

Polynomial Equations & Inequalities Unit 4

Tentative TEST date _____



Big idea

This unit is a continuation of the last unit, where you have learned about characteristics of polynomial functions as well as how to factor polynomial functions. Keep in mind that not all polynomials can be factored over the rational numbers. Recall that some quadratic equations have irrational solutions that could only be found by the quadratic formula – this is also true for higher degree polynomials. When you cannot factor the given polynomial you can resort to graphing it by using technology to find the solutions of those that do not factor nicely. (Of course on the test you will be provided with questions that DO work out algebraically.) Once you are comfortable with factoring any polynomial you will use that knowledge in problem solving as well as in solving equations and inequalities. At the end you will revisit rates of change once again.

Corrections for the textbook answers:

Section 4.1 #12 text has extra negative sign in the question – ignore one of them

#16 $2(x+2)(x-5)(x+3)$

Section 4.2 #1c) $x < -5$

#13 $x < 8$ min

#17b) $-4 < x < 2.8$ approx

Section 4.3 #6e) $x \leq -3/2$, $x \geq 3$

Section 4.4 #4a answer is not 3 but 6 or 7

Equation =
inequalities $< > \leq \geq$



Success Criteria

☐ I understand the new topics for this unit if I can do the practice questions in the textbook/handouts

| Date | pg | Topics | # of quest. done? <small>You may be asked to show them</small> | Questions I had difficulty with <small>ask teacher before test!</small> |
|------|-------|---|---|---|
| | 2-3 | Solve Polynomial Equations TWO Handouts | | |
| | 4-6 | Families of Polynomials Handout & TWO Handouts on REGRESSION | | |
| | 7-8 | Solve Polynomial Inequalities - Graphing Section 4.2 & 4.3 & EXTRA Handout with Technology | | |
| | 9-10 | Solve Polynomial Inequalities - +/- Table Section 4.2 & 4.3 & Handout | | |
| | 11-12 | Problem Solve Section 4.1 & Handout | | |
| | 13-14 | Rates of Change of Polynomial Functions Section 4.4 | | |
| | | REVIEW | | |

Reflect – previous TEST mark _____, Overall mark now _____.

Solve Polynomial Equations

find x

draw the graph

1. Solve the following equations, then sketch the function that corresponds to the one with all the terms moved to the left hand side.



LS

RS

a. $6x^3 + 49x^2 + 8x - 12 = 2x + 4$

$$6x^3 + 49x^2 + 8x - 2x - 12 - 4 = 0$$

$$f(x) = \frac{6x^3 + 49x^2 + 6x - 16}{P(1, 2, 3, 6)} = 0$$

Possible zeros: $\pm \frac{p}{q}$:

$$\pm 16, \pm \frac{8}{2}, \pm \frac{16}{3}, \pm \frac{16}{6}, \dots$$

$$\pm \frac{8}{3}, \pm \frac{8}{2}, \pm \frac{8}{3}, \pm \frac{8}{6}$$

$$\pm \frac{4}{1}, \pm \frac{4}{2}, \pm \frac{4}{3}, \pm \frac{4}{6}$$

$$\pm \frac{2}{1}, \pm \frac{2}{2}, \pm \frac{2}{3}, \pm \frac{2}{6}$$

$$f(-8) = 0 \quad (\text{or } f(\frac{1}{2}) = 0 \text{ or } f(-\frac{2}{3}) = 0)$$

$\therefore x+8$ is a factor

Use synthetic division

$$\begin{array}{r|rrrr} -8 & 6 & 49 & 6 & -16 \\ & & -48 & -8 & 16 \\ \hline & 6 & 1 & -2 & 0 \end{array} = R$$

$$\therefore f(x) = (x+8)(6x^2 + x - 2) = 0 \quad \checkmark \quad \frac{6}{3} \quad \frac{-2}{-1/2}$$

$$(x+8)(2x-1)(3x+2) = 0 \quad \checkmark$$

$$x+8=0 \text{ or } 2x-1=0 \text{ or } 3x+2=0$$

$$x_1 = -8 \quad \checkmark \quad x_2 = \frac{1}{2} \quad \checkmark \quad x_3 = -\frac{2}{3} \quad \checkmark$$

① Move all terms to the left

② use trial & error to find 1 factor.

③ continue to use trial & error to find more factor until you have quadratic

④ factor quadratic

⑤ solve for x .



b. $113x - 30 = 8x^3 - 30x^2$

$$-8x^3 + 30x^2 + 113x - 30 = 0 \quad \text{L.C. negative}$$

$$f(6) = 0 \quad \therefore x-6 \text{ is a factor}$$

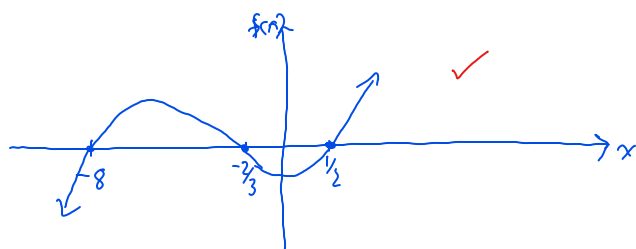
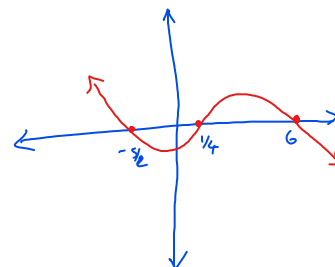
$$\begin{array}{r|rrrr} 6 & -8 & 30 & 113 & -30 \\ & & -48 & -108 & 30 \\ \hline & -8 & -18 & 5 & 0 \end{array} = R$$

$$\therefore (x-6)(-8x^2 - 18x + 5) = 0$$

$$(x-6)(2x+5)(-4x+1) = 0$$

$$x-6=0 \text{ or } 2x+5=0 \text{ or } -4x+1=0$$

$$x_1 = 6 \quad x_2 = -\frac{5}{2} \quad x_3 = \frac{1}{4}$$



Use Quadratic formula $x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$ \rightarrow must be bigger than 0!
 $ax^2 + bx + c = 0$ if $D < 0 \Rightarrow$ no solution.

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Solve the following equations, then sketch the function that corresponds to the one with all the terms moved to the left hand side.



c. $-6x^2 - 6x = 5x^3 + 1$

$-5x^3 - 6x^2 - 6x - 1 = 0$

$f(-\frac{1}{5}) = 0 \therefore (x + \frac{1}{5})$ is a factor

$$\begin{array}{r} -5 \quad -6 \quad -6 \quad -1 \\ -\frac{1}{5} \quad \quad \quad 1 \quad 1 \quad 1 \\ \hline -5 \quad -5 \quad -5 \quad 0 : R \end{array}$$

$\therefore (x + \frac{1}{5})(-5x^2 - 5x - 5) = 0$

$(x + \frac{1}{5})(-5)(x^2 + x + 1) = 0$ \rightarrow Not factorable
 check $b^2 - 4ac < 0$
 \therefore No solution!

$x + \frac{1}{5} = 0$

$x = -\frac{1}{5}$ (one zero)



d. $8x^3 + 22x^2 - 3x - 2 = 0$

HOMEWORK:

1. Solving Polynomial Equation Worksheet.