INDIAN SCHOOL AL WADI AL KABIR
CLASS XI
PHYSICS
ASSESSMENT 2 (2025 - 26)
SET 2
ANSWER KEY

Q.NO.	ANSWERS	MARKS
1	(D)[$P^1 A^{1/2} T^{-1}$]	1
2	(B)work and energy	1
3	(A) 20 ms^{-1}	1
4	(C) 40 m	1
5	(B) They are anti-parallel and equal in magnitude	1
6	(B)going up and speeding up	1
7	(A) $W_1=W_2=W_3$	1
8	(B)Option 1 and 3	1
9	(B)$g_1:g_2 = R_1\rho_1 : R_2\rho_2$	1
10	(B)$K_1 < K_2$	1
11	(B)equal to the original length	1
12	(C)area of the bottom surface	1
13	(D)Both Assertion and Reason are false.	1
14	(A)Both Assertion and Reason are true and Reason is the correct explanation of Assertion.	1
15	(A)Both Assertion and Reason are true and Reason is the correct explanation of Assertion.	1
16	(C)Assertion is true but Reason is false.	1
17	Statement Example and explanation	1 1
18	(a) Statement (b) Definition and dimensional formula [$M L^{-1} T^{-2}$]	1 ½ + ½
19	Statement Consideration/ Diagram Formula	1 ½ ½

20	Power, $P = \frac{\text{Work done}}{\text{Time}} = \frac{mgh}{t}$ $= \frac{3 \times 10^4 \times 9.8 \times 40}{15 \times 60}$ $= \frac{196}{15} = 13.07 \text{ kW}$ Percentage efficiency, $\eta = \frac{\text{Output Power}}{\text{Input Power}} \times 100$ Hence, Input power $= \frac{13.07 \times 100}{30}$ $= 43.55$ or nearly 43.6 kW. **OR** Case (i), $\frac{1}{2}mv_1^2 = \text{F}d_1$ ...(1) Case (ii), $\frac{1}{2}mv_2^2 = \text{F}d_2$ ....(2) Dividing (2) by (1), we get $\frac{v_2^2}{v_1^2} = \frac{d_2}{d_1}$ $v_2^2 = v_1^2 \times \frac{d_2}{d_1}$ $= (100)^2 \times \frac{.09}{.04}$ $= \left(\frac{100 \times 0.3}{0.2}\right)^2$ $v_2 = \frac{100 \times 0.3}{0.2} = 150 \text{ ms}^{-1}$	½ ½ ½ ½ ½ ½ ½ ½
21	$V = -\frac{GM}{(R+h)}$ $= \frac{-6 \times 10^{24} \times 6.67 \times 10^{-11}}{(6400 + 36{,}000) \times 10^3}$ $= \frac{-6 \times 6.67 \times 10^{24} \times 10^{-11}}{42400 \times 10^3}$ $= \frac{-6 \times 667 \times 10^7}{424}$ $= -9.44 \times 10^6 \text{ J kg}^{-1}$ **OR** $F' = G\frac{m_1 m_2}{(3r)^2} = \frac{Gm_1 m_2}{9r^2} = \frac{F}{9}$ Percentage decrease $= \left(1 - \frac{F'}{F}\right) \times 100 = \left(1 - \frac{1}{9}\right) \times 100 = \frac{8}{9} \times 100 \approx 88.89\%$	1 ½ ½ ½ + ½ ½ + ½

22	Let $M = kv^a \rho^b g^c$, where k is a constant. Writing dimensions of all physical quantities on both sides, we get $[M^1 L^0 T^0] = [LT^{-1}]^a [ML^{-3}]^b [LT^2]^c$ $= [L^{a-3b+c} M^b T^{-a-2c}]$ or $[M^1 L^0 T^0] = [M^b L^{a-3b+c} T^{-a-2c}]$ a=6 b=1 c=-3	½ + ½ + ½ ½ + ½ + ½
23	$$s = \frac{1}{2}at^2$$ $$2.18 = \frac{1}{2}a(2)^2$$ $$2.18 = 2a \implies a = \frac{2.18}{2} = 1.09\,\mathrm{m/s^2}$$ $$a = g\frac{m_1 - m_2}{m_1 + m_2}$$ $$1.09 = g\frac{0.05 - 0.04}{0.05 + 0.04} = g\frac{0.01}{0.09}$$ $$g = 1.09 \times \frac{0.09}{0.01} = 1.09 \times 9 = 9.81\,\mathrm{m/s^2}$$	½ ½ ½ ½ ½ ½
24	a) Statement b) Diagram Explanation	1 1 1

25	Position of centre of mass is given by $r_{cm} = \frac{m_1 r_1 + m_2 r_2}{m_1 + m_2}$ $= \frac{2\times 1 + 3\times 2}{2+3} = \frac{8}{5} = 1.6\,\text{cm}$ Velocity of centre of mass is given by $v_{cm} = \frac{m_1 v_1 + m_2 v_2}{m_1 + m_2}$ $= \frac{2\times 3 + 3\times(-1)}{2+3} = \frac{3}{5}$ $= 0.6\,\text{ms}^{-1}$ Total momentum is given by $p = (m_1 + m_2)v_{cm} = (2+3)\times 0.6$ $= 3\,\text{kg ms}^{-1}$	½ ½ ½ ½ ½ ½
26	Diagram/consideration Steps Final answer	1 1 1
27	Graph Area under the graph gives displacement Steps Final answer OR Graph Area under the graph gives displacement Steps Final answer	1 ½ 1 ½ 1 ½ 1 ½

28	a) Statement b)Statement Consideration/ diagram $V^2 - u^2 = 2as$ $½\ mv^2 - ½\ m\ u^2 = mas$ $= Fs = W$ W = change in K.E.	1 ½ ½ ½ ½

29	(I)(C) Young's modulus (II)(C) Permanent deformation occurs (III) (B) Decreases (IV) (D) 0.1 J	1 1 1 1
30	(I) Graph 2 equations (II) A projectile is an object that is thrown or projected into the air and then moves under the influence of gravity alone, with air resistance typically neglected (III) X component of a = o Y component of a = -g	1 ½ + ½ 1 ½ + ½
31	(A)Statement Fα rate of change of momentum F = k rate of change of momentum F = K $\frac{dp}{dt}$ $F = K\,ma$, If K=1 F = ma (B)Statement Proof (C) $\text{Impulse} = \text{Change in momentum}$ $= \text{Final momentum} - \text{Initial momentum}$ $= (-0.3 - 0.3)\ \text{kg ms}^{-1}$ $= -0.6\ \text{kg ms}^{-1}$ **OR** (A)Diagram NcosΘ = W + fsinΘ N = mg/(cosΘ - μsinΘ) NsinΘ + fcosΘ = mv^2/R $v = \sqrt{\frac{Rg(sin\theta+\mu cos\theta)}{cos\theta-\mu sin\theta}}$	2 1 1 1 1 ½ ½ ½ ½ 1 ½

	(B) $$F_c = \frac{mv^2}{r}$$ $$F_c = \frac{1500 \times (12.5)^2}{20}$$ $$F_c = \frac{1500 \times 156.25}{20} = \frac{234375}{20} = 11718.75\,\text{N}$$	½
32	(A) Definition Diagram/ consideration Steps Final answer (B) $$g_{Mars} = \frac{G \cdot (\frac{1}{9} M_{Earth})}{(\frac{1}{2} R_{Earth})^2}$$ m = 40 kg OR (A) Definition Diagram/consideration Steps Final expression (B) g (1- 2h/R) = g (1-d/R) h = 40 km	1 ½ 1 ½ 2 1 ½ ½ ½ ½ 2
33	(A)Diagram/ Consideration Momentum is conserved $m_1u_1 + m_2u_2 = m_1v_1+m_2v_2$ Kinetic energy conserved $½\ m_1u_1^2 + ½\ m_2u_2^2 = ½\ m_1v_1^2 + 1/2\ m_2v_2^2$ Rearranging steps $$v_2 = \frac{(M_2-M_1)u_2+2M_1u_1}{M_1+M_2}$$ Final answer of v_2, $$v_1 = \frac{(M_1-M_2)u_1+2M_2u_2}{M_1+M_2}$$ Final answer of v_1,	3

(B)

Force constant, $K = \frac{F}{x} = \frac{50}{5 \times 10^{-3}} = 10^4 N/m$

Work done in stretching the wire

$W = \frac{1}{2}Kx^2 = \frac{1}{2} \times 10^4 (5 \times 10^{-3})^2 = \frac{0.25}{2}$

$= 0.125J$

2

OR

(A) Definition

1

When bodies have the same mass i.e.,

$m_1 = m_2$

$$v_1 = \left(\frac{m_1 - m_2}{m_1 + m_2}\right)u_1 + \left(\frac{2m_2}{m_1 + m_2}\right)u_2$$

$$v_1 = (0)u_1 + \left(\frac{2m_2}{2m_2}\right)u_2$$

$$v_1 = u_2$$

$$v_2 = \left(\frac{2m_1}{m_1 + m_2}\right)u_1 + \left(\frac{m_2 - m_1}{m_1 + m_2}\right)u_2$$

$$v_2 = \left(\frac{2m_1}{2m_1}\right)u_1 + (0)u_2$$

$$v_2 = u_1$$

2

(B)

$$(m \times u_1) + (m \times u_2) = (m + m) \times v$$

$$10,000 \times 15 + 10,000 \times 0 = 20,000 \times v$$

$$150,000 = 20,000 \times v$$

$$v = \frac{150,000}{20,000} = 7.5\,\text{m/s}$$

2
