

What Do You Get...

$$\textcircled{1} \frac{\sin 29^\circ}{1} = \frac{x}{18}$$

$$x = 18 \sin 29^\circ$$

$$x = 8.7 \text{ cm}$$

$$\textcircled{2} \frac{\tan 60}{1} = \frac{32}{x}$$

$$x \tan 60 = 32$$

$$x = 18.5 \text{ in}$$

$$\textcircled{3} \cos X = \frac{83}{175}$$

$$m\angle X = \cos^{-1}\left(\frac{83}{175}\right)$$

$$m\angle X = 61.7^\circ \approx 62^\circ$$

$$\textcircled{4} \frac{\tan 52^\circ}{1} = \frac{x}{20}$$

$$x = 20 \tan 52^\circ$$

$$x = 25.6 + 5 \text{ ft} = 30.6 \text{ ft}$$

$$\textcircled{5} \sin X = \frac{51}{120}$$

$$m\angle X = \sin^{-1}\left(\frac{51}{120}\right)$$

$$m\angle X = 25.2^\circ \approx 25^\circ$$

$$\textcircled{6} \tan X = \frac{8000}{158400}$$

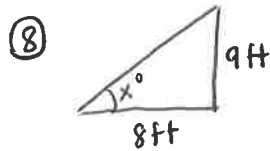
$$m\angle X = \tan^{-1}\left(\frac{8000}{158400}\right)$$

$$m\angle X = 2.9^\circ \approx 3^\circ$$

$$\textcircled{7} \frac{\sin 13^\circ}{1} = \frac{x}{3600}$$

$$x = 3600 \sin 13^\circ$$

$$x = 809.8 \approx 810 \text{ ft}$$



$$\tan X = \frac{9}{8}$$

$$m\angle X = \tan^{-1}\left(\frac{9}{8}\right)$$

$$m\angle X = 48.4^\circ \approx 48^\circ$$

$$\textcircled{9} \frac{\tan 7^\circ}{1} = \frac{90}{x}$$

$$90 = x \tan 7^\circ$$

$$x = 733 \text{ ft}$$

What You Get is ...

$$\textcircled{1} \frac{\sin 29}{1} = \frac{x}{15}$$

$$x = 15 \sin 29$$

$$x = 7.3$$

$$\textcircled{7} \frac{\sin 13}{1} = \frac{x}{3800}$$

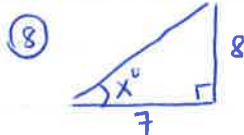
$$x = 3800 \sin 13$$

$$x = 854.8 \approx 855 \text{ ft}$$

$$\textcircled{2} \frac{\tan 60}{1} = \frac{35}{x}$$

$$\frac{35}{\tan 60} = \frac{x \tan 60}{\tan 60}$$

$$x = 20.2$$



$$\tan X = \frac{8}{7}$$

$$m\angle X = \tan^{-1}(8/7)$$

$$m\angle X = 48.8^\circ \approx 49^\circ$$

$$\textcircled{3} \cos X = \frac{92}{188}$$

$$m\angle X = \cos^{-1}\left(\frac{92}{188}\right)$$

$$m\angle X = 60.7^\circ \approx 61^\circ$$

$$\textcircled{9} \frac{\tan 5}{1} = \frac{80}{x}$$

$$\frac{80}{\tan 5} = \frac{x \tan 5}{\tan 5}$$

$$x = 914.4 \approx 914 \text{ ft}$$

$$\textcircled{4} \frac{\tan 54}{1} = \frac{x}{20}$$

$$x = 20 \tan 54$$

$$x = 27.5$$

$$\text{height} = 27.5 + 5$$

$$= 32.5 \text{ ft}$$

$$\textcircled{5} \sin X = \frac{38}{90}$$

$$m\angle X = \sin^{-1}\left(\frac{38}{90}\right)$$

$$m\angle X = 25^\circ$$

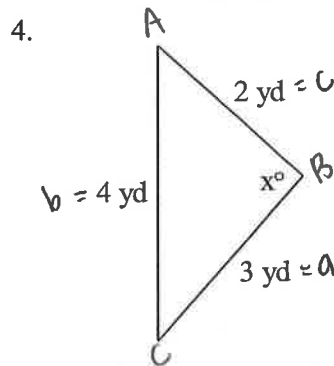
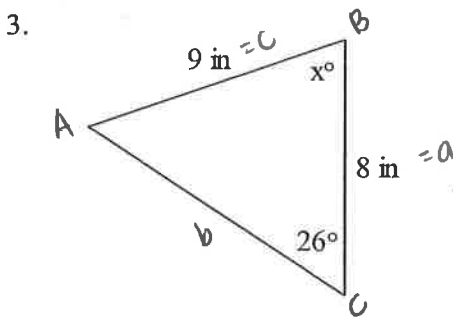
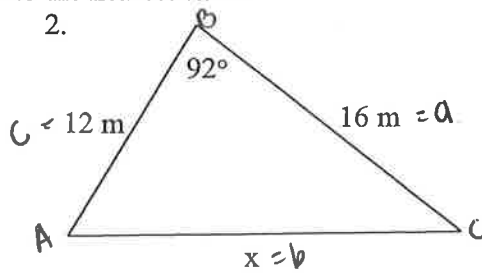
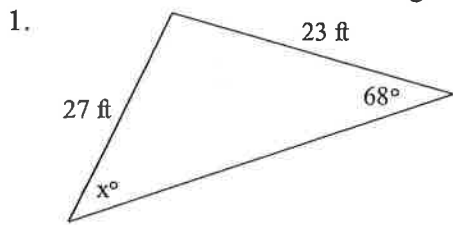
$$\textcircled{6} \tan X = 6000$$

$$m\angle X = \tan^{-1}(6000)$$

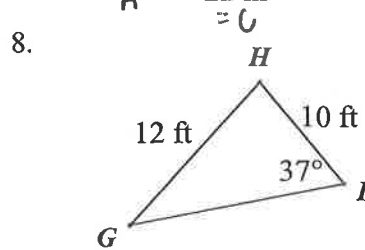
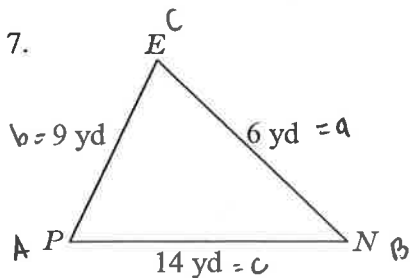
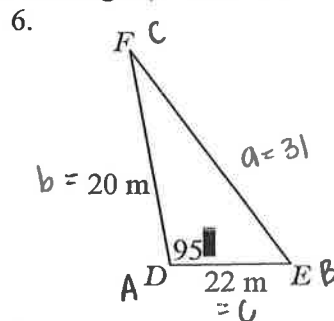
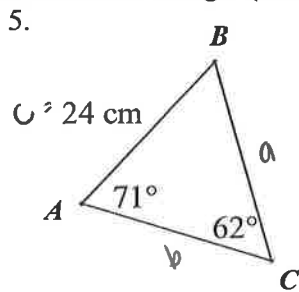
$$m\angle X = 3^\circ$$

Algebra 2 Unit 12 Law of Sines and Cosines Practice

Solve for the unknown side or angle. Round to the nearest tenth.



Solve each triangle (find all of the missing sides and angles). Round to the nearest tenth.



Some information from  $\triangle ABC$  is given. Find the missing sides and angles. Round to the nearest tenth.

9.  $A = 28^\circ$ ,  $b = 23$  cm,  $c = 8$  cm

10.  $B = 128^\circ$ ,  $a = 16$  ft,  $c = 24$  ft

11.  $A = 36^\circ$ ,  $B = 53^\circ$ ,  $b = 17$  m

12.  $A = 55^\circ$ ,  $b = 12$  mi,  $c = 7$  mi

13.  $a = 3.3$  in,  $b = 7.6$  in,  $c = 6.4$  in

14.  $A = 58^\circ$ ,  $a = 27$  in,  $b = 25$  in

## Law of Sines and Cosines Practice

① SSA  $\Rightarrow$  Law of Sines

$$\frac{\sin 68^\circ}{27} = \frac{\sin X^\circ}{23} \Rightarrow \frac{23 \sin 68^\circ}{27} = \frac{23 \sin X^\circ}{27}$$

$$0.7898 = \sin X$$

$$m\angle X = \sin^{-1}(0.7898)$$

$$\boxed{m\angle X = 52.2^\circ}$$

② SAS  $\Rightarrow$  Law of Cosines

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

$$b^2 = (16)^2 + (12)^2 - 2(16)(12) \cos 92^\circ$$

$$b^2 = 400 - 384 \cos 92^\circ$$

$$b^2 = 413.40$$

$$b = 20.3$$

$$\boxed{X = 20.3}$$

③  $\boxed{\frac{\sin A}{8}} = \frac{\sin B}{9} = \frac{\sin 26^\circ}{9}$

SSA  $\Rightarrow$  Law of Sines

$$\frac{\sin A}{8} = \frac{\sin 26^\circ}{9}$$

$$\sin A = 0.3897$$

$$m\angle A = \sin^{-1}(0.3897)$$

$$m\angle A = 22.9^\circ$$

$$m\angle B = 180 - 26 - 22.9$$

$$m\angle B = 131.1^\circ$$

$$\boxed{X = 131.1^\circ}$$

④ SSS  $\Rightarrow$  Law of Cosines

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

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

$$16 = 13 - 12 \cos B$$

$$3 = -12 \cos B$$

$$-0.25 = \cos B$$

$$m\angle B = \cos^{-1}(-0.25)$$

$$m\angle B = 104.5^\circ$$

$$\boxed{X = 104.5^\circ}$$

AAS  $\Rightarrow$  Law of Sines

⑤  $m\angle B = 47^\circ$

$BC = 25.7 \text{ cm}$

$AC = 19.9 \text{ cm}$

$$\frac{\sin 71^\circ}{a} = \frac{\sin 47^\circ}{b} = \frac{\sin 62^\circ}{24}$$

$$\frac{24 \sin 47^\circ}{\sin 62^\circ} = \frac{b \sin 62^\circ}{\sin 62^\circ}$$

$b = 19.9$

$$\frac{24 \sin 71^\circ}{\sin 62^\circ} = \frac{a \sin 62^\circ}{\sin 62^\circ}$$

$a = 25.7$

⑥ SAS  $\Rightarrow$  Law of Cosines

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

$$a^2 = 20^2 + 22^2 - 2(20)(22) \cos 95^\circ$$

$$a^2 = 884 - 880 \cos 95^\circ$$

$$a^2 = 960.70$$

$a = 31$

$EF = 31 \text{ m}$

$m\angle E = 40^\circ$

$m\angle F = 45^\circ$

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

$$22^2 = 31^2 + 20^2 - 2(31)(20) \cos C$$

$$484 = 1361 - 1240 \cos C$$

$$-877 = -1240 \cos C$$

$$0.7073 = \cos C$$

$$m\angle C = \cos^{-1}(0.7073)$$

$m\angle C = 45^\circ$

$$m\angle B = 180 - 95 - 45 = 40^\circ$$

⑦ SSS  $\Rightarrow$  Law of Cosines

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

$$14^2 = 6^2 + 9^2 - 2(6)(9) \cos C$$

$$196 = 117 - 108 \cos C$$

$$79 = -108 \cos C$$

$$-0.7315 = \cos C$$

$$m\angle C = \cos^{-1}(-0.7315)$$

$m\angle C = 137^\circ$

$$m\angle B = 180 - 137 - 17$$

$m\angle B = 26^\circ$

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

$$b^2 = 9^2 + 14^2 - 2(9)(14) \cos A$$

$$36 = 277 - 252 \cos A$$

$$-241 = -252 \cos A$$

$$0.9563 = \cos A$$

$$m\angle A = \cos^{-1}(0.9563)$$

$m\angle A = 17^\circ$

$m\angle E = 137^\circ$

$m\angle N = 26^\circ$

$m\angle P = 17^\circ$

⑧ SSA  $\Rightarrow$  Law of Sines

$$\frac{\sin 37^\circ}{12} = \frac{\sin G}{10} = \frac{\sin H}{h} \quad \Rightarrow \quad \frac{\sin 37^\circ}{12} = \frac{\sin 30.1^\circ}{10} = \frac{\sin 112.9^\circ}{h}$$

$$10 \sin 37^\circ = 12 \sin G$$

$$.5015 = \sin G$$

$$m\angle G = \sin^{-1}(.5015)$$

$$m\angle G = \boxed{30.1^\circ}$$

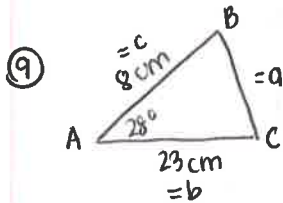
$$\frac{h \sin 37^\circ}{\sin 37^\circ} = \frac{12 \sin 112.9^\circ}{\sin 37^\circ}$$

$$h = 18.4$$

$$m\angle G = 30.1^\circ$$

$$m\angle H = 112.9^\circ$$

$$HG = 18.4 \text{ ft}$$



SAS  $\Rightarrow$  Law of Cosines

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

$$a^2 = 23^2 + 8^2 - 2(23)(8) \cos 28^\circ$$

$$a^2 = 268.08$$

$$\boxed{a = 16.4}$$

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

$$23^2 = 16.4^2 + 8^2 - 2(16.4)(8) \cos B$$

$$529 = 332.96 - 262.4 \cos B$$

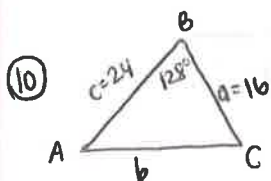
$$196.04 = -262.4 \cos B$$

$$-.7471 = \cos B$$

$$m\angle B = \cos^{-1}(-.7471)$$

$$\boxed{m\angle B = 138.3^\circ}$$

$$\boxed{m\angle C = 13.7^\circ}$$



SAS  $\Rightarrow$  Law of Cosines

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

$$b^2 = 16^2 + 24^2 - 2(16)(24) \cos 128^\circ$$

$$b^2 = 1304.83$$

$$\boxed{b = 36.1}$$

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

$$16^2 = 36.1^2 + 24^2 - 2(36.1)(24) \cos A$$

$$256 = 1879.21 - 1732.8 \cos A$$

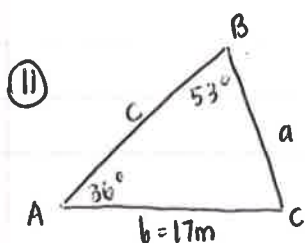
$$-1623.21 = -1732.8 \cos A$$

$$.9368 = \cos A$$

$$m\angle A = \cos^{-1}(.9368)$$

$$\boxed{m\angle A = 20.5^\circ}$$

$$\boxed{m\angle C = 31.5^\circ}$$



AAS  $\Rightarrow$  Law of Sines

$$\boxed{m\angle C = 91^\circ}$$

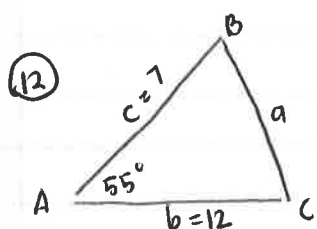
$$\frac{\sin 53}{17} = \frac{\sin 36}{a} = \frac{\sin 91}{c}$$

$$a \sin 53 = 17 \sin 36$$

$$\boxed{a = 12.5}$$

$$c \sin 53 = 17 \sin 91$$

$$\boxed{c = 21.3}$$



SAS  $\Rightarrow$  Law of Cosines

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

$$a^2 = 12^2 + 7^2 - 2(12)(7) \cos 55$$

$$a^2 = 96.64$$

$$\boxed{a = 9.8}$$

$$c^2 = a^2 + b^2 - 2abc \cos C$$

$$7^2 = 9.8^2 + 12^2 - 2(9.8)(12) \cos C$$

$$49 = 240.04 - 235.2 \cos C$$

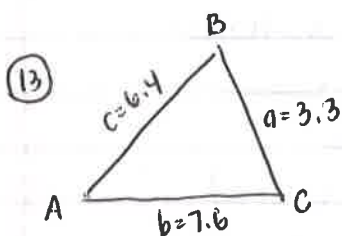
$$-191.04 = -235.2 \cos C$$

$$.8122 = \cos C$$

$$m\angle C = \cos^{-1}(.8122)$$

$$\boxed{m\angle C = 35.7^\circ}$$

$$\boxed{m\angle B = 89.3^\circ}$$



SSS  $\Rightarrow$  Law of Cosines

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

$$3.3^2 = 7.6^2 + 6.4^2 - 2(7.6)(6.4) \cos A$$

$$10.89 = 98.72 - 97.28 \cos A$$

$$-87.83 = -97.28 \cos A$$

$$.9029 = \cos A$$

$$\boxed{m\angle A = 25.5^\circ}$$

$$\boxed{m\angle B = 98^\circ}$$

$$c^2 = a^2 + b^2 - 2abc \cos C$$

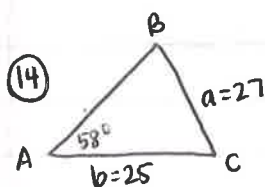
$$6.4^2 = 3.3^2 + 7.6^2 - 2(3.3)(7.6) \cos C$$

$$40.96 = 68.65 - 50.16 \cos C$$

$$-27.69 = -50.16 \cos C$$

$$.5520 = \cos C$$

$$\boxed{m\angle C = 56.5^\circ}$$



SSA  $\Rightarrow$  Law of Sines

$$\frac{\sin 58}{27} = \frac{\sin B}{25} = \frac{\sin C}{c}$$

$$\frac{\sin 58}{27} = \frac{\sin 51.7}{25} = \frac{\sin 70.3}{c}$$

$$25 \sin 58 = 27 \sin B$$

$$.7852 = \sin B$$

$$\boxed{m\angle B = 51.7^\circ}$$

$$\boxed{m\angle C = 70.3^\circ}$$

$$c \sin 58 = 27 \sin 70.3$$

$$\boxed{c = 29.9}$$