Rocking the Boat … with Waves

Apprentice Difficulty Level
Question Group 1
Question 1
Two boats are anchored in the harbor, separated by a horizontal distance of 12 m. The boats bob up and down as waves enter the harbor. When one boat is at its highest point, the other is at its lowest point and there are no wave crests between them. Each boat makes exactly 2 complete up-and-down cycles every 10.0 s. The vertical distance between a boat's highest and lowest position is 2.4 m. Complete the diagram, showing where the second boat is located. Then determine the wavelength (m), frequency (Hz), period (s), amplitude (m), and speed (m/s) of the waves.

Question 2
Two boats are anchored in the harbor, separated by a horizontal distance of 16 m. The boats bob up and down as waves enter the harbor. When one boat is at its highest point, the other is at its lowest point and there are no wave crests between them. Each boat makes exactly 3 complete up-and-down cycles every 12.0 s. The vertical distance between a boat's highest and lowest position is 3.2 m. Complete the diagram, showing where the second boat is located. Then determine the wavelength (m), frequency (Hz), period (s), amplitude (m), and speed (m/s) of the waves.

Question 3
Two boats are anchored in the harbor, separated by a horizontal distance of 24 m. The boats bob up and down as waves enter the harbor. When one boat is at its highest point, the other is at its lowest point and there are no wave crests between them. Each boat makes exactly 4 complete up-and-down cycles every 12.0 s. The vertical distance between a boat's highest and lowest position is 3.6 m. Complete the diagram, showing where the second boat is located. Then determine the wavelength (m), frequency (Hz), period (s), amplitude (m), and speed (m/s) of the waves.

Question Group 2
Question 4
Two boats are anchored in the harbor, separated by a horizontal distance of 14 m. The boats bob up and down as waves enter the harbor. When one boat is at its highest point, the other is at its lowest point and there are no wave crests between them. Each boat makes exactly 5 complete up-and-down cycles every 15.0 s. The vertical distance between a boat's highest and lowest position is 2.4 m. Complete the diagram, showing where the second boat is located. Then determine the wavelength (m), frequency (Hz), period (s), amplitude (m), and speed (m/s) of the waves.

Question 5
Two boats are anchored in the harbor, separated by a horizontal distance of 18 m. The boats bob up and down as waves enter the harbor. When one boat is at its highest point, the other is at its lowest point and there are no wave crests between them. Each boat makes exactly 5 complete up-and-down cycles every 10.0 s. The vertical distance between a boat's highest and lowest position is 2.6 m. Complete the diagram, showing where the second boat is located. Then determine the wavelength (m), frequency (Hz), period (s), amplitude (m), and speed (m/s) of the waves.

Question 6
Two boats are anchored in the harbor, separated by a horizontal distance of 20 m. The boats bob up and down as waves enter the harbor. When one boat is at its highest point, the other is at its lowest point and there are no wave crests between them. Each boat makes exactly 5 complete up-and-down cycles every 20.0 s. The vertical distance

between a boat's highest and lowest position is 2.8 m. Complete the diagram, showing where the second boat is located. Then determine the wavelength (m), frequency (Hz), period (s), amplitude (m), and speed (m/s) of the waves.

Master Difficulty Level
Question Group 3
Question 7
Two boats are anchored in the harbor, separated by a horizontal distance of 14 m. The boats bob up and down as waves enter the harbor. When one boat is at its highest point, the other is at its lowest point and there are no wave crests between them. Each boat makes exactly 5 complete up-and-down cycles every 15.0 s. The vertical distance between a boat's highest and lowest position is 2.4 m. Complete the diagram, showing where the second boat is located. Then determine the wavelength (m), frequency (Hz), period (s), amplitude (m), and speed (m/s) of the waves.

Question 8
Two boats are anchored in the harbor, separated by a horizontal distance of 18 m. The boats bob up and down as waves enter the harbor. When one boat is at its highest point, the other is at its lowest point and there are no wave crests between them. Each boat makes exactly 5 complete up-and-down cycles every 10.0 s. The vertical distance between a boat's highest and lowest position is 2.6 m. Complete the diagram, showing where the second boat is located. Then determine the wavelength (m), frequency (Hz), period (s), amplitude (m), and speed (m/s) of the waves.

Question 9
Two boats are anchored in the harbor, separated by a horizontal distance of 20 m. The boats bob up and down as waves enter the harbor. When one boat is at its highest point, the other is at its lowest point and there are no wave crests between them. Each boat makes exactly 5 complete up-and-down cycles every 20.0 s. The vertical distance between a boat's highest and lowest position is 2.8 m. Complete the diagram, showing where the second boat is located. Then determine the wavelength (m), frequency (Hz), period (s), amplitude (m), and speed (m/s) of the waves.

Question Group 4
Question 10
Two boats are anchored in the harbor, separated by a horizontal distance of 12 m. The boats bob up and down as waves enter the harbor. When one boat is at its highest point, the other is at its lowest point and there is one wave crest between them. Each boat makes exactly 2 complete up-and-down cycles every 12.0 s. The vertical distance between a boat's highest and lowest position is 3.0 m. Complete the diagram, showing where the second boat is located. Then determine the wavelength (m), frequency (Hz), period (s), amplitude (m), and speed (m/s) of the waves.

Question 11
Two boats are anchored in the harbor, separated by a horizontal distance of 18 m. The boats bob up and down as waves enter the harbor. When one boat is at its highest point, the other is at its lowest point and there is one wave crest between them. Each boat makes exactly 2 complete up-and-down cycles every 16.0 s. The vertical distance between a boat's highest and lowest position is 3.6 m. Complete the diagram, showing where the second boat is located. Then determine the wavelength (m), frequency (Hz), period (s), amplitude (m), and speed (m/s) of the waves.

Question 12

Two boats are anchored in the harbor, separated by a horizontal distance of 30 m. The boats bob up and down as waves enter the harbor. When one boat is at its highest point, the other is at its lowest point and there is one wave crest between them. Each boat makes exactly 3 complete up-and-down cycles every 18.0 s. The vertical distance between a boat's highest and lowest position is 3.8 m. Complete the diagram, showing where the second boat is located. Then determine the wavelength (m), frequency (Hz), period (s), amplitude (m), and speed (m/s) of the waves.

Question Group 5
Question 13

Two boats are anchored in the harbor, separated by a horizontal distance of 16 m. The boats bob up and down as waves enter the harbor. When one boat is at its highest point, the other is also at its highest point and there is one wave crest between them. Each boat makes exactly 5 complete up-and-down cycles every 25.0 s. The vertical distance between a boat's highest and lowest position is 2.0 m. Complete the diagram, showing where the second boat is located. Then determine the wavelength (m), frequency (Hz), period (s), amplitude (m), and speed (m/s) of the waves.

Question 14

Two boats are anchored in the harbor, separated by a horizontal distance of 20 m. The boats bob up and down as waves enter the harbor. When one boat is at its highest point, the other is also at its highest point and there is one wave crest between them. Each boat makes exactly 5 complete up-and-down cycles every 30.0 s. The vertical

distance between a boat's highest and lowest position is 2.2 m. Complete the diagram, showing where the second boat is located. Then determine the wavelength (m), frequency (Hz), period (s), amplitude (m), and speed (m/s) of the waves.

Question 15
Two boats are anchored in the harbor, separated by a horizontal distance of 24 m. The boats bob up and down as waves enter the harbor. When one boat is at its highest point, the other is also at its highest point and there is one wave crest between them. Each boat makes exactly 6 complete up-and-down cycles every 36.0 s. The vertical distance between a boat's highest and lowest position is 2.4 m. Complete the diagram, showing where the second boat is located. Then determine the wavelength (m), frequency (Hz), period (s), amplitude (m), and speed (m/s) of the waves.

Wizard Difficulty Level
Question Group 6
Question 16
Two boats are anchored in the harbor, separated by a horizontal distance of 12 m. The boats bob up and down as waves enter the harbor. When one boat is at its highest point, the other is at its lowest point and there is one wave crest between them. Each boat makes exactly 2 complete up-and-down cycles every 12.0 s. The vertical distance between a boat's highest and lowest position is 3.0 m. Complete the diagram, showing where the second boat is located. Then determine the wavelength (m), frequency (Hz), period (s), amplitude (m), and speed (m/s) of the waves.

Question 17

Two boats are anchored in the harbor, separated by a horizontal distance of 18 m. The boats bob up and down as waves enter the harbor. When one boat is at its highest point, the other is at its lowest point and there is one wave crest between them. Each boat makes exactly 2 complete up-and-down cycles every 16.0 s. The vertical distance between a boat's highest and lowest position is 3.6 m. Complete the diagram, showing where the second boat is located. Then determine the wavelength (m), frequency (Hz), period (s), amplitude (m), and speed (m/s) of the waves.

Question 18

Two boats are anchored in the harbor, separated by a horizontal distance of 30 m. The boats bob up and down as waves enter the harbor. When one boat is at its highest point, the other is at its lowest point and there is one wave crest between them. Each boat makes exactly 3 complete up-and-down cycles every 18.0 s. The vertical distance between a boat's highest and lowest position is 3.8 m. Complete the diagram, showing where the second boat is located. Then determine the wavelength (m), frequency (Hz), period (s), amplitude (m), and speed (m/s) of the waves.

Question Group 7
Question 19

Two boats are anchored in the harbor, separated by a horizontal distance of 16 m. The boats bob up and down as waves enter the harbor. When one boat is at its highest point, the other is also at its highest point and there is one wave crest between them. Each boat makes exactly 5 complete up-and-down cycles every 25.0 s. The vertical distance between a boat's highest and lowest position is 2.0 m. Complete the diagram, showing where the second boat is located. Then determine the wavelength (m), frequency (Hz), period (s), amplitude (m), and speed (m/s) of the waves.

Question 20

Two boats are anchored in the harbor, separated by a horizontal distance of 20 m. The boats bob up and down as waves enter the harbor. When one boat is at its highest point, the other is also at its highest point and there is one wave crest between them. Each boat makes exactly 5 complete up-and-down cycles every 30.0 s. The vertical distance between a boat's highest and lowest position is 2.2 m. Complete the diagram, showing where the second boat is located. Then determine the wavelength (m), frequency (Hz), period (s), amplitude (m), and speed (m/s) of the waves.

Question 21

Two boats are anchored in the harbor, separated by a horizontal distance of 24 m. The boats bob up and down as waves enter the harbor. When one boat is at its highest point, the other is also at its highest point and there is one wave crest between them. Each boat makes exactly 6 complete up-and-down cycles every 36.0 s. The vertical distance between a boat's highest and lowest position is 2.4 m. Complete the diagram, showing where the second boat is located. Then determine the wavelength (m), frequency (Hz), period (s), amplitude (m), and speed (m/s) of the waves.

Question Group 8
Question 22

Two boats are anchored in the harbor, separated by a horizontal distance of 20 m. The boats bob up and down as waves enter the harbor. When one boat is at its highest point, the other is at its lowest point and there are two wave crests between them. Each boat makes exactly 4 complete up-and-down cycles every 12.0 s. The vertical distance

between a boat's highest and lowest position is 2.6 m. Complete the diagram, showing where the second boat is located. Then determine the wavelength (m), frequency (Hz), period (s), amplitude (m), and speed (m/s) of the waves.

Question 23
Two boats are anchored in the harbor, separated by a horizontal distance of 30 m. The boats bob up and down as waves enter the harbor. When one boat is at its highest point, the other is at its lowest point and there are two wave crests between them. Each boat makes exactly 3 complete up-and-down cycles every 12.0 s. The vertical distance between a boat's highest and lowest position is 2.8 m. Complete the diagram, showing where the second boat is located. Then determine the wavelength (m), frequency (Hz), period (s), amplitude (m), and speed (m/s) of the waves.

Question 24
Two boats are anchored in the harbor, separated by a horizontal distance of 40 m. The boats bob up and down as waves enter the harbor. When one boat is at its highest point, the other is at its lowest point and there are two wave crests between them. Each boat makes exactly 2 complete up-and-down cycles every 10.0 s. The vertical distance between a boat's highest and lowest position is 3.0 m. Complete the diagram, showing where the second boat is located. Then determine the wavelength (m), frequency (Hz), period (s), amplitude (m), and speed (m/s) of the waves.

Question Group 9
Question 25

Two boats are anchored in the harbor, separated by a horizontal distance of 18 m. The boats bob up and down as waves enter the harbor. When one boat is at its highest point, the other is also at its highest point and there are two wave crests between them. Each boat makes exactly 3 complete up-and-down cycles every 15.0 s. The vertical distance between a boat's highest and lowest position is 3.2 m. Complete the diagram, showing where the second boat is located. Then determine the wavelength (m), frequency (Hz), period (s), amplitude (m), and speed (m/s) of the waves.

Question 26

Two boats are anchored in the harbor, separated by a horizontal distance of 24 m. The boats bob up and down as waves enter the harbor. When one boat is at its highest point, the other is also at its highest point and there are two wave crests between them. Each boat makes exactly 4 complete up-and-down cycles every 20.0 s. The vertical distance between a boat's highest and lowest position is 3.4 m. Complete the diagram, showing where the second boat is located. Then determine the wavelength (m), frequency (Hz), period (s), amplitude (m), and speed (m/s) of the waves.

Question 27

Two boats are anchored in the harbor, separated by a horizontal distance of 36 m. The boats bob up and down as waves enter the harbor. When one boat is at its highest point, the other is also at its highest point and there are two wave crests between them. Each boat makes exactly 3 complete up-and-down cycles every 24.0 s. The vertical distance between a boat's highest and lowest position is 3.6 m. Complete the diagram, showing where the second boat is located. Then determine the wavelength (m), frequency (Hz), period (s), amplitude (m), and speed (m/s) of the waves.