

Quick Review P.5

1. $(3x - 4)^2 = 9x^2 - 12x - 12x + 16 = 9x^2 - 24x + 16$

2. $(2x + 3)^2 = 4x^2 + 6x + 6x + 9 = 4x^2 + 12x + 9$

3. $(2x + 1)(3x - 5) = 6x^2 - 10x + 3x - 5 = 6x^2 - 7x - 5$

4. $(3y - 1)(5y + 4) = 15y^2 + 12y - 5y - 4 = 15y^2 + 7y - 4$

5. $25x^2 - 20x + 4 = (5x - 2)(5x - 2) = (5x - 2)^2$

6. $15x^3 - 22x^2 + 8x = x(15x^2 - 22x + 8) = x(5x - 4)(3x - 2)$

7. $3x^3 + x^2 - 15x - 5 = x^2(3x + 1) - 5(3x + 1) = (3x + 1)(x^2 - 5)$

8. $y^4 - 13y^2 + 36 = (y^2 - 4)(y^2 - 9) = (y - 2)(y + 2)(y - 3)(y + 3)$

9.
$$\frac{x}{2x + 1} - \frac{2}{x + 3}$$

$$= \frac{x(x + 3)}{(2x + 1)(x + 3)} - \frac{2(2x + 1)}{(2x + 1)(x + 3)}$$

$$= \frac{x^2 + 3x - 4x - 2}{(2x + 1)(x + 3)} = \frac{x^2 - x - 2}{(2x + 1)(x + 3)}$$

$$= \frac{(x - 2)(x + 1)}{(2x + 1)(x + 3)}$$

10.
$$\frac{x + 1}{x^2 - 5x + 6} - \frac{3x + 11}{x^2 - x - 6}$$

$$= \frac{x + 1}{(x - 3)(x - 2)} - \frac{3x + 11}{(x - 3)(x + 2)}$$

$$= \frac{(x + 1)(x + 2)}{(x - 3)(x - 2)(x + 2)} - \frac{(3x + 11)(x - 2)}{(x - 3)(x - 2)(x + 2)}$$

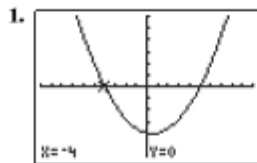
$$= \frac{(x^2 + 3x + 2) - (3x^2 + 5x - 22)}{(x - 3)(x - 2)(x + 2)}$$

$$= \frac{-2x^2 - 2x + 24}{(x - 3)(x - 2)(x + 2)}$$

$$= \frac{-2(x^2 + x - 12)}{(x - 3)(x - 2)(x + 2)}$$

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

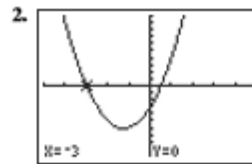
$$= \frac{-2(x + 4)}{(x - 2)(x + 2)} \text{ if } x \neq 3$$

Section P.5 Exercises

 $[-10, 10] \text{ by } [-30, 30]$

$x = -4 \text{ or } x = 5$

 The left side factors to $(x + 4)(x - 5) = 0$:

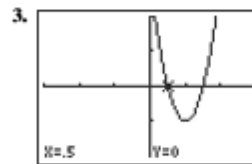
$x + 4 = 0 \quad \text{or} \quad x - 5 = 0$
 $x = -4 \quad \quad \quad x = 5$


 $[-5, 5] \text{ by } [-10, 10]$

$x = -3 \text{ or } x = 0.5$

 The left side factors to $(x + 3)(2x - 1) = 0$:

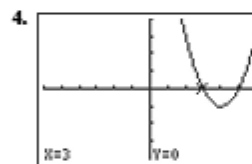
$x + 3 = 0 \quad \text{or} \quad 2x - 1 = 0$
 $x = -3 \quad \quad \quad 2x = 1$
 $\quad \quad \quad \quad \quad x = 0.5$


 $[-3, 3] \text{ by } [-2, 2]$

$x = 0.5 \text{ or } x = 1.5$

 The left side factors to $(2x - 1)(2x - 3) = 0$:

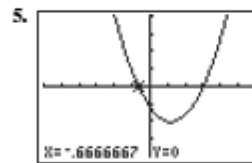
$2x - 1 = 0 \quad \text{or} \quad 2x - 3 = 0$
 $2x = 1 \quad \quad \quad 2x = 3$
 $x = 0.5 \quad \quad \quad x = 1.5$


 $[-6, 6] \text{ by } [-4, 4]$

$x = 3 \text{ or } x = 5$

 Rewrite as $x^2 - 8x + 15 = 0$; the left side factors to

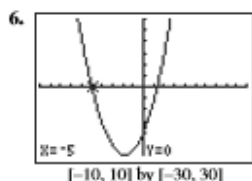
$(x - 3)(x - 5) = 0$:
 $x - 3 = 0 \quad \text{or} \quad x - 5 = 0$
 $x = 3 \quad \quad \quad x = 5$


 $[-6, 6] \text{ by } [-20, 20]$

$x = \frac{2}{3} \text{ or } x = 3$

 Rewrite as $3x^2 - 7x - 6 = 0$; the left side factors to

$(3x + 2)(x - 3) = 0$:
 $3x + 2 = 0 \quad \text{or} \quad x - 3 = 0$
 $x = -\frac{2}{3} \quad \quad \quad x = 3$



$$x = -5 \text{ or } x = \frac{4}{3}$$

Rewrite as $3x^2 + 11x - 20 = 0$; the left side factors to $(3x - 4)(x + 5) = 0$:

$$3x - 4 = 0 \quad \text{or} \quad x + 5 = 0$$

$$x = \frac{4}{3} \quad \quad \quad x = -5$$

7. Rewrite as $(2x)^2 = 5^2$; then $2x = \pm 5$, or $x = \pm \frac{5}{2}$.

8. Divide both sides by 2 to get $(x - 5)^2 = 8.5$. Then $x - 5 = \pm \sqrt{8.5}$ and $x = 5 \pm \sqrt{8.5}$.

9. Divide both sides by 3 to get $(x + 4)^2 = \frac{8}{3}$. Then

$$x + 4 = \pm \sqrt{\frac{8}{3}} \text{ and } x = -4 \pm \sqrt{\frac{8}{3}}$$

10. Divide both sides by 4 to get $(u + 1)^2 = 4.5$. Then $u + 1 = \pm \sqrt{4.5}$ and $u = -1 \pm \sqrt{4.5}$.

11. Adding $2y^2 + 8$ to both sides gives $4y^2 = 14$. Divide both sides by 4 to get $y^2 = \frac{7}{2}$, so $y = \pm \sqrt{\frac{7}{2}}$.

12. $2x + 3 = \pm 13$ so $x = \frac{1}{2}(-3 \pm 13)$, which gives $x = -8$ or $x = 5$.

13. $x^2 + 6x + 3^2 = 7 + 3^2$
 $(x + 3)^2 = 16$
 $x + 3 = \pm \sqrt{16}$
 $x = -3 \pm 4$
 $x = -7$ or $x = 1$

14. $x^2 + 5x = 9$
 $x^2 + 5x + \left(\frac{5}{2}\right)^2 = 9 + \left(\frac{5}{2}\right)^2$
 $(x + 2.5)^2 = 9 + 6.25$
 $x + 2.5 = \pm \sqrt{15.25}$

$$x = -2.5 - \sqrt{15.25} \approx -6.41 \text{ or}$$

$$x = -2.5 + \sqrt{15.25} \approx 1.41$$

15. $x^2 - 7x = -\frac{5}{4}$
 $x^2 - 7x + \left(\frac{7}{2}\right)^2 = -\frac{5}{4} + \left(\frac{7}{2}\right)^2$
 $\left(x - \frac{7}{2}\right)^2 = 11$
 $x - \frac{7}{2} = \pm \sqrt{11}$
 $x = \frac{7}{2} \pm \sqrt{11}$

$$x = \frac{7}{2} - \sqrt{11} \approx 0.18 \text{ or } x = \frac{7}{2} + \sqrt{11} \approx 6.82$$

16. $x^2 + 6x = 4$
 $x^2 + 6x + \left(\frac{6}{2}\right)^2 = 4 + \left(\frac{6}{2}\right)^2$
 $(x + 3)^2 = 4 + 9$
 $x + 3 = \pm \sqrt{13}$
 $x = -3 \pm \sqrt{13}$
 $x = -3 - \sqrt{13} \approx -6.61$ or $x = -3 + \sqrt{13} \approx 0.61$

17. $2x^2 - 7x + 9 = x^2 - 2x - 3 + 3x$
 $2x^2 - 7x + 9 = x^2 + x - 3$
 $x^2 - 8x = -12$
 $x^2 - 8x + (-4)^2 = -12 + (-4)^2$
 $(x - 4)^2 = 4$
 $x - 4 = \pm 2$
 $x = 4 \pm 2$
 $x = 2$ or $x = 6$

18. $3x^2 - 6x - 7 = x^2 + 3x - x^2 - x + 3$
 $3x^2 - 8x = 10$
 $x^2 - \frac{8}{3}x = \frac{10}{3}$

$$x^2 - \frac{8}{3}x + \left(\frac{4}{3}\right)^2 = \frac{10}{3} + \left(\frac{4}{3}\right)^2$$

$$\left(x - \frac{4}{3}\right)^2 = \frac{10}{3} + \frac{16}{9}$$

$$x - \frac{4}{3} = \pm \sqrt{\frac{46}{9}}$$

$$x = \frac{4}{3} \pm \frac{1}{3}\sqrt{46}$$

$$x = \frac{4}{3} - \frac{1}{3}\sqrt{46} \approx -0.93 \text{ or } x = \frac{4}{3} + \frac{1}{3}\sqrt{46} \approx 3.59$$

19. $a = 1$, $b = 8$, and $c = -2$:

$$x = \frac{-8 \pm \sqrt{8^2 - 4(1)(-2)}}{2(1)} = \frac{-8 \pm \sqrt{72}}{2}$$

$$= \frac{-8 \pm 6\sqrt{2}}{2} = -4 \pm 3\sqrt{2}$$

$$x \approx -8.24 \text{ or } x \approx 0.24$$

20. $a = 2$, $b = -3$, and $c = 1$:

$$x = \frac{3 \pm \sqrt{(-3)^2 - 4(2)(1)}}{2(2)} = \frac{3 \pm \sqrt{1}}{4} = \frac{3}{4} \pm \frac{1}{4}$$

$$x = \frac{1}{2} \text{ or } x = 1$$

21. $x^2 - 3x - 4 = 0$, so

$$a = 1, b = -3, \text{ and } c = -4:$$

$$x = \frac{3 \pm \sqrt{(-3)^2 - 4(1)(-4)}}{2(1)} = \frac{3 \pm \sqrt{25}}{2} = \frac{3}{2} \pm \frac{5}{2}$$

$$x = -1 \text{ or } x = 4$$

22. $x^2 - \sqrt{3}x - 5 = 0$, so

$$a = 1, b = -\sqrt{3}, \text{ and } c = -5:$$

$$x = \frac{\sqrt{3} \pm \sqrt{(-\sqrt{3})^2 - 4(1)(-5)}}{2(1)}$$

$$= \frac{\sqrt{3} \pm \sqrt{23}}{2} = \frac{1}{2}\sqrt{3} \pm \frac{1}{2}\sqrt{23}$$

$$x \approx -1.53 \text{ or } x \approx 3.26$$

23. $x^2 + 5x - 12 = 0$, so
 $a = 1, b = 5, c = -12$

$$x = \frac{-5 \pm \sqrt{(5)^2 - 4(1)(-12)}}{2(1)}$$

$$= \frac{-5 \pm \sqrt{73}}{2} = -\frac{5}{2} \pm \frac{\sqrt{73}}{2}$$
 $x \approx -6.77$ or $x \approx 1.77$

24. $x^2 - 4x - 32 = 0$, so
 $a = 1, b = -4, c = -32$:

$$x = \frac{-(-4) \pm \sqrt{(-4)^2 - 4(1)(-32)}}{2(1)}$$

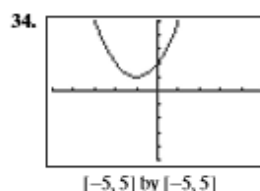
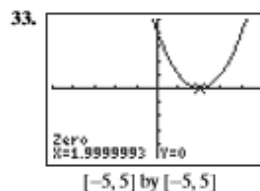
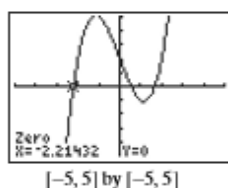
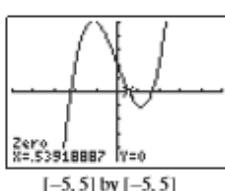
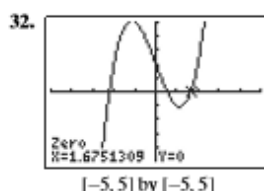
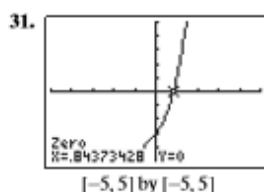
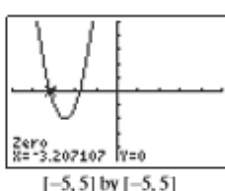
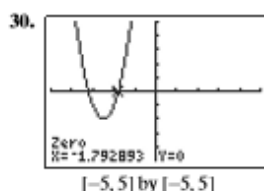
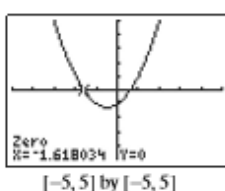
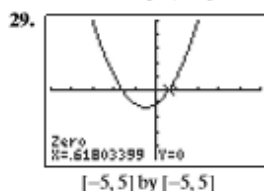
$$= \frac{4 \pm \sqrt{144}}{2} = 2 \pm 6$$
 $x = -4$ or $x = 8$

25. x-intercept: 3; y-intercept: -2

26. x-intercepts: 1, 3; y-intercept: 3

27. x-intercepts: -2, 0, 2; y-intercept: 0

28. no x-intercepts; no y-intercepts



35. $x^2 + 2x - 1 = 0$; $x \approx 0.4$

36. $x^3 - 3x = 0$; $x \approx -1.73$

37. Using TblStart = 1.61 and $\Delta Tbl = 0.001$ gives a zero at 1.62.

Using TblStart = -0.62 and $\Delta Tbl = 0.001$ gives a zero at -0.62.

38. Using TblStart = 1.32 and $\Delta Tbl = 0.001$ gives a zero at 1.32.

39. Graph $y = |x - 8|$ and $y = 2$: $t = 6$ or $t = 10$

40. Graph $y = |x + 1|$ and $y = 4$: $x = -5$ or $x = 3$

41. Graph $y = |2x + 5|$ and $y = 7$: $x = 1$ or $x = -6$

42. Graph $y = |3 - 5x|$ and $y = 4$: $x = -\frac{1}{5}$ or $x = \frac{7}{5}$

43. Graph $y = |2x - 3|$ and $y = x^2$: $x = -3$ or $x = 1$

44. Graph $y = |x + 1|$ and $y = 2x - 3$: $x = 4$

45. (a) The two functions are $y_1 = 3\sqrt{x+4}$ (the one that begins on the x-axis) and $y_2 = x^2 - 1$.

(b) This is the graph of $y = 3\sqrt{x+4} - x^2 + 1$.

(c) The x-coordinates of the intersections in the first picture are the same as the x-coordinates where the second graph crosses the x-axis.

46. Any number between 1.324 and 1.325 must have the digit 4 in its thousandths position. Such a number would round to 1.32.

47. The left side factors to $(x + 2)(x - 1) = 0$:

$$x + 2 = 0 \quad \text{or} \quad x - 1 = 0$$

$$x = -2 \quad \quad \quad x = 1$$

48. Graphing $y = x^2 - 18$ in (e.g.) $[-10, 10] \times [-20, 10]$ and looking for x-intercepts gives $x \approx -4.24$ or $x \approx 4.24$.

$$x^2 - 3x = 12 - 3x + 6$$

$$x^2 - 18 = 0$$

49. $2x - 1 = 5$ or $2x - 1 = -5$

$$2x = 6 \quad \quad \quad 2x = -4$$

$$x = 3 \quad \quad \quad x = -2$$

50. $x + 2 = 2\sqrt{x+3}$

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

$$x^2 = 8$$

$$x = -\sqrt{8} \text{ or } x = \sqrt{8}$$

$-\sqrt{8}$ is an extraneous solution, $x = \sqrt{8} \approx 2.83$