44^\circ \quad C$$

$$18^2 + 17.4^2 = c^2$$

$$\begin{aligned} m\angle A &= 46^\circ & a &= 18 \\ m\angle B &= 44^\circ & b &= 17.4 \\ m\angle C &= 90^\circ & c &= 25 \end{aligned}$$

For # 3-6, find the missing information. Round angles to the nearest degree and sides to the nearest tenth.

$$3. \quad m\angle A = 51^\circ \quad \text{SAS} \rightarrow \text{cosines}$$

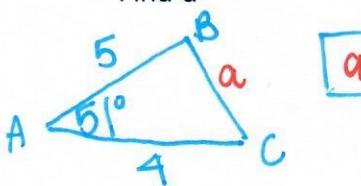
$$b = 4$$

$$c = 5$$

Find a

$$a^2 = 5^2 + 4^2 - 2(5)(4)\cos 51^\circ$$

$$a = 3.98$$



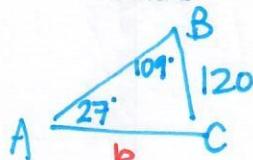
$$5. \quad m\angle A = 27^\circ \quad \text{AAS} \rightarrow \text{sines}$$

$$m\angle B = 109^\circ$$

$$a = 120$$

Find b

$$\frac{\sin 27^\circ}{120} = \frac{\sin 109^\circ}{b}$$



$$\frac{b \sin 27^\circ}{\sin 27^\circ} = \frac{120 \sin 109^\circ}{\sin 27^\circ}$$

$$b = 249.9$$

$$4. \quad a = 8 \quad \text{SSS} \rightarrow \text{cosines}$$

$$b = 6$$

$$c = 9$$

Find  $m\angle B$

$$b^2 = a^2 + c^2 - 2(a)(c)\cos B$$

$$6^2 - 9^2 - 8^2 = -2(9)(8)\cos B$$

$$\frac{-109}{-144} = \frac{-144 \cos B}{-144}$$

$$B = \cos^{-1}\left(\frac{-109}{-144}\right) \quad 41^\circ$$

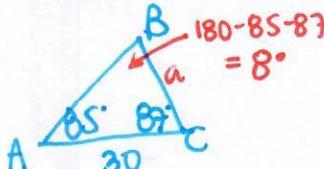
$$6. \quad m\angle A = 85^\circ$$

$$m\angle C = 87^\circ$$

$$b = 30$$

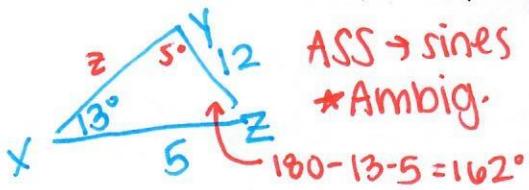
Find a

$$\frac{\sin B}{30} = \frac{\sin 85^\circ}{a}$$



$$a = 214.7$$

7. In  $\triangle XYZ$ ,  $m\angle X = 13^\circ$ ,  $x = 12$ , and  $y = 5$ . Find  $z$ .



$$\frac{\sin 13}{12} = \frac{\sin Y}{5}$$

$$\sin Y = .0937\dots$$

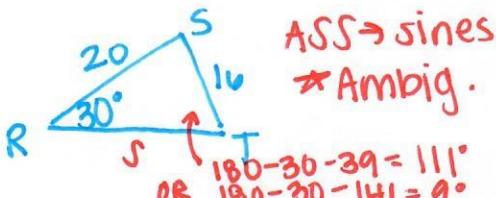
$$Y = \sin^{-1}(.0937\dots)$$

$$Y = 5^\circ \text{ OR } 180 - 5 = 175^\circ$$

$$175 + 13 > 180$$

(?)  
ONE SOLUTION

8. In  $\triangle RST$ ,  $m\angle R = 30^\circ$ ,  $r = 16$ , and  $t = 20$ . Find  $s$ .



$$\frac{\sin 30}{16} = \frac{\sin T}{20}$$

$$\sin T = .625$$

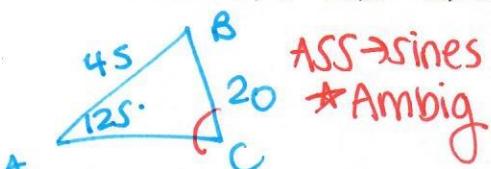
$$T = \sin^{-1}(.625)$$

$$T = 39^\circ \text{ OR } 180 - 39 = 141^\circ$$

$$141 + 30 < 180$$

TWO SOLUTIONS

9. In  $\triangle ABC$ ,  $a = 20$ ,  $c = 45$ ,  $\angle A = 125^\circ$ , find the measure of angle C.



$$\frac{\sin 125}{20} = \frac{\sin C}{45}$$

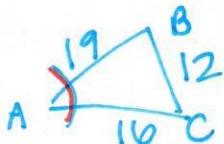
$$\sin C = 1.84\dots$$

$C = \sin^{-1}(1.84\dots)$  ERROR

NO SOLUTION

10. In  $\triangle ABC$ ,  $a = 12$ ,  $b = 16$ ,  $c = 19$ .  $\cos A$  equals...

- A)  $\frac{473}{608}$   
 B)  $\frac{13}{128}$   
 C)  $\frac{83}{152}$   
 D) 135



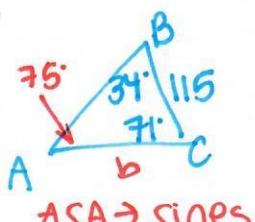
$$12^2 = 19^2 + 16^2 - 2(19)(16)\cos A$$

$$-473 = -608 \cos A$$

$$\frac{-473}{-608} = \frac{608 \cos A}{608}$$

11. In  $\triangle ABC$ ,  $m\angle B = 34^\circ$ ,  $m\angle C = 71^\circ$ , and  $a = 115$ . What is the measure of side b?

- a)  $\frac{115 \sin 34^\circ}{\sin 75^\circ}$   
 b)  $\frac{115 \sin 34^\circ}{\sin 71^\circ}$   
 c)  $\frac{115 \sin 75^\circ}{\sin 34^\circ}$   
 d)  $\frac{115 \sin 71^\circ}{\sin 34^\circ}$

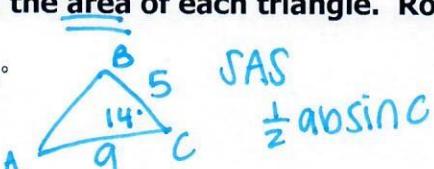


$$\frac{\sin 75}{115} = \frac{\sin 34}{b}$$

$$b \sin 75 = \frac{115 \sin 34}{\sin 75}$$

For #12-13, find the area of each triangle. Round to the nearest whole number.

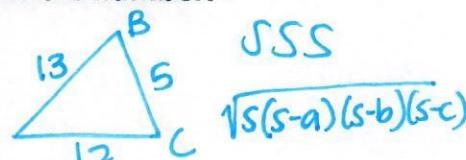
12.  $m\angle C = 14^\circ$   
 a = 5 cm  
 b = 9 cm



$$\frac{1}{2}(5)(9)\sin 14^\circ$$

5 units<sup>2</sup>

13. a = 5 in  
 b = 12 in  
 c = 13 in

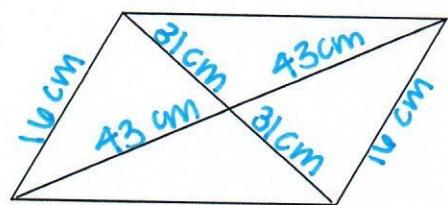


$$s = \frac{5+12+13}{2} = 15$$

$$\sqrt{15(15-5)(15-12)(15-13)}$$

30 units<sup>2</sup>

14. The diagonals of a parallelogram are 86 cm and 62 cm. The shorter side is 16 cm. Find the acute angle formed by the two diagonals. {nearest tenth}

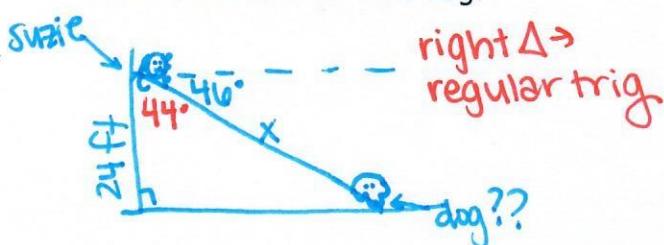


$$\begin{aligned} & \text{SSS} \rightarrow \text{law of cosines} \\ & 16^2 = 43^2 + 31^2 - 2(43)(31) \cos X \\ & \frac{-2554}{-2666} = \cos X \end{aligned}$$

$$16.7^\circ$$

diagonals of a parallelogram bisect (halve) each other

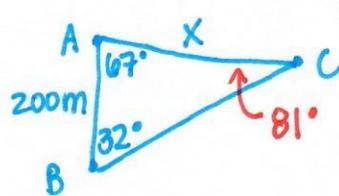
15. Looking out her apartment window, Suzie notices a lost dog sitting on the sidewalk. If the angle of depression from the window to the dog is  $46^\circ$  and Suzie's window is 24 feet above the sidewalk, how far is Suzie from the dog?



$$\cos 44 = \frac{24}{x}$$

$$x = 33.4 \text{ ft}$$

16. A surveyor marks points A and B 200 meters apart on one bank of a river. She sights a point C on the opposite bank and determines  $\angle A = 67^\circ$  and  $\angle B = 32^\circ$ . What is the distance from A to C?



ASA  $\rightarrow$  law of sines

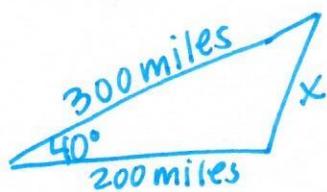
$$\frac{\sin 81}{200} = \frac{\sin 32}{x}$$

$$x = 107.3 \text{ m}$$

17. Two airplanes leave an airport, and the angle between their flight paths is  $40^\circ$ . An hour later, one plane has traveled 300 miles while the other has traveled 200 miles. How far apart are the planes at this time?

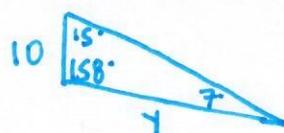
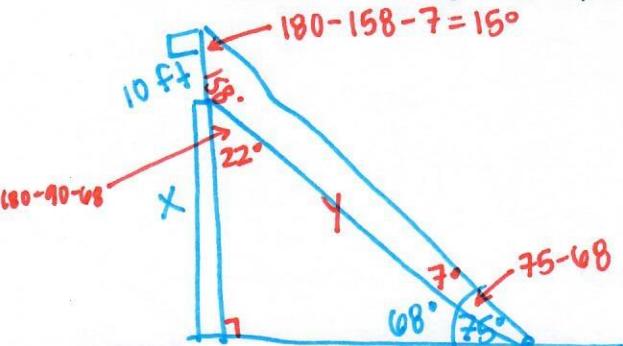
SAS  $\rightarrow$  law of cosines

$$x^2 = 300^2 + 200^2 - 2(300)(200) \cos 40^\circ$$



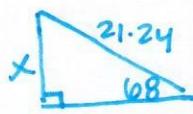
$$x = 195 \text{ miles}$$

18. A flagpole 10 feet tall stands on top of a school. From a point in front of the building, the angle of elevation to the top of the pole is  $75^\circ$ , and the angle of elevation to the bottom of the pole is  $68^\circ$ . How high is the building? Round your answer to the nearest tenth of a foot.



$$\frac{\sin 15}{Y} = \frac{\sin 7}{10}$$

$$Y = 21.24$$



$$\sin 68 = \frac{x}{21.24}$$

$$x = 19.7 \text{ ft}$$

Find  $y \rightarrow$  it's the hypotenuse of the right  $\Delta$ !