



For Performance Measurement

**ZIMBABWE SCHOOL
EXAMINATIONS COUNCIL
(ZIMSEC)**

**ORDINARY LEVEL SYLLABUS
2013 – 2017**

Technical Graphics 7049

1.0 PREAMBLE

This syllabus is intended to provide a Zimbabwe 'O' level certificate course in Technical Graphics.

As already expressed in the new name of the subject, emphasis is put on communication skills rather than on pure Technical drawing skills. The approach to the subject advocated in this syllabus is centred on problem solving and tries to involve pupils in planning and designing their own graphical work.

This approach will allow the integration of graphical skills and areas of knowledge relevant to self-reliance and requirements of industry.

2.0 AIMS

The aims of the syllabus are to:

- 2.1** enable pupils to understand and appreciate the importance of graphics in society;
- 2.2** give pupils a technical graphics course to prepare them to cope with the technical aspect of their environment;
- 2.3** give pupils an understanding of economic and social factors in the world of industry and work;
- 2.4** encourage a sense of self-reliance and community development;
- 2.5** develop in pupils a positive attitude towards work (determination, tenacity, open-mindedness, flexibility, adaptability and co-operativeness) so that they can meet the requirements of their course in co-operation with other pupils;
- 2.6** promote the development of curiosity, enquiry, initiative, ingenuity, resourcefulness and discrimination
- 2.7** develop wide range of communication skills central to designing;
- 2.8** foster awareness, understanding and a degree of expertise in creative thinking;
- 2.9** encourage technological awareness, foster attitudes of co-operation and social responsibility, and develop abilities to improve the quality of the environment;
- 2.10** encourage acquisition of knowledge and skills applicable to solving problems related to design and communication.

3.0 ASSESSMENT OBJECTIVES

By the end of the course, pupils should be able to:

- 3.1** effectively use various available types of media relevant to technical graphics;
- 3.2** present various technical data, relationships and processes by use of different types of appropriate media;
- 3.3** produce different types of pictorial sketches and drawings for graphical representation of objects;
- 3.4** construct accurately various geometric shapes;
- 3.5** construct the loci of a point under various conditions in simple practical applications;
- 3.6** sketch and draw solid objects in pictorial and orthographic projection;
- 3.7** produce sections and developments of solid objects;
- 3.8** draw and interpret parts drawings and assembly drawings and sections of general engineering components;
- 3.9** draw and interpret drawings of various types of buildings or parts thereof;
- 3.10** develop and communicate ideas by means of sketches, drawings and models;
- 3.11** use a variety of graphical methods to solve problems related to the design and the representation of an article;
- 3.12** present their work neatly and accurately.

SPECIFICATION GRID

Assessment Objectives	Graphic Communication and Geometry 1	Mechanical/Building 2 OR 3		Project 4
3.1	*			*
3.2	*			*
3.3		*	*	*
3.4	*			
3.5	*			
3.6		*	*	*
3.7	*			
3.8		*		*
3.9			*	*
3.10				*
3.11				*
3.12	*	*	*	*
Weighting	40%	40%	40%	20%

OBJECTIVES/COMPONENTS	PAPER 1	PAPER 2 or 3	PAPER 4	AVERAGE %
Knowledge with understanding	45%	40%	15%	33%
Practical skills and their application	20%	50%	45%	38%
Decision making and judgement	35%	10%	40%	29%
TOTALS	100%	100%	100%	100%

4.0 METHODOLOGY

4.1 The traditional teaching methodology in Technical Drawing has been of lecturing to give the information directly to pupils, and the practice method, to try to encourage them to learn that information. This probably is the simplest and easiest method, though not necessarily the most effective. Such methodology will not suffice if this new syllabus is to be successful. The traditional methods have been adequate because the pupils were learning skills and the examinations tested their level of skill acquisition. A look at the aims and objectives of the new syllabus indicates that basic drawing skills, though still important, do not carry the same weight as they did in the past, and therefore the methodology needs to be updated.

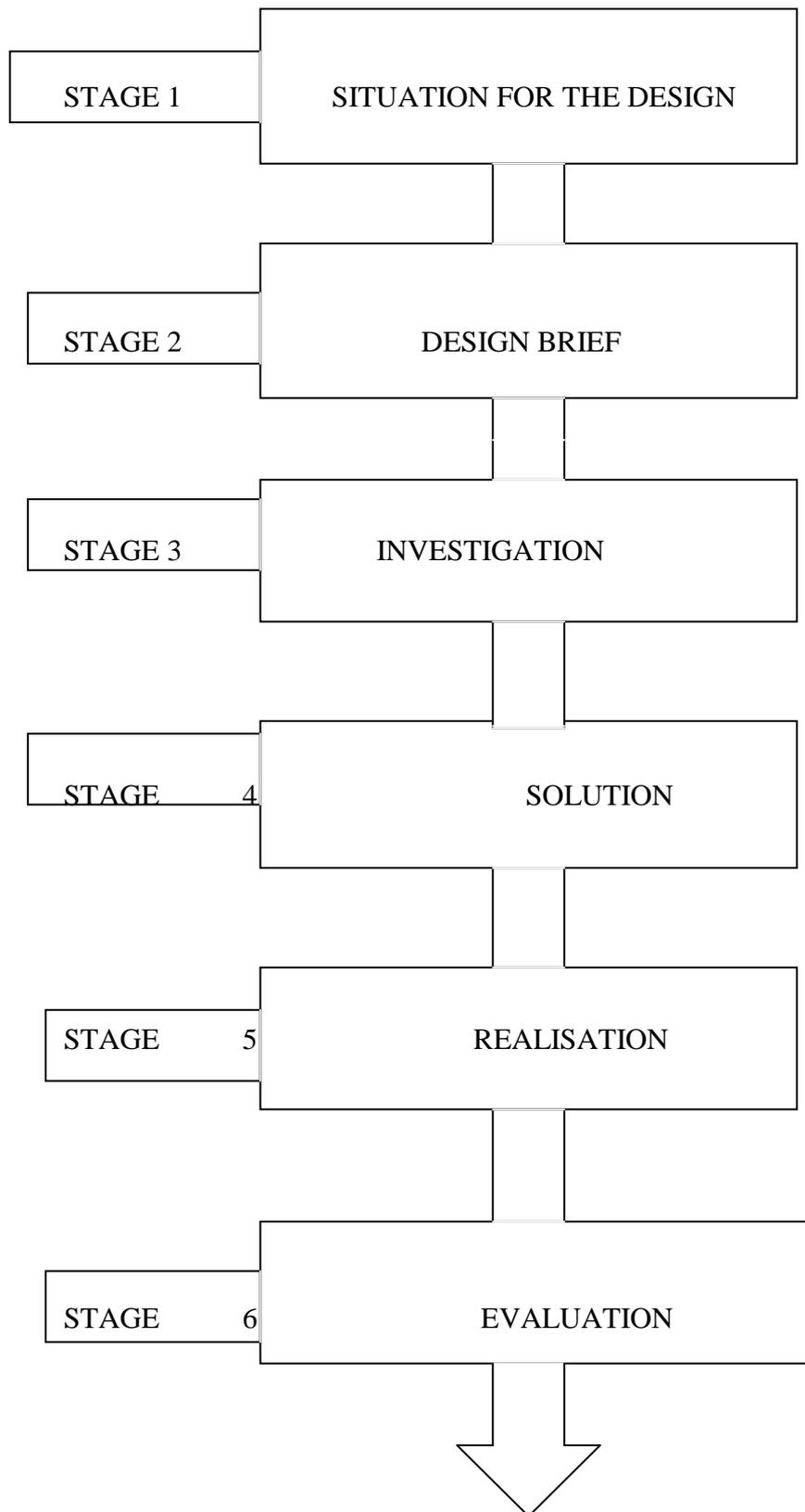
The role of the teacher in this new syllabus is changed. It is envisaged that the teacher will no longer be purely the authoritative source of all information, but a facilitator and guide to provide an environment in which pupils can express their ideas graphically and use imagination and creativity in searching for solutions to problems.

The skills and specific procedures which pupils learn will not be in theoretical isolation but will be used practically and be related to reality. This will be done by applying the principles to real situations as they are taught, or using them in the design and graphic communication segments of the course.

Lecturing as the only method will not achieve the goals of this syllabus. The use of other methodologies will be required.

For example, teachers should vary their methodology to include discussion, group project work, demonstration (pupil, not only teacher) conference, contracts, discovery, role playing “show and tell”, case studies and of course problem solving. A broad selection of methodology will more effectively equip pupils with the skills they need for life outside the school.

THE DESIGN PROCESS



5.0 CONTENT

Topic	Notes
5.1 Graphic Communication	<p>Effective use of media (pencils, coloured pencils, water colours, magic markers)</p> <ul style="list-style-type: none">-Techniques to produce simple desired effects and drawings (hatching techniques, line density, surface and line shading).-Charts (graphs, bar and pie charts, pictographs).-Flow charts.-Explanatory diagrams.-Simple maps (location maps).-Isometric and perspective (one and two point) projection.-General Graphic symbols and conventions.
5.2 Geometrical drawing	
5.2.1.	<p>Construction of triangles, quadrilaterals and other polygons, similar plane figures and figures of equal area. Reduction and enlargement of regular and irregular plane figures to specified linear and area ratios.</p> <ul style="list-style-type: none">-Construction and use of scales Plane and diagonal only) .-Loci of points of mechanism e.g. lever systems and linkages.-Construction of ellipse, parabola, hyperbola and cycloid.
5.2.2.	<p>Freehand sketching and drawing using instruments in oblique (cabinet/cavalier), isometric and orthographic (First and Third angle) projection. No isometric scale.</p>

- Sectional views of geometric solids and true shapes of section e.g. cylinder, pyramids, right cones and spheres.
- 1st Auxiliary views at 30 degrees and 60 degrees.
- Interpenetration and surface developments of right cylinders, pyramids, prisms and cones and simple combinations of these solids.
- Determination of true lengths.

5.3 Mechanical Drawing

The recommendations of P.D. 7308 1980 should be followed.

- Basic knowledge of properties and uses of materials used in engineering.
- Measuring, sketching and drawing to scale of engineering components in orthographic (first and third angle), isometric and oblique projection.
- Conventional representation and uses of fastening and locking devices (bolts, screws, rivets, pins).
- Sections, to include full, half and revolved sections and breaks in materials.
- Assembly drawings, including title block and parts list.
- Exploded views.
- Dimensioning.
- Symbols and conventions.

Subjects of drawings may be taken from workpieces, tools, machines or other objects likely to be found in a school workshop, the school or the pupils' home.

5.4 Building drawing

Recommendation of BS 1192 of 1969 should be followed.

- Basic knowledge of properties and uses of materials used in building.
- Knowledge of site lay out and site plans.
- Freehand sketching, both in orthographic and isometric projection of simple buildings and building details.
- Scale drawing in orthographic projection(first and third angle) of buildings, and parts of buildings.
- Sectional views of buildings.
- Estimation of quantities and costs: framing material, foundations, floors, wall and roofs.
- Details of buildings.
- foundations (stone concrete/strips and footing)
- floors
- walls including opening (doors, windows and parts- jambs, sills, lintels and arches)
- openings
- roofs (flat lean to, gable and hipped)
- Cold water supply; Main services only.
- Drainage of foul and waste to site boundary.
- Basic knowledge of electrical installations.
- Dimensioning of drawings.

-Symbols and conventions.

This section of the syllabus should be based on the drawing and design of simple buildings, like small dwelling houses, including the types of dwellings to be found in rural and urban areas, sheds, small workshops or school buildings.

5.5 Design and Communication

This section should be treated as an integral part of the whole syllabus.

In this section pupils will be expected to:

- identify problems and analyse the nature of these problems;
- propose and develop possible solutions to problems;
- express these solutions by means of technical graphics and model making;
- choose the most suitable solution and develop the design;
- prepare the necessary working drawings;
- evaluate the qualities of their solutions;
- record the development of their design processes.

Design exercises can be based on problems arising from the school (e.g. devices needed in the woodwork shop or the agricultural department), from the pupils' home environment (e.g. household articles, dwellings), or from commerce and industry (e.g. advertising, packaging design, work patterns and processes).

6.0 ASSESSMENT

Candidates have to complete Paper 1, either Paper 2 or Paper 3, and Paper 4.

PAPER 1:	Graphic Communication and Geometrical Drawing	(40%)
PAPER 2:	Mechanical Drawing	(40%)
PAPER 3:	Building Drawing	(40%)

PAPER 4: A design project based on section 5.5 of the syllabus. It should be completed by the end of July of the Final Year (Form 4) (20%)

7.0 TIME ALLOCATION

6 - 8 periods per week

SCHEME OF ASSESSMENT

Candidates are required to write three papers. Paper 1 and Paper 4 are compulsory, candidates must choose between Paper 2 (MECHANICAL DRAWING) and Paper 3 (BUILDING DRAWING) according to the section of the syllabus they have covered. A3 size drawing paper should be used.

PAPER 1 Graphic Communication and Geometrical Drawing
(3hrs) (40%)

Section A (35 marks) will contain 7 short compulsory questions based on Sections 5.1 and 5.2 of the syllabus.

Section B (45 marks) will contain two (2) questions from 5.1; two (2) questions from 5.2.1; and two (2) questions from 5.2.2. Candidates must answer a total of three questions (ONE QUESTION FROM EACH SUB-SECTION).

EITHER

PAPER 2 Mechanical Drawing (3 hrs) (40%)

Section A (30 marks) Candidates will answer only 5 questions from 8 given short questions based on Section 5.3 of the syllabus.

Section B (50 marks) will contain one question related to a drawing based on Section 5.3 of the syllabus.

OR

PAPER 3 Building Drawing (3 hrs) (40%)

Section A (30 marks) Candidates will answer only 5 questions from 8 given short questions based on Section 5.4 of the syllabus.

Section B (50 marks) will contain one question related to a drawing based on Section 5.4 of the syllabus.

PAPER 4 Design Project

(20%)

This will be based on Section 5.5 of the syllabus. Course work will be set in the form of a design brief set by ZIMSEC. The coursework consists of two components: the design log-book and the model.

Coursework projects can be designed for use in the house, in horticulture/agriculture, in workshop or for decorative purposes.

The design log-book (A3 size) must contain a series of sketches, drawings, models, notes etc. to show the development of the design process, including the pupil's evaluation of his/her work.

Advance information for the design project will be sent by ZIMSEC, Harare, during the third term of Form Three; the project is to be carried out during the first and second terms of Form Four.

This work will be marked by teachers and moderated by Coursework Assessors appointed by ZIMSEC. Teachers will be provided with a marking scheme when the design brief is circulated to schools.