

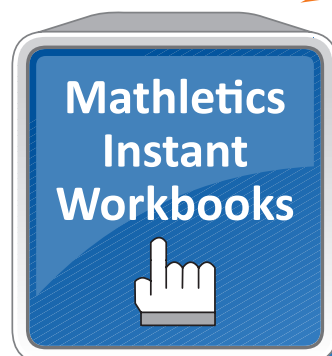
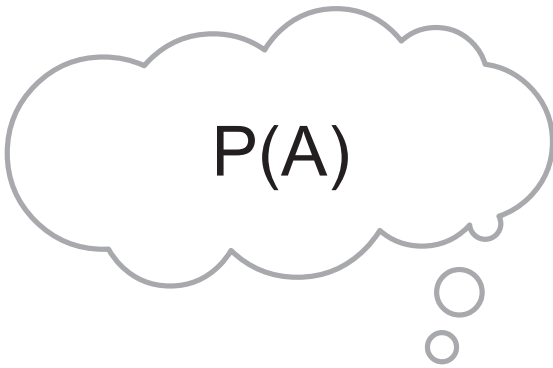
# MATHLETICS

*Inspiring Better Results*

## Probability and Statistics

Student Book - Series K-2

$P(A)$



# Probability and statistics

## Student Book - Series K 2

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Author of The Topics and Topic Tests: AS Kalra

# Probability and statistics

## Topic 1 - Review of simple probability

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

- a a vowel? \_\_\_\_\_      b a consonant? \_\_\_\_\_      c the letter B? \_\_\_\_\_  
d the letter P or B? \_\_\_\_\_      e the letter M? \_\_\_\_\_      f the letter Y? \_\_\_\_\_

# Probability and statistics

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## Topic 2 - Tree diagrams

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

a three heads

\_\_\_\_\_

b two heads and one tail in any order

\_\_\_\_\_

c 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:

a how many different two-digit numbers can be formed \_\_\_\_\_

b the probability that the number formed is less than 34 \_\_\_\_\_

c the probability that the number formed is divisible by 3 \_\_\_\_\_

d 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:

a two red balls? \_\_\_\_\_

b two blue balls? \_\_\_\_\_

c one red ball and one blue ball? \_\_\_\_\_

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

a three boys \_\_\_\_\_

b two boys and one girl \_\_\_\_\_

c one boy and two girls \_\_\_\_\_

d the eldest child being a boy \_\_\_\_\_

e the youngest child being a girl \_\_\_\_\_

f three girls \_\_\_\_\_

# Probability and statistics

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## Topic 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

## Topic 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 a double three \_\_\_\_\_      b any double \_\_\_\_\_
- c a total of 9 \_\_\_\_\_      d a sum greater than 10 \_\_\_\_\_
- e a sum of either 2 or 3 \_\_\_\_\_      f a sum less than 5 \_\_\_\_\_
- g the sum of the numbers is 7 \_\_\_\_\_      h the two numbers are odd \_\_\_\_\_
- i the sum of the numbers is 10 \_\_\_\_\_      j at least one 6 \_\_\_\_\_
- k 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?

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

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

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

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# Probability and statistics

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## Topic 5 - Venn diagrams

**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

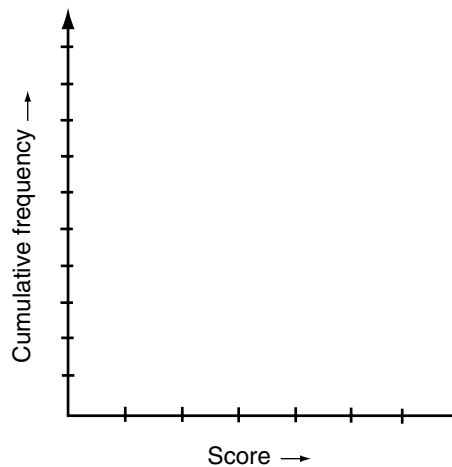
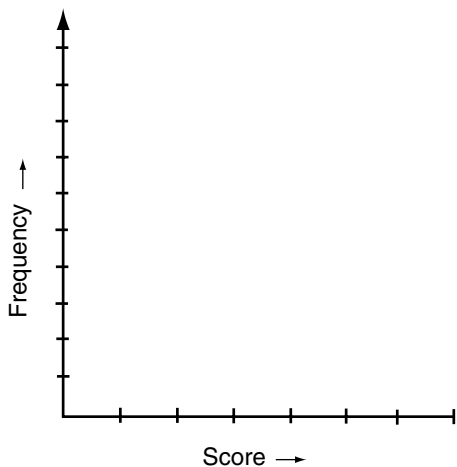
## Topic 6 - Review of statistics

**QUESTION 1** Fifty families were surveyed to find how many children each family has and the following set of data was obtained.

5 3 2 4 1 5 0 2 3 2 2 1 1 3 3  
 4 1 3 2 1 3 3 2 2 2 3 2 1 3 1  
 2 3 0 1 1 5 3 4 5 0 3 0 2 0 2  
 2 1 5 4 3

- Complete the frequency distribution table.
- Draw a frequency histogram.
- Draw a frequency polygon.
- Draw a cumulative frequency histogram.
- Draw a cumulative frequency polygon.

Score (x)	Tally	Frequency (f)	Cumulative frequency
0			
1			
2			
3			
4			
5			
		$\Sigma f =$	



**QUESTION 2** For the frequency distribution given above, calculate:

- the mean \_\_\_\_\_
- the mode \_\_\_\_\_
- the range \_\_\_\_\_
- the median \_\_\_\_\_
- the relative frequencies \_\_\_\_\_



# Probability and statistics

## Topic 7 - Measures of spread, standard deviation

**QUESTION 1** Use your calculator to find the mean and standard deviation, correct to one decimal place, for the following sets of scores. Also find the range of each set of scores.

a 2, 4, 8, 9, 10

\_\_\_\_\_

b 1, 2, 3, 4, 5, 6, 7

\_\_\_\_\_

c 7, 11, 12, 13, 14, 15, 16, 17, 18

\_\_\_\_\_

d 35, 46, 48, 40, 36, 41, 42, 37

\_\_\_\_\_

e 8, 3, 7, 3, 9, 5, 8, 8, 6, 9, 3, 6, 2, 3

\_\_\_\_\_

f 5, 8, 10, 15, 15, 10, 8, 9, 18, 20, 18, 15, 10, 15

\_\_\_\_\_

g

Score	5	7	9	11	13	15
Frequency	8	5	7	8	3	6

\_\_\_\_\_

h

Score	10	20	30	40	50	60	70
Frequency	3	4	3	2	5	2	3

\_\_\_\_\_

**QUESTION 2** Five students sat for a mathematics test and a science test. Their marks are given below.

Science	56	60	69	59	65
Mathematics	70	75	86	82	80

a Find the mean and standard deviation for each set of scores.

\_\_\_\_\_

b Michael scored 69 in science and 86 in mathematics. Which was the better mark?

\_\_\_\_\_

c If Matthew scored 65 in science and 80 in mathematics, in which subject did Matthew perform better compared with the class average?

\_\_\_\_\_

d Use your calculator to find the standard deviation and the mean for each test.

Test A 8 10 13 13 14 15 16 18 16 17 \_\_\_\_\_

Test B 3 11 15 15 9 10 7 16 16 19 \_\_\_\_\_

For which test would the result 16 be better compared with the class average?

\_\_\_\_\_

# Probability and statistics

## Topic 8 - Measures of spread, interquartile range

**QUESTION 1** For the following set of scores, 2, 3, 3, 4, 5, 7, 9, 9, 10, 11, 12, 12, find:

a the 1st quartile (Q1)

b the 2nd quartile (Q2) – (the median)

\_\_\_\_\_

\_\_\_\_\_

c the 3rd quartile (Q3)

d the interquartile range

\_\_\_\_\_

\_\_\_\_\_

**QUESTION 2** Complete the cumulative frequency table and draw a cumulative frequency histogram from the completed table.

Score	55	56	57	58	59	60	61	62	63
Frequency	1	2	4	6	7	12	8	5	3
Cumulative frequency									

From the graph find:

a the median

\_\_\_\_\_

b the lower quartile

\_\_\_\_\_

c the 80th percentile

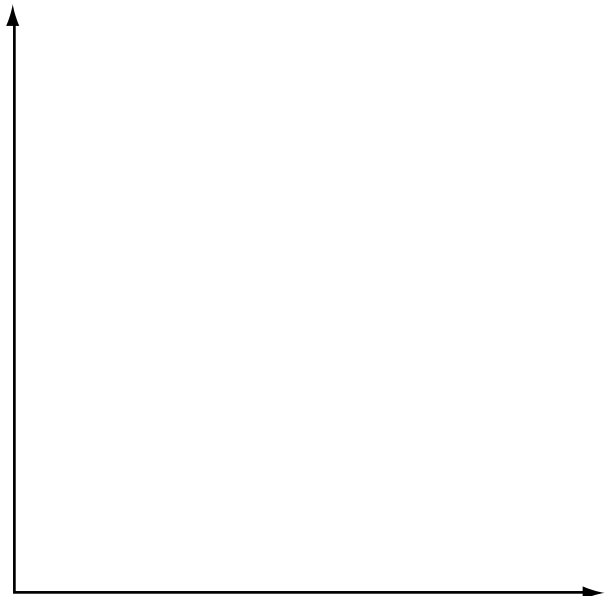
\_\_\_\_\_

d the interquartile range

\_\_\_\_\_

e the mode

\_\_\_\_\_



**QUESTION 3** Find the interquartile range of the following sets of scores.

a 5, 2, 3, 6, 8, 9, 6, 8

\_\_\_\_\_

b 8, 10, 12, 10, 12, 11, 13, 12, 10, 12, 10, 12, 10, 11, 13, 14, 13, 12, 10, 11

\_\_\_\_\_

# Probability and statistics

## Topic Test

## PART A

- Instructions** This part consists of 10 multiple-choice questions  
Each question is worth 1 mark  
Attempt ALL questions  
Calculators are NOT to be used  
Fill in only ONE CIRCLE for each question

**Time allowed: 15 minutes**

**Total marks = 10**

	Marks
<b>1</b> From a pack of 52 cards, one card is drawn at random. Find the probability of drawing a diamond. <b>(A)</b> $\frac{1}{13}$ <b>(B)</b> $\frac{2}{13}$ <b>(C)</b> $\frac{1}{4}$ <b>(D)</b> $\frac{3}{4}$	1
<b>2</b> In a single throw of one die, find the probability of throwing an odd number. <b>(A)</b> $\frac{1}{6}$ <b>(B)</b> $\frac{1}{3}$ <b>(C)</b> $\frac{1}{2}$ <b>(D)</b> $\frac{2}{3}$	1
<b>3</b> In a single throw of two dice, find the probability of throwing a double. <b>(A)</b> $\frac{1}{6}$ <b>(B)</b> $\frac{2}{3}$ <b>(C)</b> $\frac{1}{2}$ <b>(D)</b> $\frac{3}{4}$	1
<b>4</b> For the set of scores, 5, 8, 3, 1, 9, 5, 6, 7, find the range. <b>(A)</b> 6 <b>(B)</b> 7 <b>(C)</b> 8 <b>(D)</b> 9	1
<b>5</b> For the set of scores, 10, 20, 50, 10, 60, what is the difference between the mean and the mode? <b>(A)</b> 10 <b>(B)</b> 20 <b>(C)</b> 30 <b>(D)</b> 40	1
<b>6</b> The test marks of 10 students are 5, 9, 5, 7, 3, 7, 8, 7, 9, 7. What is the modal mark? <b>(A)</b> 6 <b>(B)</b> 7 <b>(C)</b> 8 <b>(D)</b> 9	1
<b>7</b> For the following set of scores, 3, 1, 4, 6, 5, 5, 7, 3, 4, 5, 4, 5, 7, the mode is <b>(A)</b> 6 <b>(B)</b> 4.538 <b>(C)</b> 5 <b>(D)</b> 4	1
<b>8</b> Find the range of the set of scores 8, 9, 12, 7, 9, 11, 8, 9, 5, 13, 7, 9. <b>(A)</b> 7 <b>(B)</b> 9 <b>(C)</b> 4 <b>(D)</b> 8	1
<b>9</b> The median of the numbers 6, 4, 9, 7, 4, 2, 8, is <b>(A)</b> 8 <b>(B)</b> 6 <b>(C)</b> 5 <b>(D)</b> 4	1
<b>10</b> The mean of the numbers 8, 10 and $x$ is the same as the mean of the numbers 6, 8, 10 and 12. Find the value of $x$ . <b>(A)</b> 6 <b>(B)</b> 9 <b>(C)</b> 10 <b>(D)</b> 12	1

**Total marks achieved for PART A**

10

# Probability and statistics

## Topic Test

## PART B

**Instructions** This part consists of 15 questions  
Each question is worth 1 mark  
Attempt ALL questions  
Calculators may be used

**Time allowed: 20 minutes**

**Total marks = 15**

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

**Total marks achieved for PART B**