

1.2, 3.4-3.6: Solving Equations

12. To solve $(x - 3)(2x - 1) = 18$

- (a) set each factor equal to 18
- (b) set each factor equal to 0
- (c) FOIL out the left side**
- (d) none of the above

13. To solve $8x^2 = 3x$

- (a) divide both sides by 3
- (b) divide both sides by x
- (c) square root both sides
- (d) none of the above**

12. $(x - 3)(2x - 1) = 18$

$$2x^2 - x - 6x + 3 = 18$$

① FOIL out left
② combine terms all to left

$$2x^2 - 7x - 15 = 0$$

$$(2x + 3)(x - 5) = 0$$

$$2x + 3 = 0 \quad \text{or} \quad x - 5 = 0$$

$$2x = -3 \quad \text{or} \quad x = 5$$

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

13. $8x^2 = 3x$

$$8x^2 - 3x = 0$$

$$x(8x - 3) = 0$$

$$x = 0 \quad \text{or} \quad 8x - 3 = 0$$

$$8x = 3$$

$$x = \frac{3}{8}$$

1) subtract $3x$

2) F!

Can we? Should we? YES or NO?

14. (a) To solve $(x + 7)^2 = 8$:

(1) can we FOIL out the left side? yes

(2) should we FOIL out the left side? NO!

Solve (b) $2(x + 7)^2 = 16$

$$(x + 7)^2 = 8$$

$$x + 7 = \pm\sqrt{8}$$

$$x = -7 \pm \sqrt{8} \leftarrow \begin{matrix} \sqrt{4 \cdot 2} \\ \sqrt{4} \cdot \sqrt{2} \end{matrix}$$

$$x = -7 \pm 2\sqrt{2}$$

(c) $2v^2 + 34 = 0$

$$2v^2 = -34$$

$$v^2 = -17$$

$$v = \pm\sqrt{-17}$$

$$v = \pm i\sqrt{17}$$

$$v = \pm i\sqrt{17}$$

Can we? Should we?

15. To solve $p^2 + (p + 2)^2 = 100$,

YES or NO?

(1) can we square root each term? NO!

(2) should we square root both sides? NO!

Solve $p^2 + (p + 2)^2 = 100$

$$p^2 + p^2 + 4p + 4 = 100$$

$$2p^2 + 4p - 96 = 0$$

$$p^2 + 2p - 48 = 0$$

$$(p + 8)(p - 6) = 0$$

$$p = -8, 6$$

Quadratic Formula

If $ax^2 + bx + c = 0$, then

$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

16. Solve $3x^2 - 2x - 7 = 0$ $a=3, b=-2, c=-7$

$$x = \frac{2 \pm \sqrt{(-2)^2 - 4(3)(-7)}}{6}$$

$$= \frac{2 \pm \sqrt{88}}{6} \quad \begin{aligned} \sqrt{88} &= \sqrt{4 \cdot 22} \\ &= \sqrt{4} \cdot \sqrt{22} \\ &= \underline{\underline{2\sqrt{22}}} \end{aligned}$$

$$= \frac{2 \pm 2\sqrt{22}}{6}$$

$$= \frac{2(1 \pm \sqrt{22})}{6}$$

$$x = \frac{1 \pm \sqrt{22}}{3}$$

17. Solve (a) $2w^3 - 8w^2 - 24w = 0$

$$2w(w^2 - 4w - 12) = 0$$

$$2w(w-6)(w+2) = 0$$

$$w = 0, 6, -2$$

(b) $2x^3 = 32x$

Do NOT divide both sides by x!

$$2x^3 - 32x = 0$$

$$2x(x^2 - 16) = 0$$

$$2x(x-4)(x+4) = 0$$

$$x = 0, 4, -4$$

(c) $64x^2 - 4x^4 = 0$

$$4x^2(16 - x^2) = 0$$

$$4x^2(4-x)(4+x) = 0$$

$$x = 0, 4, -4$$

(d) $\left(x^{\frac{2}{3}}\right)^3 = (64)^3$

$$x^2 = 64^2 \cdot 64$$

$$x = \pm \sqrt{64^2 \cdot 64}$$

$$x = \pm 64 \cdot 8$$

$$x = \pm 512$$

Practice: PT4, ALEKS PR5

More Practice – Text Exercises: 1.2 #23, 41, 47, 49; 3.4 #13, 19, 25, 31, 41, 45, 51, 53; 3.5 #19; 3.6 #11, 13

4.1-4.2: Rational Expressions

18. Simplify (a) $\frac{3(x-1)^2 + x(x-1)}{x^2-1} = \frac{(x-1)[3(x-1) + x]}{(x-1)(x+1)}$
 $= \frac{3x-3+x}{x+1}$
 $= \frac{4x-3}{x+1}$

(b) $\frac{x-1}{x^2+x-12} \cdot \frac{x+4}{x^2-x} = \frac{\cancel{x-1}}{(x+1)(x-3)} \cdot \frac{\cancel{x+4}}{x(x-1)}$
F! R!
 $= \frac{1}{x(x-3)}$

The x+1 does NOT reduce because it is not a FACTOR of the top!

Always leave denominator factored!

(c) $\frac{\frac{1}{x} - \frac{1}{3}}{1 - \frac{1}{3x}} \cdot \frac{3x}{3x} = \frac{3-x}{3x-1}$

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

To clear away the inner denominators, multiply top and bottom of overall fraction by the LCD of those denominators.

19. Combine and simplify $\frac{x-1}{x^2-x-2} + \frac{4}{x^2+x}$
LCD
 $= \frac{x-1}{(x-2)(x+1)} \cdot \frac{x}{x} + \frac{4}{x(x+1)} \cdot \frac{(x-2)}{(x-2)}$
 We do not need or want 2 factors of x + 1
 $= \frac{x^2-x + 4x-8}{x(x-2)(x+1)}$
 $= \frac{x^2+3x-8}{x(x-2)(x+1)}$
 Try to F!
 doesn't F!

Practice: PT3, ALEKS PR6

More practice – Text Exercises: 4.1 #39, 41, 49, 53, 71, 81, 91, 117; 4.2 #17, 27, 35, 37, 39, 51, 55, 63, 67, 71