Name: Key Block: _____

Date: _____

Term 4 – Rational Expressions/Equations REVIEW

factor - restrictions - cancel!

Simplify each expression. State all restrictions.

1. $\frac{x^2-4}{x+2}$ $\frac{(x+2)(x-2)}{(x+2)}$

$x \neq -2$, $(x-2)$

2. $\frac{5x}{20x+15}$ $\frac{5x}{5(4x+3)}$

$x \neq -3/4$ $\frac{x}{4x+3}$

3. $\frac{-3t}{t^3-t^2}$ $\frac{-3t}{t^2(t-1)}$

$t \neq 0, 1$ $\frac{-3}{t(t-1)}$

4. $\frac{z+2}{2z^2+z-6}$ $\frac{z+2}{(2z-3)(z+2)}$

$2z^2+4z-3z-6$

$2z(z+2)-3(z+2)$

$(2z-3)(z+2)$

$z \neq -2, 3/2$ $\frac{1}{2z-3}$

Find the product or quotient. State all restrictions.

5. $\frac{8}{x-3} \cdot \frac{3x}{x+1}$

$\frac{24x}{(x-3)(x+1)}$

$x \neq -1, 3$

6. $\frac{4n+8}{3n} \div \frac{4}{9n}$ → flip!

$\frac{4(n+2)}{3n} \cdot \frac{3}{4}$

$n \neq 0$ $3(n+2)$

7. $\frac{4x^2+x}{5x} \cdot \frac{15}{2x-2}$

$\frac{x(4x+1)}{5x} \cdot \frac{3}{2(x-1)}$

$x \neq 0, 1$ $\frac{3(4x+1)}{2(x-1)}$

8. $\frac{x+3}{x^2+x-12} \div \frac{x^2-9}{x^2+7x+12}$ ← flip!

$\frac{x+3}{(x+4)(x-3)} \cdot \frac{(x+3)(x+4)}{(x-3)(x+3)}$

$x \neq -4, -3, 3$ $\frac{x+3}{(x-3)^2}$

factor (if possible) - common denominator - simplify numerator

Add or Subtract the Rational Expressions.

9. $\frac{3}{(x+1)}+\frac{x}{(x-1)}$ $\quad (x-1)(x+1)$

$3x-3+x^2+x$

$\frac{x^2+4x-3}{(x-1)(x+1)}$

10. $\frac{3g+1}{3g}+\frac{-1}{3g}$

$\frac{3g}{3g}=1$

11. $\frac{x\cdot 3}{x\cdot 4x}+\frac{-2}{x^2}\cdot 4$

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

12. $\frac{(x+3)(x-3)}{(x-3)(x+2)}-\frac{(2x+1)(x+2)}{(x+2)}$

$x^2-9-2x^2-4x+x+2$

$\frac{-x^2-3x-7}{(x+2)(x-3)}$

Solve the Rational Equations. Check your Solutions!

13. $\frac{1}{x}=\frac{5}{x-4}$

$5x=x-4$

$4x=-4$

$x=-1$

Ck

$\frac{1}{-1}=\frac{5}{-1-4}$

$-1=-1$ ✓

14. $\frac{2}{(x+3)}-\frac{1}{x}=\frac{-6}{x(x+3)}$ $\quad x(x+3)$

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

$2x-x-3=-6$

$x-3=-6$

$x=-3$ ext

Ck

$\frac{2}{(-3+3)}-\frac{1}{-3}=\frac{-6}{-3(-3+3)}$

0 in denom →

$\emptyset$

15. $\frac{1}{2}+\frac{x}{6}=\frac{18}{x}$ $\quad 6x\ 6x\ 6x$

$3x+x^2=108$

$x^2+3x-108=0$

$(x+12)(x-9)=0$

$x=-12 \quad x=9$

Ck

$\frac{1}{2}+\frac{9}{6}=\frac{18}{9}$

$2=2$ ✓

$\frac{1}{2}+\frac{-12}{6}=\frac{18}{-12}$

$-\frac{3}{2}=-\frac{3}{2}$ ✓

16. $\frac{(x+2)}{(x+4)}=\frac{(x-2)}{(x-1)}$

$(x+2)(x-1)=(x+4)(x-2)$

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

$-x^2-2x+8 \quad -x^2-2x+8$

$-x+6=0$

$x=6$

$\frac{6+2}{6+4}=\frac{6-2}{6-1}$

$\frac{8}{10}=\frac{4}{5}$ ✓

17. $\frac{4}{3(c+4)} + \frac{1}{1} = \frac{2c}{(c+4)}$

$4 + 3(c+4) = 6c$

$4 + 3c + 12 = 6c$

$16 = 3c$

$\frac{16}{3} = c$

Ck:

$\frac{4}{3\left(\frac{16}{3}+4\right)} + 1 = \frac{2\left(\frac{16}{3}\right)}{\frac{16}{3}+4}$ $\quad \frac{8}{5} = \frac{8}{5}$ ✓

18. $\frac{4}{m} - \frac{3}{1} = \frac{2}{m}$

$4 - 3m = 2$

$-3m = -2$

$m = \frac{2}{3}$

$\frac{4}{\frac{2}{3}} - \frac{3}{1} = \frac{2}{\frac{2}{3}}$

$6 - 3 = 3$

$3 = 3$ ✓

19. $\frac{4}{(x+1)} + \frac{-2}{(x-1)} = \frac{3x+6}{x^2-1}$

$\frac{4(x+1)(x-1)}{(x+1)} + \frac{-2(x+1)(x-1)}{x-1} = \frac{3x+6}{(x+1)(x-1)}$

$4(x-1) - 2(x+1) = 3x + 6$

$4x - 4 - 2x - 2 = 3x + 6$

$2x - 6 = 3x + 6$

$-x = 12$

$x = -12$

Ck:

$\frac{4}{-12+1} - \frac{2}{(-12-1)} = \frac{3(-12)+6}{(-12)^2-1}$

$\frac{-30}{143} = \frac{-30}{143}$ ✓

20. $\frac{x-11}{3x} = \frac{x-19}{5x}$

$\frac{-1-11}{3(-1)} = \frac{-1-19}{5(-1)}$

$4 = 4$ ✓

$5x(x-11) = 3x(x-19)$

$5x^2 - 55x = 3x^2 - 57x$

$-3x^2 + 57x \quad -3x^2 + 57x$

$2x^2 + 2x = 0$

$2x(x+1) = 0$

$x = 0$ or $x = -1$

21. Anabel and Louis have volunteered to contact every member of their organization by phone to inform them of an upcoming event. Louis can complete the calls in six days if she works alone. Anabel can complete them in four days. How long will they take to complete the calls working together?

Ppl	Indiv	Rate/day	#hrs working	Rate·time
Anabel	6	$\frac{1}{6}$	x	$\frac{x}{6}$
Fran	4	$\frac{1}{4}$	x	$\frac{x}{4}$
				$= 1$

$\frac{x}{6} + \frac{x}{4} = 1$ $\quad$ (24)

$4x + 6x = 24$

$10x = 24$

$x = 2\frac{2}{5}$ days

23. Rate equals $\frac{\text{distance}}{\text{time}}$. If Jared is bicycling at a constant rate of 18 mi/h, how many hours does it take to go 45 mi? to go 90 mi? Is this a *direct variation* or an *inverse variation*? How do you know?

y = distance

x = time

This only makes sense to be a direct variation

$y = kx$

$45 = 18x$

$2.5 = x$

2.5 hrs

$90 = 18x$

5 hrs

bc as miles ↑ time ↑

$y = \frac{k}{x}$

$45 = \frac{18}{x}$

$x = .4$

$90 = \frac{18}{x}$

$x = .2$ hrs

Do the data in each table represent a *direct variation* or an *inverse variation*? Write an equation to model the data in each table.

24.

x	y
−2	−6
3	9
5	15

direct variation

$y = kx$

$k = \frac{y}{x}$ $\frac{-6}{-2}$ $\frac{9}{3}$ $\frac{15}{5}$

$k = 3$

$y = 3x$

25.

x	y
−2	−1
2	1
4	0.5

Inverse variation

$y = \frac{k}{x}$

$k = x \cdot y$

$(-2)(-1)$ $2 \cdot 1$ $4(.5)$

$k = 2$

$y = \frac{2}{x}$

26.

x	y
−2	1
2	−1
4	−2

direct variation

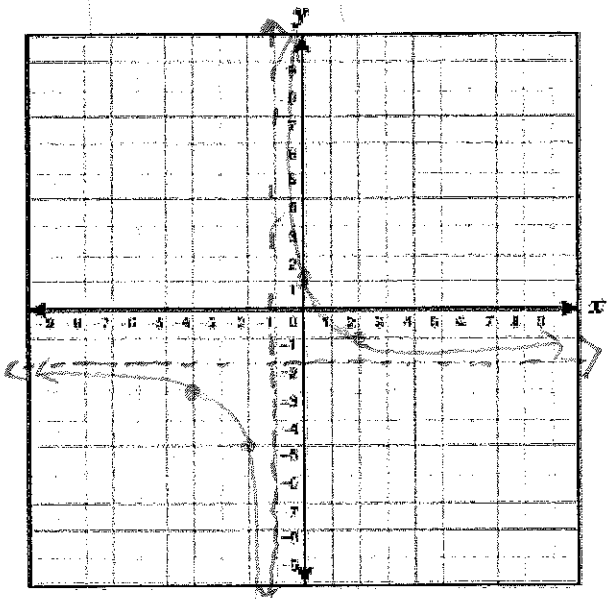
$k = \frac{y}{x}$

$\frac{1}{-2}$ $\frac{-1}{2}$ $\frac{-2}{4}$

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

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

LHS	RHS
−4 | −3	0 | 1
−2 | −5	2 | −1



28. $y = \frac{-2}{x+3}$

LHS	RHS
−5 | 1	−2 | −2
−4 | 2	−1 | −1