6.1-6.4 Review DEGREES **Name** KEY

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

Law of Cosines: $c^2 = a^2 + b^2 - 2ab\cos C$

*letters can be switched!

Use when... SAS or SSS

Law of Sines: $\frac{\sin A}{a} = \frac{\sin B}{b} = \frac{\sin C}{c}$

Use when... AAS, ASA, SSA

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

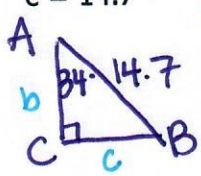
Area of a SSS triangle: $\text{Area} = \sqrt{s(s-a)(s-b)(s-c)}$

How to find semi-perimeter: $s = \frac{a+b+c}{2}$ (perimeter ÷ 2)

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

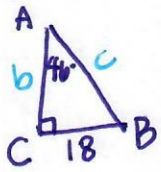
Right △ → SOCAHTOA

1. $m\measuredangle A = 34^\circ$ $m\angle B = 56^\circ$ $m\angle C = 90^\circ$ (180−90−34)
c = 14.7 $a = 8.2$ $b = 12.2$



$\cos 34 = \frac{b}{14.7}$ $\sin 34 = \frac{c}{14.7}$
$14.7\cos 34 = b$ $14.7\sin 34 = c$

2. $m\measuredangle A = 46^\circ$ $m\angle B = 44^\circ$ (180−90−46) $m\angle C = 90^\circ$
a = 18 $b = 17.3$ $c = 25.0$



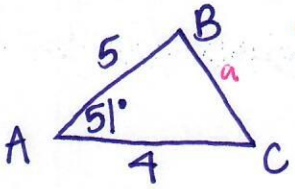
$\sin 46 = \frac{18}{c}$ $18^2 + b^2 = 25^2$
$c\sin 46 = 18$
$c = \frac{18}{\sin 46}$

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

3. $m\measuredangle A = 51^\circ$
b = 4
c= 5
Find a

SAS → cosines

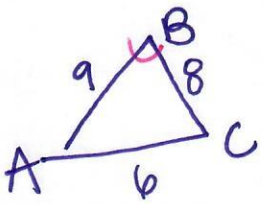
$a^2 = b^2 + c^2 - 2bc\cos A$
$a^2 = 4^2 + 5^2 - 2(4)(5)\cos 51$
$a^2 = 15.8$
$a = 3.98 \rightarrow \boxed{4}$



4. a = 8
b = 6
c = 9
Find $m\measuredangle B$

SSS → cosines

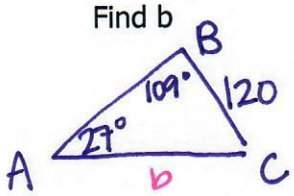
$b^2 = a^2 + c^2 - 2ac\cos B$
$6^2 = 8^2 + 9^2 - 2(8)(9)\cos B$
$\frac{-109}{-144} = \frac{-144\cos B}{-144}$
$B = \cos^{-1}(.7569\ldots)$
$\boxed{41^\circ}$



5. $m\measuredangle A = 27^\circ$
$m\measuredangle B = 109^\circ$
a = 120
Find b

AAS → sines

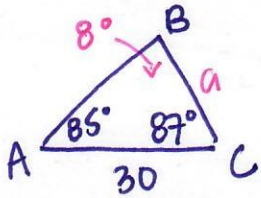
$\frac{b}{\sin B} = \frac{a}{\sin A}$
$\frac{b}{\sin 109} = \frac{120}{\sin 27}$
$\frac{b\sin 27}{\sin 27} = \frac{120\sin 109}{\sin 27}$
$b = \boxed{249.9}$



6. $m\measuredangle A = 85^\circ$
$m\measuredangle C = 87^\circ$
b = 30
Find a

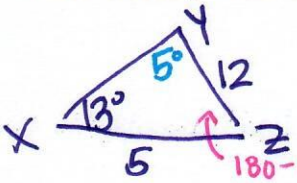
ASA → sines

$\frac{a}{\sin A} = \frac{b}{\sin B}$
$\frac{a}{\sin 85} = \frac{30}{\sin 8}$
$\frac{a\sin 8}{\sin 8} = \frac{30\sin 85}{\sin 8}$
$a = \boxed{214.7}$



180−85−87

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



SSA → sines

$\frac{\sin Y}{Y} = \frac{\sin X}{x}$

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

$\sin Y = .09\ldots$

$Y = \sin^{-1}(.09\ldots)$

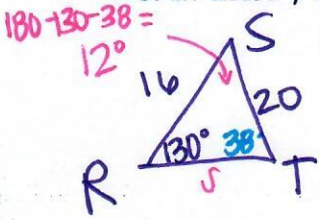
$Y = 5^\circ$

$\frac{z}{\sin 162} = \frac{12}{\sin 13}$

$z = \frac{12\sin 162}{\sin 13}$

$\boxed{16.5}$

8. In $\triangle RST$, $m\angle R = 130^\circ$, r=20, and t=16. Find s.



SSA → sines

$\frac{\sin T}{t} = \frac{\sin R}{r}$

$\frac{\sin T}{16} = \frac{\sin 130^\circ}{20}$

$\sin T = 0.61\ldots$

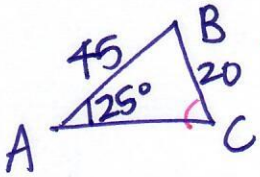
$T = 38^\circ$

$\frac{s}{\sin 12} = \frac{20}{\sin 130}$

$s = \frac{20\sin 12}{\sin 130}$

$\boxed{5.4}$

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



SSA → sines

$\frac{\sin C}{c} = \frac{\sin A}{a}$

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

$\sin C = 1.84\ldots$

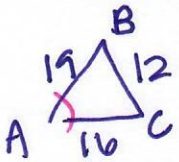
$C = \sin^{-1}(1.84\ldots)$

ERROR! ∄ DNE

$\boxed{\text{NO solution}}$

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

$\boxed{\text{A. 473/608}}$
B. 13/128
C. 83/152
D. 135



SSS → cosines

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

solve for cosA!

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

$\frac{12^2 - 16^2 - 19^2}{(-2\cdot 16\cdot 19)} = \cos A$

$\boxed{\text{MATH}}$ enter enter

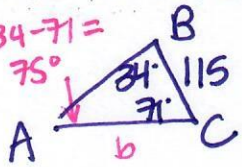
11. In $\triangle ABC$, m∠B = 34°, m∠C = 71°, and a = 115. What is the measure of side b?

$\boxed{\text{a) } \frac{115\sin 34^o}{\sin 75^o}}$

b) $\frac{115\sin 34^o}{\sin 71^o}$

c) $\frac{115\sin 75^o}{\sin 34^o}$

d) $\frac{115\sin 71^o}{\sin 34^o}$



ASA → sines

$\frac{b}{\sin B} = \frac{a}{\sin A}$

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

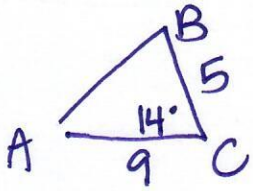
$\frac{b\sin 75}{\sin 75} = \frac{115\sin 34}{\sin 75}$

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

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

SAS → $\frac{1}{2}ab\sin C$



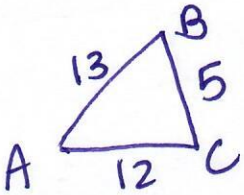
Area = $\frac{1}{2}(5)(9)\sin 14$

$\boxed{5.4}$

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

SSS → Heron's

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



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

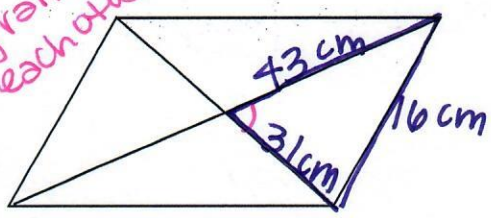
$\sqrt{15(15-5)(15-12)(15-13)}$

$\boxed{30}$

$\frac{1}{2} \rightarrow 43 \quad 31$

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}

Diagonals of parallelogram BISECT each other



SSS → cosines

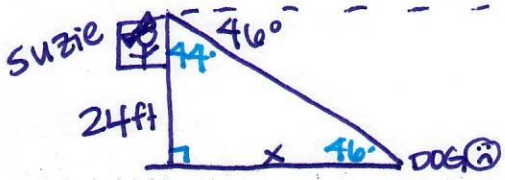
$16^2 = 43^2 + 31^2 - 2(43)(31)\cos X$

$\cos^{-1}(0.957\ldots) = X$

$X = \boxed{16.7°}$

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° and Suzie's window is 24 feet above the sidewalk, how far is Suzie from the dog?

Right Δ → SOHCAHTOA



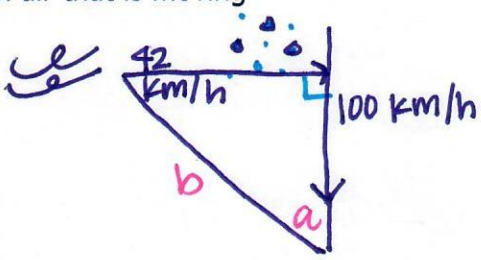
$\tan 44° = \frac{x}{24}$

$24 \tan 44 = x$

$\boxed{23.2\text{ ft}}$

(go save the puppy, Susie!)

16. Raindrops are falling vertically at a speed of 100 km per hour through air that is moving horizontally at a speed of 42 km per hour.



a) At what angle do the drops hit the ground?

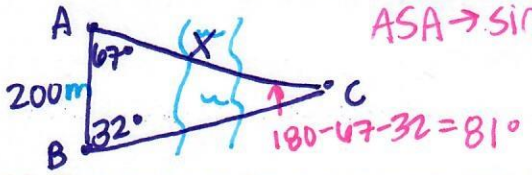
$\tan a = \frac{42}{100} \Rightarrow a = \tan^{-1}\left(\frac{42}{100}\right)$ $\boxed{23°}$

b) How fast are the drops actually falling?

$42^2 + 100^2 = b^2$ $\boxed{108.5\text{ km/h}}$

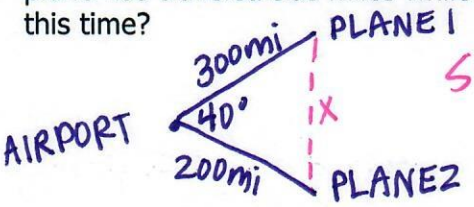
17. A surveyor marks points A and B 200 meters apart on one bank of a river. She sights a point C on the opposite bank and determines <A = 67° and <B = 32°. What is the distance from A to C?

ASA → sines



$\frac{x}{\sin 32} = \frac{200}{\sin 81}$ $\boxed{107.3\text{ m}}$

18. Two airplanes leave an airport, and the angle between their flight paths is 40°. 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?

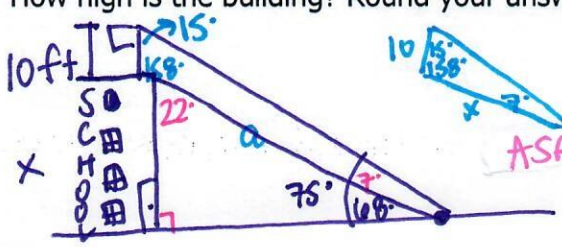


SAS → cosines

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

$\boxed{195.1\text{ miles}}$

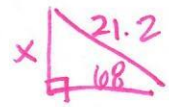
19. A flagpole 10 feet tall stands on top of a school. From a point in front of the building, the angle of elevation to the top of the pole is 75°, and the angle of elevation to the bottom of the pole is 68°. How high is the building? Round your answer to the nearest tenth of a foot.



ASA → sines

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

$x = 21.2\text{ ft}$



$\sin 68 = \frac{x}{21.2}$

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