St Andrew's Cathedral School
Year 9 Mathematics Stage 5.3
Assessment Task 3 2007

Name:_____

Class._____

ST ANDREW'S CATHEDRAL SCHOOL
Founded 1885

MATHEMATICS

YEAR 9

5.3 (Advanced) COURSE, 2007

ASSESSMENT TASK 3

Time allowed - 55 MINUTES

MARKING:

There are 4 sections in this assessment:

Section 1:	**Number: 9 marks**
Section 2:	**Algebra: 25 marks**
Section 3:	**Measurement: 6 marks**
Section 4:	**Geometry: 5 marks**
TOTAL:	**45 marks**

INSTRUCTIONS

- Attempt ALL questions
- Answers are to be written in the space provided
- Approved calculators may be used

St Andrew's Cathedral School
Year 9 Mathematics Stage 5.3
Assessment Task 3 2007

Name:.....

Class.....

Section 1 NUMBER Surds: 9 Marks

Ques.1. Write down all of the irrational numbers: $\sqrt{4}, \sqrt{144}, 2\sqrt{144}, 2\sqrt{5}, \sqrt{3}$ [1]

Ques.2. Arrange these numbers in ascending order: $\pi, \sqrt{2}, 2.1, \sqrt{12}$ [1]

Ques.3. Simplify fully:

(a) $\sqrt{72}$ [1]

(b) $3\sqrt{48}$ [1]

(c) $\sqrt{5}(2\sqrt{3}-\sqrt{5})$ [1]

Ques.4. Rationalise the denominator and leave your answer in the simplest surd form:

(a) $\dfrac{5\sqrt{7}}{3\sqrt{5}}$ [1]

(b) $\dfrac{1}{2-\sqrt{5}}+\dfrac{1}{2+\sqrt{5}}$ [3]

END OF SECTION 1 NUMBER

St Andrew's Cathedral School
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Section 2 ALGEBRA: 25 Marks

Indices

Ques.1. Simplify fully the following indices:

(a) $3x^3 \times 2x^4$ [1]

(b) $8(x^2y)^0$ [1]

(c) $(\frac{x^2}{y^2})^{-3}$ [1]

(d) $x^2(2x-5)-2x^3$ [1]

(e) $7p^7q^5 \div 35(p^2q)^3$ [2]

(f) $(\frac{16}{x^4})^{\frac{3}{4}}$ [2]

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Surds

Ques.2. Simplify fully:

(a) $\sqrt{x}(2\sqrt{x}+3)$ [1]

(b) $\sqrt{20p} \div 2\sqrt{p}$ [1]

(c) $(\sqrt{m}+2\sqrt{y})(\sqrt{m}-2\sqrt{y})$ [1]

(d) $(2\sqrt{x}+\sqrt{y})^2$ [2]

Factorisation of Algebraic Expressions:

Ques.3. Factorise fully:

(a) $16x^2y-9xy$ [1]

(b) $x^2-8x+16$ [1]

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(c) $d^2 - 36$ [1]

(d) $8x^2 - 8$ [2]

(e) $2x^2 - 5x + 2$ [2]

Ques.4. Simplify fully the following: (Show FULL working)

(a) $\dfrac{x^2 - 2x - 24}{x + 4}$ [2]

(b) $\dfrac{8x + 8}{x^2 - 1} \div \dfrac{2x - 2}{x^2 - 2x + 1}$ [3]

END OF SECTION 2 ALGEBRA

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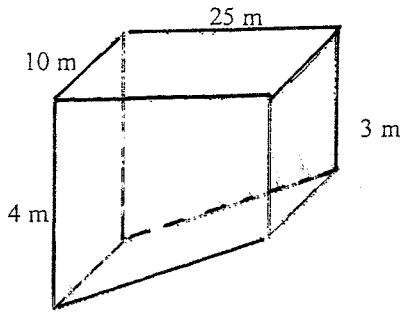
Section 3 Measurement (Practical Application): 6 Marks

Ques.1. A pool is built in the shape of a trapezoidal prism as shown.



NOT TO SCALE

(a) Find the area of the front face of the diagram. (Trapezium) [1]

(b) Find the volume of the trapezoidal prism (pool) in m^3. [1]

(c) During the summer months the water level dropped by 5 cm.

(i) What was the volume of water lost in m^3? [1]

(ii) How many litres of water were lost? [1]

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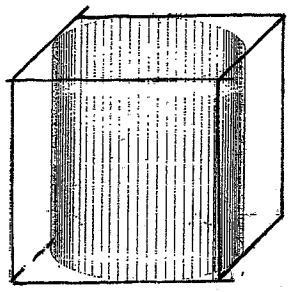
Ques.2.



A cylinder fits exactly into a cube with side lengths x .
How much space is left in the cube ? [2]
Answer in terms of π.

END OF SECTION 3 MEASUREMENT

St Andrew's Cathedral School
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Section 4 GEOMETRY Co-ordinate Geometry: 5 Marks

Ques.1 For the points A (-3,-1) and B (-5,3) find:

(a) the co-ordinates of the midpoint AB. [1]

(b) the gradient of AB. [1]

(c) the distance between the points A and B [1]

Ques.2. The gradient between two points (-3,2) and (3,m) is $\frac{1}{2}$ unit. Find the value of "m". [2]

END OF SECTION 4 GEOMETRY

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Name: ANSWERS

Class.....

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MATHEMATICS

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There are 4 sections in this assessment:

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TOTAL:	**45 marks**

INSTRUCTIONS

- Attempt ALL questions
- Answers are to be written in the space provided
- Approved calculators may be used

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Year 9 Mathematics Stage 5.3
Assessment Task 3 2007

Name: ANSWERS

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Section 1 NUMBER Surds: 9 Marks

Ques.1. Write down all of the irrational numbers: $\sqrt{4}, \sqrt{144}, 2\sqrt{144}, 2\sqrt{5}, \sqrt{3}$ [1]

$2\sqrt{5}$, $\sqrt{3}$

Ques.2. Arrange these numbers in ascending order: $\pi, \sqrt{2}, 2.1, \sqrt{12}$ [1]

$\sqrt{2}$, 2.1 , π , $\sqrt{12}$

Ques.3. Simplify fully:

(a) $\sqrt{72} = 6\sqrt{2}$ [1]

(b) $3\sqrt{48} = 12\sqrt{3}$ [1]

(c) $\sqrt{5}(2\sqrt{3}-\sqrt{5}) = 2\sqrt{15}-5$ [1]

Ques.4. Rationalise the denominator and leave your answer in the simplest surd form:

(a) $\frac{5\sqrt{7}}{3\sqrt{5}} \times \frac{\sqrt{5}}{\sqrt{5}} = \frac{5\sqrt{35}}{15}$ [1]

$= \frac{\sqrt{35}}{3}$ (MUST SIMPLIFY FOR ONE MARK)

(b) $\frac{1}{2-\sqrt{5}} + \frac{1}{2+\sqrt{5}}$ [3]

$= \frac{1}{2-\sqrt{5}} \times \frac{2+\sqrt{5}}{2+\sqrt{5}} + \frac{1}{2+\sqrt{5}} \times \frac{2-\sqrt{5}}{2-\sqrt{5}}$

$= \frac{2+\sqrt{5}}{4-5} + \frac{2-\sqrt{5}}{4-5}$

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

$= -4$

OR

$\frac{1}{2-\sqrt{5}} + \frac{1}{2+\sqrt{5}}$

$= \frac{2+\sqrt{5}+2-\sqrt{5}}{(2-\sqrt{5})(2+\sqrt{5})}$

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

$= -4$

END OF SECTION 1 NUMBER

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Class.....

Section 2 ALGEBRA: 25 Marks

Indices

Ques.1. Simplify fully the following indices:

(a) $3x^3 \times 2x^4$ $= 6x^7$ [1]

(b) $8(x^2y)^0$ $= 8 \times 1$
$= 8$ [1]

(c) $\left(\frac{x^2}{y^2}\right)^{-3}$ $= \frac{x^{-6}}{y^{-6}}$ or $\frac{y^6}{x^6}$ [1]

(d) $x^2(2x-5)-2x^3$ $= 2x^3 - 5x^2 - 2x^3$
$= -5x^2$ [1]

(e) $7p^7q^5 \div 35(p^2q)^3$ [2]
$= \frac{7p^7q^5}{35p^6q^3}$
$= \frac{pq^2}{5}$

(f) $\left(\frac{16}{x^4}\right)^{\frac{3}{4}}$ $= \frac{2^3}{x^3}$ [2]
$= \frac{8}{x^3}$

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Assessment Task 3 2007

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Class.....

Surds

Ques.2. Simplify fully:

(a) $\sqrt{x}(2\sqrt{x}+3)$ $= 2x + 3\sqrt{3x}$ [1]

(b) $\sqrt{20p} \div 2\sqrt{p}$ $= \sqrt{\frac{20p}{4p}}$ [1]
$= \sqrt{5}$

(c) $(\sqrt{m}+2\sqrt{y})(\sqrt{m}-2\sqrt{y})$ $= m - 4y$ [1]

(d) $(2\sqrt{x}+\sqrt{y})^2$ $= 4x + 4\sqrt{xy} + y$ [2]

Factorisation of Algebraic Expressions:

Ques.3. Factorise fully:

(a) $16x^2y - 9xy$ $= xy(16x - 9)$ [1]

(b) $x^2 - 8x + 16$ $= (x-4)(x-4)$ [1]
or $(x-4)^2$

(c) $d^2 - 36$ $= (d+6)(d-6)$ [1]

(d) $8x^2 - 8$ $= 8(x^2 - 1)$
$= 8(x+1)(x-1)$ [2]

(e) $2x^2 - 5x + 2$ $= (2x-1)(x-2)$ [2]

Ques.4. Simplify fully the following: (Show FULL working)

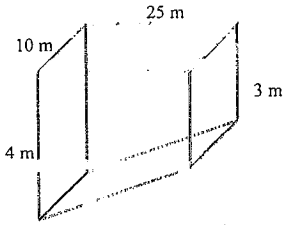
(a) $\frac{x^2-2x-24}{x+4}$ $= \frac{(x-6)(x+4)}{(x+4)}$ [2]
$= (x-6)$

(b) $\frac{8x+8}{x^2-1} \div \frac{2x-2}{x^2-2x+1}$ $= \frac{8(x+1)}{(x+1)(x-1)} \div \frac{2(x-1)}{(x-1)(x-1)}$ [3]
$= \frac{8}{x-1} \cdot \frac{x-1}{2}$
$= 4$

END OF SECTION 2 ALGEBRA

Section 3 Measurement (Practical Application): 6 Marks

Ques.1. A pool is built in the shape of a trapezoidal prism as shown.



NOT TO SCALE

(a) Find the area of the front face of the diagram. (Trapezium) [1]

Area $= \frac{1}{2}(4+3) \times 25$
$= 87.5 m^2$

(b) Find the volume of the trapezoidal prism (pool) in m^3. [1]

Vol $= Ah$
$= 87.5 \times 10$
$= 875 m^3$

(c) During the summer months the water level dropped by 5 cm.
(i) What was the volume of water lost in m^3? [1]

Vol lost $= 10m \times 25m \times 0.05m$
$= 12.5 m^3$

(ii) How many litres of water were lost? [1]

No of litres $= 12.5 \times 1000 L$
$= 12500 L$

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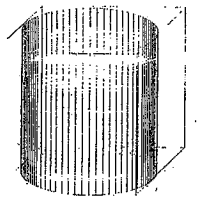
Ques.2.



A cylinder fits exactly into a cube with side lengths x .
How much space is left in the cube ? [2]
Answer in terms of π.

Vol. of cube $= x \times x \times x$
$= x^3$

Vol of cyl. $= \pi r^2 h$
$= \pi \left(\frac{x}{2}\right)^2 x$
$= \pi \frac{x^3}{4}$

Vol left $= x^3 - \pi \frac{x^3}{4}$
$= x^3\left(1 - \pi/4\right)$

END OF SECTION 3 MEASUREMENT

St Andrew's Cathedral School
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Name: ANSWERS

Class.....

Section 4 GEOMETRY Co-ordinate Geometry: 5 Marks

Ques.1 For the points A (-3,-1) and B (-5,3) find:

(a) the co-ordinates of the midpoint AB. [1]

Mid Point : $\left(\frac{-3+-5}{2}, \frac{-1+3}{2}\right)$
$= (-4, 1)$

(b) the gradient of AB. [1]

Grad. $m = \frac{3--1}{-5--3}$
$= \frac{4}{-2}$
$= -2$

(c) the distance between the points A and B [1]

dist $= \sqrt{(-5--3)^2 + (3--1)^2}$
$= \sqrt{(-2)^2 + (4)^2}$
$= \sqrt{4+16}$
$= \sqrt{20}$
$= 2\sqrt{5}$ OR 4.47

Ques.2. The gradient between two points (-3,2) and (3,m) is $\frac{1}{2}$ unit. Find the value of "m". [2]

$m = \frac{y_2 - y_1}{x_2 - x_1}$

$\frac{1}{2} = \frac{m-2}{3--3}$

$\frac{1}{2} = \frac{m-2}{6}$

$3 = m-2$

$m = 5$.

END OF SECTION 4 GEOMETRY