

# Penyelesaian Lengkap

soalan yang melibatkan pengiraan dalam Kertas 1

## PRAKTIS 1

- 8 Apabila/When  $m = 50$  g

$$T^2 = 0.25$$

$$T = \sqrt{0.25}$$

$$= 0.50 \text{ s}$$

Jawapan/Answer: C

## PRAKTIS 2

1  $v_x = \frac{2r}{t}$

$$v_y = \frac{2r}{t}$$

$$\frac{v_x}{v_y} = \frac{\frac{2r}{t}}{\frac{2r}{t}}$$

$$\frac{v_x}{v_y} = \frac{1}{1}$$

$$v_x : v_y = 1 : 1$$

Jawapan/Answer: A

- 2 Sesaran/Displacement =  $\sqrt{10^2 + 7^2}$   
 $= \sqrt{149}$   
 $= 12.21 \text{ km}$   
 $= 12\,210 \text{ m}$

$$\text{Halaju/Velocity} = \frac{12\,210 \text{ m}}{(1.5 \times 60 \times 60) \text{ s}}$$
$$= 2.26 \text{ m s}^{-1}$$

Jawapan/Answer: B

3  $\frac{\left(\frac{l}{0.02} - \frac{1.2}{0.02}\right) \div 100}{(4-1) \times 0.02} = 5$

$$\left(\frac{l}{0.02} - 60\right) \div 100 = 3$$

$$\frac{l}{0.02} - 60 = 30$$

$$\frac{l}{0.02} = 90$$

$$l = 1.8$$

Jawapan/Answer: C

4 Laju/Speed =  $\frac{2\pi(10) \times \frac{1}{2}}{30}$

$$= 1.05 \text{ m s}^{-1}$$

$$\text{Halaju/Velocity} = \frac{20}{30}$$

$$= 0.67 \text{ m s}^{-1}$$

Jawapan/Answer: B

5  $v^2 = u^2 + 2as$

$$20^2 = 30^2 + 2a(20)$$

$$a = -12.5 \text{ m s}^{-1}$$

$$u = 20 \text{ m s}^{-1}, v = 0, a = -12.5 \text{ m s}^{-1}$$

$$v^2 = u^2 + 2as$$

$$0^2 = 20^2 + 2(-12.5)s$$

$$s = 16 \text{ m}$$

Jawapan/Answer: A

- 7 Persamaan garis lurus/Equation of straight line

$$v = \frac{8}{12} t$$

$$= \frac{2}{3} t$$

$$\frac{1}{2} \times t \times v = \frac{1}{4} \times \left(\frac{1}{2} \times 12 \times 8\right)$$

$$\frac{1}{2} \times t \times \frac{2}{3} t = \frac{1}{4} \times \left(\frac{1}{2} \times 12 \times 8\right)$$

$$t^2 = \frac{1}{4} \times 12 \times 8 \times \frac{3}{2}$$

$$t^2 = 36$$

$$t = 6$$

Jawapan/Answer: D

8  $\frac{1}{2} \times (t - 5 + t) \times 10 = \frac{1}{2} \times t \times 15$

$$(2t - 5) \times 10 = 15t$$

$$20t - 50 = 15t$$

$$5t = 50$$

$$t = 10$$

Jawapan/Answer: C

15  $0.5 \times v = 1\,500 \times 2$

$$v = \frac{1\,500 \times 2}{0.5}$$

$$= 6\,000 \text{ m s}^{-1}$$

Jawapan/Answer: D

16  $m \times [75\% \times (-v)] + 50 \times v = 0$

$$-75mv + 50v = 0$$

$$0.75mv = 50v$$

$$m = 66.7$$

$$\approx 67 \text{ kg}$$

Jawapan/Answer: C

- 18 Jika beban adalah pegun atau bergerak dengan laju seragam,

If the load is stationary or move with uniform speed,

$$a = 0$$

$$F_{net} = ma \\ = m(0)$$

$$F_{net} = 0 \text{ N}$$

∴  $F = 40 \text{ N}$  dalam kedua-dua kes supaya  $F_{net} = 0$ .

∴  $F = 40 \text{ N}$  in both cases in order for  $F_{net} = 0$ .

Jawapan/Answer: C

- 19  $u = 10 \text{ m s}^{-1}$ ,  $v = 0$ ,  $s = 8 \text{ m}$

$$v^2 = u^2 + 2as$$

$$0^2 = 10^2 + 2a(8)$$

$$a = -6.25 \text{ m s}^{-2}$$

$$F = |60 \times (-6.25)|$$

$$= 375 \text{ N}$$

Jawapan/Answer: D

- 20  $|mv - mu| = |0.04 \times (-8) - 0.04 \times 15|$   
 $= 0.92 \text{ kg m s}^{-1}$

Jawapan/Answer: D

- 21  $F = \left| \frac{56(0) - 56(10)}{0.8} \right|$

$$= 700 \text{ N}$$

Jawapan/Answer: C

### PRAKTIS 3

2  $F_1 = \frac{G(m)(2m)}{a^2} = \frac{2Gm^2}{a^2}$

$$F_2 = \frac{G(m)(3m)}{a^2 + a^2} = \frac{3Gm^2}{2a^2}$$

$$\frac{F_1}{F_2} = \frac{\frac{2Gm^2}{a^2}}{\frac{3Gm^2}{2a^2}} \\ = \frac{2Gm^2}{a^2} \times \frac{2a^2}{3Gm^2} \\ = \frac{4}{3}$$

$$F_1 : F_2 = 4 : 3$$

Jawapan/Answer: D

4  $g = \frac{GM}{R^2}$

$$g' = \frac{GM}{(R + 0.1R)^2}$$

$$= \frac{GM}{1.21R^2}$$

$$\frac{g - g'}{g} \times 100\% = \frac{\frac{GM}{R^2} - \frac{GM}{1.21R^2}}{\frac{GM}{R^2}} \times 100\%$$

$$= \frac{GM}{R^2} \left( 1 - \frac{1}{1.21} \right) \times 100\% \\ = \frac{GM}{R^2}$$

$$= 17.4\%$$

Jawapan/Answer: B

7  $F = \frac{mv^2}{r}$

$$(0.05)(10) = \frac{0.03v^2}{0.36}$$

$$v^2 = 6$$

$$v = 2.45 \text{ m s}^{-1}$$

$$\text{Panjang lilitan/Circumference} = 2\pi(0.36) \\ = 0.72\pi \text{ m}$$

$$f = \frac{0.72\pi}{2.45}$$

$$= 0.92 \text{ Hz}$$

Jawapan/Answer: A

13  $v_e = \sqrt{\frac{2GM}{r}}$

$$v_e \propto \frac{1}{\sqrt{r}}$$

$$11 \propto \frac{1}{\sqrt{R}} \text{ --- ①}$$

$$v' \propto \frac{1}{\sqrt{1.5R}} \text{ --- ②}$$

$$\frac{\text{②}}{\text{①}} - \frac{v'}{11} = \frac{1}{\sqrt{1.5R}} \times \sqrt{R}$$

$$v' = \frac{1}{\sqrt{1.5}} \times 11$$

$$\approx 9 \text{ km s}^{-1}$$

Jawapan/Answer: C

### PRAKTIS 4

3  $0.78 \times c \times (47 - 31) = 1.3 \times 4200 \times (50 - 47)$

$$c = \frac{16380}{12.48}$$

$$c = 1312.5 \text{ J kg}^{-1} \text{ } ^\circ\text{C}^{-1}$$

Jawapan/Answer: A

5  $P_1 = 205 \text{ kPa}$   
 $T_1 = 273 + 32$   
 $= 305 \text{ K}$

$$P_2 = ?$$

$$T_2 = 273 + 66$$

$$= 339 \text{ K}$$

$$\frac{P_1}{T_1} = \frac{P_2}{T_2}$$

$$P_2 = \frac{P_1}{T_1} \times T_2 \\ = \frac{205}{305} \times 339 \\ = 227.9 \text{ kPa}$$

Jawapan/Answer: B

6  $P_1 = 1.3 \times 10^5 \text{ Pa}$   
 $V_1 = 50 \text{ cm}^3$   
 $P_1 V_1 = P_2 V_2$

$$P_2 = ?$$

$$V_2 = 20 \text{ cm}^3$$

$$P_2 = \frac{P_1 V_1}{V_2} \\ = \frac{(1.3 \times 10^5)(50)}{20}$$

$$= 3.25 \times 10^5 \text{ Pa}$$

Jawapan/Answer: D

$$7 \quad \theta = \frac{10}{14} \times 100$$

$$= 71.4^\circ \text{C}$$

Jawapan/Answer: C

### PRAKTIS 5

$$2 \quad a = 6.0 \times 10^{-4} \text{ m}$$

$$D = 2.6 \text{ m}$$

$$x = 2.5 \times 10^{-6} \text{ m}$$

$$\lambda = \frac{ax}{D}$$

$$= \frac{(6.0 \times 10^{-4})(2.5 \times 10^{-6})}{2.6}$$

$$= 5.77 \times 10^{-10} \text{ m}$$

Jawapan/Answer: A

### PRAKTIS 6

$$3 \quad x = \text{Tinggi dari tapak/Height from base}$$

$$1.3 = \frac{15}{15 - x}$$

$$15 - x = 11.54$$

$$x = 3.46$$

$$n_1 = \frac{12}{12 - 3.46}$$

$$= 1.4$$

Jawapan/Answer: B

$$4 \quad n_1 \sin \alpha = n_2 \sin(90 - \beta)$$

$$n_1 \sin \alpha = n_2 \cos \beta$$

$$\frac{n_1}{n_2} = \frac{\cos \beta}{\sin \alpha}$$

$$n_1 : n_2 = \frac{\cos \beta}{\sin \alpha}$$

Jawapan/Answer: B

$$6 \quad n = \frac{20}{20 - 4}$$

$$= \frac{5}{4}$$

$$\frac{20 + 5}{12 + 5 - x} = \frac{5}{4}$$

$$\frac{25}{25 - x} = \frac{5}{4}$$

$$25 - x = 20$$

$$x = 5$$

Jawapan/Answer: B

$$7 \quad n = \frac{\sin(90 - 27)}{\sin(90 - 56.2)}$$

$$= \frac{\sin 63^\circ}{\sin 33.8^\circ}$$

$$= 1.60$$

$$n = \frac{1}{\sin c}$$

$$\sin c = \frac{1}{1.60}$$

$$c = 38.68^\circ$$

Jawapan/Answer: A

$$9 \quad n_1 \sin 60^\circ = n_2 \sin 45^\circ \text{ --- ①}$$

$$n_1 \sin 40^\circ = n_2 \sin \theta \text{ --- ②}$$

$$\frac{\text{②}}{\text{①}} \rightarrow \frac{n_2 \cos \theta}{n_2 \sin 45^\circ} = \frac{n_1 \sin 40^\circ}{n_1 \sin 60^\circ}$$

$$\sin \theta = 0.5248$$

$$\theta = 31.65^\circ$$

$$\approx 32^\circ$$

Jawapan/Answer: C

### PENTAKSIRAN SUMATIF

9 Jumlah momentum sebelum letupan = Jumlah momentum selepas letupan  
*Total momentum before explosion = Total momentum after explosion*

$$0 = m_x \left( -\frac{24}{t} \right) + m_y \left( \frac{9}{t} \right)$$

$$m_x \left( \frac{24}{t} \right) = m_y \left( \frac{9}{t} \right)$$

$$\frac{m_x}{m_y} = \frac{9}{24}$$

$$m_x : m_y = 3 : 8$$

Jawapan/Answer: B

$$10 \quad \frac{1}{2} \times 30 \times 60 = 900 \text{ m}$$

Jawapan/Answer: B

$$14 \quad v = \sqrt{gR}$$

$$= \sqrt{9.81 \times 6.4 \times 10^6}$$

$$= 7.9 \times 10^3 \text{ m s}^{-1}$$

Jawapan/Answer: C

$$15 \quad v_{\text{Bumi}} = 1.1 \times 10^4 \text{ m s}^{-1}$$

$$v_{\text{Bulan}} = ?$$

$$\frac{v_{\text{Bulan}}}{v_{\text{Bumi}}} = \frac{\sqrt{\frac{2GM_{\text{Bulan}}}{R_{\text{Bulan}}}}}{\sqrt{\frac{2GM_{\text{Bumi}}}{R_{\text{Bumi}}}}}$$

$$= \sqrt{\frac{M_{\text{Bulan}}}{M_{\text{Bumi}}} \times \frac{R_{\text{Bumi}}}{R_{\text{Bulan}}}}$$

$$\frac{v_{\text{Bulan}}}{v_{\text{Bumi}}} = \sqrt{\frac{1}{81}} \times 3.7$$

$$v_{\text{Bulan}} = 0.214 \times v_{\text{Bumi}}$$

$$= 0.214 \times 1.1 \times 10^4$$

$$= 0.214 \times 10^3 \text{ m s}^{-1}$$

Jawapan/Answer: D

$$\begin{aligned}
 17 \quad g_r &= g \left( \frac{R}{r} \right)^2 \\
 &= g \left( \frac{R}{4R} \right)^2 \\
 &= 10 \left( \frac{1}{4} \right)^2 \\
 &= 0.625 \text{ m s}^{-2} \\
 F &= mg_r \\
 &= 180 \times 0.625 \\
 &= 112.5 \text{ N} \\
 \text{Jawapan/Answer: D}
 \end{aligned}$$

$$\begin{aligned}
 18 \quad v_E &= \sqrt{\frac{2GM}{r}} \\
 &= 2\,380 \text{ m s}^{-1} \\
 v'_E &= \sqrt{\frac{2GM}{r + 0.5r}} \\
 &= \sqrt{\frac{2GM}{1.5r}} \\
 &= \frac{1}{\sqrt{1.5}} \times \sqrt{\frac{2GM}{r}} \\
 &= \frac{1}{\sqrt{1.5}} \times 2\,380 \\
 &= 1\,943 \text{ m s}^{-1} \\
 \text{Jawapan/Answer: C}
 \end{aligned}$$

$$\begin{aligned}
 20 \quad Q &= mc\theta \\
 c &= \frac{Q}{m\theta} \\
 &= \frac{32\,000}{1.6 \times (53 - 24)} \\
 &\approx 690 \text{ J kg}^{-1} \text{ }^\circ\text{C}^{-1} \\
 \text{Jawapan/Answer: D}
 \end{aligned}$$

$$\begin{aligned}
 22 \quad Q &= ml \\
 &= (1)(3.4 \times 10^5) \\
 &= 3.4 \times 10^5 \text{ J} \\
 \text{Jisim bahan api/Mass of fuel} \\
 &= \frac{3.4 \times 10^5}{1.2 \times 10^3} \\
 &\approx 283 \text{ g} \\
 \text{Jawapan/Answer: A}
 \end{aligned}$$

$$\begin{aligned}
 24 \quad \theta &= \frac{8.2 - 3.1}{13.3 - 3.1} \times 100 \\
 &= 50.0 \text{ }^\circ\text{C} \\
 \text{Jawapan/Answer: D}
 \end{aligned}$$

$$\begin{aligned}
 31 \quad \frac{v_c}{v_d} &= \frac{\lambda_c}{\lambda_d} \\
 v_c &= \frac{\lambda_c}{\lambda_d} \times v_d \\
 &= \frac{1.0}{3.0} \times 2 \\
 &\approx 0.7 \text{ m s}^{-1} \\
 \text{Jawapan/Answer: D}
 \end{aligned}$$

$$\begin{aligned}
 32 \quad \lambda_k &= \frac{ax_k}{D}, & \lambda_h &= \frac{ax_h}{D} \\
 &= \frac{ax_k}{D} \\
 \frac{\lambda_k}{\lambda_h} &= \frac{\frac{ax_k}{D}}{\frac{ax_h}{D}} \\
 &= \frac{x_k}{x_h} \\
 \frac{\lambda_k}{\lambda_h} &= \frac{6 \times 10^{-7}}{5.4 \times 10^{-7}} \\
 &= 1.11 \\
 \text{Jawapan/Answer: C}
 \end{aligned}$$

$$\begin{aligned}
 38 \quad f_o + f_e &= 0.75 \\
 f_o &= 0.75 - f_e \\
 P_e &= 4P_o \\
 \frac{1}{f_o} &= 4 \left( \frac{1}{f_e} \right) \\
 \frac{1}{f_e} &= \frac{4}{0.75 - f_e} \\
 4f_e &= 0.75 - f_e \\
 5f_e &= 0.75 \\
 f_e &= 0.15 \text{ m} \\
 &= 15 \text{ cm} \\
 \text{Jawapan/Answer: B}
 \end{aligned}$$