ENGINEERING GRAPHICS & DESIGN (EGD)

2024 EGD Gr. 10-11-12 Examinable Content Mapping

Gr. 10	Gr. 11	Gr. 12

INTRODUCTION TO AND THE PURPOSE OF EGD

This content must, where applicable and in an appropriate way, be incorporated into the scenarios of assessment tasks.

*To be completed in **TERM 1**:* **Discuss** the scope, educational and career opportunities related to EGD. Include human rights, gender, and inclusivity and HIV/AIDS issues.	*No specific teaching time required:* **Continuously incorporate discussion** on the scope, educational and career opportunities related to EGD. Include human rights, gender, and inclusivity and HIV/AIDS issues.	*No specific teaching time required:* **Continuously incorporate discussion** on the scope, educational and career opportunities related to EGD. Include human rights, gender, and inclusivity and HIV/AIDS issues.

EXAMINABLE CONTENT

NB: The following two concepts must be applied to all relevant content!

ANALYTICAL AND VISUALISATION EXERCISES

No specific teaching time required:

The learner must be able to **analyse** and **visualise** prepared drawings and **answer questions** based on single, multi-view and pictorial drawings within the civil, mechanical and electrical contexts.

DRAWING PRINCIPLES

General drawing principles relevant to all types of drawings

*To be completed in **TERM 1**:* • The **correct use and care of drawing instruments** • The **dangers of sharp instruments** that could cause bleeding and the transfer of HIV/AIDS	*No specific teaching time required:* • **Continiously refer** to the correct use and care of drawing instruments • **Continuously refer** to the dangers of sharp instruments that could cause bleeding and the transfer of HIV/AIDS	*No specific teaching time required:* • **Continiously refer** to the correct use and care of drawing instruments • **Continuously refer** to the dangers of sharp instruments that could cause bleeding and the transfer of HIV/AIDS

2024 EGD Gr. 10-11-12 Examinable Content Mapping

• Relevant **line types** as contained in the *SANS (SABS) 10111 and 10143 Guidelines*	• Continue the **application** of the relevant **line types** as contained in the *SANS (SABS) 10111 and 10143 Guidelines*	• Continue the **application** of the relevant **line types** as contained in the *SANS (SABS) 10111 and 10143 Guidelines*

Guidelines for EGD pencil line-work:

NOTE: *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; solid geometry cutting planes
C–type line (lightest line): Construction; planning; projections; guidelines (for writing)
Medium chain–line (B–type): Centre points of circles and arcs; centre lines (centre axis); mechanical drawing cutting/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
Medium double-dash chain-line (B-type): Outlines of adjacent components/objects; alternative and extreme positions of movable components/parts

• General **lettering** (writing) and **annotation** requirements as contained in the *SANS (SABS) 10111 & 10143 Guidelines*	• Continue the **application** of the general **lettering** (writing) and **annotation** requirements as contained in the *SANS (SABS) 10111 & 10143 Guidelines*	• Continue the **application** of the general **lettering** (writing) and **annotation** requirements as contained in the *SANS (SABS) 10111 & 10143 Guidelines*
• General **dimensioning** requirements as contained in the *SANS (SABS) 10111 & 10143 Guidelines.*	• Continue the **application** of the general **dimensioning** requirements as contained in the *SANS (SABS) 10111 & 10143 Guidelines.*	• Continue the **application** of the general **dimensioning** requirements as contained in the *SANS (SABS) 10111 & 10143 Guidelines.*

FREE-HAND DRAWINGS

*To be completed in **TERM 1**:* **Introduce, practice and apply** the basic hand movements needed to draw proportional single, multi view and pictorial drawings on plain paper and/or grid sheets.	*No specific teaching time required:* ***The Grade 10 content remains applicable to all Grade 11 topics***	*No specific teaching time required:* ***The Grade 10 content remains applicable to all Grade 12 topics***

2024 EGD Gr. 10-11-12 Examinable Content Mapping

INSTRUMENT DRAWINGS		
Setting up of a Drawing Sheet		
*To be completed in **TERM 1**:* **Set up A4 and A3** sized drawing sheets with a **border** and **basic name/title blocks**	*To be completed in **TERMS 1 & 2**:* **Set up** A4 and A3 drawing sheets with **relevant civil** and **mechanical name/title blocks/panels**	*To be completed in **TERM 1**:* Set up A4 and A3 drawing sheets with relevant civil and mechanical name/title blocks/panels
Geometrical Constructions		
*To be completed in **TERM 1**:* • **Practice and apply** the following **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 • **Construct** regular **polygons** with **3, 4, 5, 6 & 8** sides. Determine the centre of the polygons. • **Construction** of an **ellipse** by using at least TWO different construction methods	*No specific teaching time required:* ***The Grade 10 content remains applicable to all relevant Grade 11 topics***	*No specific teaching time required:* ***The Grade 10 content remains applicable to all relevant Grade 12 topics***
NOTE: ALL construction must always be shown.		
Scales		
*To be completed in **TERM 2**:* • **Practice and apply 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	*No specific teaching time required:* ***Continue the application of any scale to all types of drawing***	*No specific teaching time required:* ***Continue the application of any scale to all types of drawing***

2024 EGD Gr. 10-11-12 Examinable Content Mapping

ORTHOGRAPHIC PROJECTIONS

Solid Geometry

*To be completed in **TERM 3**:*	*To be completed in **TERM 3**:*	*To be completed in **TERM 2**:*
***NOTE**: Solid - & Descriptive Geometry **must also be used** to **teach** the **concept** of **First (1st) Angle Orthographic Projection**.* **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: • **Layout planning** • **Sectional views** • **The true shape of the cut surface** • **ALL hidden detail must be shown on all non-sectioned and sectioned views**	**1st angle orthographic views** of **solids or a combination of solids**, which includes **solids with holes.** The solids and shape of the holes may be either right-regular **prisms** or **pyramids** with 3, 4, 5, 6 and 8 sides only, as well as **right-regular cylinders** or **cones.** The axis of the solids may be perpendicular, parallel or inclined to one principal projection plane only. Include the following: • Layout planning • Sectional views • The true shapes of the cut surfaces • **ALL hidden detail must be shown**	**1st angle orthographic views** of **solids or a combination of solids**, which includes **solids with holes.** The solids and shape of the holes may be either right-regular **prisms** or **pyramids** with 3, 4, 5, 6 and 8 sides only, as well as **right-regular cylinders** or **cones.** The axis of the solids may be perpendicular, parallel or inclined to one principal projection plane only. Include the following: • Layout planning • Sectional views • The true shapes of the cut surfaces • **ALL hidden detail must be shown**

Descriptive Geometry

*To be completed in **TERM 3**:*	*No specific teaching time required:*	*No specific teaching time required:*
1st angle orthographic views of **points** and **line segments** that are perpendicular, inclined or oblique to the projection planes. • Determine **true lengths** using at least **two different methods,** e.g. projection and construction • **True inclination** of line segments	***The Grade 10 content remains applicable to all relevant Grade 11 topics***	***The Grade 10 content remains applicable to all relevant Grade 12 topics***

NOTES for Solid Geometry & Descriptive Geometry:

- ALL construction and projections must be shown.
- Mechanical drawing hatching, and the rules thereof, must be applied to the cut surfaces of the sectioned Solids, as well as the true shapes of the cut surfaces.
- Only the curves of irregular arcs may be drawn in neat freehand. However, inaccurate and/or untidy curves will be penalised.

2024 EGD Gr. 10-11-12 Examinable Content Mapping

Mechanical Drawings

All mechanical drawings must be presented as **3rd angle orthographic working drawings.**

*To be completed in **TERM 2**:*	*To be completed in **TERM 1**:*	*To be completed in **TERM 1**:*
***NOTE:** Mechanical Drawings **must also be used** to **teach** the **concept** of **Third (3rd) Angle Orthographic Projection**.* **3rd angle orthographic** working drawings with **non-sectional** and **sectional views** of **mechanical castings and objects** from industry. Include the following: **Title**, **scale, layout planning, centre lines, hidden detail, cutting planes**, **hatching detail**, **dimensioning**, **notes** and **symbol of projection**	**3rd angle orthographic** working drawings with **non-sectional**, **sectional**, **half-sectional** and **part-sectional** views of **simple mechanical assemblies**. Include the following: • Title, scale, layout planning, centre lines, hidden detail, cutting planes, hatching detail, dimensioning, notes and symbol of projection • **Hexagonal bolts, nuts and lock nuts, washers/spacers. keys and keyways** and appropriate **labels** • Different **types of section**, e.g., aligned section, revolved section, removed section, etc. • **Conventional presentation** of common features • **Format** and **content** of working drawing **name/title blocks**	**3rd angle orthographic** working drawings with **non-sectional**, **sectional**, **half-sectional** and **part-sectional** views of **complex mechanical assemblies**. Include the following: • Title, scale, layout planning, centre lines, hidden detail, cutting planes, hatching detail, dimensioning, notes and symbol of projection • Hexagonal bolts, nuts and lock nuts, washers/spacers. keys and keyways as well as relevant labels • Different types of section, e.g., aligned section, revolved section, removed section, etc. • Conventional presentation 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 aspects of all drawings must comply with the guidelines and conventional representations contained in the ***SANS 10111***.
- ALL construction must be shown where required.
- Hidden detail must only be shown when required.

2024 EGD Gr. 10-11-12 Examinable Content Mapping

Civil Drawings

All civil drawings, **limited to SINGLE-STORY dwellings**, must be presented as **1st angle orthographic working drawings**

*To be completed in **TERM 3**:*

Limited to **single-storey** dwellings, **1st angle orthographic** working drawings with **floor plans**, **basic** single line **elevations,** including basic single line roofs (i.e., only the basic irregular triangular prismatic shape of the roof), and **sectional elevations** showing the **detail of** the **foundation to the slab.**

Include the following:

- **Annotations**, **labels**, **dimensioning** and **scales**
- Relevant **abbreviations** and **graphical symbols**
- **Windows and doors** on the **floor plan only**
- **Hatching** detail on **floor plan** and **sectional elevation**
- The **calculation of perimeters**, as well as total**- and floor areas**

*To be completed in **TERM 2**:*

Limited to **single-storey** dwellings, **1st angle orthographic** working drawings with **floor plans**, **detailed elevations** with basic single line roofs (i.e., only the basic shape of the roof), and **sectional elevations** showing the **detail of** the **foundation to the ceiling height**, but **not including the ceiling itself**.

Include the following:

- Annotation, labels, dimensioning, scales
- Relevant abbreviations & graphical symbols
- On **all relevant views/elevations: windows, doors** and fixtures such as **WC, bath, sink, shower, built-in cupboards etc.**
- Hatching detail and the **application of colours**
- The calculation of perimeters, as well as total- and floor areas
- **Format** and **content** of layout/working drawing **name/title panels**

*To be completed in **TERM 1**:*

Limited to **single-storey** dwellings, **1st angle orthographic** working drawings with **floor plans**, **complete detailed elevations** and **sectional elevations** showing the **detail of** the **foundation to the roof**.

Include the following:

- Annotation, labels, dimensioning, scales
- Relevant abbreviations & graphical symbols
- On **all relevant views/elevations: detail** of **pitched** and **flat roofs** (trusses, buttons/purlins, covering, fascia, bargeboard, ceiling, etc.)**, gutters** and **rain-water downpipes, plumbing** and **drainage detail** (floor plans, elevations & site plans)**, electrical fittings** and **wiring diagrams** as well as **all** other **features & fixtures** already **covered in Gr 10 & 11**
- Hatching detail and the application of colours
- Format and content of layout/working drawing name/title panels
- **Detailed site plans** showing **electrical, plumbing**, **drainage services** detail as well as relevant **natural features etc.**
- The calculation of perimeters, as well as total- and floor areas
- **The north point**

NOTE:

- ALL aspects of all drawings must comply with the **guidelines**, **drawing symbols**, **graphical symbols** and **representations** contained in the ***SANS 10143***. ALL features must therefore, where applicable, be drawn **as symbols and**, when dimensions are given or relevant, **to scale using instruments**. **Features may only be drawn in freehand when instructed to do so!**
- ALL, and only, substructure hatching may be drawn in neat freehand.

2024 EGD Gr. 10-11-12 Examinable Content Mapping

PICTORIAL DRAWINGS		
Isometric Drawings		
*To be completed in **TERM 2**:* **Simple** isometric drawings with isometric and non-isometric lines as well as **auxiliary views.**	*To be completed in **TERM 1**:* **Simple to complex** isometric drawings with isometric and non-isometric lines as well as **auxiliary views** and **circles**.	*To be completed in **TERM 2**:* **Complex** isometric drawings with isometric and non-isometric lines as well as **auxiliary views**, **circles** and **sections**.
Perspective Drawings		
*To be completed in **TERMS 3 & 4**:* **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, natural view, worm's eye view, etc.	*To be completed in **TERM 2**:* **2- Point** perspective drawings of **simple** castings, dwellings and civil structures The HL, PP and SP can be varied to provide any desired view.	*To be completed in **TERM 1**:* **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.
NOTES for Isometric Drawings & Perspective Drawings: • ALL construction and projections must be shown. • Only the curves of circles and arcs on the perspective drawing may be drawn in neat freehand. However, inaccurate and/or untidy curves will be penalised. • Hidden detail must only be shown if required.		

ELECTRICAL DRAWINGS		
N/A	N/A	*To be completed in **TERM 1**:* Draw the **electrical fixtures** and **wiring diagrams** on **floor plans** of **civil working drawings**.

2024 EGD Gr. 10-11-12 Examinable Content Mapping

Gr. 10	Gr. 11	Gr. 12
INTERPENETRATIONS AND **DEVELOPMENTS**		
Interpenetrations		
N/A	*To be completed in **TERM 3**:* **1st angle orthographic** views showing the **curve of interpenetration** formed between two solids or tubes joined at either 30°, 45°, 60° or 90°. • The solids or tubes/pipes have to be **right-regular geometrical prisms,** with 3, 4, 5, 6 & 8 sides, **and/or cylinders only**. • The **axes** of the two solids or tubes/pipes must **meet in a common plane**, i.e. **in-line only,** with **symmetrical curves of interpenetration** • **ALL hidden detail must be shown**, unless otherwise stated.	*To be completed in **TERMS 2 & 3**:* **1st angle orthographic** views showing the **curve of interpenetration** formed between two solids, tubes or pipes joined at either 30°, 45°, 60° or 90°. • The solids or tubes/pipes have to be **right-regular geometrical prisms,** with 3, 4, 5, 6 & 8 sides, **and/or cylinders only.** • The **axes** of the two solids or tubes/pipes must **meet in a common plane**, i.e. **in-line only**, but the solids or tubes could be turned to create **non-symmetrical curves of interpenetration** • **ALL hidden detail must be shown**, unless otherwise stated.
Developments		
N/A	*To be completed in **TERM 3**:* The **surface developments** of the parts of the **interpenetrating** solids or tubes/pipes	*To be completed in **TERMS 2 & 3**:* The **surface developments** of the parts of the **interpenetrating** solids or tubes/pipes
	NOTES for Interpenetrations & Developments: • Tubes refer to prismatic shapes that are hollow with walls (sides) of insignificant thickness. • ALL construction, calculations (if required), projections and folding lines must be shown. • Only the curves of irregular arcs may be drawn in neat freehand. However, inaccurate and/or untidy curves will be penalised.	

2024 EGD Gr. 10-11-12 Examinable Content Mapping

LOCI

Cams

N/A	*To be completed in **TERMS 3 & 4**:* The principles of the **cam** in **simple** mechanical applications in which the following has to be shown: o the **cam shaft** and **follower detail** o the complete **displacement graph** o the complete **cam profile** • The **motion** has to be **uniform**. • The **direction** has to be emphasised. • The follower has to reciprocate on the **vertical centre line** of the cam shaft. • **Wedge-shaped** and **roller followers** must be applied.	*To be completed in **TERM 3**:* The principles of the **cam** in **complex** applications in which the following has to be shown: o the **cam shaft** and **follower detail** o the complete **displacement graph** o the complete **cam profile** • **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**, provided that it reciprocates on a line which passes through the centre of the cam shaft. • The follower may be **wedge-shaped** or a **roller**.

Mechanisms

N/A	N/A	*To be completed in **TERM 3**:* The principles of the **loci of a point(s)** on **schematic drawings** of the moving **components** of **mechanisms**. • **Maximum THREE** points
	NOTES for Cams & Mechanisms: • ALL construction must be shown. • Only irregular curves, e.g., the profile of the loci, may be drawn in neat freehand. However, inaccurate and/or untidy curves/profiles will be penalised.	

2024 EGD Non-Examinable/SBA Content

Developments

N/A	*N/A*	*The **surface developments** of: **Transition pieces***

Helix

N/A	*N/A*	*The principles of the **helix** in applications of:* ***Augers: Spiral chutes; Round coil springs***

Sarel de Bruin
Provincial Coordinator (DCES)
Engineering Graphics and Design
072 202 9483
sarelcdb@gmail.com & sarel.debruin@gauteng.gov.za