STEM Program Years Prep to 10 Physics

Year level	Physical Sciences SU	Maths Understanding	Investigate SIS	Design SHE
Prep	The way objects move depends on a variety of factors, including their size and shape	Measurement-compare length, weight and time. Location- describe position and movement. Shape-sort and recognize regular shapes	Explore and make observations by using the senses **0.1 Moving on Wheels** **0.2 To and Fro Motions** **0.3 Spinning Motion** **0.4 What motion is that?** *Technology: machines* *Measurement compare length, weight and time of cars*	Science involves exploring and observing the world using the senses **0.5C LEGO car construction** **0.6P Make a playground Ride** *Resources: DUPLO or LEGO, Doll or soft toy, cardboard tubes, blocks etc.,*
1	Light and sound are produced by a range of sources and can be sensed	Number-count and add Measurement-use digital meters Data-Display data using pictures	Pose questions explore answers 1. **Investigating changing light.** 2. **Investigating changing sound.** 3. **Investigating Stopping Light.** 4. **Investigating Stopping Sound.** *Technology: construction and insulating materials* *Measuring: use digital sound and light meter*	People use science in their daily lives. **1.5P Sleeping Cubby Project.** *Resources: furniture, boxes, materials. Digital light and sound meters.*
2	A push or a pull affects how an object moves or changes shape **2.1 Forces**	Number-add and subtract Measure mass Shape- draw 2d shapes, identify various 3d shapes Data- display tables and graphs using pictures	Pose questions, explore answers, Measure results. **2.2 Investigate Pushing and Pulling** **2.3 Investigating Friction** **2.4 Investigation: Building LEGO Walls** *Technology: Construction materials, machines.* *Measuring: Digital scales to measure mass of blocks* *Graphing: Shading column Graphs*	People use science in their daily lives, **2.5P Water Tower Project** *Resources: LEGO materials or paddle pop sticks and glue* **2.6C Making Strong LEGO Models** *Digital Scales*
3	Heat can be produced in many ways and can move from one object to another **3.1 Hot and Cold**	Number- multiply and divide Measure- order measurements Shapes- make 3d shapes Angles- compare angles Data- display and interpret simple graphs	Plan and conduct investigations to find answers to questions **3.2 Investigating heat of the sun** **3.3 Investigate materials for cups.** **3.4 Investigate Keeping it Cold .doc** *Technology: Construction and insulating materials.* *Measuring: digital thermometer/ temperature sensor* *Graphing: Draw a Simple Cooling Graph*	Science knowledge helps people to understand the effect of their actions **3.5P Design a "cool house"** *Resources: Cardboard box, various materials, paint.* *thermometer or Temperature Sensor*

4	Forces can be exerted by one object on another through direct contact or from a distance **4.1 Types of Forces** **4.4 Balance and Centre of Gravity**	Number- use decimals Measure:-use instruments Shapes- make models of 2d and 3d shapes Transformations- identify and draw symmetry Data-represent data a number of ways	Compare results with predictions. Reflect on fairness of the test. **4.2 Investigation: Speed of Rolling Cars** **4.3 Investigating Strength of magnets** **4.5 Investigation: Make a tightrope walker** *Technology: Machines, construction materials.* *Measuring: digital timer or motion sensor* *Data: Display results in Tables with many variables*	Science knowledge helps people to understand the effect of their actions **4.2C LEGO car construction** **4.6P Project: Make a balancing Toy** *Resources: Construction materials (LEGO or balsa)* *Motion Sensor or Timer*
5	Light from a source forms shadows and can be absorbed, reflected and refracted **5.1 What is Light?**	Number-estimation and rounding, adding decimals Measurement- using digital instruments and appropriate units Shape- drawing 2d representation of 3d objects Geometry- measure angles Data- collect and represent data	Design fair tests with guidance Construct graphs from data. **5.2 Investigating Light brightness** **5.2B Investigating Light Brightness Using Lego datalogging** **5.3 Investigating Light reflections** **5.4 Investigating Light refraction** *Technology: Light bulbs and circuits.* *Control: Robotics and Colour sensors* *Measure: digital light sensor or meter.* Data: Do a line Graph for Light Brightness	Scientific understandings, discoveries and inventions are used to solve problems that directly affect peoples' lives. **5.2C Make a single motor car** *Resources: LEGO machines kit or Robotics kit.* **5.5P Design a Kaleidoscope** *Resources: Mirrors (Acrylic or alfoil), tubing, beads* **5.6P Robotics: Design a Colour detecting Robot.** **5.7C Make a two motor car for Robotics Project.** *Resources: Mindstorms Robotics kit and software.*

6	Electrical circuits provide a means of transferring and transforming electricity. Energy from a variety of sources can be used to generate electricity *6.1 Lessons on electricity? 6.5 Lessons Generating Electricity. 6.11 Robotics Lessons*	Number- multiply and divide decimals Measurement – measure voltage, speed Data- Compare variables	Design fair tests with guidance Plan methods to solve problems *6.3 Investigating Electric Circuits 6.4 Investigation- Are you safe at home? 6.6 Investigation- Generating Electricity Technology: Electricity and components. Capacitors for energy storage. Control: Robotics and sensors Measure: multimeter, timer. Data: Compare variables: speed and voltage*	Scientific understandings, discoveries and inventions are used to solve problems that directly affect peoples' lives *6.2C Make a simple torch Resources: D cell battery, LED or light bulb, alfoil 6.7P Design an Electrical Device 6.8P Make an Energy Storage Car. 6.9P Design an energy saving house. 6.10P Build a Burglar Alarm LEGO System Resources:* Electric Circuit Kits, Model cars or House, capacitor or rechargeable battery. LEGO Mindstorms.
7	Change to an object's motion is caused by unbalanced forces acting on the object Earth's gravity pulls objects towards the centre of the Earth *7.1 Lessons Unbalanced forces 7.5 Lessons Force and Acceleration*	Number: use powers Algebra- substitute in algebraic expressions Relationships- analyse graphs Data – analyse primary data. Determine means, range	Plan own fair tests and Use scientific knowledge and findings from investigations to evaluate claims **7.2 Nuclear Reactor Game.** *7.3 Investigating Friction and load 7.4 Investigating weight versus mass 7.6 Investigating Elastic drag cars 7.7 Investigating Balloon rockets Technology: Machines, Energy sources, Construction materials. Control: Robotics and Sensors Measure: Digital scales/ force sensor, motion sensor/ timer. Data: Analyse relationships from Graph (Weight vs Mass). Find maxima and Minima (Friction Graph)*	Science and technology contribute to finding solutions to a range of contemporary issues; these solutions may impact on other areas of society and involve ethical considerations *7.8P Design a Rocket Vehicle. Resources: Bottles, balloons, pump, bottle launcher 7.9P Design a Smart Robot Resources: LEGO Mindstorms*

8	Energy appears in different forms including movement (kinetic energy), heat and potential energy, and causes change within systems Lessons: **8.1 Lesson 1 Energy** **8.3 Lesson 2 Simple machines** **8.5 Lesson 3 Gearing**	Number- irrational numbers, rates and ratios Algebra- use algebraic expressions Relationships- plot and analyse linear relationships, lines of best fit Data- sampling, variation from trends and outliers	Plan own fair tests and Reflect on the method used to investigate a question or solve a problem, including evaluating the quality of the data collected, and identify improvements to the method. **8.2 Investigate Pendulums** **8.4 Analysing a Machine.** **8.6 Investigating gear ratios** **8.7 Investigating speed and strength of battery powered cars.** *Technology: Energy sources, machines, transport* *Control: Mindstorms Data logging* *Measure: Digital sensors or meters.* *Data: Comparing variables effects on the Period of a Pendulum. Looking for trends.* *Relationships and Ratios: Looking for relationships between Gear Teeth and speed ratios*	Science understandings influence the development of practices in areas of human activity such as industry **8.8P Project: Design a motorized crane.** *Resources: LEGO machines or other materials for a motorised crane. Weights, digital scales.* **8.9R Robotics: Gearing Challenges** *Resources: ramp, cans, Sumo field, LEGO Mindstorms*
9	Energy can be transferred in a variety of ways through different mediums **9.1 Lesson 1 Heat Movement** **9.4 Lesson 2 Sound Waves.** **9.6 Lesson 3 Nature and Properties of Light**	Number- scientific notation, direct proportion Algebra- manipulate expressions Relationships- plot non linear relationships Geometry- similarity and scaling Trigonometry - triangles	Plan fair tests and Use knowledge of scientific concepts to draw conclusions that are consistent with evidence **9.2 Investigating Temperature** **9.3 Investigating Heat Movement in Matter** **9.5 Investigating Sound waves.** **9.7 Investigating Waves** **9.8 Investigating Refraction** *Technology: Energy generation, transport and devices.* *Control: Mindstorms data logging* *Measure: Digital sensors and meters* *Data: distance vs light intensity. Temp. vs Heat, angles of incidence and reflection* *Relationships: Inverse square law, specific heat, angles in reflection*	Advances in scientific understanding often rely on developments in technology and technological advances are often linked to scientific discoveries **9.9P Project** **Design a wave energy system** *Resources: fast Cooling system (Fans, water bags) musical Instrument (pipes or strings) Light show (LED torches, reflectors, prisms)* **9.10R Robotics Challenges- Proportional Control Robot** *Resources: Mindstorm's Kit, various sensors.*

| 10 | Energy conservation in a system can be explained by describing energy transfers and transformations. The motion of objects can be described and predicted using the laws of physics | Number- surds, fractional indices, using formulae Relationships- interpret non linear graphs and apply formula Geometry- circles, angles of elevation and depression Data- bivariate data plots, calculate mean and SD | Analyse patterns and relationships in data including describing relationships between variables and identifying inconsistencies.

• *Investigate scientific laws for force and motion using cars and sleds*
Force sensor, NXT LEGO | People can use scientific knowledge to evaluate whether they should accept claims, explanations or predictions.

• *Design a car that can tow more than its weight uphill.* |