

099 HOME 9

$$\textcircled{1} \textcircled{a} \sqrt[4]{81x^2y^6z^8} = 9|x||y|^3|z|^4$$

$$= \boxed{9|xy^3z^4|}, \text{ since } |z|^4 = z^4$$

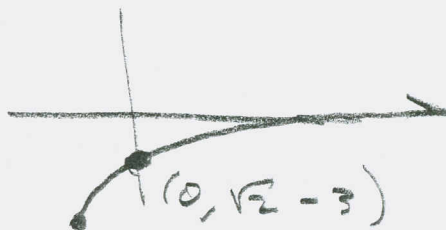
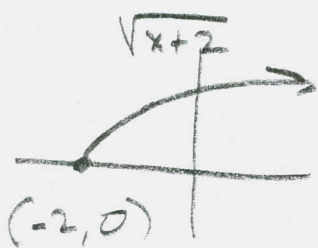
$$\textcircled{b} \sqrt{\frac{27x^3}{25y}} = \frac{3\sqrt{3}|x|\sqrt{x}}{5\sqrt{y}} = \frac{3x\sqrt{3x}}{5\sqrt{y}}, \text{ since } x \geq 0$$

$$= \frac{3x\sqrt{3x}}{5\sqrt{y}} \cdot \frac{\sqrt{y}}{\sqrt{y}} = \boxed{\frac{3x\sqrt{3xy}}{5y}}$$

is needed.

$\textcircled{2}$ $f(x) = \sqrt{x+2} - 3$ has domain

$$D = \{x \mid x+2 \geq 0\} = \{x \mid x \geq -2\} = \boxed{[-2, \infty)}$$



$$\textcircled{3} \textcircled{a} \frac{(x^{-2}y^3)^{\frac{1}{8}}}{(x^{-3}y)^{-\frac{1}{4}}} = \frac{x^{-2/8}y^{3/8}}{x^{3/4}y^{-1/4}} = \frac{x^{-\frac{1}{4}}y^{\frac{3}{8}}}{x^{\frac{3}{4}}y^{-\frac{1}{4}}}$$

$$= \frac{y^{\frac{3}{8} - (-\frac{1}{4})}}{x^{\frac{3}{4} - (-\frac{1}{4})}} = \frac{y^{\frac{3}{8} + \frac{2}{8}}}{x^{\frac{3}{4} + \frac{1}{4}}} = \frac{y^{\frac{5}{8}}}{x^1} = \boxed{\frac{y^{5/8}}{x}}$$

099 HOME 9

$$\textcircled{3b} \left(\frac{x^{-2} y^3}{x^{-3} y} \right)^{\frac{1}{8}} = \left(\frac{y^2}{x^{-3-(-2)}} \right)^{\frac{1}{8}} = \frac{y^{\frac{2}{8}}}{(x^{-1})^{\frac{1}{8}}} = \frac{y^{\frac{1}{4}}}{x^{-\frac{1}{8}}}$$
$$= \boxed{y^{\frac{1}{4}} x^{\frac{1}{8}}} \quad (a-b)(a+b) = a^2 - b^2$$

$$\textcircled{4} (3x^{\frac{1}{2}} - 2)(3x^{\frac{1}{2}} + 2)$$
$$= (3x^{\frac{1}{2}})^2 - 2^2 = \boxed{9x - 4}$$

$$\textcircled{5} \sqrt[5]{x} \sqrt[3]{5y} = x^{\frac{1}{5}} (5y)^{\frac{1}{3}} = x^{\frac{1}{5}} 5^{\frac{1}{3}} y^{\frac{1}{3}}$$
$$= \boxed{\sqrt[15]{5^5 x^3 y^5}}$$

$$\textcircled{6} \sqrt{8x^2y^3} = \boxed{2xy\sqrt{2y}}$$

$\textcircled{7}$ Distance from $(3, 2)$ to $(-2, -3)$ is

$$\sqrt{(3 - (-2))^2 + (2 - (-3))^2} = \sqrt{5^2 + 5^2} = \sqrt{50}$$
$$= \boxed{5\sqrt{2}}$$

$$\textcircled{8} \frac{\sqrt[3]{x^5}}{8} + \frac{5x\sqrt[3]{x^2}}{4} = \frac{x\sqrt[3]{x^2}}{8} + \frac{5x\sqrt[3]{x^2}}{4} \cdot \frac{2}{2}$$
$$= \frac{x\sqrt[3]{x^2} + 10x\sqrt[3]{x^2}}{8} = \boxed{\frac{11}{8} x\sqrt[3]{x^2}}$$

099 HOME 9

$$(9) (5\sqrt{7x} - \sqrt{2x})(4\sqrt{7x} + 6\sqrt{2x})$$

$$= 20\sqrt{7x}\sqrt{7x} + 30\sqrt{7x}\sqrt{2x} - 4\sqrt{2x}\sqrt{7x} - 6\sqrt{2x}\sqrt{2x}$$

$$= 20 \cdot 7x + 30 \cdot \sqrt{14} \cdot x - 4\sqrt{14} \cdot x - 6 \cdot 2x$$

$$= 140x + 26\sqrt{14}x - 12x = \boxed{128x + 26\sqrt{14}x}$$

$$(10) (a) \frac{2}{1-\sqrt{3}} = \frac{2}{1-\sqrt{3}} \cdot \frac{1+\sqrt{3}}{1+\sqrt{3}} = \frac{2+2\sqrt{3}}{1-3}$$

$$= \frac{2+2\sqrt{3}}{-2} = \boxed{-1-\sqrt{3}}$$

$$(b) \frac{2+\sqrt{7}}{5-\sqrt{3}} = \frac{2+\sqrt{7}}{5-\sqrt{3}} \cdot \frac{2-\sqrt{7}}{2-\sqrt{7}} = \frac{2^2-7}{10-5\sqrt{7}-2\sqrt{3}+\sqrt{21}}$$

$$= \frac{4-7}{10-5\sqrt{7}-2\sqrt{3}+\sqrt{21}} = \boxed{\frac{-3}{10-5\sqrt{7}-2\sqrt{3}+\sqrt{21}}}$$

$$(11) (a) \sqrt{7x-5} = \sqrt{4x+3}$$

$$7x-5 = 4x+3$$

$$3x = 8$$

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

099 HOME 9

(11) (b) $x - \sqrt{x-2} = 4$

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

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

$$x-2 = (x-4)^2 = x^2 - 8x + 16$$

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

$$x^2 - 9x + 18 = 0$$

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

~~$x \in \{3, 6\}$~~ → oops!

$x=3$ Doesn't
check!
 $x \in \{6\}$

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

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

$$x+1 = (\sqrt{x-1})^2 + 2 \cdot \sqrt{x-1} \cdot 2 + 2^2$$

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

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

$$4\sqrt{x-1} = -2 \text{ Never happen.}$$