Write your name, centre number and candidate number in the boxes below.

| Surname | Other names |
|---|---|
| | |

Centre number | | | | | |

Candidate number | | | | |

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# Algebraic fractions

Time allowed: 45 minutes

**Subject code** **0580**

# Mathematics

**Questions from Paper 2 and Paper 4**

**You must have:** a ruler marked in centimetres and millimetres, a protractor, compasses, a pen, an HB pencil and an eraser.
**You may use a calculator.**

Total marks

**/ 36**

## Instructions

- Answer every question in the space provided on this paper.
- Write in black or dark blue ink. Pencil may be used for diagrams and graphs.
- Fill in your name, centre number and candidate number above.
- Show your working: a correct method can earn marks even if the answer is wrong.
- Unless a question says otherwise, give answers that are not exact to 3 significant figures, and angles in degrees to 1 decimal place.

## Information

- This paper has 10 questions worth 36 marks in total.
- The marks for each question or part are shown in brackets, for example [3].

## Advice

- Read every question through once before you write anything.
- Use the marks in brackets to judge how long to spend on each part.
- If you finish early, go back and check your working.

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Print at 100% (Actual size) so diagrams keep their real measurements.

**1** Write the following as single fractions.

**(a)** $x + \frac{x}{2}$

*Answer(a)* ..... [1]

**(b)** $x + \frac{2}{x}$

*Answer(b)* ..... [1]

(a) Adding and subtracting algebraic fractions (b) Adding and subtracting algebraic fractions Click for more variations

| | | | | |
|---|---|---|---|---|
| **1** | **(a)** | $\frac{3x}{2}$ oe final answer | **1** | |
| | **(b)** | $\frac{x^2+2}{x}$ oe final answer | **1** | |

**2** Write as a single fraction in its simplest form

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

*Answer* ..... [2]

Adding and subtracting algebraic fractions Click for more variations

| | | | |
|---|---|---|---|
| **2** | $\frac{5x-3}{6}$ | 2 | **B1** for $5x-3$ seen<br>**SC1** $\frac{5}{6}x - \frac{3}{6}$ on answer line |

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**3** Write as a single fraction in its simplest form.

$$\frac{1}{x} - \frac{1}{x+1}$$

..... [3]

Adding and subtracting algebraic fractions Click for more variations

| | | | |
|---|---|---|---|
| **3** | $\frac{1}{x(x+1)}$ oe final answer nfww | **3** | **B1** for common denominator $x(x+1)$ oe<br>**M1** for $x + 1 - x$ |

**4** Simplify.

$$\frac{h^2+4h}{h^2-16}$$

..... [3]

Simplifying algebraic fractions Click for more variations

| | | | |
|---|---|---|---|
| **4** | $\frac{h}{h-4}$ final answer | **3** | **B1** for $h(h + 4)$ isw<br>**B1** for $(h + 4)(h - 4)$ isw |

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**5** Simplify.

**(a)** $\frac{p}{t} \div \frac{2}{t}$

..... [2]

**(b)** $\frac{3x}{4} - \frac{x-1}{2}$

..... [2]

(a) Simplifying algebraic fractions (b) Adding and subtracting algebraic fractions Click for more variations

| | | | |
|---|---|---|---|
| **5**(a) | $\frac{p}{2}$ final answer | **2** | **M1** for $\frac{p}{t} \times \frac{t}{2}$ or for cross cancelling of $t$ |
| **5**(b) | $\frac{x+2}{4}$ or $\frac{x}{4} + \frac{1}{2}$ final answer | **2** | **M1** for $\frac{3x-2(x-1)}{4}$ oe<br>If 0 scored, **SC1** for final answer $\frac{x-2}{4}$ oe |

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**6** Write as a single fraction in its simplest form.

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

*Answer* ..... [4]

Adding and subtracting algebraic fractions Click for more variations

| | | | |
|---|---|---|---|
| **6** | $\frac{8x}{(x-3)(x+1)}$ | **4** | **B1** for common denominator $(x-3)(x+1)$ seen<br>**B1** for $(x+3)(x+1)-(x-1)(x-3)$ soi<br>**B1** for $x^2+3x+x+3$ or $x^2-3x-x+3$ soi |

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**7** Simplify.

$$\frac{2x^2-11x-21}{x^2-49}$$

..... [4]

Simplifying algebraic fractions Click for more variations

| | | | |
|---|---|---|---|
| **7** | $\frac{2x+3}{x+7}$ final answer | **4** | **B2** for $(2x + 3)(x - 7)$<br>or **B1** for $2x(x - 7) + 3(x - 7)$<br>or $x(2x + 3) - 7(2x + 3)$<br>or $(2x + a)(x + b)$ where $ab = -21$ or $a + 2b = -11$<br>**B1** for $(x + 7)(x - 7)$ |

**8** Simplify.

$$\frac{3xy+36y-5x-60}{2x^2-288}$$

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..... [4]

Simplifying algebraic fractions Click for more variations

| | | | |
|---|---|---|---|
| **8** | $\frac{3y-5}{2(x-12)}$ or $\frac{3y-5}{2x-24}$ final answer | **4** | **SC3** for answer $\frac{3y-5}{x-12}$<br>or **B3** for $(3y-5)(x+12)$<br>**and**<br>$2(x-12)(x+12)$ or $(2x-24)(x+12)$<br><br>or **B2** for $(3y-5)(x+12)$<br>or $2(x-12)(x+12)$<br>or $(2x-24)(x+12)$<br>or $(2x+24)(x-12)$<br><br>or **B1** for $3y(x+12)-5(x+12)$<br>or $x(3y-5)+12(3y-5)$<br>or $2(x^2-144)$<br>or $(x-12)(x+12)$ |

**9** **(a)** Write $\frac{1}{y}-\frac{2}{x}$ as a single fraction in its lowest terms.

*Answer(a)* [2]

**(b)** Write $\frac{x^2+x}{3x+3}$ in its lowest terms.

*Answer(b)* [3]

(a) Adding and subtracting algebraic fractions (b) Simplifying algebraic fractions Click for more variations

| | | | |
|---|---|---|---|
| **9** | **(a)** $\frac{x-2y}{xy}$ | 2 | **B1** correct numerator<br>**B1** correct denominator |
| | **(b)** $\frac{x}{3}$ www | 3 | **M1** $x(x+1)$ **M1** $3(x+1)$ |

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**10** Write as a single fraction in its simplest form.

**(a)** $\frac{mp}{25y} \times \frac{15}{m}$

..... [2]

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

..... [3]

(a) Simplifying algebraic fractions (b) Adding and subtracting algebraic fractions Click for more variations

| | | | |
|---|---|---|---|
| **10**(a) | $\frac{3p}{5y}$ final answer cao | **2** | **B1** for $\frac{15p}{25y}$ or $\frac{3mp}{5my}$ final answer<br>or for correct answer spoilt |
| **10**(b) | $\frac{11x-29}{(2x-5)(x-3)}$ final answer<br>or<br>$\frac{11x-29}{2x^2-11x+15}$ final answer | **3** | **B1** for $3(x-3)+4(2x-5)$ or better seen<br>**B1** for common denominator of $(2x-5)(x-3)$ oe isw |

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