

**K to 12 BASIC EDUCATION CURRICULUM**  
**SENIOR HIGH SCHOOL – SCIENCE, TECHNOLOGY, ENGINEERING AND MATHEMATICS (STEM) SPECIALIZED SUBJECT**

**Grade:** 11  
**Core Subject Title:** Pre-Calculus

**Semester:** First Semester  
**No. of Hours/ Semester:** 80 hours/ semester  
**Pre-requisite (if needed):**

**Subject Description:** At the end of the course, the students must be able to apply concepts and solve problems involving conic sections, systems of nonlinear equations, series and mathematical induction, circular and trigonometric functions, trigonometric identities, and polar coordinate system.

CONTENT	CONTENT STANDARDS	PERFORMANCE STANDARDS	LEARNING COMPETENCIES	CODE
<b>Analytic Geometry</b>	<i>The learners demonstrate an understanding of...</i>  key concepts of conic sections and systems of nonlinear equations	<i>The learners shall be able to...</i>  model situations appropriately and solve problems accurately using conic sections and systems of nonlinear equations	<i>The learners...</i>  1. illustrate the different types of conic sections: parabola, ellipse, circle, hyperbola, and degenerate cases.***	<b>STEM_PC11AG-Ia-1</b>
			2. define a circle.	<b>STEM_PC11AG-Ia-2</b>
			3. determine the standard form of equation of a circle	<b>STEM_PC11AG-Ia-3</b>
			4. graph a circle in a rectangular coordinate system	<b>STEM_PC11AG-Ia-4</b>
			5. define a parabola	<b>STEM_PC11AG-Ia-5</b>
			6. determine the standard form of equation of a parabola	<b>STEM_PC11AG-Ib-1</b>
			7. graph a parabola in a rectangular coordinate system	<b>STEM_PC11AG-Ib-2</b>
			8. define an ellipse	<b>STEM_PC11AG-Ic-1</b>
			9. determine the standard form of equation of an ellipse	<b>STEM_PC11AG-Ic-2</b>
			10. graph an ellipse in a rectangular coordinate system	<b>STEM_PC11AG-Ic-3</b>
			11. define a hyperbola	<b>STEM_PC11AG-Id-1</b>
			12. determine the standard form of equation of a hyperbola	<b>STEM_PC11AG-Id-2</b>

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			13. graph a hyperbola in a rectangular coordinate system	<b>STEM_PC11AG-Id-3</b>
			14. recognize the equation and important characteristics of the different types of conic sections	<b>STEM_PC11AG-Ie-1</b>
			15. solves situational problems involving conic sections	<b>STEM_PC11AG-Ie-2</b>
			16. illustrate systems of nonlinear equations	<b>STEM_PC11AG-If-1</b>
			17. determine the solutions of systems of nonlinear equations using techniques such as substitution, elimination, and graphing***	<b>STEM_PC11AG-If-g-1</b>
			18. solve situational problems involving systems of nonlinear equations	<b>STEM_PC11AG-Ig-2</b>
<b>Series and Mathematical Induction</b>	key concepts of series and mathematical induction and the Binomial Theorem.	keenly observe and investigate patterns, and formulate appropriate mathematical statements and prove them using mathematical induction and/or Binomial Theorem.	1. illustrate a series	<b>STEM_PC11SMI-Ih-1</b>
			2. differentiate a series from a sequence	<b>STEM_PC11SMI-Ih-2</b>
			3. use the sigma notation to represent a series	<b>STEM_PC11SMI-Ih-3</b>
			4. illustrate the Principle of Mathematical Induction	<b>STEM_PC11SMI-Ih-4</b>
			5. apply mathematical induction in proving identities	<b>STEM_PC11SMI-Ih-i-1</b>
			6. illustrate Pascal's Triangle in the expansion of $(x + y)^n$ for small positive integral values of $n$	<b>STEM_PC11SMI-Ii-2</b>
			7. prove the Binomial Theorem	<b>STEM_PC11SMI-Ii-3</b>
			8. determine any term of $(x + y)^n$ , where $n$ is a positive integer, without expanding	<b>STEM_PC11SMI-Ij-1</b>
			9. solve problems using mathematical induction and the Binomial Theorem	<b>STEM_PC11SMI-Ij-2</b>

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<b>Trigonometry</b>	key concepts of circular functions, trigonometric identities, inverse trigonometric functions, and the polar coordinate system	1. formulate and solve accurately situational problems involving circular functions	1. illustrate the unit circle and the relationship between the linear and angular measures of a central angle in a unit circle	<b>STEM_PC11T-IIa-1</b>
			2. convert degree measure to radian measure and vice versa	<b>STEM_PC11T-IIa-2</b>
			3. illustrate angles in standard position and coterminal angles	<b>STEM_PC11T-IIa-3</b>
			4. illustrate the different circular functions	<b>STEM_PC11T-IIb-1</b>
			5. uses reference angles to find exact values of circular functions	<b>STEM_PC11T-IIb-2</b>
			6. determine the domain and range of the different circular functions	<b>STEM_PC11T-IIc-1</b>
			7. graph the six circular functions (a) amplitude, (b) period, and (c) phase shift	<b>STEM_PC11T-IIc-d-1</b>
			8. solve problems involving circular functions	<b>STEM_PC11T-IId-2</b>
		2. apply appropriate trigonometric identities in solving situational problems	9. determine whether an equation is an identity or a conditional equation	<b>STEM_PC11T-IIe-1</b>
			10. derive the fundamental trigonometric identities	<b>STEM_PC11T-IIe-2</b>
			11. derive trigonometric identities involving sum and difference of angles	<b>STEM_PC11T-IIe-3</b>
			12. derive the double and half-angle formulas	<b>STEM_PC11T-IIf-1</b>
			13. simplify trigonometric expressions	<b>STEM_PC11T-IIf-2</b>
			14. prove other trigonometric identities	<b>STEM_PC11T-IIf-g-1</b>
			15. solve situational problems involving trigonometric identities	<b>STEM_PC11T-IIg-2</b>
		3. formulate and solve accurately situational problems involving appropriate trigonometric functions	16. illustrate the domain and range of the inverse trigonometric functions.	<b>STEM_PC11T-IIh-1</b>
			17. evaluate an inverse trigonometric expression.	<b>STEM_PC11T-IIh-2</b>
			18. solve trigonometric equations.	<b>STEM_PC11T-IIh-i-1</b>
			19. solve situational problems involving inverse trigonometric functions and trigonometric equations	<b>STEM_PC11T-IIi-2</b>
		4. formulate and solve accurately situational problems involving the polar coordinate system	20. locate points in polar coordinate system	<b>STEM_PC11T-IIj-1</b>
			21. convert the coordinates of a point from rectangular to polar systems and vice versa	<b>STEM_PC11T-IIj-2</b>
			22. solve situational problems involving polar coordinate system	<b>STEM_PC11T-IIj-3</b>

\*\*\*Suggestion for ICT-enhanced lesson when available and where appropriate

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**Code Book Legend**

**Sample: STEM\_PC11AG-Ia-1**

LEGEND		SAMPLE	
<b>First Entry</b>	Learning Area and Strand/ Subject or Specialization	Science, Technology, Engineering and Mathematics Pre-Calculus	<b>STEM_PC11AG</b>
	Grade Level	Grade 11	
<b>Uppercase Letter/s</b>	Domain/Content/ Component/ Topic	Analytic Geometry	
			-
<b>Roman Numeral</b> <i>*Zero if no specific quarter</i>	Quarter	First Quarter	<b>I</b>
<b>Lowercase Letter/s</b> <i>*Put a hyphen (-) in between letters to indicate more than a specific week</i>	Week	Week one	<b>a</b>
			-
<b>Arabic Number</b>	Competency	illustrate the different types of conic sections: parabola, ellipse, circle, hyperbola, and degenerate cases	<b>1</b>

DOMAIN/ COMPONENT	CODE
Analytic Geometry	AG
Series and Mathematical Induction	SMI
Trigonometry	T