basic education
Department:
Basic Education
REPUBLIC OF SOUTH AFRICA

TECHNOLOGY: 2023/2024 ANNUAL TEACHING PLAN

GRADE 8: TERM 1

Term 1	Week 1 Jan(15 - 17)	Week 2 Jan(20 – 24)	Week 3 Jan (27 – 31)	Week 4 Feb (03 – 07)	Week 5 Feb (10 – 14)
CAPS Topic	**Revision**	**Mechanical Systems and Control** Investigation skills	**Mechanical Systems and Control:** Investigation skills	**Structures**	**Structures**
Core Concepts, Skills and Values	**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. **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 – *if force increases, speed decreases, and vice versa.*	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.	**PAT: Scenario** 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.) **PAT: 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. **PAT: Evaluate**: Learners examine information on several complex structures and list advantages and disadvantages in the designs.	Structural members under tension/compression **(worksheet).** 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).
Requisite Pre-Knowledge	Grade 7 knowledge and skills	Types and functions of mechanisms	Types and functions of mechanisms & Basic graphic communication skills.	Investigation Skills	Basic graphic communication skills
Resources (other than textbook) **to enhance learning**	Exemplar baseline assessment activities	DBE Sasol Inzalo workbooks/ Textbooks and any applicable resource whether "YouTube" videos, etc.			
Informal Assessment	**Baseline assessment**	Informal Assessment	Informal Assessment		Informal Assessment
SBA (Formal Assessment)				**PAT 1 FORMAL ASSESSMENT INVESTIGATE**	

Term 1	Week 6 Feb (17 – 21)	Week 7 Feb (24 – 28)	Week 8 – 9 March (03 – 14	Week 10 - 11 (17 – 28)	Week 6 Feb (17 – 21)
CAPS Topic	**Structures**	**Structures**	**Structures**	**Structures**	**Consolidation**
Core Concepts, Skills and Values	**PAT: Design** **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 for planning: Single view flat 2D drawing with dimensions, line types and scale. **PAT: Working Drawing:** Working drawing in 2D showing one view with dimensions and line types.	**PAT: Make:** Teams build their structure housing mechanisms using safe working practices.	Learners work in groups to: **Evaluate**: learners examine informationon several complex structures and list advantages and disadvantages in the designs.	**Communicate:**teams present their plans and model.	**Draw** a 3D isometric projection of the idea withdimensions and drawn toscale. Isometric – using underlying isometric gridin (term 1) and simple instruments in (term 3). Design Skills, Line conventions
Requisite Pre-Knowledge	Mechanical advantage and communication skills	Mechanical advantage and communication skills. Making skills	Design process skills:I, D, M, E and C	Graphic Communication Skills	Design process skills: I,D,M, E and C
Resources (other than textbook) **to enhance learning**	DBE Sasol Inzalo workbooks/ Textbooks and any applicable resource whether you tube videos, etc.				
Informal Assessment			Informal Assessment	Informal Assessment	Informal Assessment
SBA (Formal Assessment)	**PAT 1** **FORMAL ASSESSMENT** **DESIGN**	**PAT 1** **FORMAL ASSESSMENT** **MAKE**			**Programme of Assessment: Term 1** **PAT 1** Investigate: Week 4 15 Marks Design: Week 6 25 Marks Make: Week 7 35 Marks **Total** **70 Marks**

GRADE 8: TERM 2

Term 2	Week 1 Apr (08 – 11)	Week 2 Apr (15 – 17)	Week 3 Apr (22 – 25)	Week 4 May (05 - 09)	Week 5 May (12 – 16)
CAPS Topic	**Impact of Technology**	**Processing Investigation skills**	**Design skills**	**Investigation skills**	**Forces acting on materials**
Core Concepts, Skills and Values	**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.	**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 wastepaper and cardboard are recycled to produce new products for the packaging industry.	**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.	**Case study 3**: Technological products can have a negative impact**.** **Investigate** a technological product that can have a negative impact on society **Class discussion:** The teacher facilitates a class discussion on possible solutions that can counteract or compensate for the negative impact of the technology identified.	**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.
Requisite Pre-Knowledge	Pre-knowledge on how to conduct an investigation and a developed vocabulary on the terminology related to the environment and the effects that some material have on it.	Pre-knowledge on how to look for and separate information to conduct an investigation	Graphic communication and making skills	Investigation skills	Pre-knowledge of forces acting on materials
Resources (other than textbook) **to enhance learning**	Siyavula workbook/ Textbooks and or any other relevant resources.				
Informal Assessment	Informal Assessment	Informal Assessment	Informal Assessment	Informal Assessment	Informal Assessment
SBA (Formal Assessment)					

Term 2	Week 6 May (19 – 23)	Week 7 May (26 – 30)	Week 8 June (02 – 06)	Week 9 June (09 – 13)	W10 Jun (17 – 20)	Week 11 Jun (23 - 27)
CAPS Topic	**Design skills**	**Structures/ Processing**	**Structures/ Processing / Evaluating**	**Communication Skills**	**Consolidation**	**Consolidation**
Core Concepts, Skills and Values	**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	**Make**: Learners make the model/prototype/product they have designed safely.	**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).	**Communicate:** Teams present their plans, model and evaluation.	**Revise** challenging topics and or concepts of the term: • Practice more examples on developments. • Types of forces • The negative impact that material have on the environment.	Revision of concepts/ topics
Requisite Pre-Knowledge	Basic design and graphic communication skills	Pre-knowledge of strengthening and reinforce materials. Making skills	Pre-knowledge of strengthening and reinforce materials. Evaluation skills	Communication Skills	Processing and forces impact	Pre-knowledge of concepts covered during the term
Resources (other than textbook) **to enhance learning**	Siyavula workbook/ Textbooks and or any other relevant resources.					
Informal Assessment	Informal Assessment	Informal Assessment	Informal Assessment			Informal Assessment
SBA (Formal Assessment)				**PROGRAMME OF ASSESSMENT** MID-YEAR EXAMINATION WEEK 9-10 **40 MARKS**		

GRADE 8: TERM 3

Term 3	Week 1 Jul (22 – 25)	Week 2 (Jul 28 – Aug 01)	Week 3 Aug (04 - 08)	Week 4 Aug (11 – 15)	Week 5 Aug (18 – 22)
CAPS Topic	**Process: Investigation**	**Mechanical Advantage. Design skills. Calculations**	**Mechanical Systems and Control. Graphic communication**	**Structure with a mechanism**	**Impact/ Indigenous and Bias in technology. Investigation skills**
Core Concepts, Skills and Values	**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 < 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	**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	**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.	**PAT - Investigate:** Lifting mechanisms (wire rope-driven mine headgear) in use at South African mines for raising people and ore. **PAT:** • Design brief • Specifications and constraints **PAT - Sketches:** Initial Idea sketches of the mine-shaft headgear to meet the requirements given in the scenario.	**Learners working in teams investigate and report on ONE of the following:** *Distribute the investigations so all topics are covered and reported.* **Investigate:** The impact on the environment as a result of mining of: Acid mine drainage 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.
Requisite Pre-Knowledge	Pre-knowledge on levers, classes of levers. Calculation skills	Knowledge of gears and ratios and calculation	Knowledge on gears and ratios as discussed in previous week.	Knowledge on gears and ratios as discussed in previous week.	Knowledge on how to gather information, report on the findings verbally and through sketches.
Resources (other than textbook) **to enhance learning**	Siyavula workbook / Textbooks and or any other relevant resources.				
Informal Assessment	Informal Assessment				Informal Assessment
SBA (Formal Assessment)				**PAT 2 FORMAL ASSESSMENT: INVESTIGATE AND DESIGN**	

Term 3	Week 6 Aug (25 - 29)	Week 7 Sep (01 – 05)	Week 8 Sep (08 – 12)	Week 9 Sep (15 – 19)	Week 10 Sep (22 – 26)	Week 11 Sep 29 – Oct 03
CAPS Topic	**Structure with a mechanism**	**Structure with a mechanism**	**Structure with a mechanism**	**Structure with a mechanism**	**Revision and Consolidation**	**Revision and Consolidation**
Core Concepts, Skills and Values	**PAT - 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 - Budget:** Individual learners prepare a realistic budget **detailing 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. **PAT - Make:** • List tools and material • List logical steps to construct the project • Groups build their working scale model using safe working practices.	**PAT - Make: (continue)** • List tools and material • List logical steps to construct the project • Groups build their working scale model using safe working practices.	**Communicate**: Teams present their tender proposal for the mine shaft headgear (research, plans, flow chart, model and budget) to the "Tender Board".	Revision and Consolidation	Revision and Consolidation
Requisite Pre-Knowledge	Knowledge on basic drawing skills.					
Resources (other than textbook) **to enhance learning**	Siyavula workbook/ Textbooks and or any other relevant resources.					
Informal Assessment				Informal Assessment	Informal Assessment	Informal Assessment
SBA (Formal Assessment)	**PAT 2 FORMAL ASSESSMENT: DESIGN**	**PAT 2 FORMAL ASSESSMENT MAKE**	**PAT 2 FORMAL ASSESSMENT MAKE**	**PROGRAMME OF ASSESSMENT: TERM 3** **PAT 2** INVESTIGATE: WEEK 4 15 MARKS DESIGN: WEEK 4 / 6 25 MARKS MAKE: WEEK 7 / 8 35 MARKS **TOTAL** **70 MARKS**		

GRADE 8: TERM 4

Term 4	Week 1 Oct (13 - 17)	Week 2 Oct (20 - 24)	Week 3 Oct (27 - 31)	Week 4 Nov (03 – 07)	Week 5 Nov (10 – 14)
CAPS Topic	**Electrical Systems and Control Design skills**	**Electrical Systems and Control Design skills**	**Impact of / Biases in technology Evaluation skills**	**Impact of / Biases in technology Evaluation skills**	**Design & Investigation skills**
Core Concepts, Skills, and Values	**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	**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.	**Electrochemical cells.** **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.	**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.
Requisite Pre-Knowledge	Pre-knowledge of circuit diagrams, components and their symbols	Pre-knowledge of circuit diagrams, components, and their symbols	Pre-knowledge on investigation -, reasoning - and analysing skills	Pre-knowledge on investigation -, reasoning -and analysing skills	Pre-knowledge on how to identify advantages and disadvantages (tabulate if required)
Resources (other than textbook) **to enhance learning**	Siyavula workbook/ Textbooks and or any other relevant resources.	Siyavula workbook/ Textbooks and or any other relevant resources.	Siyavula workbook/ Textbooks and or any other relevant resources.	Siyavula workbook/ Textbooks and or any other relevant resources.	Siyavula workbook/ Textbooks and or any other relevant resources.
Informal Assessment	Informal Assessment	Informal Assessment	Informal Assessment: Practical: make your own batteries	Informal Assessment	Informal Assessment
SBA (Formal Assessment)					

Term 4	Week 6 Nov (17 – 21)	Week 7 Nov (24 – 28)	Week 8 Dec (01 – 05)	Week 9 Dec (08 - 12)	
CAPS Topic	**Investigation skills**	**Electrical Systems & Control Design skills**	**Electrical Systems & Control**	**Electrical Systems & Control**	
Core Concepts, Skills and Values	**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	**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.	Consolidation/ Revision/ Wrap up	Consolidation/ Revision/ Wrap up	
Requisite Pre-Knowledge	Pre-knowledge on how to identify advantages and disadvantages (tabulate if required)	Pre-knowledge of circuit diagrams	Knowledge on all relevant concepts and content discussed during the term	Knowledge on all relevant concepts and content discussed during the term	
Resources (other than textbook) **to enhance learning**	Siyavula workbook/ Textbooks and or any other relevant resources.	Siyavula workbook/ Textbooks and or any other relevant resources.	Siyavula workbook/ Textbooks and or any other relevant resources.	Siyavula workbook/ Textbooks and or any other relevant resources.	
Informal Assessment	Informal Assessment	Informal Assessment			
SBA (Formal Assessment)			**PROGRAMME OF ASSESSMENT** END-OF-YEAR EXAMINATION: WEEK 8-10 **40 MARKS**		