Station 1

1. Divide $(9x^3 - 48x^2 + 13x + 3)$ by $(x - 5)$ using long division.

2. Use long division and the given factor $(x - 4)$ to completely factor $(x^3 - 37x + 84)$. State all the zeros of the polynomial function.

Station 2

Solve each equation below:

1. $2x^3 + 2 = 0$

2. $x^3 + 125 = 0$

3. $x^4 - 12x^2 - 64 = 0$

4. $x^4 - 3x^2 - 28 = 0$

Station 3

1. The width of a box is 2 m less than the length. The height is 1 m less than the length. The volume of the box is $60m^3$. Find the length of the box.

2. The product of three consecutive integers, n - 1, n and n + 1, is 210. Write and solve an equation to find each number.

Station 4

1. Find the zeros and rewrite the polynomial function in factored form:

   $y = x^3 - 2x^2 - 5x + 6$

2. Find the roots of each equation:

   a. $x^3 - 2x^2 - 5x + 10 = 0$

   b. $45x^3 + 93x^2 - 12 = 0$

   c. $9x^4 + 3x^3 - 30x^2 + 6x + 12 = 0$

Station 5

1. Find a third-degree polynomial equation with integer coefficients that has roots 8 and 3i.

2. Find a fourth-degree polynomial equation with integer coefficients that has roots, 3 + i and -2i.

Extra

1. What is the largest number of real roots that a 7^{th} degree polynomial could have? What is the smallest number?

2. Write an expression that represents the width of a rectangle with length $x + 5$ and an area of $x^3 + 12x^2 + 47x + 60$.

3. One root of the equation $x^3 + x^2 - 2 = 0$ is $x = 1$. How many roots are there? What are all the roots for this polynomial equation?

4. Determine whether the binomial $(x - 4)$ is a factor of the polynomial $P(x) = 5x^3 - 20x^2 - 5x + 20$.