TMT V2 Top 20 Algebra Prep

1. Write an equation using (-2,6) & (-1,5)
   [210]
   $$Slope = m = \frac{y_2 - y_1}{x_2 - x_1} = \frac{5-6}{-1--2} = \frac{-1}{1} = -1$$
   $$y - y_1 = m(x - x_1)$$
   $$y - 6 = -1(x+2)$$ or $y = -1x + 4$
   or $$y - 5 = -1(x+1)$$ or $y = -1x + 4$

2. Solve $9x^2 + 3x - 6 = 0$ [85]
   $$3(3x^2 + x - 2) = 0$$
   $$3(3x - 2)(x + 1) = 0$$
   $3x - 2 = 0$ and $x + 1 = 0$
   $3x = 2$ and $x = -1$
   $x = \frac{2}{3}$

3. Simplify $(3a^3b^4)^2 \cdot 9(a^2b^6)$ [206]
   $$9a^6b^8 \cdot 9a^2b^6$$
   $$81a^8b^{14}$$

4. Simplify $1\frac{1}{4} + \frac{1}{3}$ [272]
   $$\left(\frac{3}{3}\right)\frac{5}{4} + \frac{1}{3}\left(\frac{4}{4}\right)$$
   $$\frac{15}{12} + \frac{4}{12} = \frac{19}{12}$$

5. Find 3 points on $f(x) = -x^2 + 2x + 4$
   [271]
   $-(0)^2 + 2(0) + 4$
   $-(1)^2 + 2(1) + 4$
   $-(2)^2 + 2(2) + 4$

X	Y
0	4
1	5
2	4

   and many others

6. Simplify $\frac{2}{5} \cdot \frac{4}{6}$ [42]
   $$\frac{2 \cdot 4}{5 \cdot 6} = \frac{8}{30} = \frac{2 \cdot 4}{2 \cdot 15} = \frac{4}{15}$$

7. Solve $\frac{E}{c^2} = \frac{mc^2}{c^2}$ for m [205]
   $$m = \frac{E}{c^2} \text{ where } c \neq 0$$

8. Simplify $\frac{5x^3y}{15x^2}$ [74]
   $$\frac{5 \cdot x \cdot x \cdot x \cdot y}{5 \cdot 3 \cdot x \cdot x} = \frac{xy}{3}$$

9. Simplify (PEMDAS) $2(x+3)^2 + 8$ [212]
   $$2(x+3)(x+3) + 8$$
   $$2(x^2 + 6x + 9) + 8$$
   $$2x^2 + 12x + 18 + 8$$
   $$2x^2 + 12x + 26$$

10. Simplify $\frac{-8 \pm \sqrt{8}}{2}$ [214]
    $$\frac{-8 \pm \sqrt{4}\sqrt{2}}{2}$$
    $$\frac{-8 \pm 2\sqrt{2}}{2} \leftarrow \text{factor}$$
    $$\frac{2(-4 \pm \sqrt{2})}{2} = -4 \pm \sqrt{2}$$

11. Solve $\sqrt{(x-4)^2} = \sqrt{10}$ [208]
    $$|x - 4| = \sqrt{10}$$
    $x - 4 = \sqrt{10}$ $x - 4 = -\sqrt{10}$
    $+4 \quad +4$ $+4 \quad +4$
    $x = \sqrt{10} + 4$ $x = -\sqrt{10} + 4$ or $4 \pm \sqrt{10}$

12. Simplify $\frac{4}{2}$ [50]
    $$\frac{1}{4} + \frac{7}{2} = \frac{7}{8}$$

13. Clear fractions, solve $\frac{3}{5}a + 2 = \frac{1}{3}$ [207]
    $$(3 \cdot 5)\frac{3}{5}a + 2(3 \cdot 5) = \frac{1}{3}(3 \cdot 5)$$
    $$9a + 30 = 5$$
    $$-30 \quad -30$$
    $\frac{9a}{9} = \frac{-25}{9}$
    $a = \frac{-25}{9}$

14. Find the midpoint given (-2,5) & (2,7)
    [218]
    $$\left(\frac{x_1 + x_2}{2}, \frac{y_1 + y_2}{2}\right)$$
    $$\left(\frac{-2+2}{2}, \frac{7+5}{2}\right) = (0, 6)$$

15. Simplify $\frac{x^2 + 2x - 24}{x^2 - 36}$ [209]
    $$\frac{(x+6)(x-4)}{(x+6)(x-6)} = \frac{x-4}{x-6}$$

16. Given $f(x) = 4x^2 + 6x - 7$, find $f(-1)$
    [231] $f(-1) = 4(-1)^2 + 6(-1) - 7$
    $f(-1) = 4 - 6 - 7$
    $f(-1) = -9$

17. Multiply $(x^2 + 2x - 3)(x + 8)$ [213]
    $$x^3 + 8x^2 + 2x^2 + 16x - 3x - 24$$
    $$x^3 + 10x^2 + 13x - 24$$

18. Simplify $(3x + 8m)^2$ [211] $9x^2 + 48xm + 64m$
    $$(3x + 8m)(3x + 8m)$$
    $$9x^2 + 24xm + 24xm + 64m^2 =$$

19. Find the distance between (0,-4) & (5,-8)
    [217]
    $$d = \sqrt{(x-x)^2 + (y-y)^2}$$
    $$d = \sqrt{(5-0)^2 + (-8--4)^2}$$
    $$d = \sqrt{25 + 16} = \sqrt{41}$$

20. Solve. Show 3+ steps of work [89]
    $$4(2x + 9) - (x - 1) = 10x + 1$$
    $$8x + 36 - x + 1 = 10x + 1$$
    $$7x + 37 = 10x + 1$$
    $$-7x \qquad -7x$$
    $$37 = 3x + 1$$
    $$-1 \qquad -1$$
    $$36 = 3x \quad (x = 12)$$