2. $6x^3 \cdot 2x^{-1}$

$= (6 \cdot 2)\ x^3 \cdot x^{-1}$ by commutativity + associativity of mult.

$= (12)\ x^{3+(-1)}$ by laws of exp.

$= \boxed{12x^2}$

10. $16^{-3/4} = \frac{1}{16^{3/4}}$ by law: $x^{-p} = \frac{1}{x^p}$

$= \frac{1}{(16^{1/4})^3}$ by law: $x^{p/q} = (x^p)^q = (x^q)^p$

$= \frac{1}{2^3}$ since $2^4 = 16$, $16^{1/4} = 2$, $\sqrt[4]{16} = 2$

$= 1/8$

22. $\dfrac{6}{5\sqrt{9-x^2}} = \dfrac{6}{5} \cdot \dfrac{1}{\sqrt{9-x^2}}$ by assoc. of mult.

$= \dfrac{6}{5} \dfrac{1}{(9-x^2)^{1/2}}$ since $x^{1/2} = \sqrt{x}$

$= \dfrac{6}{5}(9-x^2)^{-1/2}$ since $x^{-p} = 1/x^p$

8. $\left(\dfrac{x^{-2}y^{-1}}{2x^2y^3}\right)^{-2} = \dfrac{(x^{-2})^{-2}(y^{-1})^{-2}}{2^{-2}(x^2)^{-2}(y^3)^{-2}}$

since $(x^p)^q = x^{pq}$

$= \dfrac{x^4 y^2}{2^{-2}x^{-4}y^{-6}}$

since $x^{-p} = \dfrac{1}{x^p}$

$= x^4 y^2 2^2 x^4 y^6$

$= 4x^8y^8$

3

26. $(x^3+4x^2-x)-(-2x^3+6x-3)$

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

distributing the negative sign

$= (x^3+2x^3)+4x^2(-x-6x)+3$

by associativity of addition + commut. too

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

28. $[(2x^2-x)+(3x+2)]-[(x-3)-(x^2+1)]$

$= [2x^2-x+3x+2]-[x-3-x^2-1]$

$= [2x^2+2x+2]-[-x^2+x-4]$

$= 2x^2+2x+2+x^2-x+4$

$= 3x^2+x+6$

30. $(2x+9)^2$

$= (2x+9)(2x+9)$

$= (2x)(2x) + (2x)\cdot 9 + 9\cdot(2x) + 9\cdot 9$

$= 4x^2 + 18x + 18x + 81$

$= 4x^2 + 36x + 81$

31. $(2x+5y)(4x^2-10xy+25y^2)$

$= 2x(4x^2) + (2x)(-10xy) + (2x)(25y^2)$
$\quad + (5y)(4x^2) + (5y)(-10xy) + (5y)(25y^2)$

$= 8x^3 - 20x^2y + 50xy^2$
$\quad + 20x^2y - 50xy^2 + 125y^3$

$= \boxed{8x^3 + 125y^3}$

5

34. point $P = (-3, 7)$

with slope $m = 5/8$

line has form: $y = mx + b$

slope y-inter.

<u>So</u> $y = 5/8\, x + b$

use point: $7 = 5/8(-3) + b$

$\Rightarrow 7 = -\frac{15}{8} + b \Rightarrow b = 7 + \frac{15}{8} = 71/8$

$y = (5/8)x + \frac{71}{8}$ slope-intercept form

multiply by -8 to get standard form

$5x - 8y = -71$

37. // to $5x-3y=7$ 6

through $P=(-3,3)$

Parallel lines have the same slope

$5x-3y=7$

equivalent to

$3y=5x-7$

$y=\frac{5}{3}x-\frac{7}{3}$ ← slope $=5/3$

Our line has slope $m=5/3$

$y=5/3\,x+b$

use point $(-3,3)$

$3=(5/3)(-3)+b$

$3=-5+b \Rightarrow b=8$

$y=(5/3)x+8$

41. $y = 3(x-2)^2 + 5$

in vertex form, vertex (2,5)

parabola faces upward. $\Rightarrow$ vertex yields a min.

min is $y = 5$.

Since vertex above x-axis, and upward facing parabola, no x-interc

44. Using quadratic formula

on $y = 2x^2 - 3x - 2$

$$x = \frac{3 \pm \sqrt{(-3)^2 - 4(2)(-2)}}{2(2)}$$

$$= \frac{3 \pm \sqrt{9 + 16}}{4} = \frac{3 \pm 5}{4}$$

$$= -\frac{1}{2}, 2$$

x intercepts

$x = -1/2, 2$

44. cont.

The vertex occurs 1/2 way between zeros:

$$x = \frac{-1/2 + 2}{2} \leftarrow \text{halfway}$$

$$= \frac{3/2}{2} = 3/4$$

vertex: $x = 3/4 \Rightarrow y = 2(3/4)^2 - 3(3/4) - 2$

$$= 9/8 - 9/4 - 2$$

$$y = -25/8$$

upward facing parabola $y = \boxed{2}x^2 - 3x - 2$

so $y = -25/8$ is a min.

49.

$$f(x) = \begin{cases} 2x+1 & x \le -1 \\ x^2-2 & x > -1 \end{cases}$$

9

$f(-2)$ $\quad -2 < -1$

$f(-2) = 2(-2)+1 = -4+1 = -3$

$f(-1) = 2(-1)+1 = -1$

$f(-1/2)$ $\quad -1/2 > -1$

$f(-1/2) = (-1/2)^2 - 2 = 1/4 - 2 = -7/4$

$f(0)$ $\quad 0 > -1$

$f(0) = 0^2 - 2 = -2.$

55. $h = \sqrt{x+3}$ $\quad f(x) = 5x - 2$

$$h(\square) = \sqrt{\square + 3}$$

$$f(x)$$

$$h(f(x)) = \sqrt{(5x-2)+3}$$

$$= \sqrt{5x+1}$$

57. $f(\square) = 2\square^2 - 5\square + 3$

$$f(x) = 2x^2 - 5x + 3$$

$$f(x+h) = 2(x+h)^2 - 5(x+h) + 3$$

$$= 2[x^2 + 2xh + h^2] - 5x - 5h + 3$$

$$f(x+h) - f(x)$$

$$= \cancel{2x^2} + 4xh + 2h^2 - \cancel{5x} - 5h + \cancel{3}$$

$$- \cancel{2x^2} + \cancel{5x} - \cancel{3}$$

$$= 4xh + 2h^2 - 5h$$