Question 1

The displacement of a particular string is:

$$\Psi(x, t) = A \cos(kx - \omega t - \phi).$$

At any instant t, when x satisfies

$$kx - \omega t - \phi = 0$$

then this represents a peak/crest of the wave.

Which of the following is true as time passes?

1. This peak moves left.

2. This peak moves right.

3. This peak stays in the same location.

Question 2

Two waves in a medium are represented by

$$\Psi_1(x, t) = A \cos(kx - \omega t)$$

$$\Psi_2(x, t) = A \cos(kx - \omega t - \phi)$$

where ϕ is a constant. The superposition is

$$\Psi(x, t) = \Psi_1(x, t) + \Psi_2(x, t).$$

Which of the following is true about the amplitude of the superposition?

1. It will be A regardless of the situation.

2. It will be $2A$ regardless of the situation.

3. It could be anywhere between A and $2A$.

4. It could be anywhere between 0 and A.

5. It could be anywhere between 0 and $2A$.

Question 3

Two waves in a medium are represented by

$$\Psi_1(x, t) = A \cos(kx - \omega t)$$

$$\Psi_2(x, t) = A \cos(kx - \omega t - \phi)$$

where ϕ is a constant. The superposition is

$$\Psi(x, t) = \Psi_1(x, t) + \Psi_2(x, t).$$

For which of teh following does destructive interference occur?

1. Only when $\phi = 0$.

2. Only when $\phi = \pi/2$.

3. Only when $\phi = \pi$.

4. Only when $\phi = \pm\dfrac{\pi}{2}, \pm\dfrac{3\pi}{2}, \pm\dfrac{5\pi}{2}, \ldots$

5. Only when $\phi = \pm\pi, \pm2\pi, \pm3\pi, \ldots$

6. Only when $\phi = \pm\pi, \pm3\pi, \pm5\pi, \ldots$