

TMT V5 Top 20 Algebra Prep

1. Given  $f(x) = -4x^2 - 2x - 3$ , find  $f(-2)$  [231]

$$-4(-2)^2 - 2(-2) - 3$$

$$-4(4) + 4 - 3$$

$$-16 + 4 - 3 = -12 - 3 = -15$$

2. Simplify  $(5a - 9n)^2$  [213]

$$(5a - 9n)(5a - 9n)$$

$$25a^2 - 45n - 45n + 81n^2$$

$$25a^2 - 90n + 81n^2$$

3. Solve  $21x^2 - 15x - 6 = 0$  [85]

$$3(7x^2 - 5x - 2) = 0$$

$$3(7x+2)(x-1) = 0$$

$$7x+2=0 \quad x-1=0$$

$$\frac{-2}{7} \quad \frac{+1}{+1}$$

$$7x = -2 \quad x = 1$$

$$x = \frac{-2}{7}$$

4. Find the distance between  $(0, -2)$  &  $(5, 7)$  [217]

$$d = \sqrt{(x-x_1)^2 + (y-y_1)^2}$$

$$d = \sqrt{(5-0)^2 + (7-(-2))^2}$$

$$d = \sqrt{25 + 81}$$

$$d = \sqrt{106}$$

5. Simplify  $\frac{4}{9} \cdot \frac{7}{8}$  [42]

$$\frac{4 \cdot 7}{9 \cdot 8} = \frac{28}{72} = \frac{4 \cdot 7}{4 \cdot 18} = \frac{7}{18}$$

6. Simplify  $\frac{-2 \pm \sqrt{8}}{12}$  [214] reduce  $\sqrt{4} \sqrt{2} = 2\sqrt{2}$

$$\frac{-2 \pm 2\sqrt{2}}{2 \cdot 6} = \frac{2(-1 \pm \sqrt{2})}{2 \cdot 6} = \frac{-1 \pm \sqrt{2}}{6}$$

7. Simplify  $\frac{27x^5yz^2}{9x^2z^3}$  [24]

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

8. Simplify  $\frac{3}{9} \cdot \frac{9}{5}$  [50]  $\frac{3}{4} \cdot \frac{9}{5} = \frac{27}{20}$

9. Multiply  $(x^2 + 2x - 7)(x - 5)$  [213]

$$x^3 - 5x^2 + 3x^2 - 10x - 7x + 35$$

$$x^3 - 2x^2 - 17x + 35$$

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

$$8a^{12}b^9 \cdot 3a^2b^3$$

$$24a^{14}b^{12}$$

11. Solve  $\sqrt{(x-6)^2} = \sqrt{14}$  [208]

$$|x-6| = \sqrt{14}$$

$$x-6 = \sqrt{14} \quad x-6 = -\sqrt{14}$$

$$x = 6 + \sqrt{14} \quad x = 6 - \sqrt{14}$$

12. Simplify  $2\frac{3}{4} - \frac{2}{5}$  [272]

$$2\frac{11}{4} - \frac{2}{5} = \frac{55}{20} - \frac{8}{20} = \frac{47}{20}$$

13. Clear fractions, solve  $\frac{4}{9}a + 2 = \frac{1}{4}$  [207]

$$9 \cdot \frac{4}{9}a + 2 \cdot 4 = \frac{1}{4} \cdot 9$$

$$4a + 8 = \frac{9}{4}$$

$$4a = \frac{9}{4} - 8 = \frac{9}{4} - \frac{32}{4} = \frac{-23}{4}$$

$$a = \frac{-23}{16}$$

14. Find 3 points on  $f(x) = x^2 + 3x - 7$  [271]

X	Y
0	-7
1	-3
2	3

$$y = (0)^2 + 3(0) - 7 = -7$$

$$y = (1)^2 + 3(1) - 7 = -3$$

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

and many more

15. Simplify  $\frac{x^2 - 7x - 44}{x^2 - 121}$  [209]

$$\frac{(x+4)(x-11)}{(x+11)(x-11)} = \frac{x+4}{x+11}$$

16. Find the midpoint given  $(0, 5)$  &  $(10, -3)$  [218]

$$\left( \frac{x_1 + x_2}{2}, \frac{y_1 + y_2}{2} \right)$$

$$\left( \frac{0+10}{2}, \frac{5+(-3)}{2} \right) = (5, 1)$$

17. Write an equation using  $(12, 7)$  &  $(-9, -3)$  [210]

$$\text{slope} = m = \frac{y_2 - y_1}{x_2 - x_1} = \frac{-3 - 7}{-9 - 12} = \frac{-10}{-21} = \frac{10}{21} = m$$

$$y - y_1 = m(x - x_1)$$

$$y - 7 = \frac{10}{21}(x - 12) \text{ or } y + 3 = \frac{10}{21}(x + 9)$$

$$\text{or } y = \frac{10}{21}x + \frac{90 - 3 \cdot 21}{21} = \frac{10}{21}x + \frac{27}{21}$$

18. Simplify (PEMDAS)  $-2(x-1)^2 + 6$  [212]

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

$$-2(x^2 - 1x - 1x + 1) + 6$$

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

19. Solve  $V = \pi r^2 h$  for  $r$  [205]

$$\frac{V}{\pi h} = r^2 \quad r = \sqrt{\frac{V}{\pi h}}$$

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

$$-(6x + 4) + 2(x - 8) = 11x + 4$$

$$-6x - 4 + 2x - 16 = 11x + 4$$

$$-4x - 20 = 11x + 4$$

$$+4x \quad +4x$$

$$-20 = 15x + 4$$

$$\frac{-24}{15} = \frac{15x}{15} \quad x = \frac{-24}{15} = \frac{-8}{5}$$