NATURAL SCIENCES

GRADE 9 TERM 3

Tracker

Week 1											
CAPS Concepts and Activities	CAPS Page no.	Year:					Year:				
		Class					Class				
		Date Completed					Date Completed				
Week 1 Lesson A											

Topic: Forces
Content & Concepts: Types of forces
• A force is a push or pull (or twist) exerted upon an object
• Force is measured in units called newtons (N)
• Forces that two objects exert on each other always act in pairs
• A force can change the shape, direction and speed of an object
• All forces acting on objects can be placed into two broad groups:
  ○ contact forces
  ○ field forces
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Week 1 Lesson B											
Topic: Forces **Content & Concepts: Contact forces** • A contact force (including friction, tension, compression) results when two bodies are in contact (touch) with each other **Topic: Forces** **Content & Concepts: Field forces (non-contact forces)** • Field forces result from action-at-a-distance between two bodies • Common examples of field forces include gravitational, magnetic and electrostatic forces	71										

Week 1 Lesson C											
Topic: Forces **Content & Concepts: Field forces (non-contact forces)** • Gravitational force: gravity is the force of attraction (pull) that objects/bodies have on one another due to their masses. For example the attraction of Sun and planets, Earth and Moon, Earth and objects on the surface (people and things) o objects with greater mass have more gravitational pull on each other o force decreases as distance between the objects increases (refer to Grade 7 Planet Earth & Beyond) o force of gravity is measured in newtons (N) o the weight of an object is the gravitational force exerted on it by the Earth (or the Moon, or another planet). It is also measured in newtons (N) - the mass of the object stays the same no matter where it is determined - however, the weight of an object will change when weighed in different places with different gravitational force such as on Earth compared to the Moon	71										

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Week 2 Lesson A											

Topic: Forces
Content & Concepts: Field forces (non-contact forces)
• Magnetic force: magnets attract magnetic substances including iron, steel, cobalt, nickel
  ○ All magnets have two ends/poles (north & south)
  - opposite poles attract and like poles repel each other (magnetism is the push or pull force)
  - just like a bar magnet, the Earth has a magnetic field (north and south poles)
	72										

Week 2 Lesson B											

Topic: Forces
Content & Concepts: Field forces (non-contact forces)
• Electrostatic force: When certain materials are rubbed together, they can acquire an electrostatic charge as a result of the loss or gain of electrons [Note: only the electrons are transferred, protons cannot move]
  ○ during rubbing, the electrons move from one material causing a positive charge on its surface, and causing a negative charge on the surface of the other material
  ○ objects which have like charge (+ and + or - and -) repel (push) each other and those with unlike charge (+ and -) attract (pull) each other (refer to Gr 8 Energy & Change)
	72										

Week 2 Lesson C											

Topic: Forces
Content & Concepts: Field forces (non-contact forces)
• Charged objects in an electrostatic system possess potential energy. The energy comes from the work done during rubbing
• A thunder cloud becomes charged by the rubbing together of air and water particles moving past each other in the atmosphere
  ○ a lightning strike occurs when there is a massive discharge (release of charge) between the thunder cloud and the ground. Lightning is a giant spark of electricity
  ○ safety precautions should be considered during thunder and lightning storms
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Week 3 Lesson A											
Topic: Electric cells as energy systems **Content & Concepts: Electric cells** • A cell is a system in which certain chemical reactions can cause the flow of electricity through an external circuit • Cells are a source of electricity • A battery is a group of cells that are connected together	73										
Week 3 Lesson B											
Topic: Resistance **Content & Concepts: Uses of resistors** • Conductors (even good conductors) heat up when current passes through them: some energy is lost/wasted as heat. All conductors have some resistance • A resistor is a conducting material selected to control the current or to provide useful energy transfer, such as in bulbs, rheostats, motors, light sensitive diodes, light emitting diodes	73										
Week 3 Lesson C											
Topic: Resistance **Content & Concepts: Factors that affect resistance in a circuit** • Type of material: different conducting materials have different resistance to an electric current • Thickness of the conductor: thinner wires have more resistance than thicker wires • Length of the conductor: longer wires have more resistance than shorter wires • Temperature of the conductor: generally hotter conductors (metals) have higher resistance than colder conductors	73										

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Week 4 Lesson B											

Topic: Series and parallel circuits
Content & Concepts: Series circuits
• When cells are connected together in series, the total voltage is the sum of the voltages (potential differences) of individual cells
• Resistors can be connected in series in a circuit
• The total voltage across the battery is the same as the sum of the voltages across each of the resistors
  ○ a resistor with higher resistance will have higher voltage across it
  ○ a resistor with lower resistance will have a lower voltage across it
• The current is the same when measured at any point in a given series circuit
• The total current decreases with each resistor added in series to the circuit
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Week 4 Lesson C											

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Week 5 Lesson A											

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• The total voltage across the battery is the same as the sum of the voltages across each of the resistors
  ○ a resistor with higher resistance will have higher voltage across it
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• The current is the same when measured at any point in a given series circuit
• The total current decreases with each resistor added in series to the circuit
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Week 5 Lesson B											
Topic: Series and parallel circuits **Content & Concepts: Parallel circuits** • When cells (of same voltage) are connected in parallel, the voltage across them is the same as for one cell	74										
Week 5 Lesson C											
Topic: Series and parallel circuits **Content & Concepts: Parallel circuits** • Resistors can be connected in parallel in a circuit • The voltage is the same across each resistor connected in parallel • The total current through the battery is the same as the sum of the currents through the resistors • The total current in the circuit increases with each resistor added in parallel	74										

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Week 6 Lesson A											
Topic: Series and parallel circuits **Content & Concepts: Parallel circuits** • The lighting system in our homes is usually connected in parallel. If one light bulb fuses (filament breaks), the rest of the lights remain on because they are each connected in their own parallel pathway, to the mains circuit • Resistors are manufactured to have accurate resistances to control current • For two circuits with the same total voltage: o the current will be bigger in a circuit with low resistance o the current will be smaller in a circuit with high resistance	74										
Week 6 Lesson B											
Topic: Safety with electricity **Content & Concepts: Safety practices** • Parallel connections can cause overload on mains circuits • Circuit breakers, fuses and earth leakage systems are used as safety devices	75										
Week 6 Lesson C											
Topic: Safety with electricity **Content & Concepts: Safety practices** • Many appliances have a 3-pin plug as a safety device to connect to the main circuit • The 3-pin plug has a live wire, neutral wire and an earth wire: o the earth wire is connected to the metal case of the appliance, such as in a kettle. The earth wire is connected via the wall plug to an earth cable in the ground o the earth cable has almost zero resistance, so if the metal casing of an appliance becomes charged due to a fault, the charge is safely discharged to the ground • Illegal connections to the ESKOM mains supply can be dangerous, and are regarded as energy theft	75										

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Week 7 Lesson A											
Topic: Energy and the national electricity grid **Content & Concepts: Electricity generation** • A power station is a system for generating electricity • Most power stations in South Africa use coal as a fuel to boil water • The steam from the water turns a turbine which turns a generator, which produces electricity • There are other alternative sources of energy besides coal, that can be used to drive turbines and generators including wind, falling water (hydroelectric), sun-heated steam, nuclear fission, waves in the sea	75										
Week 7 Lesson B											
Topic: Energy and the national electricity grid **Content & Concepts: Nuclear power in South Africa** • A nuclear power station such as Koeberg in the Cape, uses radioactive fuel, the radioactivity produces heat by nuclear fission. The heat is then used to boil water to produce steam • The steam from the water turns a turbine which turns a generator, that produces electricity. The electricity is then channelled into the national electricity grid • Spent nuclear fuel (nuclear waste) is still radioactive and remains so for many hundreds of years, therefore it needs to be properly disposed of so it is not a danger to life for years to come	75										

Week 7 Lesson C											

Topic: Energy and the national electricity grid
Content & Concepts: National electricity grid
• The national grid is a network of interacting parts (a system): change in one part of the grid affects other parts of the grid
  ○ power stations feed electrical energy into the national grid at high voltages
  ○ power lines carry electricity at high voltages
  ○ transformers step down the voltage for local distributors and consumers: 15% of energy is wasted due to heating of transmission lines and transformers [No details are required of alternating current or step-down transformers]
• Power surges and grid overload can disrupt the power supply
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Week 8											
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Week 8 Lesson A											
Topic: Cost of electrical power **Content & Concepts: The cost of power consumption** • Electrical power is the rate of electrical energy supply	76										
Week 8 Lesson B											
Topic: Cost of electrical power **Content & Concepts: The cost of power consumption** • Electrical power is measured in units called watts (W) or kilowatts (kW) [one watt of power is equal to one joule of energy supplied in a second (I watt = 1 joule per second)] • Consumers pay for the quantity of power they use ○ quantity of electrical power used is measured in kWh (kilowatt hours)	76										
Week 8 Lesson C											
Topic: Cost of electrical power **Content & Concepts: The cost of power consumption** • The cost to the consumer is calculated in the following way: cost = power rating of the appliance × the number of hours it was used × the unit price of electricity	76										

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Week 9 Lesson A												
Topic: Cost of electrical power **Content & Concepts: The cost of power consumption** • The energy consumption of different appliances (such as incandescent and compact fluorescent lamps) varies	76											
Week 9 Lesson B												
Topic: Cost of electrical power **Content & Concepts: The cost of power consumption** • There are also alternative appliances/systems such as solar heating panels for heating water	76											
Week 9 Lesson C												
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Revision	71-76										

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