Station 1: Factoring

Factor each completely.

1) $15xy + 40x^2 + 12y + 32x$

2) $120xy + 168x - 140y^2 - 196y$

3) $15xy + 3x^2 + 10y + 2x$

4) $x^6 - 1 = 0$

5) $x^6 - 28x^3 + 27 = 0$

6) $x^6 + 63x^3 - 64 = 0$

7) $1 + 216m^3$

8) $375x^3 + 24$

9) $500 - 256m^3$

10) $x^3 - 27$

Station 2: Synthetic Division/Rational Root Theorem

State the possible rational zeros for each function. Then find all rational zeros.

1) $f(x) = 2x^3 - 14x^2 + 31x - 55$

2) $f(x) = 2x^3 - x^2 - 2x + 1$

3) $f(x) = 5x^3 + x^2 - 5x - 1$

Divide.

4) $(b^3 - 5b^2 - 25b + 11) \div (b - 8)$

5) $(4a^3 + 12a^2 + 18a + 17) \div (a + 1)$

Station 3: Optimization

1) A farmer has 2400 ft of fencing and wants to fence off a rectangular field that borders a straight river. He needs no fence along the river. What are the dimensions of the field that has the largest area?

2) We need to enclose a field with a rectangular fence. We have 500 ft of fencing material and a building is on one side of the field and so won't need any fencing. Determine the dimensions of the field that will enclose the largest area.

3) We have a piece of cardboard that is 14 in by 10 in and we're going to cut out the corners as shown below and fold up the sides to form a box, also shown below. Determine the height of the box that will give a maximum volume.

Station 4: Applications of Polynomials

1. A storage company needs to design a new storage box that has twice the volume of its largest box. Its largest box is 5 ft long, 4 ft wide, and 3 ft high. The new box must be formed by increasing each dimension by the same amount. Find the increase in each dimension.

2. A block of cheese is in the shape of a rectangle prism and is square on each end. The length is 4 times the width of each square end. A 2-inch slice is cut from one end of the cheese and the remaining piece of cheese has a volume of 224 cubic inches. Find the dimensions of the original block of cheese.

Station 5: Properties of Exponents

Simplify. Your answer should contain only positive exponents.

1) $x^0y^{-1}\cdot\left(-x^3y^{-1}\right)^{-5}$

2) $\left(\left(-u^5v^3\right)^5\cdot u^{-4}\right)^4$

3) $x^3y^2\cdot\left(-x^{-3}y^{-2}\right)^2$

Simplify. Your answer should contain only positive exponents with no fractional exponents in the denominator.

4) $\dfrac{u^{-2}v^{-\frac{1}{4}}\cdot u^{-\frac{1}{3}}v^0\cdot u^0v^{\frac{3}{4}}}{\left(u^0\right)^{-1}}$

5) $\left(\dfrac{y}{x^{\frac{5}{3}}y^{-\frac{1}{2}}\cdot yx^4}\right)^0$

Station 6: Properties of Logarithms

Expand each logarithm.

1) $\log_3\left(w^5\sqrt{u}\right)$

2) $\log_4\left(x\cdot y\cdot z^4\right)$

3) $\log_2\left(x^3y^5\right)$

Condense each expression to a single logarithm.

4) $\dfrac{\log_4 x}{2}+\dfrac{\log_4 y}{2}+\dfrac{\log_4 z}{2}$

5) $4\log_3 u+3\log_3 v$

6) $2\log_4 u-10\log_4 v$

Station 7: Solving Exponential and Logarithmic Equations

Solve each equation. Round your answers to the nearest ten-thousandth.

1) $2 \cdot 10^{9x} + 10 = 13$

2) $9 \cdot 10^{m+6} + 6 = 57$

3) $10 \cdot 10^{5p} - 2 = 15$

Solve each equation.

4) $\log x + \log (x + 15) = 2$

5) $\log (x + 4) + \log 7 = \log 23$

6) $\log x - \log (x - 3) = 1$

Station 8: Solving with U-Substitution

Solve the equations:

1) $x^{\frac{2}{3}} + x^{\frac{1}{3}} - 2 = 0$

2) $(x-2)^2 - 5(x-2) - 6 = 0$

3) $3^{2x} - 5(3^x) + 4 = 0$

Station 9: Applications of Exponentials and Logarithms

1) Your 3 year investment of $20,000 received 5.2% interested compounded semi-annually. What is your total return?

2) Your 6.25 year investment of $40,000 at 14% compounded quarterly is worth how much now?

3) If you invest $20,000 at an annual interest rate of 1% compounded continuously, calculate the final amount you will have in the account after 20 years.

Station 10: Graphing

1. Sketch: $y = 2^{x-7} + 5$

   a. Domain: _____

   b. Range: _____

   c. Asymptotes: _____

   d. End Behavior:

   x→_____, y→ _____
   x→ _____, y→ _____

   e. Y-intercept: _____

   f. X-intercept: _____

2. Sketch: $y = \log(x+2) - 1$

   a. Domain: _____

   b. Range: _____

   c. Asymptotes: _____

   d. End Behavior:

   x→_____, y→ _____
   x→ _____, y→ _____

   e. Y-intercept: _____

   f. X-intercept: _____