SYDNEY TECHNICAL HIGH SCHOOL

YEAR 11
MATHEMATICS

PRELIMINARY
ASSESSMENT TASK 1

MAY 2012

Time Allowed: 70 MINUTES

Instructions

1. Attempt all questions
2. Start each question on a new page
3. Show all necessary working
4. Write your name and your teachers name on each booklet used
5. Approved calculators may be used

QUESTION 1 (10 MARKS) MARKS

a) Calculate $\dfrac{3.7 \times 8.9}{\sqrt{16.94} + 10}$ to 4 significant figures. 2

b) Write $0.2\dot{6}$ as a fraction in its lowest terms, showing working. 2

c) Evaluate $\sqrt[4]{256}$ 1

d) A manufacturer produces an item for \$225. At what price must the item be sold to make a profit of 40% ? 1

e) Evaluate $|2^2 - 8| - |-7|$ 1

f) (i) Express $\sqrt[3]{x^5}$ in index notation. 1

(ii) Express $\dfrac{1}{3x^2}$ using negative indices. 1

QUESTION 2 (9 MARKS) MARKS

a) An insect weighs 2.3×10^{-3} grams. How much would 2500 of these insects weigh? 1

b) Simplify (i) $2x - 4y + 6x - 9y$ 1

(ii) $(3\sqrt{7})^2$ 1

c) Simplify $2\sqrt{75} + 4\sqrt{147}$ 2

d) Find m and n if $m - n\sqrt{5} = (3 - \sqrt{5})^2$ 2

e) Express $\dfrac{4 + \sqrt{3}}{2\sqrt{6}}$ with a rational denominator. 2

QUESTION 3 (9 MARKS) MARKS

a) Expand and simplify

(i) $5(x-2)+3(2x-9)$ 2

(ii) $(x-1)^2-(x+2)(2x+5)$ 3

b) Factorise

(i) $2x^2+3x-2$ 1

(ii) $8m^3+125$ 1

(iii) $xy-y^2-x+y$ 2

QUESTION 4 (9 MARKS)

a) Simplify (i) $\dfrac{9m+6}{3m^2+2m}$ 2

(ii) $\dfrac{x^2-x-20}{x^2-25} \div \dfrac{x+1}{x^2+5x}$ 3

b) Factorise $(2x-3)^2-25$ 2

c) Express $\dfrac{2x}{5} - \dfrac{x+1}{10}$ as a single fraction in its lowest terms. 2

QUESTION 5 (8 MARKS) MARKS

Solve a) $3t-3=5t+8$ 2

b) $|2x+3|=11$ 2

c) $\frac{7}{a}+2=\frac{3}{2a}$ 2

d) $x^2+5x=-6$ 2

QUESTION 6 (10 MARKS)

a) The curved surface area (A) of a cylinder is given by $A=2\pi rh$. 2
Find the height (h) if the area of the curved surface is $132\pi\ cm^2$ and the radius is $6cm$.

b) Solve $3x-4>x+7$ and graph its solution on a number line. 3

c) Solve simultaneously $2x+y=8$ 3
$3x+2y=13$

d) Make y the subject of $x=\sqrt{\frac{A}{y}}$ 2

QUESTION 7 (10 MARKS) MARKS

a) Solve $|2x-5| \geq 7$ 2

b) Sketch the following on separate diagrams, stating the domain and the range:

(i) $2x + 3y - 6=0$ 3

(ii) $y = x^2 - 4$ 3

c) Given that $f(x) = 3x^2 - 5x + 2$, evaluate $f(-2)$. 2

QUESTION 8 (9 MARKS) MARKS

a) Simplify $\dfrac{3}{x^2 + 2x + 1} + \dfrac{3}{x^2 - 1}$ 3

b) Solve $4x^2 + 12x + 1 = 0$, leaving your answer in simplest surd form. 3

c) If $x = (\frac{2}{3})^3$ and $y = (\frac{1}{2})^2$, find the exact value of x^2y^4 3

YEAR 11 MATHEMATICS
TERM 2 ASSESSMENT

Total = 73

QUESTION 1 (9)

a) $2\cdot33284\ldots = 2\cdot333$ (4 sig figs) 2

b) let $x = 0\cdot2666\ldots$

$10x = 2\cdot666\ldots$

$100x = 26\cdot666\ldots$

$90x = 24$

$x = \frac{24}{90} = \frac{4}{15}$

$\therefore 0\cdot2\dot{6} = \frac{4}{15}$ 2

c) 4 1

d) 140% of \$225 = \$315 1

e) -3 1

f) i) $x^{\frac{5}{3}}$ 1

ii) $3^{-1}x^{-2}$ 1

QUESTION 2 (9)

a) $2500 \times 2\cdot3 \times 10^{-3} = 5\cdot75g$ 1

b) i) $8x - 13y$ 1

ii) 63 1

c) $10\sqrt{3} + 28\sqrt{3} = 38\sqrt{3}$ 2

d) $m - n\sqrt{5} = 9 - 6\sqrt{5} + 5 = 14 - 6\sqrt{5}$

$m = 14 \quad n = 6$ 2

e) $\frac{4+\sqrt{3}}{2\sqrt{6}} \times \frac{\sqrt{6}}{\sqrt{6}} = \frac{4\sqrt{6}+\sqrt{18}}{12}$

$= \frac{4\sqrt{6}+3\sqrt{2}}{12}$ 2

QUESTION 3 (9)

a) i) $5x - 10 + 6x - 27 = 11x - 37$ 2

ii) $x^2 - 2x + 1 - (2x^2 + 5x + 4x + 10)$

$= -x^2 - 11x - 9$ 3

b) i) $(2x-1)(x+2)$ $2x \times x^{-1}_{2}$ 1

ii) $(2m+5)(4m^2 - 10m + 25)$ 1

iii) $y(x-y) - (x-y) = (x-y)(y-1)$ 2

QUESTION 4 (9)

a) i) $\frac{3(3m+2)}{m(3m+2)} = \frac{3}{m}$ 2

ii) $\frac{(x-5)(x+4)}{(x-5)(x+5)} \times \frac{x(x+5)}{x+1} = \frac{x(x+4)}{x+1}$

b) $(2x - 3 - 5)(2x - 3 + 5) = (2x-8)(2x+2)$

$= 4(x-4)(x+1)$

c) $\frac{4x - x - 1}{10} = \frac{3x-1}{10}$

QUESTION 5 (8)

a) $3t - 3 = 5t + 8$

$-11 = 2t$ 2

$t = -\frac{11}{2}$

b) $2x + 3 = 11 \qquad -2x - 3 = 11$

$2x = 8 \qquad -2x = 14$ 2

$x = 4 \qquad x = -7$

c) $\frac{7}{a} + 2 = \frac{3}{2a}$

$14 + 4a = 3$ 2

$4a = -11$

$a = -\frac{11}{4}$

d) $x^2 + 5x + 6 = 0$

$(x+2)(x+3) = 0$ 2

$x = -2, x = -3$

QUESTION 6 (10)

a) $A = 2\pi rh$ 2

$132\pi = 2\pi \times 6h$

$h = 11$ $\therefore$ Height is 11cm

b) $3x - 4 > x + 7$ 3

$2x > 11$

$x > \frac{11}{2}$

c) $2x + y = 8 \quad -①$

$3x + 2y = 13 \quad -②$

$① \times 2: \ 4x + 2y = 16 \quad -③$

$③ - ② \quad x = 3$

Sub in ①: $6 + y = 8$

$y = 2$ 3

$\therefore x = 3, y = 2$

d) $x = \sqrt{\frac{A}{y}}$

$x^2 = \frac{A}{y}$ 2

$y = \frac{A}{x^2}$

QUESTION 7 (10)

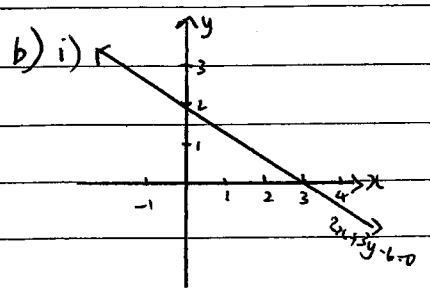
a) $|2x-5| \geq 7$

$2x-5 \geq 7 \qquad -2x+5 \geq 7$

$2x \geq 12 \qquad -2x \geq 2$ 2

$x \geq 6 \qquad x \leq -1$

b) i)

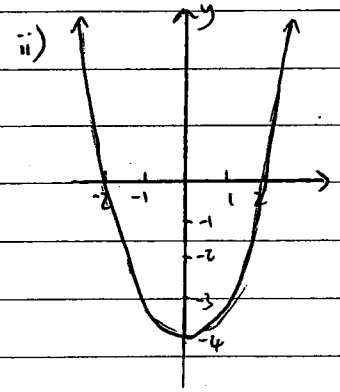


1

Domain: All real x values 1

Range: All real y values 1

ii)



1

Domain: all real x values 1

Range: $y \geq -4$ 1

c) $f(x) = 3x^2-5x+2$

$f(-2) = 3(-2)^2-5(-2)+2$ 2

$= 24$

QUESTION 8 (9)

a) $\frac{3}{(x+1)(x+1)} + \frac{3}{(x-1)(x+1)}$

$= \frac{3(x-1)+3(x+1)}{(x+1)(x+1)(x-1)}$ 3

$= \frac{3x-3+3x+3}{(x+1)^2(x-1)}$

$= \frac{6x}{(x+1)^2(x-1)}$

b) $4x^2+12x+1=0$

$x = \frac{-12 \pm \sqrt{144-4\times4\times1}}{2\times4}$

$= \frac{-12 \pm \sqrt{128}}{8}$ 3

$= \frac{-12 \pm 8\sqrt{2}}{8}$

$= \frac{-3 \pm 2\sqrt{2}}{4}$

c) $x^2y^4 = \left(\left(\frac{2}{3}\right)^2\right)^2\left(\left(\frac{1}{2}\right)^2\right)^4$

$= \frac{2^4}{3^4} \times \frac{1}{2^8}$ 3

$= \frac{1}{2^4 3^4}$

$= \frac{1}{1296}$