basic education

Department:
Basic Education
REPUBLIC OF SOUTH AFRICA

GREENBURY SECONDARY SCHOOL

GRADE 10

MATHEMATICS

MARCH EXAMINATION - 2016

MARKS: 50

EXAMINER : D. CHELLAN

TIME: 1 hour

MODERATOR : R. DEMRUGARAM

This question paper consists of 4 pages (including this page).

P.T.O. ....Page 2/ INSTRUCTIONS

INSTRUCTIONS AND INFORMATION

Read the following instructions carefully before answering the questions.

1. This paper consists of 4 pages and 6 questions.
2. Answer ALL questions.
3. Number your answers EXACTLY as the questions are numbered.
4. If necessary, answers should be rounded off to TWO decimal digits, unless otherwise stated.
5. All the necessary working details must be shown.
6. Answers only will not necessarily be awarded full marks.
7. It is in your own interest to write legibly and to present the work neatly.
8. An approved calculator (non-programmable and non-graphical) may be used unless stated otherwise.

QUESTION 1

1.1 For which value(s) of x for $x \in \{ 8 \ ; \ -1 \ ; \ 5 \}$ is $\sqrt{4 + x}$:

1.1.1 a rational number (1)

1.1.2 an irrational number (2)

1.2. Determine the two consecutive integers $\sqrt{53}$ lies between. (2)

[5]

QUESTION 2 Determine the following products:

2.1 $(3x + 2)(x + 1)$ (3)

2.2 $(2x + 3)(4x^2 - 6x + 9)$ (3)

2.3 $(a + b - 4)(a + b + 4)$ (4)

[10]

QUESTION 3 Factorise fully:

3.1 $8x^3 - y^3$ (2)

3.2 $3x^2 + 2xy - 8y^2$ (2)

3.3 $2x^2 - 32$ (3)

[7]

QUESTION 4 Simplify the following:

4.1 $\frac{4x^2 - 12x + 36}{x^3 + 27}$ (3)

4.2 $\frac{x-2}{x-1} + \frac{x-1}{2-x} + \frac{3x-5}{x^2-3x+2}$ (6)

4.3 $\frac{2^{3x-1} \cdot 2^{x+1}}{4^{2x-2}}$ (4)

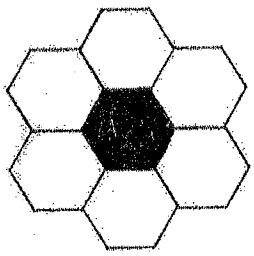
4.4 $\frac{5^{x+1} - 5^x}{5^x + 5^{x-1}}$ (4)

[17]

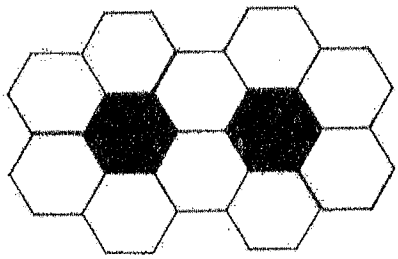
P.T.O. ....Page 4/ QUESTION 5

QUESTION 5

The city council plans to beautify the city centre with flower beds surrounded by hexagonal paving slabs according to the pattern in the sketches below.



One bed



Two beds

5.1 How many hexagonal slabs are needed to surround four flower beds? (1)

5.2 Write a formula to generalise the relationship between the number of hexagonal paving slabs(n) and the number of flower beds(T_n) (3)

5.3 How many hexagonal paving slabs are needed for 20 flower bed? (2)

5.4 Which flower bed will have 142 hexagonal paving slabs? (2)

[8]

QUESTION 6

If $a + b = 5$ and $ab = 2$, determine the value of $a^4 + b^4$.

(Show all necessary working details) **[3]**

TOTAL : 50 MARKS

Gr 10 Mathematics – March Examination 2016 Total : 50 marks

Question 1

1.1.1. 5 ✓A A (1)

1.1.2. 8 ✓ and −1 ✓ (2)

1.2. 7 and 8 ✓A ✓A (2)

[5]

Question 2

2.1. $(3x+2)(x+1)$

$= 3x^2 \checkmark^A + 5x \checkmark^A + 2 \checkmark^A$ (3)

2.2. $(2x+3)(4x^2-6x+9)$

$= 8x^3 \checkmark^A + 27 \checkmark^A$ (3)

2.3. $(a+b-4)(a+b+4)$

$= [(a+b)-4][(a+b)+4]$ ✓A

$= (a+b)^2 - 16$ ✓A

$= a^2 + 2ab + b^2 - 16$ ✓CA ✓CA (4)

[10]

Question 3

3.1. $8x^3 - y^3$ ✓A ✓A

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

3.2 $3x^2 + 2xy - 8y^2$

$= (x+2y)(3x-4y)$ ✓A ✓A (2)

3.3. $2(x^2-32)$

$= 2(x^2-16)$ ✓A

$= 2(x+4)(x-4)$ ✓A ✓A (3)

[7]

Question 4

4.1. $\dfrac{4x^2-12x+36}{x^3+27}$

$= \dfrac{4(x^2-3x+9)}{(x+3)(x^2-3x+9)}$ ✓ ✓

$= \dfrac{4}{x+3}$ ✓CA (3)

4.2. $\dfrac{x-2}{x-1} + \dfrac{x-1}{2-x} + \dfrac{3x-5}{x^2-3x+2}$

$= \dfrac{x-2}{x-1} - \dfrac{x-1}{x-2} + \dfrac{3x-5}{(x-1)(x-2)}$

$= \dfrac{(x-2)^2 - (x-1)^2 + 3x - 5}{(x-1)(x-2)}$ ✓ ✓

$= \dfrac{x^2-4x+4-x^2+2x-1+3x-5}{(x-1)(x-2)}$ ✓CA

$= \dfrac{x-2}{(x-1)(x-2)}$ ✓CA

$= \dfrac{1}{x-1}$ ✓CA ✓CA (6)

4.3. $\frac{2^{3x-1} \cdot 2^{x+1}}{4^{2x-2}}$

$= \frac{2^{3x-1} \cdot 2^{x+1}}{2^{4x-4}}$ ✓

$= 2^{3x-1+x+1-4x+4}$ ✓CA

$= 2^4$ ✓CA

$= 16$ ✓CA (4)

4.4. $\frac{5^{x+1} - 5^x}{5^x + 5^{x-1}}$

$= \frac{5^x(5-1)}{5^x(1-5^{-1})}$ ✓ ✓ ✓

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

$= 5$ ✓CA (4)

[17]

Question 5

5.1. 18 ✓ (1)

5.2. $T_n = 4n + 2$ ✓✓ (3)

5.3. $T_{20} = 4(20) + 2$ ✓

$= 82$ ✓ (2)

* Answer only full marks

5.4. $4n + 2 = 142$ ✓M

$4n = 140$

$n = 35$ ✓CA

35th flower bed (2)

[8]

Question 6.

$a + b = 5$

$(a+b)^2 = 5^2$ ✓

$a^2 + 2ab + b^2 = 25$

$a^2 + 4 + b^2 = 25$

$a^2 + b^2 = 21$

$(a^2 + b^2)^2 = 21^2$ ✓

$a^4 + 2a^2b^2 + b^4 = 441$

$a^4 + 8 + b^4 = 441$

$a^4 + b^4 = 337$ ✓ (3)

[3]

TOTAL MARKS: 50