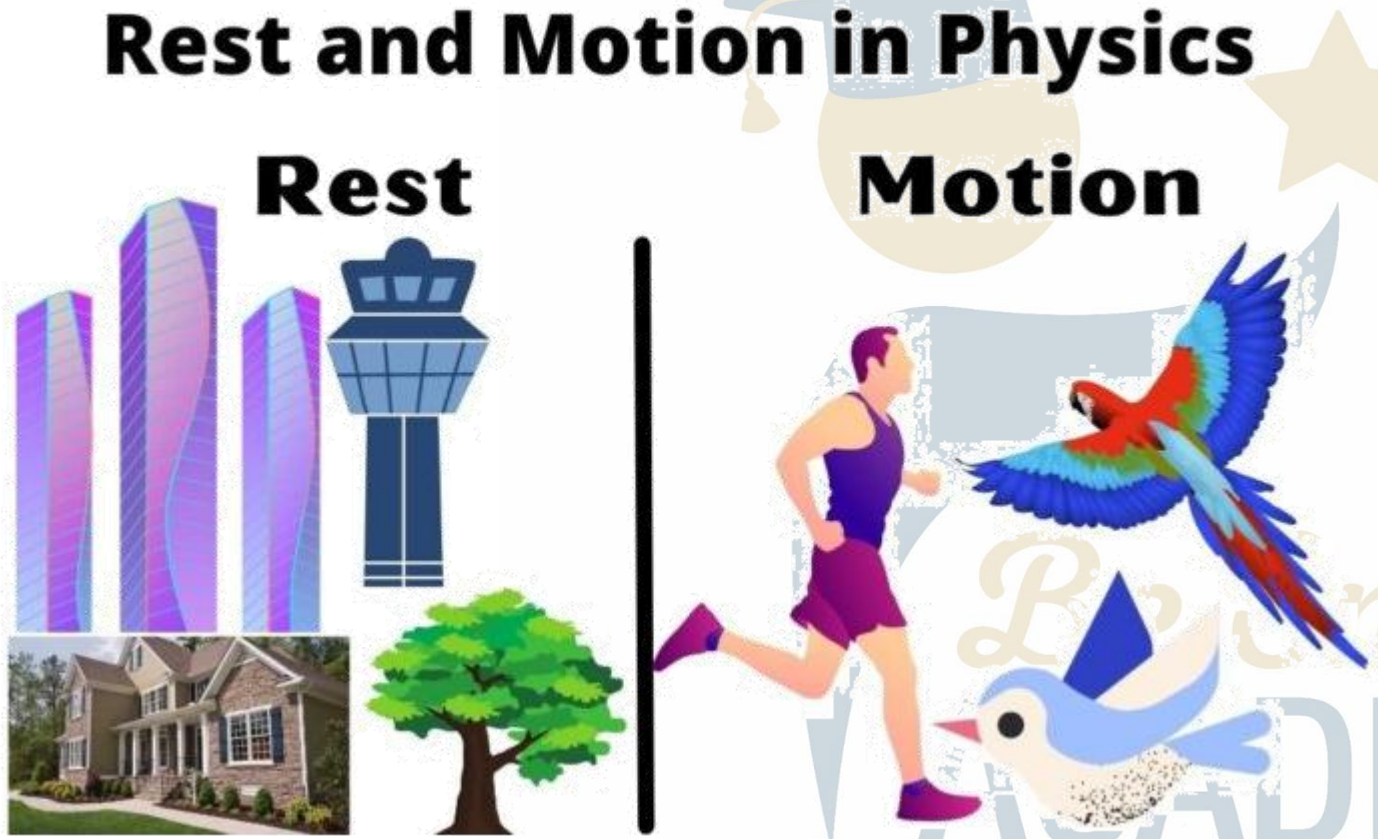
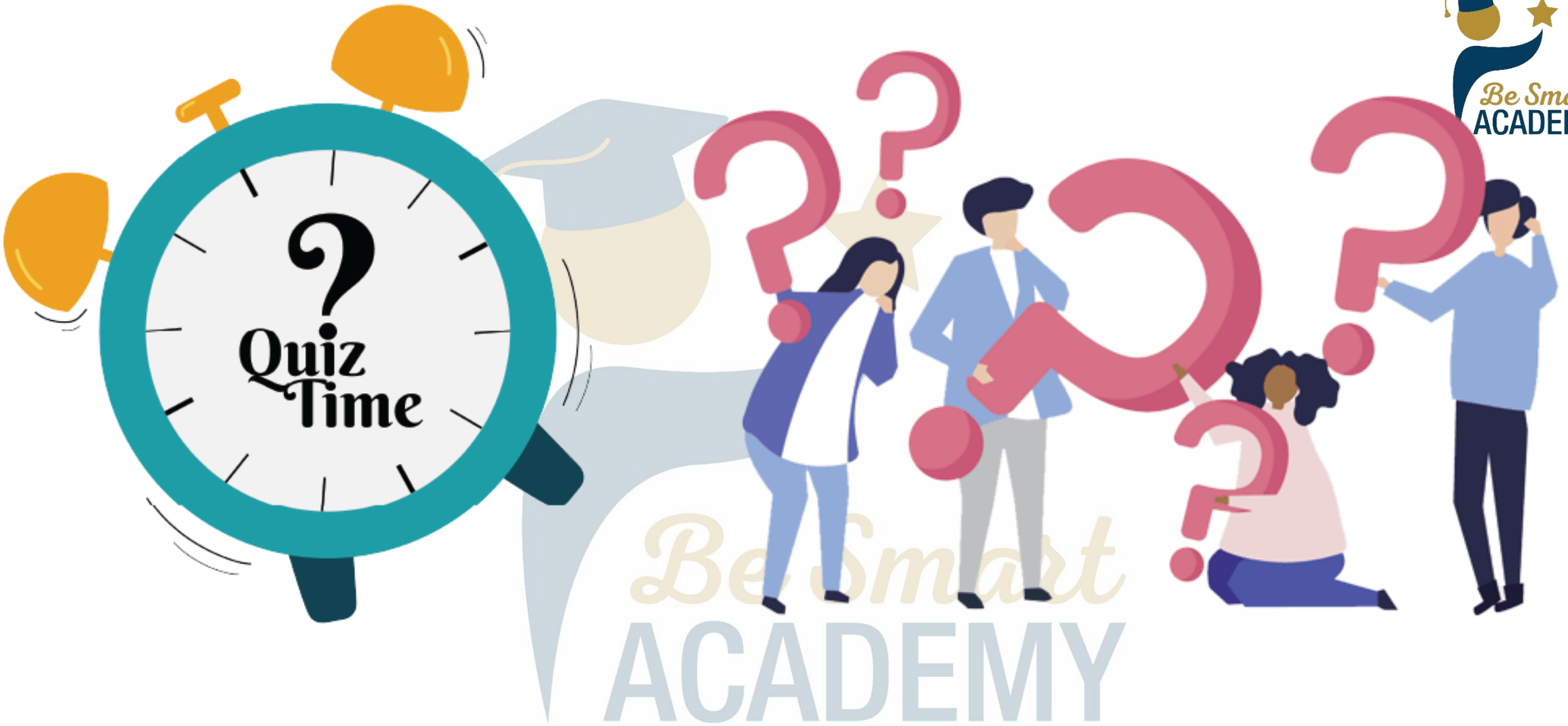
Physics – Grade 10



Unit Four
Mechanics

Chapter 14
Description of motion

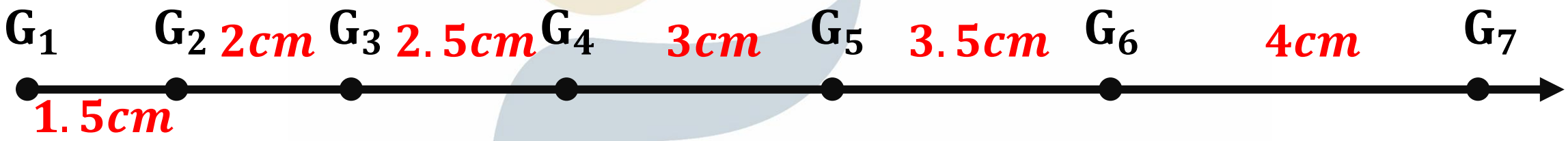
Prepared & Presented by: Mr. Mohamad Seif



Quiz Physics duration: 15 min

On an air table we print the trajectory of the center of mass of a puck.

The points are printed at regular equal intervals of time τ= 50ms.



1. Calculate the average speed between: G_1 & G_3 and between G_3 & G_5.
2. Calculate the instantaneous speed at G_2, G_4 and at G_6.
3. Give the characteristics of velocity vector at G_4 then represent it. scale of $1cm \rightarrow 0.275m/s$.

Quiz **Physics** **duration: 15 min**

4. Calculate the average acceleration between G_2 & G_4 and between G_4 & G_6.
5. Calculate the instantaneous acceleration at G_3 and G_5.
6. What is the nature of motion of the puck? Justify your answer.
7. Give the characteristics of acceleration vector at G_3 then represent it. scale of $1cm \rightarrow 1m/s^2$.

Quiz **Physics** **duration: 15 min**

$\tau = 50ms \div 1000 = 0.05s;$

1. Calculate the average speed between: G_1 & G_3; G_3 & G_5

$$V_{1,3} = \frac{G_1G_3}{t_3 - t_1} \Rightarrow V_{1,3} = \frac{G_1G_2 + G_2G_3}{3\tau - \tau}$$

$$V_{1,3} = \frac{(1.5 + 2) \times 10^{-2}}{2\tau} \Rightarrow V_{1,3} = \frac{3.5 \times 10^{-2}}{2 \times 0.05}$$

$$V_{1,3} = 0.35m/s$$

Quiz **Physics** **duration: 15 min**

$\tau = 50ms \div 1000 = 0.05s;$

1. Calculate the average speed between: G_1 & G_3; G_3 & G_5

$$V_{3,5} = \frac{G_3G_5}{t_5 - t_3} \Rightarrow V_{3,5} = \frac{G_3G_4 + G_4G_5}{5\tau - 3\tau}$$

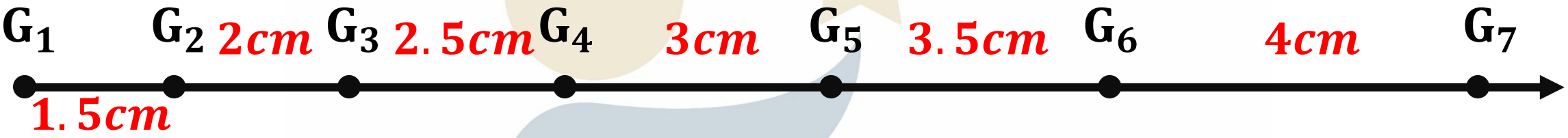
$$V_{3,5} = \frac{(2.5 + 3) \times 10^{-2}}{2\tau} \Rightarrow V_{3,5} = \frac{5.5 \times 10^{-2}}{2 \times 0.05}$$

$$V_{3,5} = 0.55m/s$$

Quiz **Physics** **duration: 15 min**

$\tau = 0.05s;$

2. Calculate the instantaneous speed at G_2, G_4 and at G_6.



$$V_2 = \frac{G_1G_3}{3\tau - \tau} \Rightarrow V_2 = \frac{G_1G_2 + G_2G_3}{2\tau}$$

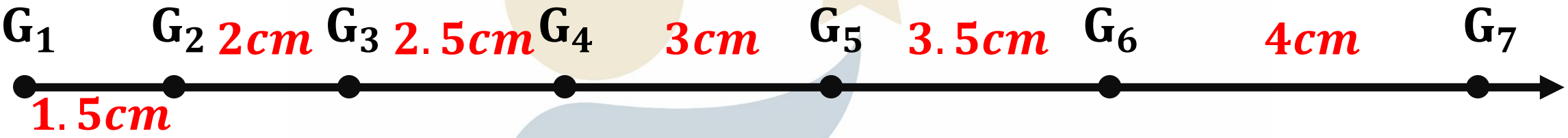
$$V_2 = \frac{(1.5 + 2) \times 10^{-2}}{2 \times 0.05} \Rightarrow V_2 = \frac{3.5 \times 10^{-2}}{2 \times 0.05}$$

$$V_2 = 0.35m/s$$

Quiz **Physics** **duration: 15 min**

$\tau = 0.05s;$

2. Calculate the instantaneous speed at G_2, G_4 and at G_6.



$$V_4 = \frac{G_3G_5}{t_5 - t_3} \Rightarrow V_4 = \frac{G_3G_4 + G_4G_5}{5\tau - 3\tau}$$

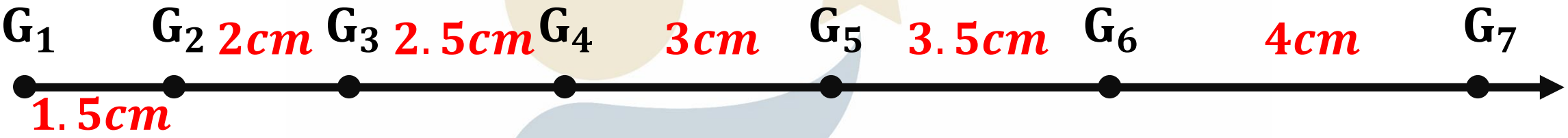
$$V_4 = \frac{(2.5 + 3) \times 10^{-2}}{2\tau} \Rightarrow V_4 = \frac{5.5 \times 10^{-2}}{2 \times 0.05}$$

$$V_4 = 0.55m/s$$

Quiz **Physics** **duration: 15 min**

$\tau = 0.05s;$

2. Calculate the instantaneous speed at G_2, G_4 and at G_6.



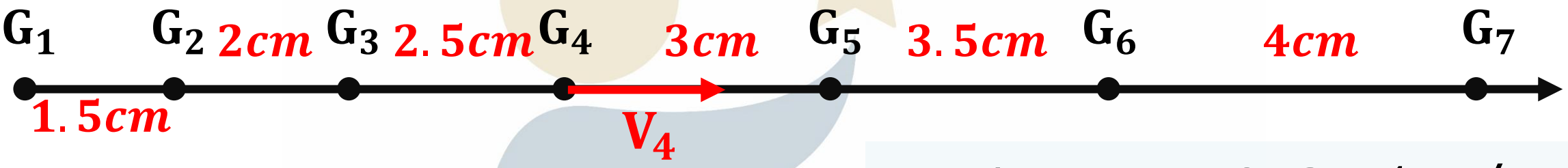
$$V_6 = \frac{G_5G_7}{t_7 - t_5} \Rightarrow V_6 = \frac{G_5G_6 + G_6G_7}{7\tau - 5\tau}$$

$$V_6 = \frac{(3.5 + 4) \times 10^{-2}}{2\tau} \Rightarrow V_6 = \frac{7.5 \times 10^{-2}}{2 \times 0.05}$$

$$V_6 = 0.75m/s$$

Quiz **Physics** **duration: 15 min**

3. Give the characteristics of velocity vector at G_4 then represent it. scale of $1cm \rightarrow 0.275m/s$.



Origin:	**point G_4**
Line of action:	**Horizontal**
Direction:	**To Right**
Magnitude:	$V_4 = 0.55m/s$

$$1cm \rightarrow 0.275m/s$$
$$x = ?? \rightarrow 0.55m/s$$

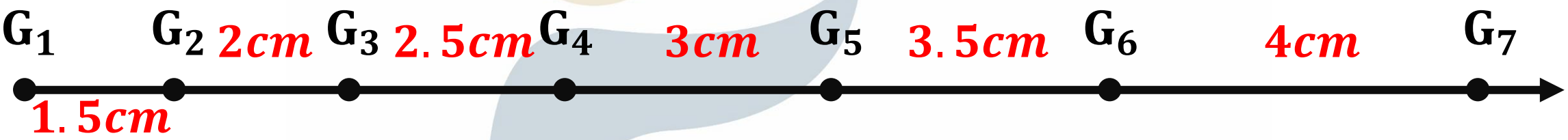
$$x = \frac{1cm \times 0.55m/s}{0.275m/s}$$

$$x = 2cm$$

Quiz **Physics** **duration: 15 min**

$\tau = 0.05s; V_2 = 0.35m/s; V_4 = 0.55m/s; V_6 = 0.75m/s$

4.Calculate the average acceleration between G_2 & G_4 and between G_4 & G_6.



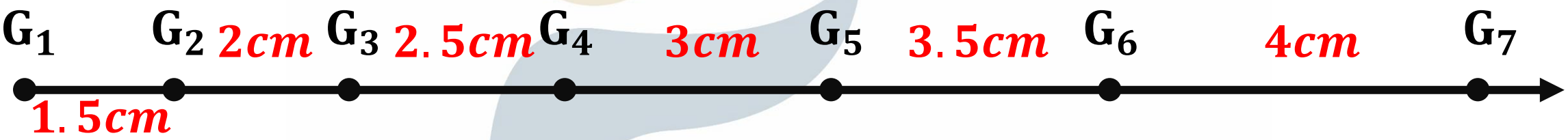
$$a_{2,4} = \frac{V_4 - V_2}{t_4 - t_2} \Rightarrow a_{2,4} = \frac{V_4 - V_2}{4\tau - 2\tau} \Rightarrow a_{2,4} = \frac{V_4 - V_2}{2\tau}$$

$$a_{2,4} = \frac{0.55 - 0.35}{2 \times 0.05} \Rightarrow a_{2,4} = \frac{0.2}{0.1} \Rightarrow a_{2,4} = 2m/s^2$$

Quiz Physics duration: 15 min

$\tau = 0.05s; V_2 = 0.35m/s; V_4 = 0.55m/s; V_6 = 0.75m/s$

4.Calculate the average acceleration between G_2 & G_4 and between G_4 & G_6.



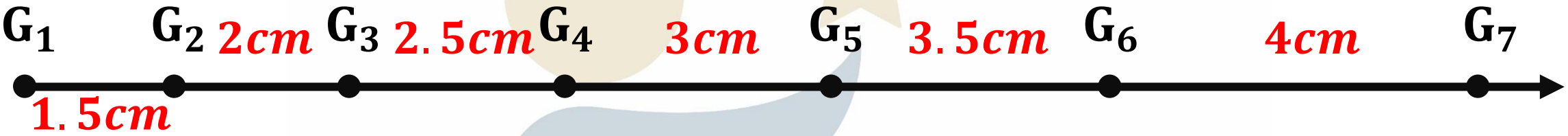
$$a_{4,6} = \frac{V_6 - V_4}{t_6 - t_4} \Rightarrow a_{4,6} = \frac{V_6 - V_4}{6\tau - 4\tau} \Rightarrow a_{4,6} = \frac{V_6 - V_4}{2\tau}$$

$$a_{4,6} = \frac{0.75 - 0.55}{2 \times 0.05} \Rightarrow a_{4,6} = \frac{0.2}{0.1} \Rightarrow a_{4,6} = 2m/s^2$$

Quiz **Physics** **duration: 15 min**

$\tau = 0.05s; V_2 = 0.35m/s; V_4 = 0.55m/s; V_6 = 0.75m/s$

5. Calculate the instantaneous acceleration at G_3 and at G_5.



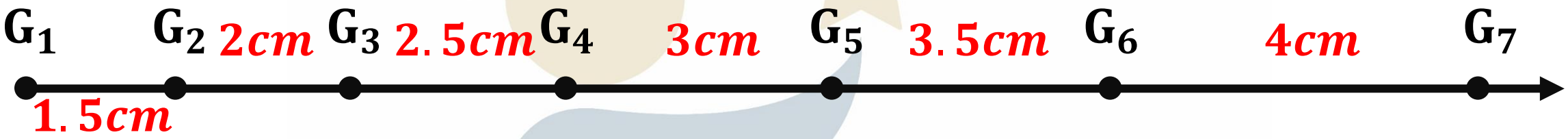
$$a_3 = \frac{V_4 - V_2}{t_4 - t_2} \Rightarrow a_3 = \frac{V_4 - V_2}{4\tau - 2\tau} \Rightarrow a_3 = \frac{V_4 - V_2}{2\tau}$$

$$a_3 = \frac{0.55 - 0.35}{2 \times 0.05} \Rightarrow a_3 = \frac{0.2}{0.1} \Rightarrow a_3 = 2m/s^2$$

Quiz Physics duration: 15 min

$\tau = 0.05s; V_2 = 0.35m/s; V_4 = 0.55m/s; V_6 = 0.75m/s$

5. Calculate the instantaneous acceleration at G_3 and at G_5.



$$a_5 = \frac{V_6 - V_4}{t_6 - t_4} \Rightarrow a_5 = \frac{V_6 - V_4}{6\tau - 4\tau} \Rightarrow a_5 = \frac{V_6 - V_4}{2\tau}$$

$$a_5 = \frac{0.75 - 0.55}{2 \times 0.05} \Rightarrow a_5 = \frac{0.2}{0.1} \Rightarrow a_5 = 2m/s^2$$

$\tau = 0.05s; V_2 = 0.35m/s; V_4 = 0.55m/s; V_6 = 0.75m/s$

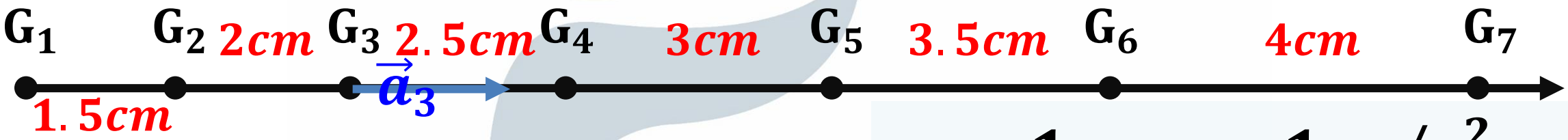
6. What is the nature of motion of the puck? Justify your answer.

Because $a = 2m / s^2 > 0$ then the motion is accelerated.

Quiz Physics duration: 15 min

$\tau = 0.05s; V_2 = 0.35m/s; V_4 = 0.55m/s; V_6 = 0.75m/s$

7.Give the characteristics of acceleration vector at G_3 then represent it. scale of $1cm \rightarrow 1m/s^2$.



Origin:	point G_3
Line of action:	Horizontal
Direction:	To the Right
Magnitude:	$a_3 = 2\,m/s^2$

$$1cm \rightarrow 1\,m/s^2$$
$$x = ?? \rightarrow 2m/s^2$$

$$x = \frac{1cm \times 2m/2^2}{1m/s^2}$$

$$x = 2cm$$

The End