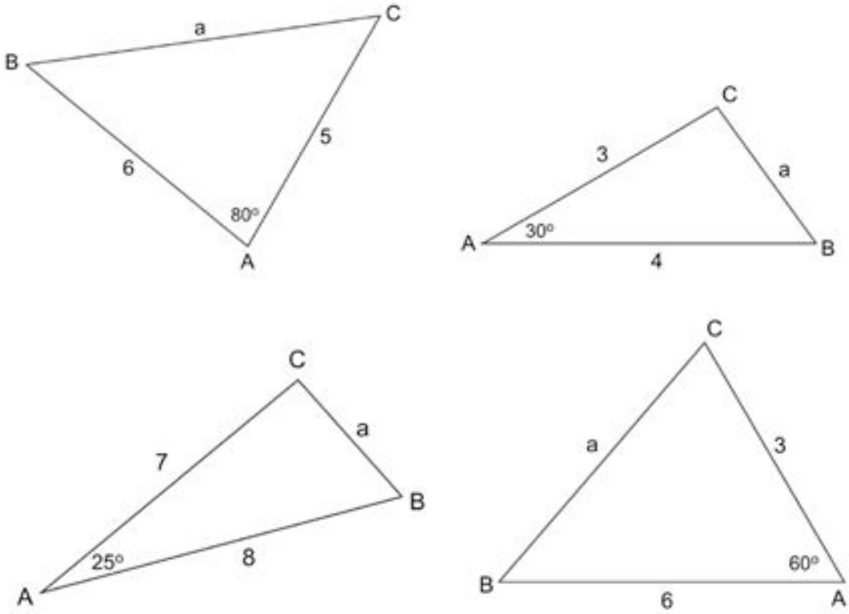
Cosine Rule Copymaster 1

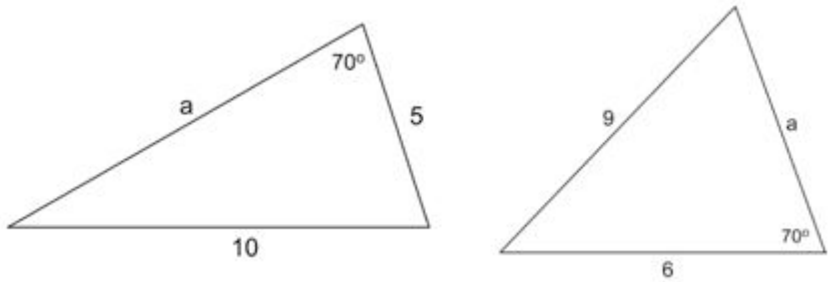
<u>The Cosine Rule I</u>

1. Find the unknown sides in the following triangles.



2. Find all of the angles in the triangles above.

3. Find the unknown angles and sides in the following triangles.

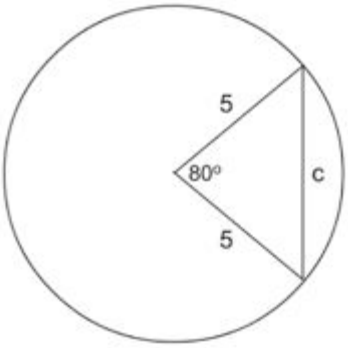


4. Find the length of the chord that subtends an angle of 80º in a circle of radius 5 cm.
5.
6. A regular octagon ABCDEFGH, has sides of length 10 cm. Find the lengths of AC, AD, and AE.

Answers to Copymaster 1

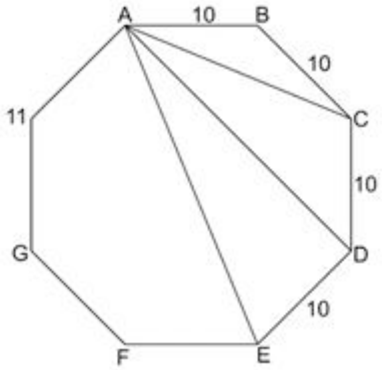
1. (i) a2 = 32 + 62 – 2×3×6 cos 60º = 9 + 36 – 36 × 0.5 = 27. So a = 5.20. (ii) 3.39; (iii) 2.05; (iv) 7.11.
2. (i) 9 = 36 + 27 – 12×5.20 cos B. So B = 30.07º. Then C = 180º – 60º – 30.07º = 89.93º. (ii) B = 60.76º and C = 94.24º. (iii) B = 46.83º and C = 103.17º. (iv) B = 43.80º and C = 56.20º.
3. (i) a2 – 12a cos 70º – 45 = 0. So a = 9.07 (discount the negative answer). (ii) a = 10.54.

4.



Let c be the length of the chord. Then c2 = 52 + 52 – 2 × 5 × 5 cos 80. Hence c = 6.43.

5.



Consider triangle ABC. First note that size of the interior angle of a regular octagon is $\frac{6\times180^\circ}{8}=135^\circ$. Then, using the Cosine Rule, we have AC2 = AB2 + BC2 – 2.AB.BC cos 135º = 102 + 102 – 2 ×10 ×10 cos 135º. Hence AC = 18.48 cm.

Before calculating ADC in triangle, we will need to find angle ACD. But angle ACD = 135º – angle ACB. So we need to calculate angle ACB using the Cosine Rule. Angle ACD = 112.5º and then AD = 24.14 cm.

AE can be found using the Cosine Rule but it is a little tortuous. It's actually quicker to note that triangle ABE has a right angle at B. Then use Pythagoras' Theorem with AC = CE = 18.48. This gives AE = 26.13 cm.