

## Extension 1 Probability Worksheet

1. On a multiple choice examination with three possible answers (out of which only one is correct) for each of the five questions, prove that the probability that a candidate would get four or more correct answers just by guessing is  $\frac{11}{243}$ .
2. A test consists of five multiple-choice questions. Each question has four alternative answers. For each question only one of the alternative answers is correct. Huong randomly selects an answer to each of the five questions. (i) What is the probability that Huong selects three correct and two incorrect answers? (ii) What is the probability that Huong selects three or more correct answers? (iii) What is the probability that Huong selects at least one incorrect answer?
3. Mr and Mrs Roberts and their four children go to the theatre. They are randomly allocated six adjacent seats in a single row. What is the probability that the four children are allocated seats next to each other?
4. In a large city, 10% of the population has green eyes. (i) What is the probability that two randomly chosen people both have green eyes? (ii) What is the probability that exactly two of a group of 20 randomly chosen people have green eyes? Give your answer correct to three decimal places. (iii) What is the probability that more than two of a group of 20 randomly chosen people have green eyes? Give your answer correct to two decimal places.
5. Sophie has five coloured blocks: one red, one blue, one green, one yellow and one white. She stacks two, three, four or five blocks on top of one another to form a vertical tower.
  - a. How many different towers are there that she could form that are three blocks high?
  - b. How many different towers can she form in total?
6. In an endurance event, the probability that a competitor will complete the course is  $p$  and the probability that a competitor will not complete the course is  $q = 1 - p$ . Teams consist of either two or four competitors. A team scores points if at least half its members complete the course.
  - (i) Show that the probability that a four-member team will have at least three of its members not complete the course is  $4p^3q^4$
  - (ii) Hence, or otherwise, find an expression in terms of  $q$  only for the probability that a four-member team will score points.
  - (iii) Find an expression in terms of  $q$  only for the probability that a two-member team will score points.
  - (iv) Hence, or otherwise, find the range of values of  $q$  for which a two-member team is more likely than a four-member team to score points

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7. From a lot of 10 bulbs, which includes 3 defectives, a sample of 2 bulbs is drawn at random. Find the probability distribution of the number of defective bulbs 0,1 and 2.
8. An insurance company insured 2000 scooter drivers, 4000 car drivers and 6000 truck drivers. The probability of an accident involving a scooter, a car and a truck are 0.01, 0.03 and 0.15 respectively. One of the insured persons meets with an accident. Show that the probability that he is a scooter driver is  $\frac{1}{52}$ .
9. A family has 2 children. Find the probability that both are boys, if it is known that
  - (i) at least one of the children is a boy
  - (ii) the elder child is a boy.
10. A pair of dice is thrown 4 times. If getting a doublet is considered a success, find the probability distribution of the number of successes.