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2.)(a) So the farmer has to choose 3 hens out of 6 hens.

no of ways of choosing 3 out of 6 is given by:

$${}^6C_3$$

and, 2 pigs out of 5

no. of ways of selecting 2 out of 5.

$${}^5C_2$$

and 4 cows out of 8.

no. of ways of selecting 4 out of 8

$${}^8C_4$$

So As he has to choose all the 3 things

so total no. of choices he has $= {}^6C_3 \times {}^5C_2 \times {}^8C_4$

$$= \frac{6!}{3!\,3!} \times \frac{5!}{3!\,2!} \times \frac{8!}{4!\,4!}$$

$$= \frac{6\times5\times4}{3\times2} \times \frac{5\times4}{2} \times \frac{8\times7\times5\times6}{4\times3\times2}$$

$$= 14000$$

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So the total no. of choices that farmer have is 14000

(b) Total no. of persons in party = 12

To shake hands we need 2 persons

So No. of ways in which we can choose 2 persons out of 12 without rearrangement will give us the total no. of hand shakes happen in party.

No. of ways to select 2 out of 12 = $^{12}C_2$

No of handshakes in party = $\frac{12!}{10! \times 2!}$

$= \frac{12 \times 11}{2}$

$= 66$

So total no. of handshakes ~~is~~ happen in party is 66