South Sydney High School
COMBINATIONS
3 Unit Worksheet

1.   From a group of nine people
   (a)   how many different groups of four may be selected ?
   (b)   how many different groups of five may be selected ?
   (c)   how many different groups of five may be selected so as to include
      (i)   neither the eldest nor the youngest ?
      (ii)   both the eldest and the youngest ?
      (iii)   the youngest or the eldest, but not both.

2.   A pack of 14 cards includes 4 Aces. If 6 are selected at random, what is the probability that
   (a)   all the aces are selected ?
   (b)   none of the aces is selected ?
   (c)   at least one of the aces is selected ?
   (d)   exactly two of the aces are selected ?

3.   From a box containing 5 red and 7 black marbles, four are selected at random. What is the probability that
   (a)   two are red and two black ?
   (b)   they are all the same colour ?

4.   There are nine points marked on the circumference of a circle. Using these points,
   (a)   how many different chords can be drawn ?
   (b)   how many different triangles can be drawn ?

5.   How many diagonals has a nine-sided convex polygon ? (A diagonal joins any vertex to a non-adjacent vertex)

6.   A committee of seven is to be formed from six Labor and four Liberal Senators. If the committee is chosen at random, find the probability that it will contain a Labor majority.

7.   From the seven colours of the spectrum, three are to be selected.
   (a)   How many different selections can be made ?
   (b)   How many different selections can be made if the selection must not include both blue and green ?

8.   Two different numbers are chosen at random from the set

$$\{1, 2, 3, 4, 5\}$$

What is the probability that they have

(a) an even sum ?   (b)   an odd sum ?

(c) an even product ?   (d)   a prime product ?

9.   From an ordinary pack of 52 playing cards, three are selected at random. Prove that the probability of at least one of them being a Jack, Queen or King is approximately 55.3%.

† 10.   In how many different ways can a group of eight people be divided

(a)   into a group of five and a group of three ?

(b)   into two groups of four ?

(c)   into two groups, four to play tennis and four to play golf ?

† 11.   A set of cards consists of a red 1, 2, and 3, a white 1, 2, 3 and 4, and a blue 1, 2, 3, 4 and 5. If four of them are selected at random, find the probability that

(a)   they are all blue

(b)   all the red ones are chosen

(c)   they are all either "1's", "2's" or "3's"

(d)   all the "4's" are chosen

(e)   the total of the numbers on them is seven.

† 12.   A bag contains 3 red and 4 black marbles. Three of them are drawn at random and placed in a second bag. If two are then drawn at random from the second bag, what is the probability that they are both black ?

COMBINATIONS

1.   (a) 126 (b) 126 (c) (i) 21 (ii) 35 (iii) 70

2.   (a) $\dfrac{15}{1001}$ (b) $\dfrac{10}{143}$ (c) $\dfrac{133}{143}$ (d) $\dfrac{90}{1001}$

3.   (a) $\dfrac{14}{33}$ (b) $\dfrac{8}{99}$ 4. (a) 36 (b) 84   5. 27 6. $\dfrac{5}{6}$

7.   (a) 35 (b) 30   8. (a) $\dfrac{2}{5}$ (b) $\dfrac{3}{5}$ (c) $\dfrac{7}{10}$ (d) $\dfrac{3}{10}$

10.   (a) 56 (b) 35 (c) 70

11.   (a) $\dfrac{1}{99}$ (b) $\dfrac{1}{55}$ (c) $\dfrac{1}{33}$ (d) $\dfrac{1}{11}$ (e) $\dfrac{32}{495}$ 12. $\dfrac{16}{35}$