Today's Plan:

Learning Target (standard): I will use the remainder theorem and factor to theorem to locate zeros of polynomials. I will use the zeros to factor the ploynomial.

Students will: Complete practice problems over previous concepts at the boards, put up homework problems on the board and make necessary corrections to their own work, take notes over new material and complete practice problems over new concepts.

Teacher will: Provide practice problems over previous concepts, check homework problems for accuracy and provide students feedback, describe and provide examples of new concepts and assign students assessment problems over new concepts.

Assessment: Board work, homework check and homework assignment

Differentiation: Students will work at the board, go over and correct homework at their seats, actively engage in lecture over new concepts, practice new concepts with the aid of other students and the teacher and complete homework assignment.

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$36)\ f(x) = (x-1)(x+5)(x+4)$

zeros: x = 1, -5, -4

* factors will not have fractions - be sure to write the factors correctly! *

$38)\ f(x) = 2(2x+1)(x^2+1)$

zeros: x = $-{}^{1}/_{2}$

$40)\ f(x) = (x-2)(x+2)(x^2+1)$

zeros: x = -2, 2

$42)\ f(x) = (2x+1)(2x-1)(x^2+4)$

zeros: x = $-{}^{1}/_{2},\ {}^{1}/_{2}$

42) $f(x) = 4x^4 + 15x^2 - 4$

$f(x) = (4x^2 - 1)(x^2 + 4)$

$f(x) = (2x+1)(2x-1)(x^2+4)$

$x = -\frac{1}{2}, \frac{1}{2}$

Solve by factoring.

$$u^2 - 2u + 4 = (2u - 3)(u + 2)$$

$u^2 - 2u + 4 = 2u^2 + u - 6$

$0 = u^2 + 3u - 10$

$0 = (u+5)(u-2)$

$u = -5, 2$

Solve by taking square roots:

$$\left(u+\frac{3}{2}\right)^2-45=0$$

$$\sqrt{\left(u+\frac{3}{2}\right)^2}=\pm\sqrt{45}$$

$$u+\frac{3}{2}=3\sqrt{5},\ -3\sqrt{5}$$

$$u=-\frac{3}{2}+3\sqrt{5},\ -\frac{3}{2}-3\sqrt{5}$$

$$u=\frac{-3+6\sqrt{5}}{2},\ \frac{-3-6\sqrt{5}}{2}$$

Solve by completing the square.

$$9x^2-6x+2=0$$

$$\frac{9x^2}{9}-\frac{6x}{9}=-\frac{2}{9}$$

$$x^2-\frac{2}{3}x+\frac{1}{9}=-\frac{2}{9}+\frac{1}{9}$$

$$\sqrt{\left(x-\frac{1}{3}\right)^2}=\pm\sqrt{-\frac{1}{9}}$$

$$x-\frac{1}{3}=\frac{1}{3}i,\ -\frac{1}{3}i$$

$$x=\frac{1}{3}+\frac{1}{3}i,\ \frac{1}{3}-\frac{1}{3}i$$

List the potential rational zeros. (p's & q's)

$$f(x) = 2x^3 + 3x^2 + x + 20$$

p: ±1, ±2, ±4, ±5, ±10, ±20

q: ±1, ±2

$\frac{p}{q}$: ±1, $\pm\frac{1}{2}$, ±2, ±4, ±5, $\pm\frac{5}{2}$, ±10, ±20

Use the Factor Theorem to determine if the given binomial is a factor of the function.

$$f(x) = 2x^4 - x^3 + 2x - 1; \boxed{2x-1}$$

factor

$2x - 1 = 0$

$2x = 1$

$x = \frac{1}{2}$ "zero"

$f(\frac{1}{2}) = 2(\frac{1}{2})^4 - (\frac{1}{2})^3 + 2(\frac{1}{2}) - 1$

$= \frac{1}{8} - \frac{1}{8} + 1 - 1$

$f(\frac{1}{2}) = 0$

∴ According to the Factor Theorem, $(2x-1)$ is a factor of $f(x)$ because $f(\frac{1}{2}) = 0$ and that is the remainder.

Find the real zeros & completely factor:

$f(x) = x^4 + x^3 - 3x^2 - x + 2$

$x=1$

$x-1=0$

MNZ: 4

p: $\pm 1, \pm 2$

q: ± 1

$\frac{p}{q}$: $\pm 1, \pm 2$

1	1	1	-3	-1	2
		1	2	-1	-2
	1	2	-1	-2	0

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

-1	1	2	-1	-2
		-1	-1	2
	1	1	-2	0

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

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

$\boxed{f(x) = (x-1)^2(x+1)(x+2)}$

$\boxed{\text{zeros: } x = 1, -1, -2}$

Find the real zeros & completely factor:

$f(x) = 2x^3 + 11x^2 - 7x - 6$

MNZ: 3

p: $\pm 1, \pm 2, \pm 3, \pm 6$

q: $\pm 1, \pm 2$

$\frac{p}{q}$: $\pm 1, \pm \frac{1}{2}, \pm 2, \pm 3, \pm \frac{3}{2}, \pm 6$

1	2	11	-7	-6
		2	13	6
	2	13	6	0

$f(x) = (x-1)(2x^2+13x+6)$

$\boxed{f(x) = (x-1)(2x+1)(x+6)}$

$\boxed{\text{zeros: } x = 1, -\frac{1}{2}, -6}$

Solve by completing the square.

$$4x^2 - 6x - 6 = 4$$

$\frac{3}{2} \cdot \frac{1}{2} = \frac{3}{4}$

$\left(\frac{3}{4}\right)^2 = \frac{9}{16}$

$\frac{4x^2}{4} - \frac{6x}{4} = \frac{10}{4}$

$x^2 - \boxed{\frac{3}{2}}x + \frac{9}{16} = \frac{5}{2} + \frac{9}{16}$

$\sqrt{\left(x - \frac{3}{4}\right)^2} = \pm\sqrt{\frac{49}{16}}$

$x - \frac{3}{4} = \frac{7}{4}, \frac{-7}{4}$

$x = \frac{5}{2}, -1$

Factor completely.

$$3 + 648u^3$$

$648u^3 + 3$

$3(216u^3 + 1)$

$3(6u + 1)(36u^2 - 6u + 1)$

Solve by completing the square.

$$8x^2-16x-52=-10$$

$$\frac{8x^2}{8}-\frac{16x}{8}=\frac{42}{8}$$

$$x^2-2x+1=\frac{21}{4}+1$$

$$\sqrt{(x-1)^2}=\pm\sqrt{\frac{25}{4}}$$

$$x-1=\frac{5}{2},-\frac{5}{2}$$

$$x=\frac{7}{2},-\frac{3}{2}$$

Use the synthetic division to tell whether or not the given value is a zero of the function.

$$f(x)=x^4-10x^3+25x^2+6x-29; x=5$$

$$\begin{array}{r|rrrrr} 5 & 1 & -10 & 25 & 6 & -29 \\ & & 5 & -25 & 0 & 30 \\ \hline & 1 & -5 & 0 & 6 & 1 \end{array}$$

∴ According to synthetic division, $x=5$ is not a zero of $f(x)$ because there is a remainder of 1.

Assignment:

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#44-56 even

* be sure to write the problem and show ALL work *