

Grade 9 Assignment memo- Part A
February 2023

$$\begin{aligned} 1. \quad & 5p - 2p(p+3) \\ &= 5p - 2p^2 - 6p \\ &= -p - 2p^2 \end{aligned}$$

$$\begin{aligned} 2. \quad & 2x(3x-y-4) \\ &= 6x^2 - 2xy - 8x \end{aligned}$$

$$\begin{aligned} 3. \quad & \frac{2}{3}x(9x-6y+4) \\ &= 6x^2 - 4xy + \frac{8}{3}x \end{aligned}$$

$$\begin{aligned} 4. \quad & 4y-3y(2y-\frac{1}{3}) \\ &= 4y - 6y^2 + y \\ &= 5y - 6y^2 \end{aligned}$$

$$\begin{aligned} 5. \quad & (4+xy)(2+xy) \\ &= 8 + 4xy + 2xy + x^2y^2 \\ &= 8 + 6xy + x^2y^2 \end{aligned}$$

$$\begin{aligned} 6. \quad & (2x-3)(3x+2) \\ &= 6x^2 + 4x - 9x - 6 \\ &= 6x^2 - 5x - 6 \end{aligned}$$

$$\begin{aligned} 7. \quad & 2(2x-3y)^2 \\ &= 2(2x-3y)(2x-3y) \\ &= 2(4x^2 - 6xy - 6xy + 9y^2) \\ &= 8x^2 - 24xy + 18y^2 \end{aligned}$$

$$\begin{aligned} 8. \quad & (4a-\frac{1}{2})(4a+\frac{1}{2}) \\ &= 16a^2 - \frac{1}{4} \end{aligned}$$

$$\begin{aligned} 9. \quad & (2t-\frac{1}{3})^2 \\ &= (2t-\frac{1}{3})(2t-\frac{1}{3}) \\ &= 4t^2 - \frac{2}{3}t - \frac{2}{3}t + \frac{1}{9} \\ &= 4t^2 - \frac{4}{3}t + \frac{1}{9} \end{aligned}$$

$$\begin{aligned} 10. \quad & \frac{x}{4}(12x-8+\frac{4}{x^2}) \\ &= 3x^2 - 2x + \frac{1}{x} \end{aligned}$$

$$\begin{aligned} 11. \quad & (\frac{1}{4}m+\frac{1}{3}n)(\frac{1}{4}m-\frac{1}{3}n) \\ &= \frac{1}{16}m^2 + \frac{1}{12}mn - \frac{1}{12}mn - \frac{1}{9}n^2 \\ &= \frac{1}{16}m^2 - \frac{1}{9}n^2 \end{aligned}$$

$$\begin{aligned} 12. \quad & (x-4)(x+4)(x^2+16) \\ &= (x^2-16)(x^2+16) \\ &= x^4 - 256 \end{aligned}$$

$$\begin{aligned} 13. \quad & (4p-\frac{1}{2}r)(p^2-2pr+6r) \\ &= 4p^3 - 8p^2r + 24p^2 - \frac{1}{2}p^2r + pr - 3r^2 \\ &= 4p^3 - 8\frac{1}{2}p^2r + 24p^2 + pr - 3r^2 \end{aligned}$$

$$\begin{aligned} 14. \quad & 2\{(5+2x)+2-3(x+1)\} \\ &= 2\{5+2x+2-3x-3\} \\ &= 2\{2\} \end{aligned}$$

$$\begin{aligned}
 15. \quad & 3(x-1)^2 - 4(3x-2) - (x-4)(x+4) \\
 &= 3(x^2 - 2x + 1) - 12x + 8 - (x^2 - 16) \\
 &= 3x^2 - 6x + 3 - 12x + 8 - x^2 + 16 \\
 &= 2x^2 - 18x + 27
 \end{aligned}$$

$$\begin{aligned}
 16. \quad & 3y - 2[y + 3(-x+2y) + 2y(4y-2)] \\
 &= 3y - 2[y - 3x + 6y + 8y^2 - 4xy] \\
 &= 3y - 2y + 6x - 12y - 16y^2 + 8xy \\
 &= -11y + 6x - 16y^2 + 8xy
 \end{aligned}$$

$$\begin{aligned}
 17. \quad & p - [2p + 3\{7 - 2(5-p)\} + 4] \\
 &= p - [2p + 3\{7 - 10 + 2p\} + 4] \\
 &= p - [2p + 3\{-3 + 2p\} + 4] \\
 &= p - [2p - 9 + 6p + 4] \\
 &= p - [8p - 5] \\
 &= p - 8p + 5 \\
 &= -7p + 5
 \end{aligned}$$

$$\begin{aligned}
 18. \quad & (x-7)^2 - 2(x-5)(x+5) - 2x(x+1) \\
 &= x^2 - 14x + 49 - 2(x^2 - 25) - 2x^2 - 2x \\
 &= x^2 - 14x + 49 - 2x^2 + 50 - 2x^2 - 2x \\
 &= -3x^2 - 34x + 99
 \end{aligned}$$

$$\begin{aligned}
 19. \quad & -3(8c-4d) + 4a - 2[b-3(4c-2d)] \\
 &= -24c + 12d + 4a - 2[b - 12c + 6d] \\
 &= -24c + 12d + 4a - 2b + 24c - 12d \\
 &= 4a - 2b
 \end{aligned}$$

$$\begin{aligned}
 20. \quad & \frac{x^2}{y^3} \left(y^2 - \frac{y^3}{x^2} \right) \\
 &= \frac{x^2}{y} - 1
 \end{aligned}$$

$$\begin{aligned}
 21. \quad & 6m^3 + 2m^2 + 4m \\
 &= 2m(3m^2 + m + 2)
 \end{aligned}$$

$$\begin{aligned}
 22. \quad & a^2b^2 - ab \\
 &= ab(ab - 1)
 \end{aligned}$$

$$\begin{aligned}
 23. \quad & x(x-1) - 6(x-1) \\
 &= (x-1)(x-6)
 \end{aligned}$$

$$\begin{aligned}
 24. \quad & -2x^2 + 32x^3y^4 \\
 &= -2x^2(1 - 16xy^4)
 \end{aligned}$$

$$\begin{aligned}
 25. \quad & x^2(x+4) + 4x(x+4) - 12(x+4) \\
 &= (x+4)(x^2 + 4x - 12) \\
 &= (x+4)(x+6)(x-2)
 \end{aligned}$$

$$\begin{aligned}
 26. \quad & -16a^2b^5 + 4ab - 8a^3b^2 \\
 &= -4ab(-4ab^4 - 1 + 2a^2b)
 \end{aligned}$$

$$\begin{aligned}
 27. \quad & x^2 - 16 \\
 &= (x+4)(x-4)
 \end{aligned}$$

$$\begin{aligned}
 28. \quad & x^3 + x^2y - 4x - 4y \\
 &= x^2(x+y) - 4(x+y) \\
 &= (x+y)(x^2 - 4) \\
 &= (x+y)(x+2)(x-2)
 \end{aligned}$$

$$\begin{aligned}
 29. \quad & x^2(m-2) + y(2-m) \\
 &= x^2(m-2) - y(m-2) \\
 &= (m-2)(x^2 - y)
 \end{aligned}$$

$$\begin{aligned}
 30. \quad & 81 - p^8 \\
 &= (9 + p^4)(9 - p^4) \\
 &= (9 + p^4)(3 + p^2)(3 - p^2)
 \end{aligned}$$

$$\begin{aligned}
 31. \quad & x^2 - 2x - 15 \\
 &= (x - 5)(x + 3)
 \end{aligned}$$

$$\begin{aligned}
 32. \quad & 6a^3(x+y) + a(y+x) \\
 &= (x+y)(6a^3 + a)
 \end{aligned}$$

$$\begin{aligned}
 33. \quad & 3x(p-2q) - 12y(2q-p) + 6z(p-2q) \\
 &= 3x(p-2q) + 12(p-2q) + 6z(p-2q) \\
 &= (p-2q)(3x + 12 + 6z) \\
 &= 3(p-2q)(x + 4 + 2z)
 \end{aligned}$$

$$\begin{aligned}
 34. \quad & 4a^2 - 25b^2 \\
 &= (2a + 5b)(2a - 5b)
 \end{aligned}$$

$$\begin{aligned}
 35. \quad & 4x^6 - \frac{1}{q} \\
 &= (2x^3 - \frac{1}{3})(2x^3 + \frac{1}{3})
 \end{aligned}$$

$$\begin{aligned}
 36. \quad & 9(x-y)^2 - 16r^2 \\
 &= [3(x-y) + 4r][3(x-y) - 4r] \\
 &= [3x - 3y + 4r][3x - 3y - 4r]
 \end{aligned}$$

$$\begin{aligned}
 37. \quad & p^2 - 4p + 3 \\
 &= (p - 3)(p - 1)
 \end{aligned}$$

$$\begin{aligned}
 38. \quad & x^2 - 3x - 18 \\
 &= (x - 6)(x + 3)
 \end{aligned}$$

$$\begin{aligned}
 39. \quad & 3y^3 - 6y^2 + 3y \\
 &= 3y(y^2 - 2y + 1)
 \end{aligned}$$

$$\begin{aligned}
 40. \quad & 7p(2p-3q) - (3q-2p) \\
 &= 7p(2p-3q) + (2p-3q) \\
 &= (2p-3q)(7p+1)
 \end{aligned}$$

$$\begin{aligned}
 41. \quad & x^4 - 13x^2 + 36 \\
 &= (x^2 - 9)(x^2 - 4) \\
 &= (x+3)(x-3)(x+2)(x-2)
 \end{aligned}$$

$$\begin{aligned}
 42. \quad & y(y-1) - 12 \\
 &= y^2 - y - 12 \\
 &= (y - 4)(y + 3)
 \end{aligned}$$

$$\begin{aligned}
 43. \quad & \frac{1}{2}y^2 + y - 4 \\
 &= \frac{1}{2}(y^2 + 2y - 8) \\
 &= \frac{1}{2}(y + 4)(y - 2)
 \end{aligned}$$

$$\begin{aligned}
 44. \quad & x^2 - 2xy - 15y^2 \\
 &= (x - 5y)(x + 3y)
 \end{aligned}$$

$$\begin{aligned}
 45. \quad & \frac{2ab^2 - 4a^2b}{b^2} \\
 &= \frac{2ab(b - 2a)}{ab} \\
 &= 2(b - 2a)
 \end{aligned}$$

$$\begin{aligned}
 47. \quad & \frac{25 - 5t}{t^2 - 25} \\
 &= \frac{5(5 - t)}{(t + 5)(t - 5)} \\
 &= \frac{-5(t - 5)}{(t + 5)(t - 5)} \\
 &= \frac{-5}{t + 5}
 \end{aligned}$$

$$\begin{aligned}
 49. \quad & \frac{y}{2} - \frac{1}{3y} + \frac{y-2}{y^2} \\
 &= \frac{y(3y^2) - 1(2y) + (y-2)(3)}{6y^2} \\
 &= \frac{3y^3 - 2y + 3y - 6}{6y^2} \\
 &= \frac{3y^3 + y - 6}{6y^2}
 \end{aligned}$$

$$\begin{aligned}
 46. \quad & \frac{3x^2 + 6x}{x^2 - 4} \\
 &= \frac{3x(x + 2)}{(x - 2)(x + 2)} \\
 &= \frac{3x}{x - 2}
 \end{aligned}$$

$$\begin{aligned}
 48. \quad & \frac{16a^2b - 8ab}{6 - 12a} \\
 &= \frac{8ab(2a - 1)}{6(1 - 2a)} \\
 &= \frac{4 \cancel{8} ab (2a - 1)}{-\cancel{6}_3 (2a - 1)} \\
 &= -\frac{4ab}{3}
 \end{aligned}$$

$$\begin{aligned}
 50. \quad & 3x - \frac{4x+1}{6} + \frac{5}{2} - \frac{1}{3} \\
 &= \frac{3x(6) - (4x+1) + 5(3) - 2}{6} \\
 &= \frac{18x - 4x - 1 + 15 - 2}{6} \\
 &= \frac{12x + 14}{6} \\
 &= \frac{2(6x + 7)}{\cancel{6}_3} \\
 &= \frac{6x + 7}{3}
 \end{aligned}$$

$$\begin{aligned}
 51. \quad & \frac{2}{p} + \frac{1}{p^2} - \frac{1}{3} + \frac{5}{3p} \\
 &= \frac{2(3p) + 1(3) - 1(p^2) + 5(p)}{3p^2} \\
 &= \frac{6p + 3 - p^2 + 5p}{3p^2} \\
 &= \frac{11p + 3 - p^2}{3p^2}
 \end{aligned}$$

$$\begin{aligned}
 52. \quad & \frac{pr+s}{p^2-q^2} - \frac{qr-s}{q^2-p^2} \\
 &= \frac{pr+s}{p^2-q^2} + \frac{qr-s}{p^2-q^2} \\
 &= \frac{pr+s+qr-s}{p^2-q^2} \\
 &= \frac{r(p+q)}{(p-q)(p+q)} \\
 &= \frac{r}{p-q}
 \end{aligned}$$

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

$$\begin{aligned}
 54. \quad & \frac{a^2-3a-18}{6a-a^2} \div \frac{6a^2+18a}{(-2a)^2} \\
 &= \frac{(a-6)(a+3)}{a(6-a)} \times \frac{(-2a)(-2a)}{6a(a+3)} \\
 &= \frac{a-6}{-(a-6)} \times \frac{-2}{6} \\
 &= \frac{1}{3}
 \end{aligned}$$

$$\begin{aligned}
 55. \quad & \frac{y-1}{y^2-4} \times \frac{(y+2)^2}{y^2+y-2} \div \frac{2y}{y^2-2y} \\
 &= \frac{y-1}{(y-2)(y+2)} \times \frac{(y+2)^2}{(y+2)(y-1)} \times \frac{y(y-2)}{2y} \\
 &= \frac{1}{2}
 \end{aligned}$$

$$\begin{aligned}
 56. \quad & \frac{x^2-8x+15}{3(x-5)^2} \times \frac{3x^2-15x}{3x-1} \div \frac{x-3}{2} \\
 &= \frac{(x-5)(x-3)}{3(x-5)^2} \times \frac{3x(x-5)}{3x-1} \times \frac{2}{x-3} \\
 &= \frac{2x}{3x-1}
 \end{aligned}$$

$$\begin{aligned}
 57. \quad & \frac{p^2-4p}{6p^2-4p^3} \div \frac{p^2-9p+20}{4p^2-9} \times \frac{3p^2-15p}{6p+9} \\
 &= \frac{p(p-4)}{2p^2(3-2p)} \times \frac{(2p+3)(2p-3)}{(p-5)(p-4)} \times \frac{3p(p-5)}{3(2p+3)} \\
 &= \frac{-2}{(2p-3)}
 \end{aligned}$$

$$\begin{aligned}
 58. \quad & \frac{x^2-xy}{xy} + \frac{yz-z^2}{yz} \\
 &= \frac{z(x^2-xy) + x(yz-z^2)}{xyz} \\
 &= \frac{xz(x-y) + xz(y-z)}{xyz}
 \end{aligned}$$

$$\begin{aligned}
 59. \quad 5x + 2 &= 5 - 2x - 1 \\
 5x + 2x &= 5 - 1 - 2 \\
 3x &= 2 \\
 x &= \frac{2}{3}
 \end{aligned}$$

$$\begin{aligned}
 60. \quad 13 - 3y &= 1 + 3y \\
 13 - 1 &= 3y + 3y \\
 12 &= 6y \\
 2 &= y
 \end{aligned}$$

$$\begin{aligned}
 61. \quad p(3p-1) + (3-p) &= (3p+1)(p-3) \\
 3p^2 - p + 3 - p &= 3p^2 - 9p + p - 3 \\
 -2p + 3 &= -8p - 3 \\
 6p &= -6 \\
 p &= -1
 \end{aligned}$$

$$\begin{aligned}
 62. \quad 3(x+1) + 5x &= -1 + 5(x-1) \\
 3x + 3 + 5x &= -1 + 5x - 5 \\
 8x - 5x &= -6 - 3 \\
 3x &= -9 \\
 x &= -3
 \end{aligned}$$

$$\begin{aligned}
 63. \quad 2(x-2)(x-3) &= 4 + 2x(x-1) - 4x \\
 2(x^2 - 3x - 2x + 6) &= 4 + 2x^2 - 2x - 4x \\
 2x^2 - 10x + 12 &= 4 + 2x^2 - 6x \\
 -10x + 6x &= 4 - 12 \\
 -4x &= -8 \\
 x &= 2
 \end{aligned}$$

$$\begin{aligned}
 64. \quad 5t - 22 &= t - 2 \\
 5t - t &= -2 + 22 \\
 4t &= 20 \\
 t &= 5
 \end{aligned}$$

$$\begin{aligned}
 65. \quad 2(2y+9) - 2(y+3) &= y+16 - 5(4-y) \\
 4y+18 - 2y-6 &= y+16-20+5y \\
 2y+12 &= 6y-4 \\
 -4y &= -16 \\
 y &= 4
 \end{aligned}$$

$$\begin{aligned}
 66. \quad (x-3)^2 - (x-1)(2x+5) &= 4 \\
 x^2 - 6x + 9 - (x^2 + 4x - 5) &= 4 \\
 x^2 - 6x + 9 - x^2 - 4x + 5 &= 4 \\
 -10x &= 4 - 14 \\
 -10x &= -10 \\
 x &= 1
 \end{aligned}$$

$$67. \quad \frac{x}{3} - \frac{3x-6}{6} = \frac{x-6}{2} - 2$$

$$\begin{aligned}
 \text{LCD} = 6 \quad \frac{2x}{6} - \frac{3x-6}{6} &= \frac{3(x-6)}{6} - 2(6) \\
 2x - (3x-6) &= 3x-18-12 \\
 -x+6 &= 3x-30 \\
 -4x &= -36
 \end{aligned}$$

$$68. \quad \frac{3(x+1)}{10} - \frac{x-2}{5} = 1$$

$$\begin{aligned}
 \text{LCD} = 10 \quad 3(x+1) - 2(x-2) &= 10 \\
 3x+3-2x+4 &= 10 \\
 x+7 &= 10 \\
 x &= 3
 \end{aligned}$$

$$\begin{aligned}
 69. \quad \frac{5}{t} + 5 &= \frac{11}{t} + 7 \quad (\text{LCD} = t) \\
 5 + 5t &= 11 + 7t \\
 5t - 7t &= 11 - 5 \\
 -2t &= 6 \\
 t &= -3
 \end{aligned}$$

$$\begin{aligned}
 70. \quad \frac{1}{3} + \frac{x+5}{x} - 1 &= 0 \\
 \boxed{\text{LCD} = 3x} \quad x + 3(x+5) - 3x(1) & \\
 x + 3x + 15 - 3x &= \\
 x &= -15
 \end{aligned}$$

$$\begin{aligned}
 71. \quad \frac{7}{2x} + \frac{3}{4} &= -\frac{5x-10}{4x} + 3 \\
 \boxed{\text{LCD} = 4x} \quad 7(2) + 3(x) &= -(5x-10) + 3(4x) \\
 14 + 3x &= -5x + 10 + 12x \\
 3x + 5x - 12x &= 10 - 14 \\
 -4x &= -4 \\
 x &= 1
 \end{aligned}$$

$$\begin{aligned}
 72. \quad \frac{1}{2y} &= \frac{y-2}{y} + \frac{1}{4} \\
 \boxed{\text{LCD} = 4y} \quad 1(2) &= 4(y-2) + 1(y) \\
 2 &= 4y - 8 + y \\
 10 &= 5y \\
 2 &= y
 \end{aligned}$$

$$\begin{aligned}
 73. \quad 3x(2x-1) &= 0 \\
 3x &= 0 \quad \text{or} \quad 2x-1=0 \\
 \therefore x &= 0 \quad \quad \quad x = \frac{1}{2}
 \end{aligned}$$

$$\begin{aligned}
 74. \quad (p-7)(2p+3) &= 0 \\
 p-7 &= 0 \quad \text{or} \quad 2p+3=0 \\
 p &= 7 \quad \quad \quad p = -\frac{3}{2}
 \end{aligned}$$

$$\begin{aligned}
 75. \quad x^2 + 4x &= 0 \\
 x(x+4) &= 0 \\
 x &= 0 \quad \text{or} \quad x+4=0 \\
 & \quad \quad \quad x = -4
 \end{aligned}$$

$$\begin{aligned}
 76. \quad x^2 + 5x + 6 &= 0 \\
 (x+3)(x+2) &= 0 \\
 x+3 &= 0 \quad \text{or} \quad x+2=0 \\
 x &= -3 \quad \quad \quad x = -2
 \end{aligned}$$

$$\begin{aligned}
 77. \quad y^2 - 3y - 40 &= 0 \\
 (y-8)(y+5) &= 0 \\
 y-8 &= 0 \quad \text{or} \quad y+5=0 \\
 y &= 8 \quad \quad \quad y = -5
 \end{aligned}$$

$$\begin{aligned}
 78. \quad x^2 - 2x - 8 &= 0 \\
 (x-4)(x+2) &= 0 \\
 x-4 &= 0 \quad \text{or} \quad x+2=0 \\
 x &= 4 \quad \quad \quad x = -2
 \end{aligned}$$

$$\begin{aligned}
 79. \quad 6a(a^2 - 36) &= 0 \\
 6a &= 0 \quad \text{or} \quad a^2 - 36 = 0 \\
 a &= 0 \quad \quad \quad (a+6)(a-6) = 0 \\
 & \quad \quad \quad a+6=0 \quad \text{or} \quad a-6=0 \\
 a &= -6 \quad \quad \quad a = 6
 \end{aligned}$$

$$\begin{aligned}
 80. \quad 3x^3 - 21x^2 + 36x &= 0 \\
 3x(x^2 - 7x + 12) &= 0 \\
 3x(x-3)(x-4) &= 0 \\
 \therefore 3x &= 0 \quad \text{or} \quad x-3=0 \quad \text{or} \quad x-4=0 \\
 x &= 0 \quad \quad \quad x = 3 \quad \quad \quad x = 4
 \end{aligned}$$

		Father	Son
81.	Now:	$7x$	x
	In 5yrs:	$7x+5$	$x+5$

$$7x+5 = 4(x+5)$$

$$7x+5 = 4x+20$$

$$3x = 15$$

$$x = 5$$

\therefore Father
= 35yrs now

Son
= 5yrs now

82.

	Josh	Malik
now	$4x$	x
later	$4x-8$	$x+8$

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

$$4x-8 = 2x+16$$

$$2x = 24$$

$$x = 12$$

Josh now
= 48 marbles

Malik now
= 12 marbles

83.

x $x+1$ $x+2$ + [consecutive numbers]

$$3(x + (x+1)) - 2((x+1) + (x+2)) = 13$$

$$3(2x+1) - 2(2x+3) = 13$$

$$6x+3 - 4x-6 = 13$$

$$2x-3 = 13$$

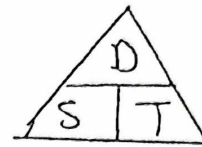
$$2x = 16$$

$$x = 8$$

\therefore numbers are 8, 9 and 10

4. 1st part of trip

Dist. Speed Time
 x 4hrs



2nd part of trip

520km $x+20$ 2hrs
6hrs

∴
 1st part of trip

Dist Speed Time
 $4x$ x 4

2nd part of trip

$2(x+20)$ $x+20$ 2
6
520km

I filled the Dist. in this to so you can see that. First I only put the Speed & Time in.

$$4x + 2(x+20) = 520\text{km}$$

$$4x + 2x + 40 = 520$$

$$6x = 480$$

$$x = 80 \text{ km/hour}$$

∴ original speed = 80 km/hour