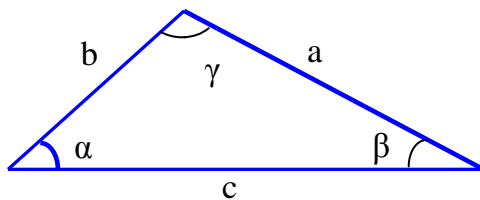


## Esercizi sui Triangoli Qualsiasi

in riferimento alla figura, risolvi i triangoli di cui sono noti:



1	$a = 4\sqrt{3}$ $b = 4$ $c = 4$	$\alpha = 120^\circ$ $\beta = 30^\circ$ $\gamma = 30^\circ$
2	$a = \sqrt{3}$ $b = 2$ $\gamma = 30^\circ$	$c = 1$ $\alpha = 60^\circ$ $\beta = 90^\circ$
3	$a = 4$ $b = 4\sqrt{2}$ $\beta = 45^\circ$	$c = 2\sqrt{6} + 2\sqrt{2}$ $\alpha = 30^\circ$ $\gamma = 105^\circ$
4	$a = 2$ $b = 2$ $\alpha = 75^\circ$	$c = 2\sqrt{2 - \sqrt{3}}$ $\beta = 75^\circ$ $\gamma = 30^\circ$
5	$a = 2\sqrt{3}$ $c = 3\sqrt{2}$ $\alpha = 45^\circ$	$b = 3 + \sqrt{3}$ $\beta = 75^\circ$ $\gamma = 60^\circ$
6	$a = \sqrt{3} + 1$ $c = \sqrt{6}$ $\beta = 45^\circ$	$b = 2$ $\alpha = 75^\circ$ $\gamma = 60^\circ$
7	$a = 2$ $c = 2\sqrt{2}$ $\gamma = 45^\circ$	$b = \sqrt{6} + \sqrt{2}$ $\alpha = 30^\circ$ $\beta = 105^\circ$
8	$b = 3 - \sqrt{3}$ $c = 3\sqrt{2}$ $\alpha = 45^\circ$	$a = 2\sqrt{3}$ $\beta = 75^\circ$ $\gamma = 60^\circ$
9	$b = \sqrt{2}$ $c = \sqrt{3} + 1$ $\beta = 30^\circ$	$a_1 = 2$ $\alpha_1 = \gamma_1 = 75^\circ$ $a_2 = 1 + \sqrt{3}$ $\alpha_2 = 45^\circ$ $\gamma_2 = 105^\circ$
10	$b = 2\sqrt{2}$ $c = 2\sqrt{3}$ $\gamma = 60^\circ$	$a = \sqrt{6} + \sqrt{2}$ $\alpha = 75^\circ$ $\beta = 45^\circ$
11	$a = 2\sqrt{6}$ $\alpha = 30^\circ$ $\beta = 120^\circ$	$b = 6\sqrt{2}$ $c = 2\sqrt{6}$ $\gamma = 30^\circ$
12	$a = 2$ $\alpha = 45^\circ$ $\beta = 75^\circ$	$b = 2(\sqrt{3} + 1)$ $c = \sqrt{6}$ $\gamma = 60^\circ$
13	$a = 2\sqrt{3} + 3$ $\beta = 15^\circ$ $\gamma = 90^\circ$	$b = \frac{2\sqrt{3} + 3}{4}$ $c = 3\sqrt{2} + \sqrt{6}$ $\alpha = 75^\circ$
14	$b = 6\sqrt{2}$ $\alpha = 60^\circ$ $\beta = 45^\circ$	$a = 4\sqrt{3}$ $c = 8\sqrt{3}$ $\gamma = 75^\circ$
15	$b = \sqrt{6}$ $\beta = 30^\circ$ $\gamma = 45^\circ$	$a = 6 + \sqrt{3}$ $c = 2\sqrt{3}$ $\alpha = 105^\circ$
16	$b = 10$ $\alpha = 15^\circ$ $\gamma = 120^\circ$	$a = 5(\sqrt{3} - 1)$ $c = 5\sqrt{6}$ $\beta = 45^\circ$
17	$c = 2\sqrt{6}$ $\alpha = 30^\circ$ $\beta = 120^\circ$	$a = 2\sqrt{6}$ $b = 6\sqrt{2}$ $\gamma = 30^\circ$
18	$c = 6\sqrt{3}$ $\alpha = 45^\circ$ $\gamma = 60^\circ$	$a = 6\sqrt{2}$ $b = 3(\sqrt{6} + \sqrt{2})$ $\beta = 75^\circ$

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19	$c = \sqrt{2} \quad \beta = 45^\circ \quad \gamma = 75^\circ$	$a = 3 - \sqrt{3} \quad b = \sqrt{6} - \sqrt{2}$ $\alpha = 60^\circ$
20	$a = 2\sqrt{3} \quad b = 3\sqrt{2} \quad c = 3 + \sqrt{3}$	$\alpha = 45^\circ \quad \beta = 60^\circ \quad \gamma = 75^\circ$

verifica la correttezza delle seguenti relazioni algebriche tra gli elementi del triangolo in figura

21	$a^2 = -\frac{2bc}{a^2} \cos \alpha \operatorname{sen}^2 \alpha$	corretta
22	$\frac{bc}{a} = \frac{c \operatorname{sen} \beta}{\operatorname{sen} \alpha}$	corretta
23	$\operatorname{sen}(\alpha + \beta) = \frac{a \operatorname{sen} \gamma \operatorname{sen} \beta}{b \operatorname{sen} \alpha}$	corretta
24	$a + b = \operatorname{sen} \gamma \left( \frac{c + b \cos(\alpha + \beta)}{\operatorname{sen} \alpha - \operatorname{sen} \beta} \right)$	corretta
25	$b^2 = a^2 + c^2 (\operatorname{sen}^2 \beta - \cos^2 \beta + 2 \operatorname{sen} \beta \cos \beta \operatorname{ctg}(\alpha + \beta))$	corretta
26	$a^2 - b^2 = c(b \operatorname{sen} \alpha \operatorname{ctg} \beta - a \operatorname{sen} \beta \operatorname{ctg} \alpha)$	corretta
27	$a + b = a (\operatorname{sen}^2 \beta - \cos \alpha \cos \beta) + b (\operatorname{sen}^2 \alpha - \cos \alpha \cos \beta) + c(\cos \alpha + \cos \beta)$	corretta
28	$b^2 = \operatorname{sen}^2 \beta (a^2 + b^2 \operatorname{sen}^2 \gamma) + b \cos \gamma (b \cos^2 \beta \cos \gamma - c \operatorname{sen} 2\beta \operatorname{sen} \beta)$	corretta
29	$\operatorname{sen} \alpha + \operatorname{sen} \beta + \operatorname{sen} \gamma =$ $= \cos \gamma + \operatorname{sen} \alpha \cos \gamma + \cos \alpha \operatorname{sen} \gamma + \frac{c}{b} (\cos \beta + \operatorname{sen} \beta)$	corretta
30	$b^2 - c^2 = a^2 \left( 1 - \frac{\operatorname{sen}(\gamma + \beta) + \operatorname{sen}(\gamma - \beta)}{\operatorname{sen} \alpha} \right)$	corretta
31	$\frac{b^2 + c^2 - a^2}{2b} = b - a \cos \gamma$	corretta
32	$ac \cos \beta - bc \cos \alpha = a^2 \cos 2\beta - b^2 \cos 2\alpha$	corretta
33	$\frac{\operatorname{sen}(\alpha - \beta)}{\operatorname{sen}(\alpha + \beta)} = \frac{a^2 + b^2}{c^2}$	corretta
34	$\frac{a^2 \operatorname{sen} \beta \operatorname{sen} \gamma}{\operatorname{sen}(\beta + \gamma)} = \frac{a^2 + b^2}{c^2}$	corretta
35	$\cos \alpha = \frac{\operatorname{sen}^2 \beta + \operatorname{sen}^2 \gamma - \operatorname{sen}^2 \alpha}{2a^2 \operatorname{sen} \beta \operatorname{sen} \gamma}$	corretta
36	$\operatorname{sen}^2 \gamma = \cos^2 \alpha + \cos^2 \beta + 2 \cos \alpha \cos \beta \cos \gamma$	corretta
37	$c^2 = b^2 \left( 1 + 2 \frac{\operatorname{sen} \alpha \operatorname{sen} \gamma \operatorname{ctg} \beta}{\operatorname{sen} \beta} \right) - a^2$	corretta
38	$c = a (\cos \beta - \operatorname{sen} \beta) + b (\cos \alpha + \operatorname{sen} \alpha)$	corretta