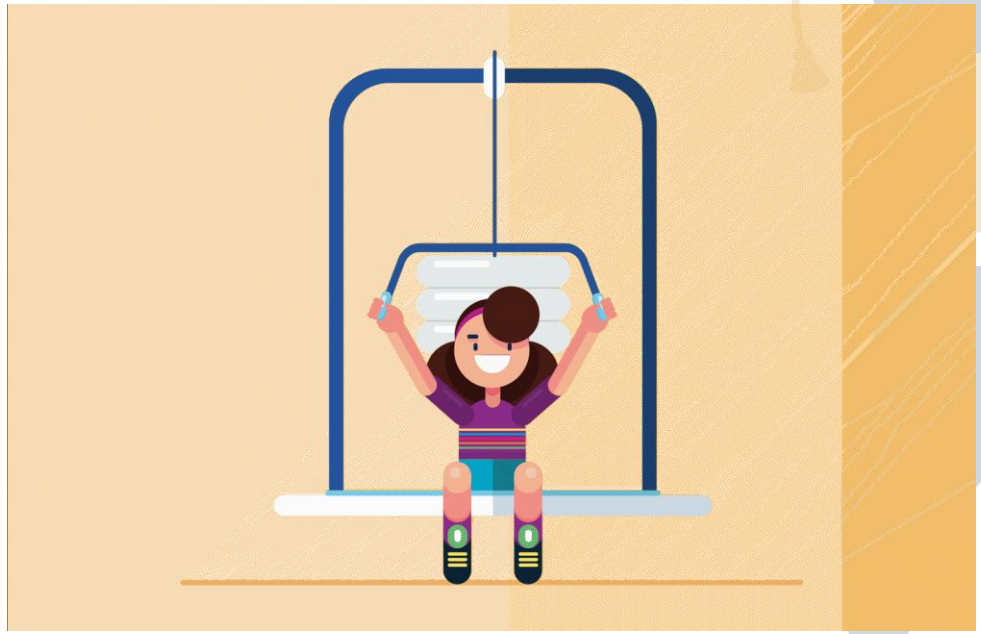
Physics – Grade 10

Unit Four – Mechanics



Chapter 16 – Forces and Interaction

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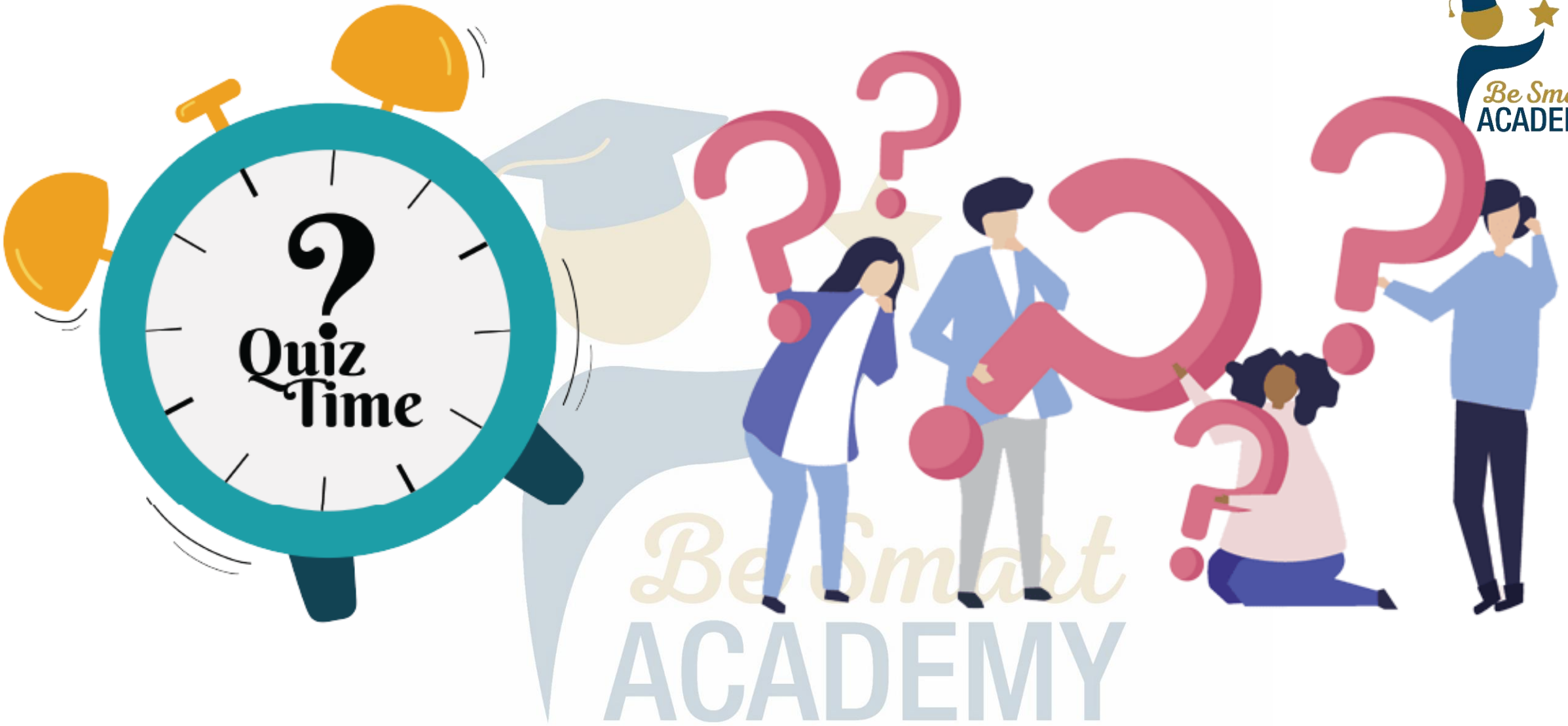
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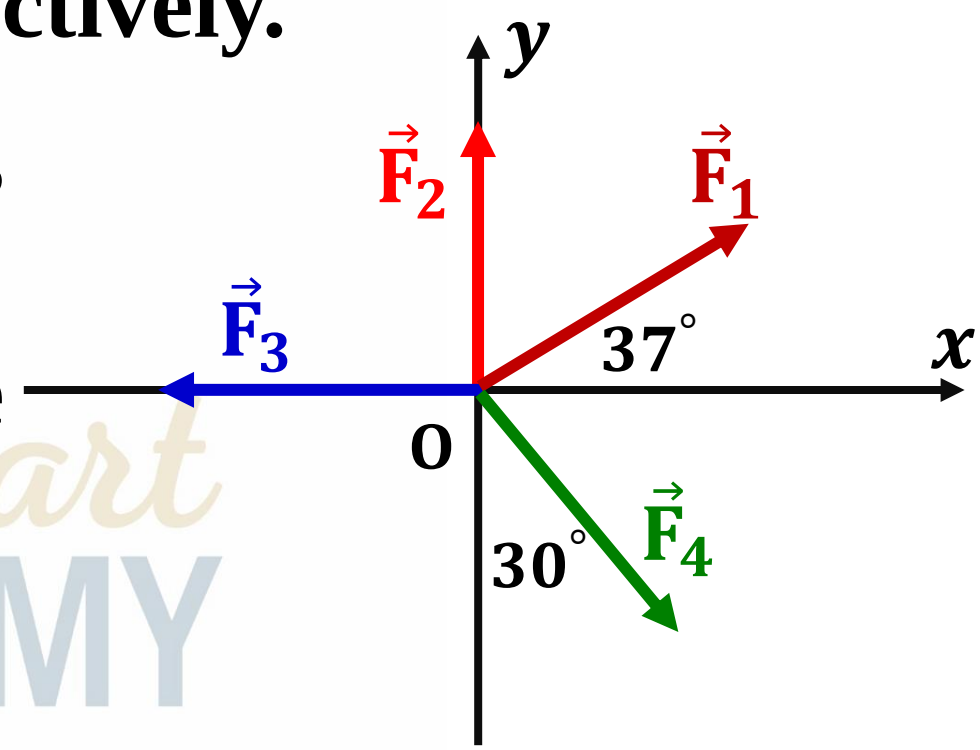
Quiz Resultant forces 15 min

In the adjacent figure, we consider four forces $\vec{F}_1$, $\vec{F}_2$, $\vec{F}_3$ and $\vec{F}_4$ whose magnitudes are $F_1 = 3N$, $F_2 = 2.5N$, $F_3 = 3.5N$ and $F_4 = 4N$ respectively.



1) Determine the component vectors of each force in the system $(O, \vec{i}, \vec{j})$.
2) Determine the magnitude of the resultant force $\vec{F}_R$.
3) Calculate the angle between $\vec{F}_R$ and the positive x-axis

Quiz Resultant forces 15 min

$$F_{1x} = F_1 \cos(37) = 3\cos(37)$$

$$F_{1x} = 2.4N$$

$$F_{1y} = F_1 sin(37) = 3sin(37)$$

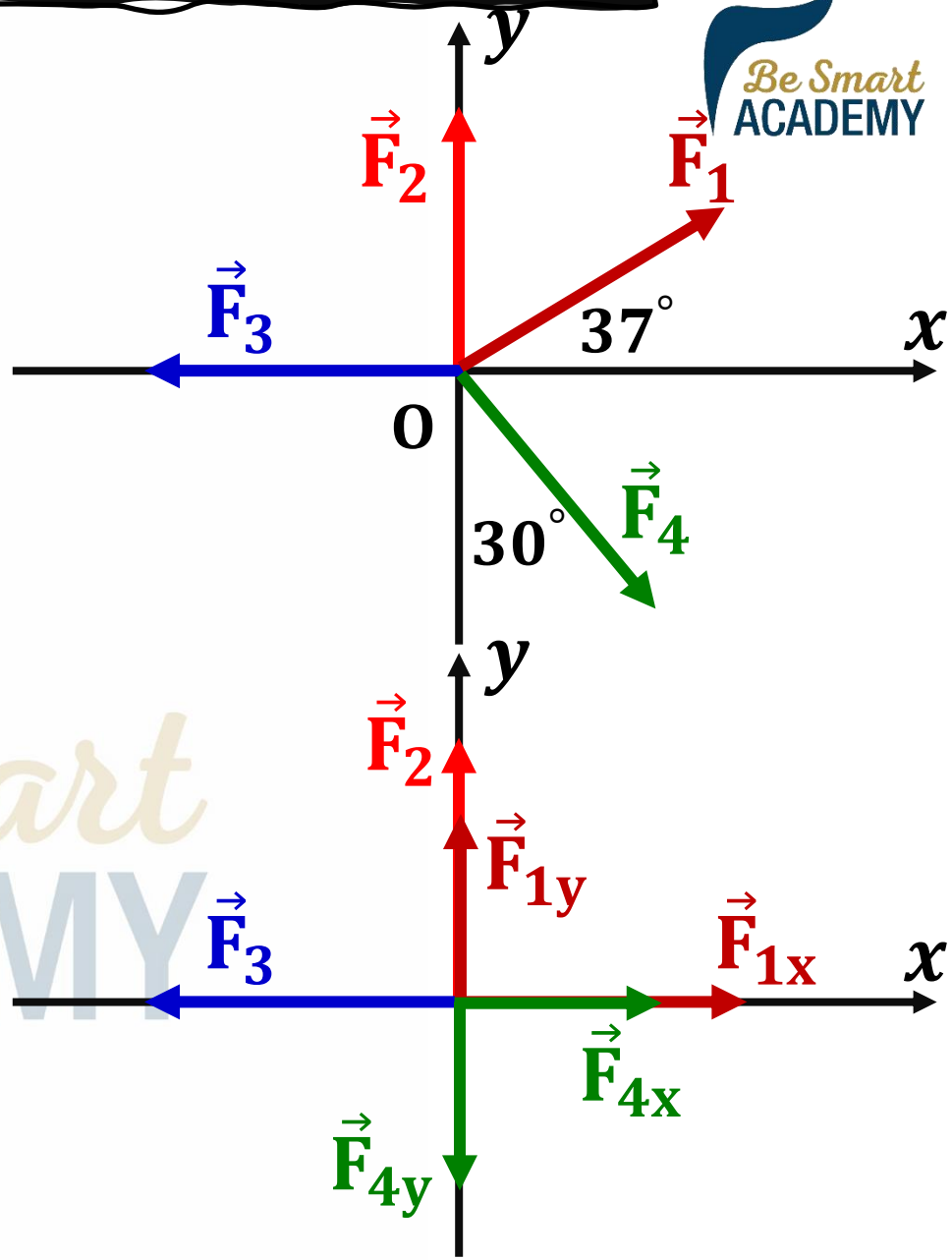
$$F_{1x} = 1.8N$$

$$F_{4x} = F_4 \cos(60) = 4\cos(-60)$$

$$F_{4x} = 2N$$

$$F_{4y} = F_4 sin(60) = 4sin(-60)$$

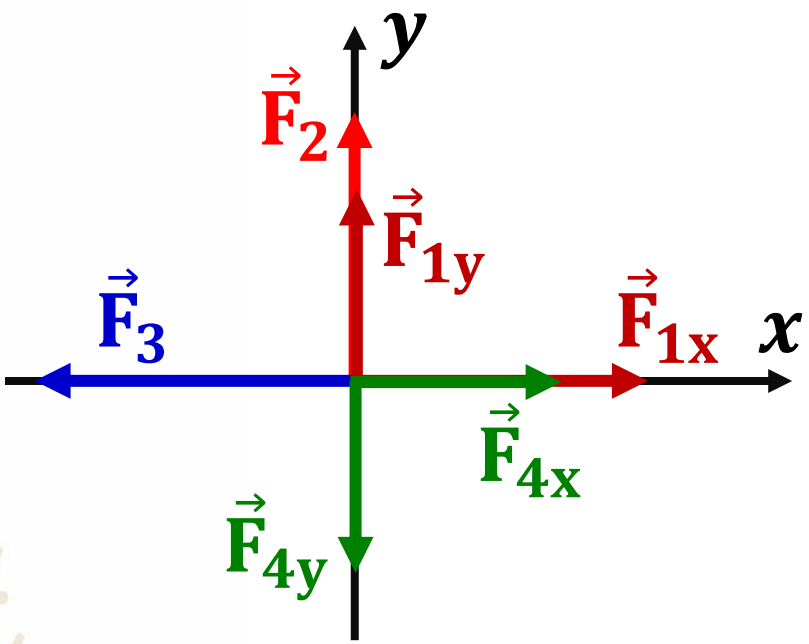
$$F_{4y} = -3.46N$$



Quiz Resultant forces 15 min

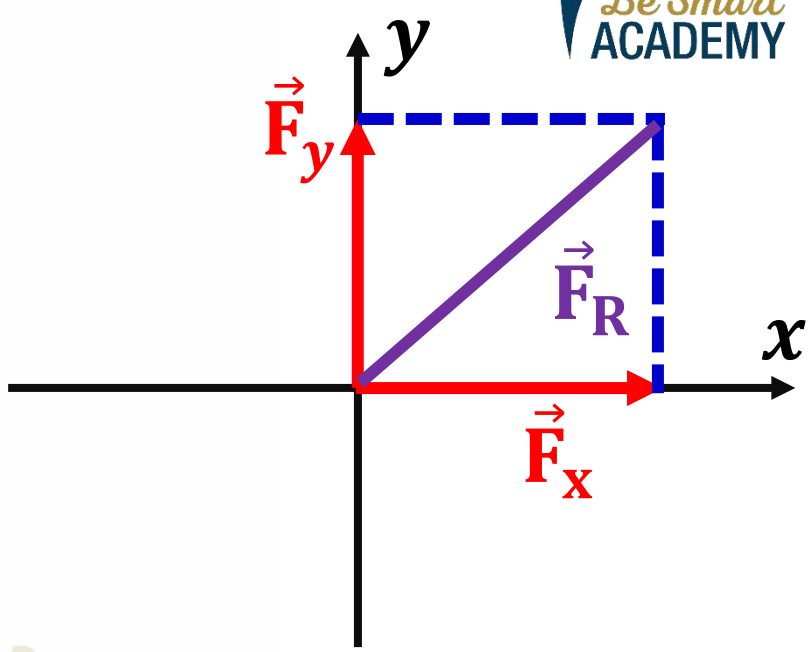
2) Determine the magnitude of the resultant force $\vec{F}$.

$\vec{F}$	$\vec{F}_x$	$\vec{F}_y$
$\vec{F}_1$	$F_{1x} = 2.4$	$F_{1y} = 1.8$
$\vec{F}_2$	$F_{2x} = 0$	$F_{2y} = 2.5$
$\vec{F}_3$	$F_{3x} = -3.5$	$F_{3y} = 0$
$\vec{F}_4$	$F_{4x} = 2$	$F_{4y} = -3.46$
$\vec{F}_R$	$F_x = 0.9N$	$F_y = 0.84N$



Quiz Resultant forces 15 min

Now complete the parm



$$F_R = \sqrt{F_x^2 + F_y^2}$$

$$F_R = \sqrt{(0.9)^2 + (0.84)^2}$$

$$F = \sqrt{0.81 + 0.705} \Rightarrow F_R = \sqrt{1.515}$$

$$F_R = 1.2N$$

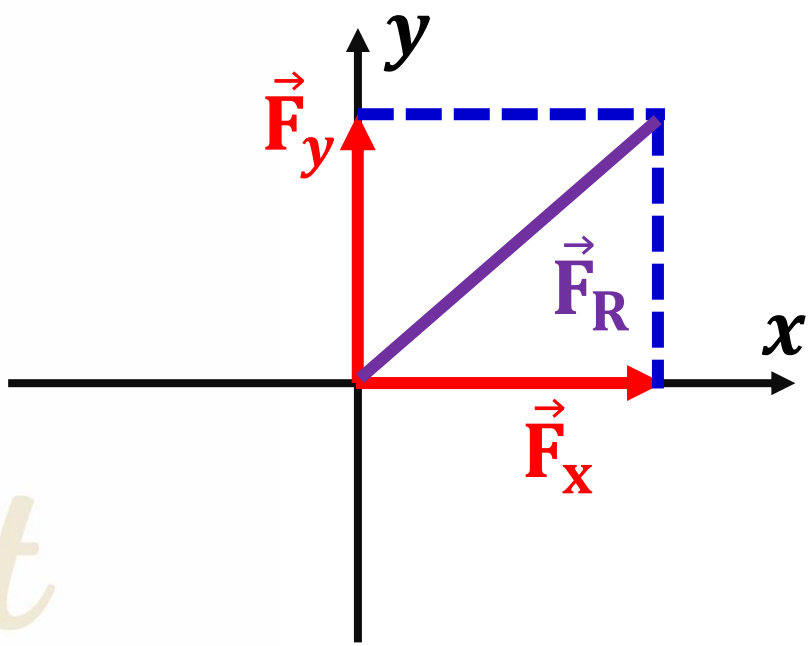
2) Calculate the angle between $\vec{F}_R$ and the positive x-axis

$$\tan(\alpha) = \frac{F_y}{F_x}$$

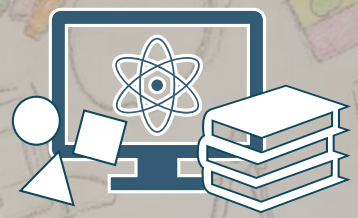
$$\tan(\alpha) = \frac{0.84}{0.9}$$

$$\tan(\alpha) = 0.933$$

$$\alpha \approx 43^\circ$$



The End



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