YEAR 11 2004

PASSPORT TERM

ASSESSMENT TASK

- **Attempt all questions.**
- **All necessary working to be shown.**
- **Start each section on a new sheet of paper.**

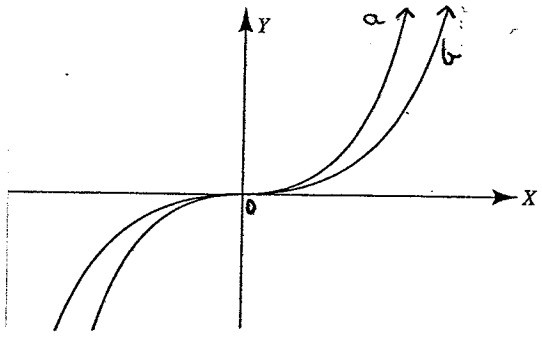
Note : Diagrams are not to scale

Outcome	Question Mark
1 **(12 marks)**	1 6 7 8 12
2 **(7 marks)**	5 10 11
3 **(4 marks)**	3 4
7 **(4 marks)**	2 9
8 **(15 marks)**	15 18 19 20 21 22
9 **(5 marks)**	16 17
10 **(6 marks)**	14 23

TOTAL / 53 = %

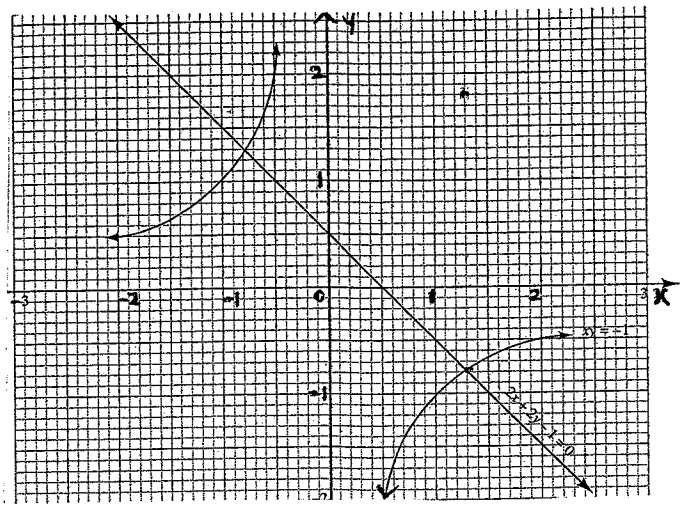
PART A (14.5 MARKS)

1. Match up each equation with its correct graph $y = 2x^3$ $y = 4x^3$ (1)



2. Sketch the curve $y = -x^6 + 1$ and label the x and y intercepts. (2)

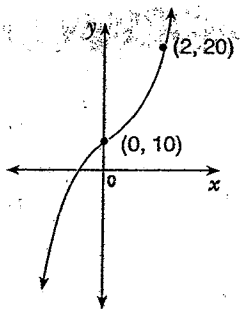
3. The graphs of $xy = -1$ and $2x + 2y - 1 = 0$ are drawn below. What are the points of intersection of the two graphs to one decimal place? (2)



4. Find algebraically the x coordinates of the points of intersection of the curves $y = x - 2$ and $y = x^2 - 4$. (2)

5. State the centre and radius of the circle $x^2 + y^2 = 19$. (2)

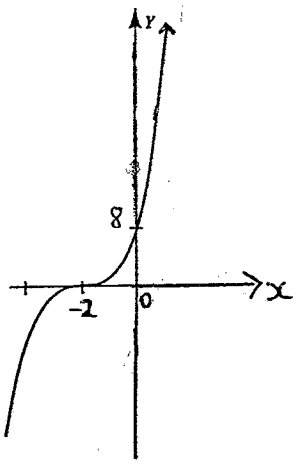
6. Given the graph is of the form $y = ax^3 + d$ find its equation. (2.5)



7. A cubic curve has x intercepts of –1, 2, and 4 and passes through the point (3, -5). What is its equation ? (3)

PART B **START A NEW PAGE.** **(12.5 marks)**

8. Write down the equation of this graph. (1)



9. Describe how $y = 3x^5$ must be moved to produce the curve with the equation $y = 3(x-1)^5 + 2$. (2)

10. Find the equation of a circle with centre (2, -5) and radius 3 units. (1.5)

11. Find the centre and radius of the circle $x^2 + y^2 - 18x - 20y + 60 = 0$. (3.5)

12. Sketch the curves on separate graphs. Label the x and y intercepts.

(a) $y = 2(x+1)(x-1)(x-2)$ (2.5)

(b) $y = (1-x)(x+2)^2$ (2)

PART C START A NEW PAGE (12.5 MARKS)

13. Solve $3^{3x-2} = 2187$ (2)

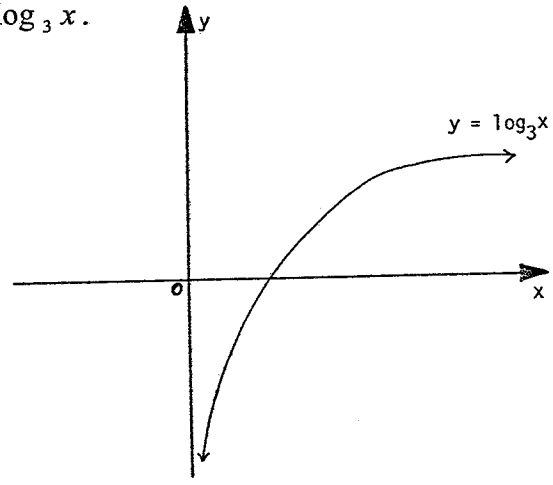
14. Find the value of x :

(a) $\log_4 x = 3$ (1)

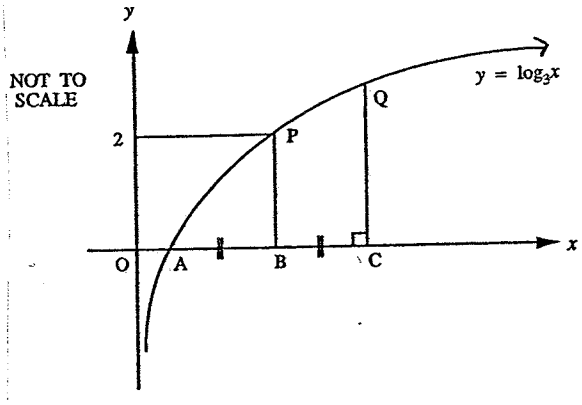
(b) $\log_x 81 = 4$ (1)

(c) $\log_3 243 = x$ (1)

15. The following graph (not to scale) represents $y = \log_3 x$. Trace or copy the graph onto your answer page. On the same graph sketch $y = \log_2 x$ showing its position relative to $y = \log_3 x$. (1)



16.



(a) State the coordinates of the point A. (1)

(b) Find the x coordinate of P . (1)

(c) If AB = BC find the length of CQ. Answer in exact form. (2)

17. Solve for x $\dfrac{\log_2 9}{\log_2 3} = \log_2 6x$. (2.5)

PART D START A NEW PAGE. (13.5 MARKS)

18. Given that $k^{1.63} = 3$ and $k^{2.39} = 5$

(a) Express $\sqrt{5}$ as a power of k . (1.5)

(b) State the logarithm of 3 to the base k . (1)

19. Simplify:

(a) $\log_6 3 + \log_6 2$ (1)

(b) $\log_3 5 - \log_3 45$ (2.5)

20. Find a relationship between x, y and p that does not involve logarithms.

$\log_2 x = \log_2 y + 3\log_2 p^3$ (1.5)

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

21. Simplify $\log_a\left(\dfrac{x^2 y}{t^2}\right) - 2\log_a\left(\dfrac{x}{t}\right)$ (2)

22. Solve $7^{x+1} = 3^x$ giving your answer correct to 3 decimal places. (4)

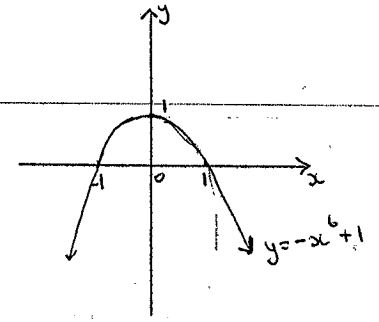
YEAR 11

PART A (14½)

1 (a) $y = 4x^3$

(b) $y = 2x^3$

2)



3) (1·3, −0·8)

(−0·8, 1·3)

4)

$y = x - 2$ ... ①

$y = x^2 - 4$ ... ②

$x^2 - 4 = x - 2$

$x^2 - x - 2 = 0$

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

$x = 2, -1$.

5) centre (0, 0)

radius $\sqrt{19}$ units

6) $y = ax^3 + d$

put $x = 0$ $y = 10$

$10 = d$

$y = ax^3 + 10$

put $x = 2$ $y = 20$

$20 = 8a + 10$

$8a = 10$

$a = \frac{5}{4}$

$y = \frac{5}{4}x^3 + 10$

7)

$y = k(x+1)(x-2)(x-4)$

subst $x = 3$ $y = -5$

$-5 = k \times 4 \times 1 \times -1$

$-4k = -5$

$k = \frac{5}{4}$

$y = \frac{5}{4}(x+1)(x-2)(x-4)$

PART B (12½)

8) $y = (x+2)^3$

9) move $y = 3x^5$ to the right 1 unit and then up 2 units

10) $(x-2)^2 + (y+5)^2 = 9$

11)

$x^2 + y^2 - 18x - 20y + 60 = 0$

$x^2 + y^2 - 18x - 20y = -60$

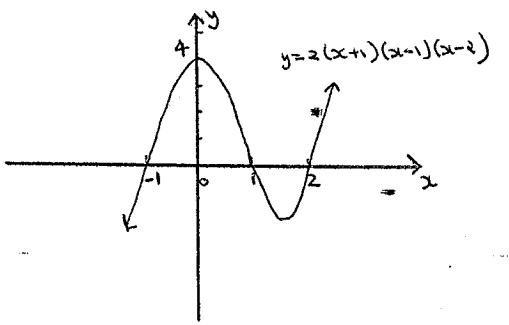
$x^2 - 18x + \left(\frac{-18}{2}\right)^2 + y^2 - 20y + \left(\frac{-20}{2}\right)^2 = 60 + \left(\frac{-18}{2}\right)^2 + \left(\frac{-20}{2}\right)^2$

$(x-9)^2 + (y-10)^2 = 121$

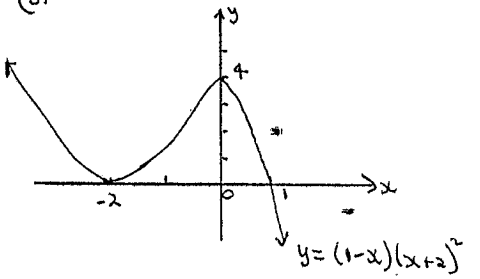
centre (9, 10)

radius 11 units

12) (a)



(b)



PART C $(12\frac{1}{2})$

(13) $3^{3x-2} = 2187$

$3^{3x-2} = 3^7$

$3x - 2 = 7$

$3x = 9$

$x = 3$

(14) (a) $x = 4^3$

$= 64$

(b) $x^4 = 81$

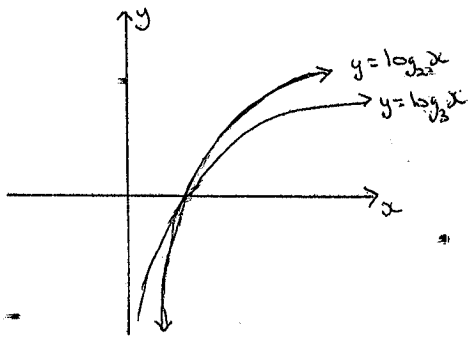
$x = 3$

(c) $3^x = 243$

$= 3^5$

$\therefore x = 5$

(15)



(16) (a) A (1, 0)

(b) $2 = \log_3 x$

$x = 3^2$

$x = 9$

(c) $AB = 9 - 1$

$= 8$

$\therefore BC = 8$

$OC = 1 + 8 + B$

$= 17$

$CQ = \log_3 17$

(17) $\frac{\log_2 3^2}{\log_2 3} = \log_2 6x$

$\frac{2\log_2 3}{\log_2 3} = \log_2 6x$

$2 = \log_2 6x$

$6x = 2^2$

$= 4$

$x = \frac{2}{3}$

PART D $(13\frac{1}{2})$

(18) (a) $\sqrt{5} = 5^{\frac{1}{2}}$

$= \left(k^{2.39}\right)^{\frac{1}{2}}$

$= k^{1.195}$

(b) $\log_k 3 = 1.63$

(19) (a) $\log_c 6$

$= 1$

(b) $\log_3 \frac{1}{9}$

$= \log_3 3^{-2}$

$= -2\log_3 3$

$= -2$

(20) $\log_2 x = \log_2 y + \log_2 p^3$

$\log_2 x = \log_2 yp^3$

$x = yp^3$

(21) $\log_a\left(\frac{x^2y}{t^2}\right) - \log_a\left(\frac{x}{t}\right)^2$

$\log_a\left(\frac{x^2y}{t^2}\right) - \log_a\left(\frac{x^2}{t^2}\right)$

$= \log_a\left(\frac{x^2y}{t^2} \div \frac{x^2}{t^2}\right)$

$= \log_a\left(\frac{x^2y}{t^2} \times \frac{t^2}{x^2}\right)$

$= \log_a y$

OR

$= \log_a x^2 + \log_a y - \log_a t^2 - (\log_a x^2 - \log_a t^2)$

$= \log_a x^2 + \log_a y - \log_a t^2 - \log_a x^2 + \log_a t^2$

$= \log_a y$

(22) $\log 7^{x+1} = \log 3^x$

$(x+1)\log 7 = x \log 3$

$x\log 7 + \log 7 = x\log 3$

$x\log 7 - x\log 3 = -\log 7$

$x(\log 7 - \log 3) = -\log 7$

$x = -\log 7 \div (\log 7 - \log 3)$

$= -2.2966\ldots$

$= -2.297$ (to 3 dp)