7. An insurance company insured 2000 scooter drivers, 4000 car drivers and 6000 truck drivers. The probability of an accidents are 0.01, 0.03 and 0.15 respectively. One of the insured persons meets with an accident. What is the probability that he is a scooter driver?

E_1 → 2000/12000

E_2 → 4000/12000

E_3 → 6000/12000

A → Accident

$P(A/E_1)$

$P(E_1/A)$

8. A factory has two machines A and B. Past record shows that machine A produced 60% of the items of output and machine B produced 40% of the items. Further, 2% of the items produced by machine A and 1% produced by machine B were defective. All the items are put into one stockpile and then one item is chosen at random from this and is found to be defective. What is the probability that it was produced by machine B?

$E_1 \rightarrow$ M/C A

$E_2 \rightarrow$ M/C B

A $\rightarrow$ Def'

$$\text{Req } P\left(\frac{E_2}{A}\right) = \frac{P(E_2)\,P\left(\frac{A}{E_2}\right)}{P(E_1)+P(E_2)}$$

9. Two groups are competing for the position on the Board of directors of a corporation. The probabilities that the first and the second groups will win are 0.6 and 0.4 respectively. Further, if the first group wins, the probability of introducing a new product is 0.7 and the corresponding probability is 0.3 if the second group wins. Find the probability that the new product introduced was by the second group.

A → New product launch.

$P(A/E_1)$ $P(\bar{A}/E_2)$

$$P\left(\frac{E_2}{A}\right) = \frac{P(E_2)\cdot P(A/E_2)}{P(E_1)\cdot P(A/E_2) + P(E_2)P(\bar{A}/E_2)}$$

10. Suppose a girl throws a die. If she gets a 5 or 6, she tosses a coin three times and notes the number of heads. If she gets 1, 2, 3 or 4, she tosses a coin once and notes whether a head or tail is obtained. If she obtained exactly one head, what is the probability that she threw 1, 2, 3 or 4 with the die?

$E_1 \rightarrow 5/6 = 2/6$ (3 → coin → {Head})

$E_2 \rightarrow 1, 2, 3, 4 = 4/6$ Coin → 1 {H/T}

A → Head Appears at 1 time

$P(A/E_1) = \frac{3}{8}$ $P(A/E_2) = 1/2$

$P\left(\frac{E_2}{A}\right)$

11. A manufacturer has three machine operators A, B and C. The first operator A produces 1% defective items, where as the other two operators B and C produce 5% and 7% defective items respectively. A is on the job for 50% of the time, B is on the job for 30% of the time and C is on the job for 20% of the time. A defective item is produced, what is the probability that it was produced by A?

A → item defective

$P(E_1)$

$P(A/E_1) =$

$P\left(\frac{E_1}{A}\right) =$

12. A card from a pack of 52 cards is lost. From the remaining cards of the pack, two cards are drawn and are found to be both diamonds. Find the probability of the lost card being a diamond.

→ Total = 52
loss → 1
Remaining → 51

E_1 → lost card is Diamond
E_1' → lost card is not Diamond.
A → 2 Cards drawn are Diamond

$P\left(\frac{E_1}{A}\right)$

i) 2 Cards Drawn → When Diamond card loss!

$P(E_1) = \frac{13}{52} = \frac{1}{4}$

Remaining → 51
Diamond → 12

$P(E_2) = \frac{39}{52} = \frac{3}{4}$

$1 - \frac{1}{4} = \frac{3}{4}$

Sol when 2 Card Drawn & both are Diamond :-

$P\left(\frac{A}{E_1}\right) = \frac{^{12}C_2}{^{51}C_2}$

$P\left(\frac{A}{E_1'}\right)$ → lost Card is not Dia & 2 Drawn card are Dia.

$= \frac{^{13}C_2}{^{51}C_2} = \frac{13 \times 12}{51 \times 50}$

$P\left(\frac{E_1}{A}\right) = \frac{\frac{1}{4} \times \frac{12 \times 11}{2}}{\frac{1}{4} \times \frac{12 \times 11}{51 \times 50} + \frac{3}{4} \times \frac{13 \times 12}{51 \times 50}}$

14. If A and B are two events such that $A \subset B$ and $P(B) \neq 0$, then which of the following is correct?

(A) $P(A|B) = \frac{P(B)}{P(A)} = \frac{P(A \cap B)}{P(B)}$

(B) $P(A|B) \leq P(A)$ [$\because P(B) \leq 1$, $\therefore \frac{1}{P(B)} \geq 1$]

(C) $P(A|B) \geq P(A)$

(D) None of these

$A \subset B$

[$B = \{1,2,3,4\}$, $A = \{1,2,3\}$]

$\frac{P(A)}{P(B)} \geq P(A)$ (2)

$\rightarrow P(A/B) \geq P(A)$

$\rightarrow A \cap B = A$

$\hookrightarrow P(A \cap B) = P(A)$

$\because P(A/B) = \frac{P(A \cap B)}{P(B)} = \frac{P(A)}{P(B)}$ (1)

Biodiversity

1.7 million

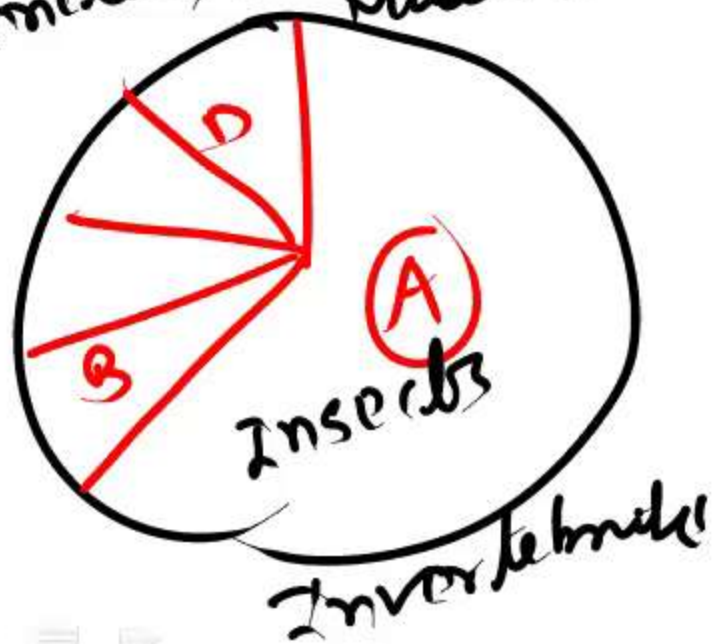
Fungi → Heterotrophs

Plants → Autotrophs (Food)

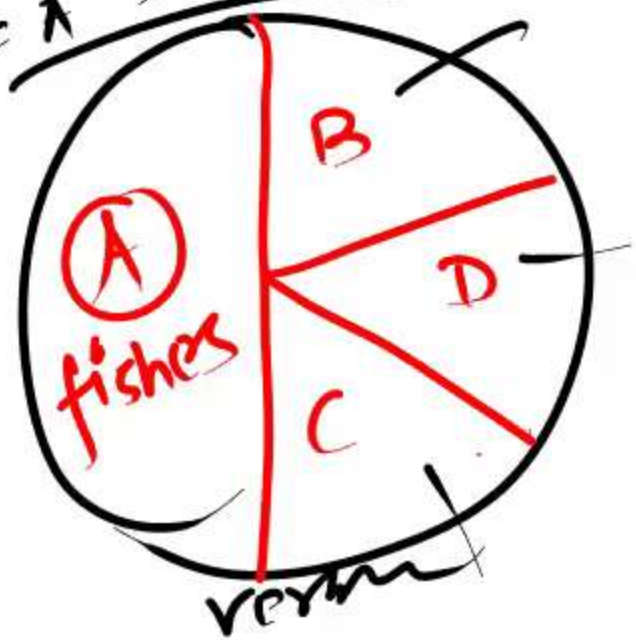
Animals → Heterotrophs

⇒ Total Diversity → 1.5 millions

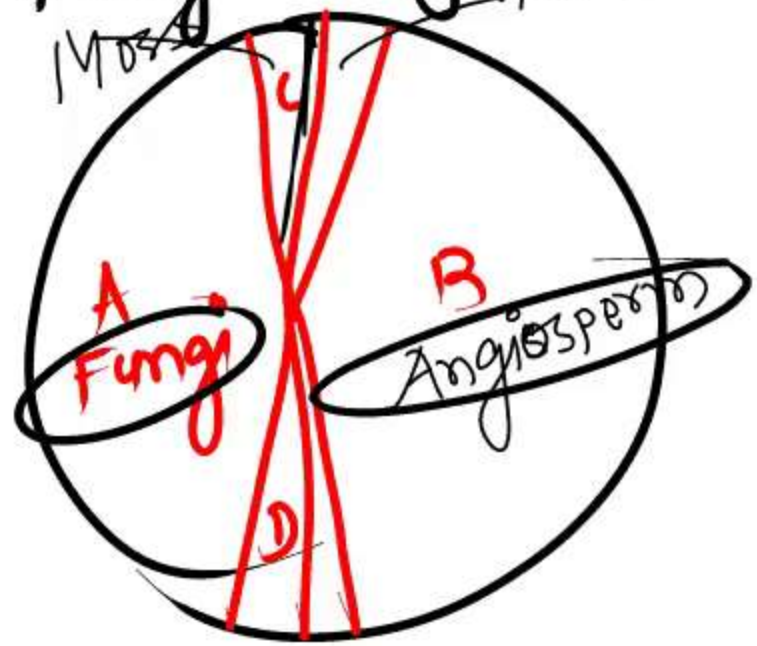
Animals: protozoa → porifera, Annelida, Arthropoda, Mollusca etc.



Plants: Fungi, Algae, Mosses, Ferns, R, A, M, F



Plant diversity



Ques: let X represent the Diff. b/w the no. of Heads & the no. of tails obtained when a Coin is tossed 6 time. possible value of X = ?

∵ Coin is tossed 6 time: & X = [no. of Head − no. tails]

∴ X ⇒ [6 − 0] = 6 ⇒ X = [5 − 1] = 4, X = [4 − 2] = 2, X = [3 − 3] = 0

X = [2 − 4] = ±2 So possible values of X = [0, 2, 4, 6] ✓

Q. Find the probability distri. of no. of Heads in Four Tosses of a Coin.

Soln:- Coin toss 4 times → { HHHH, HHHT, HHTH, HTHH, THHH
HTHT, HHTT, HTTH, TTHH, THTH, THHT
HTTT, THTT, TTHT, TTTH, TTTT }

X = no. of Head in 4 time toss.

i) X = 0 → {TTTT} → P(X = 0) = 1/16

ii) X = 1 → P(X = 1) = 4/16 = 1/4

iii) X = 2 → P(X = 2) = 6/16 = 3/8

iv) X = 3 → P(X = 3) = 4/16 = 1/4

v) X = 4 → P(X = 4) = 1/16

X	0	1	2	3	4
P(X)	1/16	1/4	3/8	1/4	1/16

16/16 = 1 ✓