C.E.M.TUITION

Name :_____

2 UNIT REVIEW TOPIC

PROBABILITY (PAPER 1)

Summary :

$$P(A) = \frac{\text{Number of outcomes favourable to A}}{\text{Total number of possible outcomes}}$$, if the outcomes are equally likely.

Note : $0 \le P(A) \le 1$

$P(A) = 1 - P(\widetilde{A})$ where $P(\widetilde{A})$ is the complement of A.

$P(A \cup B) = P(A) + P(B) - P(AB)$

$\qquad = P(A) + P(B)$ if A and B are mutually exclusive, i.e. $A \cap B = 0$.

$P(AB) = P(A).P(B)$ if A and B are independent.

Exercises :

(1) Pauline has a bag of Smarties containing 5 red and 3 black Smarties. Two Smarties are drawn in succession from the bag and eaten. Find the probability that the Smarties eaten are :

(a) both black

(b) different colours

(c) the same colour

(d) at least one red

(a) $\frac{3}{28}$ (b) $\frac{15}{28}$ (c) $\frac{13}{28}$ (d) $\frac{25}{28}$

(2) A computer assembling plant prefixes all serial numbers on its hardware items with two capital letters. A piece of hardware is selected at random. What is the probability that the prefix will :

(a) start with C

(b) contains CC

(c) not contain CC

(d) not start with C

| (a) $\frac{1}{26}$ (b) $\frac{1}{676}$ (c) $\frac{625}{676}$ (d) $\frac{25}{26}$ |

(3) John throws two normal dice, with faces numbered 1 to 6, and the product of the uppermost faces us noted. Find the probability that the product is :

(a) 18

(b) even

(c) less than 18

(d) 18 or more

(e) not 18

(f) divisible by 3

(a) $\frac{1}{18}$ (b) $\frac{3}{4}$ (c) $\frac{13}{18}$ (d) $\frac{5}{18}$ (e) $\frac{17}{18}$ (f) $\frac{5}{9}$

(4) An old hawk sees her prey four out of ten times. When she scoops on her prey, she will catch her prey 4 out of 5 times. What is the probability that she will catch her dinner the next time ?

$$\boxed{\dfrac{8}{25}}$$

(5) The die used in a new game has 20 faces. Each face has a different letter of the alphabet marked on it, however the letters Q, U, V, X, Y and Z have not been used.

   (a) The die is rolled twice. What is the probability that the same letter appears on the upper face twice ?

   (b) The die is rolled three times. What is the probability that the letter E appears on the upper face exactly twice ?

$$\boxed{(a)\ \dfrac{1}{20}\quad (b)\ \dfrac{57}{8000}}$$

(6) One thousand tickets are sold in a school fundraising raffle. The first prize is a holiday for two and the second prize is a colour television set. Millie purchased 5 tickets in the raffle. The first ticket drawn from the barrel wins first prize, while the next ticket drawn wins the second prize. Find the probability, by drawing a tree diagram, that Millie wins :

(a) the holiday for two

(b) the colour television set

(c) both prizes

(d) at least one prize

(a) $\dfrac{1}{200}$ (b) $\dfrac{199}{39960}$ (c) $\dfrac{1}{49950}$ (d) 0.00998

(7) (a) Six cards labelled A, B, C, D, E and F are drawn one at a time from a box. What is the probability that card A or card E will be the third card drawn ?

(b) A box contains 5 good and 3 defective light bulbs. Two are drawn at random.

(i) What is the probability that the first one drawn is defective ?

By drawing a tree diagram, or otherwise, calculate the probability that the two light bulbs drawn are :

(ii) both defective

(iii) both good

(iv) one defective and one good

(a) $\frac{1}{3}$ (b)(i) $\frac{3}{8}$ (ii) $\frac{3}{28}$ (iii) $\frac{5}{14}$ (iv) $\frac{15}{28}$

(8) (a) There are 3 silver and 2 gold coins in a bag. A and B takes turn to draw a coin from the bag. If A begins first, what is the probability that :
  (i) A draws a gold coin   (ii) B draws a gold coin ?

$$\text{(a) (i) } \frac{2}{5} \quad \text{(ii) } \frac{2}{5}$$

(b) Two identical packs of cards are labelled pack X and pack Y.
    The contents of the packs are as follows :

X : 1, 2, 3, 4, 5, 6 Y : 4, 5, 6, 7, 8, 9

A card is selected from pack X at random and placed on a table. Similarly, a card from pack Y is chosen and placed on the table to the right of the previous card, making a two-digit number.

Find the probability that the number formed is :

(i) 26 ;   (ii) even ;   (iii) less than 45

$$\text{(b) (i) } \frac{1}{36} \quad \text{(ii) } \frac{1}{2} \quad \text{(iii) } \frac{19}{36}$$