CHAPTER 5
Probability and statistics

UNIT 1: Review of simple probability

QUESTION 1 A card is drawn at random from a normal pack of 52 cards. Find the probability tha the card is:

a a club _____

b a black card _____

c an ace _____

d not a spade _____

e a black ace _____

f a red card _____

QUESTION 2 From the letters of the word 'CHANCE', one letter is selected at random. What is th probability that the letter is:

a a vowel? _____

b a consonant? _____

c the letter C? _____

QUESTION 3 A die is thrown once. Find the probability that the number is:

a a five _____

b an odd number _____

c a number greater than 2 _____

d zero _____

e a prime number _____

f a square number _____

QUESTION 4 A bag contains 6 yellow, 4 blue and 5 red balls. If a ball is drawn at random, find the probability that it is:

a yellow _____

b red _____

c blue _____

d not yellow _____

e white _____

f either blue or red _____

QUESTION 5 A three-digit number is to be formed from the digits 1, 5 and 9, written on three sepa rate cards. What is the probability that the number:

a formed is even? _____

b is odd? _____

c is less than 500? _____

d is divisible by 3? _____

e is divisible by 5? _____

f is greater than 100? _____

QUESTION 6 The numbers 1 to 7 are written on separate cards. One card is chosen at random. Wh is the probability that:

a the number is odd? _____

b the number is even? _____

c it is 6? _____

d it is zero? _____

e it is a prime number? _____

f it is divisible by 3? _____

QUESTION 7 A letter is chosen from the word 'PROBABILITY'. What is the probability that the letter i

a a vowel? _____

b a consonant? _____

c the letter B? _____

d the letter P or B? _____

e the letter M? _____

f the letter Y? _____

UNIT 2: Tree diagrams

QUESTION 1 A coin is tossed three times and the results noted. Use the tree diagram to find the probability of:

three heads

_____

two heads and one tail in any order

_____

at least one head

_____

QUESTION 2 There are four cards marked with the numbers 1, 2, 3 and 4. They are put in a box. Two cards are selected at random, one after the other, to form a two-digit number. Draw a tree diagram to find:

how many different two-digit
numbers can be formed _____

the probability that the
number formed is less than 34 _____

the probability that the
number formed is divisible by 3 _____

the probability that the
number formed is even _____

QUESTION 3 Three red balls and two blue balls are placed in a bag. Two balls are selected at random, without replacement. What is the probability of having:

two red balls? _____

two blue balls? _____

one red ball and one blue ball? _____

QUESTION 4 In a family of three children, use a tree diagram to find the probability of:

three boys _____

two boys and one girl _____

one boy and two girls _____

the eldest child being a boy _____

the youngest child being a girl _____

three girls _____

Probability and statistics

UNIT 3: Probability trees

QUESTION **1**   A box contains 4 yellow and 5 black balls. A ball is drawn from the box and is not replaced, then a second ball is drawn. Find the probability of:

a   yellow then black being drawn _____

b   black then yellow being drawn _____

c   both balls being yellow _____

d   both balls being black _____

e   drawing yellow and black in any order

_____

QUESTION **2**   Diana has a box containing three red and two green marbles. She selects two marbles at random. Find the probability of two green marbles if she replaces the first marble before she draws the second.

QUESTION **3**   Roger buys three tickets in a raffle in which there is a total of 20 tickets. There are two prizes. Find the probability of him winning:

a   first prize _____

b   first prize only _____

c   both prizes _____

d   no prizes _____

e   at least one prize _____

f   one prize only _____

QUESTION **4**   A jar contains five white and six red jelly beans. Kylie takes a bean at random and eats it. She then takes another jelly bean and eats it. What is the probability that:

a   the first bean eaten is white?

_____

b   the two beans eaten are both red?

_____

Probability and statistics

UNIT 4: Dot diagrams

QUESTION 1 A pair of dice is rolled simultaneously. Complete the diagram to show the total number of 36 sample points. The first column has been done for you.

36 sample points	1	2	3	4	5	6
1	1, 1					
2	1, 2					
3	1, 3					
4	1, 4					
5	1, 5					
6	1, 6					

QUESTION 2 Use the above diagram to find the probability of each event listed below.

a double three _____   b   any double _____

a total of 9 _____   d   a score greater than 10 _____

a score of either 2 or 3 _____   f   a score less than 5 _____

the sum of the numbers is 7 _____   h   the two numbers are odd _____

the sum of the numbers is 10 _____   j   at least one 6 _____

the sum of the numbers is greater than 12 _____

QUESTION 3 Suppose we wish to throw a total of 6. Which is the better chance — rolling one die or two dice?

_____

_____

QUESTION 4 What is the probability of rolling two even numbers in one roll of a pair of dice?

_____

_____

QUESTION 5 A coin and a die are thrown simultaneously. Find the probability of throwing a head and an odd number.

_____

_____

QUESTION 6 If we want to throw a score of 3, which would give a better chance — rolling one die or two dice?

_____

_____

Probability and statistics

QUESTION **1**   From a normal pack of 52 playing cards, one card is selected at random. Draw a Venn diagram to find the probability of the card being either a black card or an ace.

QUESTION **2**   The numbers from 1 to 15 are written on 15 cards and out of these a card is chosen at random. Draw a Venn diagram to find the probability of the number on the card being:

a   less than 3 or divisible by 5

b   less than 7 or divisible by 3

QUESTION **3**   Two dice are thrown simultaneously. Draw a Venn diagram to find the probability of:

a   a double or a total of 10

b   a total that is either odd or less than 4

QUESTION **4**   From a pack of 52 playing cards, a card is selected at random. Draw a Venn diagram to find the probability of it being a heart or a queen.

Probability and statistics

Instructions for SECTION 2
- You have 20 minutes to answer ALL of Section 2
- Each question is worth 2 marks
- Attempt ALL questions
- Calculators may be used

Questions	Answers	Marks
A bag contains 3 yellow, 2 blue and 4 white balls. If a ball is drawn at random, find the probability that it is:		
1 yellow.	_____	2
2 blue.	_____	2
3 not white.	_____	2
A coin is tossed three times and the results noted. Use a tree diagram to find the probability of:		
4 three tails.	_____	2
5 two tails and one head in any order.	_____	2
6 at least one tail.	_____	2
A pair of dice is rolled simultaneously. Find the probability of getting:		
7 a double five.	_____	2
8 any double.	_____	2
9 a score greater than 9.	_____	2
10 at least one six on the uppermost face of a die.	_____	2
11 the sum of the two numbers rolled being 11.	_____	2
12 two even numbers.	_____	2
Use your calculator to find the mean and standard deviation, correct to one decimal place, for the following sets of scores.		
13 8, 9, 6, 9, 7, 6, 6	_____	2
14 12, 14, 9, 6, 1, 12	_____	2
15 25, 33, 26, 56, 44, 41, 33, 25	_____	2

Total marks achieved for SECTION 2 � 30

Answers

1 a 361.6 cm³ b 174.1 cm³ 2 a 306 cm³ b 2.33 m³ 3 a 216.2 cm³ b 776.8 cm³ 4 a 396.8 cm³ b 285.6 m³

1 a 121.5 cm³ b 1838.6 cm³ 2 a 88.22 m³ b 144.76 m³ 3 a 1005.3 cm³ b 55.9 cm³ c 4712.4 cm³ 4 a 20 910.4 cm³ b 1392.8 cm

1 a 3053.6 cm³ b 4188.8 cm³ c 113 097.3 cm³ d 22 449.3 cm³ e 15 002.5 cm³ f 91 952.3 cm³ 2 a 4188.8 cm³ b 150 532.6 cm 3 a 1526.8 cm³ b 15 529.7 cm³ 4 a 10 576.70 cm³ b 753.98 cm³

1 a 5.1472×10^8 km² b 1.098×10^{12} km³ 2 a 261.3 m² b 397.18 m³ 3 61.26 m² 4 a 377 cm³ b 377 mL 5 a $14 030 b 375 kL

1 B 2 C 3 C 4 B 5 C 6 D 7 B 8 C 9 B 10 C

1 208 cm² 2 192 cm³ 3 172 cm² 4 120 cm³ 5 672π cm² 6 1960π cm³ 7 360 cm² 8 400 cm³ 9 96π cm² 10 96π cm²

11 324π cm² 12 972π cm³ 13 147π cm² 14 $\frac{686\pi}{3}$ cm³ 15 784π cm²

1 a $\frac{1}{4}$ b $\frac{1}{2}$ c $\frac{1}{13}$ d $\frac{3}{4}$ e $\frac{1}{26}$ f $\frac{1}{2}$ 2 a $\frac{1}{3}$ b $\frac{2}{3}$ c $\frac{1}{3}$ 3 a $\frac{1}{6}$ b $\frac{1}{2}$ c $\frac{2}{3}$ d 0 e $\frac{1}{2}$ f $\frac{1}{3}$ 4 a $\frac{2}{5}$ b $\frac{1}{3}$ c $\frac{4}{15}$ d $\frac{3}{5}$ e 0 f $\frac{3}{5}$ 5 a 0 b 1 c $\frac{1}{3}$ d 1 e $\frac{1}{3}$ f 1 6 a $\frac{4}{7}$ b $\frac{3}{7}$ c $\frac{1}{7}$ d 0 e $\frac{4}{7}$ f $\frac{2}{7}$ 7 a $\frac{4}{11}$ b $\frac{7}{11}$ c $\frac{2}{11}$ d $\frac{3}{11}$ e 0 f $\frac{1}{11}$

1 a $\frac{1}{8}$ b $\frac{3}{8}$ c $\frac{7}{8}$ 2 a 12 b $\frac{2}{3}$ c $\frac{1}{3}$ d $\frac{7}{12}$ 3 a $\frac{3}{10}$ b $\frac{1}{10}$ c $\frac{3}{5}$ 4 a $\frac{1}{8}$ b $\frac{3}{8}$ c $\frac{3}{8}$ d $\frac{1}{2}$ e $\frac{1}{2}$ f $\frac{1}{8}$

1 a $\frac{5}{18}$ b $\frac{5}{18}$ c $\frac{1}{6}$ d $\frac{5}{18}$ e $\frac{5}{9}$ 2 $\frac{4}{25}$ 3 a $\frac{3}{20}$ b $\frac{51}{380}$ c $\frac{3}{190}$ d $\frac{68}{95}$ e $\frac{27}{95}$ f $\frac{51}{190}$ 4 a $\frac{5}{11}$ b $\frac{3}{11}$
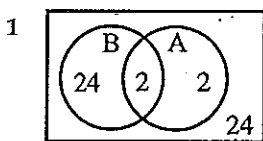
1 a

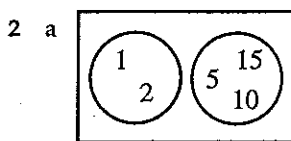| 1,1	2,1	3,1	4,1	5,1	6,1
1,2	2,2	3,2	4,2	5,2	6,2
1,3	2,3	3,3	4,3	5,3	6,3
1,4	3,4	3,4	4,4	5,4	6,4
1,5	2,5	3,5	4,5	5,5	6,5
1,6	2,6	3,6	4,6	5,6	6,6

2 a $\frac{1}{36}$ b $\frac{1}{6}$ c $\frac{1}{9}$ d $\frac{1}{12}$ e $\frac{1}{12}$ f $\frac{1}{6}$ g $\frac{1}{6}$ h $\frac{1}{4}$ i $\frac{1}{12}$ j $\frac{11}{36}$ k 0

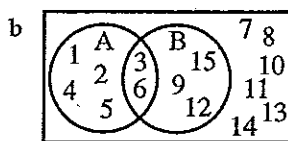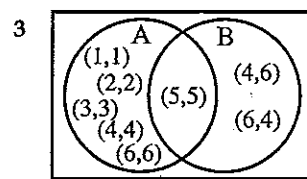3 rolling one die 4 $\frac{1}{4}$ 5 $\frac{1}{4}$ 6 rolling one die
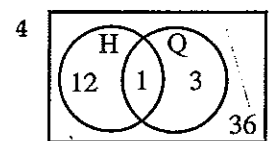
PAGE 45

1

$P(BA) = \frac{7}{13}$

2 a

$P = \frac{1}{3}$

b

$P = \frac{3}{5}$

3

$P = \frac{2}{9}$

4

$P = \frac{4}{13}$

PAGE 46

1 a

x	Tally	f	c.f.
0	卌	5	5
1	卌 卌	10	15
2	卌 卌 III	13	28
3	卌 卌 III	13	41
4	IIII	4	45
5	卌	5	50

b/c

d/e

2 a 2.32 b 2 and 3 c 5 d 2

e

Score	0	1	2	3	4	5
Relative f	0.1	0.2	0.26	0.26	0.08	0.1