KWAZULU-NATAL PROVINCE
EDUCATION
REPUBLIC OF SOUTH AFRICA

TASK 1: ASSIGNMENT

TOPIC: FRACTIONS AND EXPONENTS

DATE: 27 FEBRUARY 2025

TERM 1 2025

GRADE 10

Marks: 50 **Duration: 1 hour**

Name of Learner: _____

Grade: _____

School Name: _____

LEARNER'S MARK	

This question paper consists of 5 questions and 8 pages including the cover page

INSTRUCTIONS AND INFORMATION

Read the following instructions carefully before answering the questions.

1. Answer all questions
2. Answers to be done on this question paper
3. Write neatly and legibly
4. Calculators may be used
5. No textbooks, notes, exercise books or resources may be used
6. No group work is allowed

QUESTION 1 [12 MARKS]

Simplification of algebraic fractions/Rational expressions using factorisation.

Simplify the following expressions fully.

1.1 $\dfrac{x^2-12x+27}{4x^2-12x}$ (3)

1.2 $\dfrac{x^2-1}{(x+2)+x(x+2)}\times\dfrac{2x+4}{x-1}$ (4)

1.3 $\dfrac{x-2}{x^2+4x-5} \div \dfrac{x^2-4}{x^2+5x}$ (5)

QUESTION 2 [13 MARKS]

Addition and subtraction of algebraic fractions.

Simplify the following algebraic fractions fully

2.1 $\dfrac{5}{x^2-x-12} - \dfrac{1}{x+3}$ (4)

2.2 $\dfrac{x}{x+y}+\dfrac{x^2}{y^2-x^2}$ (4)

2.3 $\dfrac{x+1}{x^3-1}-\dfrac{3}{x-1}$ (5)

QUESTION 3 [11 MARKS]

Exponents

Simplify the following exponential expressions

3.1 $\dfrac{ab^4c^5}{a^{-7}} \times \dfrac{(a^{-4}b^3)^2}{c^{-1}b^{11}}$ (4)

3.2 $\dfrac{18^n.8^{n-1}}{9^n.4^{2n-3}}$ (4)

3.3 $\dfrac{2^x + 15.2^x}{2^{x+2}}$ (3)

QUESTION 4 [5 MARKS]

Solving exponential equations with the same base.

Solve for x in the following equations

4.1 $7^{2x+5} = 1$ (3)

4.2 $2^{3x+5} = 2^{x+1}$ (2)

QUESTION 5 [9 MARKS]

Solving exponential equations with unlike bases

Solve the following exponential equations

5.1 $2(\frac{1}{3})^x = 54$ (3)

5.2 $4^{x+3} = 0,5$ (3)

5.3 $27^{x-2} = 81^{2x+1}$ (3)

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MARKING GUIDELINE

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This marking guideline consists of 4 pages including the cover page

QUESTION 1

1.1	$\frac{x^2-12x+27}{4x^2-12x}$ $=\frac{(x-3)(x-9)}{4x(x-3)}$ $=\frac{x-9}{4x}$	Factorise numerator ✓A Factorise denominator ✓A Answer ✓CA (3)
1.2	$\frac{x^2-1}{(x+2)+x(x+2)} \times \frac{2x+4}{x-1}$ $=\frac{(x-1)(x+1)}{(1+x)(x+2)} \times \frac{2(x+2)}{(x-1)}$ $=\frac{(x-1)(x+1)}{(x+1)(x+2)} \times \frac{2(x+2)}{(x-1)}$ $=2$	Factorise numerator ✓A Factorise denominator ✓A Simplify ✓CA Answer ✓CA (4)
1.3	$\frac{x-2}{x^2+4x-5} \div \frac{x^2-4}{x^2+5x}$ $=\frac{x-2}{x^2+4x-5} \times \frac{x^2+5x}{x^2-4}$ $=\frac{(x-2)}{(x+5)(x-1)} \times \frac{x(x+5)}{(x-2)(x+2)}$ $=\frac{1}{(x-1)} \times \frac{x}{(x+2)}$ $=\frac{x}{x^2+x-2}$	Change division to multiplication ✓A Factorise numerator ✓A Factorise denominator ✓A Simplify ✓CA Answer ✓CA (5)
		[12]

QUESTION 2

2.1	$\frac{5}{x^2-x-12}-\frac{1}{x+3}$ $=\frac{5}{(x+3)(x-4)}-\frac{1}{(x+3)}$ $=\frac{5-1(x-4)}{(x+3)(x-4)}$ $=\frac{5-x+4}{(x+3)(x-4)}$ $=\frac{-x+9}{(x+3)(x-4)}$	Factorise denominator ✓A L.C.D ✓A Simplify ✓CA Answer ✓CA (4)
2.2	$\frac{x}{x+y}+\frac{x^2}{y^2-x^2}$ $=\frac{x}{(y+x)}+\frac{x^2}{(y-x)(y+x)}$ $=\frac{x(y-x)+x^2}{(y-x)(y+x)}$ $=\frac{xy-x^2+x^2}{(y-x)(y+x)}$ $=\frac{xy}{(y-x)(y+x)}$	Factorise denominator ✓A L.C.D ✓A Simplify ✓CA Answer ✓CA (4)

2.3	$\frac{x+1}{x^3-1} - \frac{3}{x-1}$ $= \frac{x+1}{(x-1)(x^2+x+1)} - \frac{3}{(x-1)}$ $= \frac{x+1-3(x^2+x+1)}{(x-1)(x^2+x+1)}$ $= \frac{x+1-3x^2-3x-3}{(x-1)(x^2+x+1)}$ $= \frac{-3x^2-2x-2}{(x-1)(x^2+x+1)}$	Factorise denominator ✓A L.C.D ✓A Simplify ✓✓CA Answer ✓CA (5)
		[13]

QUESTION 3

3.1	$\frac{ab^4c^5}{a^{-7}} \times \frac{(a^{-4}b^3)^2}{c^{-1}b^{11}}$ $= \frac{ab^4c^5}{a^{-7}} \times \frac{a^{-8}b^6}{c^{-1}b^{11}}$ $= \frac{a^{-7}b^{10}c^5}{a^{-7}b^{11}c^{-1}}$ $= a^0b^{-1}c^6$ $= \frac{c^6}{b^1}$	Power rule ✓A Product rule ✓CA Quotient rule ✓CA Answer ✓CA (4)
3.2	$\frac{18^n.\ 8^{n-1}}{9^n.\ 4^{2n-3}}$ $= \frac{(2\times3^2)^n.(2^3)^{n-1}}{(3^2)^n.(2^2)^{2n-3}}$ $= \frac{2^n.3^{2n}.2^{3n-3}}{3^{2n}.2^{4n-6}}$ $= \frac{3^{2n}.2^{4n-3}}{3^{2n}.2^{4n-6}}$ $= 2^3$ $= 8$	Prime factorizing ✓A Product rule ✓CA Quotient rule ✓CA Answer ✓CA (4)
3.3	$\frac{2^x+15.2^x}{2^{x+2}}$ $= \frac{2^x(1+15)}{2^x.2^2}$ $= \frac{16}{4}$ $= 4$	Common factor ✓A Reverse of product rule ✓CA Answer ✓CA (3)
		[11]

QUESTION 4

4.1	$7^{2x+5} = 1$ $7^{2x+5} = 7^0$ $2x + 5 = 0$ $x = -\frac{5}{2}$	Power of 0 rule ✓A Equate exponents ✓CA Answer ✓CA (3)
4.2	$2^{3x+5} = 2^{x+1}$ $3x + 5 = x + 1$ $2x = -4$ $x = -2$	Equate exponents ✓A Answer ✓CA (2)
		[5]

QUESTION 5

5.1	$2(\frac{1}{3})^x = 54$ $(\frac{1}{3})^x = 27$ $(3^{-1})^x = 3^3$ $3^{-x} = 3^3$ $x = -3$	Division ✓A Prime factorising ✓A Answer ✓CA (3)
5.2	$4^{x+3} = 0{,}5$ $(2^2)^{x+3} = \frac{1}{2}$ $2^{2x+6} = 2^{-1}$ $2x + 6 = -1$ $x = -\frac{7}{2}$	Prime factorising ✓A Same bases ✓A Answer ✓CA (3)
5.3	$27^{x-2} = 81^{2x+1}$ $(3^3)^{x-2} = (3^4)^{2x+1}$ $3^{3x-6} = 3^{8x+4}$ $3x - 6 = 8x + 4$ $-10 = 5x$ $-2 = x$	Prime factorising ✓A Power rule ✓A Answer ✓CA (3)
		[9]

TOTAL: 50 MARKS