Dream Book Work
Please get your "Dream Book" from the front table and a gold NeSA reference sheet.
Please work pages 20 - 23

Bell Work
Write a polynomial function in standard form given the following zeros.
\[ x = 4, 5, 6 \]

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Write a polynomial function in standard form given the following zeros.
\[ x^4 - 13x^2 + 36 = 0 \]

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\[ x^4 - 13x^2 + 36 = 0 \]

Quiz Review
Write a polynomial function in standard form given the following zeros.
\[ x = 4, 5, 6 \]

Quiz Review
Solve the polynomial function.
\[ x^4 - 13x^2 + 36 = 0 \]

Quiz Review
Find the zeros
Find the y-intercept
State the end behavior
Pick points between the zeros and find two or three more coordinates.
Graph the function.

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5.5 Theorems about Roots of Polynomial Equations
Factoring Polynomials can be challenging, especially if the 1st and last terms have many factors.

You can use guess and check to factor, but this is inefficient unless there is a way to minimize the number of guesses.

The Rational Root Theorem minimizes the number of guesses.
The Rational Root Theorem
Given a polynomial \( P(x) \) with integer coefficients, there are a limited number of possible roots of \( P(x) = 0 \)
1) integer roots - factors of the last term, \( a_n \).
2) rational roots - have the form of \( \frac{p}{q} \\
\ - p \) is an integer factor of \( a_0\)(last term) \\
\ - q \) is an integer factor of \( a_n\)(first term) \\
\[ \frac{21x^2 + 29x + 10 = 0}{p \quad \text{factors of } \pm 1, \pm 3, \pm 7, \pm 21} \]
One possible factor is \( \frac{5}{3} \)

What are some other possible factors of the polynomial?

What are the rational roots of:
\[ 2x^3 - x^2 + 2x + 5 = 0 \]
The only possible rational roots have the form:
\[ \frac{a_0}{a_n} \]
Factors of the constant term: ____________
Factors of the leading coefficient term: ____________
The only possible rational roots are: ____________
Check the values of \( P(x) \) for possible roots

What are the rational roots of:
\[ x^3 - 2x^2 - 5x + 6 = 0 \]
The only possible rational roots have the form:
\[ \frac{a_0}{a_n} \]
Factors of the constant term: ____________
Factors of the leading coefficient term: ____________
The only possible rational roots are: ____________
Check the values of \( P(x) \) for possible roots

Conjugate Root Theorem
Irrational roots \( (a + \sqrt{b}) \) come in pairs
\ - if \( a + \sqrt{b} \) is a root of the polynomial, then so is \( a - \sqrt{b} \)
If \( \sqrt{6+2a} \) is a root, then so is ____________
If \( -\sqrt{5} \) is a root, then so is ____________

Complex roots \( (a + bi) \) come in pairs
\ - if \( a + bi \) is a root of the polynomial, then so is \( a - bi \)
If \( 9-2i \) is a root, then so is ____________
If \( -8i \) is a root, then so is ____________