

Amplitude of the resultant oscillation is **A**:

$$A^2 = A_1^2 + A_2^2 + 2A_1A_2\cos(\Delta\varphi)$$

In the our task: $A_1 = 2a$, $A_2 = 3a$

(i) $\Delta\varphi = 2\pi$

$$A^2 = 4a^2 + 9a^2 + 2 \cdot 3a \cdot 2a \cdot \cos(2\pi) = 25a^2 \quad \rightarrow A = 5a$$

(ii) $\Delta\varphi = 0$

$$A^2 = 4a^2 + 9a^2 + 2 \cdot 3a \cdot 2a \cdot \cos(0) = 25a^2 \quad \rightarrow A = 5a$$

(iii) $\Delta\varphi = \pi/2$

$$A^2 = 4a^2 + 9a^2 + 2 \cdot 3a \cdot 2a \cdot \cos(\pi/2) = 25a^2 \quad \rightarrow A = \sqrt{13} \cdot a$$

(iv) $\Delta\varphi = \pi$

$$A^2 = 4a^2 + 9a^2 + 2 \cdot 3a \cdot 2a \cdot \cos(\pi) = a^2 \quad \rightarrow A = a$$