SOLUTIONS

Autos in Delhi

- Follow the demand approach, given there would be lesser variables + demand is the constraining factor (if you go from supply side - you would have to consider number of auto-manufacturers, which could be spread across the country + imports - which would be tough to estimate)

- Number of autos in Delhi must be sufficient to match maximum possible demand (at a point of time) - i.e., if let's say there are 100 people who want to travel at the peak time, and assuming each auto can accommodate 2 people - ~50 autos would be sufficient (these 50 autos can also serve the demand during average or non-peak hours)

- With this is mind, let's take any peak hour (say 7am-10am - which is school + office time) and estimate demand of autos during this particular time - which will tell us how many autos are there in Delhi

SOLUTIONS

- To calculate number of autos in Delhi - we break it down into simple mathematical equation:
  - People travelling from 7am-10am X %people travelling via autos
  - People travelling from 7am-10am can be bucketed as follows:
    - School + college kids
    - Office goers
  - Next step would be to estimate number of people in each of the two buckets using a) Population of Delhi b) % population currently in school, colleges c) % people employed etc.
  - Once you find number of people, use income as the second filter to identify how many people would be using public transport (including autos) and how many would travel via their private vehicles
  - Within people using public transport, use some assumptions to find %people traveling through autos, %people through metro, buses etc.
  - After you find number of people travelling through auto - assume number of people in an auto at a time (say 2) and hence find the number of autos in Delhi by dividing the two numbers

SOLUTIONS

Footwear sold on Flipkart in a month

- Follow demand approach; supply approach would be complex (given e-commerce websites have different sellers listed on them - would be tough to estimate no. of footwear sellers on Flipkart)
- Even from demand side, there are two approaches:
  - **Approach 1:** Total number of people buying footwear in a month, pan India (offline + online) X %of people who bought online X %of these online shoppers who purchased from Flipkart
  - **Approach 2:** Number of shoppers on Flipkart in a month X %of people who bought footwear
  - Both the approaches would work, however, it's tough to give a solid rationale for %of people who bought footwear on Flipkart in Approach 2. **Hence, Approach 1 is preferred**

SOLUTIONS

Approach 1

- Start with population of India
- Estimate number of footwear per person in India (let's say ~2 pair of footwear per person)
- Estimate average life of a footwear - let's say 2 years (post which you would have to replace them with new footwear)
- This means, every 2 years, an average person buys 2 pair of footwear = 1 pair of footwear per year
- Multiplying this with population of India, you can find number of footwear sold in India per year; divide it by 12 to get footwear sold per month
- Once you have this, find %of people who bought it online; here you can make a matrix with two inputs - urban/rural and income groups (these two will primarily determine whether a person buys shoes online or offline)
    - You can take any reasonable assumption here (one good way to do this is by taking your personal or your household example and calibrating numbers around it)
- Post this, multiply it by Flipkart's share - which you can assume to be ~50% (given Amazon, Flipkart are the two major players - hence is a fair assumption to take)

SOLUTIONS

Market size of smartphones in India

- Follow demand approach; for supply side, you would need to know number of mobile sellers/ manufacturers in India, their production capacity, number of imports (e.g. Apple) etc. - which requires lot of assumptions
- **Demand side approach:**
  - Start with population of India
  - Segment India's population by income group and age group (younger people are more likely to use smartphone - given they are more tech savvy; feel free to incorporate other filters as well - e.g. urban/ rural; availability of a smartphone in rural India might be lower)
  - Assign a minimum price of a smartphone, let's say Rs.3,500
  - Now we need to know how many people can spend Rs.3,500 on a phone
  - Consider this to be a discretionary spend (roughly ~25% of income, as given in book 'Case Interview Cracked')

SOLUTIONS

- Form a matrix by income group and age group - assign %s basis ability to spend Rs.3,500 and age (higher propensity to use smartphone for younger population)(Majority of income groups (except below poverty line) might be able to afford a smartphone - tech savviness seems to be the swing assumption here - hence spend more time on that parameter)

SOLUTIONS

Number of washing machines in India

- Again, follow demand approach because of similar reasons as discussed above
- Important to ask whether we are looking only at domestic washing machines (present in households) or commercial washing machines (present in hotels, hostels, hospitals etc.)
- For the case in point, we are looking at only domestic washing machines
- The problem statement can be broken down into mathematical equation as follows:
  - No. of households in India X % of households with washing machine X no. of washing machines/ household (~1 is a fair estimate)
  - Spend most time on % of households with washing machine; no. of households in India is a fact
  - Characterize households along two dimensions - urban/rural and income groups
  - You can assign directional percentages for washing machine penetration

SOLUTIONS

- One good check would be to find out average price of a washing machine (say Rs.20,000) and see what income groups would be able to comfortably own a washing machine (here - middle class and above should be able to afford washing machines; lower income and below poverty line would have 0%/ negligible penetration)

SOLUTIONS

Market size of tires in India

- Follow demand approach (similar reasons as above)
- Important to clarify whether we are looking at OEM tires (i.e. tires which are pre-fitted when you purchase a car) or replacement tires (which you replace let's say after ~5 years of purchasing a car) or both
- For case in point - let's go ahead with both - i.e. pre-fitted tires and replacement tires
- The problem statement can be broken down in to mathematical equation as follows:
  - Total tire sales per annum = (Number of new cars sold in India per annum X 5 (assuming fifth tire is the spare tire)) + Replacement tires sold in India per annum
  - Approach both the parts of equation (i.e. new cars pre-fitted tires + replacement tires) separately

SOLUTIONS

- New cars sold in India per annum could be calculated as
  - [(Number of households who can afford a car)/ (average life of a car)]*average number of car per household who can afford a car (~1 is a fair estimate)
    - We are dividing it by average life of a car because we are looking at per annum number. For e.g.: if you can afford a car, still you will not purchase a car each year. Let's say you would replace your car every 10 years - hence to incorporate this factor, we have introduced a new variable which is average life of a car
  - Calculate number of households who can afford a car following similar approach as the washing machines or the smartphone guesstimate
  - From the above, we will get number of cars being sold in India
  - Now, some of these would be new cars and some would be second hand - we would consider only new car sales because the second hand cars will already have existing tires and would not be considered as part of tire market

SOLUTIONS

- Take a % for second hand cars, say ~30%
- From above, you will get number of new cars sold in India per annum - multiply it by 5 to get answer to first part of guesstimate

- Replacement tires can be calculated as:
  - [Total number of cars in India at a given point X 5 (including spare tire)]/[Average life of a tire]
    - Average life of a tire is similar parameter used in the calculation for new cars (i.e. if you own a car, still you would not change tires every year; you would change tires lets say after ~5 years - and given we need to find #replacement tires per annum, we will have to divide it by 5]
  - Total number of cars in India you already calculated above when you found out number of households who can afford a car - use that number here as well
- Add the numbers from both the parts to get the final answer