Algebra 2 5.2

Divide polynomials using long division

Divide polynomials using synthetic division

simplify (a fraction)

quotient

divisor

remainder

long division algorithm

square puzzle

$4 \cdot 5 = 20$

$52\frac{7}{9}$

$52\ R7$

$9\overline{)475}$

-45

25

-18

7

× (place value)

−

bring down

repeat

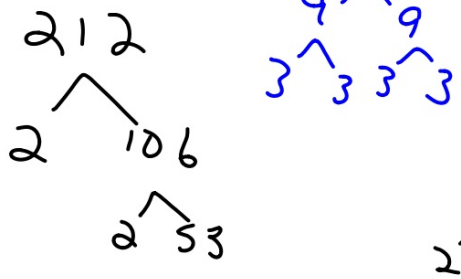
simplify a fraction

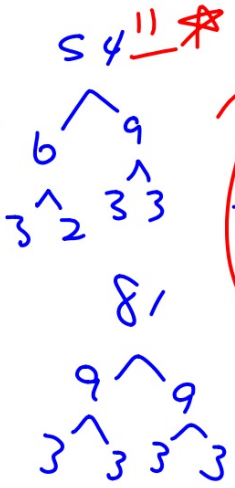
54/81

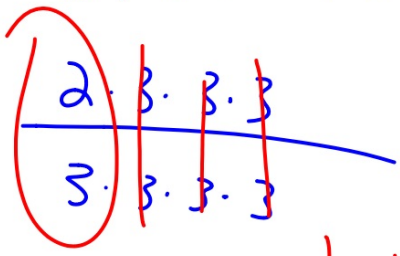
64/212

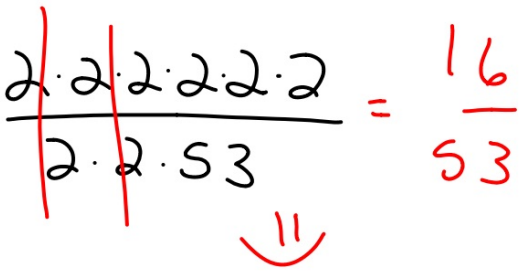
$8x^2/24x^4$

$\frac{64}{212}$









if denom = mono

Simplify

Example 1 Divide a Polynomial by a Monomial

Simplify $\dfrac{6x^4y^3 + 12x^3y^2 - 18x^2y}{3xy}$.

$$\frac{6x^4y^3}{3xy} + \frac{12x^3y^2}{3xy} - \frac{18x^2y}{3xy}$$

$$\frac{2 \cdot 3 \cdot x \cdot x \cdot x \cdot y \cdot y \cdot y}{3 \cdot x \cdot y} \quad \frac{2 \cdot 2 \cdot 3 \cdot x \cdot x \cdot y \cdot y}{3 \cdot x \cdot y} \quad \frac{2 \cdot 3 \cdot 3 \cdot x^2 y}{3 \cdot x \cdot y}$$

$$2x^3y^2 + 4x^2y - 6x$$

GuidedPractice **Simplify.**

1A. $(20c^4d^2f - 16cdf^2 + 4cdf) \div (4cdf)$

$\frac{20c^4d^2f - 16cdf^2 + 4cdf}{4cdf}$

$5c^3d - 4f + 1$

What is the code?

1B. $(18x^2y + 27x^3y^2z)(3xy)^{-1}$

$3 \times y$

Long division algorithm

96/6

144/6

150/13

how do we check long division?

$$11\ R\ 7 = 11\frac{7}{13}$$

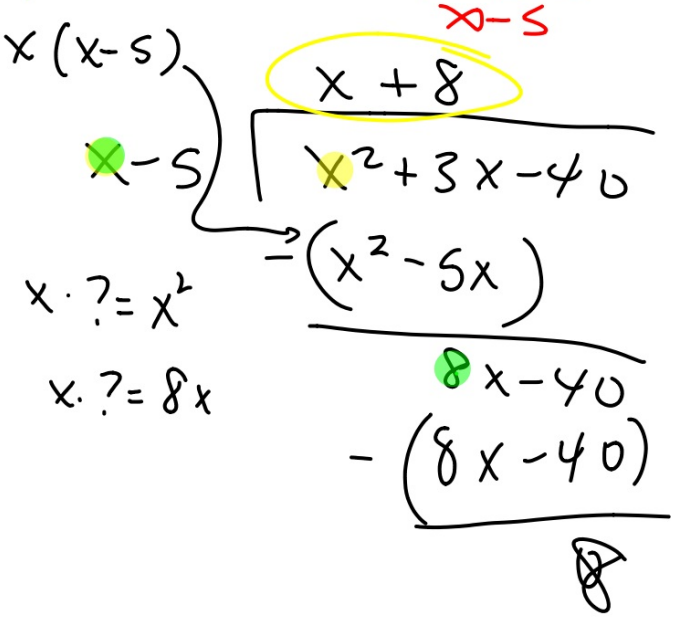
$$\begin{array}{r} 11 \\ 13\overline{)150} \\ -130 \\ \hline 20 \\ -13 \\ \hline 7 \end{array}$$

$$\begin{array}{r} 16 \\ 6\overline{)96} \\ -60 \\ \hline 36 \\ -36 \\ \hline 0 \end{array}$$

How is this problem different?

Example 2 Division Algorithm

Use long division to find $(x^2 + 3x - 40) \div (x - 5)$.



GuidedPractice **Use long division**

2A. $(x^2 + 7x - 30) \div (x - 3)$

$x + 10$

$x - 3 \overline{)\, x^2 + 7x - 30}$

$x \cdot ? = x^2$ $\quad -(x^2 - 3x)$

$x(x-3)$ $\qquad 10x - 30$

$x \cdot ? = 10x$ $\quad -(10x - 30)$

0

$(x^2 - 13x + 12) \div (x - 1)$

$$
\begin{array}{r|l}
x-1 & x^2-13x+12 \\
 & -(x^2-x) \\
\hline
 & -12x+12 \\
 & -(-12x+12) \\
\hline
 & 0
\end{array}
$$

$x - 12$

$x - 1$

$x - 12$

$x^2 - 12x + 12$

$x^2 - x$

X

What is the code?

Standardized Test Example 3 Divide Polynomials

Which expression is equal to $(a^2 + 7a - 11)(3 - a)^{-1}$?

A ~~$a + 10 - \frac{19}{3 - a}$~~

B $-a + 10$

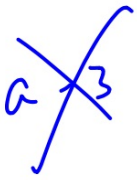
C $-a - 10 + \frac{19}{3 - a}$

D $-a - 10 - \frac{19}{3 - a}$

$$
\begin{array}{r}
-a-10 \\
-a+3 \overline{)\,a^2+7a-11} \\
-(a^2-3a) \\
\hline
10a-11 \\
-(10a-30) \\
\hline
19
\end{array}
$$

$3-a$

$-a+3$



GuidedPractice

3. Which expression is equal to $(r^2 + 5r + 7)(1 - r)^{-1}$?

F $-r - 6 + \frac{13}{1 - r}$

H $r - 6 + \frac{13}{1 - r}$

G $r + 6$

J $r + 6 - \frac{13}{1 - r}$

$-r+1 \overline{)\, r^2+5r+7}$

"synthetic division"... leave for next time...