

Answers - Algebraic Fractions

Exercise A

①

$$(i) \quad \frac{2(x+3)}{4x+12} = \frac{2\cancel{(x+3)}}{4\cancel{(x+3)}}$$

$$= \frac{2}{4}$$

$$= \underline{\underline{\frac{1}{2}}}$$

$$(ii) \quad \frac{4x-8}{(x-2)(x+8)} = \frac{4\cancel{(x-2)}}{\cancel{(x-2)}(x+8)}$$

$$= \underline{\underline{\frac{4}{x+8}}}$$

$$(iii) \quad \frac{3(x+y)}{x^2-y^2} = \frac{3\cancel{(x+y)}}{(x-y)\cancel{(x+y)}}$$

$$= \underline{\underline{\frac{3}{x-y}}}$$

$$(iv) \quad \frac{6x^2y^3}{9xy^4} = \frac{2\cancel{6}x}{3\cancel{9}y}$$
$$= \underline{\underline{\frac{2x}{3y}}}$$

$$(v) \frac{2p}{6p-2p^2} = \frac{\cancel{2p}^1}{\cancel{2p}(3-p)}$$

$$= \frac{1}{\underline{\underline{3-p}}}$$

$$(vi) \frac{\cancel{4a}^1 \cancel{b^3}^2}{10a^3 \cancel{b}^1 a^2} = \frac{4b^2}{10a^2}$$

$$= \frac{2b^2}{\underline{\underline{5a^2}}}$$

$$(vii) \frac{x^2-4x+3}{2x-6} = \frac{(x-1)(x-3)}{2(x-3)}$$

$$= \frac{x-1}{\underline{\underline{2}}}$$

$$(viii) \frac{x^2+xy}{x^2-y^2} = \frac{x \cancel{(x+y)}}{(x-y) \cancel{(x+y)}}$$

$$= \frac{x}{\underline{\underline{x-y}}}$$

$$(ix) \frac{a+2}{a^2-a-6} = \frac{\cancel{a+2}}{(a-3) \cancel{(a+2)}}$$

$$= \frac{1}{\underline{\underline{a-3}}}$$

$$(x) \quad \frac{3x^2 + 15x}{10x + 2x^2} = \frac{3x \cancel{(x+5)}}{2x \cancel{(5+x)}} \\ = \frac{3}{2}$$

$$(xi) \quad \frac{9x^2 - 1}{9x + 3} = \frac{(3x-1) \cancel{(3x+1)}}{3 \cancel{(3x+1)}} \\ = \frac{3x-1}{3}$$

$$(xii) \quad \frac{3x^2 + 3xy}{6xy + 6y^2} = \frac{3x \cancel{(x+y)}}{6y \cancel{(x+y)}} \\ = \frac{3x}{2 \cdot 3y} \\ = \frac{x}{2y}$$

$$(2) \quad (i) \quad \frac{3a^1}{b^2} \times \frac{b^3}{6a^2} = \frac{b}{2}$$

$$(ii) \quad \frac{xy - y^2}{y} \times \frac{x}{x-y} = \frac{y \cancel{(x-y)}}{y} \times \frac{x}{\cancel{(x-y)}} \\ = x$$

$$\begin{aligned}
 \text{(iii)} \quad \frac{x+1}{2x} \div \frac{4x^2-4}{x^2} &= \frac{x+1}{2x} \times \frac{x^2}{4x^2-4} \\
 &= \frac{x+1}{2x} \times \frac{x^2}{4(x^2-1)} \\
 &= \frac{\cancel{(x+1)}}{2\cancel{x}} \times \frac{x^{\cancel{2}} x}{4(x-1)\cancel{(x+1)}} \\
 &= \frac{x}{8(x-1)} \\
 &= \underline{\underline{\quad}}
 \end{aligned}$$

$$\begin{aligned}
 \text{(iv)} \quad \frac{3a^2+a-2}{2} \div \frac{6a^2-a-2}{8a+4} \\
 &= \frac{(a+1)(3a-2)}{2} \div \frac{(3a-2)(2a+1)}{4(2a+1)} \\
 &= \frac{(a+1)\cancel{(3a-2)}}{\cancel{2}} \times \frac{4\cancel{(2a+1)}}{\cancel{(3a-2)}(2a+1)} \\
 &= \underline{\underline{2(a+1)}}
 \end{aligned}$$

$3a^2+a-2$	$\begin{array}{r l} p & s \\ -6 & 1 \end{array}$
$= 3a^2+3a-2a-2$	$(3, -2)$
$= 3a(a+1)-2(a+1)$	
$= (a+1)(3a-2)$	

$6a^2-a-2$	$\begin{array}{r l} p & s \\ -12 & -1 \end{array}$
$= 6a^2-4a+3a-2$	$(-4, 3)$
$= 2a(3a-2)+1(3a-2)$	
$= (3a-2)(2a+1)$	

$$\begin{aligned}
 \text{(v)} \quad \frac{x^2-4x+4}{x^2-2x} \times \frac{x-2}{x^2-4} \\
 &= \frac{(x-2)\cancel{(x-2)}}{x\cancel{(x-2)}} \times \frac{\cancel{(x-2)}}{\cancel{(x-2)}(x+2)} \\
 &= \frac{x-2}{x(x+2)} //
 \end{aligned}$$

$$(vi) \quad \frac{2x-1}{x+1} \div \frac{2x^2-x-1}{x^2+3x+2}$$

$$= \frac{2x-1}{x+1} \times \frac{x^2+3x+2}{2x^2-x-1}$$

$$= \frac{2x-1}{\cancel{x+1}} \times \frac{\cancel{(x+1)}(x+2)}{(x-1)(2x+1)}$$

$$= \frac{(2x-1)(x+2)}{(x-1)(2x+1)}$$

$2x^2-x-1$	p	S
$= 2x^2-2x+x-1$	-2	-1
$= 2x(x-1)+1(x-1)$		$-2, 1$
$= (x-1)(2x+1)$		

$$(vii) \quad \frac{4p^2+12}{p-3} \times \frac{p^2-9}{p^2+3}$$

$$= \frac{4\cancel{(p^2+3)}}{\cancel{(p-3)}} \times \frac{\cancel{(p-3)}(p+3)}{\cancel{(p^2+3)}}$$

$$= \underline{\underline{4(p+3)}}$$

$$(viii) \quad \frac{3x^2-9}{x+2} \div \frac{x^2-6x+9}{x^2+x-2}$$

$$= \frac{3(x^2-3)}{x+2} \times \frac{x^2+x-2}{x^2-6x+9}$$

$$= \frac{3(x^2-3)}{\cancel{(x+2)}} \times \frac{\cancel{(x+2)}(x-1)}{(x-3)^2}$$

$$= \frac{3(x^2-3)(x-1)}{(x-3)^2} //$$

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$$(i) \quad \frac{3a}{5} - \frac{a}{4} = \frac{12a}{20} - \frac{5a}{20}$$
$$= \frac{7a}{20}$$

~~(ii) $\frac{3}{5a} - \frac{4}{a} = \frac{3}{5a} - \frac{20}{5a}$~~

~~$= -\frac{17}{5a}$~~

$$(ii) \quad \frac{5}{3a} - \frac{4}{a}$$
$$= \frac{5}{3a} - \frac{12}{3a}$$
$$= -\frac{7}{3a}$$

$$(iii) \quad \frac{2}{m+n} - \frac{1}{m-n}$$
$$= \frac{2(m-n)}{(m+n)(m-n)} - \frac{1(m+n)}{(m-n)(m+n)}$$
$$= \frac{2(m-n) - 1(m+n)}{(m+n)(m-n)}$$
$$= \frac{2m - 2n - m - n}{m^2 - n^2}$$
$$= \frac{m - 3n}{m^2 - n^2}$$

$$\begin{aligned}
 \text{(iv)} \quad & \frac{4}{p-2} - \frac{3}{2p+1} \\
 &= \frac{4(2p+1)}{(p-2)(2p+1)} - \frac{3(p-2)}{(p-2)(2p+1)} \\
 &= \frac{4(2p+1) - 3(p-2)}{(p-2)(2p+1)} \\
 &= \frac{8p + 4 - 3p + 6}{(p-2)(2p+1)} \\
 &= \frac{5p + 10}{(p-2)(2p+1)} \\
 &= \frac{5(p+2)}{(p-2)(2p+1)}
 \end{aligned}$$

$$\begin{aligned}
 \text{(v)} \quad & \frac{2}{a^2+a} + \frac{3}{a^2-a} \\
 &= \frac{2}{a(a+1)} + \frac{3}{a(a-1)} \\
 &= \frac{2(a-1)}{a(a+1)(a-1)} + \frac{3(a+1)}{a(a+1)(a-1)} \\
 &= \frac{2(a-1) + 3(a+1)}{a(a+1)(a-1)}
 \end{aligned}$$

$$= \frac{2a-2+3a+3}{a(a+1)(a-1)}$$

$$= \frac{5a+1}{a(a+1)(a-1)}$$

(vi)

$$\frac{2x}{x-y} + \frac{2y}{y-x}$$

$$= \frac{2x}{x-y} + \frac{2y}{-1(-y+x)}$$

$$= \frac{2x}{x-y} + \frac{2y}{-1(x-y)}$$

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

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

$$= \frac{2(x-y)}{(x-y)}$$

$$= \underline{\underline{2}}$$

$$\begin{aligned}
 \text{(vii)} \quad & \frac{p}{p^2-1} - \frac{1}{p+1} \\
 &= \frac{p}{(p-1)(p+1)} - \frac{1}{(p+1)} \\
 &= \frac{p}{(p-1)(p+1)} - \frac{(p-1)}{(p+1)(p-1)} \\
 &= \frac{p - (p-1)}{(p-1)(p+1)} \\
 &= \frac{p - p + 1}{(p-1)(p+1)} \\
 &= \frac{1}{(p-1)(p+1)} = \frac{1}{\underline{\underline{p^2-1}}}
 \end{aligned}$$

$$\begin{aligned}
 \text{(viii)} \quad & \frac{a-b}{a+b} + \frac{a+b}{a-b} \\
 &= \frac{(a-b)(a-b)}{(a+b)(a-b)} + \frac{(a+b)(a+b)}{(a-b)(a+b)} \\
 &= \frac{(a-b)(a-b) + (a+b)(a+b)}{(a-b)(a+b)} \\
 &= \frac{a^2 - ab - ab + b^2 + a^2 + ab + ab + b^2}{(a-b)(a+b)}
 \end{aligned}$$

$$= \frac{2a^2 + 2b^2}{(a-b)(a+b)}$$

$$= \frac{2(a^2 + b^2)}{a^2 - b^2}$$

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