



# HERBERT MORRISON TECHNICAL HIGH SCHOOL



**Motto: Strength and Perseverance**  
*Established 1976*

**Home of Science, Technology and Technical/ Vocational Education**

*“Promoting a Culture of Excellence”*

INDUSTRIAL ARTS DEPARTMENT

**TECHNICAL DRAWING**

**GRADE NINE (9)**

**COURSE OUTLINE**

*Revised for June 2017 Examination*

**Prepared by Mr. B. Burke**

**COURSE OUTLINE**

**Academic year:** 2020 - 2021

**Course:** Technical Drawing (*Grade 9*)

**Teachers:** K. Smith, R. Branford & D. Dixon

MONTH	WEEKS	SECTIONS	OBJECTIVES/ CONTENT	ASSESSMENTS
<p><b><u>CORE</u></b></p> <p><b><i>SECTION 1: FUNDAMENTALS OF TECHNICAL DRAWING</i></b></p> <p><b><i>1A: OCCUPATIONAL HEALTH, SAFETY AND THE ENVIRONMENT</i></b></p>				
			<p><b>1. Safety, health and welfare standards</b>            (a) Standards for:</p> <p>(i) workshop/laboratory;            (ii) equipment;            (iii) materials.</p> <p><b>1A: OCCUPATIONAL HEALTH, SAFETY AND THE ENVIRONMENT (cont'd)</b>            (b) Occupational Health and Safety (OHS).            (c) Guidelines for:</p> <p>(i) working safely;            (ii) enhancing wellness;            (iii) preventing injury and accident.</p>	

		<p><b>2. Safety, health and welfare requirements</b></p> <p>(a) Inventory of materials, tools and equipment.</p> <p>(b) Workshop/laboratory and equipment maintenance plans.</p> <p>(c) Workshop/laboratory layout and shop organisation diagrams.</p> <p>(d) List of danger points.</p> <p>(e) Safety signs and symbols.</p> <p>(f) Safety lanes.</p> <p>(g) Personal Protective Equipment (PPE).</p> <p>(h) Equipment guards.</p>	
		<p><b>3. Safety resources</b></p> <p>(a) PPE:</p> <p>(i) for different tasks;</p> <p>(ii) preparing labelled diagrams of safety gear and accessories.</p>	
		<p><b>4. Fires and fire-fighting equipment</b></p> <p><b>(a) Types of fires:</b></p> <p>(i) Class A;</p> <p>(ii) Class B;</p> <p>(iii) Class C;</p> <p>(iv) Class D.</p>	

			<p><b>(b) Fire-fighting equipment:</b></p> <p>(i) fire extinguishers (Class A, Class B, Class C and Class D);</p> <p>(ii) colour codes for fire extinguishers;</p> <p>(iii) fire hydrants;</p> <p>(iv) fire hoses.</p>	
			<p><b>5. Using a fire extinguisher</b></p> <p>(a) Safety guidelines and procedures for the various ranges of fires.</p> <p>(b) Preparing and maintaining report of usage.</p> <p>(c) Storage and maintenance of fire extinguishers</p>	
			<p><b>6. Accident, injury and emergency</b></p> <p>(a) Differences.</p> <p>(b) Examples (falls, electric shock, minor damages to the eyes, broken bones, cuts).</p>	
			<p><b>7. First Aid</b></p> <p>(a) First Aid kit station.</p> <p>(b) Responsibilities of a First Aider.</p> <p>(c) Treating:</p>	

			<ul style="list-style-type: none"> <li>(i) burns;</li> <li>(ii) electric burns;</li> <li>(iii) cuts and abrasions;</li> <li>(iv) heavy bleeding;</li> <li>(v) practising mouth-to-mouth resuscitation and recovery position.</li> </ul>	
			<p><b>8. Getting professional help</b></p> <p><i>(a) Procedures for reporting an accident.</i></p> <p><i>(b) Emergency contacts:</i></p> <ul style="list-style-type: none"> <li>(i) police;</li> <li>(ii) fire services;</li> <li>(iii) hospital and ambulance service;</li> <li>(iv) Red Cross;</li> <li>(v) the defence force.</li> </ul> <p><i>(c) Preparing an accident report.</i></p>	
			<p><b>9. Hazards and hazardous substances</b></p> <p><i>(a) Definitions:</i></p> <ul style="list-style-type: none"> <li>(i) hazard;</li> <li>(ii) hazardous substance.</li> </ul> <p><i>(b) Materials Safety Data Sheet.</i></p> <p><i>(c) Storing materials and supplies safely.</i></p>	
			<p><b>10. Mock Drills</b></p> <p><i>(a) Emergency procedures for a fire, an earthquake and a volcano.</i></p> <p><i>(b) Preparing mock drill reports.</i></p>	

**SECTION 1: FUNDAMENTALS OF TECHNICAL DRAWING**  
**1B: EQUIPMENT, TOOLS, MATERIALS, LETTERING, LINE WORK, DIMENSIONS AND SCALES**

**Free-hand sketching**

- (a) Using grid and plane papers.
- (b) Pictorial and orthographic drawings.
- (c) Sketching in proportion.
- (d) Graphic symbols.
- (e) Line work.
- (f) Sketching of building and engineering components

**The design process**

- (a) Identification of the problem.
- (a) Design of initial ideas to solve the problem.
- (b) Proposed solution.
- (c) Development and testing of models/prototypes.
- (d) Development of working drawings, notes and sketching to explain each step in the process.

	<b>SECTION 2A: GEOMETRICAL CONSTRUCTION: PLANE GEOMETRY</b>	
	<b>1. Solid and plane geometry</b> <i>(a) Definitions:</i>  (i) solid geometry;  (ii) plane geometry.  <i>(b) Differences:</i>  (i) functions and features of plane and solid geometry.  (ii) geometric terms and concepts	
	<b><i>Mathematical and graphical representation of areas of figures</i></b>  Differences in shapes and functions of mathematical and graphical representation of:  (a) rectangles;  (b) squares;  (c) triangles;  (d) circles;  (e) regular and irregular polygons.	

			<p><b>Circle Theory, Tangents, Blending of Lines and Curves</b></p> <p>(a) Definition.</p> <p>(b) Parts of a circle</p> <p>(b) Properties.</p> <p>(c) Tangency of circles, arcs and straight lines.</p> <p>(d) Internal and external tangents, centres and tangency points.</p> <p>(e) Drawing arcs tangential to two straight lines at acute, right and obtuse angles.</p> <p>(f) Constructing the common internal and external tangents to two given circles.</p> <p>(g) Drawing an arc tangential to two given circles of different radii.</p> <p>(h) Drawing lines, arcs and circles to blend tangentially to create geometric shapes.</p>	
			<p><b>Division of triangles and polygons</b></p> <p>(a) construction principles of similar and proportional triangles.</p> <p>(b) dividing triangles and polygons in a number of equal and proportional parts.</p>	



			<p><b>Geometric figures equal in areas to other figures</b></p> <p>(a) Constructing a rectangle of equivalent area to: (i) acute and right (angled) triangles; (ii) obtuse triangles.</p> <p>(b) Constructing a square of equivalent area to: (i) a regular polygon; (ii) an irregular polygon.</p>	
			<p><b>Reducing and enlarging plane figures</b></p> <p>(a) Principles of reducing and enlarging areas of plane figures.</p> <p>(b) Reducing and enlarging plane figures by: (i) linear measurements; (ii) ratio of sides; (iii) ratio of areas.</p>	

<b>SECTION 2B: GEOMETRICAL CONSTRUCTION: SOLID GEOMETRY</b>				
			<p><b>Surface Development</b></p> <p><i>Uses of surface development for oblique solids and frustum of solids (relevant to the sheet metal industry).</i></p> <p><b>Constructing surface developments of oblique and frustum solids</b></p> <p><i>(a) Applying parallel line and radial development methods for constructing:</i></p> <p>(i) prisms; (ii) cylinders; (iii) cones; (iv) pyramids; (v) truncated hexagonal pyramid, truncated cylinder; (vi) intersecting cylinders joined at angles; (vii) cylinders joined at 90 and 60 degree angles (large and small cylinders).</p> <p><i>(b) Determining true lengths and shapes of the surfaces.</i></p>	
			<p><b>1. Pictorial drawings</b></p> <p><i>(a) Types of pictorial drawings:</i></p> <p>(i) isometric; (ii) oblique; (iii) perspective.</p> <p><i>(b) Characteristics and uses of each type.</i></p> <p><i>(c) Advantages and disadvantages of each type.</i></p> <p><i>(d) Principles of projection for points, lines and planes from one view to the other.</i></p>	

		<p><b>Producing pictorial drawings</b></p> <p><b>(a) Isometric drawings:</b></p> <ul style="list-style-type: none"> <li>(i) regular shaped objects;</li> <li>(ii) irregular shaped objects;</li> <li>(iii) objects with inclined surfaces;</li> <li>(iv) given the plan and front elevation;</li> <li>(v) drawings with isometric circles;</li> <li>(vi) drawings with isometric curves;</li> <li>(vii) exploded isometric drawings.</li> </ul> <p><b>(b) Oblique drawings:</b></p> <ul style="list-style-type: none"> <li>(i) drawing geometric solids in cavalier and cabinet projections;</li> <li>(ii) drawing figures with curves and circles in cabinet and cavalier oblique projections.</li> </ul> <p><b>(c) Perspective drawings</b></p> <ul style="list-style-type: none"> <li>(i) drawing geometric solids in 1-point perspective;</li> <li>(ii) drawing geometric solids in 2-point perspective.</li> </ul>	
		<p><b>First and third angle projections</b></p> <p><i>Principles relating to the planes of projection:</i></p> <ul style="list-style-type: none"> <li>(a) horizontal plane;</li> <li>(b) vertical planes;</li> <li>(c) plans;</li> <li>(d) elevations.</li> </ul>	
		<p><b>Orthographic drawings of geometrical solids</b></p> <ul style="list-style-type: none"> <li>(a) Simple models.</li> <li>(b) Truncated solids: <ul style="list-style-type: none"> <li>(i) rectangular prism and pyramid;</li> <li>(ii) hexagonal prism.</li> </ul> </li> </ul>	

## MONTHLY ASSESSMENT MARKS ALLOCATION

<b>CLASS WORK</b>	<b>-10%</b>
<b>Portfolio &amp; Presentation</b>	<b>-30%</b>
<b>TEST</b>	<b>- 60%</b>

### Special Notes

- Students **MUST** be punctual at all times.
- **Assignments** should be handed in on the **specified due date**. Failing to comply with the specified date will result in a fifty percent (**50%**) reduction in the marks for each outstanding day. Assignments that are more than **2 days** late will **NOT BE COLLECTED**.
- At the end of this module learners will be required to complete a written and/or oral and practical internal assessment to demonstrate competence.
- Student's involvement in discussions during each session is an important aspect of the course. All students should expect to fully participate in class discussion and activities during all sessions.

### READING ASSIGNMENT/QUIZZES/TESTS

1. There are a number of reference texts and support materials used for this class. Each student is expected to read the assigned reading in full, before the class, as stated on the outline.
2. Quizzes may be announced or unannounced. Quizzes cover material covered in previous classes.
3. There will be periodic tests over sections of material covered in class lectures, reading and assignments.

### CHEATING, DISHONESTY AND PLAGIARISM

Any form of cheating is sufficient for an automatic zero. The facilitator is willing and available to help any student who seeks assistance. Cheating, dishonesty, plagiarism, copying portions of another student's assignment etc. are totally unacceptable. Assignments are given to aid in the development of competency and acquisition of knowledge. Spend extra time to do your assignments with as little help from others as possible.

## **PORTFOLIO DEVELOPMENT**

A portfolio is an organised convenient means of collection and presentation of materials which records and verifies a candidate's or student's learning achievements and relates them to the depth and breadth of work required by each topic covered. The depth and breadth of work should include a diversity of exhibits which reflects the following criteria:

- Writing, Reading and Comprehension Skills
- Critical Thinking and Problem Solving Skills
- Technology Skills - Practical Skills
- Teamwork Skills

*The outline of the portfolio should include information under the following headings:*

- Cover Page
- Table of Contents
- Introduction
- Supporting Evidence (Depth & Breadth of Work)
- Self Assessment/Reflection

## **Details of EACH Heading**

### **Cover Page**

- Name of School
- Grade and Course
- Teacher's Name
- Candidate's and Student's Name
- Year

### **Table of Contents**

- By units or main headings
- Number pages

### **Introduction**

- Portfolio of candidate to include personal data, background information on education and expectations.

### **Supporting Evidence**

Provides information on the key formative and summative assignments / projects undertaken by the candidates/ students to achieve the objectives for each topic covered. All evidence supplied by the student should be reviewed by the teacher using the criteria given. Evidence must be signed and dated on the date of the review by the teacher or assessor.

**Suggestions for supporting evidence:**

Written Assignment

- ❖ Oral Questions (checklist format)
- ❖ Projects
- ❖ Work Samples
- ❖ Research Assignments
- ❖ Fieldtrip reports
- ❖ Summative evaluation of practical work
- ❖ Digital photographs of candidates performing critical task

**Resources:**

Green, J.N. *Technical Drawing for CSE and GCE*

Morling K. *Geometric and Engineering Drawing, Third Edition*