

Meet 6

EVENT 3: Algebra I – Fractions & Mixed Expressions

Include: (1) Variables
(2) Rational expressions

Exclude: (1) Equations
(2) Negative exponents, fractional exponents

Sample Problems:

A. Simplify: $\frac{3}{x+2} - \frac{5}{x-2} + \frac{2x-4}{4-x^2}$

Answer: $\frac{-4x-12}{x^2-4}$ or $\frac{4x+12}{4-x^2}$

B. Simplify: $\frac{3p-1}{3p} \div \frac{1+3p}{3p^2} \cdot \frac{3-2p-p^2}{p^2-p}$

Answer: $\frac{-3p^2-8p+3}{3p+1}$ or $-\frac{3p^2+8p-3}{3p+1}$

C. Simplify: $2 + \frac{1}{1 + \frac{2}{x + \frac{1}{x}}}$

Answer: $\frac{3x^2+4x+3}{x^2+2x+1}$

A. Simplify: $\frac{6}{(x+2)(x+5)} + \frac{x}{x+2}$
(2 pts)

ANSWER: _____

B. Simplify: $\frac{2a-1}{a^2-4} - \frac{a-1}{2-a} + \frac{5}{a+2}$
(3 pts)

ANSWER: _____

C. Simplify: $\left[\frac{6-2x}{x^2+3x-10} \right] \div \left[\frac{1-\frac{1}{x}-\frac{6}{x^2}}{\frac{4}{x^2}-1} \right] - 2$
(5 pts)

ANSWER: _____

A. Simplify: $\frac{3}{x-3} - \frac{x+3}{9-x^2} - \frac{x}{x-3}$

(2 pts)

ANSWER: _____

B. Simplify: $\frac{y}{4xy^2-x} \left(3+2y-\frac{2}{y} \right) (2xy+x)$

(3 pts)

ANSWER: _____

C. If a and b are integers so that $\frac{x-2y}{3x+4y}$ is the simplest form of

(5 pts) $\frac{ax^2y+by^2}{6x^2-xy-12y^2} \div \frac{x^3y+2x^2y^2+4xy^3}{x^3-8y^3}$ find the value of $a+b$.

ANSWER: _____

A. Simplify: $\frac{x+3}{x+7} + \frac{16x+56}{x^2-49}$

(2 pts)

ANSWER: _____

B. Simplify: $\left(\frac{10}{x+4} - \frac{9}{x+3}\right) \div \left(\frac{2}{x+4} - \frac{1}{x-5}\right) \cdot \left(\frac{9}{x-6} - \frac{8}{x-5}\right)$

(3 pts)

ANSWER: _____

C. Simplify: $\frac{2}{2x-3} - \frac{2x+3}{4x^2+6x+9} - \frac{2x^2+5x+12}{8x^3-27}$

(5 pts)

ANSWER: _____

A. Simplify: $\frac{5}{\frac{x+4}{5} - \frac{4}{x-4}}$

(2 pts)

ANSWER: _____

B. Let $a = \frac{1}{x}$ and $b = \frac{1}{y}$. Simplify the following expression and write your answer as a single term in terms of a and b .

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

(3 pts)

ANSWER: _____

C. Simplify: $(x-1)^{2n} \cdot \frac{1}{(x-1)^{2n-1}} \cdot (x-1)^{2n-2} \cdot \frac{1}{(x-1)^{2n-3}} \cdot \dots \cdot (x-1)^{2n-(2n-2)} \cdot \frac{1}{(x-1)^{2n-(2n-1)}}$

Write your answer as a power of $(x-1)$.

(5 pts)

ANSWER: _____

Event 3: ALGEBRA I — Fractions and Mixed Expressions

March 2014

- A. A cyclist travels 12 km on a level road at $x \frac{\text{km}}{\text{h}}$ and then goes 9 km on a downhill road at $2x \frac{\text{km}}{\text{h}}$. Find her average speed in terms of x .
- (2 pts)

ANSWER: _____ $\frac{\text{km}}{\text{h}}$

- B. Simplify: $\frac{(x-2)x+1}{(x-1)x-2} \cdot \frac{(x-2)x+(x-2)}{x^2-1} \div \frac{x+6}{x+1}$
- (3 pts)

ANSWER: _____

- C. Simplify: $\left(\frac{x-y}{y}+1\right)\left(\frac{x}{x-y}-1\right)\left(\frac{y}{x}+1\right) \div \left(\frac{x}{y}+1\right)$
- (5 pts)

ANSWER: _____

A. Simplify: $\frac{x^2 + x - 2}{4x^2 - 9} \div \frac{-x^2 + x}{x^2 - 7x + 12} \cdot \frac{2x^2 - 3x}{x^2 - x - 6}$
(2 pts)

ANSWER: _____

B. Simplify: $\frac{1 - \frac{x-2}{x+1}}{\frac{x-1}{x}}$
(3 pts)

ANSWER: _____

C. Simplify: $\left(\frac{x-2}{x-1} + \frac{x-3}{x-2}\right) \div \left(\frac{3-x}{2-x} - \frac{2-x}{1-x}\right)$
(5 pts)

ANSWER: _____

A. Simplify: $\frac{3x^2 + 11x - 4}{24x^3 - 8x^2} \div \frac{9x + 36}{24x^4 - 36x^3}$
(2 pts)

ANSWER: _____

B. Simplify: $\frac{2x^3 - 10x - 3x^2 + 15}{x^2 - 7x - 18} \div \frac{2x^2 - x - 3}{x^2 - 4} \cdot \frac{x^2 - 8x - 9}{x^2 - 2x}$
(3 pts)

ANSWER: _____

C. Simplify: $\frac{5}{x+2} + \frac{2}{x^2 - 2x + 4} - \frac{60}{x^3 + 8}$
(5 pts)

ANSWER: _____

A. Simplify: $\frac{y}{x} - \frac{2xy}{x^2 - 2xy} + \frac{x}{x - 2y}$
(2 pts)

ANSWER: _____

B. Simplify: $\frac{4(x-1)}{x-3} - \frac{5}{x-2} - \frac{2x^2 - 10x + 17}{x^2 - 5x + 6}$
(3 pts)

ANSWER: _____

C. Simplify: $\frac{\frac{x+1}{2 + \frac{x-3}{x}}}{1-x}$
(5 pts)

ANSWER: _____

A. Simplify: $\frac{3}{x+2} - \frac{2x+1}{x^2+2x} + \frac{1}{x}$

(2 pts)

ANSWER: _____

B. Simplify: $\frac{x^3-1}{\frac{1}{x^2} + \frac{1}{x} + 1} \cdot \frac{1+x(x-1)}{x^3+1}$

(3 pts)

ANSWER: _____

C. Find the value(s) of x that will make k a whole number: $k = \frac{240 + 72x - 24x^2}{-x^3 + 5x^2 + 4x - 20}$

(5 pts)

ANSWER: _____

A. Simplify: $\frac{\frac{x}{y} + \frac{y}{x} + 2}{\frac{1}{x} + \frac{1}{y}}$

(2 pts)

ANSWER: _____

B. Simplify: $\left(\frac{1 - \frac{7}{x} + \frac{12}{x^2}}{\frac{16}{x^2} - 1} \right) \cdot \left(\frac{3x+12}{x^2-9} \right) + 1$

(3 pts)

ANSWER: _____

C. Simplify: $\left(\frac{8x^2-x}{6x^2-x-15} + \frac{10+x}{5-3x} + \frac{3-2x}{3+2x} \right) \cdot \left(\frac{x+2}{x+1} - \frac{x+1}{x+2} \right) + \left(\frac{8}{x+1} - \frac{7}{x+2} \right)$

(5 pts)

ANSWER: _____

Name _____ Score _____ School _____

Event 3: ALGEBRA I – Fractions and Mixed Expressions

2008

A. (2 pts) Simplify:

$$\frac{2}{x} - \frac{4}{x^2}$$
$$\frac{1}{x} - \frac{2}{x^2}$$

ANSWER _____

B. (3 pts) Simplify:

$$\frac{y^2 - 5xy + 6x^2}{3x^2 + 5xy - 2y^2} \cdot \frac{x^2 - 5xy + 3x - 15y}{2x^2 + 18x - xy - 9y} \div \frac{xy - 5y^2}{2x^2y + 18xy}$$

ANSWER _____

C. (5 pts) Simplify:

$$\frac{x+4}{2x-4} - \frac{2x+5}{x^2-x-2} + \frac{3}{4}$$

ANSWER _____

Name _____ Score _____ School _____

Event 3: ALGEBRA I – Fractions and Mixed Expressions

2007

A. (2 pts) Simplify:

$$\frac{y^2 - 16}{y^4} \div \frac{y^2 + y - 12}{6} \cdot \frac{y^4 + 3y^3}{2y - 8}$$

ANSWER _____

B. (3 pts) Simplify:

$$\frac{x^2}{9x^2y - 4y} \left(3xy - 4y - \frac{4y}{x} \right) \left(3x + 4 - \frac{4}{x} \right)$$

ANSWER _____

C. (5 pts) Simplify:

$$\frac{x^2 - 5x + 6}{2x^3 - 4x^2} \cdot \frac{8x^{10} - 24x^6p^3 + 18x^2p^6}{(2x^4 - 3p^3)^2}$$

ANSWER _____

A. (2 pts)

Simplify:

$$\frac{8x}{16-x^2} + \frac{4}{x+4}$$

ANSWER: _____

B. (3 pts)

Simplify:

$$\frac{3x^2 - 2x + 3xy - 2y}{x^2y + 7xy^2 + 6y^3} \div \frac{9x^2 + 9x - 10}{x^2 + 14xy + 48y^2} \cdot \frac{x - 8y}{64y^2 - x^2}$$

ANSWER: _____

C. (5 pts)

Simplify:

$$\frac{\frac{u^2 - 4ux + 3u^2}{x+u}}{2u^2 - 4ux - 6u^2}$$

ANSWER: _____

A. (2 pts)

Simplify:

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

ANSWER: _____

B. (3 pts)

Simplify:

$$\frac{x}{x^2 + 8x + 16} - \frac{x+2}{x^2 - 2x - 24} \div \frac{x+2}{x^2 - 8x + 12}$$

ANSWER: _____

C. (5 pts)

Simplify:

$$\frac{x^3 + 5x^2 - 9x - 45}{x^3 - 27} \div \frac{x^2 - 25}{x^4 + 3x^3 + 9x^2} \div \frac{x}{25}$$

ANSWER: _____

A. (2 pts)

Simplify:

$$\frac{3x-2}{5-x} + \frac{x-4}{x-5} - \frac{3x}{2x-10}$$

ANSWER: _____

B. (3 pts)

Simplify:

$$\frac{6 + \frac{6}{x+4}}{10 - \frac{7x-5}{x+1}} - \frac{4 - \frac{14}{x+4}}{2 + \frac{2x}{x+1}}$$

ANSWER: _____

C. (5 pts)

Simplify:

$$\frac{3x-6}{6x-3} - 3 + \frac{2x+1}{2-4x} \cdot \frac{2x^2+3x-2}{x^2-4}$$

ANSWER: _____

A. (2 pts)

Simplify:

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

ANSWER: _____

B. (3 pts)

Simplify:

$$\frac{8}{2x-4} + \frac{x}{x^2-4x+4} - \frac{3x-2}{2x^2-8x+8}$$

ANSWER: _____

C. (5 pts)

Simplify:

$$\frac{\frac{1}{x} + \frac{3}{x^2}}{1 + \frac{1}{x} - \frac{6}{x^2}} + \frac{\frac{1}{x}}{1 - \frac{6}{x} + \frac{8}{x^2}}$$

ANSWER: _____

A. (2 pts)

Simplify:

$$\frac{3x+1}{2-x} + \frac{x+3}{x-2} - \frac{4x-2}{3x-6}$$

ANSWER: _____

B. (3 pts)

Simplify:

$$\frac{x^2+4x}{x^2-4} \div \frac{x^2+8x+16}{x^2-16} \cdot \frac{x^2+4x+4}{x^2+2x}$$

ANSWER: _____

C. (5 pts)

Simplify:

$$\frac{1 + \frac{a^3}{27}}{1 - \frac{a}{3} + \frac{a^2}{9}} - \frac{a+2}{\frac{1}{a-3}} \div \frac{a^2-9}{a}$$

ANSWER: _____

Name _____ Score _____ School _____

Event 4: ALGEBRA I - Fractions and Mixed Expressions

2001

A. (2 pts) Simplify:

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

ANSWER _____

B. (3 pts) Simplify.

$$\frac{2}{x} - \frac{x-y}{xy} + \left(\frac{1}{x} - \frac{1}{y} \right)$$

ANSWER _____

C. (5 pts) Simplify:

$$3 - \frac{3}{3 - \frac{3}{3 - \frac{3}{3 - 2x}}}$$

ANSWER _____

Name _____ Score _____ School _____

Event 4: ALGEBRA I - Fractions and Mixed Expressions

2000

A. (2 pts) Simplify: $\frac{1}{1+x} + \frac{1}{1+\frac{1}{x}}$.

ANSWER _____

B. (3 pts) Simplify: $1 + \frac{1}{1 + \frac{1}{1 + \frac{1}{1-x}}}$.

ANSWER _____

C. (5 pts) Find all integral values of x for which $\frac{-36(9-x^2)}{2x^3+4x^2-18x-36}$ has a positive integral value.

ANSWER _____

A. (2 pts)

Simplify:

$$\frac{4}{x-3} - \frac{2-x}{-x^2+9} - \frac{3x+2}{x+3}$$

ANSWER: _____

B. (3 pts)

Simplify:

$$\frac{a^4 - 81b^4}{a^2c - 6abc + 9b^2c} \cdot \frac{a+3b}{a^2+9b^2} \div \frac{a^2+6ab+9b^2}{(a-3b)^2}$$

ANSWER: _____

C. (5 pts)

Simplify:

$$\frac{1 - \frac{y^3}{8}}{1 + \frac{y}{2} + \frac{y^2}{4}} \cdot \frac{1}{y-2}$$

ANSWER: _____

Name _____ Score _____ School _____

Event 4: ALGEBRA I - Fractions and Mixed Expressions

1998

A. (2 pts) Simplify:

$$\frac{\frac{1}{x^2} - 1}{1 + \frac{1}{x}} \cdot \frac{5x}{x^2 + 2x + 1}$$

ANSWER _____

B. (3 pts) Simplify:

$$\frac{x + 3}{x + 2} - \frac{6x + 22}{x^2 - x - 6} - \frac{2}{3 - x}$$

ANSWER _____

C. (5 pts) Simplify:

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

ANSWER _____

A. (2 pts) Simplify: $\frac{y^2 - 16}{y^4} \div \frac{y^2 + y - 12}{6} \cdot \frac{y^4 + 3y^3}{2y - 8}$

Answer _____

B. (3 pts) Simplify: $\frac{x^2}{9x^2y - 4y} \left(3xy - 4y - \frac{4y}{x} \right) \left(3x + 4 - \frac{4}{x} \right)$

Answer _____

C. (5 pts) Simplify:

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

Answer _____

A. (2 pts) Simplify:

$$\frac{2x - 1}{x^2 - 9} - \frac{x - 1}{3 - x} + \frac{5}{x + 3}$$

ANSWER _____

B. (3 pts) Simplify:

$$\frac{a^2 - 2ab}{a + 2b} \cdot \frac{a^2 + 3ab + 2b^2}{a^2 - b^2} \div \frac{2b - a}{b - a}$$

ANSWER _____

C. (5 pts) Simplify:

$$\left[\frac{1 + \frac{2}{x} - \frac{3}{x^2}}{\frac{9}{x^2} - 1} \right] \div \left[\frac{3 - 3x}{x^2 + 2x - 15} \right] - 3$$

ANSWER _____

Meet 6, Event 3: ALGEBRA I
Fractions & Mixed Expressions

2018

- A. $\frac{x+3}{x+5}$
B. $\frac{a^2+8a-13}{a^2-4}$
C. $\frac{-2x-8}{x+5}$

2017

- A. $\frac{-x+4}{x-3}$
B. $y+2$
C. -1

2016

- A. $\frac{x+5}{x-7}$
B. $\frac{1}{x-14}$
C. $\frac{2x^2+7x+15}{8x^3-27}$

2015

- A. $\frac{25x-100}{x^2-36}$
B. $\frac{(a+b)^2}{a^2+b^2}$
C. $(x-1)^n$

2014

- A. $\frac{14x}{11}$
B. $\frac{x-1}{x+6}$
C. $\frac{y}{x-y}$

2013

- A. $\frac{4-x}{2x+3}$
B. $\frac{3x}{x^2-1}$ or $\frac{3x}{(x+1)(x-1)}$
C. $-2x^2+8x-7$

2012

- A. $\frac{x(2x-3)}{6}$
B. $\frac{x^2-5}{x}$
C. $\frac{5x-18}{x^2-2x+4}$

2011

- A. $\frac{x+y}{x}$
B. $\frac{2x-3}{x-3}$
C. $\frac{-x(x+1)}{3}$

2010

- A. $\frac{2x+1}{x(x+2)}$ or $\frac{2x+1}{x^2+2x}$
B. $\frac{x^2(x-1)}{x+1}$ or $\frac{x^3-x^2}{x+1}$
C. 3, 4, 5, 6, 8, 10, 14, 26

2009

- A. $x+y$
B. $\frac{x}{x+3}$
C. $\frac{-5}{3x-5}$

2008

- A. 2
B. $\frac{2x^2+6x}{x+2y}$ or $\frac{2x(x+3)}{x+2y}$
C. $\frac{5x+9}{4x+4}$ or $\frac{5x+9}{4(x+1)}$

2007

- A. $\frac{3(y+3)}{y(y-3)}$ or $\frac{3y+9}{y^2-3y}$
B. x^2-4 or $(x+2)(x-2)$
C. $x-3$

2006

- A. $\frac{-4}{x-4}$ or $\frac{4}{4-x}$
B. $\frac{-1}{y(3x+5)}$
C. $\frac{x-u}{(x+u)^2}$

Note: Answers are shown as they appear on the original answer keys. There may be inconsistencies with the formatting of these answers. In all cases, consult the Guidelines for Forms of Answers to determine the correct formatting.

2005

- A. $\frac{3x^2 - 5}{x^2 - 1}$ or $\frac{3x^2 - 5}{(x+1)(x-1)}$
B. $\frac{-x^2 - x + 8}{x^2 + 8x + 16}$ or $\frac{-x^2 - x + 8}{(x+4)^2}$
C. $\frac{25x(x+3)}{x-5}$ or $\frac{25x^2 + 75x}{x-5}$

2004

- A. $\frac{-7x-4}{2x-10}$ or $\frac{7x+4}{10-2x}$ or $\frac{7x+4}{2(5-x)}$
B. $\frac{x+1}{x+4}$
C. $\frac{14x^2 - 22x + 3}{-4x^2 + 10x - 4}$ or $\frac{-14x^2 + 22x - 3}{4x^2 - 10x + 4}$ or $\frac{14x^2 - 22x + 3}{-2(2x-1)(x-2)}$

2003

- A. $x-3$
B. $\frac{7}{2(x-2)}$ or $\frac{7}{2x-4}$
C. $\frac{2}{x-4}$

2002

- A. $\frac{-10x+8}{3x-6}$
B. $\frac{x-4}{x-2}$
C. $\frac{-2a^2+9}{3a+9}$

2001

- A. $\frac{-8}{x(x-2)}$
B. $\frac{x+2}{x}$ or $\frac{2}{x} + 1$
C. $\frac{3-6x}{3-4x}$ or $\frac{6x-3}{4x-3}$

2000

- A. 1
B. $\frac{5-3x}{3-2x}$ or $\frac{3x-5}{2x-3}$
C. -1, 0, 1, 4, 7, 16

1999

- A. $\frac{-3x^2 + 10x + 20}{x^2 - 9}$ or $\frac{3x^2 - 10x - 20}{9 - x^2}$
B. $\frac{a-3b}{c}$
C. $-1/2$

1998

- A. $\frac{-5(x-1)}{(x+1)^2}$ or $\frac{5(1-x)}{(x+1)^2}$
B. $\frac{x^2 - 4x - 27}{x^2 - x - 6}$ or $\frac{x^2 - 4x - 27}{(x+2)(x-3)}$
C. $\frac{1}{x-y}$

1996

- A. $\frac{3(y+3)}{y(y-3)}$ or $\frac{3y+9}{y^2-3y}$
B. $x^2 - 4$ or $(x+2)(x-2)$
C. $\frac{-2x^3+5}{2x^3-1}$ or $\frac{2x^3-5}{1-2x^3}$

1994

- A. $\frac{x^2 + 9x - 19}{x^2 - 9}$ or $\frac{x^2 + 9x - 19}{(x+3)(x-3)}$
B. a
C. $\frac{x-4}{3}$

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