NORTH SYDNEY GIRLS HIGH SCHOOL
MATHEMATICS YEAR 10 COMMON TEST TERM 4, 2005

Time Allowed: ONE HOUR
Instructions: Answer all questions on your own paper
Part A: Multiple-choice questions
Part B: Show all necessary working
Part C: Show all necessary working.

PART A 10 MARKS – (1 MARK EACH) SELECT THE ALTERNATIVE A, B, C OR D THAT BEST ANSWERS THE QUESTION.

1. A room contains 5 adults, 3 boys and 4 girls. If one person is chosen at random, what is the probability that the person is an adult?

A. $\frac{1}{5}$ B. $\frac{1}{3}$ C. $\frac{5}{12}$ D. $\frac{5}{7}$

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2. A person is chosen at random. What is the probability that the person was NOT born on a Saturday or Sunday, if every day is equally likely?

A. $\frac{2}{5}$ B. $\frac{1}{7}$ C. $\frac{2}{7}$ D. $\frac{5}{7}$

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3. Which of the following always has a probability of $\frac{1}{2}$?

A. A pedestrian walk sign showing "walk".
B. On tossing a coin a second time the result is a tail.
C. Rolling a number less than 3 on a standard die.
D. Choosing an orange bead from a bag containing 8 yellow and 4 orange beads identical in size and shape.

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4. Sarah and Jane receive 45 text messages in the ratio 5:4 If a text message is selected at random, what is the probability it was one of Jane's?

A. $\frac{4}{9}$ B. $\frac{1}{5}$ C. $\frac{4}{9}$ D. $\frac{4}{45}$

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5. Grabby and Jessica are playing each other in a game of badmiriton. Grabby is six times more likely to win than Jessica. What is the probability that Jessica will win the game?

A. $\frac{1}{7}$ B. $\frac{1}{6}$ C. $\frac{5}{6}$ D. $\frac{6}{7}$

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6. A pack of playing cards consists of 52 cards. The cards are shuffled and a card is selected and kept. This card is red. A second card is selected. What is the probability that the second card is also red?

A. $\frac{1}{2}$ B. $\frac{25}{26}$ C. $\frac{25}{52}$ D. $\frac{25}{51}$

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PART A (CONTINUED)

7. Five hockey sticks cost $\$y$. The cost of x hockey sticks is

A. $\$\frac{5}{xy}$ B. $\$\frac{y}{5x}$ C. $\$\frac{xy}{5}$ D. $\$\frac{5y}{x}$

8. If $p>0$, $q>0$ which one will NOT always be true?

A. $p-q>0$ B. $p+q>0$ C. $pq>0$ D. $\frac{p}{q}>0$

9. If x and y are both negative, which of these expressions is always negative?

A. $x-y$ B. $x+y$ C. xy D. $\frac{x}{y}$

10. What is the reciprocal of $x+\frac{1}{x}$?

A. x^2+1 B. $\frac{1}{x}+x$ C. $\frac{x}{x^2+1}$ D. $\frac{1}{x+1}$

PART B. (18 MARKS) SHOW ALL NECESSARY WORKING. MARKS

1. A horse race, called the Melbourne Cup, is held on the first Tuesday in November each year. What is the probability that it will be held on the 8th November? 1

2. Which of the measures mean, mode or median relates to an outcome with the most likely probability? 1

3. A card is randomly chosen from a pack of 52 playing cards. Find the probability that it is: 4
   a) a heart?
   b) a queen?
   c) a heart or a queen?

4. Two dice are rolled. What is the probability of the uppermost faces totalling 4
   a) 5?
   b) 11?
   c) 12?
   d) less than 2?

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PART B (CONTINUED) MARKS

5. A bag containing 60 marbles has some which are clear and the others are opaque in colour. A marble is drawn from the bag at random. If the probability of the marble being clear is $\frac{1}{15}$ find: 4

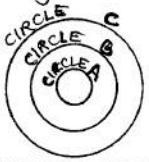
a) the number of opaque marbles in the bag.

b) the number of clear marbles that should be added to the bag to change the given probability to $\frac{1}{3}$.

6. A game uses the target shown consisting of three concentric circles with radii in the ratio 1:2:3. Given the target is hit, what is the probability of hitting the target 4

a) within circle A ?

b) between circle B and circle C ?



PART C (22 MARKS) SHOW ALL NECESSARY WORKING.

1. Make x the subject of for each of the following literal equations: 4

a) $y = mx + b$

b) $y = \sqrt{x+3}$

c) $A = x + \frac{xrt}{100}$

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2. a) Factorise: $x^2 + 2x + 1$ 2

b) hence factorise: $(g+h)^2 + 2(h+g) + 1$.

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3. If $x+y = m$ and $x-y = n$ 2

express $(x^2 - y^2) + 2x$ in terms of m and n.

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PART C (CONTINUED)

MARKS

4. For the following table of values:

x	1	2	3	6
y	12	6	4	2

2

a) Write an equation relating x and y;
b) Is this an example of direct variation, inverse variation or neither?

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5. For the following tables of values write an equation relating x and t, showing working.

a)

x	1	2	3	4
t	2	3	6	11

3

b)

x	-1	1	2	4
t	$\frac{1}{6}$	$1\frac{1}{2}$	$4\frac{1}{2}$	$40\frac{1}{2}$

2

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6. Make x the subject: $\frac{7}{x} + \frac{1}{y} = 23$ 3

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7. a) Factorise: $8x^2 - 18y^2$ 2

b) hence factorise: $8(x+h)^2 - 18(x-h)^2$ 2
expressing your answer in simplest form.

END OF TEST.

NSGHS YEAR 10 MATHEMATICS COMMON TEST TERM 4, 2005 SOLUTIONS

PART A (10 MARKS)

1. C
2. D
3. **B**
4. C
5. A
6. D
7. C

CHANCE & DATA

8. A
9. B
10. C.

ALGEBRA & COORDINATE GEOMETRY

PART B. (18 MARKS) CHANCE & DATA

(1M) 1. P(8th November) = 0

(1M) 2. MODE

(1M) 3. a) P(Heart) = $\frac{1}{4}$

(1M) b) P(Queen) = $\frac{1}{13}$

(2M) c) P(Heart or a Queen) = $\frac{16}{52}$ = $\frac{4}{13}$
for answer simplified. (1 dgg for not simplifying)

(1M) 4. a) P(5) = $\frac{4}{36}$ = $\frac{1}{9}$

(1M) b) P(11) = $\frac{2}{36}$ = $\frac{1}{18}$

(1M) c) P(12) = $\frac{1}{36}$

(1M) d) P(<2) = 0

5. a) No. of clear = $\frac{1}{15} \times 60$

(1M) $\longrightarrow$ = 4

(1M) $\therefore$ No. of opaque = 56

working (1M) b) $\therefore \frac{4+x}{60+x} = \frac{1}{3}$

(1M) $12+3x = 60+x$

$x = 24$

PART B (cont'd)

6. a) ratio of dimensions: 1 : 3 : 3
ratio of areas 1 : 4 : 9

(1M) P(within circle A) = $\frac{1}{9}$

(1M) A subtraction

(1M) b) P(between circle B and circle C) = $\frac{9-4}{9}$

(1M) CFPW(a) $\longrightarrow$ = $\frac{5}{9}$

PART A Q1-7 } CHANCE AND DATA /25
PART B }

PART A Q7-10 } ALGEBRA & CO-ORD. GEOM. /25
PART C }

TOTAL: 50 MARKS.

PART C (22 MARKS)

1. a) $x = \frac{y-b}{m}$ ← (1M)

b) $y^2 = x+3$

$x = y^2 - 3$ ← (1M)

c) $A = x\left(1 + \frac{rt}{100}\right)$ factorising (1M)

$\therefore x = A \div \left(1 + \frac{rt}{100}\right)$ (1M)

$= \frac{100A}{100+rt}$ or equivalent.

2. a) $(x+1)^2$ ← (1M)

b) $(g+h+1)^2$ ← (1M)

3. $mn + m + n$ since (1M) (1M)

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

4. a) $xy = 12$ ← (1M)

b) INVERSE ← (1M)

5. a) second layer
Common difference (2a) = 2
$\therefore a = 1$ (1M)

x	1	2	3	4
t	2	3	6	11

1 2 3 5
2 2 2

$a+b = -1$ CFPA
$\therefore b = -2$ (1M)
Value when x=0 $c = 3$ (1M)

$\therefore x = t^2 - 2t + 3$

b)

x	-1	1	2	4
t	6	$\frac{3}{2}$	$\frac{9}{2}$	$\frac{21}{2}$

Common ratio of 3
$\therefore$ form is $x = A.3^t$
When $t=1$, $\frac{3}{2} = A.3$
$\therefore A = \frac{1}{2}$

(1M) (1M) $\therefore x = \frac{1}{2} \cdot 3^t$

6. $\frac{7}{x} = 23 - \frac{1}{y}$ (3M) ← isolating x, reciprocating correctly, tidying up fraction eg. common denominator

$\frac{7}{x} = \frac{23y-1}{y}$

$\frac{x}{7} = \frac{y}{23y-1}$

$x = \frac{7y}{23y-1}$

7. a) $2(4x^2 - 9y^2)$ (2M)
$= 2(2x+3y)(2x-3y)$

b) $2[2(x+h) - 3(x-h)] \times [2(x+h) + 3(x-h)]$ (1M)
$= 2(5x-h)(5h-x)$ (1M) or equivalent