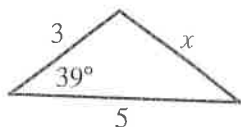


CLASS EXERCISES

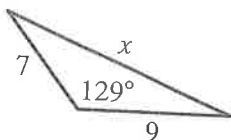
Law of Cosines

Write an equation to solve for the indicated side. Do not solve the equation.

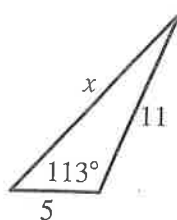
1.



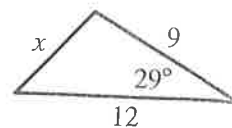
2.



3.

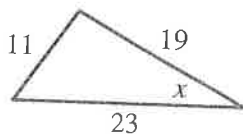


4.

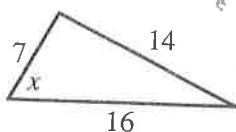


Write an expression to find the cosine of the unknown angle. Do not complete the computation.

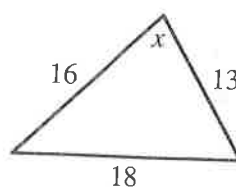
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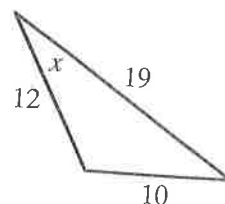
6.



7.



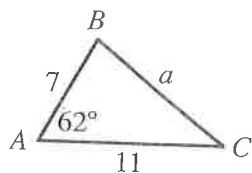
8.



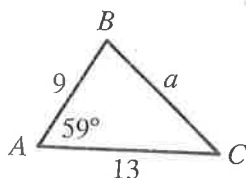
PRACTICE EXERCISES

Solve for the length of the missing side of each triangle. Round your answer to two significant digits.

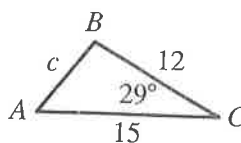
1.



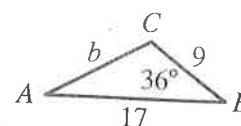
2.



3.



4.



5. $\angle C = 115^\circ$, $a = 11$, $b = 21$

6. $\angle C = 113^\circ$, $a = 13$, $b = 23$

7. $\angle A = 32^\circ$, $b = 23$, $c = 47$

8. $\angle A = 34^\circ$, $b = 24$, $c = 46$

9. $\angle B = 31^\circ$, $a = 17$, $c = 14$

10. $\angle B = 32^\circ$, $a = 15$, $c = 18$

Solve each triangle for the specified angle measure. Round your answer to the nearest degree.

11. $a = 11$, $b = 14$, $c = 17$; $\angle A$

12. $a = 12$, $b = 16$, $c = 19$; $\angle A$

13. $a = 23$, $b = 43$, $c = 31$; $\angle B$

14. $a = 21$, $b = 42$, $c = 31$; $\angle B$

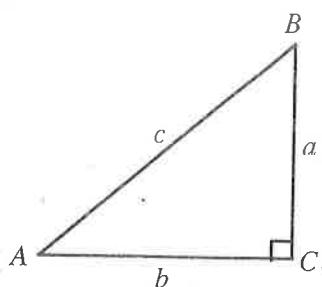
15. $a = 12$, $b = 12$, $c = 17$; $\angle C$

16. $a = 17$, $b = 17$, $c = 24$; $\angle C$

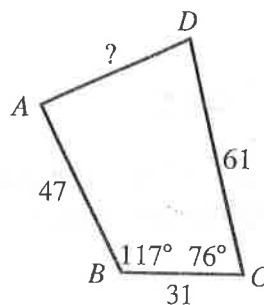
Solve each triangle PQR . Unless otherwise directed, round lengths to two significant digits and angle measures to the nearest degree.

17. $\angle R = 30^\circ$, $p = 18$, $q = 16$
 18. $\angle R = 45^\circ$, $p = 13$, $q = 19$
 19. $\angle P = 83^\circ$, $r = 43$, $q = 51$
 20. $\angle P = 77^\circ$, $r = 76$, $q = 49$
 21. $\angle Q = 113^\circ$, $p = 27$, $r = 43$
 22. $\angle Q = 129^\circ$, $p = 45$, $r = 71$
 23. $p = 15$, $q = 19$, $r = 23$
 24. $p = 27$, $q = 33$, $r = 41$
 25. $p = 310$, $q = 250$, $r = 160$
 26. $p = 200$, $q = 410$, $r = 280$
 27. $p = 104.3$, $q = 135.7$, $r = 154.6$
 (Give angle measures to the nearest hundredth of a degree.)
 28. $p = 65.5$, $q = 92.7$, $r = 114$
 (Give angle measures to the nearest tenth of a degree.)

29. Prove that the Pythagorean theorem is a special case of the law of cosines.



30. Given quadrilateral $ABCD$ with $AB = 47$, $BC = 31$, $CD = 61$, $\angle B = 117^\circ$, and $\angle C = 76^\circ$, determine AD . *Hint:* This is a three-step process.



31. A parallelogram has adjacent sides of measure a and b and diagonals of measure p and q . Use the law of cosines to show that $2a^2 + 2b^2 = p^2 + q^2$.
 32. Derive the law of cosines for the case in which $\angle C$ is an obtuse angle. *Hint:* Recall that $\cos(180^\circ - C) = -\cos C$.
 33. Show that in $\triangle ABC$, if $\angle C$ is acute, $c < \sqrt{a^2 + b^2}$, and if $\angle C$ is obtuse, $c > \sqrt{a^2 + b^2}$.

Applications

Surveying

34. A triangular field is 452 ft on one side and 572 ft on another. The sides meet in an angle of 67.1° . Find the length of the third side, to the nearest foot.
 35. If a triangular parcel of land has sides of lengths 541 ft, 429 ft, and 395 ft, what are the measures of the angles between the sides, to the nearest tenth of a degree?