UNIT 3 - LESSON 4

READY SET GO! Name Period Date

READY

Topic: Practicing long division on polynomials

Divide using long division. (These problems have no remainders. If you get one, try again.)

1. $(x+3)\overline{)5x^3+2x^2-45x-18}$

$5x^2-13x-6$

$+(-5x^3+15x^2)$

$-13x^2-45x-18$

$+(+13x^2+39x)$

$-6x-18$

$+(+6x+18)$

0

2. $(x-6)\overline{)x^3-x^2-44x+84}$

$x^2+5x-14$

$+(-x^3+6x^2)$

$5x^2-44x+84$

$+(-5x^2+30x)$

$-14x+84$

$+(+14x+84)$

0

3. $(x-5)\overline{)3x^3-3x^2-37x+15}$

$3x^2+12$

$3x^3-15x^2+12x-60$

$+(-3x^3+15x^2)$

$+(-12x+60)$

0

4. $(x+2)\overline{)x^4+6x^3+7x^2-6x-8}$

x^3+4x^2-x-4

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

$4x^3+7x^2-6x-8$

$+(-4x^3-8x^2)$

$-x^2-6x-8$

$+(+x^2+2x)$

$-4x-8$

$+(+4x+8)$

SET

Topic: Applying the Fundamental Theorem of Algebra

Predict the number of roots for each of the given polynomial equations. (Remember that the Fundamental Theorem of Algebra states: An n^{th} degree polynomial function has n roots.)

5. $a(x) = x^2 + 3x - 10$ — 2 roots
6. $b(x) = x^3 + x^2 - 9x - 9$ — 3 roots
7. $c(x) = -2x - 4$ — 1 root
8. $d(x) = x^4 - x^3 - 4x^2 + 4x$ — 4 roots
9. $f(x) = -x^2 + 6x - 9$ — 2 roots
10. $g(x) = x^6 - 5x^4 + 4x^2$ — 6 roots

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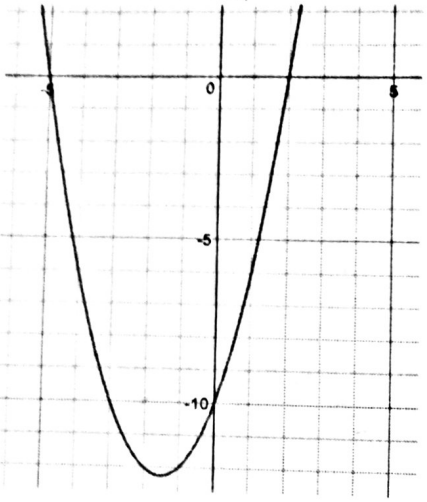
mathematics vision project

Below are the graphs of the polynomials from the previous page. Check your predictions. Then use the graph to help you write the polynomial in factored form.

11. $a(x) = x^2 + 3x - 10$

2 roots

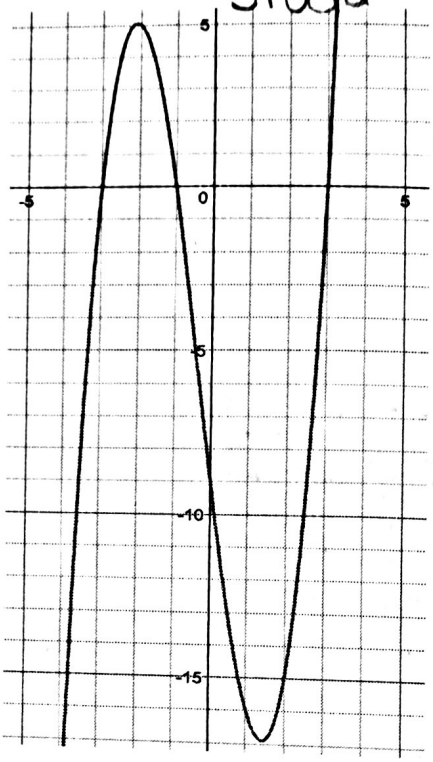


Factored form:

$a(x) = (x+5)(x-2)$

12. $b(x) = x^3 + x^2 - 9x - 9$

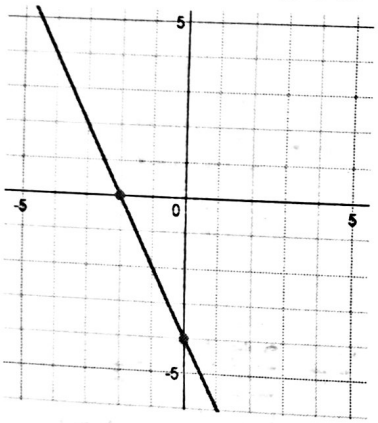
3 roots



Factored form:

$b(x) = (x+3)(x+1)(x-3)$

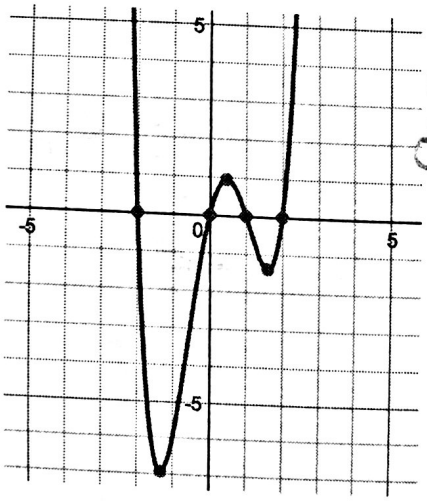
13. $c(x) = -2x - 4$ 1 root



Factored form:

$c(x) = -2(x+2)$

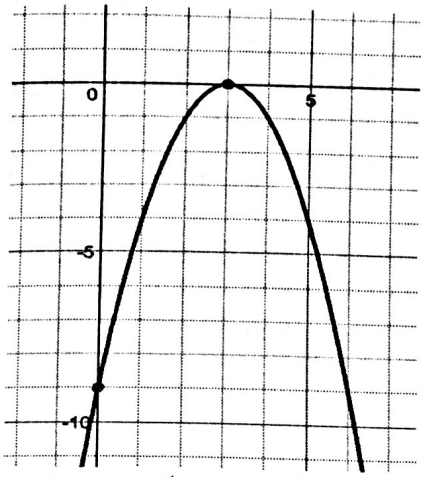
14. $d(x) = x^4 - x^3 - 4x^2 + 4x$ 4 roots



Factored form:

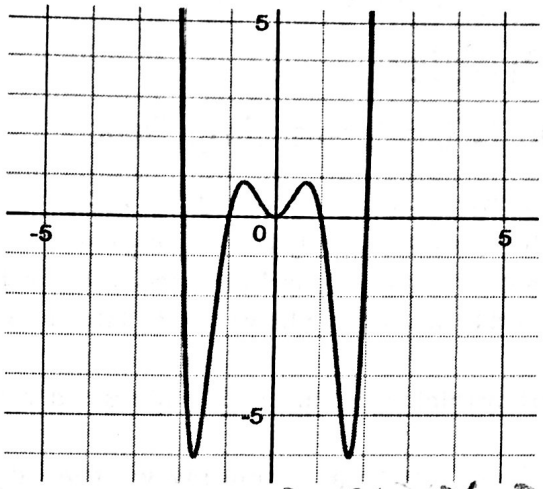
$d(x) = x(x+2)(x-1)(x-2)$

15. $f(x) = -x^2 + 6x - 9$ 2 roots



Factored form: $f(x) = -(x-3)(x-3)$ or $f(x) = -(x-3)^2$

16. $g(x) = x^6 - 5x^4 + 4x^2$ 6 roots



Factored form: $g(x) = x^2(x+2)(x+1)(x-1)(x-2)$

17. The graphs of #15 and #16 don't seem to follow the Fundamental Theorem of Algebra, but there is something similar about each of the graphs. Explain what is happening at the point (3, 0) in #15 and at the point (0,0) in #16.

- The graph touches the x-axis (or bounces off the x-axis) but does not cross the x-axis
- ∴ Double root

GO

Topic: Solving quadratic equations

Solve for x using the quadratic formula.

1. $x^2 + 20x + 51 = 0$

$x = \frac{-20 \pm \sqrt{400 - 204}}{2}$

$= \frac{-20 \pm \sqrt{196}}{2} = \frac{-20 \pm 14}{2}$

$= -3$ and -17

2. $x^2 + 10x + 25 = 0$

$x = \frac{-10 \pm \sqrt{100 - 100}}{2}$

$= \frac{-10 \pm 0}{2}$

$= -5$

3. $3x^2 + 12x = 0$

$x = \frac{-12 \pm \sqrt{144 - 0}}{6}$

$= \frac{-12 \pm 12}{6}$

$= 0$ and -4

4. $0 = x^2 - 11$

$x = \frac{0 \pm \sqrt{0 + 44}}{2}$

$= \frac{0 \pm \sqrt{44}}{2} = \frac{0 \pm 2\sqrt{11}}{2}$

$= \pm\sqrt{11}$

5. $0 = x^2 + x - 1$

$x = \frac{-1 \pm \sqrt{1 + 4}}{2}$

$= \frac{-1 \pm \sqrt{5}}{2}$

6. $0 = x^2 + 2x + 3$

$x = \frac{-2 \pm \sqrt{4 - 12}}{2}$

$= \frac{-2 \pm \sqrt{-8}}{2} = \frac{-2 \pm 2i\sqrt{2}}{2}$

$= -1 \pm i\sqrt{2}$