This worksheet focuses on the sine rule. You will learn how to use the sine rule to solve non–right-angled triangles effectively. Work carefully through each question and show all your reasoning.

Easy Questions

1. Write the sine rule formula for a triangle with sides a, b, c opposite angles A, B, C, respectively.

2. In triangle ABC, you are given that $a = 8$, $A = 40°$, and $B = 60°$. Write down the sine rule equation that relates side b to its opposite angle.

3. In the triangle from Question 2, complete the calculation using the sine rule to find side b. (Give your answer to two decimal places.)

4. In triangle DEF, angle $D = 50°$, angle $E = 70°$, and side $d = 10$. Write the sine rule equation that would allow you to find side e.

5. In triangle GHI, angle $G = 35°$, angle $H = 65°$, and side $g = 5$. Use the sine rule to set up an expression for side h, and calculate its value to two decimal places.

Intermediate Questions

6. In triangle ABC, let $A = 30°$, $B = 45°$, and side $b = 10$. Use the sine rule to find side a. (Give your answer to two decimal places.)

7. In triangle PQR, where $P = 40°$, $Q = 80°$, and side $p = 12$, set up and then use the sine rule to determine side q.

8. Consider triangle LMN with $L = 65°$, $M = 55°$, and side $l = 9$. Use the sine rule to calculate side m.

9. In triangle UVW, given $U = 50°$, $V = 75°$, and side $u = 6$, use the sine rule to find side v.

10. In triangle JKL, with $J = 20°$, $K = 80°$, and side $k = 14$, use the sine rule to determine side j.

11. In triangle ABC, if $A = 50°$, side $a = 10$, and angle $B = 60°$, set up and solve the sine rule to find side b.

12. In triangle DEF, given $D = 45°$, $E = 70°$, and side $e = 8$, use the sine rule to find side d. (Round your answer to two decimal places.)

13. In triangle QRS, let $Q = 30°$, $R = 110°$, and side $r = 7$. Apply the sine rule to determine side q.

14. In triangle TUV, if $T = 65°$, $U = 50°$, and side $t = 11$, use the sine rule to calculate side u.

15. In triangle XYZ, with $X = 40°$, $Y = 80°$, and side $x = 5$, compute side y using the sine rule.

16. In triangle ABC, suppose $A = 35°$, $B = 65°$, and side $a = 7$. First, find side b using the sine rule, and then calculate C.

17. In triangle MNO, given $M = 55°$, $N = 50°$, and side $m = 10$, use the sine rule to determine side n.

18. In triangle RST, with $R = 85°$, $S = 45°$, and side $s = 12$, apply the sine rule to find side r.

19. In triangle ABC, where $A = 70°$, $B = 50°$, and side $a = 9$, use the sine rule to calculate side b.

20. In triangle GHI, if $G = 40°$, $H = 75°$, and side $h = 10$, use the sine rule to compute side g.

Hard Questions

21. In triangle ABC, angle $A = 30°$, side $a = 8$, and side $b = 10$. Using the sine rule, find all possible values of angle B.

22. In triangle DEF, angle $D = 40°$, side $d = 9$, and side $e = 12$. Use the sine rule to determine angle E, discussing any ambiguous case that may arise.

23. In triangle PQR, angle $P = 55°$, side $p = 14$, and side $q = 20$. Use the sine rule to determine the possible values for angle Q. Explain your reasoning.

24. In triangle LMN, you are given that $M = 48°$, side $m = 7$, and side $n = 10$. First, use the sine rule to find angle N, and then determine side l. (Give your answers to two decimal places where appropriate.)

25. In triangle ABC, suppose that side $a = 6$, angle $A = 45°$, and side $b = 8$. Use the sine rule to find angle B, and then determine the remaining angle C and side c. (Round your numerical answers to two decimal places.)

26. In triangle XYZ, angle $X = 50°$, side $x = 7$, and side $y = 9$. Use the sine rule to find the possible measures for angle Y. Discuss whether one or two triangles satisfy the given conditions.

27. In triangle RST, let angle $R = 35°$, side $r = 8$, and side $s = 10$. Use the sine rule to calculate angle S. (State your answer to one decimal place.)

28. In triangle GHI, angle $H = 60°$, side $h = 5$, and side $i = 7$. Use the sine rule to determine angle I, and comment on any potential ambiguity.

29. In triangle ABC, given angle $A = 30°$, angle $B = 80°$, and side $a = 10$, use the sine rule to first calculate side b and then determine side c. (Round your answers appropriately.)

30. In triangle DEF, angle $D = 65°$, side $d = 12$, and angle $E = 50°$. Use the sine rule to find side e, and then determine angle F. (Provide your answers to two decimal places.)