Zadatak 12. Za duljine stranica trokuta vrijedi $c - b = b - a = 2$ cm, a jedan kut trokuta iznosi $120°$. Koliki je opseg trokuta?

Rješenje.

$$c - b = b - a = 2 \text{cm}$$

$$o = ?$$

$$b - a = 2 \implies b = 2 + a$$
$$c - b = 2 \implies c = 2 + b = 2 + 2 + a = 4 + a$$

c je najdulja stranica pa je $\gamma = 120°$ te vrijedi

$$\cos \gamma = \frac{a^2 + b^2 - c^2}{2ab}$$

$$\cos 120° = \frac{a^2 + (a+2)^2 - (a+4)^2}{2a(a+2)}$$

$$-\frac{1}{2} = \frac{a^2 + a^2 + 4a + 4 - a^2 - 8a - 16}{2a(a+2)}$$

$$-\frac{1}{2} = \frac{a^2 - 4a - 12}{2a(a+2)}$$

$$-\frac{1}{2} = \frac{(a-6)(a+2)}{2a(a+2)}$$

$$-\frac{1}{2} = \frac{a-6}{2a} \quad / \cdot 2a$$

$$-a = a - 6$$

$$a = 3, \quad b = 5, \quad c = 7$$

$$\implies o = a + b + c = 3 + 5 + 7 = 15 \text{cm}$$