MULTIPLYING AND DIVIDING ALGEBRAIC FRACTIONS

GRADE 9

AtoZrevision

Examination Practice Questions

You should have:

A ruler, protractor, compasses, a pen, pencil, eraser, calculator.
For some questions, you may need tracing paper.

Instructions

- Use **black** ink or ball-point pen.
- Answer the questions in the spaces provided – *there may be more space than you need.*
- **Calculators may be used.**

Information

- The marks for each question are shown in brackets.
- Use the number of marks for each question as a guide as to how much time to spend on each question. As a rough guide, you can multiply the number of marks by 1.2 to see how many minutes you should spend on a question.
- Questions been carefully compiled from or modelled on a variety of past papers and will generally get more challenging as the document progresses. Some of the later questions will go beyond the core grade level for this topic.

Advice

- Read each question carefully before you start to answer it.
- Don’t forget to have fun.
- Check your answers at the end.

Q1. AtoZrevision.com

Simplify

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

.....

(3 marks)

Q2. AtoZrevision.com

It can be shown that

$$\frac{2}{3-x} + \frac{3}{1+x} \equiv \frac{11-x}{(3-x)(1+x)}$$

Hence express

$$\left(\frac{2}{3-x} + \frac{3}{1+x}\right) \times \frac{x^2 + 8x - 33}{121 - x^2}$$

as a single fraction in its lowest terms.

.....

(3 marks)

Q3. AtoZrevision.com

Simplify fully

$$\frac{n^2-1}{n+1} \times \frac{2}{n-2}$$

.....

(3 marks)

Q4. AtoZrevision.com

Express

$$\frac{n}{n^2-4} \div \frac{3}{n-2}, \quad n \neq -2,\ n \neq 2$$

as a single fraction in its simplest form.

.....

(3 marks)

Q5. AtoZrevision.com

Express

$$\frac{4}{x+2} \div \frac{5}{(x+2)^2}, \quad x \neq -2$$

as a single fraction in its simplest form.

.....

(2 marks)

Q6. AtoZrevision.com

Express

$$\frac{1}{3x-2} \times \frac{9x^2-4}{3x^2-13x-10} - \frac{7}{x-1}$$

as a single fraction in its simplest form.

.....

(5 marks)

Express

$$\frac{25x^2 - 64}{5x^2 - 13x - 6} \times \frac{x^2 - 8x + 15}{5x + 8} - (x - 7)$$

as a single fraction in its simplest form.

.....

(4 marks)

Express

$$\frac{4x^2 - 25}{5x^2 + 2x - 7} \times \left(\frac{2}{x - 3} - \frac{3}{2x - 5}\right)$$

as a single fraction in its simplest form.

……

(4 marks)

It can be shown that

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

Hence express

$$\left(\frac{3}{2x+1} - \frac{2}{x+1}\right)\left(\frac{6x+3}{x^2+x-2}\right)$$

as a single algebraic fraction in its lowest terms.

……

(4 marks)

Write

$$\frac{4x^2 - 9}{6x + 9} \times \frac{2x}{x^2 - 3x}$$

in the form $\frac{ax+b}{cx+d}$ where a, b, c and d are integers

.....

(3 marks)

Q11. AtoZrevision.com

Show that $\frac{6x^3}{(9x^2-144)} \div \frac{2x^4}{3(x-4)}$ can be written in the form $\frac{1}{x(x+r)}$ where r is an integer.

.....

(3 marks)

Q12. AtoZrevision.com

Show that $\frac{7x-14}{x^2+4x-12} \div \frac{x-6}{x^3-36x}$ simplifies to ax where a is an integer.

.....

(4 marks)

Simplify fully

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

……

(5 marks)

Show that

$$\frac{1}{2x^2 + x - 15} \div \frac{1}{3x^2 + 9x}$$

simplifies to $\frac{ax}{bx+c}$ where a, b and c are integers to be found.

.....

(3 marks)

Simplify fully

$$\frac{4x^2 + 19x - 5}{9x^2 - 16} \div \frac{x + 5}{3x - 4}$$

……

(5 marks)

Show that

$$\frac{x^4}{x+4} \times \frac{x+2}{x} \div \frac{x^2}{3x+12}$$

simplifies to the form $ax^2 + bx$ where a and b are integers.

……

(4 marks)

Simplify fully

$$\frac{8a}{3a+6} \times \frac{5a+10}{3a^2} \div \frac{4}{15a^3}$$

.....

(4 marks)

Write

$$5 - (x + 2) \div \left(\frac{x^2-4}{x-3}\right)$$

as a single fraction. Simplify your answer fully.

.....

(4 marks)

Show that $3-(x-1)\div\left(\frac{x^2-1}{3x+2}\right)$ can be written as $\frac{a}{x+b}$ where a and b are integers.

.....

(4 marks)

Show that $6 + \left[(x+5) \div \frac{x^2+3x-10}{x-1}\right]$ simplifies to $\frac{ax-b}{cx-d}$ where a, b, c and d are integers.

.....

(4 marks)

Express

$$\left(\frac{4}{2x-5}-\frac{3}{2x-3}\right)\div\frac{9x-4x^3}{6x^2-17x+5}$$

as a single fraction in its simplest form.

.....

(4 marks)

There are only n red balls and $(n + 1)$ blue balls in a bag.

Shamsa takes at random 2 balls from the bag.

Find an expression for the probability that both balls are the same colour.

……

(4 marks)

QUESTIONS FROM MATHEMATICAL COMPETITIONS

Q1. AtoZrevision.com

What is the result when we simplify the expression:

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

Q2. AtoZrevision.com

When exactly is the value of the product $\left(1+\frac{1}{2}\right)\left(1+\frac{1}{3}\right)\left(1+\frac{1}{4}\right)\ldots\left(1+\frac{1}{n}\right)$ equal to an integer?

when n is odd

when n is even

when n is a multiple of 3

always

never