MATHEMATICAL METHODS (CAS)

Unit 1 – Written examination 1

2008 Trial Examination

SOLUTIONS

Question 1

$(x+2)^2 - 9 = 3x + 1$

$x^2 + 4x + 4 - 9 = 3x + 1$

$x^2 + 4x - 5 = 3x + 1$

$x^2 + x - 6 = 0$

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

$x = 2, -3$

$sub..values..in..y = 3x + 1$

$y = 3(2) + 1 ...and.... y = 3(-3) + 1$

$y = 7 ..... y = -8$

$co-ords..(2,7), and\,(-3,-8)$

M3 + A1

Question 2

$1)..4 = 1 + a + b + 6..and..2)..0 = -1 + a - b + 6$

$eqn.1. + eqn.2$

$-8 = 2a$

$a = -4, sub..in..1)$

$-3 = -4 + b$

$b = 1$

$\therefore a = -4, b = 1$

M2 + A1

Question 3

a.
$$(3x)^3-(2y)^3$$
$$(3x-2y)(9x^2+6xy+4y^2)$$

A1

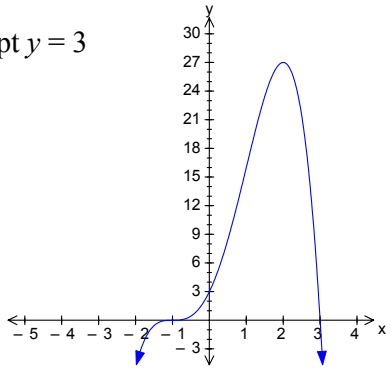
b.
$$P(-1)=-1+1+9-9=0$$
$$(x+1)\overline{)x^3+x^2-9x-9}\quad x^2-9$$
$$\text{-}\quad x^3+x^2$$
$$\text{-}\quad -9x-9$$
$$\text{-}\quad -9x-9$$
$$0$$
$$x^2-9=(x-3)(x+3)$$
$$\therefore P(x)=(x+1)(x-3)(x+3)$$

M2 + A1

Question 4

a. *POI* $(-1,0)$ x intercept $x=3$, y intercept $y=3$

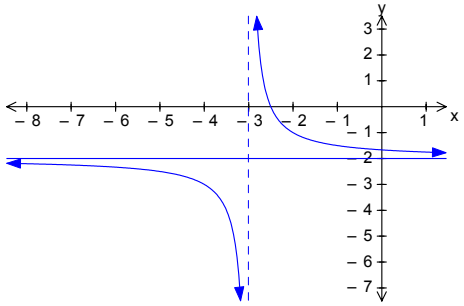
Show *POI* and intercepts, correct shape



A4

b. Show asymptotes y = −2, x = −3 and intercepts, correct shape

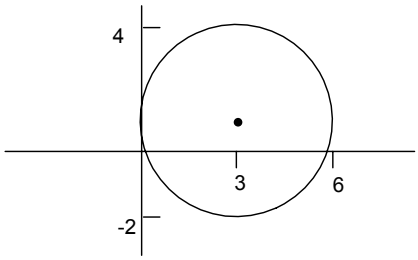
$$let...x=0, y=\frac{1}{3}-2$$
$$y=-1\frac{2}{3}$$
$$let..y=0,2=\frac{1}{x+3}$$
$$2x+6=1$$
$$x=-2\frac{1}{2}$$



A4

Question 5

a. Centre (3,1), radius = 3



A1 + A1

b. domain [0,6], range [−2,4]

A1 + A1

Question 6

$$2^{3(2x+1)} = 2^{4(x-1)}$$
$$6x + 3 = 4x - 4$$
$$2x = -7$$
$$x = -\frac{7}{2}$$

M2 + A1

Question 7

$$\log_2 (x+1)^2 = 2$$
$$2^2 = (x+1)^2$$
$$4 = x^2 + 2x - 3$$
$$0 = x^2 + 2x - 3$$
$$0 = (x+3)(x-1)$$
$$x = -3 \,..or..\, 1$$

M2 + A1

Question 8

a. use two points from the grid (3,−4) and (0,−7)

$m = \dfrac{-7 - -4}{0 - 3}$

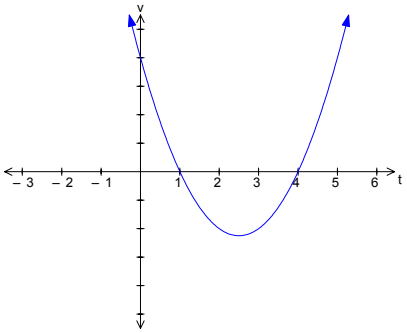
$m = 1$

$\therefore \textit{rate..of ..change..} = 1$

M1 + A1

Question 9

a. Stationary point at $x = 1$ maximum
Stationary point at $x = 4$ minimum



A2

Question 10

a. $\Pr(\text{WWW}) = \dfrac{4}{10} \times \dfrac{3}{9} \times \dfrac{2}{8}$

$= \dfrac{1}{30}$

M1 + A1

b. $\Pr(\text{BAA}) + \Pr(\text{ABA}) + \Pr(\text{AAB}) = 3 \times \dfrac{5}{10} \times \dfrac{5}{9} \times \dfrac{4}{8}$

$= \dfrac{5}{12}$

M1 + A1

Question 11

a.

	L	***L'***	
C	0.45	0.20	0.65
C'	0.30	0.05	0.35
	0.75	0.25	1

A2

b. $\Pr(C \mid L') = \dfrac{\Pr(C \cap L')}{\Pr(L')}$

$\dfrac{0.20}{0.25}$

$\dfrac{4}{5}$

A1