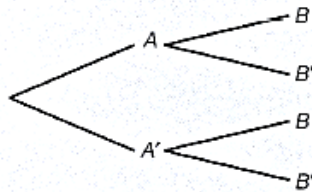


4. The following table shows the masses ( $m$  kg) and lengths ( $l$  cm) of 11 babies.

$m$	2.7	4.3	3.4	2.9	3.6	4.7	4.1	3.3	3.1	4.3	3.7
$l$	48	55	52	47	51	56	53	51	50	51	49

- (a) Write down the correlation coefficient,  $r$ , of the data.
- (b) Find the equation of the regression line of  $l$  on  $m$ .
- (c) Use your equation to estimate the length of a baby whose mass is 3.2 kg.
- (d) Can the regression line be reliably used to estimate the length of a baby of mass 5.6 kg? Explain your answer.
5. Find the coordinates of the points on the curve  $y = 3 \ln x + \frac{1}{x}$  where the tangent is parallel to the line  $2x - y = 4$ .
6. The events  $A$  and  $B$  are such that  $P(B|A) = 0.2$ ,  $P(B'|A') = 0.3$ ,  $P(A|B) = 0.4$  and  $P(A) = x$ .
- (a) Complete the following tree diagram.



- (b) Find the value of  $x$ .
- (c) State, with a reason, whether the events  $A$  and  $B$  are independent.

7. Given that  $P(B) = 0.3$ ,  $P(A|B) = 0.6$  and  $P(A|B') = 0.4$ , find  $P(B|A)$ .
8. Every morning I either walk or cycle to school, with equal probability. If I walk, the probability that I am late is 0.2. If I cycle, the probability that I am late is 0.4. Given that I was late for school yesterday, what is the probability that I walked?
9. A box contains 17 yellow balls and 13 green balls. A ball is picked at random and not replaced. A second ball is then picked.
- (a) Find the probability that the second ball is yellow.
- (b) Given that exactly one ball is yellow, find the probability that it is the second one.
16. The amount of reactant,  $V$  (grams), in a chemical reaction decays exponentially according to the function  $V = M + Ce^{-0.32t}$ , where  $t$  is the time in seconds since the start of the reaction. Initially there was 4.5 g of reactant, and this had decayed to 2.6 g after 7 seconds.
- (a) Find the value of  $C$ .
- (b) Find the value that the amount of reactant approaches in the long term.
17. A population of bacteria grows according to the model  $P = Ae^{kt}$ , where  $P$  is the size of the population after  $t$  minutes. Given that after 2 minutes there are 200 bacteria and after 5 minutes there are 1500 bacteria, find the size of the population after 10 minutes.
18. In triangle  $ABC$ ,  $AB = 6$ ,  $AC = 14$  and  $\hat{A}CB = 20^\circ$ . Find the two possible lengths  $BC$ .
19. In triangle  $ABC$ ,  $AB = 22$  cm,  $AC = 14$  cm and  $\hat{A}CB = 58^\circ$ . Show that there is only one possible triangle with these measurements, and find its area.