Sangam S. K. M College - Nadi

Year 13

Physics

Worksheet 1

Solutions:

1.

$l = (6.8 \pm 0.1)cm$ $w = (2.6 \pm 0.1)cm$

$= 6.8 \pm 1.471\%$ $= 2.6 \pm 3.846\%$

$A = l \cdot w$

$= (6.8x2.6) \pm (1.471 + 3.846)\%$

$= 17.68 \pm 5.317\%$

$= 17.68 \pm 0.94$

A $= 17.7 \pm 0.9\ cm^2$

2.

$R = (3.5 \pm 0.1)cm$ $h = (2.4 \pm 0.1)cm$

$= 6.8 \pm 2.857\%$ $= 2.6 \pm 4.167\%$

$R^2 = (6.8)^2 \pm (2\times2.857)\%$

$= 46.24 \pm 5.714\ \%$

$V = \frac{1}{3}\pi R^2 h$

$= \frac{1}{3}\pi\,(46.24 \pm 5.714\ \%)\ (2.6 \pm 4.167\%\ )$

$= (\frac{1}{3}\pi \times 46.24 \times 2.6) \pm (5.714 + 4.167)\ \%$

$= 125.90 \pm 9.881\%$

$= 125.90 \pm 12.44$

$= 126 \pm 10\ cm^3$

3.

Vernier Micometer

$= 1.06 \pm 0.01\ cm$ $= 6.69 \pm 0.01\ mm$

4. (i). $L = aT^n$

Log L = n log$T$ + log a

(ii) n = slope = 2 log a = y int

log k = -0.6

k = anti log (-0.6) = 0.25

5. $V_f = V_i + at$ $V_i = 0$ (*intially at rest*)

LHS	RHS	
v	at	
$\frac{m}{s}$	$\frac{m}{s^2}s$	
$\frac{[L]}{[T]}$	$\frac{[L]}{[T^2]}[T]$	Cancel out one T
$\frac{[L]}{[T]}$	$\frac{[L]}{[T]}$	

Since LHS = RHS we conclude that the equation is dimensionally correct.

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Solution: Week 1

Year 13

Physics

1. (i) $y = 0.04 \sin 2\pi (50t - 2x)$

   $y = 0.04 \sin (100\pi t - 4\pi x)$ expand the brackets

   $y = A \sin (\omega t - kx)$

   $A = 0.04$ m, $\omega = 100\pi$, $k = 4\pi$

   $\lambda = \frac{2\pi}{k} = \frac{2\pi}{4\pi} = \frac{1}{2}\ m$

   (ii) $\omega = 2\pi f$, $f = \frac{\omega}{2\pi} = \frac{100\pi}{2\pi} = \underline{50\text{ Hz}}$

   (iii) $V = f\lambda = (100)(\frac{1}{2}) = \underline{50\text{ m/s}}$

2. (a) $y = 5 \sin (0.01x - 4.00t)$

   $y = 5\sin (kx - \omega t)$

   A= <u>5 cm,</u> k= 0.01, ω (angular frequency) = <u>4 rad/s</u>, $\omega = 2\pi f$, $f = \frac{\omega}{2\pi} = \frac{4}{2\pi} = \frac{2}{\pi}$ Hz

   $\lambda = \frac{2\pi}{k} = \frac{2\pi}{0.01} = 628.32$

   $V = f\lambda = (\frac{2}{\pi})(628.32) = \underline{400\text{ m/s}}$

   (b) $A = \frac{A}{2}$(half) $= \frac{5}{2} = 2.5$ cm, $T = \frac{1}{f}$ if T inc by 2 then f dec by 2

   IF f is 2f then w = 2w and K = 2K

   IF f is $\frac{1}{2}$f then w = $\frac{1}{2}$w and K = $\frac{1}{2}$K

   $\underline{y = 5 \sin (-0.005x - 2t)}$ Negative (-kx) indicating the opposite direction

3. i. Frequency

   $y = 0.04\text{Sin}3\pi \left(\frac{-x}{0.5} + 50t\right)$ expand

   $y = 0.04\text{Sin}3\pi\ (-6\pi x + 150\pi t)$

$\omega = 150\pi$

$\omega = 2\pi f$

$\omega = \omega$

$150\pi = 2\pi f$

$f = 75$ Hz

ii. Velocity of the wave

$k = 6\pi$

$k = 2\pi/\lambda$

$k = k$

$6\pi = 2\pi/\lambda$

$\lambda = 0.33$ m

$v = f\lambda$

$= 75 \times 0.33$

$v = 25$ m/s

iii. Equation for the reflected component of the standing wave

$y = 0.04\text{Sin}3\pi\left(\frac{x}{o.5} + 50t\right)$