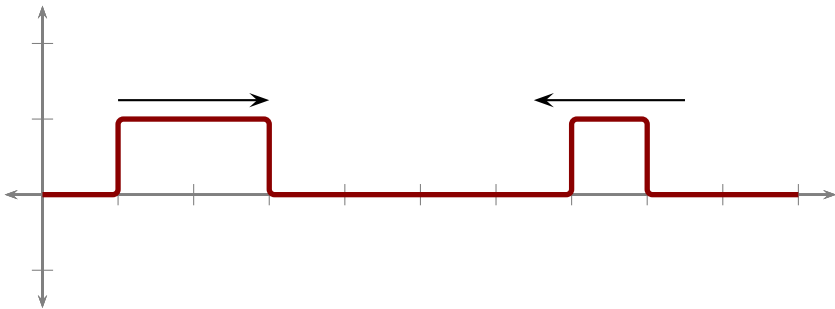
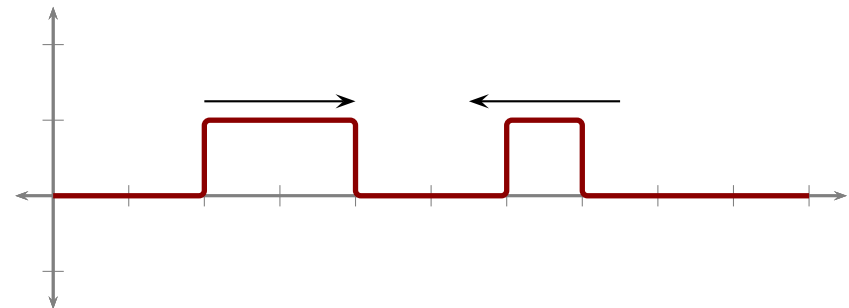


# Interference of Pulses

A snapshot of a string at  $t = 0$  s displays two pulses traveling toward each other. The horizontal units are cm. Suppose that the pulses travel with speed 1 cm/s.

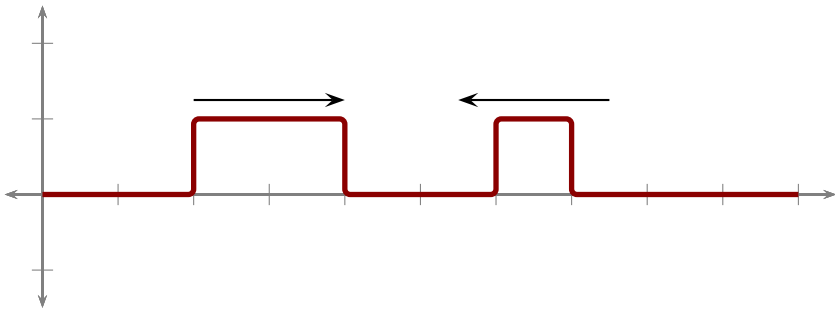


At  $t = 1$  s the pulses appear as:

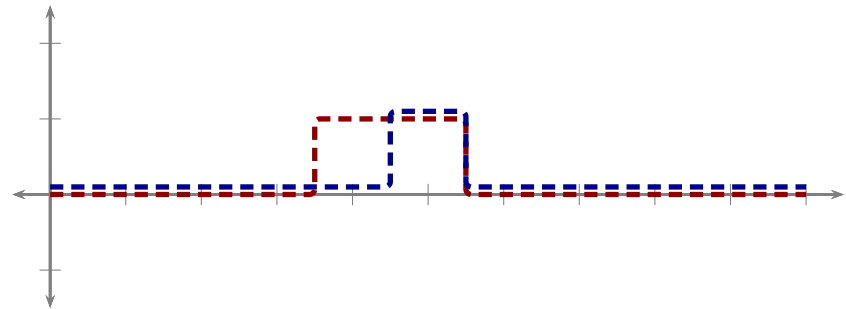


# Interference of Pulses

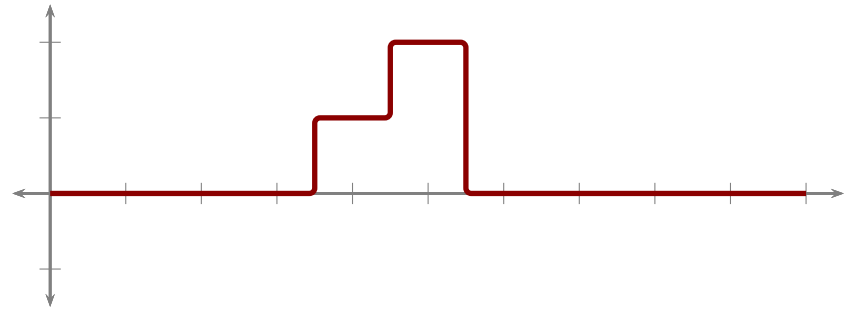
A snapshot of a string at  $t = 1$  s is as follows.



At  $t = 2.5$  s the individual pulses and their superposition appear as:

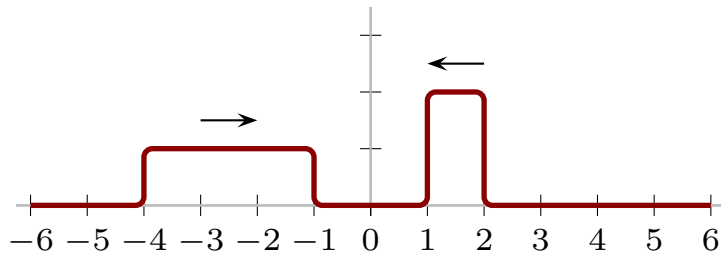


Add to give:

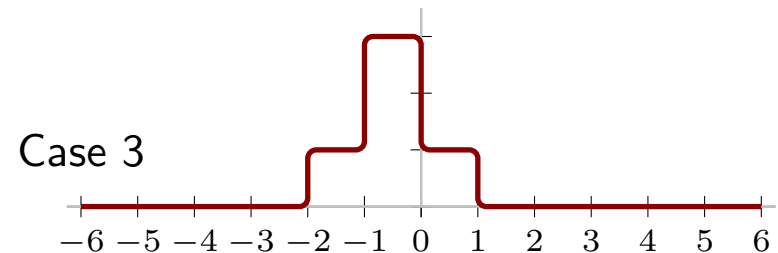
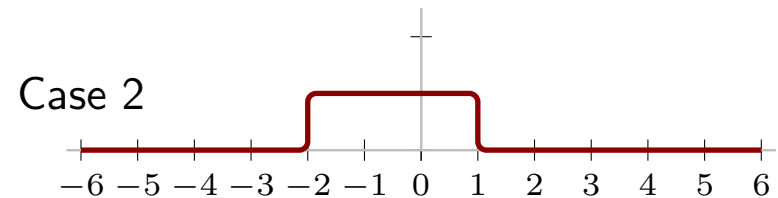
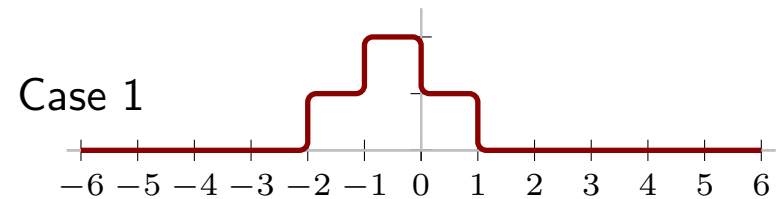


# Question 1

Two pulses approach each other on a string. At an initial instant the string is as illustrated and the pulses travel with speed 1 unit per second.

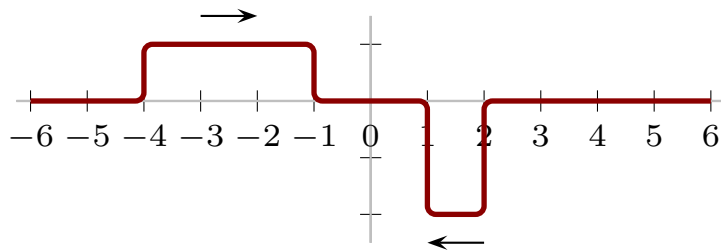


Which of the following is an accurate depiction of the entire string at an instant 2 seconds later?



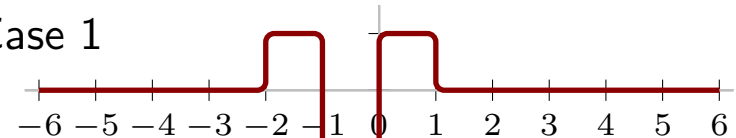
## Question 2

Two pulses approach each other on a string. At an initial instant the string is as illustrated and the pulses travel with speed 1 unit per second.

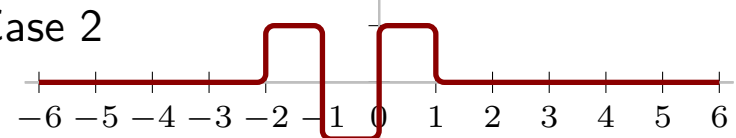


Which of the following depicts the entire string at an instant 2 seconds later?

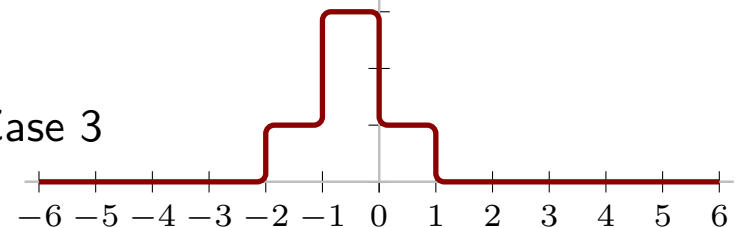
Case 1



Case 2

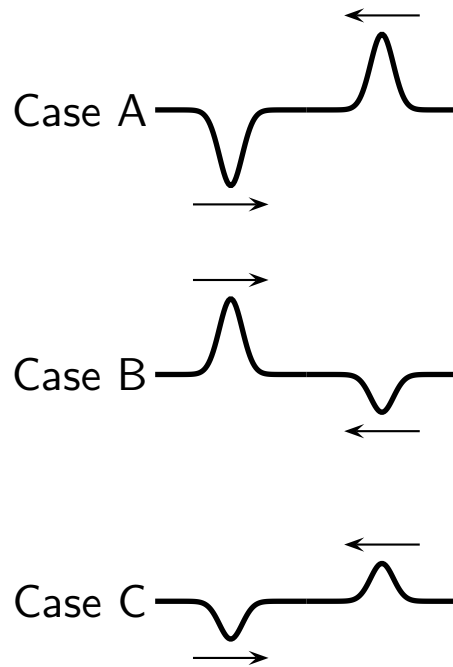


Case 3



## Question 3

Various pulses on a string approach each other as illustrated.



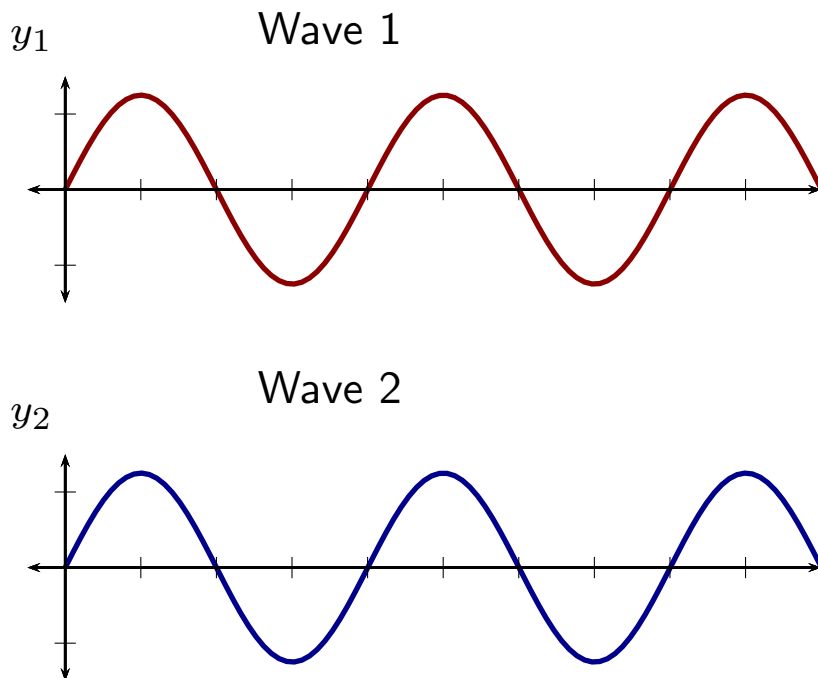
The pulses overlap and interfere.

Which of the following is the rank of the peak height of the string at the moment that the pulses overlap completely?

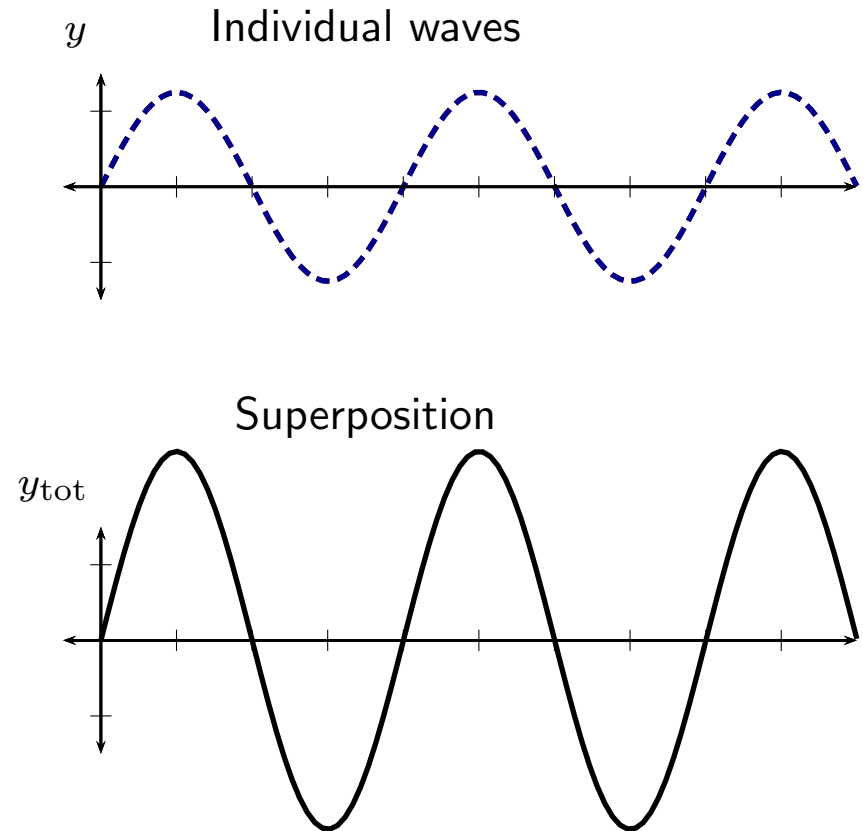
1. A largest, B middle, C smallest.
2. All three same.
3. B largest, A middle, C smallest.
4. B largest , A and C same but smaller.

# General Interference I

Snapshots of two waves at one instant are illustrated.

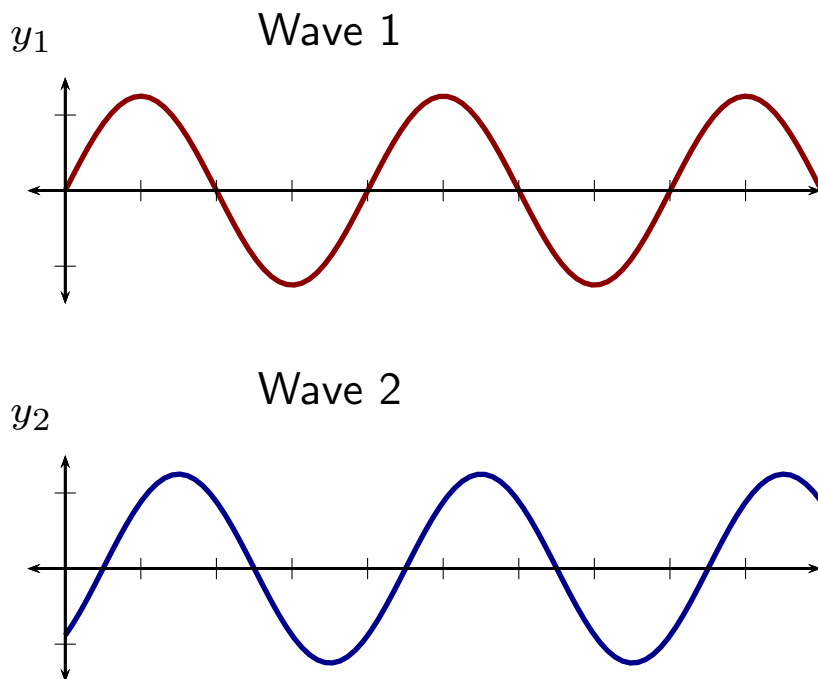


The superposition of the two waves is:

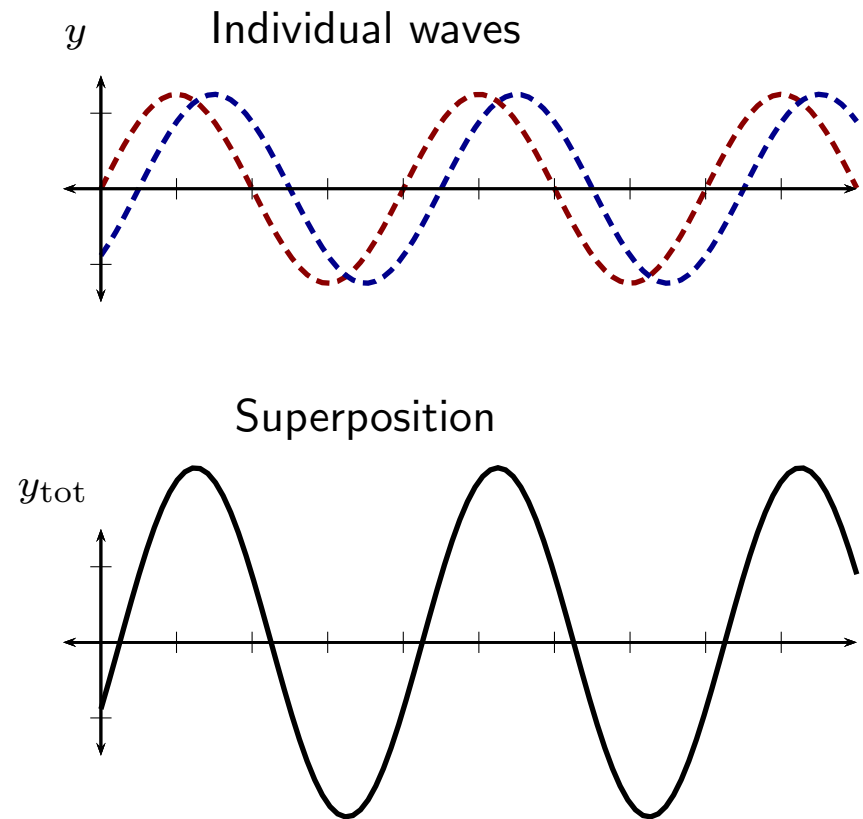


# General Interference II

Snapshots of two waves at one instant are illustrated.

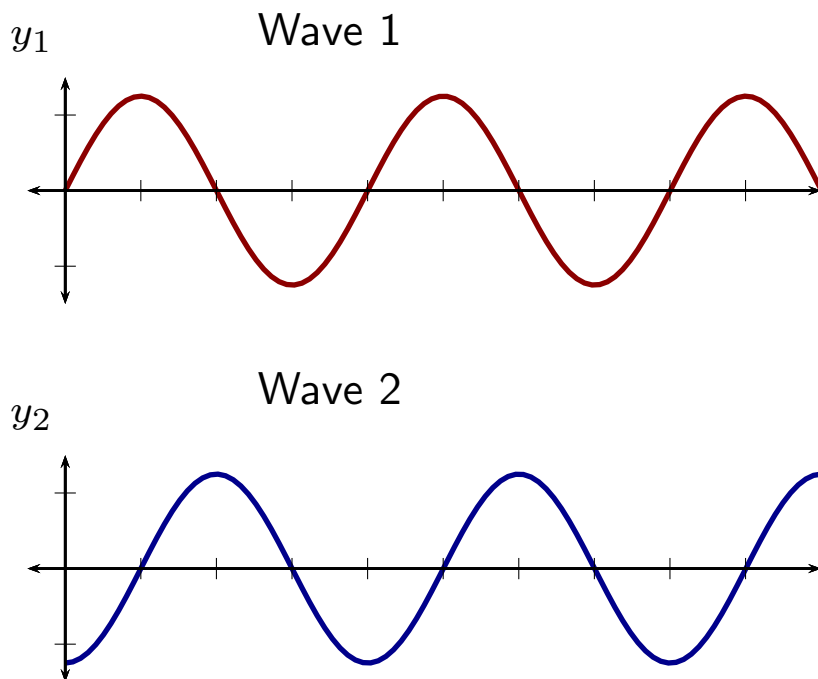


The superposition of the two waves is:

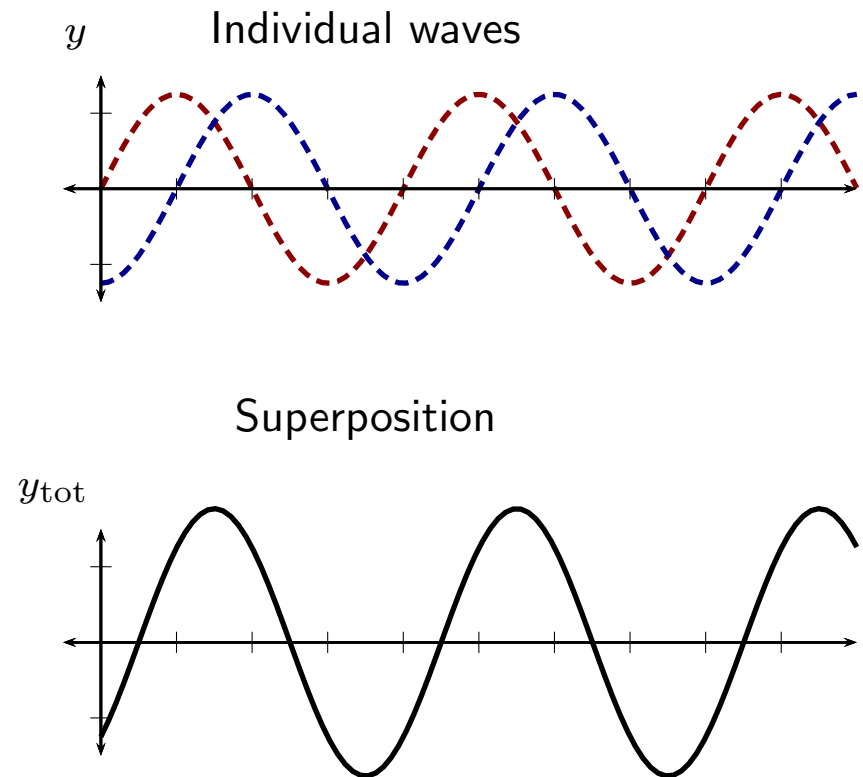


# General Interference III

Snapshots of two waves at one instant are illustrated.



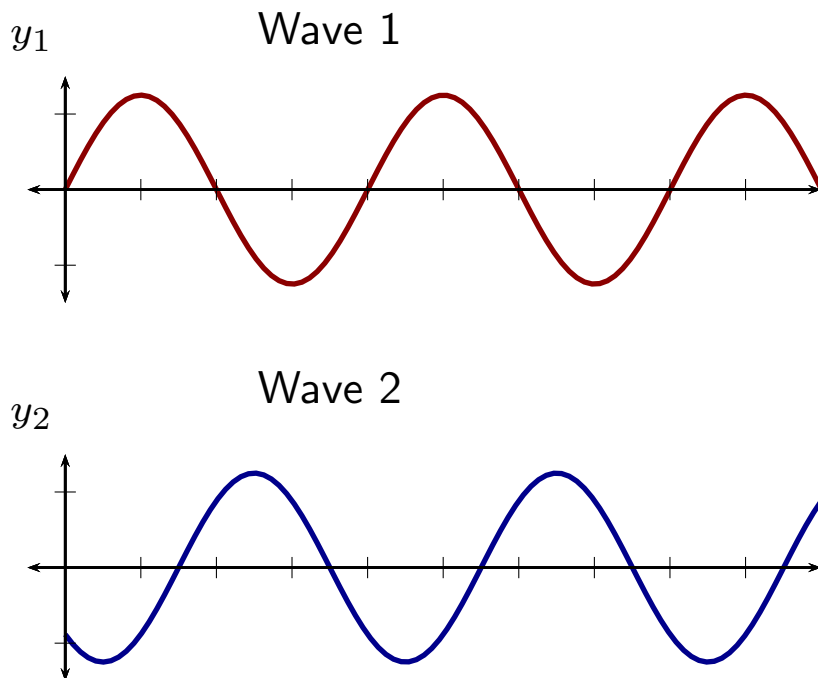
The superposition of the two waves is:



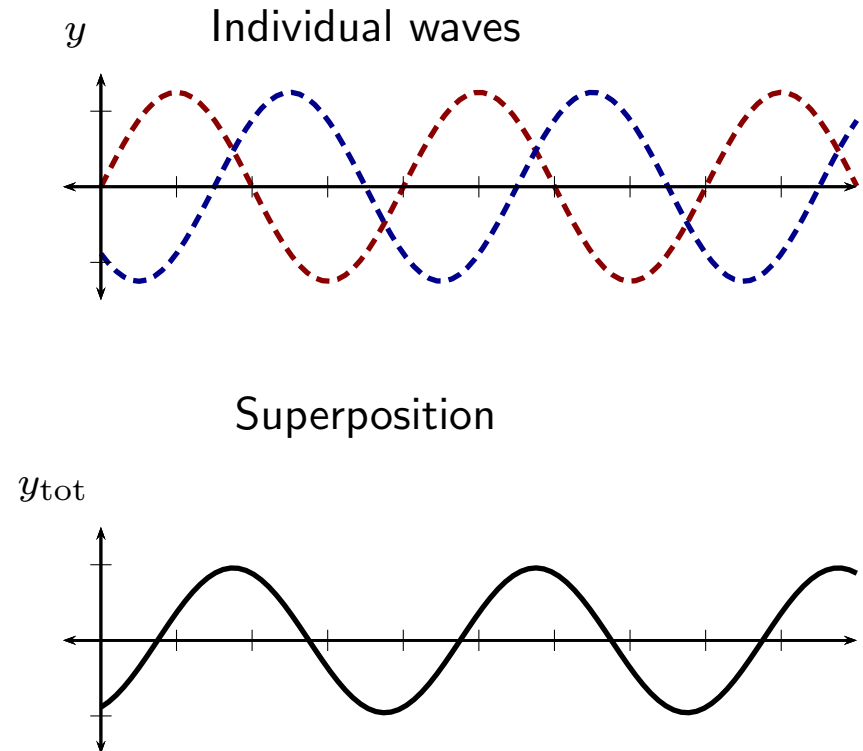


# General Interference IV

Snapshots of two waves at one instant are illustrated.

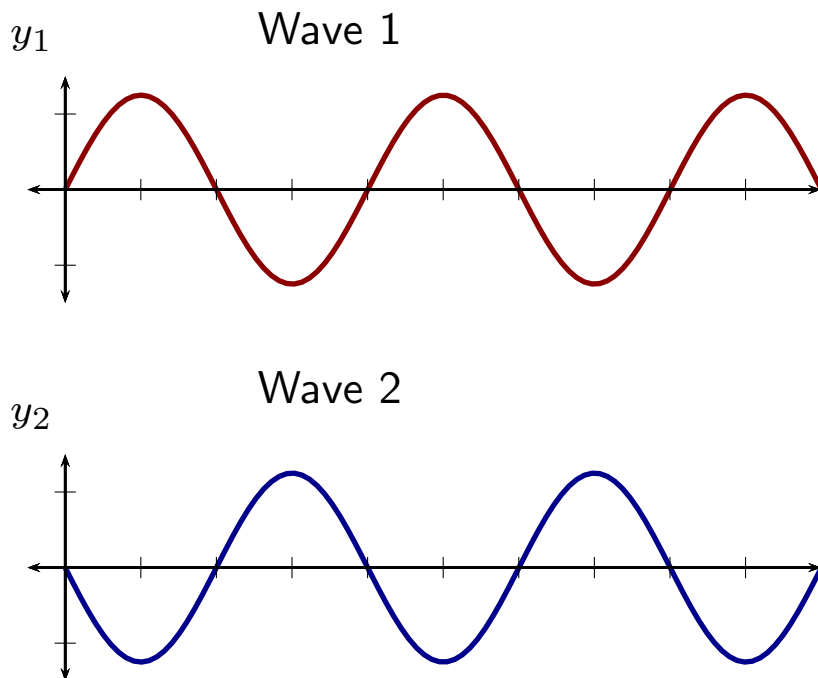


The superposition of the two waves is:

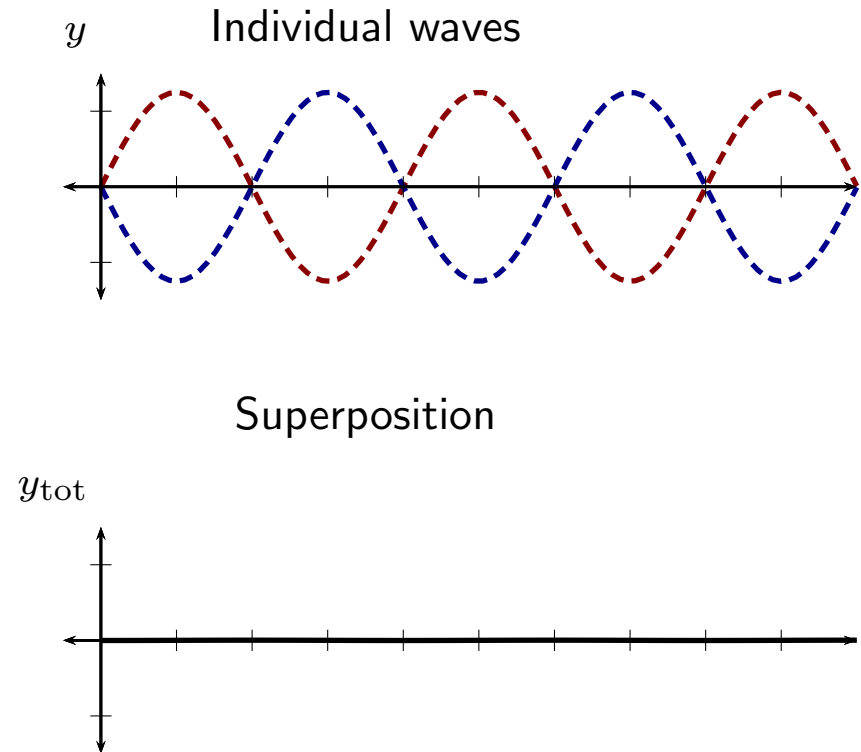


# General Interference V

Snapshots of two waves at one instant are illustrated.



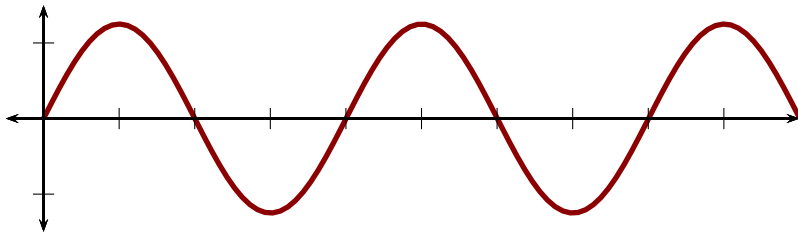
The superposition of the two waves is:



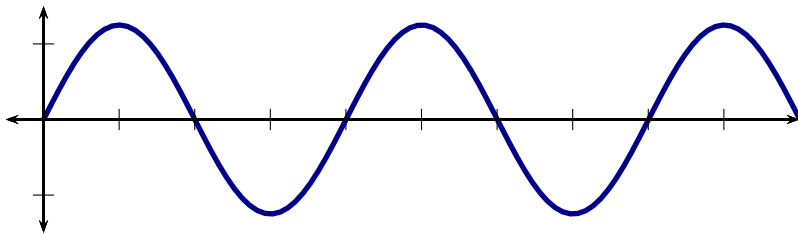
# Constructive Interference

Snapshots of two waves in the same medium at one instant. The waves “match” perfectly.

Wave 1

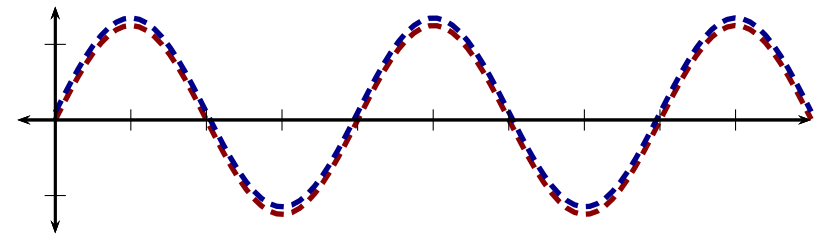


Wave 2

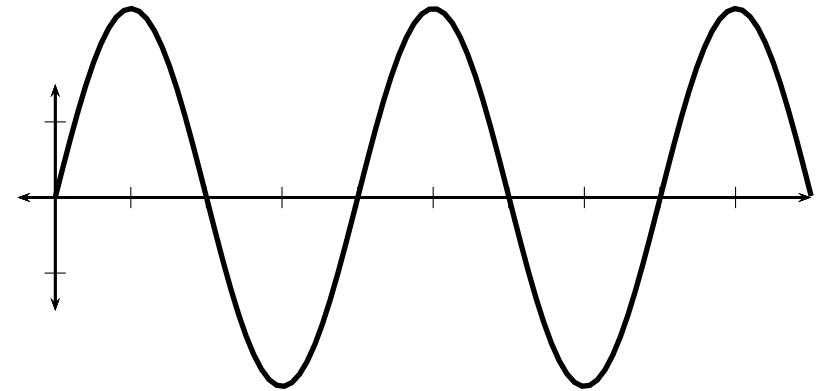


The combination of the two waves produces *constructive interference*.

Individual waves



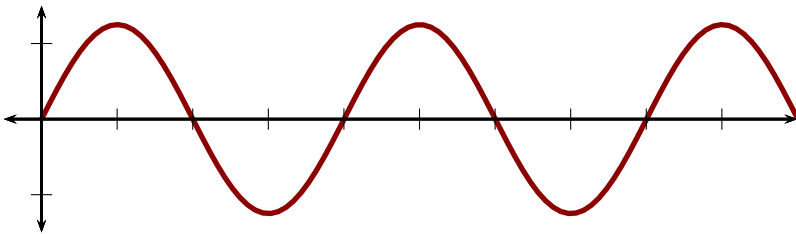
Combination



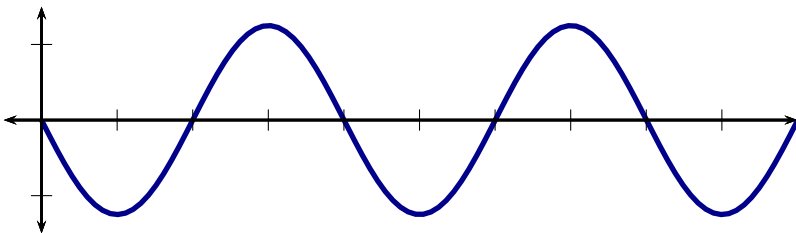
# Destructive Interference

Snapshots of two waves in the same medium at one instant. The waves are completely opposite to each other.

Wave 1

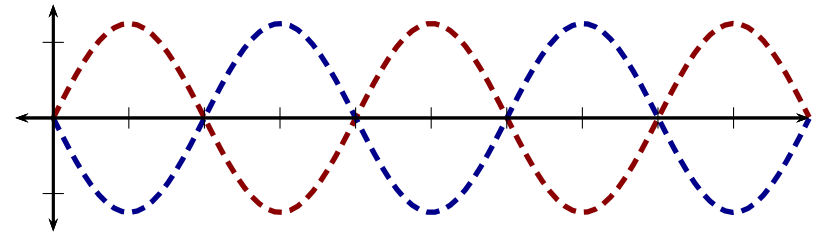


Wave 2

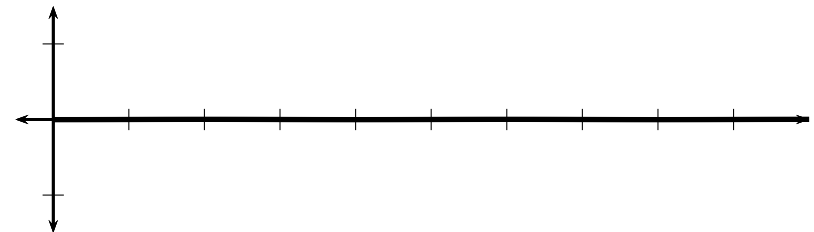


The combination of the two waves produces *destructive interference*.

Individual waves

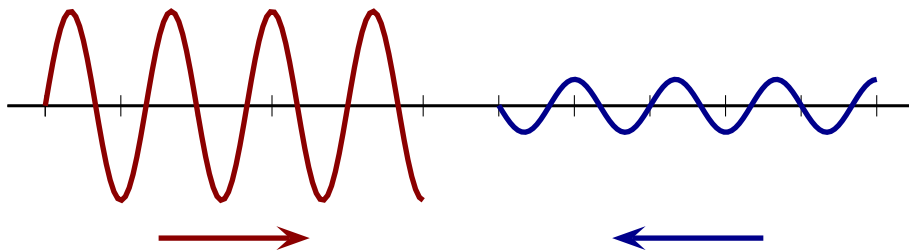


Combination



## Question 4

Two waves, illustrated to scale, travel toward each other on the same string.

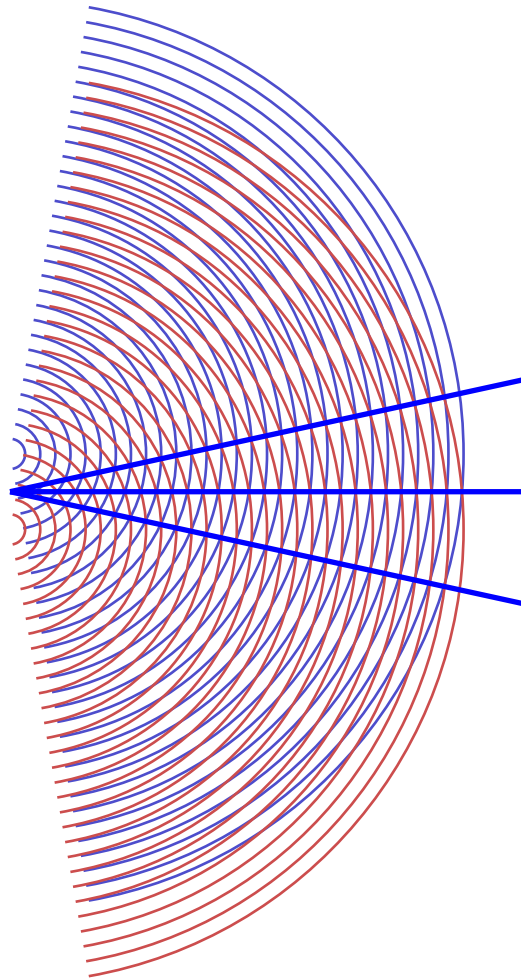


These waves eventually overlap.

Which of the following is true regarding the wave on the string?

1. It will always have a larger amplitude than either of the illustrated waves.
2. It will always have a smaller amplitude than either of the illustrated waves.
3. It will sometimes have a larger amplitude than either wave and it will sometimes have a smaller amplitude.
4. It will sometimes have a larger amplitude than either wave and it will sometimes have zero amplitude.

# Overlapping Water Waves



Straight lines indicate points along which constructive interference occurs.