Name: KEY

MATH 3 Final Review UNIT 2: Solving Equations and Inequalities

1. (a) Write the formula for the perimeter of a rectangle: $P = 2l + 2w$

   (b) Re-arrange the formula and solve for w (width): $w = \frac{1}{2}P - l$ OR $w = \frac{P-2l}{2}$

Solve:

2. $\frac{8x+10}{-7} > 2$

$8x + 10 < -14$

$8x < -24$

$x < -3$

3. $-24 < 3x - 9 \le 12$

$-15 < 3x \le 12$

$-5 < x \le 4$

4. $7x - 12 \le 24 - 2x$

$9x \le 36$

$x \le 4$

5. $|-4 + 5x| = 16$

$-4 + 5x = 16$ or $-4 + 5x = -16$

$5x = 20$ $\quad 5x = -12$

$x = 4$ $\quad x = \frac{-12}{5}$

Check: $|-4 + 20| = 16$ $\quad |-4 + 5(\frac{-12}{5})| = 16$

$|16| = 16$ ✓ $\quad |-4 - 12| = 16$

$|-16| = 16$ ✓

6. $3|-8x| + 8 = 80$

$3|-8x| = 72$

$|-8x| = 24$

$-8x = 24$ $\quad -8x = -24$

$x = -3$ $\quad x = 3$

Check: $3|-8(-3)| + 8 = 80$ $\quad 3|-8 \cdot 3| + 8 = 80$

$3|24| + 8 = 80$ $\quad 3|-24| + 8 = 80$

$72 + 8 = 80$ ✓ $\quad 72 + 8 = 80$ ✓

7. $\frac{|7x+4|}{8} = 3$

$|7x + 4| = 24$

$7x + 4 = 24$ $\quad 7x + 4 = -24$

$7x = 20$ $\quad 7x = -28$

$x = \frac{20}{7}$ $\quad x = -4$

Check: $\frac{|7 \cdot \frac{20}{7} + 4|}{8} = 3$ $\quad \frac{|7(-4) + 4|}{8} = 3$

$\frac{|24|}{8} = 3$ ✓ $\quad \frac{|-28+4|}{8} = 3$ ✓

8. $|x - 2| < 8$

$-8 < x - 2 < 8$

$-6 < x < 10$

9. $|x + 5| - 6 \le -5$

$|x + 5| \le 1$

$-1 \le x + 5 \le 1$

$-6 \le x \le -4$

10. $9|3x - 2| + 6 > 51$

$9|3x - 2| > 45$

$|3x - 2| > 5$

$3x - 2 > 5$ or $3x - 2 < -5$

$3x > 7$ $\quad 3x < -3$

$x > \frac{7}{3}$ or $x < -1$

11. $10 + \sqrt{10m - 1} = 13$

$\sqrt{10m - 1} = 3$

$10m - 1 = 9$

$10m = 10$

$m = 1$

Check: $10 + \sqrt{10 \cdot 1 - 1} = 13$

$10 + \sqrt{9} = 13$

$10 + 3 = 13$ ✓

12. $8 = \sqrt{x - 5} + 10$

$-2 = \sqrt{x - 5}$

No Solution

13. $\sqrt[3]{x^2 - 1} = 2$

$x^2 - 1 = 8$

$x^2 = 9$

$x = \pm 3$

14. $x = \sqrt{-70 + 17x}$

$x^2 = -70 + 17x$

$x^2 - 17x + 70 = 0$

$(x - 10)(x - 7) = 0$

$x = 7, 10$

Check: $x = 7$: $7 = \sqrt{-70 + 17 \cdot 7}$ $\quad x = 10$: $10 = \sqrt{-70 + 17 \cdot 10}$

$7 = \sqrt{-70 + 119}$ $\quad 10 = \sqrt{-70 + 170}$

$7 = \sqrt{49}$ ✓ $\quad 10 = \sqrt{100}$ ✓

15. $2(x - 5)^{\frac{3}{2}} = 54$

$[(x - 5)^{\frac{3}{2}}]^{\frac{2}{3}} = 27^{\frac{2}{3}}$

$x - 5 = 9$

$x = 14$

Check: $2(14 - 5)^{\frac{3}{2}} = 54$

$2 \cdot 9^{\frac{3}{2}} = 54$

$2 \cdot 27 = 54$ ✓

16. $0.5z^{\frac{1}{4}} = 2$

$z^{\frac{1}{4}} = 4$

$z = 256$

Check: $0.5 \cdot 256^{\frac{1}{4}} = 2$

$0.5 \cdot 4 = 2$

$2 = 2$ ✓

Solve each equation

17. $-3y + 28 = y^2$

$0 = y^2 + 3y - 28$

$0 = (y+7)(y-4)$

$y = -7, 4$

18. $6x^2 = 8x$

$6x^2 - 8x = 0$

$2x(3x-4) = 0$

$x = 0, \frac{4}{3}$

19. $7x - 3x^2 = 85 + 2x^2 + 2x$

$0 = 5x^2 - 5x + 85$

$0 = 5(x^2 - x + 17)$

$x = \frac{1 \pm \sqrt{1 - 4 \cdot 1 \cdot 17}}{2}$

$= \frac{1 \pm \sqrt{1-56}}{2}$

$= \frac{1 \pm i\sqrt{55}}{2}$

20. $\frac{t^2}{20} + 8 = 15$

$\frac{t^2}{20} = 7$

$t^2 = 140$

$t = \pm 2\sqrt{35}$

21. $3(x+2)^2 + 10 = 3$

$3(x+2)^2 = -7$

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

$x + 2 = \pm i\frac{\sqrt{21}}{3}$

$x = -2 \pm i\frac{\sqrt{21}}{3}$

22. $4x^2 + 12x + 56 = 0$

$4(x^2 + 3x + 14) = 0$

$x = \frac{-3 \pm \sqrt{9 - 4 \cdot 1 \cdot 14}}{2}$

$= \frac{-3 \pm \sqrt{-45}}{2}$

$= \frac{-3 \pm 3i\sqrt{5}}{2}$

23. $4x^2 + 11x + 3 = -3$

$4x^2 + 11x + 6 = 0$

$(x+2)(4x+3) = 0$

$x = -2, -\frac{3}{4}$

$\frac{1}{2} \cdot \frac{4}{8} = 24$, $\frac{4}{3}$, 11

24. Find the x-intercepts of $f(x) = 3x^2 - 8x + 5$

$0 = 3x^2 - 8x + 5$

$0 = (3x-5)(x-1)$

$x = 1, \frac{5}{3}$

25. Find the inverse of the function $y = \frac{3}{5}x - 2$.

input times $\frac{3}{5}$, minus 2

Inverse: input plus 2, times $\frac{5}{3}$

$y = \frac{5}{3}(x+2)$

26. Let $f(x) = 4x - 2$ and $g(x) = \frac{x+2}{4}$.

Are $f(x)$ and $g(x)$ inverses of each other?

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

$= (x+2) - 2$

$= x$

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

$= \frac{4x}{4}$

$= x$

Yes

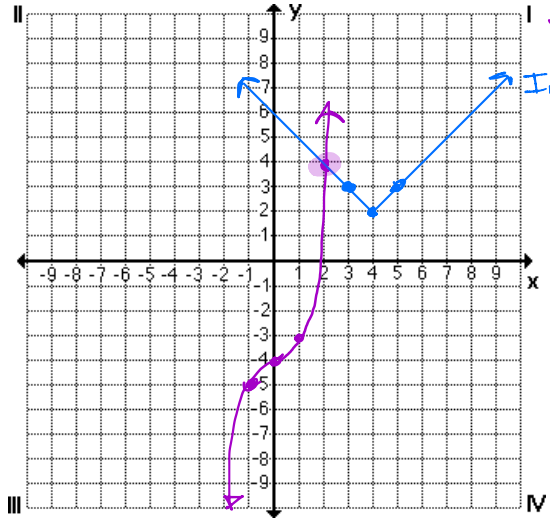
27. Solve the equation $|x - 4| + 2 = x^3 - 4$ by graphing. Check your solution by plugging it back into the original equation.

$y_1 = |x-4|+2$

$y_2 = x^3 - 4$

Intersect at $(2, 4)$

$x = 2$



28. Let $f(x) = 2x - 3$, $g(x) = 2x^3 - 5x + 2$, and $h(x) = x^2$. Find the following:

a. $f(x) + h(x)$

$= 2x - 3 + x^2$

b. $h(g(1))$

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

$= -1$

$h(-1) = (-1)^2 = 1$

$h(g(1)) = 1$

c. $h(f(x))$

$= h(2x-3)$

$= (2x-3)^2$

$= 4x^2 - 12x + 9$

d. $f(3+h) - f(3)$

$= [2(3+h) - 3] - [2 \cdot 3 - 3]$

$= [6 + 2h - 3] - [3]$

$= 2h$