DPP
DAILY PRACTICE PROBLEMS

CLASS : XITH
DATE :

Solutions

SUBJECT : PHYSICS
DPP NO. : 4

Topic :- MOTION IN A STRAIGHT LINE

1 **(c)**

Stopping distance $= \frac{\text{Kinetic energy}}{\text{Retarding force}} = \frac{\frac{1}{2}mu^2}{F}$

$= \frac{u^2}{2\mu g} [F = \mu mg]$

So both will cover equal distance

2 **(b)**

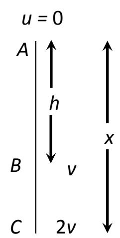
Let at point A initial velocity of body is equal to zero

for path AB:$v^2 = 0 + 2gh$ ...(i)

for path AC:$(2v)^2 = 0 + 2gx$

$4v^2 = 2gx$ ...(ii)

Solving (i) and (ii), $x = 4h$



3 **(d)**

Both trains will travel a distance of 1 km before to come in rest. In this case by using $v^2 = u^2 + 2as$

$\Rightarrow 0 = (40)^2 + 2a \times 1000 \Rightarrow a = -0.8\ m/s^2$

4 **(c)**

Since displacement is always less than or equal to distance, but never greater than distance. Hence numerical ratio of displacement to the distance covered is always equal to or less than one

5 **(d)**

The student is able to catch the bus if in time t the distance travelled by him is equal to the distance travelled by bus in time t

ie, $s_1 = s_2$ ...(i)

From Eq. (i)

$$0 + \frac{1}{2}at^2 = ut - d$$

Or $at^2 - 2ut + 2d = 0$

It is quadratic equation

So, $t = \frac{+2u \pm \sqrt{4u^2 - 8ad}}{2} = \frac{+2u \pm 2\sqrt{u^2 - 2ad}}{2}$

For t to be real

$$u \geq \sqrt{2ad} \geq \sqrt{2 \times 1 \times 50} = 10 \text{ ms}^{-1}$$

6 **(a)**

Average speed $= \frac{2v_d v_u}{v_d + v_u}$

7 **(a)**

We know that the velocity of body is given by the slope of displacement – time graph so it is clear that initially slope of the graph is positive and after some time it becomes zero (corresponding to the peak of graph) and it will become negative

9 **(b)**

Only directions of displacement and velocity gets changed, acceleration is always directed vertically downward

10 **(b)**

We will solve the problem is terms of relative initial velocity, relative acceleration and relative displacement of the coin with respect to the floor of the lift.

$u = 10 - 10 = 0\text{ms}^{-1}$, $a = 9.8\text{ms}^{-2}$, $s = 4.9\text{m}$, t=?

$4.9 = 0 \times t + \frac{1}{2} \times 9.8 \times t^2$

or $4.9t^2 = 4.9$ or $t = 1\text{s}$

11 **(b)**

$S_2 = \frac{1}{2}gt_2^2 = \frac{10}{2} \times (3)^2 = 45\ m$

$S_1 = \frac{1}{2}gt_1^2 = \frac{10}{2} \times (5)^2 = 125\ m$

$\therefore S_1 - S_2 = 125 - 45 = 80\ m$

12 **(b)**

$v = \frac{ds}{dt} = 12t - 3t^2$

Velocity is zero for $t = 0$ and $t = 4$ sec

13 **(b)**

$h_n = \frac{g}{2}(2n - 1) \Rightarrow h_{5^{th}} = \frac{10}{2}(2 \times 5 - 1) = 45\ m$

14 **(a)**

Le the initial velocity $= u$

And acceleration $= a$

In Ist case $s_1 = ut_1 + \frac{1}{2}at_1^2$

$200 = 2u + 2a \qquad (\because t_1 = 2 \text{ s})$

Or $u + a = 100 \qquad$ ...(i)

In IInd case

$$s_2 = ut_2 + \frac{1}{2}\,at_2^2$$

$420 = 6u + 18a \quad (\because t_2 = 2 + 4 = 6 \text{ s})$

Or $3a + u = 70 \qquad$ ...(ii)

Solving Eqs. (i) and (ii), we get

$a = -15 \text{ ms}^{-2}$

And $u = 115 \text{ ms}^{-1}$

$v = u + at$

$= 115 - 15 \times 7 = 10 \text{ ms}^{-1}$

15 **(d)**

Average acceleration $= \frac{\Delta v}{\Delta t}$

$= \frac{\sqrt{2gh'} - (-\sqrt{2gh})}{\Delta t} = \frac{\sqrt{2gh'} + \sqrt{2gh}}{\Delta t}$

$= \frac{\sqrt{2 \times 10 \times 2.5} + \sqrt{2 \times 10 \times 10}}{0.01} \text{ ms}^{-2}$

$= \frac{\sqrt{15} + \sqrt{200}}{0.01} \text{ ms}^{-2} = \frac{5\sqrt{2} + 10\sqrt{2}}{0.01} \text{ ms}^{-2}$

$= \frac{15\sqrt{2}}{0.01} \text{ms}^{-2} = 1500\sqrt{2} \text{ms}^{-2}$

The upward velocity has been taken as positive. Since average acceleration is positive therefore its direction is vertically upward.

17 **(b)**

Velocity of graph $=$ Area of a-t graph

$= (4 \times 1.5) - (2 \times 1) = 4 m/s$

18 **(d)**

Let the man will be able to catch the bus after t s

Then

$10t = 48 + \frac{1}{2} \times 1 \times t^2$
$t^2 - 20t + 96 = 0$
$(t - 12)(t - 8) = 0$
$t = 8s$ and $t = 12s$
Thus the man will be able to catch the bus after $8s$

19 **(c)**

Stopping distance $= \frac{\text{Kinetic energy}}{\text{Retarding force}} = \frac{\frac{1}{2}mu^2}{F}$
$= \frac{u^2}{2\mu g} [F = \mu mg]$
So both will cover equal distance

20 **(d)**

Body reaches the point of projection with same velocity

ANSWER-KEY										
Q.	1	2	3	4	5	6	7	8	9	10
A.	C	B	D	C	D	A	A	C	B	B
Q.	11	12	13	14	15	16	17	18	19	20
A.	B	B	B	A	D	B	B	D	C	D