

Year 10 Mathematics  
Extension Paper



**MLC**  
S C H O O L

NAME: \_\_\_\_\_

CLASS: \_\_\_\_\_

Date: Thursday 11<sup>th</sup> September 2008

Time allowed: 90 minutes in total for the two papers

Outcomes to be assessed:

- 5.3 Solves quadratic equations
- 5.3 Solves simultaneous equations involving quadratics
- 5.3 Draws and interprets a variety of graphs including parabolas, cubics, exponentials and circles
- 5.3 Probability – solves problems involving compound events.

Performance Criteria:

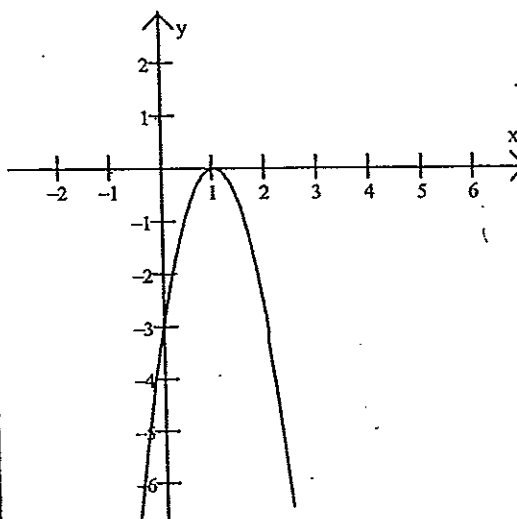
- logical, concise working and neat, clear diagrams
- correct solutions and reasoning ability
- approved calculators should be used

|                       | Mark | NE | P | S | H |
|-----------------------|------|----|---|---|---|
| Quadratics eqns 5.3   | /13  |    |   |   |   |
| Simultaneous eqns 5.3 | /16  |    |   |   |   |
| Non-linear graphs 5.3 | /11  |    |   |   |   |
| Probability 5.3       | /26  |    |   |   |   |
| Total:                | /66  |    |   |   |   |

1

Circle the equation that most closely represents the curve below:

1



a)  $y = -3(x + 1)^2$

b)  $y = 3(x - 1)^2$

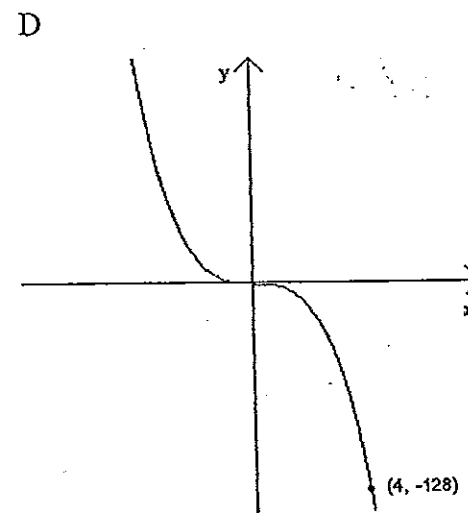
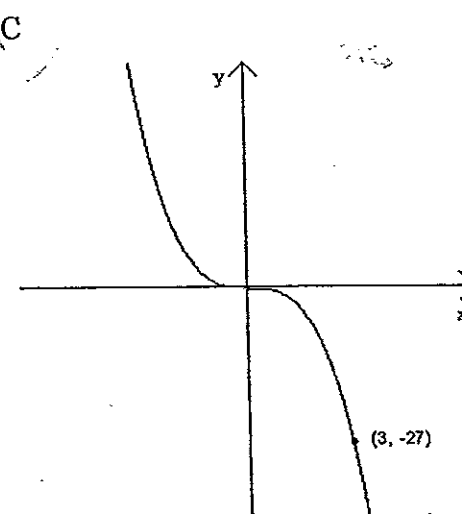
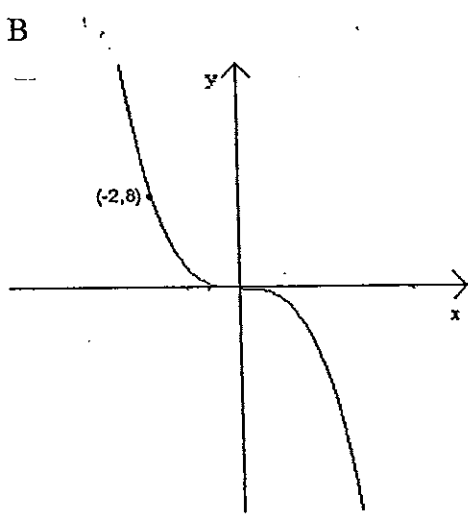
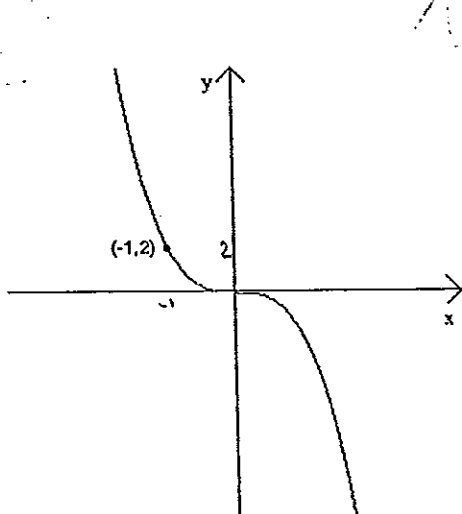
c)  $y = -3(x - 1)^2$

d)  $y = 3(x + 1)^2$

2

Test each given point to decide which curve does not satisfy the equation  $y = -2x^3$

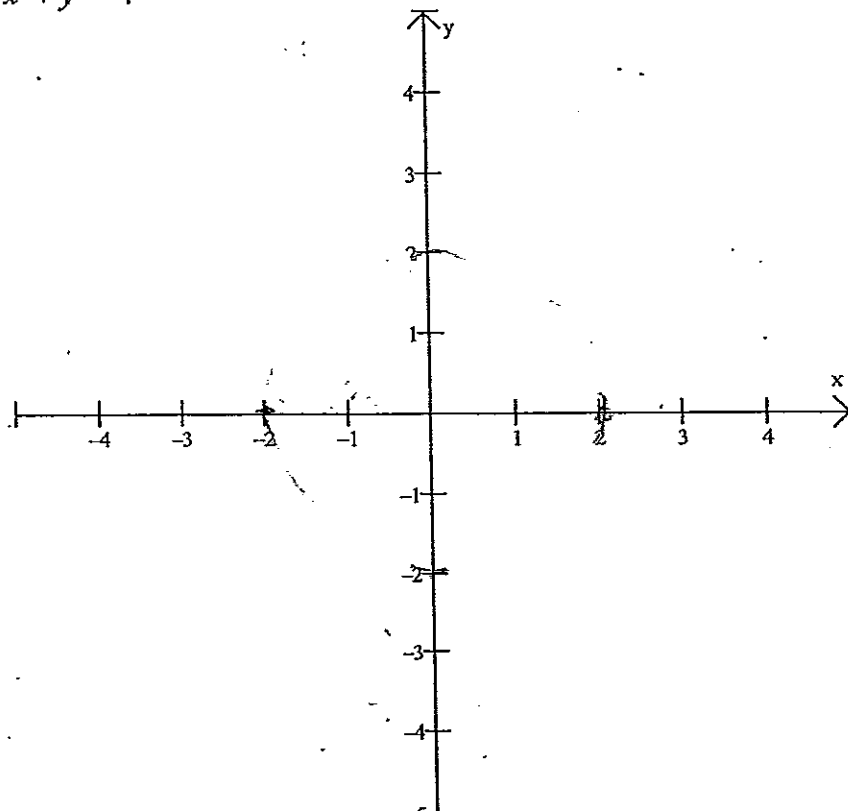
1



3

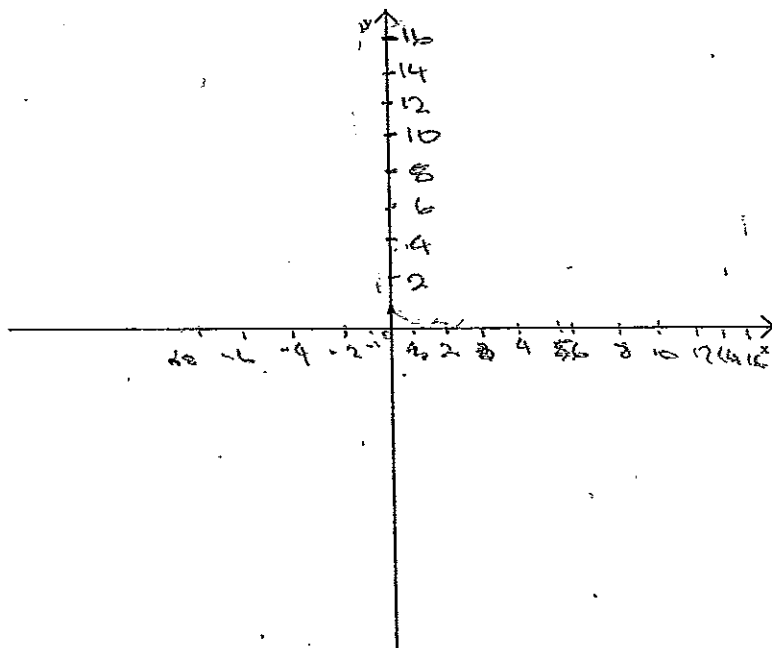
Sketch graphs of the following equations showing intercepts with the coordinate axes as appropriate.

a)  $x^2 + y^2 = 4$



1

b)  $y = 4^x$



1

4

For the parabola  $y = 16x - 2x^2$  find the following:

a)  $y$ -intercept

1

b)  $x$ -intercept(s)

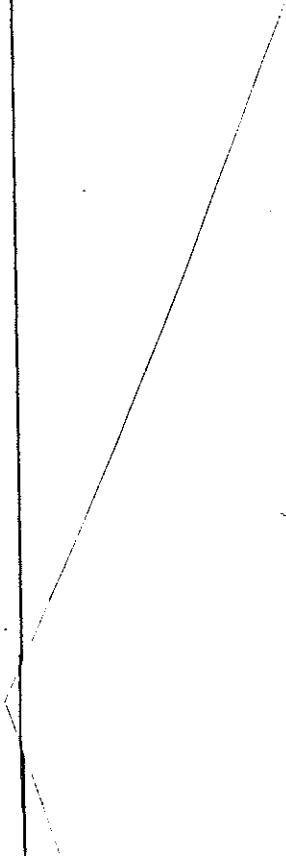
2

c) Axis of symmetry

1

e) Hence sketch the parabola  $y = 16x^2 - 2x^3$  showing all of the above features.

2



| 1       | <p>The probability that it will rain on any one day in July is 0.6. What is the probability that</p> <p>a) it will rain on two successive days in July?</p> <p>b) on a particular weekend in July, it will rain on Saturday but be fine on the Sunday?</p>   | <p>1</p> <p>1</p> |            |        |       |   |      |    |      |   |      |    |      |       |      |    |      |                            |
|---------|--|-------------------|------------|--------|-------|---|------|----|------|---|------|----|------|-------|------|----|------|----------------------------|
| 2       | <p>At a factory, machines A and B produce electronic parts. On a quality testing exercise, the number of parts produced by each machine over a week was recorded. The results are shown in the table below.</p> <table border="1" data-bbox="379 996 1193 1198"> <thead> <tr> <th>Machine</th> <th>Non Faulty</th> <th>Faulty</th> <th>Total</th> </tr> </thead> <tbody> <tr> <td>A</td> <td>1024</td> <td>16</td> <td>1040</td> </tr> <tr> <td>B</td> <td>1155</td> <td>25</td> <td>1180</td> </tr> <tr> <td>Total</td> <td>2179</td> <td>41</td> <td>2220</td> </tr> </tbody> </table> <p>a) What is the probability that machine B will produce a faulty part?</p> <p>b) A random electronic part is selected from the 2220 parts produced for the week. What is the probability that it will not be faulty?</p> <p>c) One part is selected at random from each of the batches produced by the two machines. (That is one from the batch produced by Machine A and one from the batch produced by machine B.) What is the probability that both parts are faulty?</p> | Machine           | Non Faulty | Faulty | Total | A | 1024 | 16 | 1040 | B | 1155 | 25 | 1180 | Total | 2179 | 41 | 2220 | <p>1</p> <p>2</p> <p>2</p> |
| Machine | Non Faulty   | Faulty            | Total      |        |       |   |      |    |      |   |      |    |      |       |      |    |      |                            |
| A       | 1024   | 16                | 1040       |        |       |   |      |    |      |   |      |    |      |       |      |    |      |                            |
| B       | 1155   | 25                | 1180       |        |       |   |      |    |      |   |      |    |      |       |      |    |      |                            |
| Total   | 2179   | 41                | 2220       |        |       |   |      |    |      |   |      |    |      |       |      |    |      |                            |

3.

Two four-sided tetrahedral die with faces numbered 1, 2, 3 and 4 are rolled. The two numbers on the uppermost faces are multiplied together. Complete the table below to show the product of the two numbers.

|   |   |   |   |   |
|---|---|---|---|---|
|   | 1 | 2 | 3 | 4 |
| 1 |   |   |   |   |
| 2 |   |   |   |   |
| 3 |   |   |   |   |
| 4 |   |   |   |   |

Find the probability that the product is

a) an odd number

b) a number greater than 6.

2

1

2

4.

Vivian and Venus play a game where Vivian has a 1 in 3 chance of winning the game and Venus has a 1 in 2 chance of winning the game. This game can also be drawn.

a) Show that the probability that the game will be drawn is 1 in 6.

b) Draw a probability tree to show the outcomes when Vivian and Venus play two games.

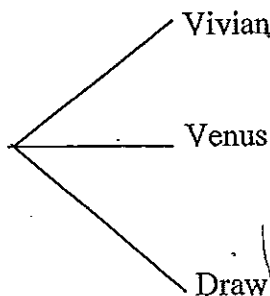
1

3

First Game

Second Game

Outcomes



|          |  |                   |
|----------|--|-------------------|
|          | <p>Use your probability tree to calculate the probability that</p> <p>c) Venus wins both games.</p> <p>d) The girls win one game each.</p>   | <p>1</p> <p>2</p> |
| <p>5</p> | <p>A bag of jelly beans contains 6 black and 4 pink jelly beans. Kristy selects a jelly bean at random and eats it. She then selects another jelly bean and eats it.</p> <p>a) Draw a probability tree to show all the possible outcomes.</p> <p>Use your tree to find the probability that</p> <p>b) Kristy selects 2 different colour jelly beans.</p> | <p>3</p> <p>2</p> |



|  |   |   |
|--|---|---|
|  | c) Kristy selects a black jelly bean first. | 2 |
|--|---|---|