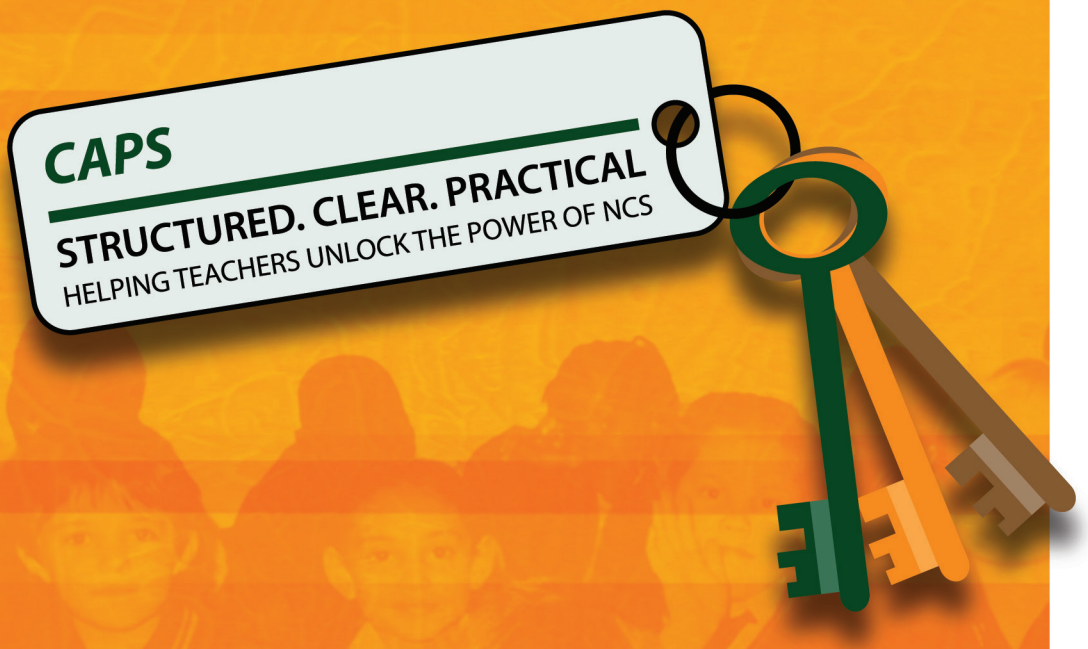
ENGINEERING GRAPHICS AND DESIGN

National Curriculum Statement (NCS)

Curriculum and Assessment Policy Statement



Further Education and Training Phase Grades 10-12

basic education
Department:
Basic Education
REPUBLIC OF SOUTH AFRICA

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CURRICULUM AND ASSESSMENT POLICY STATEMENT
GRADES 10-12

ENGINEERING GRAPHICS DESIGN

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FOREWORD BY THE MINISTER

Our national curriculum is the culmination of our efforts over a period of seventeen years to transform the curriculum bequeathed to us by apartheid. From the start of democracy we have built our curriculum on the values that inspired our Constitution (Act 108 of 1996). The Preamble to the Constitution states that the aims of the Constitution are to:

- heal the divisions of the past and establish a society based on democratic values, social justice and fundamental human rights;
- improve the quality of life of all citizens and free the potential of each person;
- lay the foundations for a democratic and open society in which government is based on the will of the people and every citizen is equally protected by law; and
- build a united and democratic South Africa able to take its rightful place as a sovereign state in the family of nations.

Education and the curriculum have an important role to play in realising these aims.

In 1997 we introduced outcomes-based education to overcome the curricular divisions of the past, but the experience of implementation prompted a review in 2000. This led to the first curriculum revision: the *Revised National Curriculum Statement Grades R-9* and the *National Curriculum Statement Grades 10-12* (2002).

Ongoing implementation challenges resulted in another review in 2009 and we revised the *Revised National Curriculum Statement* (2002) to produce this document.

From 2012 the two 2002 curricula, for *Grades R-9* and *Grades 10-12* respectively, are combined in a single document and will simply be known as the *National Curriculum Statement Grades R-12.* The *National Curriculum Statement for Grades R-12* builds on the previous curriculum but also updates it and aims to provide clearer specification of what is to be taught and learnt on a term-by-term basis.

The *National Curriculum Statement Grades R-12* accordingly replaces the Subject Statements, Learning Programme Guidelines and Subject Assessment Guidelines with the

(a) Curriculum and Assessment Policy Statements (CAPS) for all approved subjects listed in this document;

(b) *National policy pertaining to the programme and promotion requirements of the National Curriculum Statement Grades R-12*; and

(c) *National Protocol for Assessment Grades R-12.*

MRS ANGIE MOTSHEKGA, MP
MINISTER OF BASIC EDUCATION

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SECTION 1

INTRODUCTION TO THE CURRICULUM AND ASSESSMENT POLICY STATEMENTS FOR ENGINEERING GRAPHIC AND DESIGN GRADES 10-12

1.1 Background

The *National Curriculum Statement Grades R-12 (NCS)* stipulates policy on curriculum and assessment in the schooling sector.

To improve implementation, the National Curriculum Statement was amended, with the amendments coming into effect in January 2012. A single comprehensive Curriculum and Assessment Policy document was developed for each subject to replace Subject Statements, Learning Programme Guidelines and Subject Assessment Guidelines in Grades R-12.

1.2 Overview

(a) The *National Curriculum Statement Grades R-12 (January 2012)* represents a policy statement for learning and teaching in South African schools and comprises the following:

(i) Curriculum and Assessment Policy Statements for each approved school subject;

(ii) The policy document, National policy pertaining to the programme and promotion requirements of the National Curriculum Statement Grades R-12; and

(iii) The policy document, National Protocol for Assessment Grades R-12 (January 2012).

(b) The *National Curriculum Statement Grades R-12 (January 2012)* replaces the two current national curricula statements, namely the

(i) Revised National Curriculum Statement Grades R-9, Government Gazette No. 23406 of 31 May 2002, and

(ii) National Curriculum Statement Grades 10-12 Government Gazettes, No. 25545 of 6 October 2003 and No. 27594 of 17 May 2005.

(c) The national curriculum statements contemplated in subparagraphs b(i) and (ii) comprise the following policy documents which will be incrementally repealed by the *National Curriculum Statement Grades R-12 (January 2012)* during the period 2012-2014:

(i) The Learning Area/Subject Statements, Learning Programme Guidelines and Subject Assessment Guidelines for Grades R-9 and Grades 10-12;

(ii) The policy document, National Policy on assessment and qualifications for schools in the General Education and Training Band d, promulgated in Government Notice No. 124 in Government Gazette No. 29626 of 12 February 2007;

(iii) The policy document, the National Senior Certificate: A qualification at Level 4 on the National Qualifications Framework (NQF), promulgated in Government Gazette No.27819 of 20 July 2005;

(iv) *The policy document, An addendum to the policy document, the National Senior Certificate: A qualification at Level 4 on the National Qualifications Framework (NQF), regarding learners with special needs, published in Government Gazette, No.29466 of 11 December 2006, is incorporated in the policy document, National policy pertaining to the programme and promotion requirements of the National Curriculum Statement Grades R-12; and*

(v) *The policy document, An addendum to the policy document, the National Senior Certificate: A qualification at Level 4 on the National Qualifications Framework (NQF), regarding the National Protocol for Assessment (Grades R-12), promulgated in Government Notice No.1267 in Government Gazette No. 29467 of 11 December 2006.*

(d) The policy document, *National policy pertaining to the programme and promotion requirements of the National Curriculum Statement Grades R-12*, and the sections on the Curriculum and Assessment Policy as contemplated in Chapters 2, 3 and 4 of this document constitute the norms and standards of the *National Curriculum Statement Grades R-12.* It will therefore, in terms of *section 6A* of the *South African Schools Act, 1996 (Act No. 84 of 1996,)* form the basis for the Minister of Basic Education to determine minimum outcomes and standards, as well as the processes and procedures for the assessment of learner achievement to be applicable to public and independent schools.

1.3 General aims of the South African Curriculum

(a) The *National Curriculum Statement Grades R-12* gives expression to the knowledge, skills and values worth learning in South African schools. This curriculum aims to ensure that children acquire and apply knowledge and skills in ways that are meaningful to their own lives. In this regard, the curriculum promotes knowledge in local contexts, while being sensitive to global imperatives.

(b) The National Curriculum Statement Grades R-12 serves the purposes of:

- equipping learners, irrespective of their socio-economic background, race, gender, physical ability or intellectual ability, with the knowledge, skills and values necessary for self-fulfilment, and meaningful participation in society as citizens of a free country;
- providing access to higher education;
- facilitating the transition of learners from education institutions to the workplace; and
- providing employers with a sufficient profile of a learner's competences.

(c) The National Curriculum Statement Grades R-12 is based on the following principles:

- Social transformation: ensuring that the educational imbalances of the past are redressed, and that equal educational opportunities are provided for all sections of the population;
- Active and critical learning: encouraging an active and critical approach to learning, rather than rote and uncritical learning of given truths;
- High knowledge and high skills: the minimum standards of knowledge and skills to be achieved at each grade are specified and set high, achievable standards in all subjects;
- Progression: content and context of each grade shows progression from simple to complex;

- Human rights, inclusivity, environmental and social justice: infusing the principles and practices of social and environmental justice and human rights as defined in the Constitution of the Republic of South Africa. The National Curriculum Statement Grades R-12 is sensitive to issues of diversity such as poverty, inequality, race, gender, language, age, disability and other factors;
- Valuing indigenous knowledge systems: acknowledging the rich history and heritage of this country as important contributors to nurturing the values contained in the Constitution; and
- Credibility, quality and efficiency: providing an education that is comparable in quality, breadth and depth to those of other countries.

(d) The National Curriculum Statement Grades R-12 aims to produce learners that are able to:

- identify and solve problems and make decisions using critical and creative thinking;
- work effectively as individuals and with others as members of a team;
- organise and manage themselves and their activities responsibly and effectively;
- collect, analyse, organise and critically evaluate information;
- communicate effectively using visual, symbolic and/or language skills in various modes;
- use science and technology effectively and critically showing responsibility towards the environment and the health of others; and
- demonstrate an understanding of the world as a set of related systems by recognising that problem solving contexts do not exist in isolation.

(e) Inclusivity should become a central part of the organisation, planning and teaching at each school. This can only happen if all teachers have a sound understanding of how to recognise and address barriers to learning, and how to plan for diversity.

The key to managing inclusivity is ensuring that barriers are identified and addressed by all the relevant support structures within the school community, including teachers, District-Based Support Teams, Institutional-Level Support Teams, parents and Special Schools as Resource Centres. To address barriers in the classroom, teachers should use various curriculum differentiation strategies such as those included in the Department of Basic Education's *Guidelines for Inclusive Teaching and Learning* (2010).

1.4 Time Allocation

1.4.1 Foundation Phase

(a) The instructional time in the Foundation Phase is as follows:

SUBJECT	GRADE R (HOURS)	GRADES 1-2 (HOURS)	GRADE 3 (HOURS)
Home Language	10	8/7	8/7
First Additional Language		2/3	3/4
Mathematics	7	7	7
Life Skills	**6**	**6**	**7**
• Beginning Knowledge	(1)	(1)	(2)
• Creative Arts	(2)	(2)	(2)
• Physical Education	(2)	(2)	(2)
• Personal and Social Well-being	(1)	(1)	(1)
TOTAL	**23**	**23**	**25**

(b) Instructional time for Grades R, 1 and 2 is 23 hours and for Grade 3 is 25 hours.

(c) Ten hours are allocated for languages in Grades R-2 and 11 hours in Grade 3. A maximum of 8 hours and a minimum of 7 hours are allocated for Home Language and a minimum of 2 hours and a maximum of 3 hours for Additional Language in Grades 1-2. In Grade 3 a maximum of 8 hours and a minimum of 7 hours are allocated for Home Language and a minimum of 3 hours and a maximum of 4 hours for First Additional Language.

(d) In Life Skills Beginning Knowledge is allocated 1 hour in Grades R-2 and 2 hours as indicated by the hours in brackets for Grade 3.

1.4.2 Intermediate Phase

(a) The instructional time in the Intermediate Phase is as follows:

SUBJECT	HOURS
Home Language	6
First Additional Language	5
Mathematics	6
Natural Sciences and Technology	3,5
Social Sciences	3
Life Skills	**4**
• Creative Arts	(1,5)
• Physical Education	(1)
• Personal and Social Well-being	(1,5)
TOTAL	**27,5**

1.4.3 Senior Phase

(a) The instructional time in the Senior Phase is as follows:

SUBJECT	HOURS
Home Language	5
First Additional Language	4
Mathematics	4,5
Natural Sciences	3
Social Sciences	3
Technology	2
Economic Management Sciences	2
Life Orientation	2
Creative Arts	2
TOTAL	**27,5**

1.4.4 Grades 10-12

(a) The instructional time in Grades 10-12 is as follows:

SUBJECT	TIME ALLOCATION PER WEEK (HOURS)
Home Language	**4.5**
First Additional Language	**4.5**
Mathematics	**4.5**
Life Orientation	**2**
A minimum of any three subjects selected from **Group B** Annexure B, Tables B1-B8 of the policy document, *National policy pertaining to the programme and promotion requirements of the National Curriculum Statement Grades R-12,* subject to the provisos stipulated in paragraph 28 of the said policy document.	**12 (3x4h)**
TOTAL	**27,5**

The allocated time per week may be utilised only for the minimum required NCS subjects as specified above, and may not be used for any additional subjects added to the list of minimum subjects. Should a learner wish to offer additional subjects, additional time must be allocated for the offering of these subjects.

SECTION 2

INTRODUCTION TO ENGINEERING GRAPHICS AND DESIGN (EGD)

Engineering Graphics and Design (EGD) teaches internationally acknowledged principles that have both academic and technical applications. The emphasis in EGD is on teaching specific basic knowledge and various drawing techniques and skills so that the EGD learners will be able to interpret and produce drawings within the contexts of Mechanical Technology, Civil Technology and Electrical Technology.

2.1 The main topics of EGD:

- General drawing principles for all technological drawings
- Free-hand drawing
- Instrument drawing
- First- and third-angle orthographic projections
- Descriptive and solid geometry
- Mechanical working drawing
- Civil working drawing
- Isometric drawing
- Perspective drawing
- Electrical diagrams
- Interpenetrations and developments
- Loci of helixes, cams and mechanisms
- The Design Process
- CAD (Computer-Aided Drawing/Design).

2.2 The specific aims of EGD are to teach the following:

- Graphical drawings as the primary means of communication in the technological world
- Specific basic content and concepts within the contexts of Mechanical Technology, Civil Technology and Electrical Technology
- Various instrument and freehand drawing techniques and skills
- Solving technological problems through graphical drawings

- The application of the Design Process
- The implementation of CAD (Computer Aided Drawings/Design) as a drawing method.

2.3 The requirements for offering EGD:

- The minimum requirements for an EGD classroom are:

  *These requirements are the **responsibility of the school:***

  - Sufficient security to safeguard all the required resources and equipment
  - Sufficient space for medium-to-large school desks or drawing tables
  - Sufficient artificial fluorescent lighting
  - Desks with a minimum top size of 700 mm X 450 mm or A2, or larger drawing tables that will sufficiently accommodate an A3 drawing board and drawing instruments
  - All the computer hardware and software required for CAD
  - A large blackboard and/or whiteboard, with an eraser and chalk/pens
  - Large set squares, ruler, protractor and compasses for the black/whiteboard
  - Overhead projector and large projector screen
  - A large lockable cupboard for all the teacher's files and resource material
  - Sufficient cupboards or storage space for all the learners' EGD files
  - Approved EGD textbooks, with explanatory examples and exercises for each topic, and teachers' guides
  - Sufficient A4 and A3 drawing sheets for all the drawing tasks.

- The minimum requirements for each EGD learner are:

  - An approved EGD textbook with self-explanatory examples and exercises for each topic

  NOTE:

  A workbook/work file may only be used in conjunction with a textbook and not as a substitution for a textbook.

  *The following requirements should be the **responsibility of the learner:***

  - A large file
  - A3 drawing board with a T-square
  - Masking tape
  - Drawing pencil: 2H, 3H or 4H

- Eraser
- Ruler
- 30˚/60˚ drawing set square
- 45˚ drawing set square
- Drawing compass, preferably with an adjustment wheel
- Divider
- Small protractor
- Dust cloth
- Calculator

2.4 EGD career opportunities

EGD provides the fundamental knowledge and drawing skills required for the following career opportunities:

- Architecture
- Most engineering fields (e.g. Civil, Mechanical, Aviation, Maritime, Agricultural, Mining, etc.)
- Medical technician
- Industrial designer
- Interior designer
- Landscape architect
- Quantity surveyor
- Building management
- City planner
- Land surveyor
- Teacher
- Graphic illustrator
- Jewellery designer
- Model builder (scale models)
- Draughtsperson (e.g. Steel structure, Architectural, Civil, Design, Electrical, etc.)

- Technicians
- Most manufacturers
- Most artisans
- CAD system operator

SECTION 3

OVERVIEW OF TOPICS

3.1 Examinable content

Topic	Grade	Examinable Content
Introduction to & Purpose of EGD	This topic should be incorporated into the scenarios of assessment tasks in an appropriate way.	
	Grade 10	Purpose, scope and career opportunities
	Grade 11	
	Grade 12	
Analytical and Visualisation exercises	Grade 10	Applicable to pre-prepared civil, mechanical and electrical drawings
	Grade 11	
	Grade 12	
General drawing principles	Grade 10	Use and care of drawing instruments , dangers of sharp instruments (HIV/AIDS), line types and line-work, lettering (writing) and annotations, dimensioning techniques and conventions
	Grade 11	*The Grade 10 content remains applicable to all Grade 11 topics*
	Grade 12	*The Grade 10 content remains applicable to all Grade 12 topics*
Free-hand drawing	Grade 10	Free-hand drawing techniques
	Grade 11	*The Grade 10 content remains applicable to all Grade 11 topics*
	Grade 12	*The Grade 10 content remains applicable to all Grade 12 topics*
Setting up a drawing sheet	Grade 10	A4 and A3 drawing sheets with general name/title blocks
	Grade 11	A4 and A3 drawing sheets with relevant civil and mechanical name/title blocks/panels
	Grade 12	A4 and A3 drawing sheets with relevant civil and mechanical name/title blocks/panels
Geometrical construction	Grade 10	Geometrical (instrument) constructions, regular polygons and ellipses
	Grade 11	*The Grade 10 content remains applicable to all the relevant Grade 11 topics*
	Grade 12	*The Grade 10 content remains applicable to all the relevant Grade 12 topics*
Scales	Grade 10	The application of any scale
	Grade 11	*The Grade 10 content remains applicable to all the relevant Grade 11 topics*
	Grade 12	*The Grade 10 content remains applicable to all the relevant Grade 12 topics*
Descriptive geometry	Grade 10	Points and line segments, true lengths, true inclinations and true shapes
	Grade 11	*The Grade 10 content remains applicable to all the relevant Grade 11 topics*
	Grade 12	*The Grade 10 content remains applicable to all the relevant Grade 12 topics*
Solid geometry	Grade 10	Right-regular solids with sections and true shapes
	Grade 11	Combinations of the right-regular solids with sections and true shapes
	Grade 12	Revision of Grade 11 combined solids with sections and true shapes

Topic	Grade	Examinable Content
Mechanical drawing	All mechanical drawings should be presented as **3rd angle orthographic** working drawings in accordance with the *SANS (SABS) 0111 Guidelines*.	
	Grade 10	Castings
	Grade 11	Simple assemblies
	Grade 12	Complex assemblies and welding, machining & treatment symbols
Civil drawing	All civil drawings, limited to **single-storey** dwellings, should be presented as **1st angle orthographic** working drawings in accordance with the *SANS (SABS) 0143 Guidelines*.	
	Grade 10	Foundation to slab
	Grade 11	Foundation to ceiling
	Grade 12	Foundation to roof, electrical fixtures and site plans
Isometric drawing	Grade 10	Simple isometric drawings with auxiliary views
	Grade 11	Complex isometric drawings with auxiliary views and circles
	Grade 12	Complex isometric drawings with auxiliary views, circles and sections
Perspective drawing	Grade 10	1-point perspective drawings
	Grade 11	2-point perspective drawings
	Grade 12	Complex 2-point perspective drawings with circles and arcs
Electrical diagrams	Grade 10	Simple circuit diagrams
	Grade 11	Parallel and series circuit diagrams
	Grade 12	Electrical fixtures and wiring on floor plans of civil drawings
Interpenetration	Grade 10	*N/A*
	Grade 11	Between two in-line regular geometrical prisms and/or cylinders
	Grade 12	Between two in-line or offset regular geometrical prisms and/or cylinders
Development	Grade 10	*N/A*
	Grade 11	Interpenetrations, truncated pyramids & cones, simple transition pieces.
	Grade 12	Interpenetrations, sectioned pyramids & cones, complex transition pieces.
Loci (helix)	Grade 10	*N/A*
	Grade 11	Simple helixes, e.g. augers, coil springs and square screw thread
	Grade 12	Complex helixes e.g. augers, spiral chutes, coil springs, different screw thread
Loci (cam)	Grade 10	*N/A*
	Grade 11	Simple cams with uniform motion and wedge-shaped followers
	Grade 12	Complex cams with motions that are either uniform and/or harmonic and/ or uniform acceleration and retardation, with either wedge shaped or roller followers
Loci (mechanisms)	Grade 10	*N/A*
	Grade 11	*N/A*
	Grade 12	Loci of a point(s) on the moving components of mechanisms

3.2 Practical Assessment Task content

Topic	Grade	Practical Assessment Task (PAT) content
The Design Process	Grade 10	Application of the complete Design Process to a selected scenario
	Grade 11	
	Grade 12	
CAD (Computer-Aided Drawing/ Design)	Grade 10	• Application and management of the specific CAD software used • Presentation drawings for the PAT
	Grade 11	
	Grade 12	

3.3 Annual teaching plan

- This annual teaching plan is suitable for schools that will be teaching CAD either during one period per week/ cycle or after normal school hours.
- It is the responsibility of each school's EGD teacher(s) to do planning in terms of selecting the resource material, activities and assessment tasks for the annual teaching plan.
- The hours in the duration column are an indication of the minimum time that should be spent on the specific topic. The number of days, indicated in brackets in the same column, is an indication of the maximum number of school days available for the specific topic.
- All the assessment tasks for each topic have to be completed within the allocated week(s)/days for the topic.
- In order to successfully implement the annual teaching plan for EGD, the timetable has to be adjusted to allow for four hours contact time during a five-day week.

NOTE:

The sequences and/or allocated week(s)/days of these annual teaching plans may be altered. However, the altered sequences and/or allocated week(s)/days have to be approved by an Engineering Graphics and Design subject adviser or co-ordinator and all the topics and prescribed content have to be contained.

NOTE: The duration indicates the minimum time or the *maximum number of school days* that should be spent on the topic.

ANNUAL TEACHING PLAN for ENGINEERING GRAPHICS & DESIGN			
GRADE 10: TERM 1			
Min *(Max)* Duration	**Week(s) of term**	**Topic**	**Prescribed Content**
2¼ hrs *(3 days)*	**1**	**Classroom and administrative management**	All **administrative** and **classroom managerial structures** to be **put in place** and the **teachers' EGD files** as well as all the **learners' EGD files** to be **prepared** for use throughout the year.
1½ hrs *(2 days)*	**2**	**Introduction to & purpose of EGD**	The scope, educational and career opportunities related to EGD. Include human rights, gender, inclusivity and HIV/AIDS issues.
6 hrs *(8 days)*	**2 - 3**	**General drawing principles relevant to all types of drawing**	• The **correct use and care of drawing instruments** • The **dangers of sharp instruments** that could cause bleeding and the transfer of HIV/AIDS • Relevant **line types** as contained in the *SANS (SABS) 0111 and 0143 Guidelines* GUIDELINES for PENCIL LINE-WORK: **NOTE:** *A wooden pencil or a 0.3 / 0.5 clutch pencil with either a 2H, 3H or 4H lead should be used.* **A-type line** (darkest line): Border & title/name block/ panel; outlines & visible parts; answers of e.g. loci; projection symbol; tables **B-type line** (medium line): All writing & numbering; dimensions; projection planes; auxiliary views; hatching; screw threads; folding lines, break lines **C-type line** (lightest line): Constructions; planning; projections; guidelines (for writing) **Medium chain-line** (B-type): Centre points of circles; centre lines (centre axis); section planes; assembly diagrams; building lines/ boundaries (servitudes) **Dark chain-line** (A-type): Plumbing, water pipes, drainage, services, irrigation systems **Short broken-line** (B-type): Hidden detail; items to be removed on civil drawings **Long broken-line** (B--type): Contour lines on civil site plans • General **lettering** (writing) requirements as contained in the *SANS (SABS) 0111 & 0143 Guidelines* • General **dimensioning** requirements as contained in the *SANS (SABS) 0111 & 0143 Guidelines*
5¼ hrs *(7 days)*	**4 - 5**	**Free-hand drawing**	The basic hand movements needed to draw proportional single, multi-view and pictorial drawings on plain paper and/or grid sheets.
2¼ hrs *(3 days)*	**5**	**Setting up of a drawing sheet**	**A4 and A3** sized drawing sheets with **borders** and basic **name/title blocks**

ANNUAL TEACHING PLAN for ENGINEERING GRAPHICS & DESIGN			
GRADE 10: TERM 1			
Min *(Max)* Duration	**Week(s) of term**	**Topic**	**Prescribed Content**
16½ hrs *(22 days)*	**6 - 10**	**Geometrical construction**	• **Geometrical constructions**: bisecting lines and angles, perpendicular lines, angles, dividing a line, a circle through three points, circle divisions, inscribed and circumscribed circle to triangles, fillets, tangents, convex and concave tangential arcs • Regular **polygons** with 3, 4, 5, 6 & 8 sides • **Ellipse**
2¼ hrs *(3 days)*	**10**	**Scales**	• **Different scales,** e.g. 5:1, 2:1, 1:2, 1:25, 1:50, 1:75, 1:100, etc. • The application of **any scale** to all types of drawing
3 hrs *(4 days)*	**11**	**PAT** (Practical Assessment Task)	• The **Design Process:** - Problem **identification** and the formulation of a **design brief** with a list of **specifications** and/or **constraints** - Conducting **research** and **generating** graphical **ideas/concepts** - **Selecting** the best solution within the context of the design brief - Presenting the final solution as **working and 3D drawings** - **Evaluation** of the entire process • The **PAT scenarios** have to be **given** to the learners and **each scenario** has to be **explained and discussed.**

FORMAL ASSESSMENT FOR GRADE 10 TERM 1	
Assessment Tasks ***These are the minimum requirements for the term.***	**Suggested contribution for the term**
Test	60%
Course drawings: • Freehand drawing • Geometrical construction • Ellipse	40%

ANNUAL TEACHING PLAN for ENGINEERING GRAPHICS & DESIGN			
GRADE 10: TERM 2			
Min *(Max)* Duration	**Week(s) of term**	**Topic**	**Prescribed Content**
11¼ hrs *(15 days)*	**1 - 3**	**Mechanical drawing**	**3rd angle orthographic** working drawings with **non-sectional** and **sectional views** of **mechanical** **castings and objects** from industry. Include the following: **Title**, **scale, hidden detail, dimensioning**, **cutting planes**, **hatching detail, notes** and **symbol of projection** **NOTE**: ALL drawings have to comply with the *SANS (SABS) 0111 Guidelines.*
11¼ hrs *(15 days)*	**4 - 7**	**Isometric drawing**	**Simple** isometric drawings with isometric and non-isometric lines as well as **auxiliary views.**
3¾ hrs *(5 days)*	**8**	**PAT** (Practical Assessment Task)	**Phase 1: Complete the following Design Process requirements:** • Formulation of a design brief with specifications and/or constraints • Evidence of the external research conducted • Generate THREE ideas/concepts analytically and graphically (*comprehensive free-hand drawings*) • Selecting the best solution within the context of the design brief.

FORMAL ASSESSMENT FOR GRADE 10 TERM 2	
Assessment Tasks ***These are the minimum requirements for the term.***	**Suggested contribution for the term**
Course drawings: • TWO mechanical drawings • Isometric drawing	25%
Mid-year examination	75%

ANNUAL TEACHING PLAN for ENGINEERING GRAPHICS & DESIGN			
GRADE 10: TERM 3			
Min *(Max)* Duration	**Week(s) of term**	**Topic**	**Prescribed Content**
11¼ hrs *(15 days)*	**1 - 3**	**Solid geometry**	**1st angle orthographic views** of right-regular **prisms** and **pyramids** with 3, 4, 5, 6 and 8 sides only, as well as **cylinders** and **cones.** The axis of the solids may be perpendicular, parallel or inclined to one principal projection plane only. Include the following: • **Sectional** views • The **true shape** of the cut surface.
6 hrs *(8 days)*	**4 - 5**	**Descriptive geometry**	**1st angle orthographic views** of **points** and **line segments** that are perpendicular, inclined or oblique to the projection planes. • The **true length** and the **true inclination** of line segments to the horizontal plane(HP) or vertical plane (VP) using different methods, e.g. projection or construction • The **true shapes** of surfaces from given edge (side) views.
9¼ hrs *(13 days)*	**6 - 8**	**Civil drawing**	Limited to **single-storey** dwellings, **1st angle orthographic** working drawings with **floor plans**, **basic** single line **elevations** and **sectional elevations** showing the detail of the **foundation to the slab.** Include the following: • **Annotations**, **labels**, **dimensioning** and **scales** • Relevant **abbreviations** and **conventions** • On the **floor plan only:** windows and doors • **Hatching** detail • **Perimeters** and **floor areas** **NOTE**: ALL drawings have to comply with the *SANS (SABS) 0143 Guidelines.*
9 hrs *(12 days)*	**8 - 10**	**Perspective drawing**	**1-Point** perspective drawings of castings, dwellings and civil structures. • The position of the HL, PP and SP can be varied to provide any desired view e.g. bird's eye, a natural view, a worm's eye view, etc.
3 hrs *(4 days)*	**11**	**PAT** (Practical Assessment Task)	• **Phase 2: Complete ALL the instrument and CAD presentation drawings as required by the selected scenario.** • **Phase 3: Complete the PAT portfolio.**

FORMAL ASSESSMENT FOR GRADE 10 TERM 3	
Assessment Tasks ***These are the minimum requirements for the term.***	**Suggested contribution for the term**
Test	60%
Course drawings: • Solid geometry • Descriptive geometry • Civil floor plan • Civil sectional elevation • One-point perspective	40%

ANNUAL TEACHING PLAN for ENGINEERING GRAPHICS & DESIGN			
GRADE 10: TERM 4			
Min *(Max)* Duration	**Week(s) of term**	**Topic**	**Prescribed Content**
3¾ hrs *(5 days)*	**1**	**Electrical drawing**	**Simple circuit diagrams** by using given electrical and electronic component symbols**.**
	2 - 3	**All topics not completed during previous terms:**	
	2 - 3	**Consolidation**	• **Mechanical working drawings** • **Civil drawings**

COMPULSORY FORMAL ASSESSMENT FOR GRADE 10 PROMOTION		
Assessment Tasks		**Contribution to final promotion mark**
SBA	**ALL tests**	**30 marks** (7.5%)
	ALL course drawings	**30 marks** (7.5%)
	Mid-year examination	**40 marks** (10%)
PAT		**100 marks** (25%)
Final examination		**200 marks** (50%)

NOTE: The duration indicates the minimum time or the *maximum number of school days* that should be spent on the topic.

ANNUAL TEACHING PLAN for ENGINEERING GRAPHICS & DESIGN			
GRADE 11: TERM 1			
Min *(Max)* Duration	**Week(s) of term**	**Topic**	**Prescribed Content**
2 hrs *(3 days)*	**1**	**Classroom and administrative management**	All **administrative** and **classroom managerial structures** to be **put in place** and the **teachers' EGD files** as well as all the **learners' EGD files** to be **prepared** for use throughout the year.
2 hrs *(3 days)*	**1**	**Revision of the general drawing principles**	• The use, care and dangers of sharp instruments • Line types, lettering (writing) and dimensioning • Free-hand drawing techniques • The principles of 1st angle and 3rd angle orthographic projections
13½ hrs *(18 days)*	**2 - 5**	**Mechanical drawing**	**3rd angle orthographic** working drawings with **non-sectional, sectional**, **half-sectional** and **part-sectional** views of **simple mechanical assemblies**. Include the following: • Title scale, hidden detail, dimensioning, cutting planes, hatching detail, notes and symbol of projection • **Hexagonal bolts, nuts and lock nuts, washers/spacers, keys and keyways** and appropriate **labels** • The different **types of section** • **Conventional representation** of common features • **Format** and **content** of working drawing **name/title blocks** **NOTE**: ALL drawings have to comply with the *SANS (SABS) 0111 Guidelines.*
1½ hrs *(2 days)*	**5**	**PAT** (Practical Assessment Task)	• The **Design Process:** - Problem **identification** and the formulation of a **design brief** with a list of **specifications** and/or **constraints** - Conducting **research** and **generating** graphical **ideas/concepts** - **Selecting** the best solution within the context of the design brief - Presenting the final solution as **working and 3D drawings** - **Evaluation** of the whole process • The **PAT scenarios** have to be **given** to the learners and **each scenario** has to be **explained and discussed.**
9 hrs *(12 days)*	**6 - 8**	**Isometric drawing**	**Simple to complex** isometric drawings with isometric and non-isometric lines as well as **auxiliary views** and **circles**.
9¾ hrs *(13 days)*	**8 - 10**	**Perspective drawing**	**2- Point** perspective drawings of **simple** castings, dwellings and civil structures • The HL, PP and SP can be varied to provide any desired view.

ANNUAL TEACHING PLAN for ENGINEERING GRAPHICS & DESIGN			
GRADE 11: TERM 1			
Min/ *(Max)* Duration	**Week(s) of term**	**Topic**	**Prescribed Content**
3 hrs *(4 days)*	**11**	**PAT** (Practical Assessment Task)	**Phase 1: Complete the following Design Process requirements:** • Problem identification and the formulation of a design brief with a list of specifications and/or constraints • Evidence of the external research conducted • Generate THREE ideas/concepts analytically and graphically (*comprehensive free-hand drawings*) • Selecting the best solution within the context of the design brief.

FORMAL ASSESSMENT FOR GRADE 11 TERM 1	
Assessment Tasks ***These are the minimum requirements for the term.***	**Suggested contribution for the term**
Test	60%
Course drawings: • Mechanical analytical exercise • Mechanical assembly • Isometric drawing • Two-point perspective	40%

ANNUAL TEACHING PLAN for ENGINEERING GRAPHICS & DESIGN			
GRADE 11: TERM 2			
Min *(Max)* Duration	**Week(s) of term**	**Topic**	**Prescribed Content**
11¼ hrs *(15 days)*	**1 - 4**	**Civil drawing**	Limited to **single-storey** dwellings, **1st angle orthographic** working drawings with **floor plans**, **elevations** and **sectional elevations** showing the detail of the **foundation to the ceiling.** Include the following: • Annotations, labels, dimensioning and scales • Relevant abbreviations and conventions • On **all relevant views/elevations:** windows, doors, and fixtures such as WC, bath, sink, shower and built-in cupboards • **Hatching** detail and the application of **colours** • Perimeters and floor areas • **Format** and **content** of working drawing **name/title blocks.** **NOTE**: ALL drawings have to comply with the *SANS (SABS) 0143 Guidelines.*
11¼ hrs *(15 days)*	**5 - 7**	**Solid geometry**	**1st angle orthographic views** of right-regular **solids** or a **combination of** the right **solids**. The axis of the solids may be perpendicular, parallel or inclined to one principal projection plane only. Include the following: • **Sectional** views • The **true shape** of the cut surface
3¾ hrs *(5 days)*	**8**	**PAT** (Practical Assessment Task)	**Phase 2: Complete ALL the instrument and CAD presentation drawings as required by each specific scenario.**

FORMAL ASSESSMENT FOR GRADE 11 TERM 2	
Assessment Tasks ***These are the minimum requirements for the term.***	**Suggested contribution for the term**
Course drawings: • Civil floor plan with elevations • Civil sectional elevation • Solid geometry	25%
Mid-year examination	75%

ANNUAL TEACHING PLAN for ENGINEERING GRAPHICS & DESIGN			
GRADE 11: TERM 3			
Min *(Max)* Duration	**Week(s) of term**	**Topic**	**Prescribed Content**
11¼ hrs *(15 days)*	**1 - 3**	**Interpenetration**	**1st angle orthographic views** showing the **curve of interpenetration** formed between two solids or pipes joined at either 30°, 45°, 60° or 90° • The solids or pipes have to be right **regular geometrical prisms and/or cylinders** only • The curves of interpenetration have to be **symmetrical** • The axes of the two solids or pipes have to be **in line**. • The focus should be on industrial examples.
9¾ hrs *(13 days)*	**4 - 6**	**Developments**	The **surface developments** of: - the parts of the **interpenetrating** solids or pipes - **containers** - **hoppers** - **truncated pyramids and cones** - **simple transition pieces** • The focus should be on industrial examples.
7½ hrs *(10 days)*	**7 - 8**	**Loci (helix)**	The principles of the **helix** in **simple** applications of: - single-line **augers** - **coil springs** - **square thread** • **Single start** only • **Right** handed or **left** handed • The **direction** has to be emphasised**.**
7½ hrs *(10 days)*	**9 - 10**	**Loci (cam)**	The principles of the **cam** in **simple** mechanical applications in which the following has to be shown: - the **cam shaft** and **follower detail** - the complete **displacement graph** - the complete **cam profile** • The **motion** has to be **uniform**. • The **direction** has to be emphasised**.** • The follower has to be on the **vertical centre line**. • The follower has to be **wedge-shaped**.
3 hrs *(4 days)*	**11**	**PAT** (Practical Assessment Task)	**Phase 3: Complete the PAT portfolio.**

FORMAL ASSESSMENT FOR GRADE 11 TERM 3	
Assessment Tasks ***These are the minimum requirements for the term.***	**Suggested contribution for the term**
Test	60%
Course drawings: • Interpenetration and development • Development of a transition piece • Loci (helix) • Loci (cam) • Mechanical assembly	40%

ANNUAL TEACHING PLAN for ENGINEERING GRAPHICS & DESIGN			
GRADE 11: TERM 4			
Min *(Max)* Duration	**Week(s) of term**	**Topic**	**Prescribed Content**
3¾ hrs *(5 days)*	**1**	**Electrical drawing**	**Parallel and series circuit diagrams,** relevant to simple electrical appliances and house wiring, by using given electrical and electronic component symbols. **Include appropriate notes.**
	2 - 3	**All topics not completed during previous terms:**	
	2 - 3	**Consolidation**	• **Mechanical assemblies** • **Civil drawings**

COMPULSORY FORMAL ASSESSMENT FOR GRADE 11 PROMOTION		
Assessment Tasks		**Contribution to final promotion mark**
SBA	**ALL tests**	**30 marks** (7.5%)
	ALL course drawings	**30 marks** (7.5%)
	Mid-year examination	**40 marks** (10%)
PAT		**100 marks** (25%)
Final examination		**200 marks** (50%)

NOTE: The duration indicates the minimum time or the *maximum number of school days* that should be spent on the topic.

ANNUAL TEACHING PLAN for ENGINEERING GRAPHICS & DESIGN			
GRADE 12: TERM 1			
Min *(Max)* Duration	**Week(s) of term**	**Topic**	**Prescribed Content**
2 hrs *(3 days)*	**1**	**Classroom and administrative management**	All **administrative** and **classroom managerial structures** to be **put in place** and the **teachers' EGD files** as well as all the **learners' EGD files** to be **prepared** for use throughout the year.
2 hrs *(3 days)*	**1**	**Revision of the general drawing principles**	• The use, care and dangers of sharp instruments • Line types, lettering (writing) and dimensioning • Free-hand drawing techniques • The principles of 1st angle and 3rd angle orthographic projections
9¾ hrs *(13 days)*	**2 - 4**	**Mechanical drawing**	**3rd angle orthographic** working drawings with **non-sectional**, **sectional**, **half-sectional** and **part-sectional** views of **complex mechanical assemblies**. Include the following: • Title, scale, hidden detail, dimensioning, cutting planes, hatching detail, notes and symbol of projection • Hexagonal bolts, nuts and lock nuts, washers/spacers, keys and keyways and appropriate labels • The different type of section • Conventional representation of common features • Format and content of working drawing name/title blocks • Detailed drawings of individual components • **Basic welding, machining** and **surface treatment symbols** • **Tolerances** **NOTE**: ALL drawings have to comply with the *SANS (SABS) 0111 Guidelines.*
1½ hrs *(2 days)*	**4**	**PAT** (Practical Assessment Task)	• The **Design Process:** - Problem **identification** and the formulation of a **design brief** with a list of **specifications** and/or **constraints** - Conducting **research** and **generating** graphical **ideas/concepts** - **Selecting** the best solution within the context of the design brief - Presenting the final solution as **working and 3D drawings** - **Evaluation** of the whole process • The **PAT scenarios** have to be **given** to the learners and **each scenario** has to be **explained and discussed.**

ANNUAL TEACHING PLAN for ENGINEERING GRAPHICS & DESIGN			
GRADE 12: TERM 1			
Min *(Max)* Duration	**Week(s) of term**	**Topic**	**Prescribed Content**
15 hrs *(20 days)*	**5 - 8**	**Civil drawing**	Limited to **single-storey** dwellings, **1st angle orthographic** working drawings with **floor plans**, **detailed elevations** and **sectional elevations** showing the detail of the **foundation to the roof**. Include the following: • Annotation, labels, dimensioning, scales • Relevant abbreviations and conventions • On **all relevant views/elevations: detail** of **gabled** and **lean-to roofs** (trusses, battons/purlins, covering, fascia, barge-board, ceiling, etc.)**, gutters** and **rain-water downpipes, plumbing** and **drainage detail, electrical fixtures** and **wiring diagrams** as well as all the other **features and fixtures** already **covered in Grade 10 and Grade 11** • Hatching detail and the application of colours • Format and content of layout/working drawing name/title blocks • **Detailed site plans** showing **electrical, plumbing** and **drainage services** detail as well as relevant **natural features** • **Perimeters** and areas of **dwellings** and **sites.** **NOTE**: ALL drawings have to comply with the *SANS (SABS) 0143 Guidelines.*
7½ hrs *(10 days)*	**9 - 10**	**Perspective drawing**	**2- Point** perspective drawings of **complex** castings, dwellings and civil structures with overhangs, depth detail, **circles** and **arcs.** • The HL, PP and SP can be varied to provide any desired view.
3 hrs *(4 days)*	**11**	**PAT** (Practical Assessment Task)	**Phase 1: Complete the following Design Process requirements:** • Problem identification and the formulation of a design brief with a list of specifications and/or constraints • Evidence of the external research conducted • Generate THREE ideas/concepts analytically and graphically (*comprehensive free-hand drawings*) • Selecting the best solution within the context of the design brief.

FORMAL ASSESSMENT FOR GRADE 12 TERM 1	
Assessment Tasks ***These are the minimum requirements for the term.***	**Suggested contribution for the term**
Test	60%
Course drawings: • Mechanical assembly • Mechanical analytical exercise • Civil sectional elevation • Civil floor plan with elevations • Civil site plan • Two-point perspective	40%

ANNUAL TEACHING PLAN for ENGINEERING GRAPHICS & DESIGN			
GRADE 12: TERM 2			
Min *(Max)* Duration	**Week(s) of term**	**Topic**	**Prescribed Content**
7½ hrs *(10 days)*	**1-2**	**Isometric drawing**	**Complex** isometric drawings with isometric and non-isometric lines as well as **auxiliary views**, **circles** and **sections**.
3¾ hrs *(5 days)*	**3 - 4**	**Solid geometry**	**Revision** of the solid geometry covered in Grade 11 i.e. **1st angle orthographic views** of right regular **solids** or a **combination of** right **solids**. The axis of the solids may be perpendicular, parallel or inclined to one principal projection plane only. Include the following: • **Sectional** views • The **true shape** of the cut surface.
11¼ hrs *(15 days)*	**5 - 7**	**Interpenetration**	**1st angle orthographic** views showing the **curve of interpenetration** formed between two solids or pipes joined at either 30°, 45°, 60° or 90°. • The solids or pipes have to be **regular geometrical prisms and/or cylinders** only. • The axes of the two solids or pipes could be either **in line or offset**. • The focus should be on industrial examples.
3¾ hrs *(5 days)*	**8**	**PAT** (Practical Assessment Task)	**Phase 2: Complete ALL the instrument and CAD presentation drawings as required by each specific scenario.**

FORMAL ASSESSMENT FOR GRADE 12 TERM 2	
Assessment Tasks ***These are the minimum requirements for the term.***	**Suggested contribution for the term**
Course drawings: • Isometric drawing • Solid geometry • Interpenetration and development • Mechanical assembly	25%
Mid-year examination	75%

ANNUAL TEACHING PLAN for ENGINEERING GRAPHICS & DESIGN			
GRADE 12: TERM 3			
Min *(Max)* Duration	**Week(s) of term**	**Topic**	**Prescribed Content**
7½ hrs *(10 days)*	**1-2**	**Developments**	The **surface developments** of: - the parts of the **interpenetrating** solids or pipes - **hoppers** - **sectioned pyramids and cones** - **complex transition pieces** • The focus should be on industrial examples • Seam allowances should be included where relevant.
3¾ hrs *(5 days)*	**3**	**PAT** (Practical Assessment Task)	**Phase 3: Complete the PAT portfolio.**
4½ hrs *(6 days)*	**4 - 5**	**Loci (helix)**	The principles of the **helix** in **complex** applications of: - **augers** - **spiral chutes** - **coil springs** - **different types of thread** • **Single start** only • **Right** handed or **left** handed • The **direction** has to be emphasised**.**
5¼ hrs *(7 days)*	**5 - 6**	**Loci (cam)**	The principles of the **cam** in **complex** applications in which the following has to be shown: - the **cam shaft** and **follower detail** - the complete **displacement graph** - the complete **cam profile** • The **motion** may be **uniform** and/or **simple harmonic** and/or **uniform acceleration and retardation**. • The **direction** has to be emphasised**.** • The follower may be **placed at any angle**. • The follower may be **wedge-shaped** or a **roller**.
7½ hrs *(10 days)*	**7 - 8**	**Loci (mechanisms)**	The principles of the **loci of a point(s)** on **schematic drawings** of the moving **components** of **mechanisms**. • **Maximum THREE** points**.**
± 18 hrs	Sept/Oct Holiday	**Preparation for the NSC examination**	**Previous Grade 12 NCS EGD question papers** should be given to all the Grade 12 EGD learners so that they can answer the question papers as part or their preparation for the NSC examination.

FORMAL ASSESSMENT FOR GRADE 12 TERM 3	
Assessment Tasks ***These are the minimum requirements for the term.***	**Suggested contribution for the term**
Test	15%
Course drawings: • Development of a transition piece • Loci (helix) • Loci (cam) • Loci (mechanisms) • Mechanical assembly	10%
Preparatory examination	75%

ANNUAL TEACHING PLAN for ENGINEERING GRAPHICS & DESIGN			
GRADE 12: TERM 4			
Min *(Max)* Duration	**Week(s) of term**	**Topic**	**Prescribed Content**
	1-2	**All topics not completed during previous terms:**	
7½ hrs	**1 - 3**	**Revision**	• The **memoranda** of the **previous Grade 12 NCS EGD question papers** should be given to all the EGD learners and all the answers should be discussed with the learners as part of their preparation for the NSC examination. • **Consolidation** of all **examinable content**

COMPULSORY FORMAL ASSESSMENT FOR GRADE 12 PROMOTION		
Assessment Tasks		**Contribution to final promotion mark**
SBA	**ALL tests**	**30 marks** (7.5%)
	ALL course drawings	**30 marks** (7.5%)
	Mid-year and preparatory examinations	**40 marks** (10%)
PAT		**100 marks** (25%)
NSC examination		**200 marks** (50%)

This annual teaching plan for CAD is suitable for schools that will be teaching CAD either during one period per week/ cycle or after normal school hours.

An ANNUAL TEACHING PLAN for CAD
The PAT for EGD requires that some of the presentation drawings have to be generated by a CAD system**. CAD is therefore a mandatory part of EGD**. However, It is the responsibility of the school to provide a secure facility for CAD and to procure the required computer hardware and CAD software, which has to be available for use by all the EGD learners. Although there is no prescribed CAD software programme that should to be used, it is advisable to procure a recognised CAD software programme that will benefit the learners once they leave school. A period of grace has been extended to schools that are still in the process of preparing a secure CAD facility and/or procuring the required computer hardware and/or CAD software. The learners of those schools have to in the interim, complete all the required presentation drawings of the PAT as instrument drawings.

GRADE 10			
Duration	**Terms**	**Topic**	**Suggested Content**
± 15 hrs	**1 - 3**	**CAD** (Computer-Aided Drawing/Design)	• Set up a 2D CAD drawing environment • Activate the basic toolbars • Use basic tools that should include: drawing (lines and circles), modify, erase, copy, dimension, text • Set up and work with layers • **Produce orthographic drawings** • Save and retrieve a drawing.

GRADE 11			
Duration	**Terms**	**Topic**	**Suggested Content**
± 15 hrs	**1 - 3**	**CAD** (Computer-Aided Drawing/Design)	• Set up a CAD drawing environment • Activate the advanced toolbars • Use advanced tools such as: mirror, rotate, move, hatch, scale, and properties • Set up and work with layers • **Draw orthographic and pictorial drawings** • Save and retrieve a drawing • Print/plot

GRADE 12			
Duration	**Terms**	**Topic**	**Suggested Content**
± 10 hrs	**1-2**	**CAD** (Computer-Aided Drawing/Design)	• Set up a CAD drawing environment • Activate more advanced toolbars • Set up and work with layers • Use more advanced tools, properties and settings • Set up and work with layers • **Draw advanced orthographic and pictorial drawings** • Save and retrieve a drawing • Print/plot • Optional: 3D CAD operations for the more advanced learners.

SECTION 4

ASSESSMENT

4.1 Introduction

Assessment is a continuous planned process of identifying, gathering and interpreting information about the performance of learners, using various forms of assessment. It involves four steps: generating and collecting evidence of achievement; evaluating this evidence; recording the findings and using this information to understand and thereby assist the learner's development in order to improve the process of learning and teaching.

Assessment should be both informal (Assessment for Learning) and formal (Assessment of Learning). In both cases regular feedback should be provided to learners to enhance the learning experience.

Engineering Graphics & Design (EGD) is both a knowledge and application/skill-based subject. Various informal tasks on the content of each topic should therefore be done on a regular (daily) basis. These informal tasks are an essential part of the developmental process that is required for EGD. It is important that the EGD learners should, as part of the teaching and learning of EGD, be given regular feedback on their acquired knowledge and skills on each of the topics. It is therefore essential that most of the informal tasks should be assessed on a regular basis. However, to ensure that the assessment of the tasks successfully contributes to the teaching and learning process of EGD, it is imperative that assessment tasks, whether formal or informal, have to be assessed within ONE week of being submitted.

4.2 Informal or daily assessment (assessment for learning)

Assessment for learning has the purpose of continuously collecting information on a learner's achievement that can be used to improve their learning.

Informal assessment is a daily monitoring of learners' progress. This is done through observations, discussions, practical demonstrations; learner-teacher conferences, informal classroom interactions, etc. Informal assessment may be as simple as stopping during the lesson to observe learners or to discuss with learners how learning is progressing. Informal assessment should be used to provide feedback to the learners and to inform planning for teaching, but need not be recorded. It should not be seen as separate from learning activities taking place in the classroom. Learners or teachers can mark these assessment tasks.

Self-assessment and peer assessment actively involves learners in assessment. This is important as it allows learners to learn from and reflect on their own performances. The results of the informal daily assessment tasks are not formally recorded unless the teacher wishes to do so. In such instances, a simple checklist may be used to record this assessment. However, teachers may use the learners' performance in these assessment tasks to provide verbal or written feedback to learners, the school management team and parents. This is particularly important if barriers to learners or poor levels of participation are encountered. The results of daily assessment tasks are not taken into account for promotion and certification purposes.

4.3 Formal assessment (assessment of learning)

All assessment tasks which make up a formal programme of assessment for the year are regarded as Formal Assessment. Formal assessment tasks are marked and formally recorded by the teacher for progression and certification purposes. All formal assessment tasks are subject to moderation for the purpose of quality assurance and to ensure that proper standards are maintained. Formal assessment provides teachers with a systematic way of evaluating how well learners are progressing in a grade and in a particular subject. Examples of formal assessments include projects, oral presentations, demonstrations, performances, tests, examinations, practical tasks, etc. Formal assessment tasks form part of a year-long formal Programme of Assessment in each grade and subject.

The minimum formal assessment requirements for Engineering Graphics and Design are as follow:

GRADE 10:

- Two tests
- Twelve course drawings
- Mid-year examination
- One PAT
- Final examination

GRADE 11:

- Two tests
- Thirteen course drawings
- Mid-year examination
- One PAT
- Final examination

GRADE 12:

- Two tests
- Fifteen course drawings
- Mid-year examination
- One PAT
- Trial/preparatory examination
- The final NSC examination

The forms of assessment used should be age and development level appropriate. The design of these tasks should cover the content of the subject and include a variety of tasks designed to achieve the objectives of the subject. Formal assessment tasks have to cater for a range of cognitive levels and abilities of learners.

The weightings of the cognitive levels for the EGD formal assessment tasks are as follows:

The application of Bloom's Taxonomy	
Cognitive level	**Weighting**
Lower order (Understanding and remembering)	**± 30%**
Middle order (Analysing and applying)	**± 40%**
Higher order (Creating and evaluating)	**± 30%**

4.4 Projects

The only project for Engineering Graphics and Design is the Practical Assessment Task (PAT). The EGD PAT is implemented across the first three terms of the school year and should be undertaken as one extended task, which is broken down into three different phases. Each EGD learner has to complete one PAT for every year of the FET phase. (See 4.9)

Instead of an additional project(s), EGD makes use of **course drawings (CD's)**, which should come from the normal yet essential developmental process of regular drawing and analytical tasks, as part of the formal assessment program. (See 4.5.5.2)

4.5 Programme of assessment

The Programme of Assessment is designed to spread formal assessment tasks in all subjects in a school throughout a term. Without this programme, tests and tasks are crowded into the last few weeks of the term creating unfair pressure on learners. The programme of formal assessment is an overview of ALL the assessment components and formal assessment tasks and the contribution of each towards the final promotion mark.

4.5.1 Grades 10 & 11

GRADES 10 & 11 FORMAL ASSESSMENT PROGRAMME					
INTERNAL FORMAL ASSESSMENT: **100%**					
CONTINUOUS ASSESSMENT **25%** (internally set and assessed)		PRACTICAL ASSESSMENT TASK (PAT) **25%** (externally set and internally assessed)		NOVEMBER EXAMINATION **50%** (internally or externally set and internally assessed)	
LEARNER'S EGD FILE		LEARNER'S PAT PORTFOLIO			
Tests: **All the prescribed** and **other formal tests**	30	PAT Part A: The Design Process & PAT Part B: Presentation drawings of Part A *(Instrument & CAD)*		NB: The final mark for each paper can be a mark that has been converted to 100.	
Course drawings: **All the prescribed** and **other** formally assessed and recorded **tasks**	30			Paper 1	100
Examination: **Mid-year** (June)	40			Paper 2	100
Total	**100**	**Total**	**100**	**Total**	**200**

4.5.2 Grade 12

GRADE 12 FORMAL ASSESSMENT PROGRAMME					
INTERNAL FORMAL ASSESSMENT: **25%**		**EXTERNAL** FORMAL ASSESSMENT**: 75%**			
CONTINUOUS ASSESSMENT **25%** (internally set and assessed)		PRACTICAL ASSESSMENT TASK (PAT): **25%** (externally set and internally assessed)		NOVEMBER NSC EXAMINATION: **50%** (externally set and assessed)	
LEARNER'S EGD FILE		LEARNER'S PAT PORTFOLIO			
Tests: **All the prescribed** and **other formal tests**	30	PAT Part A: The Design Process & PAT Part B: Presentation drawings of Part A *(Instrument & CAD)*		The final mark for each paper will be a mark that has been converted from 200 to 100.	
Course Drawings: **All the prescribed and other** formally assessed and recorded **tasks**	30			Paper 1: 3 hrs (200 marks ÷ 2 = 100)	100
Examinations: **Mid-year** (June) & **Preparatory** (September)	40			Paper 2: 3 hrs (200 marks ÷ 2 = 100)	100
Total	**100**	**Total**	**100**	**Total**	**200**

4.5.3 The EGD annual formal assessment plan

The annual formal assessment plan is an overview of each term's minimum compulsory formal assessment tasks that have to be recorded for reporting purposes. All the compulsory formal assessment tasks have to contribute to the final promotion mark.

4.5.3.1 Grade 10

GRADE 10 ANNUAL FORMAL ASSESSMENT PLAN					
ASSESSMENT TASKS	**TERM 1**	**TERM 2**	**TERM 3**	**TERM 4**	**PROMOTION MARK**
Tests	**1**		**1**		**30** (7.5%)
Mid-year examination		**1**			**40** (10 %)
Course drawings	**3**	**3**	**5**	**1**	**30** (7.5%)
PAT: Part A & Part B	Do over first 3 terms and record for the 4th.			**1**	**100** (25%)
Final examination				**1**	**200** (50%)
TOTAL					**400** (100%)

4.5.3.2 Grade 11

GRADE 11 ANNUAL FORMAL ASSESSMENT PLAN					
ASSESSMENT TASKS	**TERM 1**	**TERM 2**	**TERM 3**	**TERM 4**	**PROMOTION MARK**
Tests	**1**		**1**		**30** (7.5%)
Mid-year examination		**1**			**40** (10 %)
Course drawings	**4**	**3**	**5**	**1**	**30** (7.5%)
PAT: Part A & Part B	Do over first 3 terms and record for the 4th.			**1**	**100** (25%)
Final examination				**1**	**200** (50%)
TOTAL					**400** (100%)

4.5.3.3 Grade 12

GRADE 12 ANNUAL FORMAL ASSESSMENT PLAN					
ASSESSMENT TASKS	**TERM 1**	**TERM 2**	**TERM 3**	**TERM 4**	**PROMOTION MARK**
Tests	**1**		**1**		**30** (7.5%)
Internal examinations		**1**	**1**		**40** (10 %)
Course drawings	**6**	**4**	**5**		**30** (7.5%)
PAT: Part A & Part B	Do over first 3 terms and record for the 4th.			**1**	**100** (25%)
NSC examination				**1**	**200** (50%)
TOTAL					**400** (100%)

4.5.4 The compulsory EGD school-based assessment (SBA) tasks for each term

This is a detailed overview of each term's compulsory school-based assessment (SBA) tasks. All the compulsory SBA tasks are part of the compulsory Programme of Formal Assessment. The compulsory SBA tasks for a specific term, with the exception of the PAT, has to be recorded during that specific term and included as part of the term's reported mark.

The indicated compulsory SBA tasks are in accordance with the suggested annual teaching plans that are included in this document.

NOTE:

The indicated compulsory SBA tasks are the **minimum requirements** for each term.

4.5.4.1 Grade 10

GRADE 10 COMPULSORY SCHOOL-BASED ASSESSMENT TASKS					
TERM 1		**TERM 2**		**TERM 3**	
Assessment Tasks	*Suggested contribution*	**Assessment Tasks**	*Suggested contribution*	**Assessment Tasks**	*Suggested contribution*
Course drawings: • Freehand drawing • Geometrical construction • Ellipse	*40%*	**Course drawings:** • **1st** mechanical • drawing • **2nd** mechanical drawing • Isometric drawing	*25%*	**Course drawings:** • Solid geometry • Descriptive geometry • Civil floor plan • Civil sectional elevation • One-point perspective	*40%*
Test(s)	*60%*	**Mid-year examination:** Paper 1 and Paper 2	*75%*	**Test(s)**	*60%*

4.5.4.2 Grade 11

GRADE 11 COMPULSORY SCHOOL-BASED ASSESSMENT TASKS					
TERM 1		**TERM 2**		**TERM 3**	
Assessment Tasks	*Suggested contribution*	**Assessment Tasks**	*Suggested contribution*	**Assessment Tasks**	*Suggested contribution*
Course drawings: • Mechanical analytical exercise • **1st** mechanical assembly • Isometric drawing • Two-point perspective	*40%*	**Course drawings:** • Civil floor plan with elevations • Civil sectional elevation • Solid geometry	*25%*	**Course drawings:** • Interpenetration & development • Development of a transition piece • Loci (helix) • Loci (cam) • **2nd** mechanical assembly	*40%*
Test(s)	*60%*	**Mid-year examination:** Paper 1 and Paper 2	*75%*	**Test(s)**	*60%*

4.5.4.3 Grade 12

GRADE 12 COMPULSORY SCHOOL-BASED ASSESSMENT TASKS					
TERM 1		**TERM 2**		**TERM 3**	
Assessment Tasks	*Suggested contribution*	**Assessment Tasks**	*Suggested contribution*	**Assessment Tasks**	*Suggested contribution*
Course drawings: • **1st** mechanical assembly • Mechanical analytical exercise • Civil sectional elevation • Civil floor plan with elevations • Civil site plan • Two-point perspective	*40%*	**Course drawings:** • Isometric drawing • Solid geometry • Interpenetration & development • **2nd** mechanical assembly	*25%*	**Course drawings:** • Development of a transition piece • Loci (helix) • Loci (cam) • Loci (mechanisms) • **3rd** mechanical assembly	*10%*
				Test(s)	*15%*
Test(s)	*60%*	**Mid-year examination:** Paper 1 and Paper 2	*75%*	**Preparatory examination:** Paper 1 and Paper 2	*75%*

4.5.5 The EGD formal assessment tasks

4.5.5.1 Tests

All the questions of the EGD tests should be of a similar or higher standard than the corresponding questions of the DBE's examination/exemplar papers. The mark allocations should also correlate with the DBE's examination/ exemplar papers' memoranda.

The question or questions for each test have to justify a minimum time allocation of 60 minutes and a minimum mark allocation of 50 marks. Most tests will therefore have to consist of at least TWO questions. However, if the time allocated for a test is not sufficient for the completion of both questions, the two questions can be written as two separate tests in order to make up the required 50 marks. It is however recommended to have as many tests as possible, formal and/or informal, written throughout the year because of the true reflection of achievement and preparatory value of tests.

4.5.5.2 Course drawings

The purpose of the course drawings is to provide evidence that ALL the topics have been adequately covered and that all the learners have been assessed and given sufficient feedback on their acquired knowledge and skills in common tasks on the prescribed content of each topic.

Engineering Graphics & Design is both a knowledge and application/skill-based subject. Drawing and analytical tasks should be done on a regular (daily) basis. From this normal yet essential developmental process of regular (daily) tasks, at least one common task has to be selected from the prescribed content of each topic. The selected common

task has to be formally assessed and recorded as part of the compulsory Programme of Formal Assessment. The selected common tasks will be referred to as course drawings (CDs).

Requirements for Course Drawings (CDs):

- CDs should come from the normal teaching and learning process of EGD and should therefore be one or more of the regular (daily) tasks;
- The teacher has to ensure that each CD is each learner's own work;
- All learners have to be afforded extended opportunities, within realistic time frames, to attempt to complete, correctly or incorrectly, each of the CDs;
- Each CD should address all, or most, of the grade-specific content of the topic and of an appropriate higher order of complexity for the specific grade. More that one task may be used to obtain the recorded CD mark;
- To ensure that all CDs comply with test and examination requirements and standards, all CDs, with the exception of the analytical exercises and the perspective drawing(s), have to be tasks that are completely redrawn;
- The questions and model answers of all CDs will be in the teacher's EGD file and all the assessed and recorded CDs of each learner will be in his/her EGD file;
- Simplified rubrics may be used to assess all CDs;
- CDs are compulsory formal assessment tasks that have to contribute to the final promotion mark;
- It is important to note that CDs are not tests;
- Detailed descriptions of all CDs are on the last two pages of this document (*See APPENDIX 4*).

4.5.5.3 Examinations

The Engineering Graphics & Design examination papers should, in terms of format and content, be of a similar or higher standard than the DBE's examination/exemplar papers. The mark allocations should also be similar to the DBE's examination/exemplar papers.

In order to ensure the validity of examination papers, all papers should consist of original questions. Complete previous EGD exam papers, whether internally or externally set, may therefore not be used again. However, individual questions from a previous question paper may, preferably with some changes, be used again.

Format and composition of the final EGD examination papers are as follows

GRADE 10 EXAMINATION PAPERS					
PAPER 1 -CIVIL- *(2 hours)* In **first-angle** orthographic projection			**PAPER 2 -MECHANICAL-** *(2 hours)* In **third-angle** orthographic projection		
Q 1A	Civil analytical	± 20%	Q 1	Mechanical analytical	± 20%
Q 1B	Electrical circuits		Q 2	Geometrical construction	± 25%
Q 2	Descriptive geometry **and/or** solid geometry	± 25%	Q 3	Isometric drawing	± 25%
Q 3	1-point perspective drawing	± 25%	Q 4	Mechanical working drawing	± 30%
Q 4	Civil working drawing	± 30%			
NOTE: For the June examination, the TWO 2-hour papers may be substituted by ONE 3-hour paper					

GRADE 11 EXAMINATION PAPERS					
PAPER 1 -CIVIL- *(3 hours)* In **first-angle** orthographic projection			**PAPER 2 -MECHANICAL-** *(3 hours)* In **third-angle** orthographic projection		
Q 1A	Civil analytical	± 15%	Q 1	Mechanical analytical	± 15%
Q 1B	Electrical circuits				
Q 2	Interpenetration and development **and/or** development of a transition piece **and/or** solid geometry	± 20%	Q 2	Loci of a helix **and/or** loci of a cam	± 20%
Q 3	2-point perspective drawing	± 25%	Q 3	Isometric drawing	± 25%
Q 4	Civil working drawing	± 40%	Q 4	Mechanical assembly	± 40%

GRADE 12 EXAMINATION PAPERS					
PAPER 1 -CIVIL- *(3 hours)* In **first-angle** orthographic projection			**PAPER 2 -MECHANICAL-** *(3 hours)* In **third-angle** orthographic projection		
Q 1	Civil analytical	± 15%	Q 1	Mechanical analytical	± 15%
Q 2	Interpenetration and development **and/or** development of a transition piece **and/or** solid geometry	± 20%	Q 2	Loci of a helix **and/or** loci of a cam **and/or** loci of a point(s) of a mechanism	± 20%
Q 3	2-point perspective drawing	± 20%	Q 3	Isometric drawing	± 20%
Q 4	Civil working drawing including electrical features	± 45%	Q 4	Mechanical assembly	± 45%

4.5.6 Assessment of the EGD formal assessment tasks

Assessment is an integral part of teaching and learning, and should be done on a regular basis. It is therefore essential that most informal exercises should also be assessed. To ensure that assessment successfully contributes to the teaching and learning process, it is imperative that all assessment tasks, whether formal or informal, have to be assessed within ONE week after submission.

4.5.6.1 Course Drawings (CDs)

- A mark out of 10 allocated according to a SIMPLIFIED RUBRIC. *(See APPENDICES 1, 2 and 3)*

  NOTE:

  The complete MODEL ANSWER of each CD should be in the teacher's EGD file and used as a guideline for obtaining the mark.

- or, a converted mark out of 10, allocated according to a MARKING MEMORANDUM.

4.5.6.2 Tests

- Marks allocated according to MARKING MEMORANDA *(*In accordance with the DBE's Exemplar and Pilot/ November examination papers*).*

4.5.6.3 Examinations

- Marks allocated according to MARKING MEMORANDA (In accordance with the DBE's Exemplar and Pilot/ November examination papers*).*

NOTE:

The principles of '**marking with the mistake**' and '**benefit of doubt to the learner**' should be applied when assessing Formal Assessment Tasks.

4.6 Recording

Recording is a process in which the teacher documents the level of a learner's performance in a specific assessment task. It indicates learner progress towards the achievement of the knowledge as prescribed in the Curriculum and Assessment Policy Statements. Records of learner performance should provide evidence of the learner's conceptual progression within a grade and her/his readiness to progress or to be promoted to the next grade. Records of learner performance should also be used to verify the progress made by teachers and learners in the teaching and learning process. Teachers will record actual marks against the tasks by using a record sheet and also report in percentages against the subject on the learner's report cards.

4.7 Reporting

Reporting is a process of communicating learner performance to learners, parents, schools, and other stakeholders. Learner performance can be reported in a number of ways, including report cards, parents' meetings, school visitation days, parent-teacher conferences, phone calls, letters, class or school newsletters, etc. Teachers in all grades report in percentages against the subject. The following rating scale will apply for reports:

Rating codes and percentages for reporting:

RATING CODE	DESCRIPTION OF COMPETENCE	PERCENTAGE
7	Outstanding achievement	80 - 100
6	Meritorious achievement	70 - 79
5	Substantial achievement	60 - 69
4	Adequate achievement	50 - 59
3	Moderate achievement	40 - 49
2	Elementary achievement	30 - 39
1	Not achieved	0 - 29

NOTE: The seven point scale should have clear descriptors that give detailed information for each level.

4.8 Moderation of assessment

Moderation refers to the process that ensures that the assessment tasks are fair, valid and reliable. Moderation should be implemented at school, district, provincial and national levels. Comprehensive and appropriate moderation practices have to be in place for the quality assurance of all subject assessments.

All the Grades 10 and 11 EGD formal assessment tasks have to (unless provided) be internally set, assessed and moderated. All Grades 10 and 11 EGD formal assessment tasks could be externally moderated.

All the Grade 12 EGD formal school-based (internal) assessment tasks have to (unless provided) be internally set, assessed and moderated. The final Grade 12 EGD formal school-based (internal) assessment task marks will be externally moderated and verified.

The Grade 12 PAT, which will be externally set, has to be internally assessed and externally moderated and verified. The final NSC examination will be externally set, assessed and moderated.

All external moderation for EGD should be done by the EGD provincial subject advisor.

4.9 Practical Assessment Task (PAT)

The Practical Assessment Task (PAT) is essentially the third examination paper of EGD. ALL the presentation requirements of the PAT have to be completed at school, under the supervision of the EGD teacher. Each learner has to complete one PAT for every year of the FET phase.

The primary purpose of the PAT is to assess four subjective content and concept topics which are not assessed in the examination papers. These are:

- the Design Process
- the application of drawing knowledge and drawing skills to the design process
- CAD management and drawings
- the quality and neatness of free-hand, instrument and CAD drawings.

The elements and mark allocation for each grade's PAT:

Elements	Gr. 10	Gr. 11	Gr. 12
Part A: The Design Process	50 %	40 %	25%
Part B: Correctness and quality of the presentation drawings	50 %	60 %	75 %

The PATs should be completed in phases during the first three terms:

- Phase 1: Design Process (by the end of the 1st term for Grades 11 & 12)
- Phase 2: Presentation drawings (by the end of the 2nd term for Grades 11 & 12)
- Phase 3: Completion of PAT portfolio (before provincial moderation in the 3rd term).

Although the phases could be done either CYCLICALLY (one EGD period per week) or in a BLOCK TIME (as contained in the annual teaching plan), it is recommended that one entire day per term, preferably during the examination sessions, be allocated for each phase.

Assessment of the Practical Assessment Task (PAT)

For each criterion, a mark out of 10 is allocated according to the RUBRICS for the EGD PAT

4.10 Progression/promotion marks

This is a detailed overview of each grades **minimum compulsory formal assessment tasks** that have to contribute to the final progression/promotion mark.

GRADE 10 PROGRESSION/PROMOTION MARK		
Assessment Tasks		**Compulsory contribution**
SBA	**ALL tests**	**30** (7.5%)
	ALL course drawings	**30** (7.5%)
	Mid-year examination: Paper 1 and Paper 2	**40** (10%)
Practical Assessment Task (PAT)		**100** (25%)
November (final) **examination:** Paper 1 (100 marks) and Paper 2 (100 marks)		**200** (50%)
TOTAL		**400**

GRADE 11 PROGRESSION/PROMOTION MARK		
Assessment Tasks		**Compulsory contribution**
SBA	**ALL tests**	**30** (7.5%)
	ALL course drawings	**30** (7.5%)
	Mid-year examination: Paper 1 and Paper 2	**40** (10%)
Practical Assessment Task (PAT)		**100** (25%)
November (final) **examination:** Paper 1 (100 marks) and Paper 2 (100 marks)		**200** (50%)
TOTAL		**400**

GRADE 12 PROGRESSION/PROMOTION MARK		
Assessment Tasks		**Compulsory contribution**
SBA	**ALL tests**	**30** (7.5%)
	ALL course drawings	**30** (7.5%)
	Mid-year examinations: Paper 1 and Paper 2	**15** (3.75%)
	Prelim/preparatory examinations: Paper 1 and Paper 2	**25** (6.25%)
Practical Assessment Task (PAT)		**100** (25%)
November (final) **examination:** Paper 1 (100 marks) and Paper 2 (100 marks)		**200** (50%)
TOTAL		**400**

4.11 APPENDICES:

4.11.1 APPENDIX 1: A simplified RUBRIC for assessing course drawings (CDs) and daily exercises

NOTE:

If the task is a course drawing, the complete model answer of the drawing has to be used as a guideline for obtaining the mark.

RUBRIC FOR THE CORRECTNESS OF THE DRAWING			
DESCRIPTION for MARK	***GENERAL INDICATORS***	**± PERCENTAGE**	**MARK**
OUTSTANDING	***Error free***	**100%**	**7**
MERITORIOUS (VERY GOOD)	***Few errors***	**± 85%** A distinction drawing	**6**
SUBSTANTIAL (GOOD)		**± 70%** A good 'C' to 'B' drawing	**5**
ADEQUATE (SATISFACTORY)	***Some errors*** *(± ½ right and ½ wrong)*	**± 55%** MORE than a 50%	**4**
MODERATE (ACCEPTABLE)		**± 40%** LESS than a 50%	**3**
ELEMENTARY (UNACCEPTABLE)	***Many errors***	**± 33%** Only a few correct features	**2**
NOT ACHIEVED (VERY BAD)	***Completely wrong***	**± 25% & LESS** '*Something*' drawn very wrongly	**1**
NON-COMPLIANCE	***No work handed in***	*Nothing to mark*	***NC***

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RUBRIC FOR THE QUALITY AND NEATNESS OF THE DRAWING			
Assess the **consistency** and **quality** of **line work**, **printing/writing, dimensioning techniques** and **general neatness** of the drawing.			
DESCRIPTION for MARK	***GENERAL INDICATORS***	**± PERCENTAGE**	**MARK**
OUTSTANDING (VERY GOOD)	***Very easy to 'read'***	**80% +**	**3**
ADEQUATE (SATISFACTORY)	***'Readable', but could be better***	**60% +**	**2**
NOT ACHIEVED (UNACCEPTABLE)	***Difficult to 'read'***	**50% & LESS**	**1**
NON-COMPLIANCE	***No work handed in***	*Nothing to mark*	***NC***

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TOTAL	
	10

4.11.2 APPENDIX 2: A simplified RUBRIC for assessing multi-view civil working drawings

NOTE:

If the task is a course drawing, the complete MODEL ANSWER of the multi-view civil working drawing has to be used as a guideline for obtaining the mark.

CRITERIA	2 VIEWS	3 VIEWS	4 VIEWS	OWN CRITERIA	MARKS
VIEW 1	**6**	**4**	**3**		
VIEW 2	**6**	**4**	**3**		
VIEW 3	**–**	**4**	**3**		
VIEW 4	**–**	**–**	**3**		
BORDER and COMPLETE TITLE BLOCK	**1**	**1**	**1**		
ANNOTATIONS/NOTES/ SECTION PLANE	**2**	**2**	**2**		
DIMENSIONS	**2**	**2**	**2**		
PRESENTATION: planning, quality and neatness	**3**	**3**	**3**		
TOTAL	**20**	**20**	**20**	**TOTAL**	
CALCULATION	÷ 2	÷ 2	÷ 2	CALCULATION	
RECORDED TOTAL	**10**	**10**	**10**	**RECORDED TOTAL**	**10**
No work handed in	*NC*	*NC*	*NC*	*No work handed in*	*NC*

4.11.3 APPENDIX 3: A simplified RUBRIC for assessing multi-view mechanical working drawings

NOTE:
If the task is a course drawing, the complete MODEL ANSWER of the multi-view mechanical working drawing has to be used as a guideline for obtaining the mark.

CRITERIA	2 VIEWS	3 VIEWS	4 VIEWS	OWN CRITERIA	MARKS
VIEW 1	**6**	**4**	**3**		
VIEW 2	**6**	**4**	**3**		
VIEW 3	**–**	**4**	**3**		
VIEW 4	**–**	**–**	**3**		
BORDER and COMPLETE TITLE BLOCK	**1**	**1**	**1**		
SECTION PLANE(S)	**1**	**1**	**1**		
PROJECTION SYMBOL	**1**	**1**	**1**		
DIMENSIONS	**2**	**2**	**2**		
PRESENTATION: Planning, Quality and Neatness	**3**	**3**	**3**		
TOTAL	**20**	**20**	**20**	**TOTAL**	
CALCULATION	÷ 2	÷ 2	÷ 2	CALCULATION	
RECORDED TOTAL	**10**	**10**	**10**	**RECORDED TOTAL**	**10**
No work handed in	*NC*	*NC*	*NC*	*No work handed in*	*NC*

4.11.4 APPENDIX 4: Detailed descriptions of the prescribed course drawings (CDs):

The CDs listed below are the **minimum** number of compulsory CDs required for each grade's promotion mark out of 30.

NOTE*:*

A **working drawing refers** to a layout drawing in which **all relevant drawing features** such as a complete title block, symbols, dimensions and labels, cutting plane(s), hatching detail etc, **should be included.**

GRADE **10** (***12*** *CDs*):

- **Free-hand drawing:** *An enlarged freehand drawing that shows clear evidence of the use of blocks to establish correct proportions and sizes.*
- **Geometrical constructions:** *A complex drawing(s) that provides evidence that all or most of the geometrical constructions were taught.*
- **Construction of an ellipse:** *A complex drawing that provides evidence that the construction of the ellipse was taught.*
- **TWO mechanical drawings**: *These have to be multi-view 3rd angel working drawings of two* ***complex castings*** *that are completely different in terms of their design.*

- **Isometric drawing:** *A drawing, which could include hidden detail, with isometric and non-isometric lines as well as auxiliary views.*

- **Solid geometry**: *A multi-view 1st angle drawing of a sectioned right regular geometrical solid with an inclined axis. Include the true shape(s) of the cut surface.*

- **Descriptive geometry**: *A multi-view 1st angle drawing with at least THREE true lengths and THREE true angles with at least one to the VP and one to the HP (realistic application).*

- **Civil floor plan:** *The floor plan should be of a dwelling with more than one room/space that contains all the basic drawing features such as outer and inner walls, outer and inner doors, windows, hatching detail, all relevant labels and dimensions.. The perimeter and floor area of the dwelling has to be indicated.*

- **Civil sectional elevations of 'foundation-to-slab':** *A detailed working drawing of both a load-bearing and a non-load-bearing foundation-to-slab should be presented on the drawing sheet. Include ALL relevant labels and dimensions.*

- **One-point perspective drawing:** *An advanced one-point perspective*.

- **Electrical:** *A circuit diagram with at least eight components.*

GRADE **11** (***13*** *CDs*):

- **Mechanical analytical exercise:** *Different types of sections and conventions for mechanical drawings to be included and there should be at least 15 questions.*

- **TWO mechanical assemblies:** *These have to be multi-view 3rd angle working drawings of two* ***advanced*** *mechanical assemblies that are completely different in terms of their design, their function and their parts. Both should have fasteners that are presented in different ways.*

- **Isometric drawing:** *A complex drawing with an auxiliary view(s) and constructed circles. Hidden detail could be included.*

- **Two-point perspective drawing:** *The perspective should be of a complex civil object.*

- **Civil floor-plan with elevations:** *A multi-view 1st angle working drawing that shows the complete floor plan and at least THREE elevations of a dwelling that has at least two separate bedrooms, a separate bathroom, a separate kitchen and a separate living/working area. Include ALL the relevant Grade 11 fixtures and ALL the relevant drawing features.*

- **Civil sectional elevations of 'foundation-to-ceiling':** *A detailed working drawing of both a load-bearing wall with a window and a non load-bearing wall with a door. ALL relevant Grade 11 labels and dimensions.*

- **Solid geometry:** *A multi-view 1st angle drawing of an inclined sectioned solid that consists of a combination of geometrical solids. Include the true shape(s) of the cut surface(s).*

- **Interpenetration and development:** *An advanced drawing of two objects or solids that are joined together. Both parts of the interpenetration, or relevant sections of each part, have to be developed.*

- **Development of a transition piece:** *A drawing of an advanced polygon-to-polygon transition piece.*

- **Loci of a helix:** *An advanced application of a helix in either a civil or a mechanical context.*
- **Loci of a cam:** *An advanced application of a cam with a uniform motion. The follower has to be wedge-shaped.*
- **Electrical:** *A circuit diagram with at least eight components.*

GRADE **12** (***15*** *CDs*):

- **THREE mechanical assemblies** (ONE PER TERM)**:** *These have to be multi-view 3rd angle working drawings of three* ***complex*** *mechanical assemblies that are completely different in terms of their design, their function and their parts. All three should have fasteners that are, if possible, presented in different ways.*
- **Mechanical analytical exercise:** *Tolerances, welding symbols and machining and surface treatment symbols to be included and there should be at least 20 questions.*

  NOTE: The same dwelling or civil project can be used for the following THREE civil exercises. However, the THREE civil exercises should be done on THREE separate drawing sheets.

- **Civil floor plan and elevations:** *A multi-view 1st angle working drawing that shows the complete floor plan and at least THREE elevations of a dwelling that has at least two separate bedrooms, a separate bathroom, a separate kitchen and a separate living/working area. The complete* ***electrical wiring*** *diagram should be included on the floor plan as well as the* ***plumbing detail*** *on all relevant views. ALL other relevant fixtures and drawing features should be included on all relevant views.*
- **Civil sectional elevations of 'foundation-to-roof':** *A detailed working drawing, at an enlarged scale, of a complete section through a window, a door and the roof. Include ALL other visible features and ALL relevant dimensions and labels.*
- **Civil site plan:** *A working drawing showing all the water, sewerage and electrical features. ALL other relevant features, as required for a site plan working drawing, have to be included.*
- **Two-point perspective drawing:** *The perspective should be of a complex civil object that has circular features, preferably horizontally and vertically, as well as features on different planes.*
- **Isometric drawing:** *A complex drawing with an auxiliary view(s), constructed circles and a section.*
- **Solid geometry:** *A multi-view 1st angle drawing of an inclined sectioned solid that consists of a combination of geometrical solids. Include the true shape(s) of the cut surface(s).*
- **Interpenetration and development:** *A complex drawing of two or more objects or solids that are joined together. Both parts of the interpenetration, or relevant sections of each part, have to be developed.*
- **Development of a transition piece:** *A drawing of a complex off-centred polygon-to-circle transition piece.*
- **Loci of a helix:** *A complex application of a helix in either a civil or a mechanical context.*
- **Loci of a cam:** *A complex application of a cam that could include different types of motion. The follower should be a roller follower.*
- **Loci of points on a mechanism:** *An advanced application of the loci of two or more points on the moving parts of a mechanism.*

4.12 GENERAL

This document should be read in conjunction with:

4.12.1 *National policy pertaining to the programme and promotion requirements of the National Curriculum Statement Grades R – 12*; and

4.12.2 The policy document, *National Protocol for Assessment Grades R – 12.*