Session 1 worksheet answer key

1. No because there are two input values that are the same

2. Yes because even though the output values repeat, the input values do not repeat.

Vertical line test graphs
#1 fails #2 passes

Circles

1. $x^2+y^2+2x+6y-15=0$ set up equation for completing the square

$x^2+2x+y^2+6y-15=0$

$(x^2+2x+\underline{1}\quad)+(y^2+6y+\underline{9}\quad)=15+1+9$

$2/2=1^2=1$ $\quad 6/2 \to 3^2=9$ you must add to both sides

$b/2 \to (b/2)^2=$ factor each square

x^2+2x+1

$2/2 \to 1^2=1$ ← this becomes factor

$(x+1)^2$

$(x+1)^2+(y+3)^2=25$ $\quad r^2=25$

2. $x^2+y^2+4x-4y-17=0$

$(x^2+4x+\underline{4}\quad)+(y^2-4y+\underline{4}\quad)=17+4+4$

$4/2 \to 2^2=4$ $\quad -4/2 \to (-2)^2=4$ $\quad 21+4$

25

$(x+2)^2+(y-2)^2=25$

$r^2=25$

$\frac{4x-8}{x^2+x-6}$ $\frac{4(x-2)}{(x+3)(x-2)}$ $x-2=0$ $x=2$ $\frac{4}{x+3}$ $\frac{4}{2+3}$ $\frac{4}{5}=4$ value

hole @ $(2, 4/5)$

$x+3$ left over in the denominator

$x=-3$ is V.A.

y int $\frac{4}{0+3}$ $0, \frac{4}{3}$ if you ever need it

h.a. $y=0$ ↖

top degree is less than bottom degree

no x-ints

horizontal asymptotes $\frac{3x^2-2x-8}{1x^2+x-12}$ $\frac{3}{1}=3$

h.a. $= \boxed{y=3}$

degrees are the same, so you look at the coefficients of the x^2 values.

$\frac{4x-8}{x^2+x-6}$ ← degree on top is less than degree on bottom, so the h.a. $= \boxed{y=0}$

$\frac{x^3-8}{x-4}$ ← degree on top is bigger than degree on bottom, so no horizontal asymptote

3. The point $(1,-2)$ lies on a circle whose center is at $(-3,-5)$. Write the standard form for the equation of the circle.

Center $= -3, -5$ h, k $(x-h)^2+(y-k)^2=r^2$

$(x-(-3))$ $(x+3)^2+(y+5)^2=r^2$

$(y-(-5))$

plug in points given to get r value

$(1+3)^2+(-2+5)^2=r^2$

$4^2+3^2=r^2$

$16+9=r^2$, $25=r^2$, $\sqrt{25}=r$ $r=5$

$\boxed{(x+3)^2+(y+5)^2=25}$

factor the following...

$\dfrac{x^2+8x+12}{x+2}$ $\dfrac{(x+6)(x+2)}{x+2}$ $x+2=0$

$x=-2$ to find y-value plug in x-value into simplified equation

$(-2+6)=4$

hole @ $(-2,4)$

no left over factor in the denominator, no V.A.

$(x+6)$ left over in the numerator

$x=-6$ is x-intercept

$\frac{x^2+8x+12}{x+2}$ — degree on top 1 more than degree on bottom, so no horizontal asymptote, but there is a slant asymptote.

$$\begin{array}{r} x+6 \\ x+2\overline{)\,x^2+8x+12} \\ -(x^2+2x) \\ \hline 6x+12 \\ -(6x+12) \\ \hline 0 \end{array}$$

slant asymptote =

$\boxed{y=x+6}$