Name:_____ Maths Class:_____

Sydney Technical High School

2 Unit Mathematics

Year 11

Assessment Task 1 May 2008

General Instructions

- Working time allowed – 70 minutes
- Write using black or blue pen
- Approved calculators may be used
- All necessary working should be shown
- Start each question on a new page
- All questions are of equal value

Q1	Q2	Q3	Q4	Q5	Q6	Q7	Q8	Total

Question 1 (7 marks)

a) Simplify $|-5| - |8|$ 1

b) Multiply x^3y by $\frac{4y}{x}$ 1

c) Evaluate $\frac{\sqrt{11.3}}{21.5\times0.68}$ to 3 significant figures. 2

d) The hyperbola $y = \frac{3}{a-x}$ has a vertical asymptote at $x = 1$. What is the value of a. 1

e) Express the following as fractions in the simplest form

i) $(3\frac{1}{2})^{-1}$ 1

ii) $5\frac{1}{3}\%$ 1

Question 2 (7 marks)

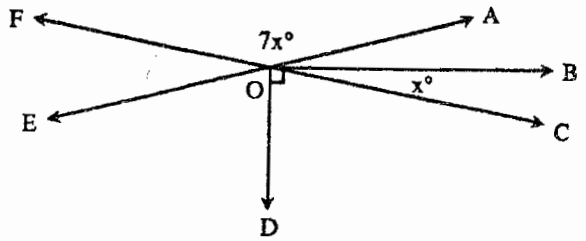
a) Factorise

i) $9 - 4a^2$ 1

ii) $3x^2 - 10x + 8$ 2

b) Solve $2 - 3x < -4$ and graph the solution on a number line 2

c) AE, CF are straight lines; OD bisects $\angle COE$, $\angle BOD = 90°$



i) Explain why $\angle EOC = 7x^\circ$ 1

ii) Find the value of x (no reason) 1

Question 3 (7 marks)

a) Express $0.3\dot{2}$ as a simple fraction 2

b) Solve

i) $\frac{100+p}{p} = \frac{5}{2}$ 2

ii) $4^{x+1} = 8$ 2

c) Simplify $(2\sqrt{3})^3$ as a surd 1

Question 4 (7 marks)

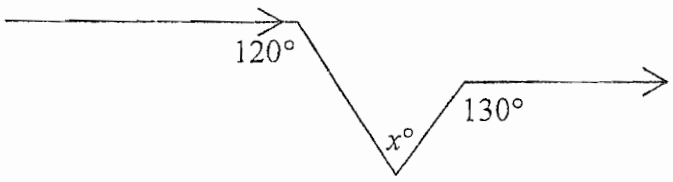
a) By rationalising the denominator express $\frac{3}{3-\sqrt{5}}$ in the form $a + b\sqrt{5}$ 2

b) Simplify

i) $\frac{2x}{3} - \frac{x-1}{4}$ 2

ii) $\sqrt{20} + 3\sqrt{5} + \sqrt{50}$ 2

c)



Find the value of x (no reasons necessary) 1

Question 5 (7 marks)

a) If $g(x) = x^2 - 6x$

Evaluate

i) $g(-2)$ 1

ii) $g(a-1)$ 2

b) Use the quadratic formula to solve $2x^2 - 2x - 3 = 0$. Leave the solution in simplified surd form. 2

c) Factorise $m^3 - 8$ 1

d) Write down the domain for the function $y = \sqrt{x+2}$ 1

Question 6 (7 marks)

a) Sketch the following clearly showing the x and y intercepts.

i) $y = |x+2|$ 2

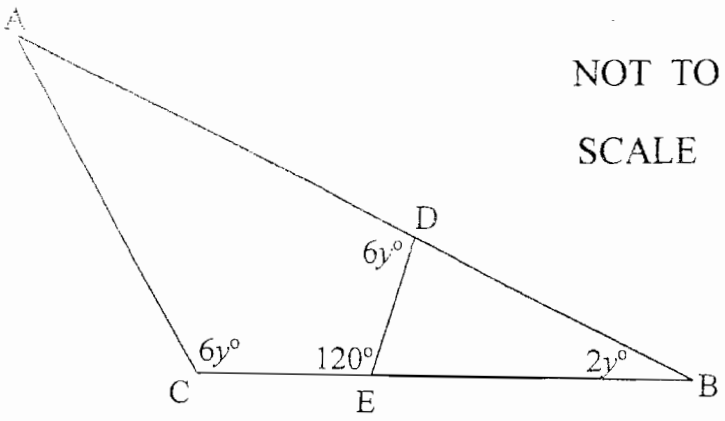
ii) $y = \sqrt{9-x^2}$ 2

b) If $V = \frac{4}{3}\pi r^3$, find r correct to 2 decimal places when $V = 50$ 2

c) State the range of the function $y = x^2 + 2$ 1

Question 7 (7 marks)

a)



i) Explain why $< DEB = 4y°$ 1

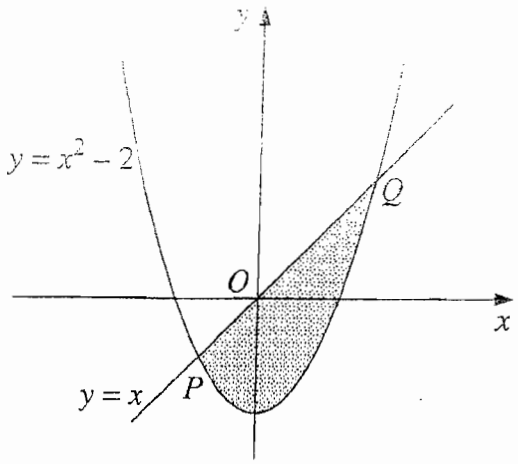
ii) Hence find the size of $< CAB$ 2

b) Solve $|2x + 3| = 5$ 2

c) $T = a + (n - 1)d$. Change the subject to n, writing the expression on the right hand side as a single fraction. 2

Question 8 (7 marks)

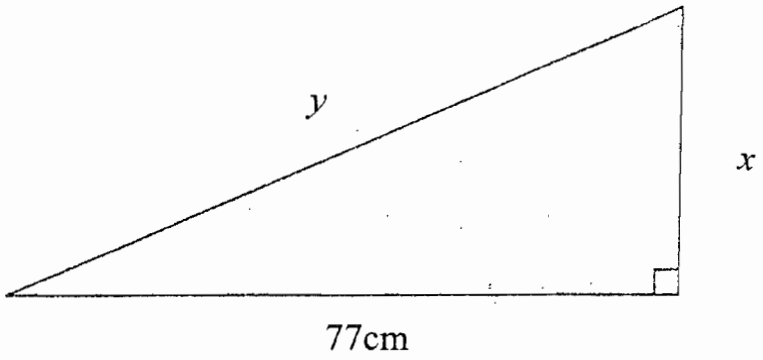
a) The diagram shows the graphs of $y = x^2 - 2$ and $y = x$.



i) Find the x values of the points of intersection, P and Q. 2

ii) Write down the two inequalities which combine to define the shaded region shown. 2

b) The triangle has a perimeter of 198 cm 3



By forming a pair of simultaneous equations or otherwise find the values of x and y.

Teacher's Name: Student's Name/No.:

Question 1

1a) $5 - 8 = -3$

b) $\frac{4x^3y^2}{x} = 4x^2y^2$

c) $0.229927\ldots$
$= 0.230$

d) $a = 1$

e) i) $\frac{2}{7}$

ii) $\frac{4}{75}$

Question 2

a) i) $(3 - 2a)(3 + 2a)$

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

b) $2 - 3x < -4$

$-3x < -6$

$x > 2$

c) i) vertically opposite angles are equal

ii) $\frac{9x}{2} = 90^\circ$

$x = 20^\circ$

Question 3

a) $\frac{32 - 3}{90} = \frac{29}{90}$

b) i) $200 + 2p = 5p$

$3p = 200$

$p = 66\frac{2}{3}$

ii) $(2^2)^{x+1} = 2^3$

$2^{2x+2} = 2^3$

$2x + 2 = 3$

$x = \frac{1}{2}$

c) $(2\sqrt{3})^3 = 8\sqrt{27}$

$= 24\sqrt{3}$

Question 4

a) $\frac{3}{3 - \sqrt{5}} \times \frac{3 + \sqrt{5}}{3 + \sqrt{5}} = \frac{9 + 3\sqrt{5}}{4}$

b) i) $\frac{8x - 3(x - 1)}{12}$

$= \frac{5x + 3}{12}$

ii) $2\sqrt{5} + 3\sqrt{5} + 5\sqrt{2}$

$= 5\sqrt{5} + 5\sqrt{2}$

c) $x = 70^\circ$

Teacher's Name: Student's Name(s):

Question 5

a) i) $g(-2) = 4 + 12$
$= 16$

ii) $g(a-1) = (a-1)^2 - 6(a-1)$
$= a^2 - 2a + 1 - 6a + 6$
$= a^2 - 8a + 7$

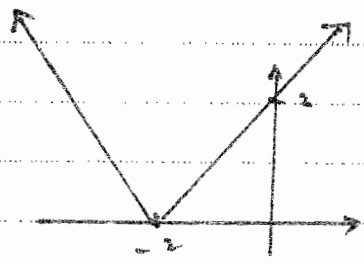
b) $x = \frac{2 \pm \sqrt{4 + 24}}{4}$
$= \frac{2 \pm \sqrt{28}}{4}$
$= \frac{2 \pm 2\sqrt{7}}{4}$
$= \frac{1 \pm \sqrt{7}}{2}$

c) $m^3 - 8 = (m-2)(m^2 + 2m + 4)$

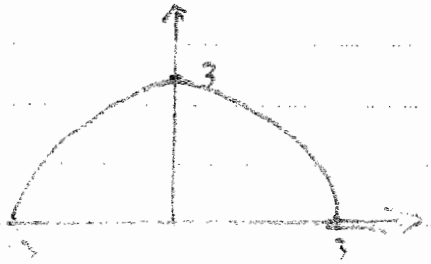
d) $x \geq -2$

Question 6

a) i)



ii)



b) $SC = \frac{4}{3}\pi r^3$
$r = \sqrt[3]{\frac{SC}{\pi}}$

c) $y \geq 2$

Question 7

a) i) exterior angle of triangle (equals sum of interior opposite angles)

ii) $4y + 120^\circ = 180$
$y = 15^\circ$
$\therefore \angle CAB + 90^\circ + 30^\circ = 180^\circ$ angle sum of triangle.
$\angle CAB = 60^\circ$

b) $2x + 3 = 5$
$2x = 2$
$x = 1$
OR.
$2x + 3 = -5$
$2x = -8$
$x = -4$

c) $T = a + (n-1)d$
$T - a = (n-1)d$
$\frac{T-a}{d} = n - 1$
$n = \frac{T-a}{d} + 1$
$= \frac{T-a+d}{d}$

Teacher's Name: Student's Name/No.:

Question 8

a) i) $x^2 - 2 = x$

$x^2 - x - 2 = 0$

$(x-2)(x+1) = 0$

$x = 2$ or -1

For $y = x$

ii) at $(0, -1)$ $-1 \leq 0$

$\therefore y \leq x$

For $y = x^2 - 2$

at $(0, -1)$ $-1 \geq -2$

$\therefore y \geq x^2 - 2$

b)

$x + y + 77 = 198$

$x + y = 121$ (1)

$x^2 + 77^2 = y^2$

$y^2 - x^2 = 5929$

$(y - x)(y + x) = 5929$

$\therefore y - x = 49$ (2)

(1) + (2)

$2y = 170$

$y = 85$

$x = 36$

$\therefore x = 36, y = 85$