Statistics 1 : Chapter 3 Probability

3.1 Introduction to Probability

1 An ordinary fair cubical die is thrown. Find the probability that the score is

(i) even,

(ii) lower than 7,

(iii) a factor of 6,

(iv) at least 4,

(v) higher than 1.

2 In a box of 40 highlighters, there are 10 red, 15 blue, 5 green and 10 yellow highlighters. Of these, 8 have dried up and will not write. Ed picks a highlighter at random from the box. Find the probability that the highlighter

(i) is blue,

(ii) is neither green nor yellow,

(iii) is purple,

(iv) will write.

3 An integer is picked at random from the integers from 1 to 20 inclusive.

A is the event 'the integer is a multiple of 3' and B is the event 'the integer is a multiple of 4'.

Find (i) $P(A)$ (ii) $P(B')$.

4 A card is dealt from a well-shuffled ordinary pack of 52 playing cards.

(i) Find the probability that the card dealt is

(a) a Queen,

(b) a heart or a diamond,

(c) a picture card showing spades.

(ii) Two cards are dealt and put face-up on the table. They are the 4 of clubs and the 7 of diamonds. A third card is now dealt. What is the probability that it is a club or a 7?

5 Every work day Jamie catches a bus to work. The bus is never early but it is sometimes late.

Jamie decided to record the number of minutes the bus is late over a period of 10 days. Here are his results.

0, 3, 4, 1, 0, 0, 5, 4, 6, 0.

Find the probability that on a randomly chosen day from the 10 days

(i) the bus was on time,

(ii) the bus was more than the mean number of minutes late.

Jamie estimates that the probability that his bus will be late when he is on his way home from work is 0.75.

(iii) What is the probability that his bus will not be late when he is on his way home from work?

6 In a party bag of blue, red, green and yellow balloons, 55 are long balloons and 45 are round balloons.

	Blue	Red	Green	Yellow
Long	12	15	10	a
Round	10	14	b	7

(i) Find the values of a and b.

(ii) Yizi takes a balloon at random from the bag and blows it up. Find the probability that the balloon she takes

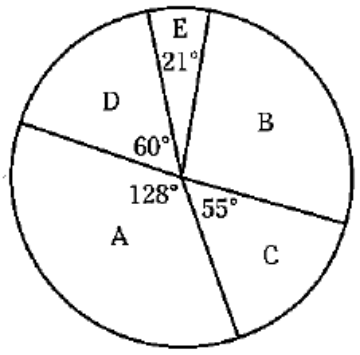
(a) is red,

(b) is a blue round balloon,

(c) is not yellow.

7 In a survey, people were asked which factor from the following list influenced them most when buying a car.

A – Price
B – Reliability
C – Fuel economy
D – Servicing costs
E – Range of optional extras



The pie chart shows the results from 90 people.

The names of those who took part were then placed in a prize draw. Find the probability that someone who said 'Reliability' will win the prize.

8 The 30 pupils in a particular class were asked how many brothers and sisters they had. The answers are shown in the table.

Number of brothers and sisters	0	1	2	3	4	5
Number of pupils	4	12	8	3	2	1

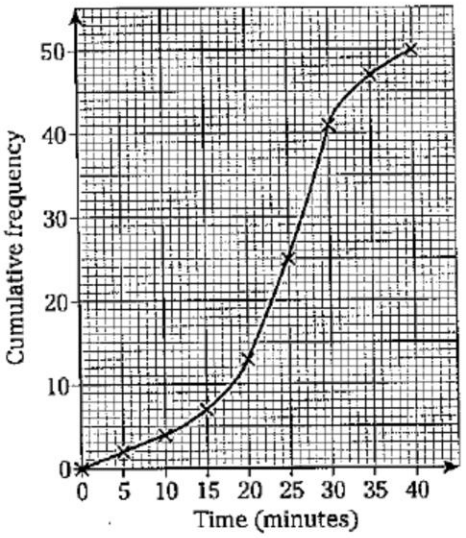
Find the probability that a pupil chosen at random from the class comes from a family with three children.

9 A cubical die, numbered 1 to 6, is weighted so that a 6 is twice as likely to occur as any other number.

Find the probability that when the die is thrown the score is

(i) 6, (ii) odd.

10 When leaving a supermarket, 50 people were asked to take part in a survey on the amount of time they had spent shopping in the supermarket. The results are shown in the following cumulative frequency graph.



The names of the 50 people were put into a box and one name was picked out at random to receive a prize. Find the probability that the time spent in the supermarket by the prize winner was

(i) less than 20 minutes,

(ii) 35 minutes or more,

(iii) at least 5 minutes but less than 25 minutes,

(iv) more than 45 minutes.

11 An ordinary tetrahedral die has four faces and they are labelled 1, 2, 3, 4. When the die is thrown, the score is the number on which the die lands.
Two fair tetrahedral dice are thrown.
By using a possibility space diagram, or otherwise, find the probability that

(i) the sum of the scores is divisible by 4,

(ii) the product of the scores is an even number,

(iii) the scores differ by at least 2.

12 Two fair coins are tossed together. Find the probability that

(i) exactly one tail is obtained,

(ii) at most one head is obtained.

13 Two ordinary fair cubical dice are thrown. Find the probability that

(i) the sum of the numbers on the dice is 3,

(ii) the sum of the numbers on the dice exceeds 9,

(iii) the dice show the same number,

(iv) the numbers on the dice differ by more than 2.

14 Two ordinary fair cubical dice are thrown at the same time and the scores are multiplied. $P(N)$ denotes the probability that the number N will be obtained.

(i) Find (a) P(9), (b) P(4), (c) P(14) (d) P(37)

(ii) If $P(N) = \frac{1}{9}$, find the possible values of N.

15 Three fair coins are tossed.

(i) List all the possible outcomes.

(ii) Find the probability that two heads and one tail are obtained.