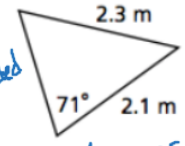
Honors Math 2
Law of Sines and Law of Cosines

Identify whether you would use the Law of Sines or Law of Cosines as the first step when solving the given triangle.

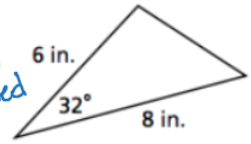
1.



• 2 sides
• Non-included angle

Law of sines

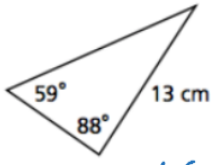
2.



• 2 sides
• included angle

Law of cosines

3.

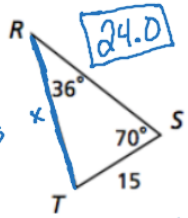


• 2 angles
• 1 side

Law of Sines

Find each measure. Round lengths to the nearest tenth and angle measures to the nearest degree.

4. RT



24.0

• 2 angles
• 1 side

Law of Sines

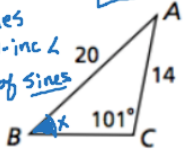
$$\frac{\sin 70^\circ}{x} = \frac{\sin 36^\circ}{15}$$

$$15 \sin 70^\circ = x \sin 36^\circ$$

$$x = \frac{15 \sin 70^\circ}{\sin 36^\circ}$$

5. $m\angle B$

43°



• 2 sides
• Non-inc ∠

Law of Sines

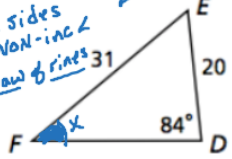
$$\frac{\sin 101^\circ}{20} = \frac{\sin x}{14}$$

$$\frac{14 \sin 101^\circ}{20} = 20 \sin x$$

$$x = \sin^{-1}\left(\frac{14 \sin 101^\circ}{20}\right)$$

6. $m\angle F$

40°



• 2 sides
• Non-inc ∠

Law of Sines

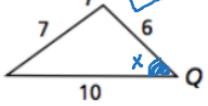
$$\frac{\sin x}{20} = \frac{\sin 84^\circ}{31}$$

$$31 \sin x = 20 \sin(84)$$

$$x = \sin^{-1}\left(\frac{20 \sin 84}{31}\right)$$

7. $m\angle Q$

44°



• 3 sides

Law of Cosines

$$7^2 = 10^2 + 6^2 - 2(10)(6)\cos x^\circ$$

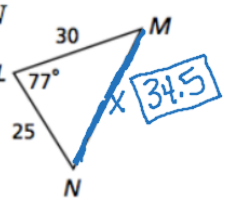
$$49 = 136 - 120\cos x^\circ$$

$$-87 = -120\cos x^\circ$$

$$\frac{87}{120} = \cos x^\circ$$

$$x = \cos^{-1}\left(\frac{87}{120}\right)$$

8. MN



• 2 sides
• inc. ∠

Law of Cosines

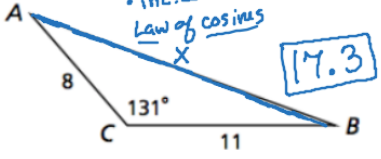
34.5

$$x^2 = 25^2 + 30^2 - 2(25)(30)\cos 77^\circ$$

$$x^2 = 1525 - 1500\cos 77^\circ$$

$$x = \sqrt{1525 - 1500\cos 77^\circ}$$

9. AB



• 2 sides
• inc. ∠

Law of Cosines

17.3

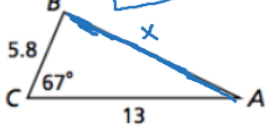
$$x^2 = 8^2 + 11^2 - 2(8)(11)\cos 131^\circ$$

$$x^2 = 185 - 176\cos 131^\circ$$

$$x = \sqrt{185 - 176\cos 131^\circ}$$

10. AB

12.0



• 2 sides
• inc. ∠

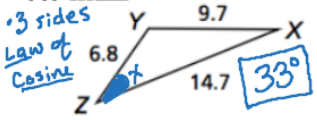
Law of Cosines

$$x^2 = 5.8^2 + 13^2 - 2(5.8)(13)\cos 67^\circ$$

$$x^2 = 202.64 - 150.8\cos 67^\circ$$

$$x = \sqrt{202.64 - 150.8\cos 67^\circ}$$

11. $m\angle Z$



• 3 sides

Law of Cosine

33°

$$9.7^2 = 6.8^2 + 14.7^2 - 2(6.8)(14.7)\cos x^\circ$$

$$94.09 = 262.33 - 199.92\cos x^\circ$$

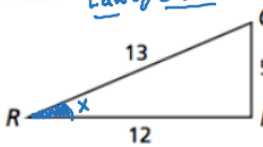
$$\frac{-168.24}{-199.92} = \frac{-199.92\cos x^\circ}{-199.92}$$

$$x = \cos^{-1}\left(\frac{168.24}{199.92}\right)$$

12. $m\angle R$

• 3 sides

Law of Cosine



$$5^2 = 13^2 + 12^2 - 2(13)(12)\cos x^\circ$$

$$25 = 313 - 312\cos x^\circ$$

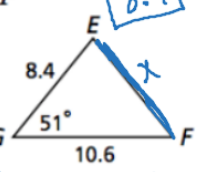
$$\frac{-288}{-312} = \frac{-312\cos x^\circ}{-312}$$

$$x = \cos^{-1}\left(\frac{288}{312}\right)$$

13. EF — 8.4

- 2 sides
- inc ∠

Law of cosines



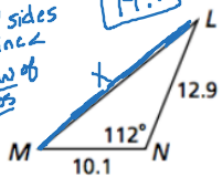
$x^2 = 8.4^2 + 10.6^2 - 2(8.4)(10.6)\cos 51°$

$x = \sqrt{182.92 - 178.08\cos 51°}$

14. LM — 19.1

- 2 sides
- inc ∠

Law of cos



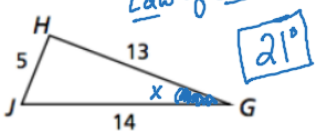
$x^2 = 10.1^2 + 12.9^2 - 2(10.1)(12.9)\cos 112°$

$x = \sqrt{268.42 - 260.58\cos 112°}$

15. m∠G — 21°

- 3 sides

Law of cos



$5^2 = 14^2 + 13^2 - 2(14)(13)\cos x°$

$25 = 365 - 364\cos x°$

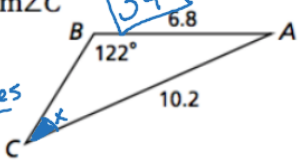
$\frac{-340}{-364} = \frac{-364\cos x}{-364}$

$x = \cos^{-1}\left(\frac{340}{364}\right)$

16. m∠C — 34°

- 2 ∠'s
- 1 side

Law of sines



$\frac{\sin x°}{6.8} = \frac{\sin 122°}{10.2}$

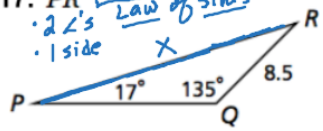
$10.2\sin x° = \frac{6.8\sin 122°}{10.2}$

$x = \sin^{-1}\left(\frac{6.8\sin 122°}{10.2}\right)$

17. PR — 21°

- 2 ∠'s
- 1 side

Law of sines



$\frac{\sin 135°}{x} = \frac{\sin 17°}{8.5}$

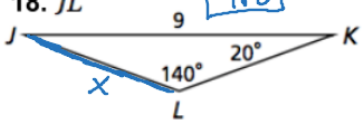
$8.5\sin 135° = x\sin 17°$

$x = \frac{8.5\sin 135°}{\sin 17°}$

18. JL — 4.8

- 2 ∠'s
- 1 side

Law of sines



$\frac{\sin 20°}{x} = \frac{\sin 140°}{9}$

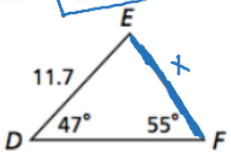
$9\sin 20° = x\sin 140°$

$x = \frac{9\sin 20°}{\sin 140°}$

19. EF — 10.4

- 2 ∠'s
- 1 side

Law of sines



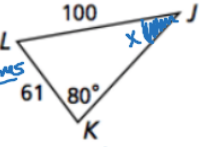
$\frac{\sin 47°}{x} = \frac{\sin 55°}{11.7}$

$x = \frac{11.7\sin 47°}{\sin 55°}$

20. m∠J — 37°

- 2 sides
- NON-inc ∠

Law of sines



$\frac{\sin x}{61} = \frac{\sin 80°}{100}$

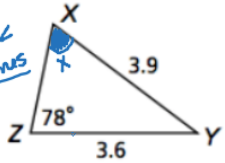
$\sin x° = \frac{61\sin 80°}{100}$

$x = \sin^{-1}\left(\frac{61\sin 80°}{100}\right)$

21. m∠X — 65°

2 sides
NON inc ∠

Law of sines



$\frac{\sin 78°}{3.9} = \frac{\sin x}{3.6}$

$x = \sin^{-1}\left(\frac{3.6\sin 78°}{3.9}\right)$

22. **Multi-Step** Three circular disks are placed next to each other as shown. The disks have radii of 2 cm, 3 cm, and 4 cm. The centers of the disks form $\triangle ABC$. Find m∠ACB to the nearest degree.