1) $\left(\frac{125x^6}{64}\right)^{\frac{1}{3}}$

$\frac{5x^2}{4}$

2) $\frac{\left(2x^{\frac{1}{2}}\right)^3}{4x^2}$

$\frac{8x^{3/2}}{4x^2}$

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

3) $\left(\frac{216x^6}{27y^3}\right)^{-2/3}$

$\left(\frac{6x^2}{3y}\right)^{-2}$

$\left(\frac{2x^2}{y}\right)^{-2}$

$\left(\frac{4x^4}{y^2}\right)^{-1}$

$\frac{y^2}{4x^4}$

4) 9^{3x+2}

$3^{2(3x+2)}$

3^{6x+4}

5) 8^{2x-5}

$2^{3(2x-5)}$

2^{6x-15}

6) a) $y = 2^x$

$4^x = 2^{2x}$

$= 2^x \times 2^x$

$= y \times y$

$= y^2$

b) $y^2 - 6y - 16 = 0$

$(y-8)(y+2) = 0$

$y = 8 \quad y = -2$

$8 = 2^x \qquad -2 = 2^x$

$x = 3 \qquad \times$

7) $2^{2x+1} - 5(2^x) - 12 = 0$

$2 \times 2^{2x} - 5(2^x) - 12 = 0$

$2(2^x)^2 - 5(2^x) - 12 = 0$

let $y = 2^x$

$2y^2 - 5y - 12 = 0$

$(2y + 3)(y - 4) = 0$

$y = -3/2 \quad y = 4$

$-3/2 = 2^x \quad 4 = 2^x$

$\times \quad x = 2$

8) $8^{2x-5} = 2^{x+1}$

$2^{3(2x-5)} = 2^{x+1}$

$2^{6x-15} = 2^{x+1}$

$6x - 15 = x + 1$

$5x - 15 = 1$

$5x = 16$

$x = \frac{16}{5}$

9a) $x^2 - 9x + 8 = 0$

$(x - 8)(x - 1) = 0$

$x = 8 \quad x = 1$

b) $x = y^{3/2}$

$8 = y^{3/2} \quad 1 = y^{3/2}$

$64 = y^3 \quad y = 1$

$y = 4$

10) $8^{x+1} = 4^{3x-1}$

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

$3(x+1) = 2(3x-1)$

$3x + 3 = 6x - 2$

$3 = 3x - 2$

$5 = 3x$

$x = 5/3$

11) $x - 16x^3$

$x(1 - 16x^2)$

$x(1 + 4x)(1 - 4x)$

12) $75x - 12x^3$

$3x(25 - 4x^2)$

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

13) $(2x-1)(x+2)(x-3)$

$(2x-1)(x^2 - 3x + 2x - 6)$

$(2x-1)(x^2 - x - 6)$

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

$2x^3 - 3x^2 - 11x + 6$

14) $(3x-2)(x-5)(x-5)$

$(3x-2)(x^2 - 10x + 25)$

$3x^3 - 30x^2 + 75x - 2x^2 + 20x - 50$

$3x^3 - 32x^2 + 95x - 50$

15) $\frac{1+x}{x} = \sqrt{5}$

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

$1 = \sqrt{5}\,x - x$

$1 = x(\sqrt{5} - 1)$

$x = \frac{1}{\sqrt{5} - 1}$

$$2 = \frac{1}{(\sqrt{5}-1)} \cdot \frac{(\sqrt{5}+1)}{(\sqrt{5}+1)}$$

$$= \frac{\sqrt{5}+1}{5+\sqrt{5}-\sqrt{5}-1}$$

$$= \frac{\sqrt{5}+1}{4}$$

$$= \frac{1}{4}\sqrt{5} + \frac{1}{4}$$

16) $$\frac{(5+\sqrt{3})(2+\sqrt{3})}{(2-\sqrt{3})(2+\sqrt{3})}$$

$$\frac{10+5\sqrt{3}+2\sqrt{3}+3}{4+2\sqrt{3}-2\sqrt{3}-3}$$

$$\frac{13+7\sqrt{3}}{1}$$

$$13+7\sqrt{3}$$

17) $$\frac{(5+2\sqrt{3})(2-\sqrt{3})}{(2+\sqrt{3})(2-\sqrt{3})}$$

$$\frac{10-5\sqrt{3}+4\sqrt{3}-6}{4-2\sqrt{3}+2\sqrt{3}-3}$$

$$\frac{4-\sqrt{3}}{1}$$

$$4-\sqrt{3}$$

18) $\dfrac{(1-\sqrt{2})(3-2\sqrt{2})}{(3+2\sqrt{2})(3-2\sqrt{2})}$

$\dfrac{3-2\sqrt{2}-3\sqrt{2}+4}{9-6\sqrt{2}+6\sqrt{2}-8}$

$\dfrac{7-5\sqrt{2}}{1}$

$7-5\sqrt{2}$