EXERCISE 33.1

Question. 1
Solution:
Let us assume P denotes the probability of having defective item,
From the question, P = 6%
= 6/100
P = 3/50
We know that, P + Q = 1
Then, Q = 1 – P
Q = 1 – 3/50
Q = (50 - 3)/50
Q = 47/50
Now assume X denotes the number of defective items in a sample of 8 items.
So, probability of getting r defective bulks is $P(X - r) = {}^{n}C_{r}P^{r}Q^{n-r}$
$P(X - r) = {}^{8}C_{r}(3/50)^{r} (47/50)^{8-r}$ … [equation (i)]
Hence, probability of getting not more than one defective item,
= P(X = 0) + P(X = 1)
By using equation (i)
$= {}^{8}C_{0}(3/50)^{0} (47/50)^{8-0} + {}^{8}C_{1} (3/50)^{1} (47/50)^{8-1}$
$= 1.1(47/50)^{8} + 8 (3/50) (47/50)^{7}$
$= (47/50)^{7} (47/50 + 24/50)$
$= (71/50) (47/50)^{7}$
$= (1.42) (0.94)^{7}$
Therefore, the required probability is $(1.42) (0.94)^{7}$.

Question. 2
Solution:
From the question it is given that,
A coin is tossed 5 times.
So, probability of getting head on one throw of coin = ½
P = ½
We know that, P + Q = 1
Q = 1 – ½
Q = (2 - 1)/2
Q = ½
Now assume X denotes the number of getting head as 5 tosses of coins.

So, probability of getting r heads in n tosses of coin is given by $P(X - r) = {}^nC_rP^rQ^{n-r}$

$P(X - r) = {}^5C_r(1/2)^r (1/2)^{5-r}$ … [equation (i)]

Hence, probability of getting at least 3 heads,

$= P(X = 3) + P(X = 4) + P(X = 5)$

By using equation (i)

$= {}^5C_3(½)^3 (½)^{5-3} + {}^5C_4 (½)^4 (½)^{5-4} + {}^5C_5 (½)^5 (½)^0$

$= {}^5C_3(½)^3 (½)^2 + {}^5C_4 (½)^4 (½) + {}^5C_5 (½)^5 (1)$

$= (5 \times 4)/2 (½)^5 + 5 (½)^5 + 1 (½)^5$

$= (½)^5 (10 + 5 + 1)$

$= 16 (1/32)$

$= 16/32$

$= ½$

Therefore, the required probability is ½.

Question. 3

Solution:

Let us assume P denotes the probability of getting tail on a toss of a fair coin,

We know that, P + Q = 1

Then, Q = 1 – P

Q = 1 – ½

Q = (2 - 1)/2

Q = 1/2

Now assume X denotes the number of tail obtained on the toss of coin 5 times.

So, probability of getting r tails in n tosses of coin is given by $P(X - r) = {}^nC_rP^rQ^{n-r}$

$P(X - r) = {}^5C_r (½)^r (½)^{5-r}$ … [equation (i)]

Hence, probability of getting tail an odd number of times,

$= P(X = 1) + P(X = 3) + P(x = 5)$

By using equation (i)

$= {}^5C_3(½)^1 (½)^{5-1} + {}^5C_4 (½)^3 (½)^{5-3} + {}^5C_5 (½)^5 (½)^0$

$= {}^5C_3(½)^1 (½)^4 + {}^5C_4 (½)^3 (½)^2 + {}^5C_5 (½)^5 (1)$

$= (5 \times 4)/2 (½)^5 + 5 (½)^5 + 1 (½)^5$

$= (½)^5 (5 + 10 + 1)$

$= 16 (½)^5$

$= 16(1/32)$

$= 16/32$

$= ½$

Therefore, the required probability is ½.

Question. 4

Solution:

Let us assume P be the probability of getting a sum of 9 and it considered as success,

From the question it is given that, a pair of dice is thrown 6 times,

= [(3, 6), (4, 5), (5, 4), (6, 3)]

Then, P = 4/36 … [divide both side by 4]

P = 1/9

We know that, P + Q = 1

Then, Q = 1 – P

Q = 1 – 1/9

Q = (9 - 1)/9

Q = 8/9

Now assume X be the number of success in throe of a pair of dice 6 times.

So, probability of getting r success out of n is given by

$P(X - r) = {}^nC_rP^rQ^{n-r}$ … [equation (i)]

Hence, probability of getting at least 5 success,

= P(X = 5) + P(X = 6)

By using equation (i)

$= {}^6C_5 (1/9)^5 (8/9)^{6-5} + {}^6C_6 (1/9)^6 (8/9)^{6-6}$

$= 6 (1/9)^5 (8/9) + 1 (1/9)^6 (8/9)^0$

$= (1/9)^5 (48/9 + 1/9)$

$= (49/9) (1/9)^5$

$= 49/9^6$

Therefore, required probability is $49/9^6$.

Question. 5

Solution:

Let us assume P be the probability of getting head in a throw of coin,

Then, P = ½

We know that, P + Q = 1

Then, Q = 1 – P

Q = 1 – 1/2

Q = (2 - 1)/2

Q = ½

Now assume X be the number of heads on tossing the coin 6 times.

So, probability of getting r tossing the coin n times is given by

$P(X - r) = {}^nC_rP^rQ^{n-r}$ … [equation (i)]

Hence, probability of getting at least 3 heads,

$= P(X = 3) + P(X = 4) + P(X = 5) + P(X = 6)$

$= 1 – (P(X = 0) + P(X = 1) + P(X = 2))$

By using equation (i)

$= 1 - ({}^6C_0 (½)^0 (½)^{6-0} + {}^6C_1 (½)^6 (½)^{6-1} + {}^6C_2 (½)^2 (½)^{6-2})$

$= 1 – (1 (½)^6 + 6 (½)^6 + 6.5/2 (½)^6)$

$= 1 – ((½)^6 (1 + 6 + 15))$

$= 1 – (22/64)$

$= (64 – 22)/64$

$= 42/64$

$= 21/32$

Therefore, the required probability is 21/32.