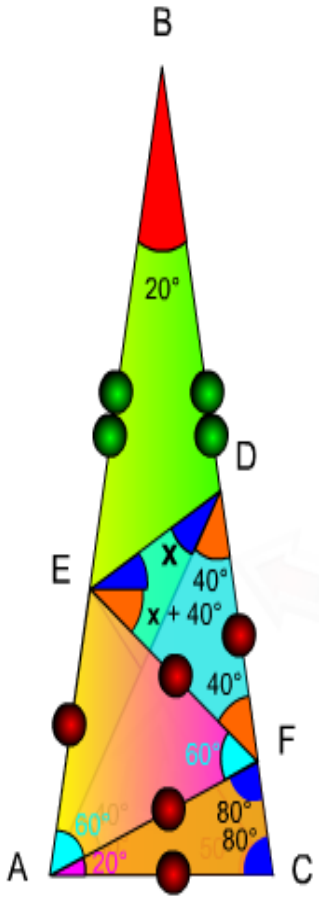
Geometry Step by Step
From the Land of the Incas

Geometry: Langley's Problem



Given:

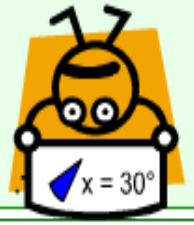
- ABC: isosceles
- B = 20°
- CAD =60°
- ACE = 50°

Find:

- ADE = x

Solution:

1. ABC isosceles: ∴ A = C = 80°
2. AEC isosceles: AEC = 50° ∴ AE = AC
3. ADC: ADC = 40° (sum of the angles in a triangle)
4. AF = AC (construction)
   ∴ AFC = C = 80° and CAF =20°
5. AFD isoceles because DAF = ADF = 40°
   ∴ AF = DF
6. AEF equilateral (AE = AF, EAF = 60°)
   ∴ EF = AF = AE and AFE = 60°
   ∴ DFE = 180° - 80° - 60° = 40°
7. DFE isosceles (EF = DF)
   ∴ E = D = x + 40°
   ∴ (x +40°) + (x + 40°) + 40° = 180°



The famous **Langley problem** is a type of problem called "*Adventitious Angles*" problem because it is a matter of chance that we will be able to solve this problem. It appears to be an easy problem, but it is deceivingly difficult.

- Reference: The Mathematical Gazette, UK
- Author: Edward M. Langley
- Title: A problem
- Page: 173
- Issue: October 1922
- Category: M Note 644

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