TERM 1

LESSON PLAN 1
PHYSICAL SCIENCES
PHYSICS GRADE 11

KNOWLEDGE AREA	MECHANICS	TOTAL TIME: 31 DAYS
Term	**1**	
Unit 1	**VECTORS IN TWO DIMENSIONS** Scalars and vectors Graphical presentation Resolution of a vector into its parallel and perpendicular components Contact- and non-contact forces Forces and free body diagrams Frictional force Forces in equilibrium, resultant force Determining the resultant vector	
Date	**/ /20_ _**	
Resources	**Doc Scientia Textbook and Workbook** **Physical Sciences** **Book 1 Physics Grade 11** **P. 11 – 59**	
Time	**12 days**	
Core knowledge	Vectors in two dimensions • Draw a sketch of the vectors (parallel and perpendicular) on the Cartesian level. • Add co-linear vectors along the parallel and perpendicular direction to obtain the net parallel component (R_x) and a net perpendicular component (R_y). • Sketch R_x and R_y. • Sketch the resultant (R), using either the tail-to-head or tail-to-tail method. • Determine the magnitude of the resultant using the theorem of Pythagoras. • Find resultant vector graphically using the tail-to- head method as well as by calculation (by component method) for a maximum of four force vectors in both 1-Dimension and 2-Dimension. • Understand what a closed vector diagram is. • Determine the direction of the resultant using simple trigonometric ratios. Use examples involving force vectors. Recall the Theorem of Pythagoras. • Draw a sketch of the vector on the Cartesian plane showing its magnitude and the angle (θ) between the vector and the x-axis. • Use $R_x = R\cos(\theta)$ for the resultant x-component • Use $R_y = R\sin(\theta)$ for the resultant y-component. • Resolve two-dimensional forces (like the weight of an object on an incline) in two mutually perpendicular components; parallel (x) and perpendicular (y).	

Core knowledge	Use examples involving force vectors. Different kinds of forces: weight, normal force, frictional force, applied (push, pull), tension (strings or cables) • Define normal force, N, as the force exerted by a surface on an object in contact with it. • Know that the normal force acts perpendicular to the surface irrespective of whether the plane is horizontal or inclined. • Know that a force diagram is a picture of the object(s) involved with all the forces acting on it, added as arrows. • Know that in a free body diagram the object of interest is drawn as a dot and all the forces acting on it are drawn as arrows starting on the dot and pointing away from it. • Define frictional force, f, as the force that opposes the motion of an object and acts parallel to the surface the object is in contact with. • Distinguish between static and kinetic friction forces. • Explain what is meant by the maximum static friction, f_{Smax} • Calculate the value of the maximum static frictional force for objects at rest on a horizontal and inclined planes using: $f_{Smax} = \mu_S N$ • Know that static friction $f_S < \mu_S N$. • Calculate the value of the kinetic friction force for a moving object on horizontal and inclined planes using: $f_K = \mu_{KN}$. • Resolve two-dimensional forces (such as the weight of an object with respect to the inclined plane) into its parallel (x) and perpendicular (y) components. • The resultant or net force in the x-direction is a vector sum of all the components in the x-direction. • The resultant or net force in the y-direction is a vector sum of all the components in the y-direction. The force of static friction can have a range of values from zero up to a maximum value, $\mu_S N$. The force of dynamic friction on an object is constant for a given surface and equals $\mu_K N$. Friction forces can be explained in terms of the interlocking of the irregularities in surfaces, which impedes motion. N.B. for horizontal plane problems the only forces perpendicular to the plane should be the weight, W, and the normal, N. All other forces should be parallel to the plane. N.B. for inclined plane problems the only forces perpendicular to the plane should be the component of the weight, $W\cos\theta$, and the normal, N. All other forces should be parallel to the plane. Indigenous Knowledge Systems First people to make fire did so using friction.

Practical activity/ experiments	Experiment 1 P. 36 – 37 Experiment 2 P. 38 Experiment 3 P. 39 Experiment 4 P. 46 – 47		
Assessment method	**Class test**	**Control test**	**Project**
	Experiment	**Class work**	**Building models, posters or interviews**
Resources	Workbook, transparencies, Mind maps Summary P. 56 – 58 Mind maps P. 59		
Homework	Exercise 1 P. 16 – 19 Exercise 2 P. 26 – 28 Exercise 3 P. 40 – 43 Exercise 4 P. 51 – 55		