

**NORTH SYDNEY GIRLS HIGH SCHOOL**  
**YEAR 10 MATHEMATICS 2004**  
**TERM 4**

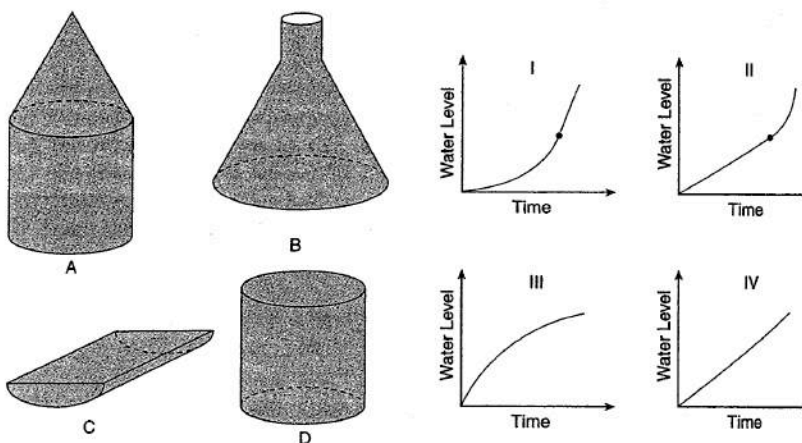
**TIME ALLOWED:** 60 minutes

**INSTRUCTIONS:** Attempt all questions

Show all necessary working

**PART A** (20 marks)

1. Each of the four containers pictured is filled with water at a steady rate. When the level of water in each container was plotted, the graphs I to IV were obtained. Match each container to its graph.



2. It is known that the mass of an egg varies directly with the cube of its length and that an egg of 8 centimetres length has a mass of 128 grams. Find the mass of an egg of length 6 centimetres.
3. The time taken to load a truck varies inversely with the number of men employed. If 8 men can load a truck in 45 minutes, how long would it take 3 men to load the same truck?
4. Find the rule for this quadratic relationship.

$x$	1	2	3	4	5
$y$	-2	4	12	22	34

5. Find the rule for this relationship.

$x$	1	2	3	6
$y$	6	3	2	1

6. Make  $x$  the subject of this equation

$$5(2 - x) = y$$

7. Solve this literal equation for  $a$

$$s = \sqrt{b - a}$$

8. Solve this equation for  $m$

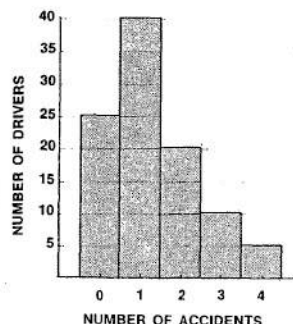
$$\frac{m}{m+3} = n$$

9. Substitute  $X$  for  $2^x$  and hence solve this equation for  $x$

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

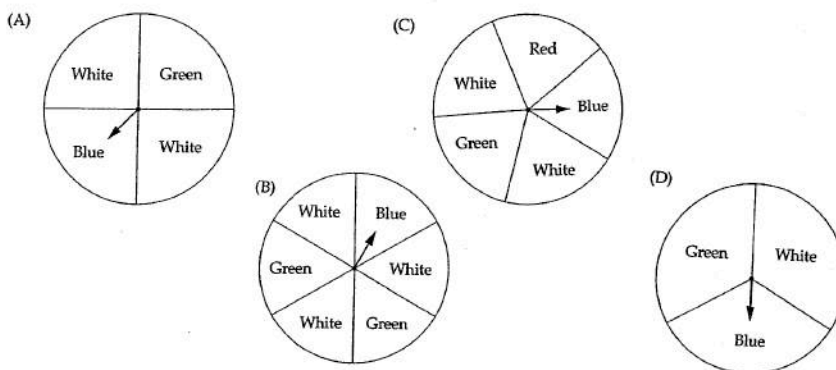
**PART B** (16 marks)

- There are 100 000 tickets sold in a lottery which has 50 prizes. What is the chance of a person winning a prize if he buys one ticket?
- If the probability in favour of an event is 1, what does this mean?
- A two-digit number is to be formed from the set of digits  $\{3, 4, 5, 6\}$  where the first number chosen is the *tens* digit and the second number chosen is the *units* digit. If no digit is repeated,
  - how many two digit numbers can be formed?
  - what is the probability that the number formed is divisible by 5?
- In Year 10 at a certain high school there are 150 students. Of these students 75 study French and 95 study Commerce, while 20 students study neither of these subjects.
  - How many students study both French and Commerce?
  - If a student is chosen at random, what is the probability that the student chosen studies
    - French only
    - Commerce?
- In a survey involving a sample of 100 drivers each driver was asked how many accidents he had been involved in. The results of the survey are shown. Based on this sample, what is the probability that a driver selected at random:
  - has not been involved in any accidents?
  - has been involved in exactly 2 accidents?
  - has been involved in more than 2 accidents?



6. Jim and Kevin are playing a game using a spinner.  
A player wins when the spinner stops on his colour.  
Jim always chooses green and Kevin always chooses white.

Which spinner should Kevin choose so that he has the greatest chance of beating Jim?



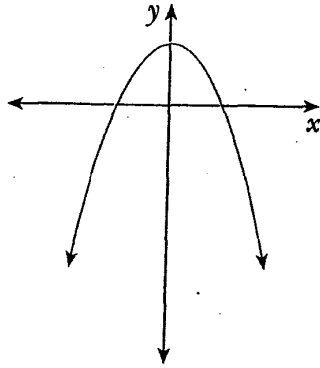
7. Two dice, with faces 0, 1, 2, 3, 4, 5 are thrown.  
The possible outcomes are

0, 0	0, 1	0, 2	0, 3	0, 4	0, 5
1, 0	1, 1	1, 2	1, 3	1, 4	1, 5
2, 0	2, 1	2, 2	2, 3	2, 4	2, 5
3, 0	3, 1	3, 2	3, 3	3, 4	3, 5
4, 0	4, 1	4, 2	4, 3	4, 4	4, 5
5, 0	5, 1	5, 2	5, 3	5, 4	5, 5

- Brad adds the two numbers on the dice.  
Find the probability that he obtains a score greater than 7
- Brad intends to throw the pair of dice 300 times.  
When he adds the numbers, how many times would he expect to obtain a score of 5?
- Sue multiplies the two numbers on the dice.  
What is her most likely score?
- On the same roll of the dice, Brad's score is the same as Sue's score.  
In how many ways is this possible?
- George throws the dice.  
The numbers have a product greater than 10 and a sum smaller than 9.  
Write down a pair of numbers that George could have thrown.

**PART C** (10 marks)

1. Sketch  $y = x^3$  and  $y = \frac{1}{2}x^3$  on the same number plane.
2. Write down the equation of the curve obtained by moving  $y = x^3$  horizontally 5 units to the right.
3. The curve drawn here has an equation of the form  $y = ax^n + d$



- a) What can you say about the sign of
    - (i)  $a$  ?
    - (ii)  $d$  ?
  - b) What can you say about  $n$  ?
4. State the co-ordinates of the centre and the radius of the circle with equation  $(x + 4)^2 + (y - 1)^2 = 12$
  5. On your own paper sketch the curve  $y = (x - 3)(x + 2)(x - 4)$

**END OF TEST**



TOTAL

(50)

YEAR 10 TERM 4 2004 MATHEMATICS.PART A - (14 Marks)

- Q1 A - II  
 B - I  
 C - III  
 D - IV

Q2  $m \propto l^3$   
 $m = kl^3$   
 $128 = k(8)^3$   
 $128 = 512k$   
 $k = \frac{128}{512}$   
 $= \frac{1}{4}$   
 $m = \frac{1}{4}l^3$   
 $m = \frac{1}{4}(6)^3$   
 $= 54$

Mass is 54 g.

Q3  $T \propto \frac{1}{m}$   
 $T = \frac{k}{m}$   
 $45 = \frac{k}{8}$   
 $k = 360$   
 $T = \frac{360}{m}$   
 $T = \frac{360}{3}$

$$= 120$$

time is 120 mins  
 or 2 hours.

Q4

0	1	2	3	4	5
-6	-2	4	12	22	34

4 6 8 10 12  
 2 2 2 2

$$2a = 2$$

$$a = 1$$

$$c = -6$$

$$a + b = 4$$

$$1 + b = 4$$

$$b = 3$$

Q5

$$xy = 6$$

Q6

$$5(2-x) = y$$

$$10 - 5x = y$$

$$10 - y = 5x$$

$$x = \frac{10-y}{5}$$

Q7

$$s = \sqrt{b-a}$$

$$s^2 = b-a$$

$$a = b - s^2$$

Q8

$$\frac{m}{m+3} = n$$

$$m = mn + 3n$$

$$m - mn = 3n$$

$$m(1-n) = 3n$$

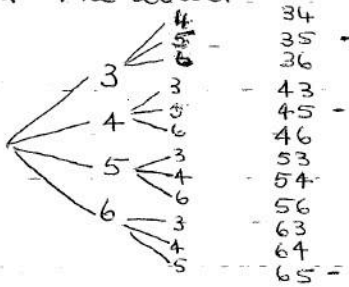
$$m = \frac{3n}{1-n}$$

Q9  $(2^x)^2 - 3(2^x) + 2 = 0$   
 $X^2 - 3X + 2 = 0$   
 $(X-2)(X-1) = 0$   
 $X = 1, 2$   
 $2^x = 1 \quad 2^x = 2$   
 $x = 0 \quad x = 1$   
 $x = 0, 1$

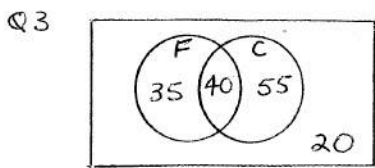
PART B (16 Marks)

Q1  $P(\text{win}) = \frac{50}{10000}$   
 $= \frac{1}{2000}$

Q2 The event must occur



a) 12  
b)  $P(\text{divisible by 5}) = \frac{3}{12} = \frac{1}{4}$



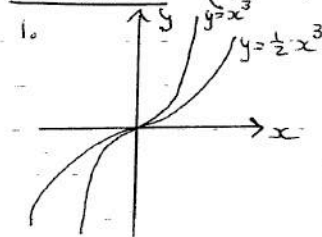
a) 40  
b)  $P(\text{French only}) = \frac{35}{150} = \frac{7}{30}$   
c)  $P(\text{Commerce}) = \frac{95}{150} = \frac{19}{30}$

Q5 Total =  $25 + 40 + 20 + 10 + 5 = 100$   
a)  $P(\text{no accident}) = \frac{25}{100} = \frac{1}{4}$   
b)  $P(2 \text{ accidents}) = \frac{20}{100} = \frac{1}{5}$   
c)  $P(> 2) = \frac{10+5}{100} = \frac{15}{100} = \frac{3}{20}$

Q6 A

- Q7 a)  $\frac{1}{6}$   
b) 50  
c) 0  
d) 2  $(0,0) + (2,2)$   
e) any one of  $(4,3) (5,3) (3,4) (4,4) (3,5)$

PART C (10 Marks)



- Q2  $y = (x-5)^3$   
Q3 a) (i)  $a < 0$   
(ii)  $d > 0$   
b) even

Centre  $(-4, 1)$   
radius  $\sqrt{12}$

