

\*\*\*Your Year 13 September assessment will be based on the following three areas:\*\*\*

**Part 1: Flipped Learning**

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Your teacher will have given you a copy of the binomial expansion gapped notes and a code to add the Year 2 book to your Cambridge Elevate login.

Please read **Chapter 6: Section 1**, use it to fill in the examples, and complete exercise 6A.

You may also find the videos starting at <https://tinyurl.com/jackbrownbinomial> to be useful.

**Part 2: Algebraic Fractions Revision**

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Please complete the following two exercises to revise the topic of algebraic fractions in preparation for year 13 (answers below). You may wish to refer to last year's (or this year's) SIL on the college website for examples.

**Exercise 1**

1 Work out the following. Answers may be left as improper fractions.

- |                                 |                                    |                                   |                                    |
|---------------------------------|------------------------------------|-----------------------------------|------------------------------------|
| (a) $\frac{4}{7} \times 5$      | (b) $\frac{5}{12} \times 3$        | (c) $\frac{7}{9} \times 2$        | (d) $\frac{4}{15} \times 3$        |
| (e) $\frac{8}{11} \div 4$       | (f) $\frac{8}{11} \div 3$          | (g) $\frac{6}{7} \div 3$          | (h) $\frac{6}{7} \div 5$           |
| (i) $\frac{3x}{y} \times x$     | (j) $\frac{3x}{y^2} \times y$      | (k) $\frac{5x^3}{4y} \div x$      | (l) $\frac{5x^2}{6y} \div y$       |
| (m) $\frac{5x^3}{2y} \times 3x$ | (n) $\frac{3y^4}{4x^2z} \times 2x$ | (o) $\frac{6x^2y^3}{5z} \div 2xy$ | (p) $\frac{5a^2}{6x^3z^2} \div 2y$ |

2 Simplify the following compound fractions.

- |   |   |   |
|---|---|---|
| (a) $\frac{\frac{1}{x} + 1}{\frac{1}{x} + 3}$ | (b) $\frac{\frac{2}{x} + 1}{\frac{3}{x} - 1}$ | (c) $\frac{\frac{1}{x+1} + 2}{\frac{1}{x+1} + 1}$ |
|---|---|---|

3 Write as single fractions.

- |                                     |                                     |  |                         |
|-------------------------------------|-------------------------------------|--|-------------------------|
| (a) $\frac{2}{x-1} + \frac{1}{x+3}$ | (b) $\frac{2}{x-3} - \frac{1}{x+2}$ | (c) $\frac{1}{2x-1} - \frac{1}{3x+2}$      | (d) $\frac{3}{x+2} + 1$ |
| (e) $2 - \frac{1}{x-1}$             | (f) $\frac{2x}{x+1} - 3$            | (g) $\frac{3}{4(2x-1)} - \frac{1}{4x^2-1}$ |                         |

4 Write as single fractions.

- |                                       |  |   |
|---------------------------------------|--|---|
| (a) $\frac{x+1}{\sqrt{x}} + \sqrt{x}$ | (b) $\frac{2x}{\sqrt{x+3}} + \sqrt{x+3}$ | (c) $\frac{x}{\sqrt[3]{x-2}} + \sqrt[3]{(x-2)^2}$ |
|---------------------------------------|--|---|

## Exercise 2

1 Simplify the following as far as possible.

(a)  $5x + 3y + 7x - 3y$       (b)  $3x^2 + 4xy + y^2 + x^2 - 4xy - y^2$ .

(c)  $\frac{4+6x}{2}$       (d)  $\frac{4 \times 6x}{2}$       (e)  $\frac{3x+xy}{x}$

(f)  $\frac{3x \times xy}{x}$       (g)  $\frac{4x+10y}{8x+6y}$       (h)  $\frac{3x-6y}{9x-3y}$

(i)  $\frac{4x+9y}{2x+3y}$       (j)  $\frac{4x+6y}{6x+9y}$       (k)  $\frac{5xy+6y^2}{10x+12y}$

(l)  $\frac{3x^2+4y^2}{6x^2-8y^2}$       (m)  $\frac{x-3}{3-x}$       (n)  $\frac{x^2-2xy-y^2}{y^2+2xy-x^2}$

2 Make  $x$  the subject of the following formulae.

(a)  $\frac{ax}{b} = \frac{py}{qz}$       (b)  $\frac{3\pi ax}{b} = \frac{4y^2}{qz}$

3 Simplify the following.

(a)  $\frac{2\pi x}{ab} \div \frac{1}{3}\pi r^3$       (b)  $\frac{2\pi h^2}{rb} \div \frac{4}{3}\pi hr^2$

4 Simplify into a single factorised expression.

(a)  $(x-3)^2 + 5(x-3)^3$       (b)  $4x(2x+1)^3 + 5(2x+1)^4$

(c)  $\frac{1}{2}k(k+1) + (k+1)$       (d)  $\frac{1}{6}k(k+1)(2k+1) + (k+1)^2$

5 Simplify as far as possible.

(a)  $\frac{x^2+6x+8}{x^2-x-6}$       (b)  $\frac{3x^2-2x-8}{x^2-4}$

(c)  $\frac{(x+3)^2-2(x+3)}{x^2+2x-3}$       (d)  $\frac{x(2x-1)^2-x^2(2x-1)}{(x-1)^2}$

(e)  $\frac{\frac{x^2}{\sqrt{x^2+1}} - \sqrt{x^2+1}}{x^2}$       (f)  $-\frac{\frac{x}{2\sqrt{1-x}} + \sqrt{1-x}}{x^2}$

(g)  $\frac{\frac{\sqrt{x}}{2\sqrt{1+x}} - \frac{\sqrt{1+x}}{2\sqrt{x}}}{x}$       (h)  $\frac{\sqrt[3]{1+x} - \frac{x}{3\sqrt[3]{(1+x)^2}}}{\sqrt[3]{1+x}}$

### Part 3: Year 12 Revision

In a linear course it is vital to keep the year 12 content ticking over – not only because it will be examined in your final A level exams, but also because a lot of the year 13 content directly builds on year 12 topics.

Therefore please complete Madas Maths MP1 papers [K](#) and [L](#) in timed exam conditions, and mark these yourself using the solutions ([here](#) and [here](#)).

## Answers to algebraic fractions exercises

### Exercise 1

- 1 (a)  $\frac{20}{7}$  (b)  $\frac{5}{4}$  (c)  $\frac{14}{9}$  (d)  $\frac{4}{5}$
- (e)  $\frac{2}{11}$  (f)  $\frac{8}{33}$  (g)  $\frac{2}{7}$  (h)  $\frac{6}{35}$
- (i)  $\frac{3x^2}{y}$  (j)  $\frac{3x}{y}$  (k)  $\frac{5x^2}{4y}$  (l)  $\frac{5x^2}{6y^2}$
- (m)  $\frac{15x^4}{2y}$  (n)  $\frac{3y^4}{2xz}$  (o)  $\frac{3xy^2}{5z}$  (p)  $\frac{5a^2}{12x^3yz^2}$
- 2 (a)  $\frac{1+x}{1+3x}$  (b)  $\frac{2+x}{3-x}$  (c)  $\frac{3+2x}{2+x}$
- 3 (a)  $\frac{3x+5}{(x-1)(x+3)}$  (b)  $\frac{x+7}{(x-3)(x+2)}$  (c)  $\frac{x+3}{(2x-1)(3x+2)}$
- (d)  $\frac{x+5}{x+2}$  (e)  $\frac{2x-3}{x-1}$  (f)  $-\frac{x+3}{x+1}$
- (g)  $\frac{6x-1}{4(2x-1)(2x+1)}$
- 4 (a)  $\frac{2x+1}{\sqrt{x}}$  (b)  $\frac{3x+3}{\sqrt{x+3}}$  (c)  $\frac{2x-2}{\sqrt[3]{x-2}}$

### Exercise 2

- 1 (a)  $12x$  (b)  $4x^2$
- (c)  $2+3x$  (d)  $12x$  (e)  $3+y$
- (f)  $3xy$  (g)  $\frac{2x+5y}{4x+3y}$  (h)  $\frac{x-2y}{3x-y}$
- (i) can't be simplified (j)  $\frac{2}{3}$  (k)  $\frac{y}{2}$
- (l) can't be simplified (m)  $-1$  (n)  $-1$

2 (a)  $x = \frac{bpy}{aqz}$  (b)  $x = \frac{4by^2}{3\pi aqz}$

3 (a)  $\frac{6x}{abr^3}$  (b)  $\frac{3h}{2br^3}$

4 [see Example 5]

(a)  $(x-3)^2(5x-14)$  (b)  $(2x+1)^3(14x+5)$

(c)  $\frac{1}{2}(k+1)(k+2)$  (d)  $\frac{1}{6}(k+1)(k+2)(2k+3)$

5 (a)  $\frac{x+4}{x-3}$  (b)  $\frac{3x+4}{x+2}$

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

(e)  $\frac{-1}{x^2\sqrt{x^2+1}}$  (f)  $\frac{x-2}{2x^2\sqrt{1-x}}$

(g)  $\frac{-1}{2x\sqrt{x}\sqrt{x+1}}$  (h)  $\frac{3+2x}{3(1+x)}$