The Scots College

Year 11 Mathematics Extension 1

Assessment 1

March 2007

GENERAL INSTRUCTIONS

- Working time - 50 minutes
- Write using blue or black pen
- Board approved calculators may be used
- All necessary working should be shown in every question
- **Complete each question on a new page.**
- Attempt All Questions

TOTAL MARKS: 48

WEIGHTING: 15%

Question 1: (16 marks)

a) Simplify $\dfrac{25^{4x} \times 8^{3x}}{10^{2x}}$ 2

b) Solve $-2x^2 - 5x + 12 \geq 0$ 3

c) Solve $\dfrac{3}{x-5} \leq 2$ 3

d) Factorise as fully as possible $x + x^7$ 2

e)i) Find the points of intersection of the circle $x^2 + y^2 = 16$ and the line $y = -x + 4$. 3

ii) Hence sketch diagrams showing the regions where the given inequalities hold simultaneously $x^2 + y^2 < 16$ and $y \geq -x + 4$. 3

Question 2: (16 marks)

a) By showing full reasoning determine if the function $f(x) = |2x| - 3$ is odd, even or neither. 2

b) State the domain and range of the functions below:

i) $y = \dfrac{1}{\sqrt{x-2}}$ ii) $y = \dfrac{1}{\sqrt{25-x^2}}$ 4

c) If $f(x) = 10^x + 10^{-x}$, find the value of $[f(x)]^2 - f(2x)$ 3

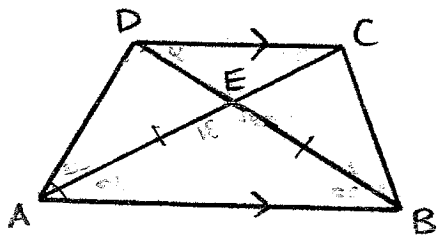
d) Sketch

i) $y = 3^{-x} - 3$ ii) $y - 2 = \dfrac{1}{x-1}$ 4

e) On the same set of axes, graph $y = |1 - 2x|$ and $y = -x - 1$. Using the graph, or otherwise, explain why $|1-2x| + x + 1 = 0$ has no solutions. 3

Question 3: (16 marks)

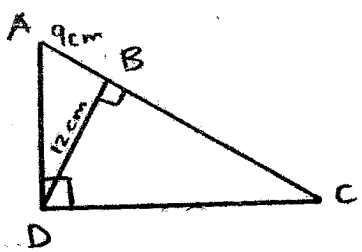
a) In the diagram, AB // ~~CE~~ DC and $\angle CAB = \angle ABD = \alpha$. Prove $\angle DAC = \angle CBD$. 6



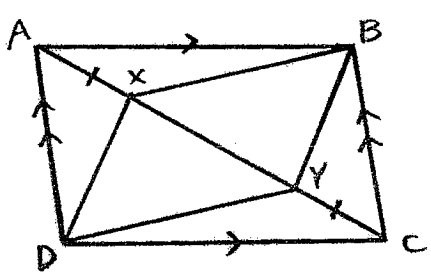
b) In the diagram below AB = 9 cm, DB = 12 cm and $\angle ABD = \angle ADC = 90^0$.

i) Prove ΔABD *is similar to* ΔADC. 2

ii) Hence, find the length of DC and BC. 3



c) The diagram shows the parallelogram ABCD with diagonal AC. The points X and Y lie on this diagonal in such a way that AX = CY. Prove that DXBY is a parallelogram. 5



END OF EXAM