

*Algebraic Fractions and Equations***Answers****1 Algebraic Manipulation**

1. (a) $-a - b$ (b) $\frac{b-d}{a-c}$ (c) $\frac{-1}{a-b}$ (d) $4a + 6$
 (e) $\frac{c-b}{3}$ (f) $\frac{a-c}{b-d}$ (g) $\frac{a-2}{3}$ (h) a
 (i) $\frac{p+q}{q-p}$ (j) $3a + 2b$ (k) $\frac{-5-a}{3}$ (l) $\frac{ab}{4-a}$
2. (a) $\frac{P}{1-P}$ (b) $\frac{b}{p-a}$ (c) $\frac{Qa+b}{Q-1}$ (d) $\frac{q^2y+y}{q^2-1}$
 (e) $\frac{-2-3a}{a-1}$ (f) $\frac{4c-b}{3}$ (g) $\frac{p^2}{1-p^2}$ (h) $\frac{-2}{w^2-1}$ or $\frac{2}{1-w^2}$
 (i) $\frac{w^2+2}{1-w^2}$ (j) $\pm\sqrt{\frac{2}{p-1}}$ (k) $\pm\sqrt{\frac{3p-2}{p-1}}$ (l) $\pm\sqrt{\frac{gy+y}{1-g}}$

2 Algebraic Fractions: Part 1

1. (a) $\frac{9x}{20}$ (b) $\frac{11x}{28}$ (c) $\frac{8x}{15}$ (d) $\frac{41y}{21}$ (e) $\frac{23y}{20}$
 (f) $\frac{13y}{7}$ (g) $\frac{19x}{70}$ (h) $\frac{x}{6}$ (i) $\frac{9x}{8}$ (j) $\frac{27x}{24}$
 (k) $\frac{5a+4b}{20}$ (l) $\frac{8x+3y}{24}$ (m) $\frac{5a-3b}{15}$ (n) $\frac{10a+12b}{15}$ (o) $\frac{32a-27b}{36}$
2. (a) $\frac{4y+2x}{xy}$ (b) $\frac{6y-x}{xy}$ (c) $\frac{y+3x}{xy}$ (d) $\frac{5}{a}$ (e) $\frac{8b+3a}{2ab}$
 (f) $\frac{10b-3a}{6ab}$ (g) $\frac{25b+12a}{15ab}$ (h) $\frac{23}{15a}$ (i) $\frac{17}{28a}$ (j) $\frac{21b-16a}{24ab}$
 (k) $\frac{1}{12a}$ (l) $\frac{11}{8a}$
3. (a) $\frac{2x+1}{x(x+1)}$ (b) $\frac{3x+4}{x(x+2)}$ (c) $\frac{7x+3}{x(x+1)}$ (d) $\frac{4x+10}{x(x+2)}$ (e) $\frac{4x+2}{x(x-2)}$
 (f) $\frac{14x-12}{3x(x+3)}$ (g) $\frac{-6}{x(x+1)}$ (h) $\frac{6x-10}{x(x-5)}$ (i) $\frac{27x+42}{5x(x+6)}$ (j) $\frac{17x-49}{2x(x-7)}$
 (k) $\frac{23x-50}{3x(x-10)}$ (l) $\frac{7x-8}{3x(x-8)}$

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4. (a) $\frac{2x+3}{(x+1)(x+2)}$ (b) $\frac{2x}{(x-1)(x+1)}$ (c) $\frac{7}{(x+2)}$
- (d) $\frac{6x-28}{(x-2)(x-6)}$ (e) $\frac{-x-2}{(x+3)(x+4)}$ (f) $\frac{x+35}{(x+7)(x-7)}$
- (g) $\frac{8x+28}{(x-4)(8+x)}$ (h) $\frac{-2x+30}{(x-4)(x+7)}$ (i) $\frac{8x+27}{(x+6)(x-1)}$
- (j) $\frac{5x-2}{(2x+6)(3x-8)}$ (k) $\frac{-6x}{(2x+5)(5-4x)}$ (l) $\frac{17x-7}{(2x-1)(3x-1)}$
- (m) $\frac{37x+13}{(2x+3)(5x-1)}$ (n) $\frac{18x+4}{(3x-7)(2x+3)}$
5. (a) $\frac{3x^2}{(x+1)(x-2)}$ (b) $\frac{15x}{(x-7)(2x+1)}$ (c) $\frac{5x^2-3x}{(x-1)(3x-1)}$
- (d) $\frac{x^2+3x+12}{(x+3)(x-1)}$ (e) $\frac{8x^2+11x}{(x-3)(x+4)}$ (f) $\frac{5x}{(2-x)(4x-3)}$
- (g) $\frac{5x^2-13x}{(5-x)(x+1)}$ (h) $\frac{-4x^2-14x}{(4+x)(x+6)}$ (i) $\frac{x^2-4x-18}{(x+6)(x-1)}$
6. $\frac{15-pq}{3q}$
7. $\frac{5a-9}{a(a-3)}$
8. (a) $m-2$ (b) $\frac{y-6}{y(y-2)}$
9. $\frac{5-x}{(x-1)(x+1)}$ or $\frac{5-x}{x^2-1}$

3 Algebraic Fractions: Part 2

1. (a) x^2 (b) $\frac{x+2}{x(x-2)}$ (c) $\frac{x-3}{x-2}$ (d) $\frac{2x-1}{x(x+1)}$
- (e) $\frac{x^2(x-6)}{x+6}$ (f) $\frac{1}{x}$ (g) $\frac{5x-3}{x}$ $\frac{2x+1}{x}$ (i) $\frac{x-3}{x+2}$

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2. (a) $\frac{1}{x}$ (b) x (c) $2x$ (d) x (e) $x(x-1)$
- (f) $x^2(x^2 + x + 1)$ (g) $\frac{x}{x-1}$ (h) $\frac{x(x+2)(x-2)}{(x-4)(x+1)}$ (i) $\frac{x-3}{x+1}$
- (j) $\frac{x(x+4)}{x-2}$ (k) $\frac{x+5}{x-3}$ (l) $\frac{x(x-2)}{x+1}$ (m) $\frac{(x-1)}{x(x-3)}$
- (n) $\frac{x(x-1)}{x+8}$ (o) $\frac{x-5}{x(x+6)}$ (p) $\frac{5x-6}{x+1}$ (q) $\frac{5x-2}{x-7}$
- (r) $\frac{3x+1}{5x+1}$ (s) $\frac{2x-7}{3x+2}$ (t) $\frac{4x-3}{5x-1}$ (u) $\frac{x(3x+2)}{4x+3}$
3. (a) $\frac{x}{x+4}$ (b) $\frac{x-1}{x(x+1)}$ (c) $\frac{(x+2)^2}{x}$ (d) $\frac{3}{x^2(x+2)}$ (e) $\frac{(x+3)^2}{x^3}$
- (f) $x(x+3)$ (g) $\frac{x^2(x-1)}{x+1}$ (h) $\frac{x^3(x+1)}{(x+4)^2}$ (i) $\left(\frac{x+3}{x-4}\right)^2$
4. (a) $\frac{3x-1}{(x+2)(x-5)}$ (b) $\frac{-x-14}{(x+2)(x-1)}$ (c) $\frac{x}{(x+1)(x-1)}$
- (d) $\frac{8}{x+2}$ (e) $\frac{x+4}{(x+3)(x-3)}$ (f) $\frac{3(3x-13)}{(x-3)(x-6)}$
- (g) $\frac{6x}{(x-4)(x+2)}$ (h) $\frac{x(x-1)}{x+1}$ (i) $\frac{2x^2+3x-24}{(x-6)(2x-1)}$ (j) $\frac{x(5x-14)}{(x+2)(x-6)}$
- (k) $\frac{x(2x-1)}{(x-1)(x+1)}$ (l) $\frac{x^2+8x+1}{x^2}$ (m) $\frac{x(x+9)}{(x+6)(x+7)}$
- (n) $\frac{2x^2+11x+11}{(x+2)(x+3)}$ (o) $\frac{2x^2-7x-17}{(x+1)(x+2)}$
5. (a) $x+1$ (b) $4b+2a=2(2b+a)$

4 Algebraic Fractions and Quadratic Equations

1. Both answers are
2. 4 and
3. 5 and
4. 2 and $\frac{-2}{3}$

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5. 3 and

6. 7 and $\frac{1}{4}$ 7. 2 and $\frac{-23}{9}$ 8. 10 and $\frac{-5}{2}$ 9. 3 and $\frac{1}{3}$ 10. 2 and $\frac{-48}{7}$ 11. 8 and $\frac{5}{2}$ 12. 1 and $\frac{9}{4}$ 13. $\frac{-9 \pm \sqrt{113}}{8}$ 14. 3 and $\frac{44}{3}$ 15. $\frac{35 \pm \sqrt{1605}}{10}$ **4 Algebraic Solution of Simultaneous Equations – One Linear and One Quadratic**

1. (a) $x = 4, y = 12$ and $x = -1, y = -3$
 (b) $x = -5, y = 0$ and $x = 2, y = 14$
 (c) $x = 2, y = 7$ and $x = -1, y = -2$
2. (a) $x = 2.62, y = 6.85$ and $x = 0.38, y = 0.15$
 (b) $t = -0.55, x = 8.30$ and $t = -5.45, x = 37.70$
 (c) $x = 0.28, y = -0.43$ and $x = -5.28, y = -11.57$
3. (a) $x = 0, y = 1$ and $x = 4, y = -1$
 (b) $x = 3, y = 7$ and $x = 3.4, y = 5.4$
 (c) $x = 3, y = 6$ and $x = -1.4, y = 23.6$

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4.

x	-3	-2	-1	0	1	2	3	4
$y = 9 - x^2$	0	5	8	9	8	5	0	-7

(e) $(-1, 8)$ and $(3, 0)$ (f) $x = -1, y = 8$ and $x = 3, y = 0$ 5. (a) $x = 3, y = 4$ and $x = 0, y = -5$ (b) $x = 3, y = 6$ and $x = -3, y = -6$ (c) $x = -2, y = 2$ (There is only one solution here which means that the line is actually a tangent to the circle.)(d) $x = 2, y = 8$ and $x = -3.2, y = -7.6$ (e) $x = -4, y = -3$ and $x = 3, y = -4$ (f) $x = 3.11, y = -3.22$ and $x = -0.71, y = 4.42$ 6. $(4.65, -0.65)$ and $(-0.65, 4.65)$ 7. (d) P $(10, 0)$ and Q $(-10, 0)$ (e) R $(\sqrt{10}, 3\sqrt{10})$ (f) $30\sqrt{10}$ units²(h) $\frac{3}{1 - \sqrt{10}}$