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Tugas dan Latihan Soal Fisika

1. $h = 2\ m$
   $\rho = 1000\ kg/m^3$
   $g = 9.8\ m/s^2$
   Jawab: $P = \rho \cdot g \cdot h$
   $= 1000 \cdot 9.8 \cdot 2 = 19600\ Pa$

2. Dik: $A_1 = 10\ cm^2$ $F_1 = 100\ N$
   $A_2 = 50\ cm^2$ $F_2 = ?$
   Jawab: $\frac{F_1}{A_1} = \frac{F_2}{A_2}$
   $\frac{100}{10} = \frac{F_2}{50}$
   $F_2 = 500\ N$

3. Dik: $D_1 = 10\ cm = 0{,}1\ m$ $\Delta P = 1200\ Pa$
   $D_2 = 5\ cm = 0{,}05\ m$ $\therefore \rho = 1000\ kg/m^3$
   Dit: $V_2 = \dots$
   Jawab: $A_1 V_1 = A_2 V_2$
   $\frac{\pi (0.1)^2}{4} V_1 = \frac{\pi (0{,}05)^2}{4} V_2$
   $V_1 = 0{,}25 V_2$
   Pers. bernoulli:
   $\Delta P = \frac{1}{2} \rho (V_2^2 - V_1^2)$
   $1200 = \frac{1}{2} \cdot 1000 (V_2^2 - (0{,}25 V_2)^2)$
   $V_2 = 1.6\ m/s$

4. • Gerakannya periodik
   • Selalu melewati posisi kesetimbangan
   • Percepatan/gaya sebanding dgn posisi/simpangan benda

5. Dik: $k = 100\ N/m$

$x_{maks} = 0{,}2\ m$

$m = 2\ kg$

Dit: $v_{maks} = \ldots$

Jawab: $E_p = E_k$

$\frac{1}{2}kx^2 = \frac{1}{2}mv^2_{maks}$

$\frac{1}{2} \cdot 100 \cdot (0{,}2)^2 = \frac{1}{2} \cdot 2 \cdot v^2_{maks}$

$50 \times 0{,}04 = v^2_{maks}$

$v_{maks} = \sqrt{2} = 1{,}41\ m/s$

6. Dik: $m = 1\ kg$

$k = 200\ N/m$

$A = 0{,}1$

Jawab: $E_K = \frac{1}{2} \cdot m \cdot v^2$

$= \frac{1}{2} \cdot m \cdot (\omega A)^2$

$= \frac{1}{2} \times 1 \times (\sqrt{200} \times 0{,}1)^2 = \frac{1}{2} \cdot 1 \cdot 2 = 1\ J$

$E_p = \frac{1}{2} \cdot 200 \cdot (0{,}1)^2 = 1\ J$

$E = 1 + 1 = 2\ J$

7. Dik: $M = 0{,}05\ kg/m$, $F = 100\ N$

Dit: $v = \ldots$

Jawab: $v = \sqrt{\frac{F}{M}} = \sqrt{\frac{100}{0{,}05}} = 20\sqrt{10}$

8. $F = \frac{9}{5} \cdot 100 + 32 = 212^\circ F$

$K = 100 + 273{,}15 = 373{,}15\ K$

9. Dik: $T = 300\ K$ Dit: V_{rms}:

$M = 0{,}032\ kg/mol$

$k = 1.38 \times 10^{-23}\ J/K$

Jawab: $V_{rms} = \sqrt{\frac{3kT}{M}}$

$= \sqrt{\frac{3 \times 1.38 \times 10^{-23} \times 300}{0{,}032}}$

$= \sqrt{\frac{1{,}242 \times 10^{-20}}{0{,}032}} = 6.237 \times 10^{-10}\ m/s$

10. Dik: $P_A = 2\ atm$ $V_A = 3L$

$P_B = 1\ atm$ $V_B = 6L$

Jawab: rata-rata tekanan $= \frac{2+1}{2} = 1.5\ atm$

$W = \int_{V_A}^{V_B} \bar{P}\, dV$

$= 1{,}5\ atm\,(6L - 3L)$

$= 4{,}5\ atm \cdot L$

$W = 4{,}5 \times 101{,}325$

$= 456.86\ J$

11. Dik: $V_{terendam} = 0.6 \times V_{total}$, $\rho_{air} = 1000\ kg/m^3$

Dit: $\rho_{benda} = \ldots$

Jawab: $m_{benda} = \rho_{air} \cdot V_{terendam}$

$= 1000\ kg/m^3 \times 0{,}6 \times V_{total}$

$\frac{m_{benda}}{V_{total}} = \rho_{benda} = 600\ kg/m^3$

12. Dik: $V_1 = 0{,}3\ m/s$ $A_1 = 1\ cm^2 = 1 \times 10^{-4}\ m^2$ $\rho_{darah} = 1060\ kg/m^3$

$P_1 = 120\ mmHg$ $A_2 = 0{,}5\ cm^2 = 0{,}5 \times 10^{-4}\ m^2$

Dit: $P_2 = \ldots$

Jawab: $v_2 = \frac{1 \cdot 10^{-3}}{0,5 \cdot 10^{-3}} \times 0,3 = 0,6$

$$P_1 + \frac{1}{2} \rho v_1^2 = P_2 + \frac{1}{2} \rho v_2^2$$

$$120 + \frac{1}{2} \cdot 1060 \cdot (0,3)^2 = P_2 + \frac{1}{2} (1060)(0,18)^2$$

$$120 + 47,79 = P_2 + 17,89$$

$$P_2 = 149,9 \text{ mmHg}$$

13. Dik: $r = 0,01$ m $Q = 1 \times 10^{-6}$ m^3/s

$L = 1$ m $\Delta P = 100$ Pa

Dit: $\mu = \ldots$

Jawab: $Q = \frac{\pi \Delta P r^4}{8 \mu L}$

$$1 \times 10^{-6} = \frac{\pi \times 100 \times (0,01)^4}{8 \mu}$$

$$\mu = 0,3927 \times 10^{-6} = 3,927 \times 10^{-7} \text{ Pa.s}$$

14. Dik: $r = 0,02$ m $g = 9,8$ m/s^2

$F = 0,03$ N

Dit: $\gamma = \ldots$

Jawab: $\gamma = \frac{F}{2\pi r} = \frac{0,03}{2\pi \times 0,02}$

$$= \frac{0,03}{0,12} = 0,24 \text{ N/m}$$

15. Dik: $T = 2$ s, $g = 9,8$ m/s^2

Jawab: $T = 2\pi \sqrt{\frac{L}{g}} \rightarrow L = \frac{9,8}{4\pi^2} \times 2^2 = 0,994$ m

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16. Dik: $I = 0{,}1\ kg\,m^2$ $g = 9.8\ m/s^2$
$m = 0{,}5\ kg$
$h = 0{,}2\ m$

Jawab: $T = 2\pi\sqrt{\frac{I}{mgh}}$

$= 2\pi\sqrt{\frac{0{,}1}{0{,}5 \times 9.8 \times 0{,}2}}$

$= 2\ s$

17. Dik: $m = 2\ kg$ Dit: $T = \ldots$
$b = 0{,}5\ kg/s$

Jawab: $T = \frac{2}{0{,}5} = 4s$

18. Dik: $K = 2.2 \times 10^9\ N/m^2$ Dit: $v = \ldots$
$\rho = 1000\ kg/m^3$

Jawab: $v = \sqrt{\frac{K}{\rho}}$

$= \sqrt{\frac{2.2 \times 10^{9}}{1000}} = 1.48 \times 10^3\ m/s$

19. Dik: $A = 0{,}05\ m$ $v = 20\ m/s$
$f = 10\ Hz$ $\mu = 0{,}2\ kg/m$

Jawab: $\omega = 2\pi \times 10 = 20\pi\ rad/s$

$P = \frac{1}{2}(0{,}2)(20\pi)^2 \times (0{,}05)^2(20)$

$= 9.869\ W$

20. Dik: $Q = 500\ J$, $T = 300\ K$

Jawab: $\Delta S = \frac{500}{300} = 1{,}67\ J/K$

21. Dik: $V = 0{,}1\ m^3$ $N = 2.5 \times 10^{25}$ Dit: P = ...
$T = 400\ k$ $k_B = 1.38 \times 10^{-23}\ J/K$

Jawab: $PV = Nk_BT$

$P \cdot 0{,}1 = 2{,}5 \times 10^{25} \times 1{,}38 \times 10^{-23} \times 400$

$P \cdot 0{,}1 = 3.45 \cdot 10^{2} \rightarrow P = 3450\ Pa$

22. Dik: $n = 2\ mol$ $T_1 = 300\ k$ $\Delta T = 100\ K$
$R = 8.31\ J/(mol\ k)$ $T_2 = 400\ k$

Dit: $\Delta U = \cdots$

Jawab: $\Delta U = \frac{3}{2} n R \Delta T$

$= \frac{3}{2} \times 2 \times 8{,}31 \times 100 = 2493\ J$

23. Dik: $T_H = 500\ k$ Dit: $\eta = \cdots$
$T_c = 300\ k$

Jawab: $\eta = 1 - \frac{300}{500} = 0{,}4 = 40\%$.

24. Dik: $V_i = 2\ m^3$ $T = 300\ k$ $R = 8.31\ J/(mol \cdot K)$
$V_f = 4\ m^3$ $n = 1\ mol$

Dit: $W = \cdots$

Jawab: $W = 1 \times 8.31 \times 300 \times \ln \frac{4}{2}$

$= 8{,}31 \times 300 \times 0{,}693 = 1727{,}05\ J$