Test 5.3 Review Key

① $g(x) = \frac{-2}{x}$ ← vertical stretch by factor of 2

reflected across x-axis

② $g(x) = \frac{1}{x+3} + 5$ ← translated up 5

translated 3 to the left

③ $g(x) = \frac{-1}{x-4} - 3$ ← translated down 3

translated 4 to the right

reflected across x-axis

④ $f(x) = \frac{1}{x-2} + 0$

$\boxed{x = 2;\ y = 0;\ D: \mathbb{R}, x \neq 2;\ R: \mathbb{R}, y \neq 0}$

⑤ $f(x) = \frac{6}{x+0} + 8$

$\boxed{x = 0;\ y = 8;\ D: \mathbb{R}, x \neq 0;\ R: \mathbb{R}, y \neq 8}$

⑥ $f(x) = \frac{1}{x+1} - 5$

$\boxed{x = -1;\ y = -5;\ D: \mathbb{R}, x \neq -1;\ R: \mathbb{R}, y \neq -5}$

⑦ $x=0$ and $y=3$

$$\boxed{f(x)=\frac{1}{x}+3}$$

⑧ $x=-4$ and $y=0$

$$\boxed{f(x)=\frac{1}{x+4}}$$

⑨ $x=6$ and $y=-8$

$$\boxed{f(x)=\frac{1}{x-6}-8}$$

⑩ $f(x)=\dfrac{x^2-9}{x+3}$

$$f(x)=\frac{\cancel{(x+3)}(x-3)}{\cancel{x+3}}$$

$\boxed{\text{hole @ } (-3,-6)}$

$f(-3)=-3-3$

⑪ $f(x)=\dfrac{x^2-8x+15}{x-5}$

$$f(x)=\frac{\cancel{(x-5)}(x-3)}{\cancel{x-5}}$$

$\boxed{\text{hole @ } (5,2)}$

$f(5)=5-3$

⑫ $f(x)=\dfrac{x^2-3x-4}{x+1}$

$$f(x)=\frac{(x-4)\cancel{(x+1)}}{\cancel{x+1}}$$

$\boxed{\text{hole b/c it is removable}}$

⑬ $f(x)=\dfrac{x^2-4}{x-4}$

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

$\boxed{\text{vertical asymptote b/c not removable}}$

⑭ $f(x)=\dfrac{3}{x-5}$

$$f(x)=\frac{3x^0}{x^1-5}$$

$0<1$

h.a.: $\boxed{y=0}$

(15) $f(x) = \dfrac{x^2}{x^1+9}$

$2 > 1$

h.a.: $\boxed{\text{none}}$

(16) $f(x) = \dfrac{1x^2-9}{1x^2+2x+1}$

$2=2$

$f(x) = \dfrac{(x+3)(x-3)}{(x+1)(x+1)}$

no holes

h.a.: $\boxed{y=1}$

(17) $f(x) = \dfrac{11x^1-3}{4x^1+5}$

$1=1$

h.a.: $\boxed{y = \frac{11}{4}}$

(18) $f(x) = \dfrac{x^2-5x+6}{x-3}$

$f(x) = \dfrac{\cancel{(x-3)}(x-2)}{\cancel{x-3}}$

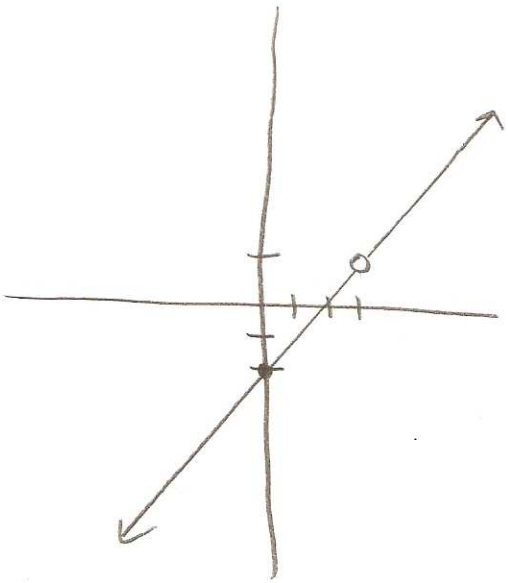
$f(x) = x-2$

hole @ $x=3$

$f(3) = 3-2$

line

w/ hole @ $(3,1)$



$\boxed{\begin{array}{l} D: \mathbb{R},\ x \neq 3 \\ R: \mathbb{R},\ y \neq 1 \end{array}}$

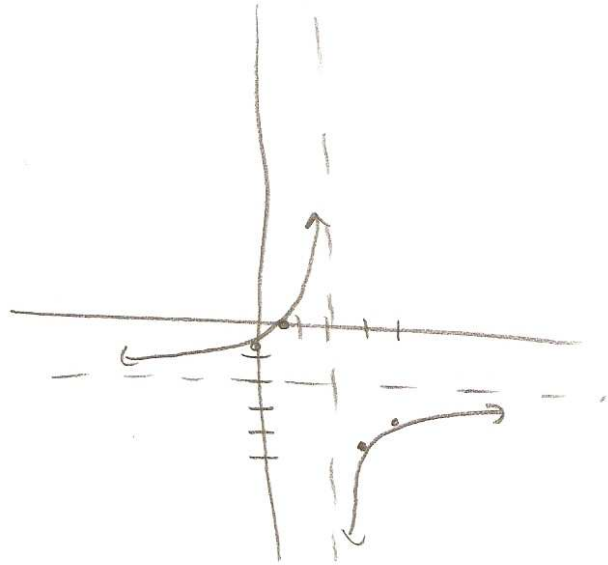
(19) $f(x) = \dfrac{-4x+3}{2x-4}$

v.a. : $x = 2$

h.a. : $y = -2$

D : $\mathbb{R},\ x \neq 2$

R : $\mathbb{R},\ y \neq -2$



(20) $y^{\frac{7}{5}} = \boxed{\sqrt[5]{y^7}}$

(21) $125^{-\frac{2}{3}}$

$\dfrac{1}{\left(\sqrt[3]{125}\right)^2}$

$\dfrac{1}{5^2}$

$\boxed{\dfrac{1}{25}}$

(22) $\left(\dfrac{1}{8}\right)^{\frac{4}{3}}$

$\left(\sqrt[3]{8}\right)^4$

2^4

$\boxed{16}$

(23) $\left(\dfrac{1}{32}\right)^{\frac{1}{3}}$

$\dfrac{\sqrt[3]{1}}{\sqrt[3]{32}}$

$\dfrac{1}{\sqrt[3]{2\cdot2\cdot2\cdot2\cdot2}}$

$\dfrac{1\ \sqrt[3]{2\cdot2}}{2\sqrt[3]{2\cdot2\cdot2\cdot2}}$

$\dfrac{\sqrt[3]{4}}{2\cdot2}$

$\boxed{\dfrac{\sqrt[3]{4}}{4}}$

(24) $\sqrt[9]{x^4}$

$\boxed{x^{\frac{4}{9}}}$

(25) $\sqrt{25x^6y^{-4}z^5}$

$\sqrt{25} \cdot x^{\frac{6}{2}} y^{-\frac{4}{2}} \cdot z^{\frac{5}{2}}$

$5x^3y^{-2}z^{\frac{5}{2}}$

$\boxed{\dfrac{5x^3y^{\frac{5}{2}}}{y^2}}$

(26) $\sqrt[3]{27x^{12}y^{-7}}$

$\sqrt[3]{27} \cdot x^{\frac{12}{3}} \cdot y^{-\frac{7}{3}}$

$3x^4y^{-\frac{7}{3}}$

$\boxed{\dfrac{3x^4}{y^{\frac{7}{3}}}}$

(27) $\sqrt[3]{x^4} \cdot \sqrt[3]{x^8}$

$\sqrt[3]{x^4 \cdot x^8}$

$\sqrt[3]{x^{12}}$

$x^{\frac{12}{3}}$

$\boxed{x^4}$

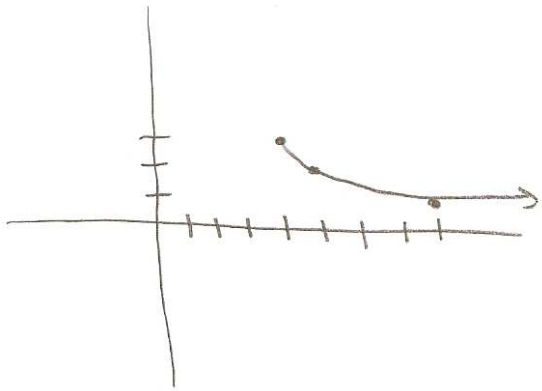
(28) $f(x) = -\sqrt{x-4} + 3$

reflect across x-axis

4 right

up 3

$\boxed{\begin{array}{l} D: x \geq 4 \\ R: y \geq 3 \end{array}}$

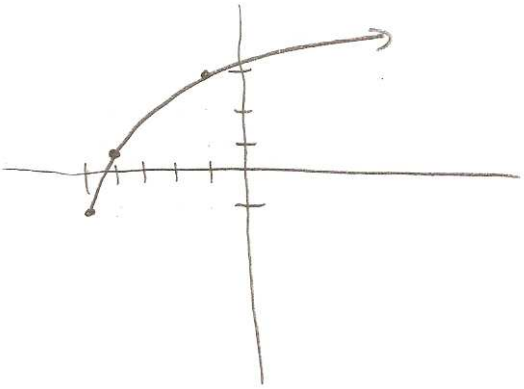


(29) $f(x) = 2\sqrt{x+5} - 1$

vert. stretch factor 2

left 5

down 1



$\boxed{\begin{array}{l} D: x \geq -5 \\ R: y \geq -1 \end{array}}$

(30) $\boxed{f(x) = 4\sqrt{x+6}}$

(31) $\boxed{f(x) = \frac{2}{3}\sqrt{x-5} - 4}$

(32) $\left(\sqrt[3]{x+3}\right)^3 = (-3)^3$

$x + 3 = -27$

$\boxed{x = -30}$

(33) $\left(\sqrt{2x+35}\right)^2 = (x)^2$

$2x + 35 = x^2$

$0 = x^2 - 2x - 35$

$0 = (x-7)(x+5)$

$\boxed{x = 7}$, $\cancel{x = -5}$