Math 54 –Chapters 9 and 10 test – Spring ’10 Name_____
Directions: Show your work for credit. Write all responses on separate paper.

1. Perform the operations and simplify as a single ratio in lowest terms: $\frac{3}{T+1}+\frac{1}{T}-\frac{T}{3}$

2. Perform the indicated operations and simplify as completely as possible: $\frac{\frac{a}{2}-\frac{b}{8}}{\frac{16}{b^2}-\frac{1}{a^2}}$

3. Solve the equation: $\frac{6}{x^2-2x-3}=\frac{5}{x^2-5x-6}$

4. Solve the equation: $\frac{13}{a^2-16}=\frac{2}{a^2-4a}$

5. Find the value of c so that the line passing through the points (1, c) and (–7, 2) is parallel to the line passing through (3,4) and (7, – 2) .

6. Solve the formula for b: $y - a = m(x - b)$.

7. Solve the equation for x: $y=\frac{2x+3}{x-1}$

8. Solve the equation for w: $\frac{1}{x}=\frac{2}{y}-\frac{3}{w}$

9. One number is 3 time another, and the sum of their reciprocals is $\frac{13}{3}$. Find the numbers.

10. What number must be added to both the numerator and the denominator of $\frac{6}{5}$ to obtain a fraction whose value is $\frac{7}{8}$?

11. Simplify $\sqrt{289-225}$

12. Solve the equation: $\frac{8+\sqrt{x}}{3}=5$

13. Solve the equation: $(2x+1)^2=8$

Math 54 –Chapters 9 and 10 test Solutions.

1. Perform the operations and simplify as a single ratio in lowest terms: $\frac{3}{T+1}+\frac{1}{T}-\frac{T}{3}$

$$\frac{3}{T+1}+\frac{1}{T}-\frac{T}{3}=\frac{9T}{3T(T+1)}+\frac{3(T+1)}{3T(T+1)}-\frac{T^2(T+1)}{3T(T+1)}=\frac{9T+3T+3-T^3-T^2}{3T(T+1)}=\frac{-T^3-T^2+12T+3}{3T(T+1)}$$

2. Perform the indicated operations and simplify as completely as possible: $\dfrac{\frac{a}{2}-\frac{b}{8}}{\frac{16}{b^2}-\frac{1}{a^2}}$

$$\frac{\frac{a}{2}-\frac{b}{8}}{\frac{16}{b^2}-\frac{1}{a^2}}=\frac{\frac{4a}{8}-\frac{b}{8}}{\frac{16a^2}{a^2b^2}-\frac{b^2}{a^2b^2}}=\frac{\frac{4a-b}{8}}{\frac{16a^2-b^2}{a^2b^2}}=\frac{4a-b}{8}\frac{a^2b^2}{16a^2-b^2}=\frac{4a-b}{8}\frac{a^2b^2}{(4a-b)(4a+b)}=\frac{a^2b^2}{8(4a+b)}$$

3. Solve the equation: $\frac{6}{x^2-2x-3}=\frac{5}{x^2-5x-6}$

SOLN: $\frac{6}{x^2-2x-3}=\frac{5}{x^2-5x-6}\Leftrightarrow\frac{6}{(x-3)(x+1)}=\frac{5}{(x-6)(x+1)}\Leftrightarrow 6(x-6)=5(x-3)$

$\Leftrightarrow 6x-36=5x-15\Leftrightarrow x=21$

as a check,

$$\frac{6}{21^2-2(21)-3}=\frac{5}{21^2-5(21)-6}\Leftrightarrow\frac{6}{441-42-3}=\frac{5}{441-105-6}\Leftrightarrow\frac{6}{396}=\frac{5}{330}\Leftrightarrow\frac{1}{66}=\frac{1}{66}$$

4. Solve the equation: $\frac{13}{a^2-16}=\frac{2}{a^2-4a}$ an

SOLN: $\frac{13}{a^2-16}=\frac{2}{a^2-4a}\Leftrightarrow\frac{13}{(a-4)(a+4)}=\frac{2}{a(a-4)}\Leftrightarrow 13a=2(a+4)$

$\Leftrightarrow 13a=2a+8\Leftrightarrow 11a=8\Leftrightarrow \boxed{a=\frac{8}{11}}$

As a check,

$$\frac{13}{\left(\frac{8}{11}\right)^2-16}=\frac{2}{\left(\frac{8}{11}\right)^2-4\left(\frac{8}{11}\right)}\Leftrightarrow\frac{13}{\frac{64}{121}-\frac{1936}{121}}=\frac{2}{\frac{64}{121}-\frac{352}{121}}\Leftrightarrow\frac{-13}{\frac{1872}{121}}=\frac{-2}{\frac{288}{121}}\Leftrightarrow\frac{13(121)}{13(144)}=\frac{2(121)}{2(144)}$$

5. Find the value of *c* so that the line passing through the points (1, *c*) and (–7, 2) is parallel to the line passing through (3,4) and (7, – 2) .

SOLN: $\frac{c-2}{1-(-7)}=\frac{4-(-2)}{3-7}\Leftrightarrow\frac{c-2}{8}=\frac{6}{-4}\Leftrightarrow\frac{c-2}{8}=\frac{-12}{8}\Leftrightarrow c-2=-12\Leftrightarrow\boxed{c=-10}$

6. Solve the formula for b: $y - a = m(x - b)$.
SOLN: $y - a = mx - mb$

$\Leftrightarrow mb = mx - y + a \Leftrightarrow \boxed{b = \frac{mx - y + a}{m}}$ or $\boxed{b = x - \frac{y - a}{m}}$ or $\boxed{b = x + \frac{a - y}{m}}$.

7. Solve the equation for x: $y = \frac{2x+3}{x-1}$

SOLN:

$y = \frac{2x+3}{x-1} \Leftrightarrow y(x-1) = 2x+3 \Leftrightarrow yx - y = 2x+3 \Leftrightarrow yx - 2x = y+3 \Leftrightarrow (y-2)x = y+3 \Leftrightarrow \boxed{x = \frac{y+3}{y-2}}$

8. Solve the equation for w: $\frac{1}{x} = \frac{2}{y} - \frac{3}{w}$

$\frac{1}{x} = \frac{2}{y} - \frac{3}{w} \Leftrightarrow \frac{wy}{wxy} = \frac{2wx}{wxy} - \frac{3xy}{wxy} \Leftrightarrow wy = 2wx - 3xy \Leftrightarrow wy - 2wx = -3xy$

SOLN:

$\Leftrightarrow w(y - 2x) = -3xy \Leftrightarrow \boxed{w = -\frac{3xy}{y - 2x}}$

9. One number is 3 time another, and the sum of their reciprocals is $\frac{13}{3}$. Find the numbers.

SOLN: Let x = one of the numbers. Then the other could be $3x$ and the sum of their reciprocals is $\frac{1}{x} + \frac{1}{3x} = \frac{13}{3} \Leftrightarrow \frac{3}{3x} + \frac{1}{3x} = \frac{13x}{3x} \Leftrightarrow \frac{4}{3x} = \frac{13x}{3x} \Leftrightarrow 4 = 13x \Leftrightarrow \boxed{x = \frac{4}{13}}$

10. What number must be added to both the numerator and the denominator of $\frac{6}{5}$ to obtain a fraction whose value is $\frac{7}{8}$?

SOLN: $\frac{6+x}{5+x} = \frac{7}{8} \Leftrightarrow 8(6+x) = 7(5+x) \Leftrightarrow 48 + 8x = 35 + 7x \Leftrightarrow \boxed{x = -13}$

11. Simplify $\sqrt{289 - 225} = \sqrt{64} = 8$

12. Solve the equation: $\frac{8 + \sqrt{x}}{3} = 5 \Leftrightarrow 8 + \sqrt{x} = 15 \Leftrightarrow \sqrt{x} = 7 \Leftrightarrow \boxed{x = 49}$

13. Slve the equation: $(2x+1)^2 = 8 \Leftrightarrow 2x + 1 = \pm\sqrt{8} \Leftrightarrow 2x = -1 \pm \sqrt{8} \Leftrightarrow \boxed{x = \frac{-1 \pm \sqrt{8}}{2}}$ o

Note that $\sqrt{8} = \sqrt{4 \cdot 2} = \sqrt{4}\sqrt{2} = 2\sqrt{2}$