

MTH-4106 Factoring and Algebraic Fractions: **Worksheet #10**

e.g. 1 $\frac{8}{x^2 - 36} \times \frac{x + 6}{4x + 4}$

e.g. 2 $\frac{y^2 + 6y + 5}{7y^2 - 63} \times \frac{7y + 21}{(5 + y)^2} \times \frac{3 - y}{1 + y}$

$$\text{e.g. 3} \quad \frac{2x+y}{y^2} \times \frac{3y^2-3xy}{xy+2x^2} \times \frac{5xy-10x^2}{y^2-3xy+2x^2}$$

$$\text{e.g. 4} \quad \frac{-x-y}{4x} \times \frac{-x^2+y^2}{-a} \times \frac{-2xa}{(x+y)^2}$$

e.g. 5 $\frac{2}{3} \div \frac{5}{6}$

e.g. 6 $\frac{5a^2}{b^2-36} \div \frac{25ab-25a}{b^2-7b+6}$

e.g. 7 $\frac{2-x}{b} \div \frac{x^2+2x}{4a^2-a^2x^2}$

e.g. 8 $\frac{x^2 - 8x - 9}{x^2 - 17x + 72} \times \frac{x^2 - 25}{x^2 - 1} \div \frac{x^2 + 4x - 5}{x^2 - 9x + 8}$

e.g. 9 $\frac{b^2 - b - 20}{b^2 - 25} \div \frac{b^2 + 2b - 8}{b^2 - b - 2} \div \frac{b + 1}{b^2 + 5b}$

$$1. \quad \frac{a-2b}{2} \times \frac{12}{6b-3a}$$

$$2. \quad \frac{x^2-x-12}{x-2} \times \frac{x^2+4x-12}{x-4}$$

$$3. \quad \frac{3q^2+8q-3}{2q^2+q-15} \times \frac{6q^2-11q-10}{-3q^2+4q-1}$$

$$4. \quad \frac{m^2 - 2mn + n^2}{4mn + 4n} \times \frac{(m+1)^2}{2m^2 - 2mn} \times \frac{8mn}{m^2 - 1}$$

$$5. \quad \frac{s^2 + 4s - 5}{r + 2} \times \frac{s^2 + 6s + 8}{r + 5} \times \frac{s^2 + s - 2}{(r - 1)^2}$$

$$6. \quad \frac{3a - 2b}{5a + 2b} \times \frac{8b + 20a}{6b - 9a}$$

$$7. \quad \frac{z^2 - 49}{z^2 - 5z - 14} \div \frac{z + 7}{2z^2 - 13z - 7}$$

$$8. \quad \frac{6x^2 - ax - 2a^2}{ax - a^2} \times \frac{x - a}{9x^2 - 4a^2} \times \frac{3ax + 2a^2}{2x + a}$$

$$9. \quad \frac{r^2 + 5r + 6}{r^2 - 1} \div \frac{r^2 - 9}{r^2 - 2r - 3}$$

$$10. \quad \frac{c^2 - 18c + 80}{c^2 - 5c - 50} \times \frac{c^2 - 6c - 7}{c^2 - 15c + 56} \times \frac{c + 5}{c - 1}$$

$$11. \quad \frac{4x + 5y}{4x - 5y} \div \frac{16x^2 - 25y^2}{4x - 5y}$$

$$12. \quad \frac{-m - n}{4m} \times \frac{-2ms}{(m + n)^2} \times \frac{-m^2 + n^2}{-s}$$

$$13. \quad \frac{4-a^2}{a^2+4} \div (b^2a^2-4b^2)$$

$$14. \quad \frac{b^2-4ab}{b-a} \div \frac{16a^2b^2-b^4}{4a^2-3ab-b^2}$$

$$15. \quad \frac{2c+d}{d^2} \times \frac{3d^2-3cd}{cd+2c^2} \times \frac{5cd-10c^2}{d^2-3cd+2c^2}$$

$$16. \quad \frac{25-x^2}{x} \times \frac{5x-10}{-25x-5x^2}$$

$$17. \quad \frac{3p+p^2}{12+3p} \div \frac{9p-p^3}{12-p-p^2}$$

$$18. \quad \frac{9-a^2}{a-3} \div \frac{a^2-a-12}{a-4}$$

$$19. \quad \frac{64p^2q^2 - z^2}{x^2 - 4} \times \frac{(x-2)^2}{8pq + z} \div \frac{x^2 - 4}{(x+2)^2}$$

$$20. \quad \frac{r^2 - s^2}{3 - r} \div \frac{4s - 4r}{r^2 + 3rs} \div \frac{r^2 + 4rs + 3s^2}{rs - 3s}$$

$$21. \quad \frac{9x^2 - 6x + 1}{x - 5} \times \frac{x^2 - 7x + 10}{3x^2 - 7x + 2}$$

$$22. \quad \frac{6b^2 - ab - 2a^2}{ab - a^2} \times \frac{b - a}{9b^2 - 4a^2} \times \frac{3ab + 2a^2}{2b + a}$$

$$23. \quad \frac{4c^2 + c - 14}{6cd - 14d} \times \frac{4c^2}{c^2 - 4} \times \frac{c - 2}{4c - 7} \div \frac{2c^2 + 4c}{3c^2 - c - 14}$$

$$24. \quad \frac{6x - 4x^2}{2x^2 - 5xy + 3y^2} \div \frac{2x^3 - 3x^2}{xy - x^2}$$

$$25. \quad \frac{-x^4 + 25}{5x - 15} \times \frac{2x^3 + 2x^2 + 6x + 6}{x^4 - 2x^2 - 15} \times \frac{x^3 - 3x^2}{x^4 + 5x^2}$$

hint... the 4-step trinomial method (product-sum method) works for the second denominator

$$26. \quad \frac{1-x^2}{x^2+xy} \times \frac{x^2-y^2}{x-1} \div \frac{x^2-xy+x-y}{x}$$

$$27. \quad \frac{3x^2 - 13x + 4}{-3x^2 + 16x - 5} \div \frac{x^2 - 16}{-x^2 + 9x - 20}$$

$$28. \quad \frac{-2 - b + b^2}{2b^2 + 6b - 3bc - 9c} \times \frac{3b - 2c}{b^2 - 2b} \times \frac{-2b^3 - 6b^2}{b^2 + b}$$

$$29. \quad \frac{h^2 - 16g^2}{4 - 4g + g^2} \times \frac{4 - g^2}{2h - 8g + hg - 4g^2} \div \frac{3(h + 4g)}{4(2 - g)}$$

$$30. \quad \frac{16a^2 - 9b^2}{2a - 8a^2} \div \frac{3b - 4a}{4a^2 - a}$$

$$31. \quad \frac{2a^2 - 4ab}{-2a^2 + 7ab - 6b^2} \div \frac{2b}{2a - 3b}$$

$$32. \quad \frac{3p + p^2}{12 + 3p} \div \frac{9p - p^3}{12 - p - p^2} \times \frac{p^3 - 64p}{2p^2 + 16p} \div \frac{p^2 - 9p + 8}{p^2 + 4p - 5}$$

$$33. \quad \frac{(v - w)^2}{bw - bv} \times \frac{b^2}{3w - 3v} \div \frac{16b^2 - 9}{5v + 5w} \div \frac{15w + 5v}{8b + 6}$$

$$34. \quad \frac{4x^2 - 16x + 15}{2x^2 + 3x + 1} \div \frac{2x^2 - 17x + 21}{x^2 - 6x - 7} \div \frac{1}{5x^2 - 2x^3} \times \frac{4x^2 - 1}{4x^2 - 20x + 25}$$

$$35. \quad \frac{36a^4 - 49b^2}{6a^2 + 9} \times \frac{5b^3}{3 - 2a^2} \div \frac{6a^2b^2 + 7b^3}{3} \times \frac{20a^4 - 45}{25b}$$

$$36. \quad \frac{16y^2 - 12y + 2}{4y^2 - 4} \div \frac{10y^2 + 15y - 10}{2y + 10} \times \frac{y^2 - y - 2}{4y^2 + 19y - 5}$$

$$37. \quad \frac{x^2 - 12x + 36}{x^2 + x} \times \frac{2xy}{x^2 - 7x + 6} \div \frac{xy - 6y}{x^2 - 1}$$

$$38. \quad \frac{(x+y)^2}{(x-y)^3} \times \frac{(x^2-y^2)^2}{x^4-y^4} \div \frac{(x+y)^3}{x^2+y^2}$$

$$39. \quad \frac{x^2-25}{-x^2-7x-10} \div \frac{5y-xy}{xy+2y}$$

$$40. \quad \frac{3x^2+11x-4}{12x^2-4x} \times \frac{4x^2-28x+40}{x^2-x-20}$$

$$41. \quad \frac{2y+x}{6y+1} \div \frac{x^2-4y^2}{2+9y-18y^2} \div \frac{4-9y^2}{6y^2-3xy+4y-2x}$$

$$42. \quad \frac{2x^3-10x^2}{-2x^3+3x^2} \div \frac{6x^2-21x-45}{9-4x^2}$$

$$43. \quad \frac{2b^4+3b^3}{9-4b^2} \times \frac{2b^3-3b^2}{3b^2+2b^3} \times \frac{2b^2+9b+9}{-b^2+2b^3}$$

$$44. \quad \frac{144 - 4b^2}{5b^2 + 35b + 30} \times \frac{5b^2 + 30b - 35}{b^2 + 6b - 7} \times \frac{b^4 - b^2}{12b^3 - 2b^4}$$

$$45. \quad \frac{4x^2 + 12xy + 9y^2}{4x^2 - 9y^2} \div (4x^2 + 6xy)$$

$$46. \quad \frac{-x^2 - 14x - 40}{x - 5} \div \frac{19x + 5 - 4x^2}{x^2 - 25} \times \frac{1 - 16x^2}{4x + 16}$$

$$47. \quad \frac{y - x}{-9y^2 + 4x^2} \times \frac{3xy + 2x^2}{x^2 - xy} \times \frac{-6y^2 + xy + 2x^2}{-x - 2y}$$

$$48. \quad \frac{2a^2 + 3a - 2}{2a^2 + 5a - 3} \times \frac{2a^2 + 7a + 3}{4 - a^2} \div \frac{2a^2 + 5a + 2}{3a^2 - 7a + 2}$$

$$49. \quad \frac{6a + 6b}{a^2 + a - 30} \div \frac{2a + 2b}{a - 5}$$

$$50. \quad \frac{25 - x^2}{-x^2 - 7x - 10} \div \frac{5y - xy}{xy + 2y}$$