Cubing

Description: Cubing is a strategy which uses a concrete visual of a cube with its six sides to serve as a starting point for consideration of the multiple dimensions of topics within subject areas. **This activity can also be done using dice with numbers 1-6. Students (usually in groups) can take turns rolling the dice and whatever number it lands on, the student will answer that particular question. It should be done in groups of 3-6 students, with a recap of the responses for the class.**

Application: To introduce cubing, start with a familiar topic and model the process. Then, assign more complex topics once students have a grasp of how the process works. The students examine the topic using the prompts from the six sides of the cube.

1. **Describe it**

   If applicable, include color, shape, and size.
   How would you describe the item/concept/topic?

2. **Compare it**

   What it is similar to or different from.
   "It's sort of like _____ ."

3. **Associate it**

   What it makes you think of.
   How does the topic connect to other concept/subjects?

4. **Analyze it**

   Tell how it is made or what it is composed of.
   How would you break the problem/concept into smaller parts?

5. **Apply it**

   Tell how it can be used.
   How does it help you understand other topics/concepts?

6. **Argue for/against it**

   Take a stand and support it.
   I am for this because _____ .
   This works because _____ .

Cubing
Topic:_____

1. **Describe it**:
   What does it look like**?**

2. **Compare it**:
   What is it similar to or different from?

3. **Associate it**:
   What does it make you think of?

4. **Analyze it**:
   How is it made or what is it composed of?

5. **Apply it**:
   What can you do with it? How is it used?

6. **Argue for or against it**:
   Take a stand and list reasons for supporting or not supporting it.
   > I am for this because. . . .
   > I am not for this because. . . .
   > This works because. . . .
   > This does not work because. . . .
   > I agree because. . . .
   > I disagree because. . . .

Algebra II/Trig H – Cubing

Prerequisite Unit

Real Numbers
Real number line
Inequality
Absolute value
Variables
Algebraic expressions
Coefficient
Evaluate
Additive inverse
Multiplicative inverse

Factors
Exponential form
Scientific Notation
Principal n^{th} root
Index
Radicand
Simplest form
Conjugate
Polynomial
Degree of a polynomial

Domain
Equivalent expressions
Rational expression
Complex fractions
Rectangular coordinate system
Ordered pair
Distance formula
Midpoint formula

Unit 1: Equations and Inequalities

Equations in two variables
Solution of equation in two variables
Graphs of an equation
Intercepts
Symmetry
Identity equation
Circle
Solution of equation in one variable
Conditional equation

Linear equation in one variable
Equivalent equations
Extraneous solution
Quadratic equation
Quadratic Formula
Discriminant
Position equation
Complex number
Imaginary number
Pure imaginary number

Complex conjugates
Principal square root of a negative number
Polynomial equation
Solution of an inequality
Graph of an inequality
Linear inequality in one variable
Double Inequality
Critical numbers
Test intervals

Unit 2: Functions and Their Graphs

Linear equation in two variables
Slope
Slope-intercept form
Point-slope form
Parallel
Perpendicular
Function
Domain
Range

Independent variable
Dependent variable
Implied domain
Graph of a function
Vertical Line Test
Zeros of a function
Increasing function
Decreasing function
Constant function
Relative minimum

Relative maximum
Even function
Odd function
Vertical and horizontal shifts
Reflection
Nonrigid transformations
Inverse function
Horizontal Line Test
One-to-One functions

Unit 3: Polynomial Functions

Polynomial function
Parabola
Axis (of a parabola)
Vertex (of a parabola)
Standard form of a quadratic function
Continuous
Leading Coefficient Test
Repeated zero
Multiplicity
Intermediate Value Theorem
Division Algorithm
Improper (rational expression)
Proper (rational expression)
Synthetic division
Rational Zero Test
Conjugates
Irreducible over the reals
Descarte's Rule of Signs
Variation in sign
Upper bound
Lower bound
Directly proportional
Constant of variation
Inversely proportional
Jointly proportional
Sum of square differences
Least squares regression line

Unit 4: Rational Functions and Conics

Rational function
Vertical asymptote
Horizontal asymptote
Slant (or oblique) asymptote
Partial fraction
Partial fraction decomposition
Basic equation
Conic section or conic
Degenerate conic
Parabola
Directrix
Focus
Standard form of the equation of a parabola
Ellipse
Foci
Vertices
Major axis
Center
Minor axis
Standard form of the equation of an ellipse
Hyperbola
Branches
Transverse axis
Standard form of the equation of a hyperbola
Conjugate axis
Asymptotes of a hyperbola

Unit 5: Exponential and Logarithmic Functions

Algebraic functions
Transcendental functions
Exponential function f with base a
Natural base
Natural exponential function
Continuous compounding
Logarithmic function with base a
Common logarithmic function
Natural logarithmic function
Exponential growth model
Exponential decay model
Gaussian model
Logistic growth model
Logarithmic models
Bell-shaped curve
Logistic curve
Sigmoidal curve

Unit 6: Trigonometry

Trigonometry
Angle
Initial side (of an angle)
Terminal side (of an angle)
Vertex (of an angle)
Standard position
Coterminal angles
Degree
Acute angles
Obtuse angles
Complementary angles

Supplementary angles
Central angle
Radian
Linear speed
Angular speed
Sine
Cosine
Tangent
Cosecant
Secant
Cotangent

Angle of elevation
Angle of depression
Reference angles
Period
Amplitude
Phase shift
Damping factor
Inverse sine function
Inverse cosine function
Inverse tangent function
Simple harmonic motion

Unit 7: Analytic Trigonometry

Sum and difference
formulas
Reduction formulas

Double-angle formulas
Power-reducing formulas
Half-angle formulas

Product-to-sum formulas
Sum-to-product formulas

Unit 8: Additional Topics in Trigonometry

Oblique triangle
Law of Sines
Law of Cosines
Directed line segment
Initial point
Terminal point
Magnitude of a directed
line segment
Vector $\mathbf{v}$ in the plane
Standard position
Component form of a
vector $\mathbf{v}$

Zero vector
Magnitude of $\mathbf{v}$
Unit vector
Parallelogram law
Resultant
Standard unit vectors
Linear combination of
vectors
Direction angle
Dot product
Angle between two
nonzero vectors

Orthogonal vectors
Work
Complex plane
Real axis
Imaginary axis
Absolute value of a
complex number
Trigonometric form of a
complex number
n^{th} root of a complex
number
n^{th} roots of unity

Unit 9: Systems of Equations and Inequalities

System of equations
Solution of a system of equations
Method of substitution
Graphical method
Points of intersection
Break-even point
Method of elimination
Equivalent systems
Consistent systems

Inconsistent systems
Row-echelon form
Ordered triple
Row operations
Gaussian elimination
Nonsquare system of equations
Position equation
Solution of an inequality
Graph of an inequality

Linear inequalities
Solution of a system of inequalities
Consumer surplus
Producer surplus
Optimization
Linear programming
Objective function
Constraints
Feasible solutions

Unit 10: Matrices and Determinants

Matrix
Entry of a matrix
Order of a matrix
Square matrix
Main diagonal
Row matrix
Column matrix
Augmented matrix

Coefficient matrix
Elementary row operations
Row-equivalent matrices
Row-echelon form
Reduced row-echelon form
Gauss-Jordan elimination
Scalars
Scalar multiple

Zero matrix
Matrix multiplication
Identity matrix of order n
Inverse of a matrix
Determinant
Minors
Cofactors
Cramer's Rule

Unit 11: Sequences, Series and Probability

Infinite series
Terms of a sequence
Finite sequence
Factorial
Summation or sigma notation
Finite series
Infinite series
Arithmetic sequence
Common difference
Geometric sequence

Common ratio
Geometric series
Mathematical induction
Binomial coefficients
Binomial Theorem
Fundamental Counting Principle
Permutation
Distinguishable permutations
Combination

Experiment
Outcomes
Sample space
Event
Probability
Mutually exclusive
Independent events
Complement of an event