

No Calculator - 20 Minutes Timed

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TMT V4 Top 20 Algebra Prep

1. Simplify  $\frac{3x^2 - 14x - 24}{x^2 - 36}$  [209]

$$\frac{(3x+4)(x-6)}{(x-6)(x+6)} = \frac{3x+4}{x+6} \quad x \neq -6$$

2. Solve  $6x^2 + 2x - 4 = 0$  [85]

$$\begin{aligned} 2(3x^2 + x - 2) &= 0 \\ 2(3x-2)(x+1) &= 0 \\ 3x-2=0 & \quad x+1=0 \\ 3x=2 & \quad x=-1 \\ x=\frac{2}{3} & \quad x=-1 \end{aligned}$$

3. Simplify  $\frac{5}{\frac{2}{5} \cdot \frac{1}{6}}$  [42]

$$\frac{2 \cdot 1}{5 \cdot 6} = \frac{2}{30} = \frac{21}{12 \cdot 15} = \frac{1}{15}$$

4. Simplify  $(4a + 2n)^2$  [211]

$$(4a+2n)(4a+2n) = 16a^2 + 8an + 8an + 4n^2 = 16a^2 + 16an + 4n^2$$

5. Simplify  $\frac{18x^{11}y^2}{12x^2y}$  [74]

$$\frac{6 \cdot 3 \cdot x^2 \cdot x^9 \cdot y \cdot y}{6 \cdot 2 \cdot x^2 \cdot y} = \frac{3x^9y}{2}$$

6. Multiply  $(x^2 + 2x - 3)(x - 7)$  [213]

$$\begin{aligned} x^3 - 7x^2 + 2x^2 - 14x - 3x + 21 \\ x^3 - 5x^2 - 17x + 21 \end{aligned}$$

7. Find the distance between  $(-2, 0)$  &  $(3, 8)$

$$\begin{aligned} [217] \quad d &= \sqrt{(x-x)^2 + (y-y)^2} \\ d &= \sqrt{(3-(-2))^2 + (8-0)^2} \\ d &= \sqrt{25 + 64} = \sqrt{89} \end{aligned}$$

8. Simplify (PEMDAS)  $-8(x-2)^2 + 1$

$$\begin{aligned} [212] \quad -8(x-2)(x-2) + 1 \\ -8(x^2 - 4x + 4) + 1 \\ -8x^2 + 32x - 32 + 1 = -8x^2 + 32x - 31 \end{aligned}$$

9. Simplify  $(5a^2b^3)^3 \cdot 2(a^3b^4)$  [206]

$$125a^6b^9 \cdot 2a^3b^4 = 250a^9b^{13}$$

10. Write an equation using  $(-1, -9)$  &  $(-5, -2)$

$$[210] \quad \text{slope} = m = \frac{y_2 - y_1}{x_2 - x_1} = \frac{-2 - (-9)}{-5 - (-1)} = \frac{-7}{-4}$$

$$\begin{aligned} y - y_1 &= m(x - x_1) \\ y + 2 &= \frac{-7}{4}(x + 5) \\ \text{or} \\ y + 9 &= \frac{-7}{4}(x + 1) \end{aligned}$$

$$y = \frac{-7}{4}x + \frac{-7}{4} \cdot \frac{-9}{1} \Rightarrow y = \frac{-7}{4}x - \frac{43}{4}$$

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11. Solve  $(x-3)^2 = 17$  [208]

$$\begin{aligned} \sqrt{(x-3)^2} &= \sqrt{17} \\ |x-3| &= \sqrt{17} \\ x-3 &= \sqrt{17} \quad x-3 = -\sqrt{17} \\ x &= 3 + \sqrt{17} \quad x = 3 - \sqrt{17} \end{aligned}$$

12. Find 3 points on  $f(x) = -x^2 + 5x - 1$

X	Y
0	-1
1	3
2	5

13. Clear fractions, solve  $\frac{3}{8}a + 1 = \frac{1}{3}$  [207]

$$\begin{aligned} 3 \cdot 8 \cdot \frac{3}{8}a + 8 \cdot 1 &= \frac{1}{3} \cdot 3 \cdot 8 \\ 9a + 24 &= 8 \\ -24 & \quad -24 \\ 9a &= -16 \\ a &= \frac{-16}{9} \end{aligned}$$

14. Given  $f(x) = -3x^2 - 5x - 1$ , find  $f(-2)$

$$\begin{aligned} [231] \quad -3(-2)^2 - 5(-2) - 1 \\ -12 + 10 - 1 \\ -2 - 1 = -3 \end{aligned}$$

15. Simplify  $\frac{3}{8} \cdot \frac{3}{2}$  [50]

$$\frac{3}{8} \cdot \frac{3}{2} = \frac{9}{16}$$

16. Simplify  $\frac{-6 \pm \sqrt{8}}{10}$  [214]

$$\begin{aligned} \leftarrow \text{Factor } \sqrt{4} \sqrt{2} = 2\sqrt{2} \\ \frac{-6 \pm 2\sqrt{2}}{10} \\ \frac{2(-3 \pm \sqrt{2})}{2 \cdot 5} = \frac{-3 \pm \sqrt{2}}{5} \end{aligned}$$

17. Find the midpoint given  $(5, 1)$  &  $(-3, 7)$

$$\begin{aligned} [218] \quad \left( \frac{x+x}{2}, \frac{y+y}{2} \right) \\ \left( \frac{5+(-3)}{2}, \frac{1+7}{2} \right) \Rightarrow (1, 4) \end{aligned}$$

18. Solve. Show 3+ steps of work [89]

$$\begin{aligned} -(x+7) - 3(x+6) &= 3x+6 \\ -x-7-3x-18 &= 3x+6 \\ -4x-25 &= 3x+6 \\ +4x & \quad +4x \end{aligned}$$

$$\begin{aligned} -31 &= 7x \\ \frac{-31}{7} &= \frac{7x}{7} \\ x &= \frac{-31}{7} \end{aligned}$$

19. Solve  $\frac{F}{a} = \frac{ma}{a}$  for m [205]

$$\frac{F}{a} = m$$

20. Simplify  $2\frac{1}{8} + \frac{1}{3}$  [222]

$$\begin{aligned} 2\frac{1}{8} + \frac{1}{3} \\ \frac{3 \cdot 1}{3 \cdot 8} + \frac{1 \cdot 8}{3 \cdot 8} \\ \frac{3}{24} + \frac{8}{24} = \frac{11}{24} \end{aligned}$$