

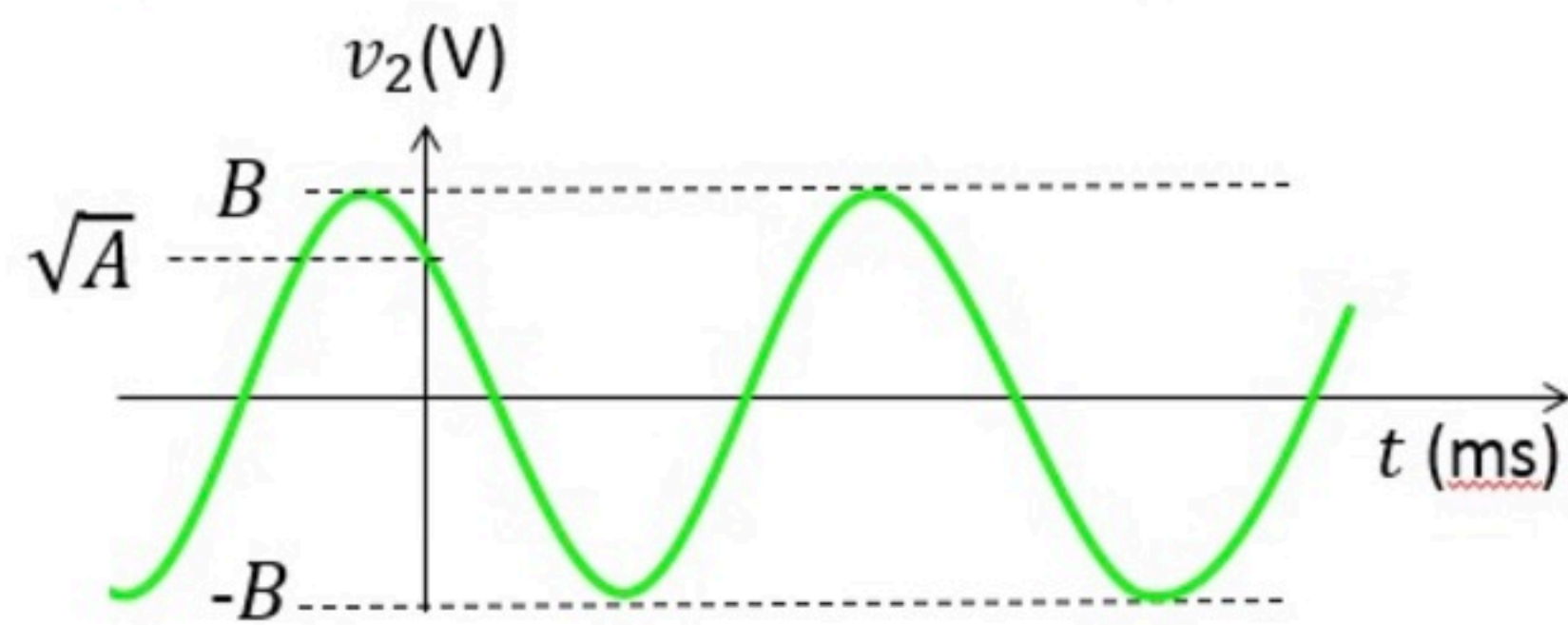
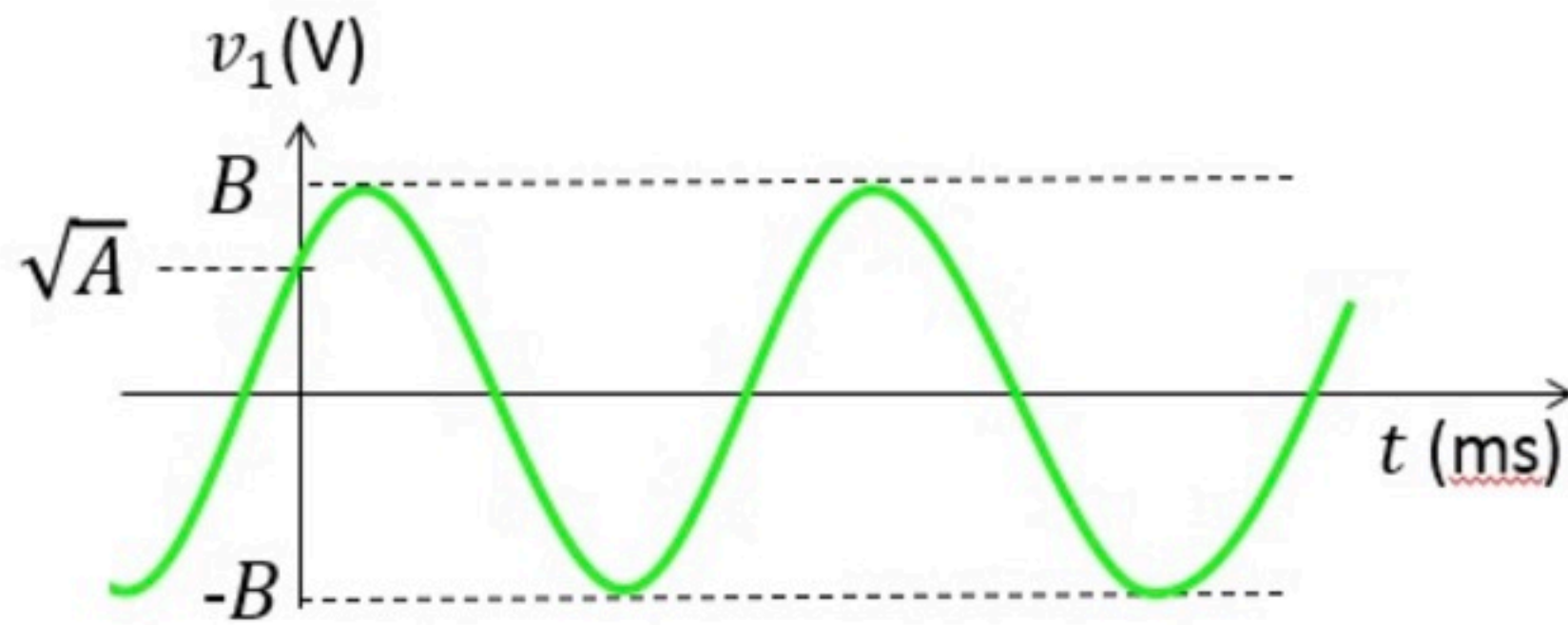
Phasors 001

Problem has been graded.

$$v_1(t) = B \cos(200t + D_1) \quad \text{with } -180^\circ \leq D_1 \leq 180^\circ$$

$$v_2(t) = B \sin(200t + D_2) \quad \text{with } -180^\circ \leq D_2 \leq 180^\circ$$

Find D_1 and D_2 .



Given Variables:

A : 9 V²

B : 6 V

Calculate the following:

D1 (degrees) :

-60



D2 (degrees) :

150



Hint: Look on the graph to disambiguate.

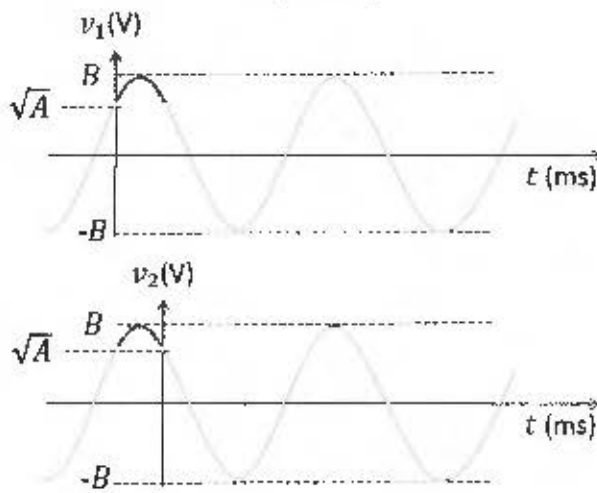
$$v_1(t) = B \cos(200t + D_1) \quad \text{with } -180^\circ \leq D_1 \leq 180^\circ$$

$$A: 3 \text{ V}^2$$

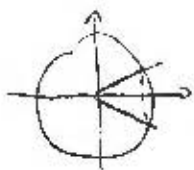
$$v_2(t) = B \sin(200t + D_2) \quad \text{with } -180^\circ \leq D_2 \leq 180^\circ$$

$$B: 2 \text{ V}$$

Find D_1 and D_2 .



① PLUG IN $t=0$: $v_1(0) = 2 \cdot \cos(D_1) = \sqrt{3} \Rightarrow \cos(D_1) = \frac{\sqrt{3}}{2}$



$$D_1 = 30^\circ$$

$$\text{or}$$

$$D_1 = -30^\circ$$

WE KNOW THAT $\cos(\omega(t-t_0)) = \cos(\omega t + \phi)$

$$\phi = -\omega t_0$$

HERE $t_0 > 0 \Rightarrow \phi < 0 \Rightarrow$

$$D_1 = -30^\circ$$

degrees

② * OPTION 1: WRITE AS COSX FIRST

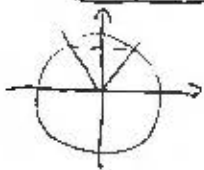
$$v_2(t) = B \cos(200t + \alpha) \Rightarrow v_2(0) = 2 \cos(\alpha) = \sqrt{3}$$

$$\Rightarrow \alpha = 30^\circ \text{ or } -30^\circ$$

HERE $t_0 < 0 \Rightarrow \phi > 0 \Rightarrow \alpha = 30^\circ$

$$v_2(t) = B \cos(200t + 30^\circ) = B \sin(200t + 30^\circ + 90^\circ) \Rightarrow D_2 = 120^\circ$$

* OPTION 2: $v_2(0) = 2 \sin(D_2) = \sqrt{3} \Rightarrow \sin(D_2) = \frac{\sqrt{3}}{2}$



$$D_2 = 60^\circ$$

$$\text{or}$$

$$D_2 = 180^\circ - 60^\circ = 120^\circ$$

\Rightarrow LOOK AT THE GRAPH

SIN() SHIFTED MORE THAN 90°

$$\Rightarrow D_2 = 120^\circ$$