C.E.M.TUITION

Student Name :_____

Review Topic : Probability

(HSC - PAPER 2)

Year 12 - 2 Unit

8. Two six-sided dice are painted such that opposite faces on each die are the same colour. On each die two faces are coloured red, two green and the other two blue. Mitchell tosses the two dice and notes the uppermost colours. Find the probability that the uppermost faces will be:

(a) both blue;   (b) one blue;

(c) any colour but blue;   (d) the same colour;

(e) different colours

9. **(a)** In a supermarket promotion 10 gold tokens numbered 1 to 10 are hidden. Katya found one of the tokens. Find the probability that Katya found the token:

    (i) number 7;   **(ii)** numbered less than 7;

    (iii) numbered 7 or more.

(b) An old cat sees a mouse four out of ten times. When she sees the mouse she will catch the mouse 4 out of 5 times. Find the probability that the cat will catch the next mouse to come within her range.

10. The probability of giving birth to twins in 1985 was 0·02. If two expectant mothers were chosen at random, what is the probability that: (a) both; (b) one; (c) at least one; of the mothers gave birth to twins in 1985.

11. The names of 8 boys and 4 girls are placed in one hat, while the names of 6 boys and 6 girls are placed in another hat. One name is drawn from each hat. Find the probability that the names drawn are:

(a) both boys;   (b)   a boy and a girl;
(c) not boys;   (d)   at least one boy.

12. Michelle has a bag of Smarties containing 5 red and 3 blue Smarties. Two Smarties are drawn in succession from the bag and eaten. Find the probability that the Smarties consumed are:

(a) both blue;

(b) different colours;

(c) the same colour;

(d) at least one red.

13. Robyn keeps loose coins in the ashtray of her car. Last Sunday she noted that there were 4 fifty-cent coins and 6 twenty-cent coins. Robyn randomly chooses two coins to buy a 70-cent paper. Find the probability that, if the choice is random, Robyn has chosen sufficient to complete her purchase.

14. Six cards, numbered one to six, are placed face down on the table in random order.

(a) Cathy chooses one card. Find the probability that it is:
   (i) 6;   (ii) even;
   (iii) not 6.

(b) Margaret chooses two cards with the first drawn making up the tens digit of a number and the second the units digit (i.e. 34).

   Find the probability that the number formed is:
   (i) 54;   (ii) 45;
   (iii) 54 or 45;   (iv) even;
   (v) divisible by 5;   (vi) is greater than 20.

(c) Find the probability that the sum of the two digits turned up is:
   (i) 8;   (ii) less than 8.

8. Possible combinations include:

(R, R) (R, G) (R, B)
(G, R) (G, G) (G, B)
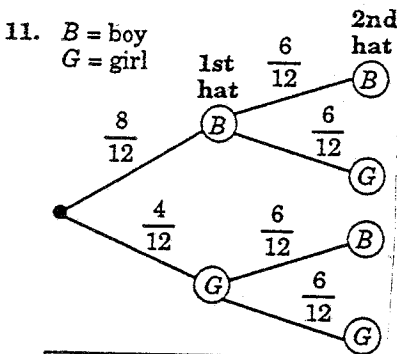(B, R) (B, G) (B, B)

| 9 different combinations |

(a) $P(BB) = \dfrac{1}{9}$

(b) $P(1 \text{ blue}) = \dfrac{4}{9}$

(c) $P(\text{not blue}) = \dfrac{4}{9}$

(d) $P(\text{same colour}) = \dfrac{3}{9} = \dfrac{1}{3}$

(e) $P(\text{different}) = 1 - \dfrac{1}{3} = \dfrac{2}{3}$

9. (a) (i) $P(7) = \dfrac{1}{10}$

     (ii) $P(< 7) = \dfrac{6}{10} = \dfrac{3}{5}$

     (iii) $P(\geq 7) = 1 - \dfrac{3}{5} = \dfrac{2}{5}$

(b) $P = \dfrac{4}{10} \times \dfrac{4}{5} = \dfrac{8}{25}$

10. $P(\text{twins}) = 0.02$
$P(\text{not twins}) = 0.98$

(a) $P(\text{both})$
$= 0.02 \times 0.02 = 0.0004$

(b) $P(\text{one})$
$= 0.02 \times 0.98 + 0.98 \times 0.02$
$= 0.0392$

(c) $P(\text{at least one})$
$= 1 - P(\text{none})$
$= 1 - (0.98)^2 = 0.0396$

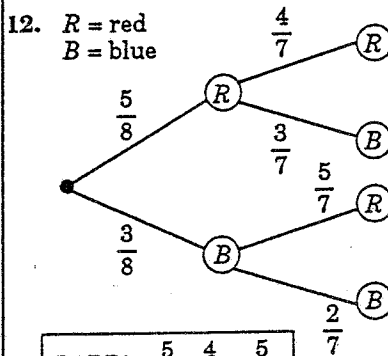**11.** $B = \text{boy}$
$G = \text{girl}$

$$P(BB) = \dfrac{8}{12} \times \dfrac{6}{12} = \dfrac{1}{3}$$
$$P(BG) = \dfrac{8}{12} \times \dfrac{6}{12} = \dfrac{1}{3}$$
$$P(GB) = \dfrac{4}{12} \times \dfrac{6}{12} = \dfrac{1}{6}$$
$$P(GG) = \dfrac{4}{12} \times \dfrac{6}{12} = \dfrac{1}{6}$$

(a) $P(BB) = \dfrac{1}{3}$

(b) $P(B \text{ and } G)$
$= P(BG) + P(BG)$
$= \dfrac{1}{3} + \dfrac{1}{6} = \dfrac{1}{2}$

(c) $P(\text{not boys}) = P(GG) = \dfrac{1}{6}$

(d) $P(\text{at least one boy})$
$= 1 - P(GG)$
$= 1 - \dfrac{1}{6} = \dfrac{5}{6}$

12. $R = \text{red}$
$B = \text{blue}$

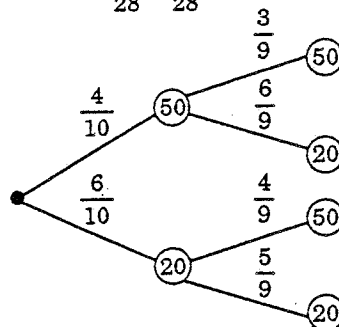$$P(RR) = \dfrac{5}{8} \times \dfrac{4}{7} = \dfrac{5}{14}$$
$$P(RB) = \dfrac{5}{8} \times \dfrac{3}{7} = \dfrac{15}{56}$$
$$P(BR) = \dfrac{3}{8} \times \dfrac{5}{7} = \dfrac{15}{56}$$
$$P(BB) = \dfrac{3}{8} \times \dfrac{2}{7} = \dfrac{3}{28}$$

(a) $P(BB) = \dfrac{3}{28}$

(b) $P(\text{different})$
$= P(RB) + P(BR)$
$= \dfrac{15}{56} + \dfrac{15}{56} = \dfrac{30}{56} = \dfrac{15}{28}$

(c) $P(\text{same colour})$
$= P(RR) + P(BB)$
$= \dfrac{5}{14} + \dfrac{3}{28} = \dfrac{13}{28}$

(d) $P(\text{at least one red})$
$= 1 - P(BB)$
$= 1 - \dfrac{3}{28} = \dfrac{25}{28}$

13.

$$P(50, 50) = \dfrac{4}{10} \times \dfrac{3}{9} = \dfrac{2}{15}$$
$$P(50, 20) = \dfrac{4}{10} \times \dfrac{6}{9} = \dfrac{4}{15}$$
$$P(20, 50) = \dfrac{6}{10} \times \dfrac{4}{9} = \dfrac{12}{45}$$
$$P(20, 20) = \dfrac{6}{10} \times \dfrac{5}{9} = \dfrac{1}{3}$$

$P(\text{at least 70c})$
$= 1 - P(20, 20)$
$= 1 - \dfrac{1}{3} = \dfrac{2}{3}$

14. (a) (i) $P(6) = \dfrac{1}{6}$

     (ii) $P(\text{even}) = \dfrac{1}{2}$

     (iii) $P(\neq 6) = 1 - \dfrac{1}{6} = \dfrac{5}{6}$

(b) 36 possible numbers

     (i) $P(54) = \dfrac{1}{6} \times \dfrac{1}{5} = \dfrac{1}{30}$

     (ii) $P(45) = \dfrac{1}{6} \times \dfrac{1}{5} = \dfrac{1}{30}$

     (iii) $P = \dfrac{2}{30} = \dfrac{1}{15}$

     (iv) $P(\text{even}) = \dfrac{1}{2}$
     (can end in 2, 4, 6,
     i.e. 3 out of 6)

     (v) $P(\text{divisible by 5}) = \dfrac{1}{6}$
     (must end in 5,
     i.e. 1 out of 6)

     (vi) $P(> 20) = \dfrac{5}{6}$ (must
     begin with 2, 3, 4, 5, 6,
     i.e. 5 out of 6 numbers)

(c) Use table from question 4.

     (i) $P(8) = \dfrac{2}{15}$

     (ii) $P(< 8) =$
     $= \dfrac{3}{5}$