① $\dfrac{n^2-3n-28}{3n-21} \cdot \dfrac{3}{8n}$

$\dfrac{(n-7)(n+4)}{3(n-7)} \cdot \dfrac{3}{8n}$

$\boxed{\dfrac{(n+4)}{8n}}$

① FACTOR EVERYTHING
② CANCEL LIKE FACTORS ON TOP & BOTTOM
③ MULTIPLY LEFTOVER STRAIGHT ACROSS

(2) $\dfrac{n+7}{n^2+2n-8} \cdot \dfrac{n^2+5n-14}{n+7}$

$\dfrac{\cancel{n+7}}{(n+4)\cancel{(n-2)}} \cdot \dfrac{(n+7)\cancel{(n-2)}}{\cancel{n+7}} = \boxed{\dfrac{n+7}{n+4}}$

Division → multiply by reciprocal

③ $\frac{x+5}{x+2} \div \frac{x^2-x-30}{x^2-8x+12} \rightarrow \frac{x+5}{x+2} \cdot \frac{x^2-8x+12}{x^2-x-30}$

$\frac{\cancel{x+5}}{x+2} \cdot \frac{\cancel{(x-6)}(x-2)}{\cancel{(x-6)}\cancel{(x+5)}} = \frac{x-2}{x+2}$

(4) $\dfrac{b-9}{b^2+8b+7} \div \dfrac{b+8}{b^2+15b+56} \rightarrow \dfrac{b-9}{b^2+8b+7} \cdot \dfrac{b^2+15b+56}{b+8}$

$\dfrac{b-9}{(b+7)(b+1)} \cdot \dfrac{(b+7)(b+8)}{b+8} = \dfrac{b-9}{b+1}$

① Find Common Denominator
② Multiply in missing factors
③ Combine the tops.

⑤ $\frac{3a}{4b} + \frac{a-5b}{4a^2b}$

a^2 / a^2

C.D.: $4a^2b$

$$\frac{3a^3}{4a^2b} + \frac{a-5b}{4a^2b} = \frac{3a^2+a-5b}{4a^2b}$$

⑥ $\frac{2}{3n} + \frac{2n}{3n^2+15n}$

$3n \qquad 3n(n+5)$

C.D.: $3n(n+5)$

$(n+5)$ $\frac{2}{3n} + \frac{2n}{3n(n+5)}$

$(n+5)$

$\frac{2n+10}{3n(n+5)} + \frac{2n}{3n(n+5)} = \frac{4n+10}{3n(n+5)}$

⑦ $\frac{6}{x-3} - \frac{6x}{x+2}$

LCD: $(x-3)(x+2)$

$\frac{(x+2)}{(x+2)}\frac{6}{x-3} - \frac{6x}{x+2}\frac{(x-3)}{(x-3)}$

$\frac{6x+12}{(x+2)(x-3)} - \frac{6x^2-18x}{(x+2)(x-3)}$ ← remember top acts like ( ) around it.

$\frac{-6x^2+24x+12}{(x+2)(x-3)}$

⑧ $\dfrac{4k-4}{3k^2-15k} - \dfrac{3}{3k}$

$3k(k-5) \qquad 3k$

CD: $3k(k-5)$

$\dfrac{4k-4}{3k(k-5)} - \dfrac{3}{3k}\ (k-5)$

$3k(k-5) \qquad 3k \quad (k-5)$

$\dfrac{4k-4}{3k(k-5)} - \dfrac{3k-15}{3k(k-5)}$

$\dfrac{k+11}{3k(k-5)}$

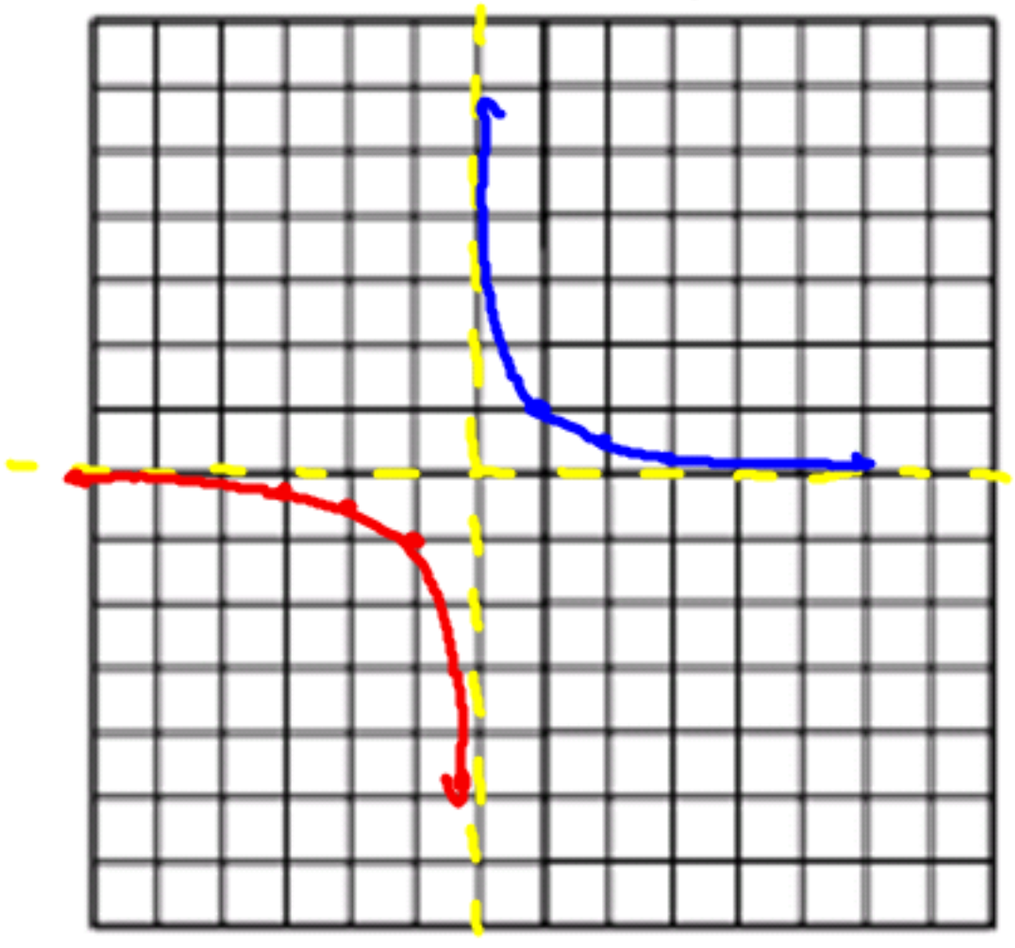
(9) $f(x) = \frac{1}{x+1}$

① Find · V. Asymptotes
· Holes
· H. Asymptotes

$x+1=0$ $x+1$ is not cancellable
$x=-1$ so $x=-1$ is a V.A.

② Plot Asymptotes and make tables for each section

top degree is smaller (0) than bottom degree (1)
so $y=0$ is H.A.



Left of $x=-1$

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

Right of $x=-1$

x	y
0	$\frac{1}{0+1} = 1$
1	$\frac{1}{1+1} = \frac{1}{2}$
2	$\frac{1}{2+1} = \frac{1}{3}$

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

$-x+3=0$

$-x=-3$

V.A.: $x=3$

H.A.: $y=\frac{1}{-1}=-1$

left

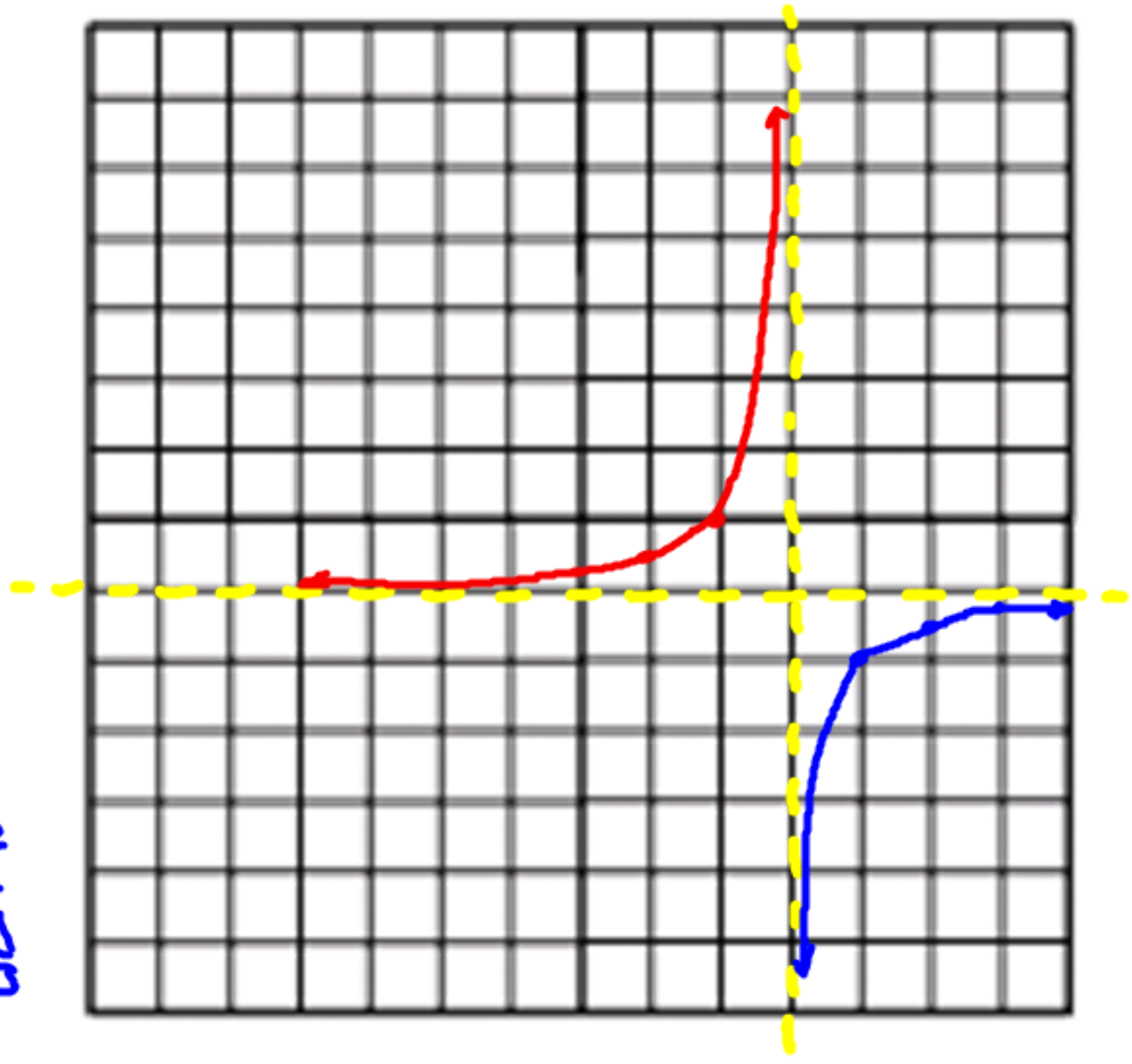
x	y
2	0
1	-1
0	-2

min

right

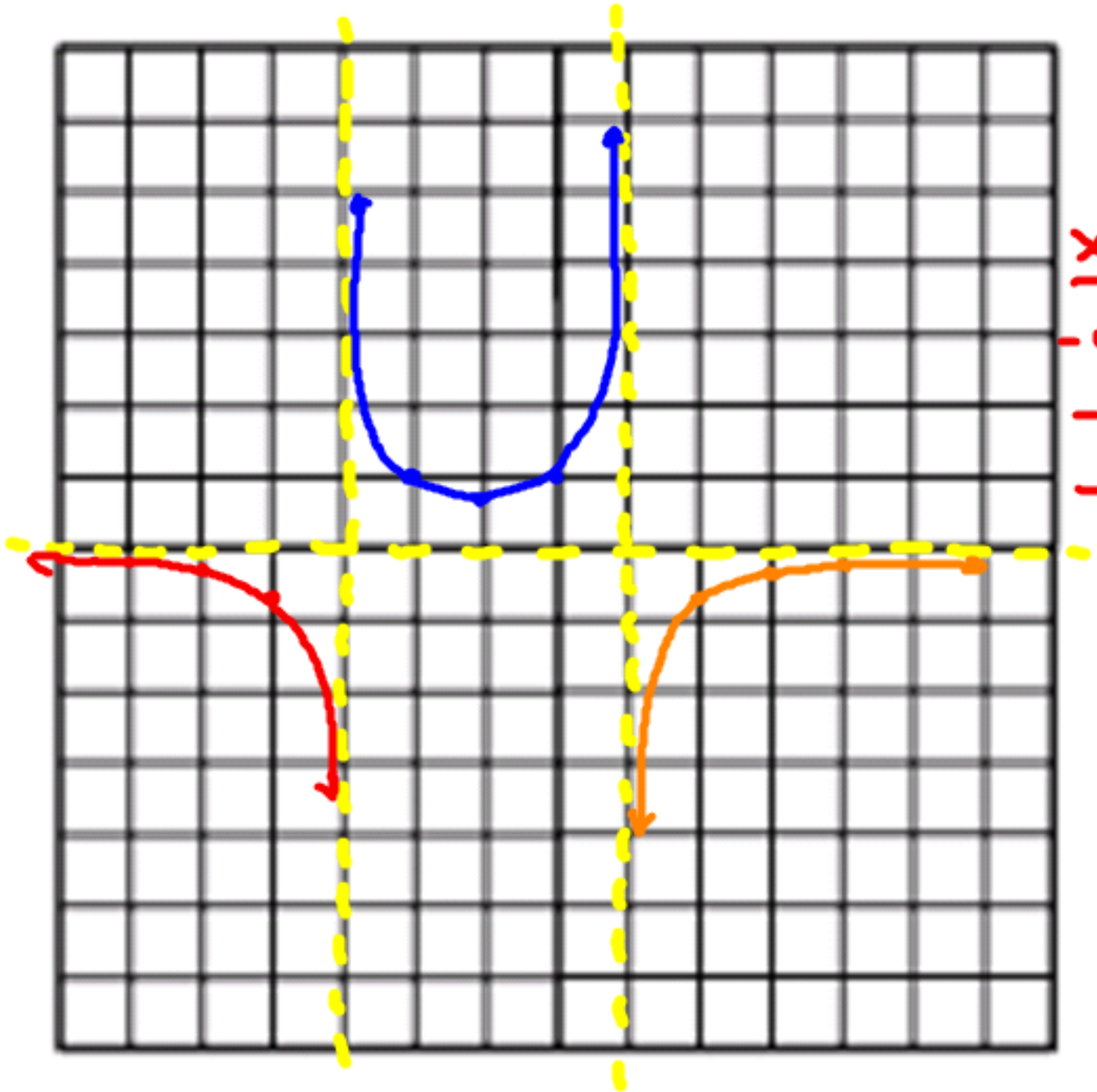
x	y
4	-2
5	-3
6	-4

min



⑪ $f(x) = -\dfrac{3}{x^2+2x-3} = -\dfrac{3}{(x+3)(x-1)}$

V.A. : $x=-3$ and $x=1$
H.A. : $y=0$



left

x	y
-4	$-\frac{3}{5}$
-5	$-\frac{1}{4}$
-6	$-\frac{1}{5}$

middle

x	y
-2	1
-1	$\frac{3}{4}$
0	1

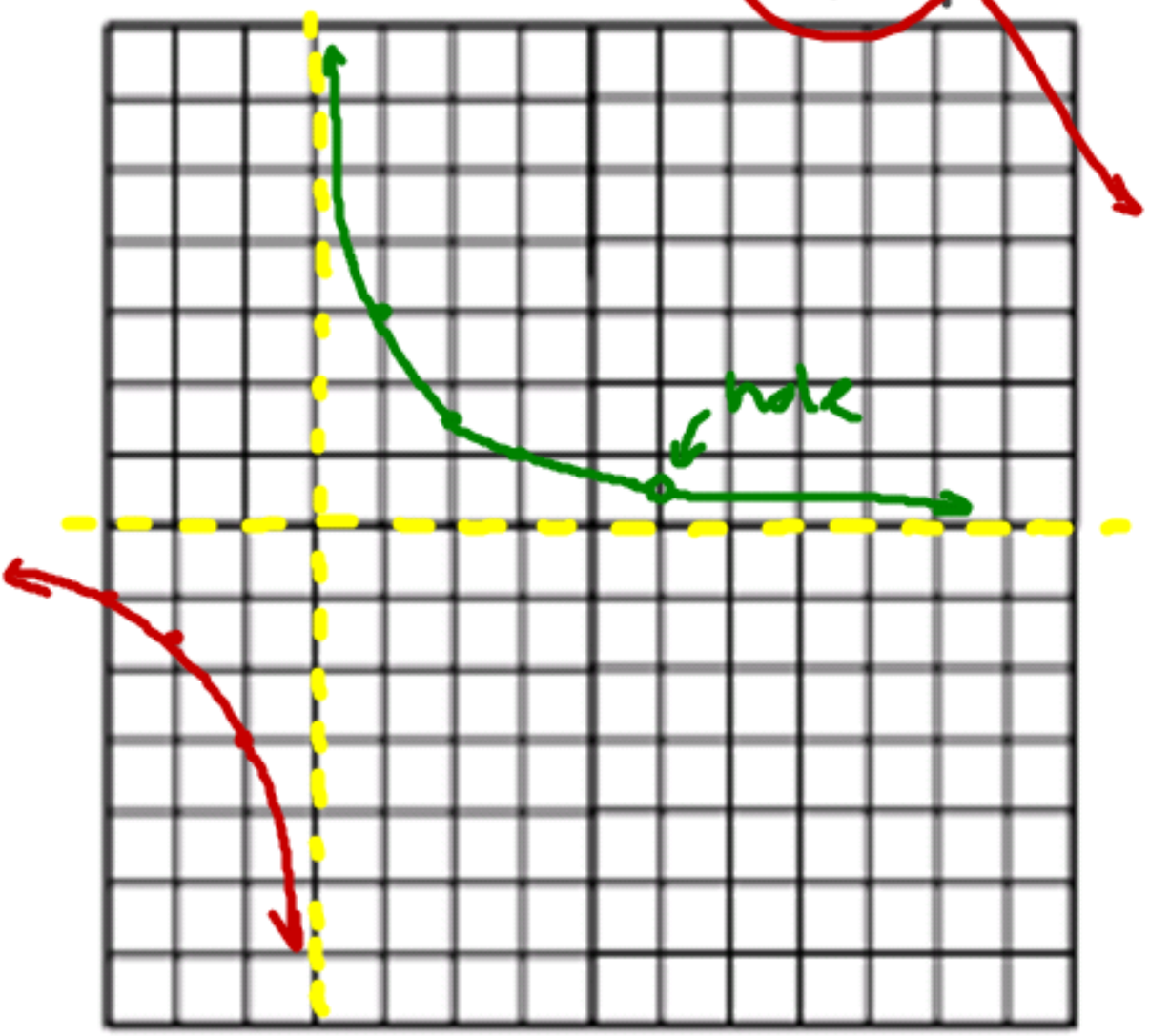
right

x	y
2	$-\frac{3}{5}$
3	$-\frac{1}{4}$
4	$-\frac{1}{5}$

(12) $\dfrac{3x-3}{x^2+3x-4} = \dfrac{3(x-1)}{(x+4)(x-1)}$

$x=-4$ is a V.A.
$x=1$ is a hole
$y=0$ is H.A.

$f(x) = \dfrac{3}{x+4}$ ← graph this ∴ put a hole at $x=1$



Left

x	y
-5	-3
-6	$-\frac{3}{2}$
-7	-1

Right

x	y
-3	3
-2	$\frac{3}{2}$
-1	1

hole → 1

$\frac{3}{4}$ (put open dot)

(13) $\frac{a-4}{2a} + 3 = \frac{a+2}{a}$

① Find the common denominator
② multiply each term by C.D. to cancel out all denom.

C.D.: $2a$

$$2a\left(\frac{a-4}{2a} + 3\right) = \left(\frac{a+2}{a}\right)2a$$

$$a - 4 + 6a = 2(a+2)$$

$$\begin{array}{r} +4 \qquad\qquad +4 \\ 7a - 4 = 2a + 4 \\ -2a \qquad\quad -2a \end{array}$$

$$\frac{5a}{5} = \frac{8}{5} \quad \Big| \quad a = \frac{8}{5}$$

(H) $\frac{1}{2v^2} = \frac{5}{6v} + \frac{5}{v^2}$

C.D.: $6v^2$

$$\cancel{36v^2}\ \frac{1}{\cancel{2v^2}} = \left(\frac{5}{6v} + \frac{5}{v^2}\right) 6v^2$$

$$3 = 5v + 30$$
$$-30 \qquad -30$$
$$\frac{-27}{5} = \frac{5v}{5}$$

$$\boxed{\frac{-27}{5} = v}$$

(15) $6n\frac{1}{6n} + 6n\frac{5n+4}{6n} = 1 \cdot 6n$

C.D. = $6n$

$$1 + 5n + 4 = 6n$$

$$5n + 5 = 6n$$

$$-5n \qquad -5n$$

$$\boxed{5 = n}$$

(10) $\frac{1}{m} + \frac{1}{2m^2+8m} = \frac{5}{m^2+4m}$

$m \qquad 2m(m+4) \qquad m(m+4)$

CD: $2m(m+4)$

$2m(m+4)\frac{1}{m} + 2m(m+4)\frac{1}{2m(m+4)} = \frac{5}{m(m+4)}2m(m+4)$

$2(m+4) + 1 = 10$

$2m + 8 + 1 = 10$

$2m + 9 = 10$

$2m = 1$

$m = \frac{1}{2}$

(17) $1 - \frac{6}{a(a-4)} = \frac{5}{a}$

C.D.: $a(a-4)$

$a(a-4)1 - \cancel{a(a-4)}\frac{6}{\cancel{a(a-4)}} = \frac{5}{\cancel{a}}a(a-4)$

$a(a-4) - 6 = 5(a-4)$

Quadratic → Set=0

$a^2 - 4a - 6 = 5a - 20$

$-5a \quad +20 \quad -5a \quad +20$

$a^2 - 9a + 14 = 0$

$(a-7)(a-2) = 0$

$a = 7 \quad a = 2$ ← neither will make a denom. equal zero so both work

(18) $1 = \frac{b-3}{b} + \frac{1}{b(b+2)}$

C.D.: $b(b+2)$

$b(b+2)\ 1 = \cancel{b}(b+2)\frac{b-3}{\cancel{b}} + \cancel{b(b+2)}\frac{1}{\cancel{b}(b+2)}$

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

$b^2 + 2b = b^2 - b - 5$

$-b^2 \quad\quad -b^2$

$2b = -b - 5$

$+b \quad +b$

$\frac{3b}{3} = \frac{-5}{3}$

$b = -\frac{5}{3}$

(19) $\frac{5}{n} = \frac{1}{n} - \frac{n+3}{n(n-5)}$

C.D.: $n(n-5)$

$n(n-5)\frac{5}{n} = \frac{1}{n}n(n-5) - \frac{n+3}{n(n-5)}n(n-5)$

$5n-25 = (n-5) - (n+3)$

$5n-25 = -8$

$+25 \quad +25$

$\frac{5n}{5} = \frac{17}{5}$

$\boxed{n = \frac{17}{5}}$

(20) $\frac{b+1}{2} - \frac{b}{2} = \frac{1}{2(b-6)}$

CR: $2(b-6)$

$2(b-6)\frac{b+1}{2} - 2(b-6)\frac{b}{2} = \frac{1}{2(b-6)}\,2(b-6)$

$(b-6)(b+1) - b(b-6) =$

$b^2 - 5b - 6 - b^2 + 6b = 1$

$b - 6 = 1$

$\boxed{b = 7}$