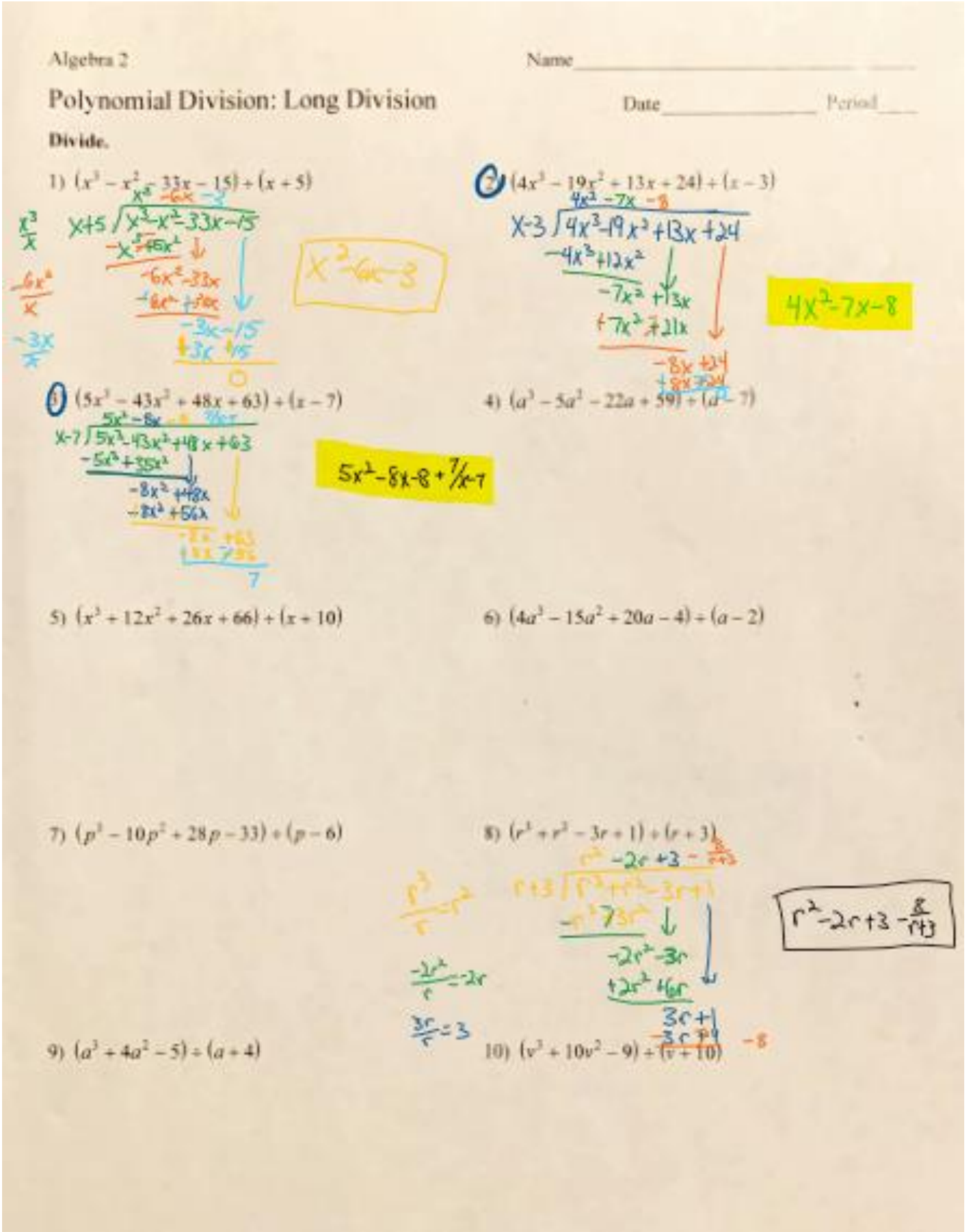
Today we reviewed the concept of long division by checking the homework assignment. We then learned a new method for dividing polynomials, synthetic division. This method can only be used when dividing by linear binomials. Below you will find the answer to last nights homework followed by the notes we took in class today. Your homework tonight is to complete the rest of the worksheet from last night using synthetic division.



Algebra 2 Name _____

Polynomial Division: Long Division Date _____ Period ____

Divide.

1) $(x^3 - x^2 - 33x - 15) \div (x + 5)$

$x^2 - 6x - 3$

2) $(4x^3 - 19x^2 + 13x + 24) \div (x - 3)$

$4x^2 - 7x - 8$

3) $(5x^3 - 43x^2 + 48x + 63) \div (x - 7)$

$5x^2 - 8x - 8 + \frac{7}{x-7}$

4) $(a^3 - 5a^2 - 22a + 59) \div (a - 7)$

5) $(x^3 + 12x^2 + 26x + 66) \div (x + 10)$

6) $(4a^3 - 15a^2 + 20a - 4) \div (a - 2)$

7) $(p^3 - 10p^2 + 28p - 33) \div (p - 6)$

8) $(r^3 + r^2 - 3r + 1) \div (r + 3)$

$r^2 - 2r + 3 - \frac{8}{r+3}$

9) $(a^3 + 4a^2 - 5) \div (a + 4)$

10) $(v^3 + 10v^2 - 9) \div (v + 10)$

11) $(3x^3 - 7x^2 + 3x + 5) \div (x - 2)$

$3x^2 - 1x + 1 + \frac{7}{x-2}$

$x-2 \overline{)3x^3 - 7x^2 + 3x + 5}$

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

$-1x^2 + 3x$

$+1x^2 - 2x$

$1x + 5$

$-x + 2$

7

$\frac{3x^3}{x}$, $\frac{-1x^2}{x}$, $-1x(x-2)$, $\frac{1x}{x}$

$3\overline{)\begin{array}{r}1\\5\\-3\\\hline 2\end{array}}$ $1\frac{2}{3}$ $\frac{a^3}{a}$

12) $(a^3 - 25a - 5) \div (a + 5)$

$a^2 - 5a + 0 - \frac{5}{a+5}$

$a+5 \overline{)a^3 - 0a^2 - 25a - 5}$

$-a^3 + 5a^2$

$-5a^2 - 25a$

$+5a^2 + 25a$

$0a - 5$

$-0a + 0$

-5

$\frac{-5a^2}{a} = -5a$, $\frac{0a}{a} = 0$

13) $(x^5 + 6x^4 - 8x^2 - 47x + 9) \div (x + 6)$

$x^4 + 0 - 8x + 1 + \frac{3}{x+6}$

$x+6 \overline{)x^5 + 6x^4 - 8x^2 - 47x + 9}$

$-x^5 - 6x^4$

$0 - 8x^2$

$-0 - 0$

$-8x^2 - 47x$

$+8x^2 + 48x$

$x + 9$

$+x + 6$

3

$\frac{x^5}{x} = x^4$, $\frac{0}{x} = 0$, $\frac{-8x^2}{x} = -8x$, $\frac{3}{x} = 1$

$x^2 - 8x + 1 + \frac{3}{x+6}$

14) $(4x^3 + 40x^2 + 2x + 11) \div (x + 10)$

15) $(n^4 - 15n^3 + 61n^2 - 35n - 39) \div (n - 8)$

$n^3 - 7n^2 + 5n + 5 + \frac{1}{n-8}$

$n-8 \overline{)n^4 - 15n^3 + 61n^2 - 35n - 39}$

$-n^4 + 8n^3$

$-7n^3 + 61n^2$

$-7n^3 + 56n^2$

$5n^2 - 35n$

$-5n^2 + 40n$

$5n - 39$

$-5n + 40$

1

$\frac{n^4}{n} = n^3$, $\frac{-7n^3}{n} = -7n^2$, $\frac{5n^2}{n} = 5n$, $\frac{5n}{n} = 5$

16) $(r^4 + r^3 - 20r^2 + 19r + 12) \div (r - 3)$

① divide first terms

② multiply ← distribute top number product

③ subtract

④ bring down

17) $(n^4 - 25n^2 - 4n - 11) \div (n + 5)$

18) $(b^4 - 17b^3 + 81b^2 - 67b - 30) \div (b - 8)$

19) $(5x^4 - 49x^3 + 81x^2 - 79x + 63) \div (x - 8)$

20) $(k^4 + 2k^3 - 4k - 18) \div (k + 2)$

Synthetic Division

Tuesday, October 8, 2019 9:02 AM

- Shortcut for long division
- Can only be used when dividing by a linear binomial. ex. $(x+5)$ $x-7=0$, $x=7$
- If dividing by $x+5$ Set $x+5=0$ and solve for x. Result would be $x=-5$. Dividing by -5.
- Always check polynomial is in standard form.

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

Ex. 1 $(x^3-2x^2+2x+5) \div (x-1)$ $x-1=0$, $x=1$ dividing by

coefficients: 1 −2 2 5

	1	−2	2	5
1	↓	1	−1	1
	1	−1	1	6

quadratic, linear, constant, Remainder

$x^2 - x + 1 + \frac{6}{x-1}$

Ex. 2 $(3x^3+7x^2-4x+3) \div (x+3)$ $x+3=0$, $x=-3$

	3	7	−4	3
−3	↓	−9	6	−6
	3	−2	2	−3

$3x^2-2x+2$ $\frac{-3}{x+3}$

$3x^2-2x+2-\frac{3}{x+3}$

Ex 3. $(3x^5-2x^4+x^2-4x+12) \div (x-2)$ missing x^3

$x-2=0$, $x=2$

	3	−2	0	1	−4	12
2	↓	6	8	16	34	60
	3	4	8	17	30	72

$3x^4+4x^3+8x^2+17x+30+\frac{72}{x-2}$

Ex. 4 $(14p^2+48p+p^3+41) \div (p+4)$

$p^3+14p^2+48p+41$

	1	14	48	41
−4	↓	−4	−40	−32
	1	10	8	9

$p^2+10p+8+\frac{9}{p+4}$