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GEOMETRIC REPRESENTATION IN A FUNDAMENTAL CONTEXT 2



Geometric Representation in a Fundamental Context 2 MTH-5173-2 2nd ed.

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Project Management:

Marie-Ève Côté (2nd ed.) Linda Tremblay (2nd ed.) Nancy Mayrand (1st ed.) Isabelle Tanguay (1st ed.) Nadia Leroux (1st ed.)

Pedagogical Design: Jean-Claude Hamel Brahim Miloudi

Authors:

Stephan Bertrand Sylvio Guay Jonathan Lafond Jean-Claude Hamel Brahim Miloudi Benoit Morand Catherine Paris Éric Rouillard

Pedagogical Review:

Valériane Passaro Déborah Nadeau Parent Steeve Pinsonneault

Docimological Review: Stephan Bertrand

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Scientific Review:

Olivier Arsenault Jean-François Cardin Hélène Décoste

Linguistic Review: Nadia Leroux

Graphic Design and Cover: Mylène Choquette

Layout:

Marquis Interscript (2nd ed.)

Graphics: Olivier Choquette

Production and Illustrations: Alphatek

Proofreading:

Olivier Arsenault Hélène Décoste Cédric Lierman Catherine Paris

Corrections: Sabine Cerboni (2nd ed.) Pierre-Yves L'Heureux (1st ed.)

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Project Management:

Mélanie d'Amours (2nd ed.) Véronique Lacroix (2nd ed.) Ali K. Mohamed (1st ed.)

Translation and Proofreading:

Claudia de Fulviis (2nd ed.) Documens (1st ed.)

Mathematical Content Review:

Bernard Osei-Asamoah (Mathematics Consultant, English Montreal School Board)

Adrian Bracisiewicz (Mathematics Teacher, Lester B. Pearson School Board)

Daniel Afriyie (Mathematics Teacher, English Montreal School Board)

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• p. 89t © NASA • p. 122 © NASA

Legend: r = right	c = centre	l = left
t = top	b = bottom	

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STRUCTURE OF THE LEARNING GUIDE

Welcome to the learning guide for the *Geometric Representation in a Fundamental Context 2* course. The aim of this course, which is the third in the **Secondary V Science** sequence, is to develop your ability to deal with situations that involve spatial descriptions or representations. To achieve this, you will learn about geometric loci, in particular:

- the circle
- the ellipse
- the hyperbola
- the parabola.

You will also be introduced to the concept of vectors and their properties and deepen your knowledge of trigonometric identities.

You will be required to use various solution strategies to understand and model situational problems. You will need to use your mathematical reasoning skills. You will also have to describe how you solved these problems clearly and thoroughly using mathematical language.

You are now invited to complete the learning activities found in the three chapters of this guide and to enrich your knowledge of geometry.

Portailsofad.com

Go to <u>portailsofad.com</u> for videos, ICT activities and printable versions of resources that are complementary to the SOLUTIONS series, which you can use throughout your learning journey.





CHAPTER COMPONENTS

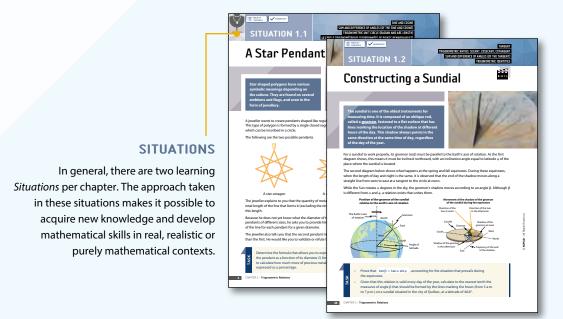
The learning process followed in each chapter enables students to progress by building on what they have learned from one section to the next. The following diagrams illustrate this approach and specify the pedagogical intent of each section.

CHAPTER OPENING

The first page describes the context and theme that will serve as a backdrop for the acquisition of the new knowledge discussed in the chapter.

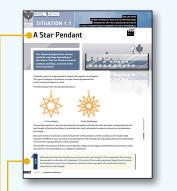


A table of contents accompanies this first page. The knowledge to be acquired is described for each of the *Situations*, as well as the theme of the situational problems.





PHASES OF EACH SITUATION



SITUATIONAL PROBLEM

Linked to the main theme of the chapter, this page briefly describes the context of the situational problem, as well as the information required to solve it.

 A box describes the task you will have to perform later in the *Solution* section.
 This task is the starting point for acquiring new knowledge to solve the situational problem.

-	EXPLORATION
	The flattering spectrum of the ground here and strategies for the flatter spectra flatter spectra flatter spectra flattering sp
	 Indicate the length of the leng
	Incomparison I

- EXPLORATION

This section invites you to analyze the data of a situational problem, and then to identify the knowledge that you possess and the knowledge you need to acquire in order to perform the task.

 The questions posed will guide you toward a problem-solving strategy.

•	ACQUISITION A Advanced for the set of the se
	1. A New Definition of the Sine and Cosine
	you formed that the cire or course of an acute angle can be defined for your produce of the produce of the second se
	by measuring the cube of a right biangle. However, the angles farming a promotics floure are not all acute. They may be right, obtains, closely or refers, Rico, From are Letters
	about natation, they measures may exceed 380° or even be negative. It is therefore too limiting to define
	the size and the cosize of an angle based on the right brangle. You must non-have a new definition that can apply to all types of angles.
	1.1 Chord Lengths
	To better undextand a concept, it is camelines necessary to return to its origin.
	To cluster the class in the day and describe their apparent markers, and end adsonament and mathematicizes had to be able to determine the levals of a sover-chard in a ciccle. Anoseina the centre anale that intercepts.
	had to be able to determine the tength of a given chand in a circle, knowing the centre angle that intercepts, It, and all without a calculation The following our dates will alw you a before understanding of the concret
	of dura.
	It a circle with a unit of radius of 1, determine the exact length of the chard intercepted by the following circle analys.
	and a contraction of the contrac
Annual II- MOG	
1	
- 21	The following is an encrypt from a table of chards, taken from the Alexa. CHORDS. CHORDS.
1	of radius for different control angles.
	According to what is written in the last now of the lable, a centre ing him this from them
	angle of 120° attenciptic a chord of 123, 15, 23. This convergionds: 124 0 241 25 27 to a written numeric expression in sequencinal existion in base 60. 126 20 21 21 23
	which is equivalent to 121 + $\frac{61}{10}$ + $\frac{21}{10}$ units. 117 0 301 10 1
	EX EX<
	1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1
	120 4 201 20 44
	120 0 101 10 21
	ACCRETE TALE OF

ACQUISITION A

This is where the knowledge needed to solve the situational problem is assimilated. Each *Acquisition* encourages reflection before presenting new mathematical knowledge.



- SOLUTION

By the time you reach this section, you should have acquired all the knowledge and strategies that are essential to solving the situational problem described at the beginning of the situation.

ACQUISITION B	 proving the lamates of the same Number of Assesser difference of organ 	
1. Formulas for the Sum or Difference of Angles	 using large-source in a solution involving large-source and tracker of different angles. 	- 1
The end line inclines will seek be register which the way of Antiputy and the Makle Ages did to constant the or half should. Theregoend into the convert similarity paranel have you can constant a table giving the read- solutes the introlution of a social angle, such as at we formulae. For those web will contene these education is an assumed when demonstrations provide.	table of chools bits means adding I sine and cashee digits of 12. To achieve this, you must know ordate	
1.1 Sine of a Sum of Angles		
Yau-have almody uses in Querian 7 of Acquisition A th a contain Mangle, however, there is another, more gen- scritten. This method uses a formula that almost you're save and contro of each of these angles. The formula is	eal method to find this value. This is the facus of this calculate the size of a sam of two angles from the	
$\cos\left s\right +\left l\right -\sin s$	congi = cana singi	
As you can see, this formula applies very well to the of 32° and 40°.	te case of the 71° angle, which is the sam	- 1
Complete the following calculation, which allows	you to determine the exact value of sin 75°.	
	(2se of the formula with $n=32^{\circ}$ and $\beta=41^{\circ}$	- 1
-(8)-(9 <u>)</u> -(9)-(9)-(9)-(9)-(9)-(9)-(9)-(9)-(9)-(9)	(Replacement of shand cacwith their value)	- 1
	(Calculation of the two multiplications)	
	(Notation of the result of the sum)	
Compare the result with the one you abcaned for	Question 7 k) of Aspendium A	
STRATIST Prove a fermula in better understa		
No. a possible time to memorize this largest, which allows p it has important applications, as you will verified to pase to and/mixed bear it is derived and, observer pacellet, t	stades. One of the best ways to memoriae a hormula is	

- ACQUISITION B

In this second acquisition, you will acquire new knowledge prescribed by the program linked to the knowledge encountered in *Acquisition A*.

	Optimize the real solar of the following interconduct solars.
	a) cost? b) cos(-327)
	4 sector
	e) seett" () see(-147)
	gi se(-818) N sec1182'
	O day the importantic unit circle, determine the measures of each angle between 2" and 180" that satisfy the following regulators, Round the angle measures to the respond texts.
	that called y the following equations. Found the angle ensures to the ensured tests. a) $\sin n = -\frac{1}{2}$ b) $\cos p = \frac{\sqrt{2}}{2}$ c) $\sin \theta = \frac{\sqrt{2}}{2}$.
	8) and - 2 all and - 2 all and - 2
	1 1 1
	+ + +
	😢 Ontervalue to the reward. Tends of a degree the measure of all the angles contained in the gives intervals
	that satisfy the following equations. a) cosis = "07. where a (1187. 387") b) co 8 = 02. where 8 (1197. 0")
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1	
2	
1000 - 112 -	c) cost - 0.5 where it (1967, 907) d) cost0.72 where a (1997, 1710)
- 1	
8	
- 1	
	DID YOU KNOW?
	The word size used in mathematics serves from a inertialize error. In fact, the isom jul, used kythe mathematiciae astronomer Kryshheis in the Ethnonismytic designate the length of
	By the methematician azimuman Ryshbela's the lith anskey in designate the length of hell should now admired by the lashe is the low in the lates in the Webb Law. One only
	hall vhanis, was astopied by the lindex in the lasm jibs. Later in the Middle Ages, these who isocidated the Joshis into Latin and your jibs with another similar Joshis word, je ib
	leythe mathematidae anitomount leysthetic in the Kit anthony in designate the length of half shouly one adapted by the factors the fame (the tains in the Kittel before Conservation touchade the factor is in a stress of the stress hand on the factor work (in the which means a pendent or a field is a garment, and ability is translated in Lains as size.
	hall shands, was adopted by the livelouin the laser, jiba Later in the Middle Ages, these who isoredated the Andria inits Latin confused (the with another similar Andria word, je th

CONSOLIDATION

This section will allow you to consolidate the mathematical knowledge acquired in *Acquisitions A* and *B*. As in the *Integration* section, this *Consolidation* also contributes to the development of mathematical skills.

AT THE END OF A CHAPTER...

KNOWLEDGE SUMMARY

This section summarizes all the knowledge to *Remember* in the form of fill-in-the-blank questions. We invite you to fill in the missing information.

INTEGRATION

In this section, which includes exercises and complex situations, you will have to apply the knowledge seen in this chapter.

LES

The *LES* is a complex task developed according to the certification evaluation model. It is accompanied by a competency evaluation grid.

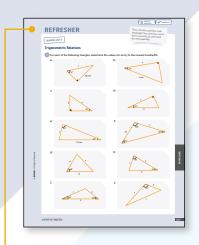
COMPLEMENTS

TABLE OF CONTENTS



SELF-EVALUATION

A *Self-evaluation* is presented in the first part of the Complements in Volume 2. It allows you to evaluate your acquired knowledge and the mathematical skills you have developed throughout the course. In this way, you will be able to identify the knowledge that you have mastered and that for which a revision is necessary before moving on to the *Summary Scored Activity*.



REFRESHER

Throughout the *Situations*, you will come across headings entitled *Reminder*. These sections present concepts seen in a previous course that are necessary to understand the new knowledge or to solve the current situation.

The *Refresher* section allows you to use exercises to review the mathematical rules and concepts that are the subject of a *Reminder*.

1	CHAPTER 1	
	The Trigonometric Unit Circle	
	The triggeneratic unit order is a clock with radius 1 unit, corrected at the object of the triggeneration of the s-axis at a point P with coordinates (1, 0).	
	Any rotation of angle = of point P(1, 8) anound centre 0 determines a unique trigonometric point with coordinates P(u) on the circle.	
	Definition of Sine and Cosine in Relation to the Trigosometric Unit Circle	
	The sine and cosine of angle α are defined as follows:	
	costo: the x-coordinate of P(x)	
	tine: the y-coordinate of P(a)	
	Important Points on the Trigonometric Unit Circle	
	The following diagram below shows the exact coordinates of 16 important points on the trigonometric unit circle.	
	$ \begin{pmatrix} \boldsymbol{\theta}_{1} \end{pmatrix}_{1} & \overset{\boldsymbol{\theta}_{2} \rightarrow \boldsymbol{\theta}_{2}}{\underset{\boldsymbol{\theta}_{2} \rightarrow \boldsymbol{\theta}_{2} \rightarrow \boldsymbol{\theta}_{2}}} \boldsymbol{\theta}_{\boldsymbol{\theta}_{2} \rightarrow \boldsymbol{\theta}_{2}} \boldsymbol{\theta}_{\boldsymbol{\theta}_{2} \rightarrow \boldsymbol{\theta}_{2} \rightarrow \boldsymbol{\theta}_{2} \rightarrow \boldsymbol{\theta}_{2}} \boldsymbol{\theta}_{\boldsymbol{\theta}_{2} \rightarrow \boldsymbol{\theta}_{2} \rightarrow \boldsymbol{\theta}_{2} \rightarrow \boldsymbol{\theta}_{2} \rightarrow \boldsymbol{\theta}_{2} \rightarrow \boldsymbol{\theta}_{2} $	Terrande stight is - OxOOC
	In general, if $\boldsymbol{\alpha}$ represents a given angle of rotation expressed in degrees, then	
	$P(\omega)=P(\omega\pm 360^{\circ}n),$ for any integer $n.$	
	Example: $\label{eq:starsplit} \sin(-30^\circ) = \sin(-30^\circ) + 360^\circ) = \sin(330^\circ) = -\frac{1}{2}.$	
235	CAMPER 1 - Trepresentes Relations	

KNOWLEDGE SUMMARY

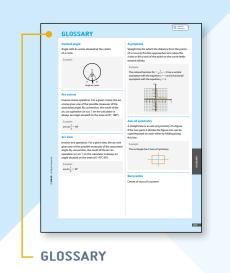
The full version of the *Knowledge Summary* is found in this section. A printable version is also available online.

	HEMATICAL REF			
Symbol	Weating	Symbol	Washing	
~	is approximately equal to	R	Set of real numbers	
	is not equal to	-	is congruent to	
	_ is equal to _	11	is parallel to	
>	is greater than	nAk	Measure of arc AB	
 	is less than	m ĀŘ	Measure of line segment AB	
	is less than or equal to	m ∠ AQN	Measure of angle ADB	
	is greater than or equal to	∆ ABC	Triangle ABC	
	Plus or minus	3	There exists	
24	Change in x	21	There exists one and only one	
저	Vector whose origin is A and endpoint is B	v		
	Vector 2	v	For all values of	
19	Magnitude of vector a		implies that	
010	Fand Fare orthogonal	**	If and only if	
5-7	The scalar product of \$ and \$	QED	Quad east demonstratum What had to be proved	
	corresponds to	d(P,F)	The distance from point P to point F	
6	belongs to		Absolute value	
z	Set of integers		· · · · · · · · · · · · · · · · · · ·	-
Units of	Measure and Other Units	Time		
	millinets()		second))	78
 	centimetre(i)	min	minute(i)	٦.
	metae(d)	h	how(i)	٦.
km Mass	kilonetre(t)	Other		
		m/s	metre(0 per second	
9	gram(i)	m/v ²	metre(i) per second squared	
kg	kilogram(4)	km/h	kilometre)) per hour	_
Angles		km/s	kilometre)() per second	_
· ·	degree(i)	N	newson(s)	-
nd	radiat(s)	kN	kilonewton(i)	-
		1	joule(d)	

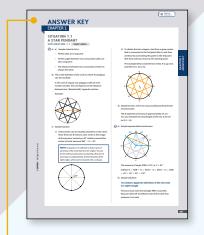
MATHEMATICAL REFERENCE

In this section, we present mathematical symbols used in the guide and some abbreviations of units of measurement. Reminders of mathematical formulas are also provided.



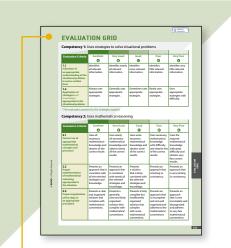


Words and expressions written in blue in the current text are defined in the *Glossary*.



ANSWER KEY

Toward the end of the guide, you will find the *Answer Key*. It is designed not only for checking your answers, but also to complement your learning process. It contains the answers to questions and detailed explanations of the approach to be taken or the reasoning to be used.



EVALUATION GRID

A competency *Evaluation Grid* is available at the end of the guide. After solving an *LES*, you are asked to evaluate yourself using this grid. You can then complete the abbreviated version at the bottom of each *LES*.

Name of learner.	
Provide Mark	OUCKER BENCE
*To pask doors not have statistically draw 1.1 (pp that (is trade-time or photos)), multiply in tang- times or many or the statistical or photos (in the statistical or photos).	2

QUICK REFERENCE

You can create your own quick reference guide. A detachable sheet is provided for this purpose at the end of the guide. You may use this quick reference during the final test.



HEADINGS AND PICTOGRAMS



TASK

Invites the student to watch a video clip on the situational problem.

Determine the formula that allows you to express the exact length *L*...

Presents the task to be performed as part of your Situational Problem.

REMINDER

REFRESHER EXERCISES PAGE 329, QUESTIONS 6 AND 7

Solving...

The quadratic formula...

Example:

Solve the equation...

Refers to knowledge you have acquired in previous courses and refresher exercises related to this *Reminder*.

REMEMBER

Definition of the Sine...

The trigonometric unit circle ...

Example:

The sine law allows you...

Presents the mathematical knowledge you will be required to master. This is the knowledge prescribed by the study program.

STRATEGY Estimate a...

To determine a missing measure in a geometry problem,...

Presents problem-solving strategies that can be applied to a variety of situations.



DID YOU KNOW?

Although the number 3438 may seem strange, Aryabhata referred to it, ...

Allows you to discover historical and cultural information related to the mathematical concepts being studied.

TIP

It is important to note that this definition of the sine and the cosine in a circle of radius 1 does not contradict what you... Provides a tip that simplifies the task, or offers a different way of dealing with the problem or of applying the concept being studied.

NOTE

This first chapter concerning the concepts involved in trigonometric relations and proofs is the most difficult... Warns of traps to avoid or exceptions that may apply to the concept being studied.

ICT

In ICT activity 2.1.1, you can observe composites of translation sequences using GeoGebra. Find the activity on portailsofad.com... Prompts you to complete an online activity (GeoGebra or graphing calculator) that will encourage you to explore the concept studied using technological tools.

SCORED ACTIVITY

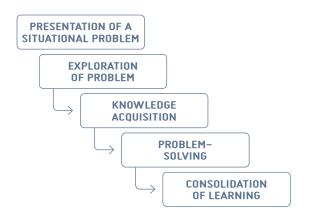
You must now complete Scored Activity 1. It can be found on the course website... Indicates that you are ready to complete the Scored Activity designed to assess your comprehension as you learn. The Summary Scored Activity is completed at the very end of the course. These activities are presented in separate booklets of the guide. You will have to submit each completed activity to your teacher or tutor who will provide you with feedback following correction.

SOLUTIONS

The **SOLUTIONS** series covers all the courses in the Diversified Basic Education Program, including the Secondary V *Cultural, Social and Technical* (CST) and *Science* (Sci) options.



The **SOLUTIONS** learning approach is based on the acquisition of all the prescribed mathematical knowledge in a problem-solving context. The learning sequence that supports this approach is as follows:



Inductive and deductive questions give meaning to the knowledge and strategies to be acquired. The learning guides offer a multitude of simple exercises and more complex tasks to meet the needs expressed by learners and teachers. Additional resources are also available on <u>portailsofad.com</u>.

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- Learning guide: print and PDF versions;
- Teaching guide (PDF);
- · Videos on situational problems;
- ICT activities: GeoGebra, graphing calculator;
- Scored activities;
- Answer keys.



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