

Algebraic Fraction (分式) - 最简分式(Simplest Fraction)

Eg. $\frac{a^2bc}{ab^2c^2} = \frac{a}{bc^2}$

Exercise

1. $\frac{16a^2b^2}{48a^3b}$

6. $\frac{(7ab)^2(x+y)}{21b^3(x-y)}$

11. $\frac{a^2-a-ab+b}{(a-b)(1-a)}$

2. $\frac{15ac^7}{75a^3bc^2}$

7. $\frac{x(a-b)^2}{(a-b)^3}$

12. $\frac{mp+q+mp+p}{p+q}$

3. $\frac{16a^2bc}{48ab^2c^4}$

8. $\frac{2x^2-18y^2}{2x^2+24xy-90y^2}$

13. $\frac{2x^2+x-6}{x^2-4}$

4. $\frac{(-2x)^3y^2z}{(4xy)^3}$

9. $\frac{6x^2+5x-6}{12x^2-11x+2}$

14. $\frac{a^2+3a-ab-3b}{9-a^2}$

5. $\frac{-8a^2b^4x}{(-2abx)^3}$

10. $\frac{x^2+4x+3}{x^2-1}$

15. $\frac{y^2-6y+5}{1-y}$

Algebraic Fraction (分式) - 加减(Addition & Subtraction)

Eg. $\frac{m-4}{m} - \frac{3(2-m)}{m^2}$
 $= \frac{m(m-4)-6+3m}{m^2}$
 $= \frac{m^2-4m-6+3m}{m^2}$
 $= \frac{m^2-m-6}{m^2}$

Eg. $\frac{1}{2p} - \frac{p-6}{6p^2}$
 $= \frac{3p-(p-6)}{6p^2}$
 $= \frac{3p-p+6}{6p^2}$
 $= \frac{2p+6}{6p^2}$
 $= \frac{2(p+3)}{6p^2}$
 $= \frac{p+3}{3p^2}$

Eg. $\frac{3e-d}{de} - \frac{9-d}{3d}$
 $= \frac{3(3e-d)-e(9-d)}{3de}$
 $= \frac{9e-3d-9e+de}{3de}$
 $= \frac{de-3d}{3de}$
 $= \frac{d(e-3)}{3de}$
 $= \frac{e-3}{3e}$

Exercise

1. $\frac{3a}{a+2b} + \frac{6b}{a+2b}$

2. $\frac{6x}{2x-3y} + \frac{9y}{3y-2x}$

3. $\frac{5a}{a^2} - \frac{3}{a}$

4. $\frac{1}{x+3} - \frac{1}{x-3}$

5. $\frac{1}{2a-2b} - \frac{1}{3a-3b}$

6. $\frac{b-c}{bc} + \frac{c-a}{ca} + \frac{a-b}{ab}$

7. $\frac{2}{a^2-2a} - \frac{3}{a^2-3a} + \frac{2}{a^2-5a+6}$

8. $\frac{2(y+1)}{5} - \frac{10(y-1)}{1} - \frac{24}{5(2y+3)}$

9. $\frac{2x+3}{a-b} + \frac{x+2}{a+b}$

10. $\frac{x-1}{a+b} + \frac{1-x}{a-b}$

11. $\frac{m-n}{m^2} + \frac{n-m}{n^2}$

12. $\frac{x-y}{xy} + \frac{y-z}{yz} - \frac{z+x}{zx}$

$$13. \frac{2x}{x^2-y^2} + \frac{2y}{y^2-x^2}$$

$$14. \frac{\frac{2}{2x+1}}{\frac{7}{(x-3)(2x+1)}}$$

$$15. \text{ If } xy = 1, \frac{x}{x+1} + \frac{y}{y+1} =$$

$$16. \text{ If } \frac{1}{x} + \frac{1}{y} = 8, x + y = 2 \text{ find } xy$$

$$17. \frac{2(h+1)}{2eh} - \frac{4+e}{4e}$$

$$18. \frac{\frac{1}{a^2-16}}{\frac{1}{16-a^2}} - \frac{\frac{4e}{a-8}}{\frac{1}{16-a^2}}$$

$$19. \frac{\frac{1}{x+2}}{\frac{2}{x^2+5x+6}} - \frac{\frac{1}{x^2+5x+6}}{\frac{3}{x^2+5x+6}}$$

$$20. \frac{\frac{1}{x^2+4x+3}}{\frac{1}{2+x-x^2}} - \frac{\frac{1}{2+x-x^2}}{\frac{1}{2+x-x^2}}$$

$$21. \frac{1}{p^2-1} + \frac{1}{1-p}$$

$$22. \frac{m^2+mn}{mn-n^2} + \frac{m^2+2mn+n^2}{n^2-m^2}$$

$$23. \frac{y-1}{y^2+3y+2} + \frac{2}{y+1}$$

$$24. \frac{7x+6}{x^2-4} + \frac{5}{2-x} + \frac{2}{x+2}$$

$$25. \frac{1}{(x-y)(y-z)} + \frac{1}{(y-z)(x-z)} + \frac{1}{(z-x)(y-x)}$$

$$26. \frac{\frac{2x}{2x-3}}{\frac{2x}{2x+3}} - \frac{\frac{2x}{2x+3}}{\frac{2x}{2x-3}}$$

$$27. \frac{\frac{x^2-x-1}{x^2-x-2}}{\frac{1}{x^2-5x+6}} - \frac{\frac{x^2-5x+7}{x^2-x-2}}{\frac{1}{x^2-5x+6}}$$

$$28. \frac{\frac{1}{x+3}}{\frac{1}{2x-6}} - \frac{\frac{1}{2x-6}}{\frac{3x-15}{2x^2-18}}$$

$$29. \frac{\frac{1}{2x+4}}{\frac{1}{x-1}} + \frac{\frac{1}{x-1}}{\frac{x+5}{2x^2+2x-4}}$$

Factorization by Grouping (分组分解)

$$\text{Eg. } x^2 - xy + bx - by$$

$$= x(x - y) + b(x - y)$$

$$= (x - y)(x + b)$$

$$\text{Eg. } xd + yc + xc + yd$$

$$= xd + xc + yc + yd$$

$$= x(d + c) + y(d + c)$$

$$= (d + c)(x + y)$$

$$\text{Eg. } 4(a - b) + x(b - a)$$

$$= 4(a - b) - x(a - b)$$

$$= (a - b)(4 - x)$$

Exercise

- $pm - pn + qm - qn$
- $x + y - xz - yz$
- $a^2 - ab + 5a - 5b$
- $6x^2 + 2x + 6xy + 2y$
- $a^2 - 5a - ac + 5c$
- $5a - 5b + ap - bp$
- $4ax - 2ay - 6bx + 3by$
- $k^2 - km - 10k + 10m$
- $49x^2 - 7x + 7ax - a$
- $3p^2 + 6pq - 4pr - 8qr$
- $x^2y^2 - 5x^2y - 5xy^2 + xy^3$
- $4q + 4p - q^2 - pq$
- $2ap - a + 4 - 8p$
- $x^2 - 1 + y(x + 1)$

15. $a^2 - b^2 + a + b$
16. $4ax + 6by + 4bx + 6ay$
17. $x + y - xz - yz$
18. $(3x + 2y)^2 - 6x - 4y$
19. $3 - 3x + cx - x$
20. $1 - m^2 - t - tm$
21. $(a + 3b)(2a - b) - (a + 3b)^2$
22. $m^3 + m^2(2m - 1)$
23. $(a - 3b)(4x + 5y) - (a - 3b)(5y + z)$
24. $(2a + b)(3a - 2b) - (2a + b)^2$
25. $(p - 3q)^2 + (p - 3q)(p + 2q)$
26. $x^2 - 1 + y(x + 1)$
27. $x + 7y - 2(x + 7y)^2$
28. $(a - b)(a + 2b) - 2a + 2b$
29. $(a + b)^2 - 3a - 3b$
30. $(4x + y)^2 - (3x - 2y)^2$
31. $a^2 + 2a + 1 + 1(a + 1)$
32. $6p(3x + 2y) - (3p + 2q)(3x + 2y)$
33. $2px + 2yp - yq - xq$
34. $25a^2 - 4b^2 + 5a + 2b$
35. $ad + bc - ac - bd$
36. $ac - bc - a^2 + 2ab - b^2$
37. $(m - 2)(m - 1)^3 - (m - 2)^3(m - 1)$
38. $x(x - 1) - x + 1$
39. $(m - a)x - (x^2 - m)$
40. $x^2 - y^2 + 6x - 6y$
41. $x^2 - y^2 + x - y$
42. $ab + bc - da - dc$
43. $x^2 - mx - nx + mn$
44. $ax - bx + a^2 - b^2$