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 $\dfrac{4y}{x}$

1

c) Evaluate $\dfrac{\sqrt{11.3}}{21.5 \times 0.68}$ to 3 significant figures.

2

d) The hyperbola $y = \dfrac{3}{a-x}$ 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

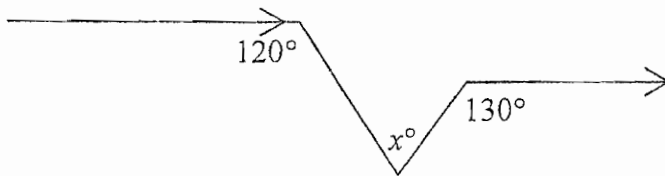c) AE, CF are straight lines; OD bisects $<COE, < BOD = 90°$
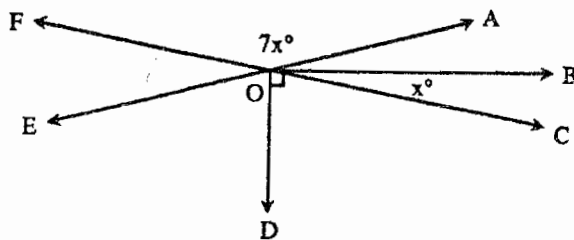
    i) Explain why $< EOC = 7x°$

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) $\dfrac{100+p}{p} = \dfrac{5}{2}$ 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 $\dfrac{3}{3-\sqrt{5}}$ in the form $a + b\sqrt{5}$ 2

b)   Simplify

      i) $\dfrac{2x}{3} - \dfrac{x-1}{4}$ 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.
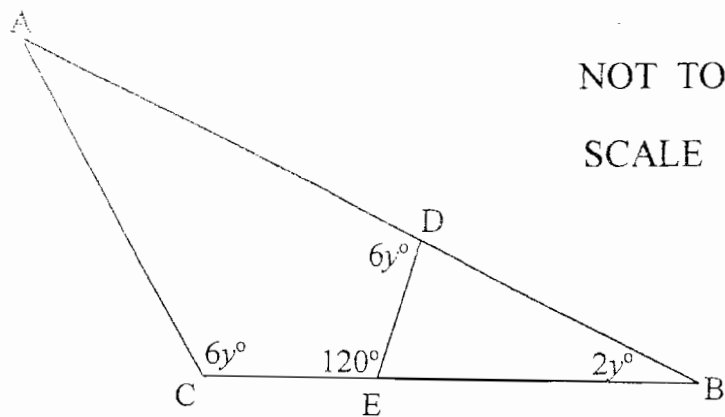
  i) $y = |x + 2|$ 2

  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

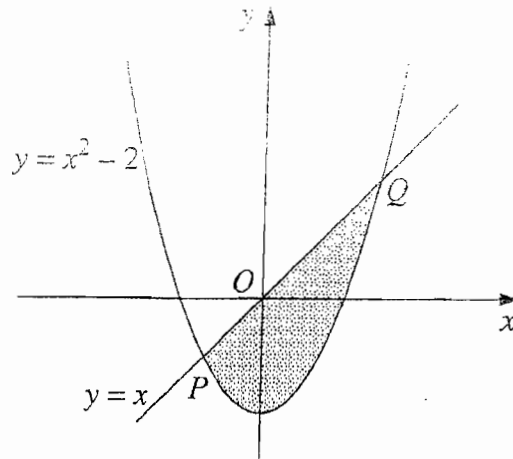c) State the range of the function $y = x^2 + 2$ 1

Question 7   (7 marks)

a)

NOT TO SCALE

    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
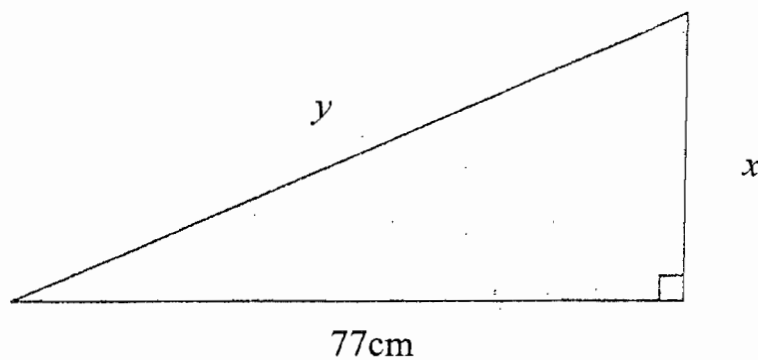
Question 8 **(7 marks)**

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.

Question 1

1a) $5 - 8 = -3$

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

c) $0.229927\cdots$
   $= 0.230$

d) $a = 1$
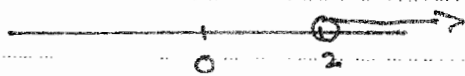
e) i) $\dfrac{2}{7}$

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

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) $\dfrac{9x}{2} = 90°$
   $x = 20°$

Question 3

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

b) i) $200 + 2p = 5p$
   $3p = 200$
   $p = 66\tfrac{2}{3}$

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

c) $(2\sqrt{3})^3 = 8\sqrt{27}$
   $= 24\sqrt{3}$

Question 4

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

b) i) $\dfrac{8x - 3(x-1)}{12}$
   $= \dfrac{5x + 3}{12}$

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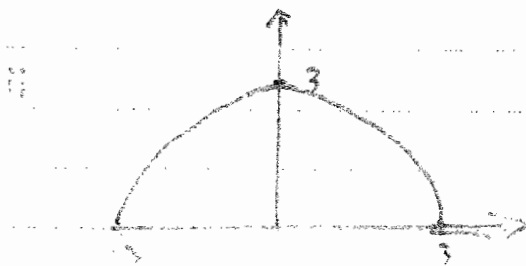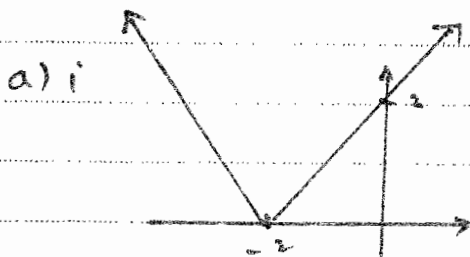 $= 5\sqrt{5} + 5\sqrt{2}$

c) $x = 70°$

Question 5

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

ii) $g(a-1) = (a-1)^2 - 4(a-1)$
$$= a^2 - 2a + 1 - 6a + 6$$
$$= a^2 - 8a + 7$$

b) $x = \dfrac{2 \pm \sqrt{4 + 24}}{4}$

$$= \dfrac{2 \pm \sqrt{24}}{4}$$

$$= \dfrac{2 \pm 2\sqrt{7}}{4}$$

$$= \dfrac{1 \pm \sqrt{7}}{2}$$

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

d) $x \geq -2$

Question 6

a) i)

ii)

b) $Sc = \frac{4}{3}\pi r^3$

$r = \sqrt[3]{\cdot 5c}$

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c) $y \geq 2$

Question 7

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

ii) $4y + 120° = 180$
$$y = 15°$$
∴ $\angle CAB + 90° + 30° = 180°$
angle sum of triangle.

$$\angle CAB = 60°$$

b) $2x + 3 = 5$
$$2x = 2$$
$$x = 1$$

or.

$$2x + 3 = -5$$
$$2x = -8$$
$$x = -4$$

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

Question 8

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

$x^2 - x - 2 = 0$

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

$x = 2 \text{ or } -1$

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

$2y = 170$

$y = 85$

$x = 36$

$\therefore x = 36, \; y = 85$