

KEY

Worksheet #8—Basic Arithmetic Fractional Exponent Problems

E. White

Fall 2004

Simplify each of the following. Leave no exponents in your final answer.

(1) $9^{-2} = \frac{1}{9^2} = \frac{1}{81}$

(4) $27^{-1/3} = \frac{1}{\sqrt[3]{27}} = \frac{1}{3}$

(7) $16^{1/2} = \sqrt{16} = 4$

(10) $\left(\frac{4}{9}\right)^{-2} = \left(\frac{9}{4}\right)^2 = \frac{81}{16}$

(13) $5^0 = 1$

(16) $1^{-2} = \frac{1}{1^2} = 1$

(19) $\left(-\left(\frac{1}{8}\right)\right)^{-2} = (-8)^2 = 64$

(22) $4^{-5/2} = \frac{1}{(\sqrt{4})^5} = \frac{1}{32}$

(25) $8^{-2} = \frac{1}{8^2} = \frac{1}{64}$

(28) $64^{1/6} = \sqrt[6]{64} = 2$

(31) $16^{1/4} = \sqrt[4]{16} = 2$

(34) $64^{2/3} = (\sqrt[3]{64})^2 = 16$

(37) $\left(\frac{1}{2}\right)^3 = \frac{1}{8}$

(40) $\left(\frac{2}{3}\right)^{-2} = \left(\frac{3}{2}\right)^2 = \frac{9}{4}$

(43) $(-9)^{-1} = \frac{1}{-9}$

(46) $(-8)^{-3} = \frac{1}{(-8)^3} = \frac{1}{-512}$

(49) $125^{-2/3} = \frac{1}{(\sqrt[3]{125})^2} = \frac{1}{25}$

(52) $64^{-1/2} = \frac{1}{\sqrt{64}} = \frac{1}{8}$

(2) $8^{2/3} = (\sqrt[3]{8})^2 = 4$

(5) $\left(\frac{1}{2}\right)^{-2} = 2^2 = 4$

(8) $\left(\frac{4}{81}\right)^{3/2} = \left(\sqrt{\frac{4}{81}}\right)^3 = \left(\frac{2}{9}\right)^3 = \frac{8}{729}$

(11) $(-8)^{2/3} = (\sqrt[3]{-8})^2 = (-2)^2 = 4$

(14) $16^{-3/4} = \left(\frac{1}{16}\right)^{3/4} = \left(\sqrt[4]{\frac{1}{16}}\right)^3 = \left(\frac{1}{2}\right)^3 = \frac{1}{8}$

(17) $-\left(\frac{1}{8}\right)^{-1} = -8$

(20) $\left(\frac{9}{16}\right)^{1/2} = \sqrt{\frac{9}{16}} = \frac{3}{4}$

(23) $144^{1/2} = \sqrt{144} = 12$

(26) $4^{-3/2} = \left(\frac{1}{4}\right)^{3/2} = \left(\sqrt{\frac{1}{4}}\right)^3 = \left(\frac{1}{2}\right)^3 = \frac{1}{8}$

(29) $100^{-1/2} = \frac{1}{\sqrt{100}} = \frac{1}{10}$

(32) $8^{2/3} = (\sqrt[3]{8})^2 = 2^2 = 4$

(35) $\left(\frac{1}{9}\right)^{-3/2} = (9)^{3/2} = (\sqrt{9})^3 = 27$

(38) $(-8)^{-1/3} = \frac{1}{\sqrt[3]{-8}} = \frac{1}{-2}$

(41) $\left(\frac{1}{4}\right)^{1/2} = \sqrt{\frac{1}{4}} = \frac{1}{2}$

(44) $64^{3/2} = (\sqrt{64})^3 = 512$

(47) $3^{-1} 5^{-2} = \frac{1}{3} \cdot \frac{1}{25} = \frac{1}{75}$

(50) $36^{-3/2} = \left(\frac{1}{36}\right)^{3/2} = \left(\sqrt{\frac{1}{36}}\right)^3 = \left(\frac{1}{6}\right)^3 = \frac{1}{216}$

(53) $4^{1/2} 8^{1/3} = 2 \cdot 2 = 4$

(3) $32^{2/5} = (\sqrt[5]{32})^2 = 2^2 = 4$

(6) $(-32)^{-3/5} = \left(\frac{1}{-32}\right)^{3/5} = \left(\sqrt[5]{\frac{1}{-32}}\right)^3 = \left(\frac{1}{-2}\right)^3 = \frac{1}{-8}$

(9) $\left(\frac{2}{3}\right)^2 = \frac{4}{9}$

(12) $\left(\frac{1}{64}\right)^{-2/3} = (\sqrt[3]{64})^2 = 4^2 = 16$

(15) $4^{-2} = \frac{1}{4^2} = \frac{1}{16}$

(18) $-\left(\frac{1}{8}\right)^{-1} = -8$

(21) $\left(\frac{8}{27}\right)^{-2/3} = \left(\frac{27}{8}\right)^{2/3} = (\sqrt[3]{\frac{27}{8}})^2 = \left(\frac{3}{2}\right)^2 = \frac{9}{4}$

(24) $27^{1/3} = \sqrt[3]{27} = 3$

(27) $25^{3/2} = (\sqrt{25})^3 = 5^3 = 125$

(30) $64^{1/3} = \sqrt[3]{64} = 4$

(33) $4^{-1/2} = \frac{1}{\sqrt{4}} = \frac{1}{2}$

(36) $4^{1/2} + 9^{-1/2} = 2 + \frac{1}{3} = \frac{7}{3}$

(39) $\left(\frac{4}{9}\right)^{3/2} = \left(\sqrt{\frac{4}{9}}\right)^3 = \left(\frac{2}{3}\right)^3 = \frac{8}{27}$

(42) $27^{-1/3} = \left(\frac{1}{27}\right)^{1/3} = \sqrt[3]{\frac{1}{27}} = \frac{1}{3}$

(45) $32^{1/5} = \sqrt[5]{32} = 2$

(48) $64^{1/3} = \sqrt[3]{64} = 4$

(51) $32^{-2/5} = \left(\frac{1}{32}\right)^{2/5} = \left(\sqrt[5]{\frac{1}{32}}\right)^2 = \left(\frac{1}{2}\right)^2 = \frac{1}{4}$

(54) $\left(\frac{2}{5}\right)^0 = 1$

(55) $8^{2/6} = 8^{1/3} = \sqrt[3]{8} = 2$ (56) $11^{-2} = \left(\frac{1}{11}\right)^2 = \frac{1}{121}$ (57) $81^{-3/2} = \left(\frac{1}{81}\right)^{3/2} = \left(\sqrt{\frac{1}{81}}\right)^3 = \left(\frac{1}{9}\right)^3 = \frac{1}{729}$

(58) $(4^{1/3})^{-3/2} = 4^{1/2} = \sqrt{4} = 2$ (59) $729^{-1/3} = \left(\frac{1}{729}\right)^{1/3} = \sqrt[3]{\frac{1}{729}} = \frac{1}{9}$ (60) $3^{-2} + 2^{-3} = \frac{1}{9} + \frac{1}{8} = \frac{8}{72} + \frac{9}{72} = \frac{17}{72}$

(61) $3\left(\frac{4}{9}\right)^{-3/2} = 3 \cdot \left(\frac{9}{4}\right)^{3/2} = 3\left(\sqrt{\frac{9}{4}}\right)^3 = 3\left(\frac{3}{2}\right)^3 = \frac{81}{8}$ (62) $\left(\frac{8}{125}\right)^{2/3} = \left(\sqrt[3]{\frac{8}{125}}\right)^2 = \left(\frac{2}{5}\right)^2 = \frac{4}{25}$ (63) $\left(\frac{1}{27}\right)^{-2/3} = (27)^{2/3} = \left(\sqrt[3]{27}\right)^2 = 3^2 = 9$

(64) $\left(\frac{64}{9}\right)^{3/2} = \left(\sqrt{\frac{64}{9}}\right)^3 = \left(\frac{8}{3}\right)^3 = \frac{512}{27}$ (65) $16^{-1/4} = \left(\frac{1}{16}\right)^{1/4} = \sqrt[4]{\frac{1}{16}} = \frac{1}{2}$ (66) $(10^8)^{3/2} = 10^{12} = \dots$

(67) $5^{3/4} 5^{1/4} = 5^{4/4} = 5$ (68) $4(8)^{-2/3} = 4 \cdot \left(\frac{1}{8}\right)^{2/3} = 4\left(\sqrt[3]{\frac{1}{8}}\right)^2 = 4\left(\frac{1}{2}\right)^2 = 1$ (69) $(-1)^{1/2} = \sqrt{-1} = i$

(70) $\left(-\left(\frac{4}{9}\right)\right)^{-2} = \left(-\frac{9}{4}\right)^2 = \frac{81}{16}$ (71) $\left(\left(\frac{2}{3}\right)^{2/3}\right)^6 = \left(\frac{2}{3}\right)^4 = \frac{16}{81}$ (72) $\left(\frac{216}{729}\right)^{2/3} = \left(\sqrt[3]{\frac{216}{729}}\right)^2 = \left(\frac{6}{9}\right)^2 = \left(\frac{2}{3}\right)^2 = \frac{4}{9}$

(73) $\left(\frac{1}{64}\right)^{-2/3} = (64)^{2/3} = \left(\sqrt[3]{64}\right)^2 = 4^2 = 16$ (74) $4^{-5/2} = \left(\frac{1}{4}\right)^{5/2} = \left(\sqrt{\frac{1}{4}}\right)^5 = \left(\frac{1}{2}\right)^5 = \frac{1}{32}$ (75) $125^{2/3} = \left(\sqrt[3]{125}\right)^2 = 5^2 = 25$

(76) $\left(\frac{2}{3}\right)^{-3} = \left(\frac{3}{2}\right)^3 = \frac{27}{8}$ (77) $\left(-\left(\frac{2}{3}\right)\right)^{-3} = \left(-\frac{3}{2}\right)^3 = -\frac{27}{8}$ (78) $\left(-\left(\frac{2}{3}\right)\right)^{-2} = \left(-\frac{3}{2}\right)^2 = \frac{9}{4}$

(79) $\left(\frac{7}{11}\right)^{-1} = \frac{11}{7}$ (80) $49^{-1/2} = \frac{1}{\sqrt{49}} = \frac{1}{7}$ (81) $1000^{-2/3} = \left(\frac{1}{1000}\right)^{2/3} = \left(\sqrt[3]{\frac{1}{1000}}\right)^2 = \left(\frac{1}{10}\right)^2 = \frac{1}{100}$

- Answers: (1) $\frac{1}{81}$ (2) 4 (3) 4 (4) $\frac{1}{3}$ (5) 4 (6) $-\frac{1}{8}$ (7) 4 (8) $\frac{8}{729}$
- (9) $\frac{4}{9}$ (10) $\frac{81}{16}$ (11) 4 (12) 16 (13) 1 (14) $\frac{1}{8}$ (15) $\frac{1}{16}$ (16) 1
- (17) -8 (18) -8 (19) 64 (20) $\frac{3}{4}$ (21) $\frac{9}{4}$ (22) $\frac{1}{32}$ (23) 12 (24) 3
- (25) $\frac{1}{64}$ (26) $\frac{1}{8}$ (27) 125 (28) 2 (29) $\frac{1}{10}$ (30) 4 (31) 2 (32) 4
- (33) $\frac{1}{2}$ (34) 16 (35) 27 (36) $\frac{7}{3}$ (37) $\frac{1}{8}$ (38) $-\frac{1}{2}$ (39) $\frac{8}{27}$ (40) $\frac{9}{4}$
- (41) $\frac{1}{2}$ (42) $\frac{1}{3}$ (43) $-\frac{1}{9}$ (44) 512 (45) 2 (46) $-\frac{1}{512}$ (47) $\frac{1}{75}$ (48) 4
- (49) $\frac{1}{25}$ (50) $\frac{1}{216}$ (51) $\frac{1}{4}$ (52) $\frac{1}{8}$ (53) 4 (54) 1 (55) 2 (56) $\frac{1}{121}$
- (57) $\frac{1}{729}$ (58) 2 (59) $\frac{1}{9}$ (60) $\frac{17}{72}$ (61) $\frac{81}{8}$ (62) $\frac{4}{25}$ (63) 9 (64) $\frac{512}{27}$
- (65) $\frac{1}{2}$ (66) 1000000000000 (67) 5 (68) 1 (69) i (70) $\frac{81}{16}$ (71) $\frac{16}{81}$
- (72) $\frac{4}{9}$ (73) 16 (74) $\frac{1}{32}$ (75) 25 (76) $\frac{27}{8}$ (77) $-\frac{27}{8}$ (78) $\frac{9}{4}$ (79) $\frac{11}{7}$
- (80) $\frac{1}{7}$ (81) $\frac{1}{100}$

LESSON
8-6

Practice B

Radical Expressions and Rational Exponents

Simplify each expression. Assume all variables are positive.

1. $\sqrt[3]{125x^9}$
 $5x^3$

2. $\sqrt[4]{\frac{x^8}{81}}$ = $\frac{\sqrt[4]{x^8}}{\sqrt[4]{81}}$ = $\frac{x^2}{3}$

3. $\sqrt[3]{\frac{64x^3}{8}}$ = $\frac{\sqrt[3]{64x^3}}{\sqrt[3]{8}}$ = $\frac{4x}{2} = 2x$

Write each expression in radical form, and simplify.

4. $64^{\frac{5}{6}}$
 $(\sqrt[6]{64})^5 = 2^5 = 32$

5. $27^{\frac{2}{3}}$
 $(\sqrt[3]{27})^2 = 3^2 = 9$

6. $(-8)^{\frac{4}{3}}$
 $(\sqrt[3]{-8})^4 = (-2)^4 = 16$

Write each expression by using rational exponents.

7. $\sqrt[5]{51^4}$
 $51^{4/5}$

8. $(\sqrt{169})^3$
 $169^{3/2}$

9. $\sqrt[7]{36^{14}}$
 $36^{14/7} = 36^2$

Simplify each expression.

10. $4^{\frac{3}{2}} \cdot 4^{\frac{5}{2}}$
 $4^{8/2} = 4^4 = 256$

11. $\frac{27^{\frac{4}{3}}}{27^{\frac{2}{3}}}$
 $27^{2/3} = (\sqrt[3]{27})^2 = 3^2 = 9$

12. $(125^{\frac{2}{3}})^{\frac{1}{2}}$
 $(\sqrt[3]{125})^2 = 5^2 = 25$ $\sqrt{25} = 5$

13. $(27 \cdot 64)^{\frac{2}{3}} = 27^{2/3} \cdot 64^{2/3}$
 $(\sqrt[3]{27})^2 = 9$ $9 \cdot 16 = 144$

14. $(\frac{1}{243})^{\frac{1}{5}}$
 $\sqrt[5]{\frac{1}{243}} = \frac{\sqrt[5]{1}}{\sqrt[5]{243}} = \frac{1}{3}$

15. $64^{-\frac{1}{3}}$
 $(\frac{1}{64})^{1/3} = \sqrt[3]{\frac{1}{64}} = \frac{\sqrt[3]{1}}{\sqrt[3]{64}} = \frac{1}{4}$

16. $(-27x^6)^{\frac{2}{3}}$
 $\sqrt[3]{-27x^6} = -3x^2$

17. $\frac{(25x)^{\frac{3}{2}}}{5 \cdot x^{\frac{1}{2}}}$
 $\frac{25^{3/2} \cdot x^{3/2}}{5 \cdot x^{1/2}} = \frac{125 \cdot x^{3/2}}{5 \cdot x^{1/2}} = 25\sqrt{x^2} = 25|x|$

18. $(4x)^{-\frac{1}{2}} \cdot (9x)^{\frac{1}{2}}$
 $\frac{1}{\sqrt{4x}} \cdot \frac{\sqrt{9x}}{1} = \frac{\sqrt{9x}}{\sqrt{4x}} = \frac{3\sqrt{x}}{2\sqrt{x}} = \frac{3}{2}$

Answers:

- | | | | |
|-----------|--------------------|-----------------------|------------------------|
| 1. $5x^3$ | 2. $\frac{x^2}{3}$ | 3. $2x$ | 4. 32 |
| 5. 9 | 6. 16 | 7. $51^{\frac{4}{5}}$ | 8. $169^{\frac{3}{2}}$ |
| 9. 36^2 | 10. 256 | 11. 9 | 12. 5 |
| 13. 144 | 14. $\frac{1}{3}$ | 15. $\frac{1}{4}$ | 16. $-3x^2$ |
| | | 17. $25 x $ | 18. $\frac{3}{2}$ |

8.6-8.8 Review Answers

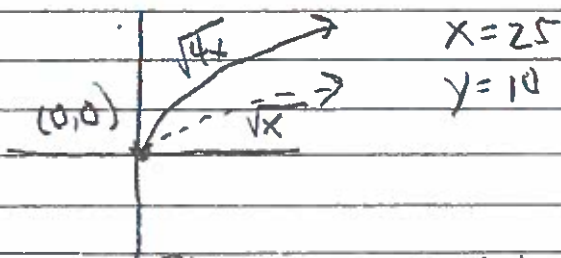
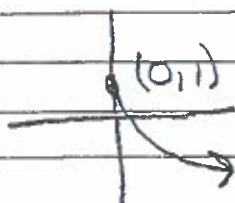
8.8 wkst 2-42 even

- | | |
|----------------------------|------------------------|
| ② 5 | ②⑥ 7 |
| ④ 10 | ②⑧ -3, 2 |
| ⑥ -13 | ②⑩ $\frac{10}{9}, 2$ |
| ⑧ -2 | |
| ⑩ \emptyset ($x = -5$) | ③② \emptyset (12, 4) |
| ⑫ 6 | ③④ 2, -2 |
| ⑭ 7 | ③⑥ -22 |
| ⑯ -2 | ③⑧ \emptyset (2) |
| ⑰ -1 | ④⑩ $\frac{9}{4}$ |
| ⑲ 1 | |
| ⑳ -2 | ④⑫ $\frac{1}{2}, 5$ |
| ㉑ $1, \frac{25}{9}$ | |

p. 641 62-65

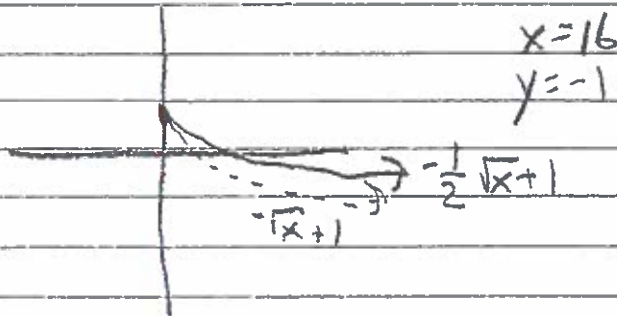
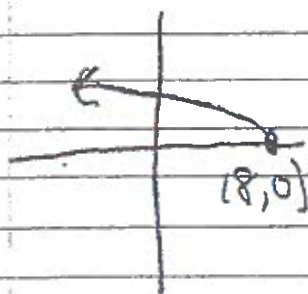
62. Flip x, up 1

63. Vertical Stretch by 2



64. Flip y; right 8

65. Flip x; up 1; Vert. Stretch by $\frac{1}{2}$



Solving Radical EQs (Evens)

$$2) \sqrt{x+4} = 3$$

$$x+4=9$$

$$x=5 \checkmark$$

$$4) 5 - \sqrt{x-1} = 2$$

$$-\sqrt{x-1} = -3$$

$$\sqrt{x-1} = 3$$

$$x-1=9$$

$$x=10 \checkmark$$

$$6) \sqrt{3-x} = 4$$

$$3-x=16$$

$$-x=13$$

$$x=-13 \checkmark$$

$$8) \sqrt{2x+5} - x = 3$$

$$\sqrt{2x+5} = x+3$$

$$2x+5 = x^2+6x+9$$

$$0 = x^2+4x+4$$

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

$$x=-2 \checkmark$$

$$10) \sqrt{x^2-9} = x+1$$

$$x^2-9 = x^2+2x+1$$

$$-9 = 2x+1$$

$$-10 = 2x$$

$$x = -5$$

no solution

$$12) 2x = 3\sqrt{x+3} + 3$$

$$2x-3 = 3\sqrt{x+3}$$

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

$$4x^2-12x+9 = 9x+27$$

$$4x^2-21x-18 = 0$$

$$(4x+3)(x-6) = 0$$

$$x = -3/4, x=6$$

$$14) 3\sqrt{2x+2} = 2x-2$$

$$9(2x+2) = 4x^2-8x+4$$

$$18x+18 = 4x^2-8x+4$$

$$0 = 4x^2-26x-14$$

$$0 = 2(2x^2-13x-7)$$

$$0 = 2(2x+1)(x-7)$$

$$x = -1/2, x=7$$

$$16) \sqrt{1-4x} - x = 5$$

$$\sqrt{1-4x} = x+5$$

$$1-4x = x^2+10x+25$$

$$0 = x^2+14x+24$$

$$0 = (x+12)(x+2)$$

$$x = -12, x = -2$$

$$18) \sqrt{5+x} - x - 2 = 0$$

$$2$$

$$\sqrt{5+x} = x+2$$

$$2$$

$$\sqrt{5+x} = 2x+4$$

$$5+x = 4x^2+16x+16$$

$$0 = 4x^2+15x+11$$

$$0 = (4x+11)(x+1)$$

$$x = -11/4, x = -1$$

$$20) 2\sqrt{x} = \sqrt{4x-3} + 1$$

$$4x = 4x-3 + 2\sqrt{4x-3} + 1$$

$$4x = 4x-2 + 2\sqrt{4x-3}$$

$$2 = 2\sqrt{4x-3}$$

$$1 = \sqrt{4x-3}$$

$$1 = 4x-3$$

$$4 = 4x$$

$$x = 1$$

$$\begin{aligned}
 22) \quad & \sqrt{x+6} = \sqrt{x+3} + 1 \\
 & x+6 = x+3 + 2\sqrt{x+3} + 1 \\
 & x+6 = x+4 + 2\sqrt{x+3} \\
 & 2 = 2\sqrt{x+3} \\
 & 1 = \sqrt{x+3} \\
 & 1 = x+3 \\
 & x = -2 \checkmark
 \end{aligned}$$

$$\begin{aligned}
 24) \quad & 2\sqrt{x} = \sqrt{x-1} + 2 \\
 & 4x = x-1 + 4\sqrt{x-1} + 4 \\
 & 4x = x+3 + 4\sqrt{x-1} \\
 & 3x-3 = 4\sqrt{x-1} \\
 & 9x^2 - 18x + 9 = 16(x-1) \\
 & 9x^2 - 18x + 9 = 16x - 16 \\
 & 9x^2 - 34x + 25 = 0 \\
 & (9x-25)(x-1) = 0 \\
 & x = \frac{25}{9}, x = 1
 \end{aligned}$$

$$\begin{aligned}
 26) \quad & \sqrt{x+2} - \sqrt{x-3} = 1 \\
 & \sqrt{x+2} = 1 + \sqrt{x-3} \\
 & x+2 = 1 + 2\sqrt{x-3} + x-3 \\
 & x+2 = -2 + x + 2\sqrt{x-3} \\
 & 4 = 2\sqrt{x-3} \\
 & 2 = \sqrt{x-3} \\
 & 4 = x-3 \\
 & x = 7
 \end{aligned}$$

$$\begin{aligned}
 28) \quad & \sqrt{7+x} + \sqrt{6-x} = 5 \\
 & \sqrt{7+x} = 5 - \sqrt{6-x} \\
 & 7+x = 25 - 10\sqrt{6-x} + 6-x \\
 & 7+x = 31 - x - 10\sqrt{6-x} \\
 & 2x - 24 = -10\sqrt{6-x} \\
 & 4x^2 - 96x + 576 = 100(6-x) \\
 & 4x^2 - 96x + 576 = 600 - 100x \\
 & 4x^2 + 4x - 24 = 0 \\
 & 4(x^2 + x - 6) = 0 \quad \nearrow x = -3, x = 2 \\
 & 4(x+3)(x-2) = 0
 \end{aligned}$$

$$\begin{aligned}
 30) \quad & \sqrt{5-2x} + \sqrt{x-1} = 2 \\
 & \sqrt{5-2x} = 2 - \sqrt{x-1} \\
 & 5-2x = 4 - 4\sqrt{x-1} + x-1 \\
 & 5-2x = 3 + x - 4\sqrt{x-1} \\
 & -3x + 2 = -4\sqrt{x-1} \\
 & 9x^2 - 12x + 4 = 16(x-1) \\
 & 9x^2 - 12x + 4 = 16x - 16 \\
 & 9x^2 - 28x + 20 = 0 \\
 & (9x-10)(x-2) = 0 \\
 & x = \frac{10}{9}, x = 2
 \end{aligned}$$

$$\begin{aligned}
 32) \quad & \sqrt{2x+1} + \sqrt{x-3} = 2 \\
 & \sqrt{2x+1} = 2 - \sqrt{x-3} \\
 & 2x+1 = 4 - 4\sqrt{x-3} + x-3 \\
 & 2x+x = 1 + x - 4\sqrt{x-3} \\
 & x = -4\sqrt{x-3} \\
 & x^2 = 16(x-3) \\
 & x^2 = 16x - 48 \\
 & x^2 - 16x + 48 = 0 \\
 & (x-12)(x-4) = 0 \\
 & x = 12, x = 4 \\
 & \text{No solution}
 \end{aligned}$$

$$\begin{aligned}
 34) \quad & \sqrt{x^2+5} + \sqrt{5-x^2} = 4 \\
 & \sqrt{x^2+5} = 4 - \sqrt{5-x^2} \\
 & x^2+5 = 16 - 8\sqrt{5-x^2} + 5-x^2 \\
 & x^2+5 = 21 - x^2 - 8\sqrt{5-x^2} \\
 & 2x^2 - 16 = -8\sqrt{5-x^2} \\
 & 4x^4 - 64x^2 + 256 = 64(5-x^2) \\
 & 4x^4 - 64x^2 + 256 = 320 - 64x^2 \\
 & 4x^4 - 64 = 0 \\
 & 4x^4 = 64 \\
 & x^4 = 16 \\
 & x = \pm 2
 \end{aligned}$$

$$36) \sqrt[3]{x-5} + 3 = 0$$

$$\sqrt[3]{x-5} = -3$$

$$x-5 = -27$$

$$x = -22$$

$$38) \sqrt[4]{2x-8} = \sqrt[4]{6-5x}$$

$$2x-8 = 6-5x$$

$$7x = 14$$

$$x = 2$$

no solution

$$40) 2\sqrt{x+1} = \frac{6}{\sqrt{x}}$$

$$\frac{2\sqrt{x^2+\sqrt{x}}}{\sqrt{x}} = \frac{6}{\sqrt{x}}$$

$$2\sqrt{x^2+\sqrt{x}} = 6$$

$$2x + \sqrt{x} = 6$$

$$\sqrt{x} = 6 - 2x$$

$$x = 36 - 24x + 4x^2$$

$$0 = 4x^2 - 25x + 36$$

$$0 = (4x-9)(x-4)$$

$$x = \frac{9}{4}, x = 4$$

$$42) \sqrt{x+4} + \sqrt{2x-1} = \sqrt{7x+1}$$

$$x+4+2\sqrt{(x+4)(2x-1)}+2x-1 = 7x+1$$

$$x+4+2\sqrt{2x^2+7x-4}+2x-1 = 7x+1$$

$$3x+3+2\sqrt{2x^2+7x-4} = 7x+1$$

$$2\sqrt{2x^2+7x-4} = 4x-2$$

$$4(2x^2+7x-4) = 16x^2-16x+4$$

$$8x^2+28x-16 = 16x^2-16x+4$$

$$0 = 8x^2-44x+20$$

$$0 = 4(2x^2-11x+5)$$

$$0 = 4(2x-1)(x-5)$$

$$x = \frac{1}{2}, x = 5$$

