LEARNING GUIDE

TRANSFORMATIONS MECHANIZATION OF WORK

SCIENCE AND TECHNOLOGY

TSC-4063-2





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About this Learning Guide

Welcome to the learning guide for the *Mechanization of Work* course. This **Secondary IV** course in the **Science and Technology** program is intended to develop your ability to deal with situations relating to:

- · the types of diagrams used to represent a technical object;
- the motion mechanisms in certain technical objects and the way in which they transmit or transform motion;
- the links between the parts of a technical object that allow or do not allow for motion;
- · forces and fluids;
- the characteristics of different types of materials.

Listed below are the three competences you will develop:

- seeks answers or solutions to scientific or technological problems;
- makes the most of his/her knowledge of science and technology;
- communicates in the languages used in science and technology.

You are now invited to carry out the learning activities presented in the five chapters of this learning guide.

Portailsofad.com

Video capsules and printable versions of the complementary resources for this guide and the rest of the TRANSFORMATIONS collection are available at **portailsofad.com**. They will assist you throughout this course.



CHAPTER ORGANIZATION

The learning process presented in each chapter allows you to make progress by building on what you learned in the previous sections. The following diagram illustrates this process and states the educational aim of each section.

INTRODUCTION TO THE CHAPTER

The first page describes the context and the theme that will provide the basis for learning the new concepts introduced in the chapter.



A table of contents opposite the first page presents the knowledge to be acquired in the two learning situations and the theme of each one.



SITUATIONS

There are two learning situations in each chapter: one is theoretical and the other is practical. The learning process in both situations allows you to acquire new concepts and develop competencies within real-life, meaningful contexts.

PARTS OF A LEARNING SITUATION



PRESENTATION OF THE LEARNING SITUATION

This page sets out the main theme of the chapter, briefly describes the context of the learning situation, and provides the information needed to solve it.

The task to be carried out later on, in the *Solution* section, is presented in the text box at the bottom of the page. This task is the starting point for acquiring the new knowledge required to solve the learning situation.



SOLUTION

When you get to this section, you should have all the knowledge you need to solve the learning situation described at the beginning of the chapter.

Additional elements of the investigative process in science and exploration strategies may also be suggested here.

	The following questions will help you analyze the situation. Even if you, write them down. You will be able to check them against the exploration	are rail sare about your answers, oc in the answerkey.	
	INVESTIGATIVE PROCESS Description of the approach	100LKIT	Sitteria Cancer
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The second s	(a) New you new accessibled a pace of function by following the top if so, exploit here you went about the.	s in the assembly indivadians?	
į.			
			- 8

- EXPLORATION

In this section you will analyze the information provided in the learning situation and identify what you already know about the topic at hand, as well as any new knowledge needed to complete the task.

Different aspects of the investigative process in science and exploration strategies are suggested here.

 Performance and the second s		
all sense advected metal to the structure shale that the structure struct		Associate each of the following leves with its corresponding description function the extension line, the dimension and the dimension line.
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	6	

CONSOLIDATION

In this section you can put into practice what you learned in the *Aquisition* section.

Like the *Integration* exercises, the exercises in the *Consolidation* section also help you to develop the competencies.

AT THE END OF THE CHAPTER

KNOWLEDGE SUMMARY

This section summarizes all the key concepts presented in the chapter.

INTEGRATION

This section includes some complex exercises and scenarios that require you to apply what you have learned in the chapter.

LES

The learning and evaluation situation (*LES*) is a complex task similar to those that you will encounter in the final exam. It includes a competency evaluation chart.

Layi Difees stjoct, in with an United	ng out a techni disector used to cente There are international co di thereby allow taketoi rother. For example, aut fation need to be able to	cal drawing a technical-drawing of a technical mentions, that govern the use of these desists in different todays in a communicate models good manufacturess in the understand plant drawing in Canada.	Technical Loi of rains lorogo a leatonia Digest maileon o	
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		Easts Inno		
	Line	Description Function	Example	
	Construction line	a sharing		
	Valide continue line	Thick line representing shiftle details, of the object		
	Halden carriese line	Darited line representing hidden details of the object		
	Dimension line	First line used to indicate a dimension		
	Estansian Ine	Fine line used to precisely indicate the beginning and end of a dimension	1 1	
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ACQUISITION

In this section, you will acquire the knowledge required to solve the learning situation.

ADDITIONAL MATERIALS



- SELF-EVALUATION

A Self-Evaluation activity is found at the beginning of the Additional Materials section. This activity allows you to assess what you have learned and the competencies you have developed in the course. It also helps you to determine what subject matter you have mastered and what concepts you need to review before completing the Scored Synthesis Activity.

0.01	phical Language
0 N	me the type of line used to make a drawing.
0.	hy are certain parts of a technical drawing cross-hatched?
0	It possible to represent the hidden details of an object in a technical drawing? Explain your annews.
O ₁₀	arie wants to make a scale drawing of her father's boat. What type of scale should she use? stify your answer.
1.2	
6.	Nch of the following scales should you use to represent a die? Justify your answer. 125 X1 S1 13 101
0.	hn uses a scale of 1:10 to draw the shed in his backgard. The dimensions of the shed are shown below.
	Length 115 cm Height 115 cm
	hat are the measurements of the shed in his drawing?

REVIEW

In the *Situation* sections, you will come across *Reminder* text boxes containing topics covered in previous courses, which are essential for understanding new concepts or completing the assigned task.

The questions and exercises in the *Review* section will help you review the topics appearing in the *Reminder* text boxes.

Selected measurer Measuring	sent and layout tools Laying out
Ruler Used to measure small lengths. It is generally graduated in millimetric (em).	-
For each of the second	the production of the set of the
Control by the second s	Auto

- APPENDIX

This section presents additional information.

The key concepts are bolded blue and the terms that a black .	are defined in the body test of the chapters are bolded
Adhesion (p. 120) Phenomenon by which the surfaces of a part or a technical object tend to remain in contact with each other without slipping.	Deflection (p. 177) The force that bends an object: the material is stretched and slightly crushed. Degrees of freedom of a part (p. 117)
Apothem of a pyramid (p. 13) For a regular pyramid, the slart height of a lateral face, i.e. the shortest distance from apex to base on a given face.	The number of ways a part can move independently If an object could exist totally independent from any other object it would have six degrees of motion freedom translation along three axes (x, y and z) and rotation around the same three axes.
Archimedes' principle states that the upward acting force that is exerted on a body immersed in a fluid is equal to the weight of the fluid that the body displaces.	Design plan (p. 64) Simplified drawing that shows how a technical object works.
Assocratic projection (p. 11) An assocratic projection, also known as an exploded view, is used to show the relationship of the different parts that may us a technical object by separating the parts.	Comparing the second se
Bending (p. 83) A machining technique used to curve a material into the desired shape.	the dimension of a part may vary when it is manufactured. Dimensioning (p. 7)
Bernoull's principal (p. 146) Bernoull's principle states that an increase in the speed of a fluid occurs simultaneously with a decrease in pressum.	Dimensioning involves indicating actual measurements on a technical drawing. It is also used to position different elements on an object such as the location and diameter of a hole.
Ceramic (p. 182) A material obtained by heating such raw materials as clay and sand to high temperatures.	Drilling (p. 81) A machining technique that consists in making round holes essential to manufacturing and
Channel (p. 57) Groove in a material.	technical object.
Composite material (p. 183) Material made from two or more constituent materials with complementary properties.	Electric force (p. 166) Force of attraction between objects with different charges.
Compression (p. 177) The force that squeezes an object: the material is crushed.	Equilibrium (p. 162) State of an object subjected to more than one force if the forces are of the same magnitude, but applied in remeating directions

- GLOSSARY

Key concepts **bolded blue** and terms **bolded black** in the body text of the chapters also appear in the *Glossary*.



ANSWER KEY

The Answer Key at the end of the guide will allow you to check your answers and steer you through the learning process. It contains the answers to the questions in the guide and detailed explanations regarding the correct procedure or line of reasoning.

Theory						
The theory here	artivity involves o	ompatencies 2 and	0			
	Malar for most o	This free barred and		-		
· competency a		a contraction to contract,	pron accentice and in			
 Competency 3 	Communicates in	one languages use	d in science and te	chhology.		
Here is a rubric of Use this rubric to	the evaluation crit complete the mini-	eria for these com rubric found at th	e end of each LES.	uting scale for the	criteria.	
Evaluation	Excellent	Very good	Geed	Weak	Very weak	
2.5	When analyzing	When analyzing	When analyzing	When analyzing	When analyzing	
Accurate	dagans,	dagans,	diagrams, identifier mme	diagrams, identifies few	dagrams, identifies year few	
of the issue	principles that	of the principles	of the principles	of the principles	of the principles	
	undertie the	that underlay the	that undertail the	that undertee the	the methodismu	
	responsible for	responsible for	responsible for	responsible for	responsible for	
	a technological	a technological	a technological	a technological	a technological	
	application, or,	application, or,	application, or,	application, or,	application, or,	
	when analyting an application.	whee analyzing an application.	when analyzing an application.	when analyting an application.	whee analyzing an application.	
	identifies all the	identifies mod	identifies some	identifies few	identifies very few	
	condition to an	of the constants	of the constaints to which the	of the constraints	of the constaints	
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	subjected.	culipedied.	subjected.	catpected.	adjected.	
Relevant use	use af higher	Names good use of Nicher knowledge	higherknowledge	histerknowledge	use of higher	
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	technological	application and	application and	application and	technological	
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2.3	Circle oregents	PresentsEarch	Lacks some darity	Is undear in	Presents higher	
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	to manufacture	ta-manufacture	the materials used	to manufacture	to manufacture	
	a technological	attechnological	to manufacture a technological	a technological	a sechnological	
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	improvements by	improvements by	suggests relevant	improvements by	suggeds improve-	
	appropriate	judifications.	providing brief	justications	nievanz.	
	is officiations		institle stores			

RUBRIC FOR THE COMPETENCIES

After completing a learning and evaluation situation, or *LES*, you can use the *Rubric for the Competencies* at the end of the guide to evaluate your work. You can then complete the abbreviated rubric found at the end of each *LES*.

TEXT BOXES



You will interpret different techniques in order to correctly assemble ...

Presents the task to be carried out as part of the learning situation.

REMINDER

Scale

Technical drawings are not ...

Refers to knowledge acquired in previous courses and to review exercises related to this *Reminder*.

KEY KNOWLEDGE

A **multiview orthogonal projection** is used to ...

Presents new key concepts to be learned. This knowledge is prescribed by the program of studies.

INVESTIGATIVE PROCESS

The first step in the investigative process is to define the problem ...

B

Presents aspects of the investigative process in science that can be applied in various situations.

STRATEGY Consider ...

When an investigative approach involves forming an opinion or ...

Presents exploration or analysis strategies that can be applied in various situations.

DID YOU KNOW?



Super glue Cyanoacrylates are a family of special glues. Encourages you to discover additional scientific, historical and cultural information related to the concepts under study.

NOTE

Specifications

On page 28, you ...

Provides additional information or points out possible exceptions to the concept in question.

You are invited to refer to the Toolkit for a review of certain ...

Refers to information found in the toolkit.



Now complete the **Reviewing the design process** section and write a short **conclusion** (p. 13).

Prompts you to complete a section in the practical activity booklet.

0.0



SCORED ACTIVITY

You must now do Scored Activity 1. It is available on the course website ... Indicates that you are now ready for the *Scored Activity*, which will test your understanding of the material covered so far. At the very end of the course you will complete a *Scored Synthesis Activity*.

These activities are presented in separate booklets. Once completed, they must be submitted to your teacher (or tutor), who will mark them and provide feedback. The **TRANSFORMATIONS** collection consists of all the courses in the Diversified Basic Education Program for Secondary IV and Secondary V.





SOFAD

TRANSFORMATIONS

The courses in the **TRANSFORMATIONS** collection feature a learning process based on the acquisition of prescribed knowledge through interesting and meaningful learning situations. The instructional approach underlying this learning process is outlined below.



The knowledge and competencies to be developed become meaningful through investigations that require learners to use inductive and deductive reasoning skills. The learning guides provide a variety of simple exercises and more complex tasks that address the needs of both learners and teachers. Additional resources are available on portailsofad.com.

Components of the TRANSFORMATIONS collection:

- Toolkit: Print and PDF versions;
- · Learning Guide: Print and PDF versions;
- Teaching Guide: PDF;
- Video clips of concepts and laboratory techniques;
- Experiment kits;
- Scored activities;
- Answer keys.



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