③ Find the slope of lines containing

Blue → $(-2, 5)$ and $(3, -1)$

→ $m = \dfrac{y_2 - y_1}{x_2 - x_1} = \dfrac{5+1}{-2-3} = \dfrac{6}{-5} = -\dfrac{6}{5}$

→ $m = \dfrac{-1-5}{3+2} = -\dfrac{6}{5}$

$3 - (-2) = 3 + 2$

$m = \dfrac{\Delta y}{\Delta x}$ $\dfrac{\text{change in } y}{\text{change in } x} = \dfrac{\text{rise}}{\text{run}}$

4 Yellow

Find equations of lines with $m = \frac{3}{2}$ and containing $(-4, 7)$

$y = mx + b$

$7 = \frac{3}{2}(-4) + b$

$7 = -6 + b$

$+6 \quad +6$

$13 = b$

$y = \frac{3}{2}x + 13$

$y - 7 = \frac{3}{2}(x + 4)$

$y - 7 = \frac{3}{2}x + 6$

$+7 \quad +7$

$y = \frac{3}{2}x + 13$

(55) $(x+3)(x+4)(x+5)$

5.5

$(x^2+4x+3x+12)(x+5)$

$(x^2+7x+12)(x+5)$

$(x+5)(x^2+7x+12)$

$x^3+7x^2+12x+5x^2+35x+60$

$x^3+12x^2+47x+60$

$x^2+7x+12$

$x+5$

x^3+7x^2+12x

$+5x^2+35x+60$

$x^3+12x^2+47x+60$

$x+3$

$x+4$

x^2+3x

$4x+12$

$x^2+7x+12$

5.6 Special Products

$ba = ab$ commutative

$$(a+b)^2 = (a+b)(a+b)$$

$$= a^2 + ab + ab + b^2$$

$$= a^2 + 2ab + b^2 \quad \star$$

$$(x+y)^2 = x^2 + 2xy + y^2$$

x^2: Square of 1st term

$2xy$: $1^{st} \cdot 2^{nd} \cdot 2$

y^2: 2nd term squared

We get 3 terms

ALWAYS

$(x-5)^2 = x^2 - 10x + 25$

$(x-5)(x-5) = x^2 - 5x - 5x + 25$ ✡

1st 2nd

$(x-5)^2 = x^2 - 10x + 25$

1st term squared

$1^{st} \cdot 2^{nd} \cdot 2 = -10x$

$(3x + 4)^2 = 9x^2 + 24x + 16$ ←

1st 2nd

perfect square trinomial

$(a-b)(a+b) = a^2 + ab - ab - b^2$

$= a^2 - b^2$

Conjugates

The difference of two squared.

$(x+y)(x-y) = x^2 - y^2$

$(2x+6)(2x-6) = 4x^2 - 36$

$(3y+6x)(3y-6x) = 9y^2 - 36x^2$

$(2x - y)^2 = 4x^2 - 4xy + y^2$ perfect square trinomial

$2x(-y)(2)$

$(3z + 6)^2 = 9z^2 + 36z + 36$

$(3z)(6)(2)$

$(3z + 6)(3z + 6) = 9z^2 + 18z + 18z + 36$

5.7 Dividing a polynomial by a monomial.

ex $(4x^3 - 3x^2 + 6x)$ divided by $2x$

$$\frac{4x^3 - 3x^2 + 6x}{2x} \qquad \frac{a+b}{c} = \frac{a}{c} + \frac{b}{c}$$

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

$$2x^2 - \frac{3x}{2} + 3 \quad \text{answer}$$

(ex) $$\frac{27x^2 - 9x^3 - 18x^4}{18x^3}$$

$$= \frac{27x^2}{18x^3} - \frac{9x^3}{18x^3} - \frac{18x^4}{18x^3}$$

$$= \frac{3}{2x} - \frac{1}{2} - x$$

$$\frac{xx}{xxx}$$

$$\frac{3x^{-1}}{2} = \frac{3}{2x}$$

(4)

$$\frac{18x^{2m} + 24x^{4m} + 30x^{6m}}{6x^{2m}}$$

$$\frac{\overset{3}{\cancel{18}}\,x^{\cancel{2m}}}{\underset{1}{\cancel{6}}\,x^{\cancel{2m}}} + \frac{\overset{4}{\cancel{24}}\,x^{4m}}{\underset{1}{6}\,x^{2m}} + \frac{\overset{5}{\cancel{30}}\,x^{6m}}{\underset{1}{6}\,x^{2m}}$$

$$\frac{3 + 4x^{2m} + 5x^{4m}}{\text{done.}}$$

$\frac{x^{2m}}{x^{2m}} = 1$

$\frac{x^{4m}}{x^{2m}} = x^{4m-2m}$

5.8 Dividing a polynomial by a polynomial

divide 3962 by 27

$$
\begin{array}{r}
146 \\
27\overline{)3962} \\
-27\downarrow \\
\hline
126 \\
-108 \\
\hline
182 \\
-162 \\
\hline
20
\end{array}
$$

$146 + \frac{20}{27}$

$146\frac{20}{27}$

Using polynomials

$$\frac{a^2 + 9a + 20}{a+5}$$

$$\begin{array}{r} a+4 \\ a+5 \overline{)\, a^2+9a+20} \\ \underline{-a^2+5a} \\ 4a+20 \\ \underline{-4a+20} \\ 0 \end{array}$$

Check

$$\begin{array}{r} a+5 \\ a+4 \\ \hline a^2+5a \\ \underline{\quad 4a+20} \\ a^2+9a+20 \end{array}$$

long division

Divide $\dfrac{4a^2 - 8a - 6}{2a+1}$

$-8a - 2a = -10a$

$2a - 5 - \frac{1}{2a+1}$

$2a+1 \overline{)\,4a^2 - 8a - 6}$

$-4a^2 + -2a$

$-6-(-5)$

$-6+5$

$-10a - 6$

$\pm 10a \pm 5$

-1

-1

$2a - 5 + \frac{-1}{2a+1}$

(ex) $\dfrac{x^3 + 4x^2 - 8}{x + 2}$

descending order not missing any terms

answer $x^2 + 2x - 4$

$$
\begin{array}{r}
x^2 + 2x - 4 \\
x+2 \overline{)\, x^3 + 4x^2 + 0x - 8} \\
\underline{-(x^3 + 2x^2)} \\
2x^2 + 0x \\
\underline{-(2x^2 + 4x)} \\
-4x - 8 \\
\underline{-(-4x - 8)} \\
0
\end{array}
$$