Cosine And Sine Rule

Here we are dealing with a triangle with sides a, b, c and angles A, B, C such that each angle is opposite the same letter side.

- The *cosine rule* states that
$$c^2 = a^2 + b^2 - 2ab\cos C.$$
We use it when
  1. we have all three sides and want any angle,
  2. we have two sides and an angle and want the other side.
- The *sine rule* states that
$$\frac{\sin A}{a} = \frac{\sin B}{b} = \frac{\sin C}{c}.$$
We use it when
  1. we have a side opposite an angle pair and a length and want the angle opposite,
  2. we have a side opposite an angle pair and an angle and want the side opposite.
- Patrons are reminded that it is worth remembering that $\sin 30° = \cos 60° = \frac{1}{2}$.

Questions

Find the missing angles and lengths (all answers to 3 significant figures):

1. Triangle ABC with $AB = 5$, $AC = 7$, $B\hat{A}C = 32°$. Find BC. [3.83]
2. Triangle DEF with $EF = 8$, $E\hat{D}F = 57°$, $D\hat{F}E = 23°$. Find DE. [3.73]
3. Triangle XYZ with $XY = 10$, $XZ = 8$, $YZ = 3$. Find $Y\hat{X}Z$. [14.4°]
4. Triangle PQR with $PQ = 6$, $PR = 8$, $P\hat{Q}R = 40°$. Find $P\hat{R}Q$. [28.8°]
5. Triangle XYZ with $XZ = 10$, $YZ = 3$, $X\hat{Z}Y = 101°$. Find XY. [11.0]
6. Triangle LMN with $MN = 11$, $M\hat{L}N = 100°$, $L\hat{N}M = 38°$. Find LM. [6.88]
7. Triangle ABC with $AB = 5.9$, $BC = 4.2$, $AC = 6.2$. Find $A\hat{B}C$. [73.6°]
8. Triangle ABC with $AC = 8.1$, $BC = 4.3$, $A\hat{B}C = 121°$. Find $B\hat{A}C$. [27.1°]
9. Triangle PQR with $QR = 6.2$, $PQ = 5.1$, $P\hat{Q}R = 57°$. Find PR. [5.48]
10. Triangle ABC with $AC = 7$, $C\hat{A}B = 120°$, $A\hat{B}C = 40°$. Find BC. [9.43]
11. Triangle LMN with $LM = 10$, $MN = 6$, $LN = 5$. Find $L\hat{N}M$. [131°]
12. Triangle XYZ with $XZ = 9$, $XY = 11$, $X\hat{Z}Y = 97°$. Find $X\hat{Y}Z$. [54.3°]