



ANSWER BOOK

Progressive waves

Waves · Year 12

AQA 3.3.1.1 · CIE 7.1 · OCR A 4.4.1

10 questions · 29 marks

NAVY EDITION

SECTION A · Warm-up

A1 A progressive wave transfers energy (and information) through the medium. The particles oscillate about fixed equilibrium positions; they do not travel with the wave. [2]

A2 $c = f\lambda = 50 \times 6.0 = 300 \text{ m s}^{-1}$. [2]

A3 $f = 1/T = 1/0.020 = 50 \text{ Hz}$. [2]

SECTION B · Standard

B1 $\lambda = c/f = 340/170 = 2.0 \text{ m}$. [3]

B2 $f = c/\lambda = (3.0 \times 10^8)/(600 \times 10^{-9}) = 5.0 \times 10^{14} \text{ Hz}$. [3]

B3 (a) $c = f\lambda = 25 \times 1.2 = 30 \text{ m s}^{-1}$. (b) $T = 1/f = 1/25 = 0.040 \text{ s}$. [3]

B4 Phase difference = $(\Delta x/\lambda) \times 360^\circ = (0.75/1.0) \times 360^\circ = 270^\circ$. [3]

SECTION C · Stretch

C1 (a) $f = 20/10 = 2.0 \text{ Hz}$. (b) $c = f\lambda = 2.0 \times 3.0 = 6.0 \text{ m s}^{-1}$. (c) $T = 1/f = 0.5 \text{ s}$. [4]

C2 A phase difference of $\pi/2$ is a quarter of a cycle, so the separation = $\lambda/4 = 2.4/4 = 0.60 \text{ m}$. [3]

C3 Each particle oscillates about its own fixed equilibrium position, passing energy to the next particle. It is this disturbance (energy) that moves forward through the medium; the particles themselves only move back and forth and stay in the same average place. [3]