Newtown High School of the Performing Arts©
Mathematics Faculty

Year 11 Extension 1 Mathematics
Assessment Task 1 - 2007

Student Name: _____ Class: _____

Time Allowed: 75 minutes

Instructions

- Attempt ALL questions
- Write using blue or black pen
- Show all necessary working
- Marks may not be awarded for careless or badly arranged work
- Calculators may be used

QUESTION 1:

Simplify each of the following.

(a) $5a^2b^3 \times a^3b^4$

(b) $4x^2y^2 \times 2x^4y^5 \times 3x^7y^8$

(c) $\dfrac{16p^7 \times 9q^8 \times 2r^4}{20p^5 \times 3q^4}$

(d) $(a^3b^6)^4$

(e) $(x^3y^2)^3 \times (x^4y^2)^4$

(f) $\sqrt{144g^2}$

QUESTION 2: A class of y students go to the zoo. One quarter of the class visit the Reptile House while one third of the class go to the Butterfly House.

(a) Write an expression to represent the number of students who went to the Reptile House.

(b) Write an expression to represent the number of students who went to the Butterfly House.

(c) Write an expression to represent the number of students who went to the Reptile House and Butterfly House.

QUESTION 3:

Simplify the following.

(a) $\dfrac{y}{6} \div \dfrac{y}{24} =$

(b) $\dfrac{4x}{6y} \div \dfrac{12x}{36yz}$

QUESTION 4

If $A = \dfrac{1}{2}h(a+b)$, find A when $h = 20$, $a = 8$ and $b = 5$.

QUESTION 5:

Simplify the following.

(a) $\frac{x}{2} - \frac{x}{3}$

(b) $\frac{4}{6m} + \frac{3}{5m}$

QUESTION 6:

Simplify the following.

(a) $\frac{8m}{80} \times \frac{10}{m}$

(b) $\frac{p}{9} \times \frac{18}{20} \times \frac{5}{p}$

QUESTION 7:

Simplify the following expressions by collecting like terms.

$5x + 4y - 5 - 7x$

QUESTION 8:

Simplify the following expressions by collecting like terms.

$5a^2b + 4ab - 4ab^2 - 3 + 5ab$

QUESTION 9:

Simplify the following.

(a) $7q \times q \times 2p$

(b) $-5abc \times -cba \times a$

QUESTION 10:

Expand and simplify the following expressions:

(a) $5(x + 2) + 3(x + 6) =$

(b) $-3(2x + 3y) - 7(x - y) =$

QUESTION 11:

The surface area (S) of a cylinder is given by $S = 2\pi r(r + h)$. Find S if r is the radius of the cylindrical end and h is the height of the cylinder when:

$r = 10, h = 7$

QUESTION 12:

Solve the following equations.

(a) $w + 152 = 243$

(b) $4y = 57$

(c) Solve the equation $5x - 2 = 12x - 30$.

(d) Solve the following equations.

$6(x + 2) = -8$

(e) $-7(2x + 5) = 26$

(f) $8(2p + 1) = -2(7 - 3p)$

(g) $5(2q - 4) - 3 + 7(2 - q) = 0$

QUESTION 13:

Solve the following equations.

(a) $3p + 2.5 = 3.7$

(b) $1 - 6q = -17$

QUESTION 14.

(a) Solve the linear inequality $7 - 5x < 17$

(b) Solve the inequality $\frac{2x-9}{3} + 3 > -7$.

QUESTION 5

Expand the following expressions and simplify where possible.

(a) $-2(4q - 10)$

(b) $p(6p + 3)$

QUESTION 6

Expand and simplify the following expression.

$2(x + 3y) + 3(2x - 4y)$

QUESTION 17.

Expand and simplify the expressions.

(a) $(y - 3)(y - 5)$

(b) $(a + 3b)(4a - 5b)$

(c) $(3d - 6)(3d + 6)$

(d) $(7 - 5p)^2$

QUESTION 18:

Expand and simplify the following expressions.

$(x-5)^2-(x-3)(x+3)$

QUESTION 19

Factorise each of the following.

(a) p^2-1

(b) Factorise $(y+1)^2-(x+6)^2$.

(b) Factorise $8y^3+125x^3$

QUESTION 20:

Factorise each of the following.

(a) x^2-4x-5

(b) $4y^2+16y+12$.

QUESTION 21:

Simplify the following expressions.

(a) $\frac{m+5}{3}+\frac{2m-4}{5}$

QUESTION 21 (continued)

(b) $\dfrac{3x-2}{27} - \dfrac{4x+3}{9}$

(c) $\dfrac{4}{(x+1)(x-2)} + \dfrac{5}{(x-2)(x+4)}$

QUESTION 22:

Simplify the following expressions.

(a) $\dfrac{2x-1}{13y} \times \dfrac{y}{2x-1}$

(b) $\dfrac{z^2+3z-4}{z^2+3z} \times \dfrac{18z}{z-4} \div \dfrac{3z+12}{6}$

QUESTION 23:

Identify the following equations as linear, quadratic or other.

(a) $5x + 5x^4 = 3$

(b) $x - 7x^2 = 8x^2 + 3$

(c) $2x + 3 = 0$

(d) $8y^2 - 3y + 7 = 0$

QUESTION 24:

Solve the following quadratic equations

(a) $(x - 6)(x + 2) = 0$

(b) $x^2 - 81 = 0$

(c) $\frac{1}{6}x^2 - \frac{4}{7}x = 0$

(d) $x^2 + 3x - 10 = 0$

QUESTION 25:

(a) Solve the following by using the 'complete the square' method. Give an exact answer.

$x^2 + 6x - 1 = 0$

(b) Solve the following quadratic equations using the quadratic formula. Where necessary give your answer correct to 2 decimal places.

$x^2 - 9x + 14 = 0$

QUESTION 26:

Solve the following inequalities and graph the solutions on seperate number lines.

(a) $\frac{5}{x-3} \geq 2$

(b) $\frac{2x+1}{x+1} < 3$

END OF PAPER

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Year 11 Extension 1 Mathematics
Assessment Task 1

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Instructions

- Attempt ALL questions
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- Show all necessary working
- Marks may not be awarded for careless or badly arranged work
- Calculators may be used

QUESTION 1:

Simplify each of the following.

(a) $5a^2b^3 \times a^3b^4$ $= 5a^5b^7$

(b) $4x^2y^2 \times 2x^4y^5 \times 3x^7y^8$ $= 24x^{13}y^5$

(c) $\dfrac{16p^7 \times 9q^8 \times 2r^4}{20p^5 \times 3q^4}$ $= \dfrac{24}{5}p^2q^4r^4$

(d) $(a^3b^6)^4$ $= a^{12}b^{24}$

(e) $(x^3y^2)^3 \times (x^4y^2)^4$ $= x^{25}y^{14}$

(f) $\sqrt{144g^2}$ $= 12g$

QUESTION 2: A class of y students go to the zoo. One quarter of the class visit the Reptile House while one third of the class go to the Butterfly House.

(a) Write an expression to represent the number of students who went to the Reptile House.

(b) Write an expression to represent the number of students who went to the Butterfly House.

(c) Write an expression to represent the number of students who went to the Reptile House and Butterfly House.

(a) $RH = \dfrac{y}{4}$

(b) $BH = \dfrac{y}{3}$

(c) $RH + BH = \dfrac{7y}{12}$

QUESTION 3:

Simplify the following.

(a) $\dfrac{y}{6} \div \dfrac{y}{24} = 4$

(b) $\dfrac{4x}{6y} \div \dfrac{12x}{36yz} = 2z$

QUESTION 4:

If $A = \dfrac{1}{2}h(a+b)$, find A when $h = 20$, $a = 8$ and $b = 5$.

$A = 130$

QUESTION 5:

Simplify the following.

(a) $\frac{x}{2} - \frac{x}{3}$ $= \frac{x}{6}$

(b) $\frac{4}{6m} + \frac{3}{5m}$ $= \frac{19}{15m}$

QUESTION 6:

Simplify the following.

(a) $\frac{8m}{80} \times \frac{10}{m}$ $= 1$

(b) $\frac{p}{9} \times \frac{18}{20} \times \frac{5}{p}$ $= \frac{1}{2}$

QUESTION 7:

Simplify the following expressions by collecting like terms.

$5x + 4y - 5 - 7x$ $= -2x + 4y - 5$

QUESTION 8:

Simplify the following expressions by collecting like terms.

$5a^2b + 4ab - 4ab^2 - 3 + 5ab$ $= 5a^2b + 9ab - 4ab^2 - 3$

QUESTION 9:

Simplify the following.

(a) $7q \times q \times 2p$ $= 14q^2p$

(b) $-5abc \times -cba \times a$ $= 5a^3b^2c^2$

QUESTION 10:

Expand and simplify the following expressions:

(a) $5(x+2) + 3(x+6) =$ $8x + 28$

(b) $-3(2x+3y) - 7(x-y) =$ $-13x - 2y$

QUESTION 11:

The surface area (S) of a cylinder is given by $S = 2\pi r(r+h)$. Find S if r is the radius of the cylindrical end and h is the height of the cylinder when:

$r = 10, h = 7$

$S = 1068 \cdot 14$

QUESTION 12:

Solve the following equations.

(a) $w + 152 = 243$

$w = 91$

(b) $4y = 57$

$y = 14\frac{1}{4}$

QUESTION 13:

Solve the following equations.

(a) $3p + 2.5 = 3.7$

$p = \frac{2}{5}$

(b) $1 - 6q = -17$

$q = 3$

(c) Solve the equation $5x - 2 = 12x - 30$.

$x = 4$

(d) Solve the following equations.

$6(x+2) = -8$

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

(e) $-7(2x+5) = 26$

$x = -4\frac{5}{14}$

(f) $8(2p+1) = -2(7-3p)$

$p = -2\frac{1}{5}$

(g) $5(2q-4) - 3 + 7(2-q) = 0$

$q = 3$

QUESTION 14.

(a) Solve the linear inequality $7 - 5x < 17$

$x > -2$

(b) Solve the inequality $\frac{2x-9}{3} + 3 > 7$.

$x > -10\frac{1}{2}$

QUESTION (5)

Expand the following expressions and simplify where possible.

(a) $-2(4q-10)$ $= -8q + 20$

(b) $p(6p+3)$ $= 6p^2 + 3p$

QUESTION (6)

Expand and simplify the following expression.

$2(x+3y) + 3(2x-4y)$

$= 8x - 6y$

QUESTION 17.

Expand and simplify the expressions.

(a) $(y-3)(y-5)$

$= y^2 - 8y + 15$

(b) $(a+3b)(4a-5b)$

$= 4a^2 + 7ab - 15b^2$

(c) $(3d-6)(3d+6)$

$= 9d^2 - 36$

(d) $(7-5p)^2$

$= 49 - 70p + 25p^2$

QUESTION 18.

Expand and simplify the following expressions.

$(x-5)^2 - (x-3)(x+3)$

$-10x + 34$

QUESTION (9)

Factorise each of the following.

(a) $p^2 - 1$ $= (p+1)(p-1)$

(b) Factorise $(y+1)^2 - (x+6)^2$.

$(y+1+x+6)(y+1-x-6)$

$= (x+y+7)(y-x-5)$

(c) Factorise $8y^3 + 125x^3$

$= (2y+5x)(4y^2 - 10xy + 25x^2)$

QUESTION 20.

Factorise each of the following.

(a) $x^2 - 4x - 5$

$= (x-5)(x+1)$

(b) $4y^2 + 16y + 12$.

$= 4(y+1)(y+3)$

QUESTION 21.

Simplify the following expressions.

(a) $\frac{m+5}{3} + \frac{2m-4}{5}$

$= \frac{11m+13}{15}$

QUESTION 21 (continued)

(b) $\frac{3x-2}{27} - \frac{4x+3}{9}$

$= \frac{-9x-11}{27}$

(c) $\frac{4}{(x+1)(x-2)} + \frac{5}{(x-2)(x+4)}$

$\frac{4(x+4)+5(x+1)}{(x+1)(x-2)(x+4)}$

$= \frac{9x+21}{(x+1)(x-2)(x+4)}$

QUESTION 22

Simplify the following expressions.

(a) $\frac{2x-1}{13y} \times \frac{y}{2x-1}$

$= \frac{1}{13}$

(b) $\frac{z^2+3z-4}{z^2+3z} \times \frac{18z}{z-4} \div \frac{3z+12}{6}$

$= \frac{(z+4)(z-1)}{z(z+3)} \times \frac{18z}{(z-4)} \times \frac{6}{3(z+4)}$

$= \frac{36(z-1)}{(z+3)(z-4)}$

QUESTION 23:

Identify the following equations as linear, quadratic or other.

(a) $5x + 5x^4 = 3$ OTHER

(b) $x - 7x^2 = 8x^2 + 3$ QUADRATIC

(c) $2x + 3 = 0$ LINEAR

(d) $8y^2 - 3y + 7 = 0$ QUADRATIC

QUESTION 24:

Solve the following quadratic equations

(a) $(x-6)(x+2) = 0$

$x = 6$ or -2

(b) $x^2 - 81 = 0$

$(x+9)(x-9) = 0$

$x = 9$ or -9

(c) $\frac{1}{6}x^2 - \frac{4}{7}x = 0$

$7x^2 - 24x = 0$

$x(7x-24) = 0$

$x = 0$ or $\frac{24}{7} = 3\frac{3}{7}$

(d) $x^2 + 3x - 10 = 0$

$(x+5)(x-2) = 0$

$x = -5$ or 2

QUESTION 25:

(a) Solve the following by using the 'complete the square' method. Give an exact answer.

$x^2 + 6x - 1 = 0$

$x = 0.16$ or -6.16

$x^2 + 6x = 1$

$(x+3)^2 = 1 + 9$

$x + 3 = \pm\sqrt{10}$

$x = -3 \pm \sqrt{10}$

b) Solve the following quadratic equations using the quadratic formula. Where necessary give your answer correct to 2 decimal places.

$x^2 - 9x + 14 = 0$

$x = 2$ or 7

QUESTION 26:

Solve the following inequalities and graph the solutions on seperate number lines.

(a) $\frac{5}{x-3} \geq 2$

$3 < x \leq 5\frac{1}{2}$

(b) $\frac{2x+1}{x+1} \leq 3$

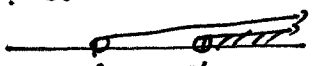
$\frac{2x+1}{x+1} - 3 < 0$

$\frac{2x+1-3x-3}{x+1} < 0$

$\frac{-x-2}{x+1} < 0$

When $-x-2 < 0 \cap x+1 > 0$

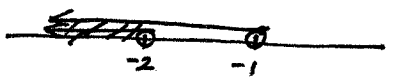
$\therefore x > -2 \cap x > -1$



$\therefore$ $\boxed{x > -1}$

Also when $-x-2 > 0 \cap x+1 < 0$

$x < -1$



$\therefore$ $\boxed{x < -2}$

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