Check homework with your neighbor.

Bring your smartphone to class if you have one on Monday.

1-1 HWAnswer Key

1. $4x^3+6x^2-7x+5$, cubic, 4, 3
2. $3x^2-4x+5$, quadratic, 3, 2
3. $15x^3+4x^2-x+5$
4. $-15x^3+2x^2+5x+5$
5. $-3x^2-7x+14$
6. $-9x^2+3x-3$
7. $9x^2-3x+3$
8. $6x^4+27x^3-18x^2$
9. $-6x^5y-2x^3y^3+10x^3y^2-4x^2y^2$
10. $-y^4-2y^3z+x^2y^2+x^3-xy^2-2xyz$
11. $2y^2-32$
12. $21a^2-29ab-10b^2$
13. $-4x^3+23x^2-12x-15$
14. When multiplying two polynomials, multiply each term of the first with each term of the second.

1. Write $6x^2+4x^3-7x+5$ in standard form.

Standard form: $4x^3+6x^2-7x+5$

Identify: name: Cubic, leading coefficient: 4, degree: 3

2. Write $5+3x^2-4x$ in standard form.

Standard form: $3x^2-4x+5$

Identify: name: quadratic, leading coefficient: 3, degree: 2

Add or subtract. Write your answer in standard form.

3. $(3x^2+2x+5)+(15x^3+x^2-3x) = 15x^3+4x^2-x+5$

4. $(3x^2+2x+5)-(15x^3+x^2-3x) = 3x^2+2x+5-15x^3-x^2+3x$
$= -15x^3+2x^2+5x+5$

5. $(4x^2-3x+9)+(-4x+5-7x^2) = -3x^2-7x+14$

6. Subtract $(2x^2-3x+9)$ from $(6-7x^2)$ $= (6-7x^2)-(2x^2-3x+9)$
$= 6-7x^2-2x^2+3x-9$
$= -9x^2+3x-3$

7. From $(2x^2-3x+9)$ subtract $(6-7x^2)$ $= (2x^2-3x+9)-(6-7x^2)$
$= 2x^2-3x+9-6+7x^2$
$= 9x^2-3x+3$

Multiply. Write your answer in standard form.

8. $3x^2(2x^2+9x-6) = 6x^4+27x^3-18x^2$

9. $-2x^2y(3x^3+xy^2-5xy+2y)=$ $-6x^{[illegible]}y - 2x^{[illegible]}y^{[illegible]} + 10x^{[illegible]}y^{[illegible]} - [illegible]x\ y$

10. $(x^2-2yz-y^2)(y^2+x)=$ $y^2(x^2-2yz-y^2)+x(x^2-2yz-y^2)$

$= x^2y^2-2y^3z-y^4+x^3-2xyz-xy^2$

$=-y^4-2y^3z+x^2y^2+x^3-xy^2-2xyz$

11. $(2y-8)(y+4)=$ $2y^2+8y-8y-32 \quad = 2y^2-32$

12. $(3a-5b)(7a+2b)=$ $21a^2+6ab-35ab-10b^2$

$=21a^2-29ab-10b^2$

13. $(3+3x-4x^2)(x-5)=$ $x(3+3x-4x^2)-5(3+3x-4x^2)$

$=3x+3x^2-4x^3-15-15x+20x^2$

$=-4x^3+23x^2-12x-15$

14. Explain double distribution.

method used when multiplying two polynomials. Multiply each term of the first polynomial by each term of the second.

1-2: Dividing Polynomials

Using Long Division to Divide Polynomials

- Polynomial Long Division is a method for dividing a polynomial by another polynomial of a lower degree.
- It is very similar to dividing whole numbers

Arithmetic Long Division

Divisor 12, Quotient $23\frac{1}{12}$, Dividend 277

$$\begin{array}{r} 23\,\tfrac{1}{12} \\ 12\overline{)277} \\ -24\downarrow \\ \hline 37 \\ -36 \\ \hline 1 \end{array}$$

D
M
S
BD

Polynomial Long Division

Divisor $x+2$, Quotient $2x+3$, Dividend $2x^2+7x+7$, Remainder 1

$$\begin{array}{r} 2x+3 \\ x+2\overline{)2x^2+7x+7} \\ -2x^2-4x \\ \hline 3x+7 \\ 3x+6 \\ \hline 1 \end{array}$$

D: $\frac{2x^2}{x}=2x$
M: $2x(x+2)=2x^2+4x$
S: negate both
BD

$$\boxed{2x+3+\frac{1}{x+2}}$$

We can think of long division as follows:

F(x) ÷ G(x) = Q(x) with a remainder of R(x)
where F(x) is the Dividend
G(x) is the Divisor
Q(x) is the Quotient
and R(x) is the Remainder

How can you check your answer? Check both answers. Quotient X Divisor + Remainder

$(x+2)(2x+3)+1$
$2x^2+3x+4x+6+1$
$2x^2+7x+7$ ✓

Example 1: $(2x^3 - 4x^2 + 2) \div (2x - 2)$ $0x$

Step 1: Write the polynomial in standard form.
Include missing terms with a zero coefficient.

Step 2: Write in long division format.

Step3: Divide first terms. $\frac{\cancel{2}x^3}{\cancel{2}x} = x^2$ $\frac{-2x^2}{2x} = -x$ $\frac{-2x}{2x}$

Step 4: Multiply. $x^2(2x-2) = 2x^3 - 2x^2$
$-x(2x-2) = -2x^2 + 2x$ $-1(2x-2)$

Step5: Subtract and bring down the next term.
↳ negate both terms

Step 6: Repeat steps 3 – 5 as necessary.

Step 7: Check and write answer.

$$
\begin{array}{r|l}
 & x^2 - x - 1 \\
2x-2 & 2x^3 - 4x^2 + 0x + 2 \\
 & -2x^3 + 2x^2 \\
 & -2x^2 + 0x \\
 & +2x^2 \mp 2x \\
 & -2x + 2 \\
 & +2x \mp 2 \\
 & 0 \quad 0
\end{array}
$$

Example 2: $(x^2 + 6x + 9) \div (x + 3)$

$$
\begin{array}{r|l}
 & x + 3 \\
x+3 & x^2 + 6x + 9 \\
 & -x^2 \mp 3x \\
 & 3x + 9 \\
 & -3x \mp 9 \\
 & 0
\end{array}
$$

D $\frac{x^2}{x} = x$ $\frac{3x}{x}$
M $x(x+3)$ $3(x+3)$
S
BD

Example 3: $(y^3 - 27) \div (y - 3)$

D: $\frac{y^3}{y} = y^2$ | $\frac{3y^2}{y} = 3y$ | $\frac{9y}{y}$

M: $y^2(y-3)$ | $3y(y-3)$ | $9(y-3)$

S: negate both

BD:

$$
\begin{array}{r|l}
 & y^2 + 3y + 9 \\
\hline
y-3 & \cancel{y^3} + 0y^2 + 0y - 27 \\
 & -\cancel{y^3} + 3y^2 \\
\hline
 & \quad 3\cancel{y^2} + 0y \\
 & \quad -\cancel{3y^2} + 9y \\
\hline
 & \qquad 9y - 27 \\
 & \qquad -9y + 27 \\
\hline
 & \qquad\quad 0
\end{array}
$$

Example 4: $(11y^2 - 1 + 6y^3 + 2y) \div (2y + 1)$

$$
\begin{array}{r|l}
 & 3y^2 + 4y - 1 \\
\hline
2y+1 & \cancel{6y^3} + 11y^2 + 2y - 1 \\
 & -\cancel{6y^3} \mp 3y^2 \\
\hline
 & \quad 8y^2 + 2y \\
 & \quad -8y^2 \mp 4y \\
\hline
 & \qquad -2y - 1 \\
 & \qquad +2y + 1 \\
\hline
 & \qquad\quad 0
\end{array}
$$

Example 5: $(x^2 + 8x + 19) \div (x + 5)$

$$x + 3 + \frac{4}{x+5}$$

$$x+5 \enclose{longdiv}{x^2 + 8x + 19}$$

$$-\ x^2 + 5x$$

$$3x + 19$$

$$-\ 3x + 15$$

$$4$$

Example 6: $(5x^2 - 10 + 2x^3 + 5x) \div (2x - 1)$

$$x^2 + 3x + 4 - \frac{6}{2x-1}$$

$$2x-1 \enclose{longdiv}{2x^3 + 5x^2 + 5x - 10}$$

$$-\ 2x^3 + x^2$$

$$6x^2 + 5x$$

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

$$8x - 10$$

$$-\ 8x + 4$$

$$-6$$