

2023

Annual Teaching Plans **TECHNOLOGY**

Senior Phase



Shuter & Shooter
PUBLISHERS (PTY) LTD



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Shuter & Shooter Publishers (Pty) Ltd
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<http://www.shuters.co.za>

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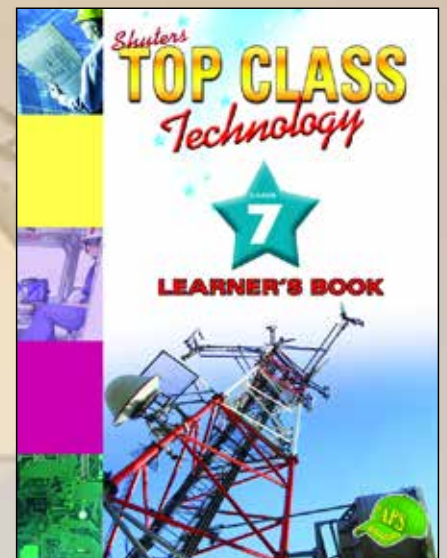
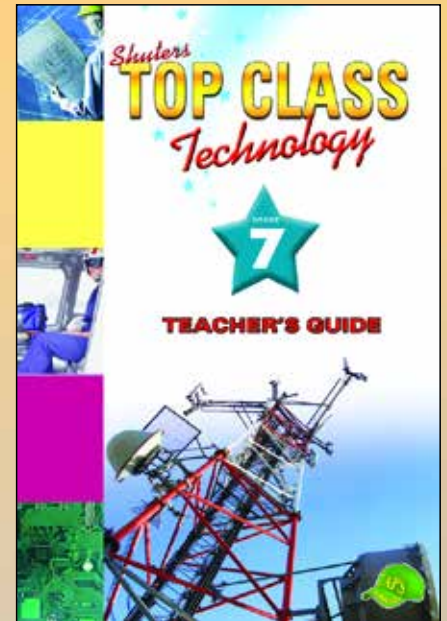
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Topic	Content	Time allocation	Where to find it in Top Class Technology Grade 7		
			Unit	LB	TG
Design Process Skills	Introduce the problem scenario for the Practical Assessment Task (PAT) through investigate, design, make, evaluate, and communicate (IDMEC) processes: Scenario: Impact of technology – emergency workers use “Jaws-of-Life” system to rescue trapped accident victims Learners must know and be able to apply the methodology and the purpose of the IDMEC Teachers provide two simple examples of everyday aspects to briefly explain concepts of the IDMEC	Week 1	Formal Assessment Tasks: Term 1	39–47	26–34
	Simple mechanisms Levers – mechanical advantage: simple quantitative treatment – no calculations using moments Examine the relationship between load, effort and their distances from the pivot - First-class levers: Characteristics (fulcrum/pivot placed between effort and load) - First-class levers may give a mechanical advantage or not – depending on pivot position Case study: first-class levers with mechanical advantage: $ma > 1$, $ma = 1$, $ma < 1$	Week 2			
Mechanical Systems and Control	(1 hour) Second-class levers: Characteristics (load is placed between effort and fulcrum), give real examples - Learners demonstrate models of second-class levers, which always give a mechanical advantage - Third-class levers: Characteristics (effort is placed between load and fulcrum): Give real examples - Learners to demonstrate models of third-class levers, which never give a mechanical advantage (1 Hour) Practical investigation: Levers and linkages - Examine simple linked first-class levers (e.g., pair of scissors, pair of pliers, hedge trimming shears) - Examine simple linked second-class levers (e.g., office punch, nut crackers) - Examine simple linked third-class levers (e.g., most office staplers, pair of tweezers) - Examine more complex linkages (e.g., linkages with more than one pivot)	Week 3	Unit 3: Simple mechanisms	26–33	14–20

Topic	Content	Time allocation	Where to find it in Top Class Technology Grade 7		
			Unit	LB	TG
Mechanical Systems and Control	Pneumatics and hydraulics - Using pneumatics and hydraulics to obtain a mechanical advantage - Practical investigations: - Force transfer between two equal syringes filled with 1) air and 2) water - Force transfer between two unequal syringes filled with 1) air and 2) water	Week 4	Unit 3: Simple mechanisms	26–33	14–20
	PAT 1: Formal Assessment (Investigate) Design: <i>Design brief, specifications, constraints, initial idea sketches, choosing the best design, selecting materials</i> Design considerations Fitness-for-purpose: Who is it for? What is it for? Will it do the job? Is it cost effective? Is it safe? Is it easy to use (ergonomics)? Does it look good (aesthetics)? Will it affect society? Will it affect the environment? [Explain the above by using examples for learners to understand the concepts better] Write a design brief, specifications and constraints	Week 5	Unit 1: Design process skills Unit 4: Investigation skills	1–12 34–38	1–7 21–25
Communication Skills	PAT 1: Formal Assessment (Investigate) Introduction to graphical communication - Purpose of graphics: Develop and communicate ideas Conventions: Outlines (<i>thin/dark</i>), construction lines (<i>thin/feint</i>), hidden detail (<i>dashed</i>) scale, dimensioning. Sketch: Free-hand sketching Working drawings: Two-dimensional drawing of ONE face of an object using conventions (dark lines, feint lines, dashed lines, dimensions, scale). 3D oblique – Front view with depth at 45° (use squared 'quadrant' paper), oblique projection used to assist with interpretation	Week 6	Unit 2: Communication skills	13–25	8–13
	Learners develop a working model of a hydraulic-syringe powered, linked-lever rescue device using simple materials Draw a 3D drawing of the idea in oblique projection using dark and feint lines Draw working drawing in 2D showing <u>one view with dimensions to scale</u> PAT 1: Formal Assessment (Design)	Week 7			

Topic	Content	Time allocation	Where to find it in Top Class Technology Grade 7		
			Unit	LB	TG
Making Skills	Learners make a simple working model (At a minimum, the "Jaws-of-Life" model may be a simple device representing how any one machine in the "Jaws-of-Life" system will work using plastic tubing, syringe(s) and cardboard) PAT 1: Formal Assessment (Make)	Weeks 8–9	Formal Assessment Tasks: Term 1	39–47	26–34
Consolidation	Revision and consolidation of work done in Term 1.	Week 10			

Topic	Content	Time allocation	Where to find it in Top Class Technology Grade 7		
			Unit	LB	TG
Structures	Definition and purpose of structures to contain, protect, support, span Classification of structures: natural and man-made Types of structures: shell, frame, solid – learners complete a worksheet	Week 1	Unit 5: Structures	48–55	35–39
Structures, Investigation, and Impact of Technology	Investigate: A cell phone tower frame structure Case study: Examine existing towers strengthened by triangulation, including pylons, windmills and mine headgear Case study: Study photographs of existing cell phone towers noting structural elements, reinforcing techniques and design issues such as visual pollution, stability, base size and centre of gravity Class discussion: How designers consider the needs of society in terms of technology while considering the impact on society and on the environment	Week 2	Unit 5: Investigate a cell phone tower – a frame structure	56–59	35–39
	Case study 1: Existing designs: Examine the <i>features</i> of a school desk, write the <i>design brief</i> with <i>specifications</i> for a school desk Case study 2: Existing designs: Examine an existing product (FM radio/cell phone), list its features and then write a design brief with specifications for that product Evaluate: Worksheet on the advantages and disadvantages of telephone systems: Landline vs. mobile: Learners complete a table	Week 3			
Structures	Scenario: Cell phone towers are everywhere and are built using materials to ensure stability, strength, and rigidity (stiffness) Action research: To stiffen materials/structures - Practical activity 1: Stiffen a structural material by tubing - Practical activity 2: Stiffen a structural material by folding - Practical activity 3: Stiffen a frame structure by triangulation	Week 4	Unit 7: Action research: stiffen materials and structures	60–65	44–46

Topic	Content	Time allocation	Where to find it in Top Class Technology Grade 7		
			Unit	LB	TG
Structures, Design Skills and Impact of Technology	Write the design brief: Individual learners write the design brief with specifications for a new cell phone tower Note 1: At a minimum, the cell phone tower can consist of struts made of found materials like “elephant grass” or rolled paper dowels. It should show reinforcing using triangular webs, gussets and internal cross-bracing Note 2: One of the design ideas must involve disguising the tower so that it blends in with the environment, avoiding visual pollution Sketch initial ideas: Individual learners draw free- hand sketches to show two different design ideas in 3D for a cell phone tower to be erected near the school Draw the two ideas using oblique projection	Week 5	Unit 8: Investigating design issues	66–75	47–51
Design Skills Evaluation Skills Making Skills	Learners form groups to examine and discuss the various design ideas of the individuals in the group They evaluate the sketches of each individual to determine advantages and disadvantages of each design Individual learners now adapt their own design ideas in terms of the group evaluation, making any necessary improvements	Week 6		76–83	47–51
Making Skills	Making: Includes working drawings, choosing materials and tools Each learner lists the resources to be used Each learner draws a working drawing for the cell phone tower showing one face in 2D (working drawing) from these inputs assessed informally	Week 7	Formal Assessment Tasks: Term 2	76–83	52–60
Revision and Consolidation	Revise and consolidate term 1 and 2 content in preparation for formal test.	Weeks 8–9			
	Administration of test (mid-year exam)	Week 10			

Topic	Content	Time allocation	Where to find it in Top Class Technology Grade 7		
			Unit	LB	TG
Investigation Skills	Scenario: A scrap-metal dealer sorts magnetic and non-magnetic metals into separate piles for recycling. The simplest way to do this is to use a crane with a magnet. BUT it is difficult to remove the metals that do stick to permanent magnets. Case study: Examine pictures of cranes in order to get ideas to be used in the learner's own designs. PAT 2: Formal Assessment (Investigate) Investigate: What is magnetism? - Practical investigation: Different types of permanent magnets – bar and horseshoe - Practical investigation on magnetic and non-magnetic metals Case study: Recycling scrap metals. Honest gleaners who collect scrap metal and deliver it to scrap metal dealers perform a valuable service to society. This good work is tainted by the criminal acts of thieves who steal copper telephone wire and steel manhole covers.	Week 1	Formal Assessment Tasks 3: Term 3	108–116	77–84
		Week 2	Unit 9: Magnetism	84–87	61–63
			Unit 10: Testing materials and recycling	88–91	64–65
Electrical Systems and Control	Simple electric circuits Demonstrate a simple electric circuit with an energy source (cell), switch, conductor and a light bulb or buzzer. Sketch the circuit showing how to use component symbols. Practical: Learners work in groups to make a simple circuit as demonstrated. Circuit diagram: Each learner draws the circuit using correct symbols for components.	Week 3	Unit 11: Simple electric circuits	92–99	66–71
	Practical demonstration: A simple electromagnet. Make a simple electromagnet made by winding insulated copper wire around an iron nail. When an electric current flows in the wire coil (solenoid) a magnetic field is created, and this is amplified by the iron core. Switching the current off causes the magnetic field to fade away. (Note: Electromagnetism is a key to a wide range of technologies making up our modern world). Write a design brief with specifications and constraints for a crane with electromagnet. Sketch two possible designs for a suitable crane. Draw a circuit diagram for the electromagnet (with a light to show when it is on). PAT 2: Formal Assessment (Design)	Week 4			

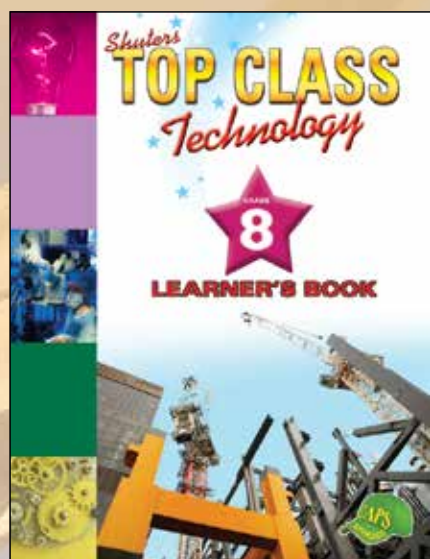
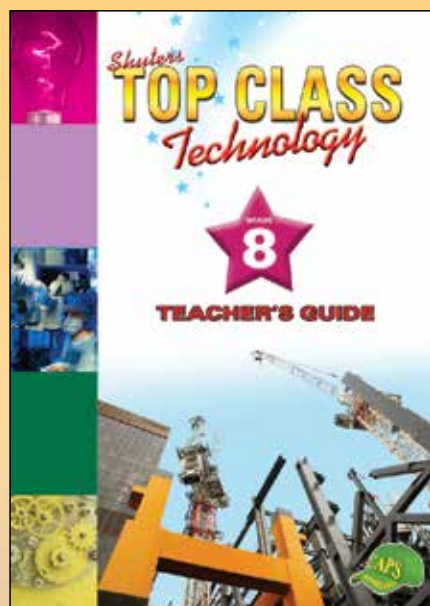
Topic	Content	Time allocation	Where to find it in Top Class Technology Grade 7		
			Unit	LB	TG
Mechanical Systems and Control	Introductory lesson: All complex machinery consists of combinations of simple mechanisms. Machines can be designed to give the user a “mechanical advantage” Introduce learners to cranks and pulleys • The crank – an adaptation of a second-class lever • The pulley – a type of wheel and axle Revision • What is mechanical advantage? • Strengthening frame structures	Week 5	Unit 12: Mechanical systems and control	100–107	72–76
Design Skills Communication Skills Making Skills	Revision: Revise the 3D oblique drawing technique, line types, scale, dimensions Drawing: Each learner uses the Oblique technique to draw an idea for the crane chosen from the two ideas sketched the previous week. The idea should be drawn on squared paper (quadrant) using pencil and ruler Flow chart: Each learner works out a flow chart detailing the sequence of manufacture of the crane with its electromagnet PAT 2: Formal Assessment (Design)	Week 6			
Structures and Electricity Cranks and Pulleys	A working model At a minimum the crane should be made of simple materials like elephant grass, rolled paper dowels or bought materials. It should show the learner’s understanding of reinforcing techniques. The mechanisms must function, and the crane should be able either to pivot or to raise and lower its arm. The electromagnet should have a switch, a light to show when it is ‘on’, and should be strong enough to pick up several steel paper clips, coins or nails Electromagnet: Using an electrochemical cell, a switch, a light bulb, a “soft” iron core and a long length of insulated copper wire, the teams of learners make an electromagnet Crane: Learners work safely in teams using simple materials to make a model crane with a crank and pulley system which will carry the electromagnet that will sort the ferrous metals (iron and steel) from the non-ferrous metals (copper, aluminium, lead, brass, etc.) PAT 2: Formal Assessment (Make)	Weeks 7–8		108–116	72–76

Topic	Content	Time allocation	Where to find it in <i>Top Class Technology Grade 7</i>		
			Unit	LB	TG
Structures and Electricity Cranks and Pulleys	The learner's ability to evaluate a product or a process is developed further - Each learner develops a rubric to evaluate the models of other teams - Each team uses the rubric to evaluate the models of other teams. Assess each learner's objectivity, fairness and the validity of their comments - Teams plan a joint strategy to present their model and plans to the class. All team members must explain their ideas and roles they played when they present - Each team presents the design sketches, working drawings and functioning model to the class. They demonstrate how strong their electromagnet is and show that it releases the load when switched off. Each learner explains the role s/he played and shares the role of spokesperson. They explain the principles involved with the magnetic sorting and how their electromagnet could be made stronger. They comment on the value of recycling and explain how sorting the metals into types, improves their scrap value. They enhance their presentation using posters giving an artist's impression of their completed crane and electromagnet in use	Weeks 9–10	Unit 12: Mechanical systems and control	108–116	72–76

Topic	Content	Time allocation	Where to find it in Top Class Technology Grade 7		
			Unit	LB	TG
Investigation Skills	Learners investigate emergency situations that can lead to refugees: - Find out what situations commonly result in people becoming refugees - Find out what initial problems are typically faced by refugees - What mix of people will usually be present? - What are their needs for shelter? - What are their needs for food and water?	Week 1	Unit 13: Investigating emergency situations	117–123	85–89
	Processing food: Emergency food Investigate the types of food that can be supplied to occupants of a refugee camp Design brief Learners write a design brief giving specifications of the types and quantities of food needed for a population of 100 refugees Design: List the ingredients of a meal that will be nutritious as well as tasty, and which can be prepared under conditions likely to be found in a refugee camp	Week 2			
Making and Evaluating Skills	Write down the sequence of manufacture for the process of preparing one item from the meal described above Learners prepare the item selected above. Learners evaluate the item in terms of flavour, texture, and nutritional value	Week 3	Unit 14: Processing food: Emergency food	124–128 129–135	90–95 95–98
Investigation Skills	Learners investigate clothing worn by people in specialised occupations like the emergency services, e.g., fire department, NSRI or dangerous professions Learners must investigate the following: - Find out what textiles are used to make the clothing worn by fire fighters or - Find out what textiles are used to make the clothing worn by members of the NSRI	Week 4	Unit 15: Clothing in specialised occupations	136–147	99–111
Impact of Technology, Indigenous Technology, and Investigation Skills	Scenario: Tragic shack fires or natural disasters like floods or earthquakes or political strife may create the need for emergency shelters to be erected for the victims Learners design and make a simple emergency shelter for disaster victims. The shelter must be sturdy, waterproof, easy to erect and able to house a family of six for a month Learners must be aware of the importance of health and safety issues	Week 5			

Topic	Content	Time allocation	Where to find it in Top Class Technology Grade 7		
			Unit	LB	TG
Investigation and Design Skills	Investigate Learners investigate materials and building techniques used by indigenous people for constructing housing in rural South Africa. Materials used in such construction are typically readily available, appropriate and environmentally friendly Investigate Learners find out what chemicals can waterproof a textile like canvas Investigate Learners find out about the burning characteristics of various textiles	Week 6	Unit 15: Clothing in specialised occupations	136–147	99–111
	Design brief: Learners write an appropriate design brief with specifications for producing a textile suitable for use in making an emergency shelter Design: Learners sketch design ideas for an emergency shelter that can be transported to and erected at a site where people have become homeless	Week 7			
	Revise Term 3 and Term 4 work	Week 8			
Revision	Administration of end-of-year examination	Week 9			

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Topic	Content	Time allocation	Where to find it in Top Class Technology Grade 8		
			Unit	LB	TG
Revision	- Revision of Grade 7 content:///baseline assessment Revision: Mechanical advantage: Well-designed machines give “mechanical advantage” All complex machinery consists of combinations of simple mechanisms The wedge: E.g. inclined plane or ramp, door wedge, knife blade, etc. The wheel and axle: E.g. from bicycle to shopping trolley Gears: (Wheels with wedges for teeth) Show how meshing of two spur gears causes counter-rotation Show how introducing an idler gear between two spur gears synchronises rotation of the driver and driven gears	Week 1			
Mechanical Systems and Control	Gear ratios Show how different sized gears result in a change in the velocity ratio as well as an “opposite” change in the force ratio – <i>if force increases, speed decreases, and vice versa</i>	Week 2	Unit 4: Mechanical systems and control	44–52	22–28
Investigation Skills	Mechanisms that change the direction of movement: The cam: Show how a cam converts rotary motion into reciprocating motion. Compare an eccentric wheel and a snail cam The Crank: An adaptation of a second-class lever. Show how a crank converts rotary motion into reciprocating motion Graphic skills: Learners draw an artist’s impression of one of each of the above mechanisms (cam and crank) in their books using colour, shading and texture	Week 3			
Structures	Introduce the problem scenario for the Practical Assessment Task (PAT) through Investigate, Design, Make, Evaluate, and Communicate (IDMEC) (Learners work in groups to design a structure utilising required structural components and mechanisms to suit the context provided) Case Study: Electrical pylons – use pictures of a range of pylon designs noting: - The variety of designs that solve the same problem effectively - The use of internal cross-bracing and triangulation to provide stiffness Evaluate: Learners examine information on several complex structures and list advantages and disadvantages in the designs PAT 1: Formal Assessment (Investigate)	Week 4	Unit 1: Frame structures	1–13	1–7

Topic	Content	Time allocation	Where to find it in Top Class Technology Grade 8		
			Unit	LB	TG
Structures	Structural members under tension/compression (worksheets) Definition of frame structures - Purpose of structural members (components) in wood and steel roof trusses (king and queen post, strut, tie, rafter, tie beam) - Learners identify structural members and type of force (shear, torsion, tension, compression) acting on them in given frame structures Structural members Structures that span over space: - Beams: Steel I-beams (girders), concrete lintels, beam and column bridge - Alternative bridge supports: Suspension bridges, cable-stayed bridges - Arches: Arches in buildings, bridges, dam walls - Cantilevers: Simple cantilever, cable stayed cantilever Structural failure – the three most likely ways structures fail are: - Fracture of a member – due to lack of strength - Bending (flexing, buckling) – due to lack of stiffness (rigidity) - Toppling over – due to lack of stability (top heavy, narrow base)	Week 5	Unit 1: Frame structures	1–13	1–7
			Unit 2: Structural members	14–27	8–16
	Design brief - Design: Initial idea sketches - Design: Design brief with specifications and constraints Purpose of graphics: Develop and communicate ideas Conventions: Outlines thick/dark,, construction lines (thin/feint),, hidden detail (dashed),, centre lines (chain dash-dot),, scaling up and scaling down,, dimensioning (in mm) Working drawing techniques or planning: Single view flat 2D drawing with dimensions, line types and scale Working drawing in 2D showing one view with dimensions and line types PAT 1: Formal Assessment (Design)	Week 6	Unit 3: Communication Skills	28–43	17–21

Topic	Content	Time allocation	Where to find it in Top Class Technology Grade 8		
			Unit	LB	TG
Structures	Teams build their structure housing mechanisms using safe working practices	Week 7	Formal Assessment Tasks: Term 1	53–61	29–37
	PAT 1: Formal Assessment (Make)				
	Learners work in groups to: Evaluate: Learners examine information on several complex structures and list advantages and disadvantages in the designs	Week 8			
	Communicate: Teams present their plans and model	Week 9			
Consolidation	Draw a 3D isometric projection of the idea with dimensions and drawn to scale Isometric – using underlying isometric grid in (term 1) and simple instruments in (term 3)	Week 10			

Topic	Content	Time allocation	Where to find it in Top Class Technology Grade 8		
			Unit	LB	TG
Revision	The positive impact of technology: Many natural materials have been replaced in modern times by new or improved materials Some new materials are environmentally friendly by being bio-degradable	Week 1	Unit 5: The impact of technology	62–68	38–41
Processing Investigation Skills	Case study 1: Investigate the impact of plastic shopping bags on the environment Report: Learners write a report evaluating the effectiveness of using thicker, bio-degradable plastic shopping bags which shoppers must buy Case study 2: Technology with a positive impact on society Investigate how waste paper and cardboard are recycled to produce new products for the packaging industry	Week 2	Unit 6: Technology with a positive impact on society	69–75	42–46
Design Skills	Development: Draw a development of an opened container Practical activity: A product requires packaging. Design various packaging for different purposes. The nature of the product determines the design and properties of the packaging material - Learners work safely to make and assemble the above packaging product	Week 3			
Investigation Skills	Case study 3: Technological products can have a <u>negative</u> impact Investigate a technological product that can have a negative impact on society Class discussion: Teacher facilitate a class discussion on possible solutions that can counteract or compensate for the negative impact of the technology identified	Week 4	Unit 7: The negative impact of technological products	76–80	47–49
Forces acting on materials	Revise: Forces that act on material – tension, compression, bending, torsion, shear - Adapting materials to withstand forces reinforcing concrete, plywood - Selecting metal sections (I-beam, angle iron, T- bar, etc.) to withstand forces and to save material	Week 5	Unit 8: Structures	81–86	50–52

Topic	Content	Time allocation	Where to find it in Top Class Technology Grade 8		
			Unit	LB	TG
Design Skills	Design: Learners adapt a material or design a product that will solve the problem or reduce the impact or negative effects of the technology identified Design: Learners sketch free-hand sketches showing two possible solutions Make (drawing): Learners draw their chosen solution in 3D using isometric projection	Week 6	Formal Assessment Tasks: Term 2	87–94	53–59
Structures/ Processing	Make: Learners make the model/prototype/product they have designed safely	Week 7			
Structures Processing Evaluating	Make (cont.): Learners make the model/prototype/product they have designed safely Evaluate: Learners evaluate their solution in terms of its effectiveness in solving or reducing the negative impact of the technology identified. Their evaluation will be assessed in terms of its objectivity, fairness, accuracy, and scope (depth)	Week 8			
Communication Skills	Communicate: Learners present their plans, model, and evaluation	Week 9			
Consolidation	Revise challenging topics and or concepts of the term: - Practise more examples on developments - Types of forces - The negative impact that material have on the environment	Weeks 10–11			

Topic	Content	Time allocation	Where to find it in Top Class Technology Grade 8		
			Unit	LB	TG
PAT Scenario	PAT Scenario South Africa is a country rich in mineral resources. Mining occurs to some extent in every province of our country. We have huge reserves of coal, copper and iron ore. We are the main suppliers of platinum, manganese and chromium in the world A commercially viable ore body containing platinum group metals has been found on land belonging to a tribe in rural South Africa. Drill samples have proved that the reef lies at a relatively shallow depth only 500m below surface. Your mechanical engineering company has decided to submit a tender for the construction of a shaft head-gear suitable to transport miners to and from the work level, and for raising ore and waste in loads. Investigate gear systems Mechanical advantage • Gear systems – concepts (counter rotation, idler, velocity ratio, force multiplication) • Two spur gears of unequal size – note counter rotation and velocity ratio • Two spur gears of unequal size – note velocity ratio and force ratio (mechanical advantage $< \text{ or } > 1$) • Two spur gears connected via an idler – note synchronised rotational direction Suitable materials – the idler needs to be of a harder material than the other gears Two bevel gears linked to transfer the axis of rotation through 90°	Week 1	Formal Assessment Tasks: Term 3	136–150	81–86
Mechanical Advantage Design Process: Investigation Skills Calculation	Calculate mechanical advantage (MA) Levers Mechanical advantage calculations for levers using ratios • Calculations using LOAD/EFFORT, load ARM/effort ARM, etc. • Do NOT use the method of “taking moments about a point” Gears • Mechanical advantage calculations for gears using ratios • Calculations using tooth ratios, gear wheel diameters, velocity ratios	Week 2	Unit 10: Mechanical advantage calculations	107–114	65–69

Topic	Content	Time allocation	Where to find it in Top Class Technology Grade 8		
			Unit	LB	TG
Mechanical Systems and Control Graphic Communication	Represent gear systems graphically Use circular templates and/or pair of compasses to draw gear systems with: - The driven gear rotating in the opposite direction to the driver (counter rotation) - The driven gear rotating in the same direction to the driver (include an idler gear) - The driven gear rotating faster than the driver (with and without an idler) - The driven gear rotating slower than the driver (with and without an idler) SYSTEMS DIAGRAMS - Analyse a mechanical system by breaking it into input-process-output - Draw a systems diagram for a gear system with a mechanical advantage of 4:1 - Systems diagram for a gear train with the driven gear rotating faster than the driver	Week 3	Unit 11: Communication skills – gear systems	115–128	70–76
Structure with a mechanism	Investigate Lifting mechanisms (wire rope-driven mine head-gear) in use at South African mines for raising people and ore DESIGN Design Brief Specifications and constraints Sketch Initial idea sketches of the mine-shaft headgear to meet the requirements given in the scenario	Week 4			
Impact of Bias of Technology Indigenous Technology Investigation Skills	PAT 2: Formal Assessment (Investigate and Design) Investigate impact, bias and indigenous knowledge systems (IKS) in technology INVESTIGATE and report on one of the following: INVESTIGATE: Bias in technology: Gender bias in career choice/opportunities related to mining <i>Distribute the investigations so all topics are covered and reported</i> INVESTIGATE: The impact on the environment as a result of mining of: Acid mine drainage	Week 5	Unit 12: Impact of technology and bias in technology	129–135	77–80

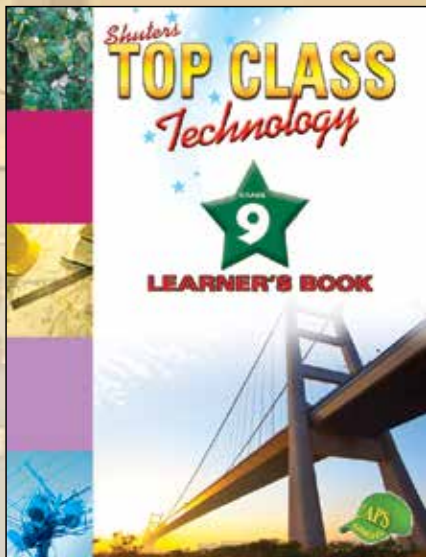
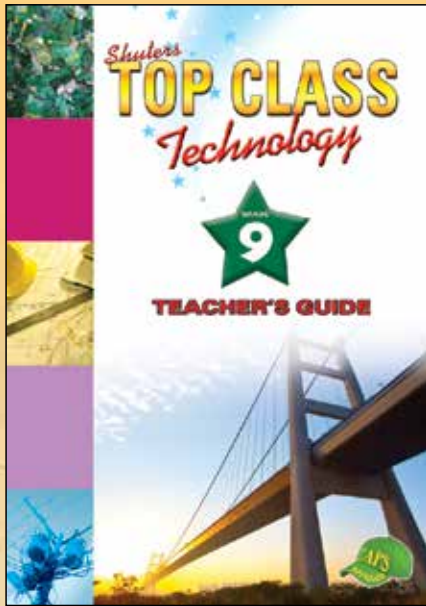
Topic	Content	Time allocation	Where to find it in Top Class Technology Grade 8		
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Impact of Bias of Technology Indigenous Technology Investigation Skills	OR INVESTIGATE: The impact on the environment as a result of mining of: Dust pollution from mine dumps on residential areas OR INVESTIGATE: Iron age technology: Indigenous mining of iron in South Africa before the modern era OR INVESTIGATE: Gender bias in career choice/opportunities related to mining	Week 5	Unit 12: Impact of technology and bias in technology	129–135	77–80
	2D working drawing showing one or more views with dimensions and lines Simulation: Teams form mechanical engineering companies They evaluate sketches of individuals and select the best idea for the team tender bid PAT 2: Formal Assessment (Design)	Week 6	Unit 9: Levers and gear systems	95–106	60–64
Structure with a mechanism	Budget Individual learners prepare a realistic budget detailed expected costs of constructing a real mine shaft headgear, detailing valid prices of materials and labour costs of the range of workers who would be involved in designing and building such a device Make - List tools and material - List logical steps to construct the project - Groups build their working scale model using safe working practices PAT 2: Formal Assessment (Make)	Week 7	Formal Assessment Tasks: Term 3	136–150	81–86

Topic	Content	Time allocation	Where to find it in <i>Top Class Technology Grade 8</i>		
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Structure with a mechanism	Make (continued): - List tools and material - List logical steps to construct the project - Groups build their working scale model using safe working practices	Week 8	Formal Assessment Tasks: Term 3	136–150	81–86
	PAT 2: Formal Assessment (Make)				
	Communicate Teams present their tender proposal for the mine shaft headgear (research, plans, flow chart, model and budget) to the "tender board"	Week 9			
Revision and Consolidation	Revision and Consolidation	Week 10			

Topic	Content	Time allocation	Where to find it in Top Class Technology Grade 8		
			Unit	LB	TG
Electrical Systems and Control	REVISE: Simple circuit components, input devices (electrochemical cell, generator, solar panel), output devices (resistor, lamp, heater, buzzer, motor), control device (switches) Note: Some devices can serve as input, output, process or control device CORRECT CONNECTIONS, short circuits, electrical components and their accepted symbols DRAWING ELECTRICAL CIRCUITS using accepted symbols (as in Grade 12 see Addendum C) Set up circuits using a range of components, Learners draw the circuits using symbols	Week 1	Unit 13: Electrical systems and control	151–160	87–91
	Design Skills	Energy for heating, lighting and cooking in rural and informal settlements Energy from illegal connections, ethical issues, safety considerations CLASS DISCUSSION: equitable sharing of resources – industry needs reliable power for job creation, schools need power for lighting and computing WRITTEN REPORT: Learners write a balanced report on these issues	Unit 14: Energy for heating, lighting and cooking	161–165	92–93
Impact of / Biases in Technology	ELECTROCHEMICAL CELLS	Week 3	Unit 15: Electrochemical cells	166–170	94–96
	Evaluation Skills	Advantages and disadvantages of series and parallel batteries Photovoltaic cells - advantages and disadvantages of solar cells GENERATE ELECTRICITY FOR THE NATION – ADVANTAGES AND DISADVANTAGES of: - Thermal power stations (steam turbines – sources of heat: coal, gas, nuclear, sun) - Hydroelectric power stations (including pumped storage schemes) - Wind-driven turbines - ALTERNATING CURRENT, step-up and step- down transformers, distributing electric power across the country: The national grid	Unit 16: Generation of electricity	171–193	97–100

Topic	Content	Time allocation	Where to find it in Top Class Technology Grade 8		
			Unit	LB	TG
Design and Investigation Skills	Investigation: Introduce Ohm's law (qualitatively – no calculations) Learners will use one cell, then two cells, and then three cells connected in series and note the effect of the lamp. They must conclude that more cells in series (more voltage) will cause the current strength to increase, if the resistance does not change Practical: Learners DRAW CIRCUIT DIAGRAMS & CONNECT CIRCUITS showing the effect of circuits with resistors connected in series and parallel	Week 5	Formal Assessment Tasks: Term 4	180–193	101–110
Investigation Skills	Investigation: AND logic gate and simple cases where it is used Investigation: OR logic gate and simple cases where it is used Lesson: Truth tables for AND & OR logic conditions	Week 6			
Electrical Systems and Control Design Skills	Design brief: Learners write a design brief giving specifications for a suitable panic button system OR scenario given by the textbook Circuit diagram: Draw the circuit diagram using correct symbol conventions Communicate: Learners draw the truth table for the device Communicate: Learners prepare an advertising poster for their device	Week 7			
Revision and Consolidation	Consolidation / Revision / Wrap up	Weeks 8–10			

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Topic	Content	Time allocation	Where to find it in Top Class Technology Grade 9		
			Unit	LB	TG
Baseline Assessment	Baseline assessment	Week 1	Use Top Class Technology Grade 7 and Grade 8		
Design skills	Flight of stairs and wheelchair ramp: Design brief specifying number of steps, height of stair risers, width and gradient of ramp, handrail, etc. Line types: Dark, feint, dashed, wavy, chain. Scale and dimensions First angle orthographic projection: Three- dimensional objects on flat paper - Concept of drawing three different views: Front, top and side. Simple cubes	Week 2	Unit 1: First angle orthographic projection	1–10	1–7
	Draw a plan for the stair and ramp using first angle orthographic projection to an appropriate scale, using correct views, line types and dimensions according to convention More complex 3D objects drawn in orthographic projection with instruments	Week 3	Unit 2: Design skills	11–16	8–11
Investigation Skills	Introduce the problem scenario for the Practical Assessment Task (PAT) through Investigate, Design, Evaluate, Communicate and Make (IDMEC) Investigate: Provide the scenario so that learners can investigate the problem situation and various possible structures which could solve the problem(s) they identify. Analysis of existing products relevant to the identified problem in terms of fitness-for-purpose (including suitability of materials), safety for users, costs of materials and costs of construction. Realistic costs of real materials, labour, transport, etc. PAT 1: Formal Assessment (Investigate)	Week 4	Formal Assessment Tasks	28–36	17–27
Design and Evaluate Skills	Design brief: Learners write a design brief with specifications for the final idea Sketch initial ideas: Each learner generates two possible ideas Evaluate and adapt: Groups evaluate individual ideas and develop the idea further Groups, with guidance from the teacher, collaborate to produce an evaluation instrument Groups use the instrument to evaluate their solution and others PAT 1: Formal Assessment (Design)	Week 5	Unit 2: Design Skills	11–16	8–11

Topic	Content	Time allocation	Where to find it in Top Class Technology Grade 9		
			Unit	LB	TG
Making Skills Structures	Working drawings: Each learner draws the plan (or an aspect of the plan) using first angle orthographic projection with suitable scale, correct line types and dimensions Flow chart: Teams discuss how to proceed, then each learner draws a flow chart Forces can be static or dynamic, and loads can be even or uneven Strength of materials under the action of forces – metal cross-sections Tension (pulling),, compression (pushing),, bending of beams (compression and tension) Torsion – using internal cross-bracing to resist twisting PAT 1: Formal Assessment (Design & Make)	Week 6	Unit 3: Structures	17–27	12–16
Making Skills Structures	Properties of various construction materials Mass/density, hardness, stiffness, flexibility, corrosion resistance and prevention of corrosion Make the model of a viable solution It must be built neatly to scale, showing intelligent use of materials (group work) Learners must use safe working practices PAT 1: Formal Assessment (Make)	Week 7	Formal Assessment Tasks: Term 1	28–36	17–27
Making Skills	Completion of the model of a viable solution: It must be built neatly to scale, showing intelligent use of materials (group work) Learners must use safe working practices PAT 1: Formal Assessment (Make)	Week 8			
Budgeting	Budgeting Practical exercise on budgeting Costing of the “real-life” solution, including correct materials and labour costs (ramp and staircase)	Week 9			
Communication Skills	Team presentations Teams present their tender bid to the “tender board” Each team member must be responsible for an aspect of the presentation Tenders consist of sketches, plans, budget and model	Week 10			

Topic	Content	Time allocation	Where to find it in Top Class Technology Grade 9		
			Unit	LB	TG
Mechanical Systems and Control Investigation Skills	Revise: Syringe mechanics using two equal sized syringes linked by a tube Force transfer between the syringes filled with: - Compressed air – pneumatic system - Water – hydraulic system Action research: Learners experiment/teacher demonstrates with two different sizes of syringes linked by a tub and filled with hydraulic fluid (water), learners experience force transfer with either force multiplication or force division Gases (like air) are compressible, liquids (like water, oils) are incompressible	Week 1	Unit 4: Pneumatic systems and hydraulic systems	37–43	28–31
	Pascal's principle – pressure exerted on one part of a hydraulic system will be transferred equally, without any loss, in all directions to other parts of the system Note that equal volumes of liquid are moved through the systems, and this results in different extensions (amount of movement) where syringes (cylinders) are of different sizes, so less distance/more force ($MA > 1$), and more distance /less force ($MA < 1$), (why is this part left out?)	Week 2			
	The hydraulic press (including simple calculations) The hydraulic jack Investigation: Design considerations fit-for- purpose: Evaluate the design of the hydraulic jack in terms of: Who is it for? What is it for? Will it do the job? What should it be made of? What should it cost? Is it cost- effective? Does it look good (aesthetics)? Is it safe/easy to use for the end user (ergonomics)?	Week 3	Unit 5: The hydraulic press and hydraulic jack	44–50	32–35
	Draw a systems diagram that describes how a hydraulic jack function Action research: Practical investigations: Use a single wheel fixed pulley to change the direction of pull ($MA = 1$) Use a single wheel moveable pulley to change the direction of pull ($MA > 0$) Use a pulley block system (block and tackle) to determine the relationship between loadbearing ropes on moveable pulley wheels and M.A (force multiplication)	Week 4			

Topic	Content	Time allocation	Where to find it in Top Class Technology Grade 9		
			Unit	LB	TG
Mechanical Systems and Control Investigation Skills	Investigate: Learners find out about the following mechanical control systems: • Ratchet and pawl • Disc brake • Bicycle brake • Cleat	Week 5	Unit 5: The hydraulic press and hydraulic jack	44–50	32–35
Mechanical Systems and Control Investigation Skills	Lead learners as they revise the interactions of the following: • Spur gears of equal size counter-rotating • Spur gears of unequal size counter-rotating • – note velocity/force relationships • Spur gears using an idler to synchronise rotation Lead learners as they find out about the interactions of the following: • Bevel gears of equal size – axis of rotation 90o • Bevel gears of unequal size – axis of rotation 90o – note velocity/force relationships • Rack-and-pinion gear system as found on automatic gates and steering racks • Worm gear system for large reduction in speed and increase in force	Week 6	Unit 6: Mechanical control systems	51–62	36–39
			Unit 7: Gears	63–70	40–42
Investigation and Design Skills	Investigate the situation so that an appropriate machine can be designed to solve the problem, need or want given in the scenario. Investigate the possible mechanisms and controls to be used together to make the machine The design brief: Each learner writes his/her suggestion for the design giving specifications and constraints Sketches: Each learner produces two sketches of viable possible designs. And then decide on a final solution	Week 7	Formal Assessment Tasks: Term 2	81–89	46–54
Making Skills	Plan: Working drawings • Learners produce drawings for their model/prototype using first angle orthographic projection • Each learner draws a plan of the design OR, if it is very complex, one or more aspects of the design Each learner must demonstrate her/his competency in using this drawing technique	Week 8	Unit 8: Evaluation skills and communication skills	71–80	43–45
Consolidation and revision	Compressed air – pneumatic system Hydraulic system Pascal's principle The hydraulic press (including simple calculations)	Week 9			

Topic	Content	Time allocation	Where to find it in Top Class Technology Grade 9		
			Unit	LB	TG
Electrical Systems and Control Investigation Skills	Investigate the situation and the nature of the need so that an appropriate circuit can be chosen to solve the problem, need or want given in the scenario A given circuit must be incorporated into the design of a device that will use the electronics to address the problem, need or want Revise 1 – component symbols - Cells in series and parallel - Lamps in series and parallel - Switches in series (AND logic) and parallel (OR logic) - Current in the circuit – conventional current flows from positive to negative PAT 2: Formal Assessment (Investigate)	Week 1	Unit 9: Electrical systems and control	90–96	55–58
	Revise 2 – simple circuits - One cell, switch, two lamps in series - Two cells in series, switch, two lamps in series Diodes and LED (Light Emitting Diode): A diode is a component that allows current to flow in one direction only. A LED allows current to flow in one direction only and also gives off light and is often used as an indicator that a circuit is 'ON'. Resistor colour codes: - Low value resistors often have their resistance value printed on them in numbers - Higher value resistors are coded using coloured bands. The first three bands give the value of the resistor in ohms. The fourth band is an accuracy rating as a percentage	Week 2			
	The design brief: Each learner writes his/her suggestion for the design giving specifications and constraints Sketches: Each learner draws the circuit diagram. Each learner produces a sketch in 3D showing the device that will use the electronic circuit Teams meet and examine the individual suggestions and then decide on a final solution PAT 2: Formal Assessment (Design)	Week 3	Formal Assessment Tasks: Term 3	110–114	72–77

Topic	Content	Time allocation	Where to find it in Top Class Technology Grade 9		
			Unit	LB	TG
Electrical Systems and Control Investigation Skills	Ohm's law quantitatively: as voltage increases, current increases if resistance is constant. Action research: testing Ohm's Law practically – measure the voltage (potential difference) and the current strength in each of the following circuits: - One cell connected to a resistor – note the voltmeter and ammeter readings - Two cells connected to the resistor – note the voltmeter and ammeter readings - Three cells connected to the resistor – note the voltmeter and ammeter readings (Use the same resistor for both activities) Plot the readings on a graph and determine the relationship between potential difference and current strength while keeping the resistance constant	Week 4	Unit 10: Resistor colour codes	97–100	59–62
Electronic Systems and Control	Calculate values Calculate values: $R = \frac{V}{I}$ use to calculate R if V and I are known. $V = IR$ use to calculate V if I and R are known. $I = \frac{V}{R}$ use to calculate I if V and R are known. Note R - represents the resistance of a resistor in ohms [Ω] V - represents the potential difference in volts [V] I - represents the current strength in amperes [A] Switches: Manual switches controlled by the user, e.g. Push SPST, SPDT, DPDT	Week 5			
Electronic Systems and Control Investigation and Design Skills	Transistors: Only npn-type will be used at this level. A transistor is a device that can act as a switch and it can amplify a small current Sensors – Important input devices: LDR (Light Dependent Resistor) – a component whose resistance decreases with light [dark: High resistance, bright light: Low resistance]. with light [dark high resistance, bright light – low resistance]	Week 6	Unit 11: Electronic components	101–106	63–66

Topic	Content	Time allocation	Where to find it in Top Class Technology Grade 9		
			Unit	LB	TG
Electronic Systems and Control	Thermistor: A component whose resistance varies with temperature. Two types exist: + t: Resistance increases with increasing temperature. - t: Resistance decreases with increasing temperature. - Touch or moisture detector: A component that can be bridged using a "wet" finger, thus completing the circuit, indicating the touch Capacitors: A component which can store and then release electrical energy	Week 6	Unit 11: Electronic components	101–106	63–66
Electronic systems and control	Simple electronic circuits Learners draw, these simple electronic circuits: LED, 470Ω resistor, switch, and 4,5V series battery LDR, buzzer, 3V series battery NPN transistor, buzzer or bell, thermistor, variable resistor, 1kΩ resistor, 6V series battery, LED, 470Ω resistor, 1 000μF capacitor, switch The learners produce plans for their device/model/prototype using a 3D "assembly" drawing in exploded view showing how the model fits together	Week 7	Unit 12: Simple electronic circuits	107–109	67–71
Design Skills	PAT 2: Formal Assessment (Design) Complete making of the prototype/working model Learners use safe working practice Building: The model must showcase a viable solution to the problem. It should be to scale and neat, and show intelligent use of available materials Building: The model must showcase a viable solution to the problem. It should be to scale and neat, and show intelligent use of available materials	Week 8	Formal Assessment Tasks: Term 3	110–114	72–77
Making Skills	PAT 2: Formal Assessment (Make) Team presentations (team) Each team is given five minutes to present their solution in the form of sketches, artistic impressions of the solution, working/ plans, costing and their model Each learner compiles a record of his/her own individual contribution to the task. It should be reflected in each learner's workbook	Week 9			
Communication Skills	Team presentations (team) Each team is given five minutes to present their solution in the form of sketches, artistic impressions of the solution, working/ plans, costing and their model Each learner compiles a record of his/her own individual contribution to the task. It should be reflected in each learner's workbook	Week 10			

Topic	Content	Time allocation	Where to find it in Top Class Technology Grade 9		
			Unit	LB	TG
Processing: Indigenous technology	PRESERVING METALS First two methods theoretically • Painting • Galvanising • Electroplating	Week 1	Unit 13: Preserving metals	115–121	78–80
	Practical investigation: Preserving metals by electroplating PRESERVING FOOD First two methods theoretically Storing grain Pickling Drying and/or salting Practical investigation: Preserving metals by drying and salting NB: The drying/salting process will take time and be evaluated when completed	Week 2	Unit 14: Preserving food	122–128	81–84
Processing Investigation and Design Skills	TYPES OF PLASTICS AND THEIR USES Investigation: Identification of plastic, identifying codes and sorting for recycling Properties of plastics Reduce – reuse – recycle	Week 3	Unit 15: Types of plastics and their uses	129–134	85–87
	CASE STUDY: Remanufacturing waste plastic into pellets for re-use Systems diagram: Draw a systems diagram describing a plastics recycling project Case study: Moulding recycled plastic pellets into products Problem identification: Learners identify a need or want that can be satisfied by the making of a plastic item of their own design	Week 4	Unit 16: Remanufacturing waste plastic into pellets for reuse	135–138	88–90
Design Skills	Case study: Plastics used on modern motor cars Case study: Plastics used around the home	Week 5			
Design Skills	Plan: Learners draw their plastic item using first angle orthographic projection	Week 6	Formal Assessment Tasks: Term 4	139–146	88–90
Revision and Consolidation	Revise Term 3 and 4	Weeks 7–8			
Formal Test	End-of-year examination	Weeks 9–10			

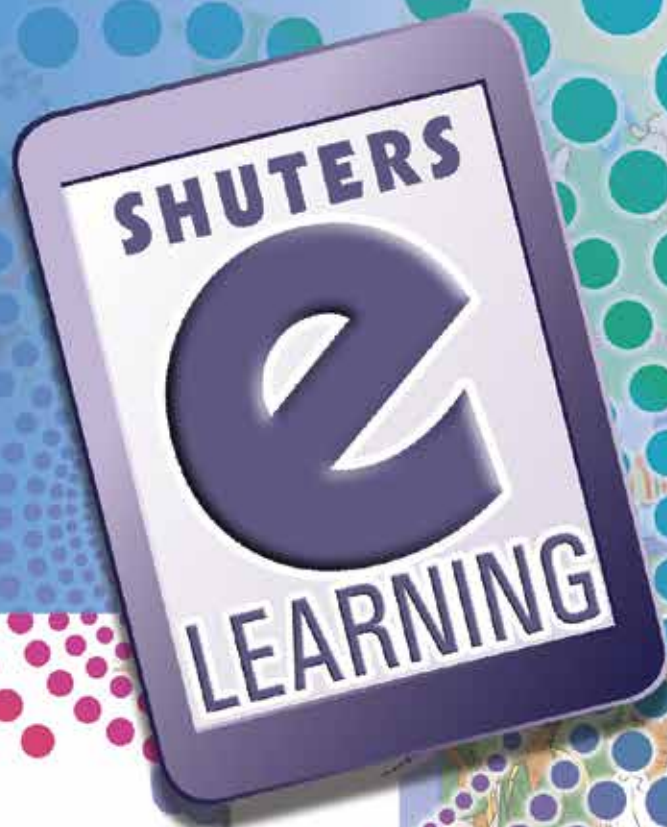
PROGRAMME OF ASSESSMENT

Grade 7		
Term	Assessment task	Page references
1	PAT 1	LB page 39 TG page 26
2	Controlled test	LB page 76 TG page 52
3	PAT 2	LB page 136 TG page 77
4	Controlled test	LB page 136 TG page 99

Grade 8		
Term	Assessment task	Page references
1	PAT 1	LB page 53 TG page 29
2	Controlled test	LB page 87 TG page 53
3	PAT 2	LB page 136 TG page 81
4	Controlled test	LB page 180 TG page 101

Grade 9		
Term	Assessment task	Page references
1	Investigation	LB page 28 TG page 17
2	Controlled test	LB page 81 TG page 46
3	Investigation	LB page 110 TG page 72
4	Controlled test	LB page 139 TG page 91

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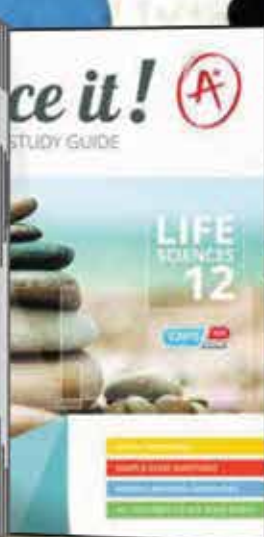
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