

## Oman Academic Standards (OAS) Mathematics (3 sets)

### 1. Basic Mathematics (15 LOs)

- a) Describe the set of real numbers, all its subsets and their relationship.
- b) Identify and use the arithmetic properties of subsets of integers, rational, irrational, and real numbers, including closure properties for the four basic arithmetic operations where applicable.
- c) Demonstrate an understanding of the exponent laws, and apply them to simplify expression and manipulate fractions, ratios, decimals, and percentages.
- d) Understand measurements and conversion from one unit to another.
- e) Simplify rational expressions and rationalize numerators or denominators.
- f) Translate worded problems into mathematical expression and model simple real life problems with equations and inequalities.
- g) Solve linear equations, equations involving radicals, fractional expression and inequalities.
- h) Use coordinate plane to solve algebraic and geometric problem, and understand geometric concepts such as equation of a circle, perpendicular, parallel, and tangent lines.
- i) Use the three types of symmetry of an equation to sketch its graph.
- j) Perform operations on polynomials and manipulate numerical and polynomial expressions and solve first degree equations.
- k) Use the quadratic formula to find roots of a second-degree polynomial.
- l) Know the relationship between degree and radian measure of an angle and find the length of a circular arc and the area of a sector.
- m) Understand trigonometric and circular functions and use the fundamental trigonometric identities in various problems.
- n) Solve a right-angle triangles using angle of elevation and depression.
- o) Apply knowledge of basic algebra and trigonometry in real life problems.

### 2. Applied Mathematics (11 LOs)

- a) Solve two variables linear equations and inequalities and sketch their graph.
- b) Interpret a series of three simultaneous inequalities of two variables, display them graphically and determine the solution set.
- c) Demonstrate an understanding of the definition of a function and its graph.
- d) Solve quadratic, exponential, logarithmic equations, and inequalities.
- e) Solve simple real life problems involving linear, quadratic, and exponential functions graphically and algebraically.
- f) Determine the zeros and the maximum or minimum of a quadratic function, and solve related problems, including those arising from real world applications.
- g) Sketch the graphs of a quadratic, exponential, and logarithmic functions.
- h) Compare simple and compound interest and relate compound interest to exponential growth.
- i) Understand the inverse relationship between exponents and logarithms and use this relationship to solve related problems.
- j) Understand basic concepts of descriptive statistics, mean, median, mode and summarize data into tables and simple graphs (bar charts, histogram, and pie chart).
- k) Understand basic probability concepts and compute the probability of simple events using tree diagrams and formulas for permutations and combinations.

### 3. Pure Mathematics (11 LOs)

- a) Demonstrate understanding of the definition of a function and its graph.
- b) Solve quadratic equations using quadratic formula.
- c) Define and manipulate exponential and logarithmic functions and solve problems arising from real life applications.
- d) Understand the inverse relationship between exponents and logarithms functions and use this relationship to solve related problems.
- e) Understand the definition of the different types of angles and measure them in degrees and radians.
- f) Describe analytically the trigonometric and circular functions.
- g) Demonstrate an understanding of trigonometric identities.
- h) Use the law of sines and cosines to solve a triangle and real life problems.
- i) Use appropriate software to interpret equations and graphs.
- j) Understand basic concepts of descriptive statistics, mean, median, mode and summarize data into tables and simple graphs (bar charts, histogram, and pie chart).

k) Understand basic probability concepts and compute the probability of simple events using tree diagrams and formulas for permutations and combinations.

### Breakdown of OAS by Levels

3 Sets of OAS for Mathematics	Number of OAS	Distribution of OAS across the levels		
		Pre-Level	Level 1	Level 2
1. Basic Mathematics	15	6	8	1
2. Applied Mathematics	11	-	2	9
3. Pure Mathematics	11	-	2	9
<b>Total</b>		6	12	9+1
<b>GENERAL STUDY SKILLS</b>				
OAS-GSS-6.2.1 Managing time and accepting responsibility		✓	✓	✓
OAS-GSS-6.2.2 Research Skills		x	x	✓
OAS-GSS-6.2.3 Taking Notes		✓	✓	✓
OAS-GSS-6.2.4 Giving Presentations		x	x	x

FP Levels	S. No.	DU FP LO Scope & Sequence (Math & General Study Skills) (Pre-Level)	
		OAS LO	FP LO
Pre-Level	1	Basic-a) Describe the set of real numbers, all its subsets and their relationship.	1. Identify set notations and their subsets and use different set names
	2	Basic-b) Identify and use the arithmetic properties of subsets of integers, rational, irrational, and real numbers, including closure properties for the four basic arithmetic operations where applicable.	2. Apply basic mathematical operations on real numbers
			3. Identify properties of the four-basic arithmetic operations and use them to simplify expressions. (Commutative, associative, distributive and identity properties)
	3	Basic-e) Simplify rational expressions and rationalize numerators or denominators. (Pre & L1)	4. Reducing rational expressions using factoring methods
	4	Basic-f) Translate worded problems into mathematical expression and model simple real-life problems with equations and inequalities.	5. Solve real-life problems related to equations inequalities
	5	Basic-g) Solve linear equations, equations involving radicals, fractional expression, and inequalities.	6. Solve first degree equations (involving fractions and radicals)
7. Solve Inequalities, draw a graph, and write the interval notation and use it to solve real-life problems			
6	Basic-j) Perform operations on polynomials and manipulate numerical and polynomial expressions and solve first degree equations.	8. Define polynomials, degree of a polynomials, and classify polynomials	
		9. Perform basic mathematical operations on polynomials	

			10. Factor polynomials using GCF, grouping, 2nd degree polynomials, and difference between two squares rules.
<b>General Study Skills (Pre Level)</b>			
<b>OAS-GSS-6.2.1</b> Managing time and accepting responsibility			
e) Show respect for teachers and students. f) Use a variety of study techniques. k) Identify preferred study strategies based on learning styles.			
<b>OAS-GSS-6.2.3</b> Taking Notes			
a) Recall and define main concepts. b) Utilize abbreviations and symbols.			
<b>FP Levels</b>	<b>S. No.</b>	<b>DU FP LO Scope &amp; Sequence (Math &amp; General Study Skills) (Level 1)</b>	
		<b>OAS LO</b>	<b>FP LO</b>
Level 1	1	Basic-c) Demonstrate an understanding of the exponent laws, and apply them to simplify expression and manipulate fractions, ratios, decimals, and percentages.	1. Identify Integer exponents and simplify expressions using exponents' rules.
	2	Basic-d) Understand measurements and conversion from one unit to another.	2. Use measurements and unit conversion (metric units).
	3	Basic-h) Use coordinate plane to solve algebraic and geometric problem, and understand geometric concepts such as equation of a circle, perpendicular, parallel, and tangent lines.	3. Finding distance between two points.
			4. Find the equation of lines in standard form and define the concept of the slope.
			5. Identify, graph the circle, and write the equation of a circle in standard and general forms.
	4	Basic-k) Use the quadratic formula to find roots of a second-degree polynomial.	6. Solve quadratic equations by quadratic formula and use it to solve real-life problems
	5	Basic-l) Know the relationship between degree and radian measure of an angle and find the length of a circular arc and the area of a sector.	7. Define angles and find the length of Arc and area of sector
	6	Basic-m) Understand trigonometric and circular functions and use the fundamental trigonometric identities in various problems.	8. Define basic Trigonometric Functions
	7	Basic-n) Solve a right-angle triangles using angle of elevation and depression.	9. Solve right triangle and using Pythagorean Theorem
8	Basic-o) Apply knowledge of basic algebra and trigonometry in real life problems.	10. Solve real life problems using basic trigonometric functions.	
	Basic-e) Simplify rational expressions and rationalize numerators or denominators. (Pre & L1)	11. Rationalize binomial denominators	
9	Applied-a) Solve two variables linear equations and inequalities and sketch	12. Solving and graphing two variables linear equations.	

		their graph.	13. Solve System of linear inequalities in two variables
	10	Applied-b) Interpret a series of three simultaneous inequalities of two variables, display them graphically and determine the solution set.	14. Interpret three inequalities of two variables, display them graphically
	11	Pure-b) Solve quadratic equations using quadratic formula.	15. Solve quadratic equations by quadratic formula
	12	Pure-e) Understand the definition of the different types of angles and measure them in degrees and radians.	16. Define angles using radian measure and convert between radian and degree measure

### General Study Skills (Level 1)

#### OAS-GSS-6.2.1 Managing time and accepting responsibility

- f) Use a variety of study techniques.
- g) Create term planners and study schedules noting key dates/events.

#### OAS-GSS-6.2.3 Taking Notes

- a) Recall and define main concepts.
- b) Utilize abbreviations and symbols.
- e) Adopt a note-taking strategy

FP Levels	S. No.	DU FP LO Scope & Sequence (Math & General Study Skills) (Level 2 Applied Mathematics)	
		OAS LO	FP LO
Level 2 Applied	1	Basic-i) Use the three types of symmetry of an equation to sketch its graph.	1. Determine if the graph of equation is symmetric to x-axis, y-axis, and origin.
	2	Applied-c) Demonstrate an understanding of the definition of a function and its graph.	2. Define a function graphically and by set notation, finding the domain of certain types of functions, and evaluating functions.
	3	Applied-d) Solve quadratic, exponential, logarithmic equations, and inequalities.	3. Identify exponential functions, draw their graphs, and solve their equations
	4	Applied-e) Solve simple real life problems involving linear, quadratic, and exponential functions graphically and algebraically.	4. Solve simple real-life problems involving exponential functions
	5	Applied-f) Determine the zeros and the maximum or minimum of a quadratic function, and solve related problems, including those arising from real world applications.	5. Graph quadratic functions by finding the vertex
	6	Applied-g) Sketch the graphs of a quadratic, exponential, and logarithmic functions.	6. Define the Logarithmic functions, draw their graphs, and solve their equations
	7	Applied-h) Compare simple and compound interest and relate compound interest to exponential growth.	7. Solve simple real-life problems involving exponential functions. (Compare simple and compound interest and relate compound interest to exponential growth).
	8	Applied-i) Understand the inverse relationship between exponents and logarithms and use this relationship to solve related problems.	8. Use the relationship between exponents and logarithms to solve related problems
	9	Applied-j) Understand basic concepts of descriptive statistics, mean, median, mode and summarize data into tables and simple graphs (bar charts,	9. Identify central tendency measures, mean, median, mode, midrange

		histogram, and pie chart).	
	10	Applied-k) Understand basic probability concepts and compute the probability of simple events using tree diagrams and formulas for permutations and combinations.	10. Finding the probability of random experiments. 11. Use formulas for permutations and combinations

### General Study Skills (Level 2 Applied Mathematics)

**OAS-GSS-6.2.1** Managing time and accepting responsibility

f) Use a variety of study techniques.

**OAS-GSS-6.2.3** Taking Notes

a) Recall and define main concepts.

e) Adopt a note-taking strategy

**OAS-GSS-6.2.2** Research Skills

h) Find specific information using internet search engines and electronic resources.

i) Cite a source in accordance with academic conventions.

FP Levels	S. No.	DU FP LO Scope & Sequence (Math & General Study Skills) (Level 2 Pure Mathematics)	
		OAS LO	FP LO
Level 2 Pure	1	Basic-i) Use the three types of symmetry of an equation to sketch its graph.	1. Determine if the graph of equation is symmetric to x-axis, y-axis, and origin.
	2	Pure-a) Demonstrate understanding of the definition of a function and its graph.	2. Define a function graphically and by set notation, finding the domain of certain types of functions, and evaluating functions.
	3	Pure-c) Define and manipulate exponential and logarithmic functions and solve problems arising from real life applications.	3. Identify exponential functions, draw their graphs, and solve their equations 4. Use the relationship between exponents and logarithms to solve related problems
	4	Pure-d) Understand the inverse relationship between exponents and logarithms functions and use this relationship to solve related problems.	5. Solve simple real-life problems involving exponential functions 6. Define the Logarithmic functions, draw their graphs, and solve their equations
	5	Pure-f) Describe analytically the trigonometric and circular functions.	7. Define and solve basic trigonometric functions and express them graphically
	6	Pure-g) Demonstrate an understanding of trigonometric identities.	8. Define and apply the rules, more types of identities, and proof of trigonometric functions
	7	Pure-h) Use the law of sines and cosines to solve a triangle and real life problems.	9. Use the law of sines and cosines to solve a triangle and real-life problems

	8	Pure-i) Use appropriate software to interpret equations and graphs.	10. Use appropriate software (Geometry Application) to interpret Functions
	9	Pure-j) Understand basic concepts of descriptive statistics, mean, median, mode and summarize data into tables and simple graphs (bar charts, histogram, and pie chart).	11. Identify central tendency measures, mean, median, mode, midrange
	10	Pure-k) Understand basic probability concepts and compute the probability of simple events using tree diagrams and formulas for permutations and combinations.	12. Finding the probability of random experiments. 13. Use formulas for permutations and combinations

### General Study Skills (Level 2 Pure Mathematics)

<b>OAS-GSS-6.2.1</b> Managing time and accepting responsibility
f) Use a variety of study techniques.
<b>OAS-GSS-6.2.3</b> Taking Notes
a) Recall and define main concepts. e) Adopt a note-taking strategy
<b>OAS-GSS-6.2.2</b> Research Skills
h) Find specific information using internet search engines and electronic resources. i) Cite a source in accordance with academic conventions.