6. Probability

Optimising social media adverts

You work in the digital advertising team of an online shoe company. Your role is to understand and analyse the effectiveness of different online advertising campaigns so that the company gets the best possible results for their advertising spend.

Task one: Analysing advert performance

The company currently places online adverts on Facebook, Instagram and Google. You have been tasked with understanding which of these platforms has been the most effective. The below table shows results from each platform over the last week.

Platform	Impressions (The total number of people who saw your advert)	Clicks (The total number of people who clicked on your advert and went to the website)	Purchases (The number of people who purchased a product after clicking on the advert)
Facebook	635,619	31,781	3,496
Instagram	829,262	58,048	5,224
Google	372,926	33,563	2,014

1. For each platform, what is the probability that someone who sees the advert will click on it?

   a. Facebook

31,781 ÷ 635,619 = 5%

b. Instagram

58,048 ÷ 829,262 = 7%

c. Google

33,563 ÷ 372,926 = 9%

2. If someone clicks on the advert, what is the probability that they will go on to make a purchase?

a. Facebook

3,496 ÷ 31,781 = 11%

b. Instagram

5,224 ÷ 58,048 = 9%

c. Google

2,014 ÷ 33,563 = 6%

3. If your company wanted to optimise for the highest rate of people who clicked on your adverts which platform would you suggest they advertise on?

Google

4. If your company wanted to advertise on the platform which had the best conversion rate from click to purchase (i.e. the platform where the most people went on to purchase after seeing the company's website) which platform would you recommend they focus on?

Facebook

5. A colleague reviews the results from last week and comments that "Instagram ads brought the most people to our website and generated the most purchases so that's clearly the most effective platform for us to advertise on." Comment on the validity of this statement.

Although Instagram brought in the most website traffic and purchases overall, Google had a higher conversion rate from impression to click. So, if the company wanted to optimise for the most click throughs to the website, then Google would be the most effective place to advertise. However, if the company wanted to optimise for the conversion rate from impression to sale, then Instagram adverts would be the most effective as 0.63% of people who saw the ad made a purchase, which was higher than Facebook (0.55%) and Google (0.54%).

6. You are planning a big campaign for the launch of a new line of trainers. You invest in Instagram adverts and get a total of one million impressions.

   a. How many people would you expect to click on the advert?

1,000,000 x 7% = 70,000

   b. How many people would you expect to make a purchase?

70,000 x 9% = 6,300 (using prior answer)

or

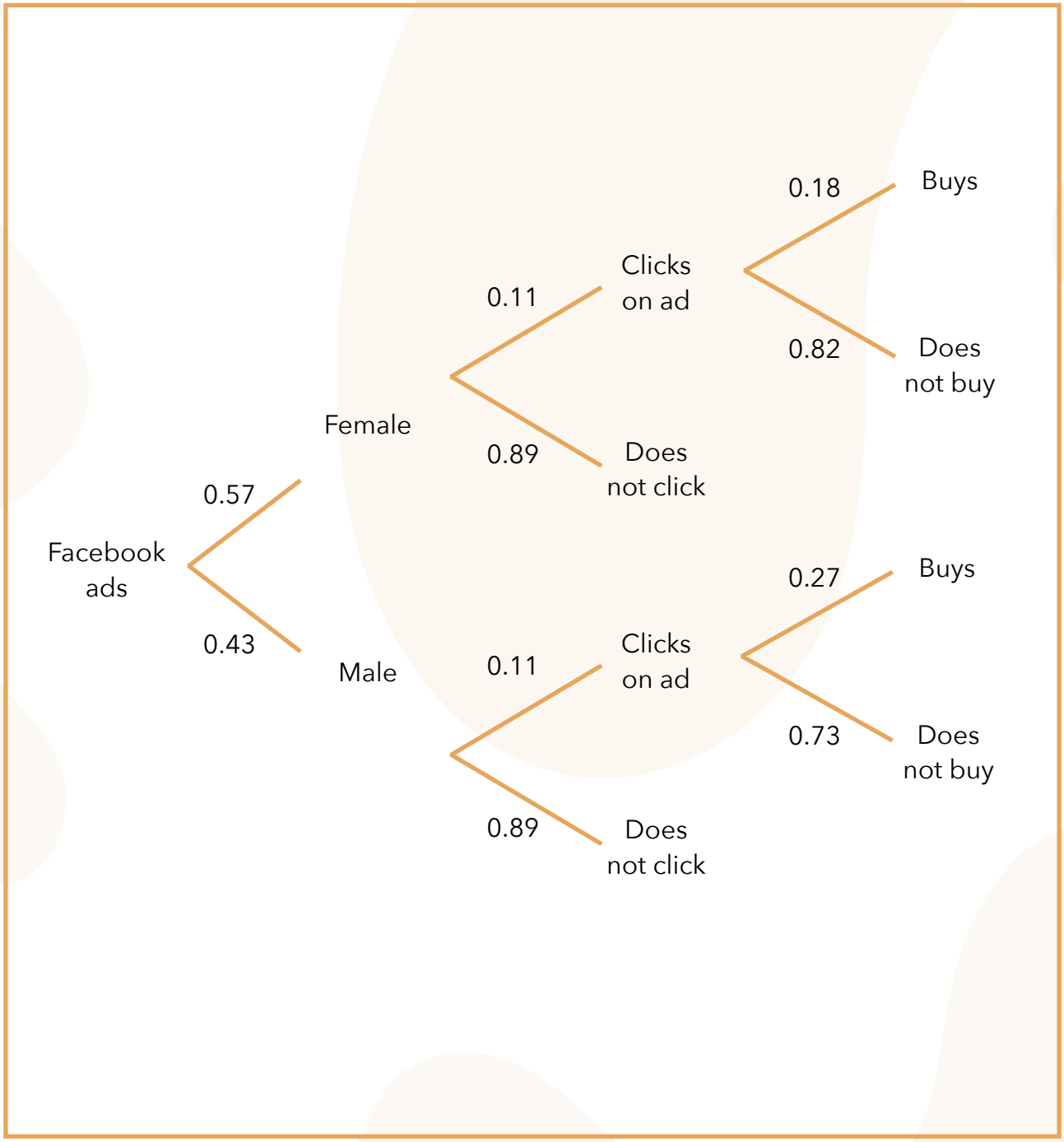
1,000,000 x 0.63% = 6,300

Task two: Understanding your audience

Platforms such as Facebook allow companies to target specific audiences with their adverts.

1. Create a tree diagram showing the following probabilities:

   On Facebook, 57% of people who see your advert are female. There is a 11% probability that those who see your advert will click on it. Of those who click on the advert 18% of females and 27% of males will go on to purchase something on your website.



2. If you selected someone at random who saw the ad, what is the probability that they were either a male who made a purchase or a female who did not?

Male who purchases = 0.43 x 0.11 x 0.27 = 0.0128 = 1.28%
Female who does not = (0.57 x 0.11 x 0.82) + (0.57 x 0.89) = 0.5587 = 55.87%

1.28% + 55.87% = 57.15%

3. If 1,000 people see your Facebook advert how many men and women would you expect to make a purchase?

Female = 1,000 x (0.57 x 0.11 x 0.18) = 11.29
= 11 females are expected to make a purchase.

Male = 1,000 x (0.43 x 0.11 x 0.27) = 12.77
= 12 males are expected to make a purchase.

The below two-way table gives information about the spending behaviour of 150 random customers who interacted with your advert.

Advert they interacted with	**Did not make a purchase**	**Made a purchase less than £100**	**Made a purchase and spent over £100**	**Total**
Facebook Ad	32	11	9	52
Instagram Ad	23	16	12	51
Google Ad	29	12	8	49
Total	84	39	29	152

4. Complete the two-way table.

5. One of the customers is picked at random…

   a. What is the probability that they did not make a purchase?

84/152 = 21/36 = 55.26%

   b. What is the probability that they interacted with a Google ad?

49/152 = 32.24%

   c. What is the probability that they made a purchase less than £100?

39/152 = 25.66%

   d. What is the probability that they interacted with the Facebook advert and made a purchase?

(11+9)/152 = 13.16%