

ADVANCED FUNCTIONS – 15 lessons , 2 h each.

UNITS:

1. Polynomial Functions
2. Rational Functions
3. Trigonometric Functions
4. Exponential and Logarithmic Functions
5. Combining Functions and Rates of Change

Lesson 1:

UNIT 1. Polynomial Functions.

Review of prerequisite skills: Domain, ranges, transformations.

New topics: Characteristics of Polynomial functions, end-behaviour, even/odd functions, Sketching Polynomial functions in factored form, given the graph writing the equation of a polynomial function.

Lesson 2:

Review of prerequisite skills: Factoring, solving quadratic equations.

New topics: Long division of polynomials, Remainder theorem, Factor theorem, factoring difference and sum of cubes

Lesson 3:

New topics: Solving polynomial equations and inequalities, Applications.

Review/TEST on Unit 1. Polynomial Functions.

UNIT 2. Rational Functions.

Lesson 4:

New topics: Sketching any general Rational Function $y = \frac{P(x)}{Q(x)}$ using Asymptotes and x and y intercepts.

Lesson 5:

New topics: Sketching the Reciprocal of a Function $y=1/f(x)$ using given graph of $y=f(x)$.

Sketching some reciprocals – the graphs of the functions:

$$y = \frac{1}{mx + b} \quad y = \frac{mx + b}{ax + c} \quad y = \frac{1}{x^2 + a} \quad y = \frac{1}{(x - a)^2} \quad y = \frac{1}{(x - a)(x - b)}$$

Solving Rational equations and inequalities.

Review/TEST on Unit 2. Rational Functions

Unit 3. Trigonometric Functions.

Lesson 6.

New topics: Radian measure, the length of an arc, angular velocity, Equivalent Trigonometric Expressions -co-functional identities, proving co-functional identities.

Lesson 7

New topics: Compound angle and double angle formulas, finding exact values using formulas. Proving Identities using all trig formulas.

Lesson 8 :

Review of prerequisite skills: Graphs of sin, cos, tan, cot, sec, csc functions – main characteristics of Sin, cos, Tan functions: domain, range, period, max/min, x, y intercepts, amplitudes, asymptotes

New topics: Sketching transformed trigonometric functions. Writing equations of the functions given their graphs. Application.

Lesson 9:

New topics: Solving trigonometric equations, Solving word problems using trigonometric models.

Lesson 10:

Review of Trigonometric Functions unit. Practice test.

UNIT 4. Exponential and Logarithmic functions.

Lesson 11:

Review of prerequisite skills: Laws of exponents, simplifying exponential expressions.

New topics: Logarithmic functions and transformations. Sketching logarithmic functions. Laws of logarithms. Simplifying logarithmic expressions. Advanced methods

Lesson 12:

New topics: Solving logarithmic and exponential equations: various methods.

Applications on exponential function, exponential growth and decays. Application in science.

Lesson 13:

New topics: Average Rate of Change and Instantaneous Rate of Change.

Lesson 14:

New topics: Combining Functions by adding, subtracting, Multiplying, Dividing. Composition of Functions. Solving Inequalities graphically.

Lesson 15:

Course review/Practice exam.