NAME :

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YEAR 12 – MATHS EXT.1

REVIEW TOPIC (PAPER 2): PERMUTATION & COMBINATION

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JAMES RUSE 2002 Q4

(b) An urn contains 6 cards numbered 1, 2, 3, 4, 5, 6. One card is drawn at random and a second card is drawn without the first card being replaced. Find the probability that: -

(i) the second number is 3 1

(ii) the larger number is 5 2

(iii) the larger number is even 2

JAMES RUSE 2002 Q7

(a) In a box, there are 10 black counters (each marked with the digit "2") and 5 white counters (each marked with digits "3"\ 4 counters are withdrawn one at a time, the first being replaced before the second is drawn. Find the probability that

(i) 2 blacks and 2 white counters are drawn in any order 2

(ii) The sum of digits on the counters drawn is greater than 9 3

MANLY 2002 Q3

b) Three boys and five girls are at a birthday party.

i) The children are asked to form a queue to collect some food. In how many ways can the queue be formed? (1)

ii) After eating the children are asked to sit in a circle for the party games. In how many ways can the children be seated around the circle? (1)

iii) For the '*Pass the Parcel*' game the children remain in a circle, but two of the boys are asked not to sit together. In how many ways may this occur? (2)

NEWINGTON 2004 Q2

d) (i) How many teams of 3 women can be chosen from a group of 5 women? 1

(ii) If the names of 6 men and 5 women are placed in a hat and 3 names are then drawn from the hat simultaneously to form a team, what is the probability that the team is exclusively female? 2

NEWINGTON 2004 Q4

(c) At a reception for the Queen, 6 dignitaries are to be seated on stage with the Queen seated in the middle of them. Two of these dignitaries are Mr Hill and Mr Hall. Before the reception they quarrel and insist that they be seated on different sides of the Queen. How many seating plans can be drawn up to satisfy their wish? 3

ST IGNATIUS 2002 Q4

(a) Consider the letters of the word MILLER.

(i) How many arrangements of these letters are possible if the letters are arranged in a straight line? 1

(ii) What is the probability that the L's will be separated when the letters are arranged in a straight line? 2

(iii) If the letters are arranged in a circle, how many arrangements are possible? 1

(iv) If the letters are arranged in a circle, what is the probability the L's will be opposite each other? 2

JAMES RUSE 2002 Q1

(d) Eight identical coins show 3 heads and 5 tails.

(i) In how many ways can they be arranged in a straight line? 1

(ii) What is the probability that all the tails will be together? 1

SOLUTIONS

JAMES RUSE 2002 Q4

(b)(i) Sample space $= {}^6P_2 = 30$

No. of favourable events = 5

i.e. (1,3)(2,3)(4,3)(5,3)(6,3)

$P(\text{2nd no. is 3}) = \frac{5}{30}$

$= \frac{1}{6}$ (1)

(ii) Sample space $= {}^6C_2 = 15$

No. of favourable events = 4

$P(\text{larger no. is a 5}) = \frac{4}{15}$ (2)

(iii) $n(S) = {}^6C_2 = 15$

5 has 2 larger even no's.

3 " 4 " " "

1 " 6 " " "

9 $\therefore n(E) = 9$

$P(\text{larger no. even}) = \frac{9}{15}$

$= \frac{3}{5}$ (2)

JAMES RUSE 2002 Q7

(a) 4 chosen (2B, 2W) $= \frac{4!}{2!2!}$ ways

(i) $P(2B, 2W) = 6\left(\frac{10}{15}\right)^2\left(\frac{5}{15}\right)^2$

$= 6\left(\frac{4}{9}\right)\left(\frac{1}{9}\right)$ (2)

$= \frac{8}{27}$

(ii) Listing

$P(2W, 2B) = 6\left(\frac{10}{15}\right)^2\left(\frac{5}{15}\right)^2$

$P(3W, 1B) = \frac{4!}{3!}\left(\frac{10}{15}\right)\left(\frac{5}{15}\right)^3$

$P(4W) = \frac{4!}{4!}\left(\frac{5}{15}\right)^4$

$P(\text{sum} > 9) = \frac{5^2}{15^4}\left(6 \times 10^2 + 4 \times 10 \times 5 + 25\right)$

$= \frac{11}{27}$ (3)

MANLY 2002 Q3

(b). 3 boys, 5 girls.

(i). $8! = 40320.$ ✓

(ii). $7! = 5040.$ ✓

(iii). P(Two boys not sit Together) = All − P(Can sit together)

$= 7! - 6! \times 2$ ✓

$= 3600.$

NEWINGTON 2004 Q2

(a) (i) ${}^5C_3 = 10$

(ii) $\frac{{}^5C_3}{{}^{11}C_3} = \frac{10}{165} = \frac{2}{33}$

NEWINGTON 2004 Q4

(c) $4! \times 3 \times 3 \times 2 = 432$ plans

ST IGNATIUS 2002 Q4

(a) MILLER.

(i) No. of arrange's $= \frac{6!}{2!} = 360$

(ii) Prob (L's separated)
$= 1 - P(L's\ together)$
$= 1 - \frac{5!}{360}$
$= \frac{2}{3}$

(iii) No. of arrange's $= \frac{5!}{2!} = 60$

(iv) $P(L's\ opposite) = \frac{1}{5}$
or $\frac{4!}{5!} = \frac{1}{5}$

JAMES RUSE 2002 Q1

(d)(i) No. of ways $= \frac{8!}{5!\,3!}$
$= 56$

(ii) Pr(all tails together) $= \frac{4}{56}$
$= \frac{1}{14}$

TTTTTHHH
HTTTTTHH (1)
HHTTTTTH
HHHTTTTT