NAME _____ **INDEX NUMBER** _____

SCHOOL _____ **DATE** _____

ALGEBRAIC EXPRESSIONS

KCSE 1989 – 2012 Form 2 Mathematics		Working space
1.	**1989 Q2 P1** Factorize completely $a^2 - 15ab + 36b^2$ (2 marks)	
2.	**1990 Q3 P1** Simplify $\frac{(6a+b)(a+b)-7b(a+b)}{2a^2-2b^2}$ (3 marks)	
3.	**1991 Q8 P2** Simplify $\frac{a}{2(a+b)} + \frac{b}{2(a-b)}$ (3 marks)	
4.	**1992 Q6 P1** If the expression $25y^2 - 70y + d$ is a perfect square, where d is a constant, find the value of d. (3 marks)	Working Space

5.	**1993 Q1 P1** Factorize $2x^2 y^2 - 5xy - 12$ (3 marks)	
6.	**1993 Q14 P2** Simplify $\frac{x-2}{x+2} + \frac{2x+20}{x^2-4}$	
7.	**1994 Q 2 P1** Simplify $28x^2 + 3x - 1$ (2 marks)	
8.	**1995 Q 2 P1** Simplify (3 marks) $\frac{2x-2}{6x^2-x-12} \div \frac{x-1}{2x-3}$	

		Working Space
9.	**1995 Q 8 P2 z** Simplify completely $\frac{3x^2-1}{x^2-1}-\frac{2x+1}{x+1}$ (3 marks)	
10.	**1996 Q 2 P1** Factorize completely $3x^2 - 2xy - y^2$ (2 marks)	
11.	**1997 Q 2 P1** Find the greatest common factor of x^3y^2 and $4xy^4$. Hence factorize completely the expression $x^3y^2 - 4xy^4$	
12.	**1998 Q 2 P1** Factorize $a^2 - b^2$ Hence find the exact value of $2557^2 - 2547^2$ (2 marks)	

		Working Space
13.	**1999 Q 1b P1** (b) Simplify the expression 5a – 4b – 2 [a- (2b + c)] (2 marks)	
14.	**1999 Q 15 P1** By substituting y for (2-a) or otherwise simplify the expression $(x + 2 – a)^2 + (2 – a-x)^2 – 2(x- 2 + a) (x + 2 – a)$. Give your answer in terms of a and as a product of two squares. (3 marks)	
15.	**1999 Q 22 P1** If $x^2 + y^2 = 29$ and $x + y = 3$ (a) Determine the values of (i) $x^2 + 2xy + y^2$ (ii) $2xy$ (iii) $x^2 – 2xy + y^2$ (iv) $x – y$ (b) Find the value of x and y (8 marks)	
16.	**2000 Q 2 P1** Simplify the expression $\frac{3a^2+4ab+b}{4a^2+3ab-b^2}$ (3 marks)	

		Working Space
17.	**2001 Q 6 P1** Simplify the expression $\frac{3x^2 - 4xy - y^2}{9x^2 - y^2}$ (3 marks)	
18.	**2002 Q 2 P1** Simplify: $(x + 2y)^2 - (x- 2y)^2$ (3 marks)	
19.	**2002 Q 11 P2** Simply the expression $\frac{4x^2 - y^2}{2x^2 - 7xy + 3y^2}$	
20.	**2003 Q2 P1** Simplify the expression $\left(a + \frac{1}{b}\right)^2 - \left(a - \frac{1}{b}\right)^2$ (3 marks)	

		Working Space
21.	**2004 Q 3 P1** Simplify the expression $\frac{2a^2-3ab-2b^2}{4a^2-b^2}$	
22.	**2005 Q 4 P1** Simplify the expression $\frac{9t^2-25a^2}{6t^2+19at+15a^2}$ (3 marks)	
23.	**2006 Q 3 P1** Simplify $\frac{p^2+2pq+q^2}{p^3-pq^2+p^2q-q^3}$ (4 marks)	
24.	**2007 Q 3 P1** Expand the expression $(x^2 - y^2)(x^2 + y^2)(x^4 - y^4)$ (2 marks)	

		Working Space
25.	**2007 Q 6 P1** Simplify the expression $\frac{15a^2b-10ab^2}{3a^2-5ab+2b^2}$ (3 marks)	
26.	**2008 Q 3 P1** Simplify the expression $\frac{a^4-b^4}{a^3-ab^2}$ (3marks)	
27.	**2009 Q 8 P1** Simplify the expression $\frac{12x^2+ax-6a^2}{9x^2-4a^2}$ (3 marks)	
28.	**2010 Q 12 P1** Simplify the expression $\frac{x^2+x-4xy-4x}{(x+1)(4xy^2-xy)}$ (3 marks)	

		Working Space
29.	**2011 Q 6 P1** Simplify the expression: $\frac{4x-9x^3}{3x^2-4x-4}$ (3 marks)	
30.	**2011 Q 8 P1** Factorise $2x^2y^2 - 5xy - 12$	
31.	**2012 Q3 P1** Expand and simplify the expression $(2x^2 - 3y^3)^2 + 12x^2y^3$ (2 marks)	
32.	**2012 Q20 P1** (a) Express $\frac{1}{x-2} - \frac{2}{x+5} = \frac{3}{x+1}$ in the form $ax^2 + bx + c = 0$, where a, b and c are constants hence solve for x (4 marks) (b) Neema did y tests and scored a total of 120 marks. She did two more tests which she scored 14 and 13marks. The mean score of the first y tests was 3marks more than the mean score for all the tests she did. Find the total number of tests that she did.	

ALGEBRAIC EXPRESSIONS MARKING SCHEME

NO	SOLUTION	MKS
1.	a^2 -3ab -12ab + $36b^2$ a(a – 3b) – 12b(a-3b) (a -12b) (a-3b) **1989Q2**	2M
2.	$\frac{(6a+b-7)(a+b)}{2(a^2-b^2)}$ $\frac{a(6a-6b)(a+b)}{2(a-b)\,(a+b)}$ $\frac{6(a-b)}{2(a-b)}$ $= \frac{6}{3}$ **1990Q3**	3M
3.	$\frac{a(a-b)(a+b)}{2(a+b)\,(a-b)}$ $\frac{a^2-ba+ba+b^2}{(2a+2b)\;(a-b)}$ $\frac{a^2+b^2}{2a^2-2ab+2ab-2b^2}$ $\frac{a^2+b^2}{2a^2-2b^2}$ $\frac{a^2+b^2}{2(a^2-b^2)}$ **1991Q8**	3M
4.	Ac = $\left(\frac{b}{2}\right)^2$ 25d = $\left(\frac{-70}{2}\right)^2$ $\frac{25d}{25} = \frac{1225}{25}$ d=49 **1992Q6**	3M
5.	$2x^2y^2$ – 8xy + 3xy -12 2xy (xy -4) + 3(xy -4) (xy-4) (2xy + 3) **1993Q1**	3M
6.	$\frac{(x-2)(x-2)-(2x+20)}{(x+2)\,(x-2)}$ $\frac{x^2-4x+4+2x-20}{(x+2)\;(x-2)}$ $\frac{x^2-6x-16}{(x+2)\;(x-2)}$ $\frac{x^2-8x+2x-16}{(x+2)\;(x-2)}$ $\frac{x(x-b)=2\;2(x-8)}{(x+2)\,(x-2)}$ $\frac{(x+2)\,(x-8)}{(x+2)\,(x-2)}$ $= \frac{X-8}{X-2}$ **1993Q14**	4M
7.	$28x^2$ + 7x -4x -1 7x (4x + 1) -1(4x + 1) (4x + 1)(7x -1) **1994Q2**	2M
8.	$\left(\frac{2x-2}{6x^2-9x+8x-12}\right) \div \left(\frac{x-1}{2x-3}\right)$ $\left(\frac{2x-2}{3x\,(2x-3)+4\,(2x-3)}\right) \div \left(\frac{x-1}{2x-3}\right)$ $\left(\frac{2x-2}{(3x+4)\,(2x-3)}\right) \times \frac{x-1}{2x-3}$ $= \frac{2}{3X+4}$ **1995Q2**	3M
9.	$\frac{(3x^2-1)-(2x-1)\,(x-1)}{(x-1)\,(x+1)}$ $\frac{(3x^2-1)-(2x^2-2x+1x-1)}{(x-1)\,(x+1)}$ $\frac{3x^2-1+2x+16}{(x-1)\;(x+1)}$ $\frac{x^2+x}{(x-1)\;(x+1)} = \frac{x(x+1)}{(x-1)\;(x+1)}$ $= \frac{X}{X-1}$ **1995Q8**	3M

10	$3x^2 - 3xy + xy - y^2$ $3x(x-y) + y(x-y)$ $(x-y)(3x+y)$ **1996Q2**	M1 A1
11.	G.C.F= $xy^{2\surd}$ $xy^2(x^2-4y^2)\surd$ $xy^2(x-2y)(x+2y)\surd$ **1997Q2**	B1 B1 B1 3 M
12.	$(a+b)(a-b)$ $(2557+2547)(2557-2547)$ $5104 \times 10 = 51040$ **1998Q2**	B1 M1 A1
13	b). $5a-4b-2[a-(2b+c)]$ $=5a-4b-2a+4b+2c$ $=3a+2c$ **1999Q1b**	M1 A1 4M
14.	$(x+y)^2+(y-x)^2-2(x-y)(x+y)$ $=x^2+2xy+y^2+y^2-2xy+x^2+2x^2+2y^2$ $=2x^2+2y^2-2x^2+2y^2$ $=4y^2$ $=2^2(2-a)^2$ **1999Q15**	 M1 M1 A1 3M
15.	a). i). $(x+y)^2=x^2+2xy+y^2$ $=x^2+2xy+y^2$ $3^2=x^2+2xy+y^2=9$ ii). $2xy=9-(x^2+y^2)$ $=9-29$ $=-20$ iii). $(x-y)^2=x^2+y^2-2xy$ $=29-(-20)$ $=49$ iv). $x-y=+\sqrt{49}$ $=+7$ 0r -7 b). $x+y=3$ $\quad x+y=3$ $x-y=7$ $\quad x-y=-7$ $2x=10$ $\quad 2x=-4$ $x=5$ $\quad x=-2$ $y=-2$ $\quad y=5$ **1999Q21**	 B1 B1 B1 B1 B1 B1 B1 8 M
16.	$\frac{(3a+b)(a+b)}{(4a-b)(a+b)}$ $=\frac{3a+b}{4a-b}$ **2000Q2**	
17.	$\frac{(3x-y)(x-y)}{(3x-y)(3x-y)}$ $=\frac{x-y}{3x+y}$ **2001Q6**	 M1 M1 A1 3M
18.	Either $(x^2+4y^2+4xy)-$ $(x^2+4xy-4y)$ $=4xy+4xy$ $=8xy$ **2002Q2**	B1 B1 A1 3M
19.	$4x^2-y^2=(2x+y)(2x-y)$ $2x^2-7xy+3y^2=(x-3y)(2x-y)$ $\frac{(2x+y)(2x-y)}{(x-3y)(2x-y)}$ $=\frac{2x+y}{x-3y}$ **2002Q11**	M1 M1 A1 3 M
20.	$=\{(a+{}^1/_b)-(a-{}^1/_b)-(a+{}^1/_b)+(a+{}^1/_b)\}$ $(a^2+2a/_b+{}^1/_b{}^2)-(a^2+2a/_b+{}^1/_b{}^2)$ $=({}^2/_b)(2a)$ $=4a/_b$ **2003Q2**	M1 M1 A1 3 M
21.	$\frac{(2a+b)(a-2b)}{(2a+b)(2a-b)}$ $\frac{a-2b}{2a-b}$ **2004Q3**	M1 M1 A1 3 M
22.	$\frac{9t^2-25a^2}{6t^2+19at+15a^2}$ $\frac{(3t)^2-(5a)^2}{6t^2+9at+10at+15a^2}$ $=\frac{(3t+5a)(3t-5a)}{(3t+5)(2t+3a)}=\frac{3t-5a}{2t+3a}$ **2005Q4**	B1 M1 A1 3 M
23.	$\frac{(p+q)(p+q)}{p(p^2-q^2)+q(p^2-q^2)}$ $=\frac{(p+q)(p+q)}{(p+q)(p+q)(p\_q)}$ $=\frac{1}{p+q}$ **2006Q3**	M1 M1 M1 A1 4 M

24.	$(x^2-y^2)(x^2+y^2)(x^4-y^4)$ $=9x^4-y^4)\ (x^4-y^4)$ $=x^8-2x^4y^4+y^8$ **2007Q3**	A1 M1 2 M
25.	$\frac{15a^2b-10ab^2}{3a^2-5ab+2b^2} = \frac{5ab(3a-b)}{(3a-2b)\ (a-b)}$ $= \frac{5ab}{a-b}$ **2007Q6**	M1 M1 A1 3 M
26.	$\frac{a^4-b^4}{a^3-ab^2} = \frac{(a^2+b^2)\ (a^2-b^2)}{a(a^2-b^2)}$ $= \frac{a^2+b^2}{a}$ **2008Q3**	M1 M1 A1 3 M
27.	$\frac{12x^2+ax-6a^2}{9x^2-4a^2}$ $\frac{(4x+3a)\ (3x-2a)}{(3x+2a)\ (3x-2a)}$ $= \frac{4x+3a}{3x+2a}$ **2009Q8**	M1 M1 A1 3 M
28.	$x^2 + x - 4xy - 4y - x(x + 1)$ $(x + 1)\ (4y^2 - xy)\ \ (x + 1)\ (y)\ (4y - x)$ $= (x - 4y)\ (x + 1)$ $= {}^{-1}/_{y}$ $(x + 1)\ (-y)\ (x - 4y)$ **2010Q12**	M1 M1 A1 3
29.	$\frac{4x-9x^3}{3x^2-4x-4} = \frac{x(2-3x)\ (2+3x)}{(3x+2)\ (x-2)}$ $\frac{x(2-3x)}{x-2}$ **2011Q6**	M1 M1 A1 3
30.	$2x^2y^2 - 5xy - 12$ $=2x^2y^2 - 8xy + 3xy - 12$ $= 2xy\ (xy-4) + 3(xy - 4)$ $= (2xy + 3)\ (xy - 4)$ **2011Q8**	M1 A1 2
31.	$(2x^2 - 3y^3)^2 + 12x^2y^3$ $= 4x^4 - 12x2y^3 + 9y^6 + 12x^2y^3$ $= 4x^4 + 9y^6$ **2012 Q3**	M1 A1 2
32. (a)	$\frac{1}{x-2} - \frac{2}{x+5} = \frac{3}{x+1}$ $\frac{x+5-2(x-2)}{(x-2)\ (x+5)} = \frac{3}{x+1}$ $\frac{-x+9}{x^2+3x-10} = \frac{3}{x+1}$ $4x^2 + x - 39 = 0$ $(4x + 13)\ (x - 3) = 0$ $x = 3$ or $x = -3^1/_4$	M1 A1 M1 A1
(b)	Mean for second tests $= \frac{147}{y+2}$ $\frac{120}{y} - \frac{147}{y+2} = 3$ $\frac{120y+240-147y}{y(y+2)} = 3$ $-27y + 240 = 3y2 + 6y$ $-9y + 80 = y2 + 2y$ $-9y + 80 = y2 + 2y$ $y^2 + 11y - 80 = 0$ $(y - 5)\ (y+16)$ $y=5$ or -16 no. of tests: 5+2 =7 **2012 Q20**	B1 M1 M1 M1 M1 M1 A1 10