Assignment 1

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Question 7

a

$\frac{6!}{3!3!}$ as there are 6 people in total to arrange with 3 and 3 indistinguishable boys and girls.

But if the boys and girls are distguishable (meaning they are actually different human) then the outcome is 6!.

b

2! as we can consider the boys and girls blocks, leaving 2 options(in the case that they are indistinguishable).

If they are distinguishable then the outcome is $2! \cdot 3! \cdot 3!$ as there are 2 blocks of boys and girls that can be arranged in 3! ways.

c

4! as we can consider the boys are a block (and indistinguishable) and thus we are left 4 items to arrange.

If the boys are distinguishable then the outcome is $4! \cdot 3!$ as there are 4! ways to arrange the block and then 3! ways to arrange the boys inside the boys block.

d

$3! \cdot 3! \cdot 2$ as there are 3! ways to order the boys and girls and 2 ways to start of with either a boy or girl. The outcomes is the same if they children are distinguishable or indistinguishable.

Question 10

a

8! as there are 8 spots with no restrictions.

b

$7! \cdot 2$ as the block of A and B is treated as one spot leading to 7 spots and then there are 2 ways to organize the block of 2 people.

c

$4! \cdot 4! \cdot 2$ as there are 4! ways to order the men and the women, and there are 2 different ways to start.

d

$5! \cdot 4!$ as the 5 men become 1 block leaving 4 items, and then there are 4! ways to order those for blocks and then there are 5! ways to order the men in the block of 5 men.

e

$4! \cdot 2^4$ as there are 4! ways to order the couples and then 2! ways to order each of the couples leading to 2^4 ways to order all the couples.

Question 11

a

$\frac{6!}{3!2!}$ as there are 6 books and then divide by the number of ways to order the 3 and 2 indistinguishable books.
If the books are distinguishable then the outcome is 6!

b

3! as the books become 3 block and since each item in the block is indistinguishable, there are 3! ways to order the blocks.
If the books are distguishable then the outcome is $3! \cdot 2! \cdot 3!$ as there are 3! ways to order the blocks and then 2! ways to order the books in the block of 2 and 3! ways to order the books in the block of 3.

c

$4! \cdot 3!$ since the 3 novels become a block with there being 4 blocks in total which can be ordered 4! different ways and then 3! ways to order the books inside the block of 4.

Question 17

$\frac{10!}{3!}$ as there are 10 spots for children with 7 that are distguishable with distinct gifts and 3 that are indistinguishable with no gifts. Thus it is $\frac{10!}{3!}$.