KZN 2024 TAS Maths Workshop

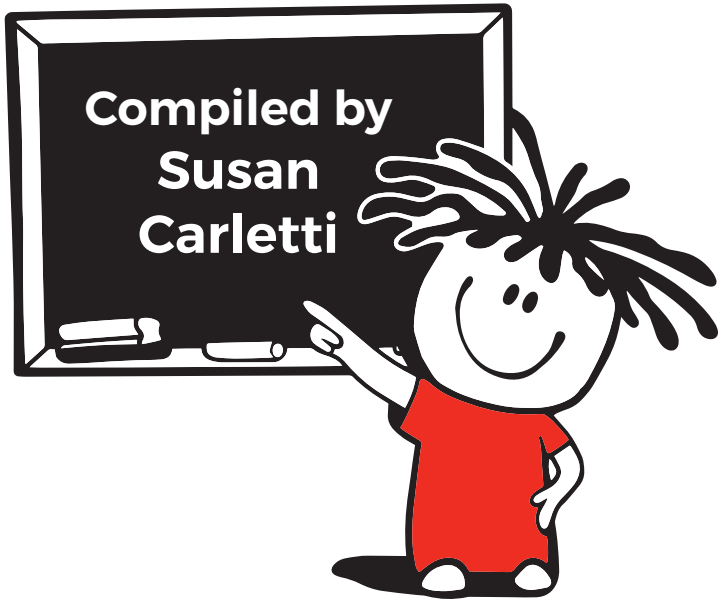
PROBABILITY & COUNTING PRINCIPLES

Building confidence one question at a time

#BREAK THE 70% CEILING

LEARN HOW – Remember for a moment

LEARN WHY – Remember for a life time



THE ANSWER SERIES *Your Key to Exam Success*

CONTENTS

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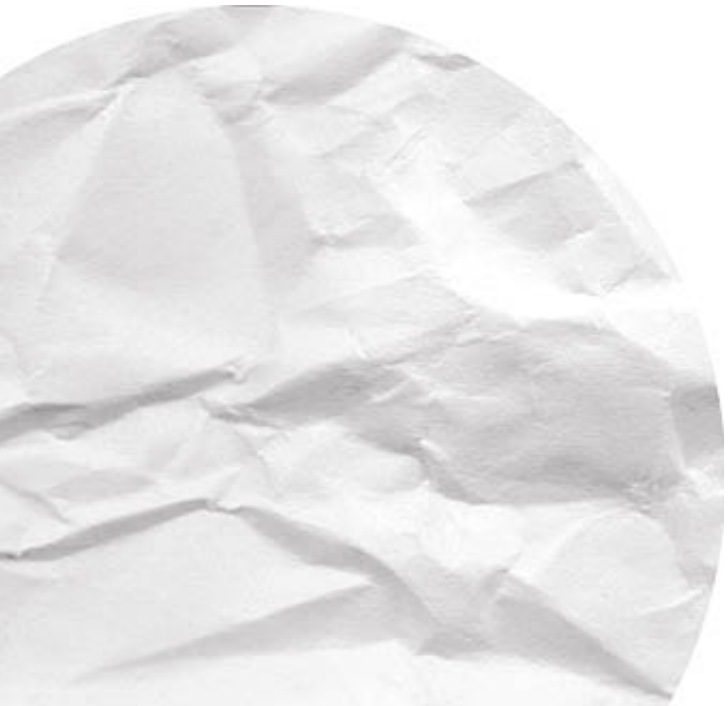
PROBABILITY



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Question 1

There are 20 tickets in a hat, numbered from 1 to 20. One ticket is taken out. Determine the probability of taking out:

1.1 a number less than 5.

1.2 a number not bigger than 5.

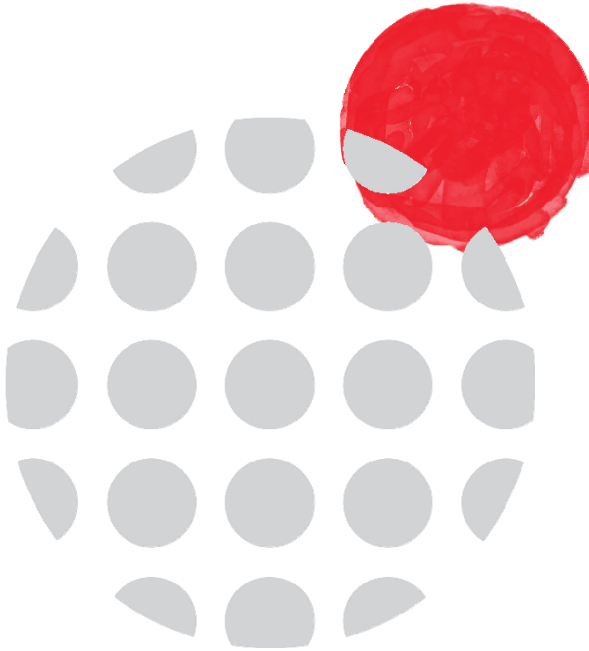
1.3 an odd number.

1.4 a factor of 20.

1.5 a multiple of 7.

1.6 a prime number.

1.7 a number greater than 10 but less than 16.



Question 2

If P(not A) = 0,3 ; P(A or B) = 0,8 and P(A and B) = 0,4,

determine:

2.1 P(A)

2.2 P(B)

2.3 P((not A) or B)

- **Gr 10 Maths 3-in1:**
  p. 12.11, Exercise 12.3, Q 10

Question 3

There are 80 Grade 10 learners in a school.

50 take Mathematics

38 take History

20 take both Mathematics and History

Use a Venn diagram to determine:

3.1 the number of learners taking neither Mathematics nor History.

3.2 the probability that a learner takes Mathematics only.

Question 4

There are 80 Grade 10 learners in a school.

50 take Mathematics

38 take History

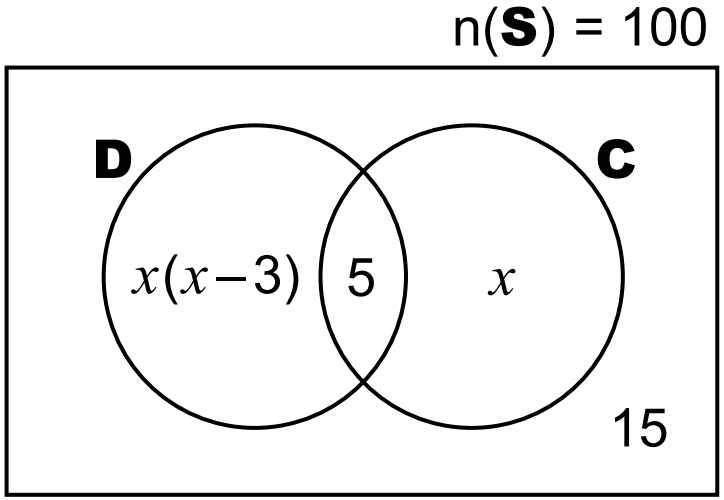
12 take neither Mathematics nor History

Use a Venn diagram to determine the number of learners taking both Mathematics and History.

Question 5

The Venn diagram shows information about the number of learners who own dogs and/or cats or neither.

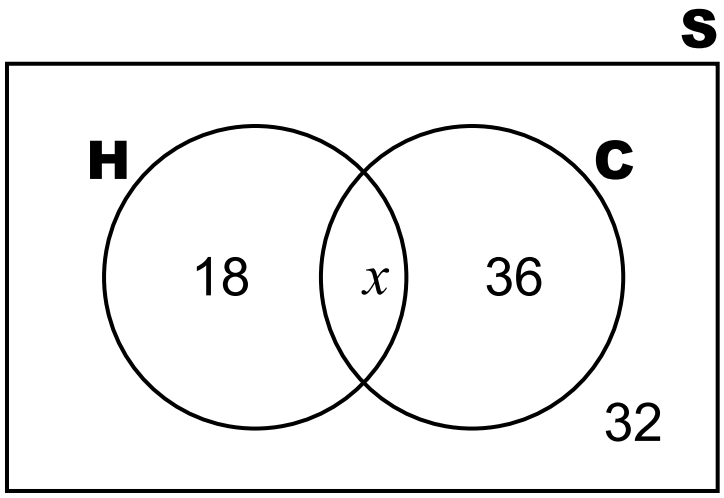
There are 100 learners in total.



Determine the probability that a learner owns a dog ONLY.

Question 6

There is a vendor at a sports match selling hot dogs and cans of cooldrinks. The hotdogs cost R40 each, and the cooldrinks cost R15 each.



The vendor received a total of R2 855. Determine the number of people who bought both a hotdog and a cooldrink.

Question 7

At a school, a survey was carried out to determine the number of Grade 12 learners who take Geography (G), History (H) and Economics (E).

The following information was collected:

- 135 learners took part in the survey
- 5 learners take Geography and Economics, but not History
- 12 learners take Geography and History, but not Economics
- 24 learners take History and Economics, but not Geography
- y learners take History only
- x learners take all three subjects
- y learners take Economics only
- 2y + 3 learners take Geography only
- 60 learners take Economics
- The number of learners who take Geography is equal to the number of learners who take History

For similar examples see

- **Grade 11 Maths 3-in-1**, Exercise 12.2
- **Grade 12 Maths 2-in-1**, Exercise 12.2 and Challenging Question 1

Determine:

7.1 P((G or H) and E)

7.2 P(G or (H and E))

Question 8

A bag contains 6 blue marbles, 5 green marbles, and 4 red marbles.

One marble is drawn from a bag, the colour is noted, and then it is returned to the bag. A second marble is then drawn.

Determine the probability that:

8.1 both marbles are red.

8.2 the first marble is blue, and the second marble is green.

8.3 a blue and a green marble are drawn.

Question 9

A bag contains 6 blue marbles, 5 green marbles, and 4 red marbles.

One marble is drawn from a bag, and then a second marble is drawn without the first one being replaced.

Determine the probability that:

9.1 both marbles are red.

9.2 the first marble is blue, and the second marble is green.

9.3 a blue and a green marble are drawn.

For similar examples see

- **Grade 11 Maths 3-in-1**, Exercise 12.3
- **Grade 12 Maths 2-in-1**, Exercise 12.3

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Question 10

There are 120 passengers on board an aeroplane. Passengers have a choice between a meat sandwich or a cheese sandwich, but more passengers will choose a meat sandwich. There are only 120 sandwiches available to choose from. The probability that the first passenger chooses a meat sandwich and the second passenger chooses a cheese sandwich is $\frac{18}{85}$.

Calculate the probability that the first passenger will choose a cheese sandwich.

DBE June 2022

Question 11

Events S and T are independent such that P(S) = P(T) = y and P(S or T) = 0,84. Determine the numerical value of y.

Northern Cape 2021

For similar examples see

- **Grade 11 Maths 3-in-1**, Exercise 12.1
- **Grade 12 Maths 2-in-1**, Exercise 12.1 and Challenging Questions 3, 4 and 5

Question 12

For similar examples see

- **Grade 11 Maths 3-in-1**, Exercise 12.4
- **Grade 12 Maths 2-in-1**, Exercise 12.4 and Challenging Question 2

A tuckshop offers the following choices for lunch. You may either have a sandwich or a pie, and you may either have a juice or a bottle of water.

	Sandwich (S)	**Pie (P)**	**TOTAL**
Juice (J)		30	
Water (W)			
TOTAL	200		250

The probability of a person choosing a juice and a sandwich is 0,48.

Is the choice of choosing a juice independent of choosing a sandwich?

Question 13

Determine the probability of throwing at least one six in four rolls of a regular six-sided dice.

Question 14

Three events, A, B and C are considered:

$$P(A) = \frac{2}{5}, \quad P(B) = \frac{1}{4} \quad \text{and} \quad P(A \text{ or } B) = \frac{13}{20}$$

14.1 Are events A and B mutually exclusive?

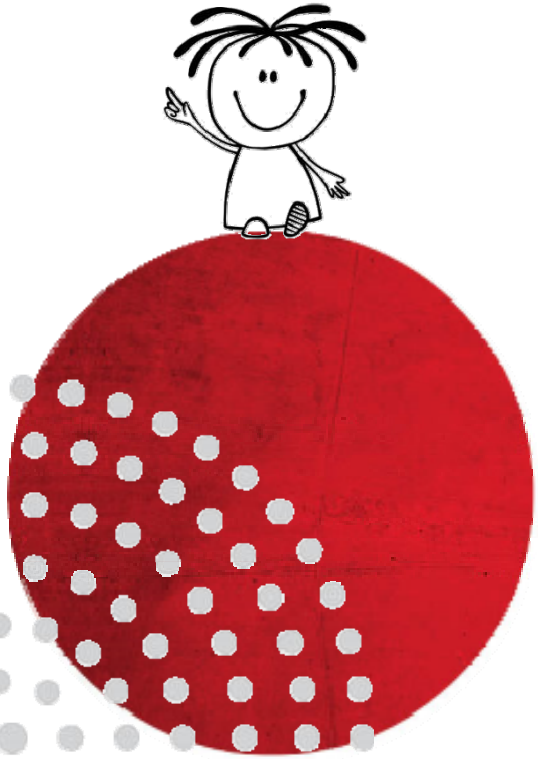
14.2 Determine P(only C), if it is further given that $P(A \text{ or } C) = \frac{7}{10}$, $P(A \text{ and } C) = \frac{2}{5}$ and $2P(B \text{ and } C) = P(A \text{ and } C)$.

14.3 Determine the probability that events A, B or C do NOT take place.

DBE June 2023

Question 15

There are 10 boys in a class of boys and girls. If two learners are selected at random, then the probability that both are boys is 0,15. How many girls are in the class?



Question 16

A bag contains p red marbles and q blue marbles. One marble is selected, and its colour is noted. The marble is returned to the bag, along with n other marbles of the same colour as the one that was selected. A second marble is now selected from the bag. Prove that the probability that the second marble is red is not dependent on the value of n.

COUNTING PRINCIPLES

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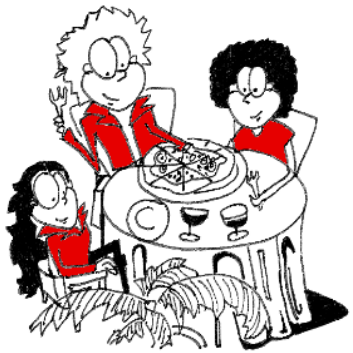
Question 1

A dog runs through two fences. One has three holes, and the other has four holes. How many different ways can he run through the two fences?

Question 2



At a restaurant there is a choice of
three starters (mushrooms (M), soup (S) or pate (P)),
four main courses (chicken (C), beef (B), fish (F) or vegetarian (V))
and two deserts (ice cream (I) or trifle (T)).

How many different combinations could be chosen?

For similar examples see

Grade 12 Maths 2-in-1
Exercise 12.5, Question 1

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Question 3

The digits from 0 to 9 are to be used to make a ten-digit code.
Determine the number of ways to do this given that:

3.1 the digits may be repeated.

3.2 the digits may not be repeated.

Question 4

The digits from 0 to 9 are to be used to make a six-digit code.
Determine the number of ways to do this given that:

4.1 the digits may be repeated.

4.2 the digits may not be repeated.

Question 5

Determine the number of ways the letters of the word EQUATIONS can be arranged.

Question 6

A code is made up of three letters followed by three digits.
Only consonants may be used, and they may not be repeated. Any digit from 0 to 6 may be used, and they may be repeated. How many such codes are there?

Question 7

A code is made up of three letters followed by three digits.
The first letter must be a vowel, thereafter any letter may be used.
Any digit from 0 to 9 may be used, but the last digit must be even.
How many such codes are there?

Question 8

The letters of the word PANDEMIC are arranged in any order.

8.1 Determine the number of unique arrangements that can be made.

8.2 Determine the number of arrangements if each word must start with C and end with M.

8.3 Determine the probability that each word starts with C and ends with M.

For similar examples see

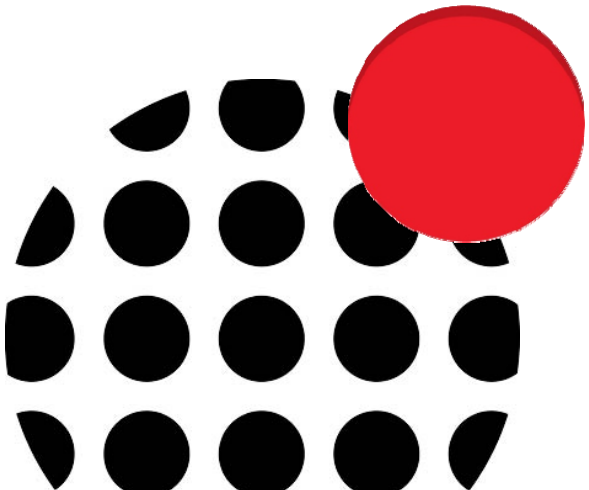
Grade 12 Maths 2-in-1
Challenging Questions 6 and 7

Question 9

The letters of the word ALGORITHMS are used to form different five-letter words.

9.1 How many different five-letter words can be formed?

9.2 How many different five-letter words can be formed using only one vowel?



Question 10

Consider the digits 1 to 8.

10.1 How many two-digit numbers can be formed if digits may be repeated?

10.2 How many four-digit numbers can be formed if digits may not be repeated?

10.3 How many numbers between 3 000 and 4 000 can be formed?

For similar examples see

Grade 12 Maths 2-in-1

Exercise 12.5, Questions 4 & 5

and Challenging Questions 8 and 9

Question 11

Mr and Mrs Brown and their four children line up for a photograph.

11.1 In how many ways can they line up if anyone may sit anywhere?

11.2 In how many ways can they line up if Mr and Mrs Brown must each sit at an end?

11.3 In how many ways can they line up if Mr and Mrs Brown must sit next to each other in the middle?

11.4 In how many ways can they line up if Mr and Mrs Brown must sit next to each other anywhere?

Question 12

Five Maths books and three Science books are to be placed on a shelf. The books are all different.

12.1 In how many ways can the books be arranged?

Grade 12 Maths 2-in-1
p. 53, Exercise 12.5
Question 6

12.2 In how many ways can the books be arranged if the five Maths books must be together?

12.3 In how many ways can the books be arranged if the Maths books must be together and the Science books must be together?

Question 13

Consider the word ISOSCELES. In how many ways can you arrange the letters?

Question 14

A four-digit code is made from the digits 0 to 6.

How many four-digit codes can be made if the code has to be greater than 2 000, less than 3 000, and must be even? You may not repeat digits.

Question 15

There are 7 different shirts and 4 different pairs of trousers hanging in a cupboard.

15.1 In how many ways can the clothes be hung if all the shirts must be together and all the trousers must be together?

15.2 What is the probability that a shirt will hang at the beginning of the rail and a pair of trousers at the end of the rail?

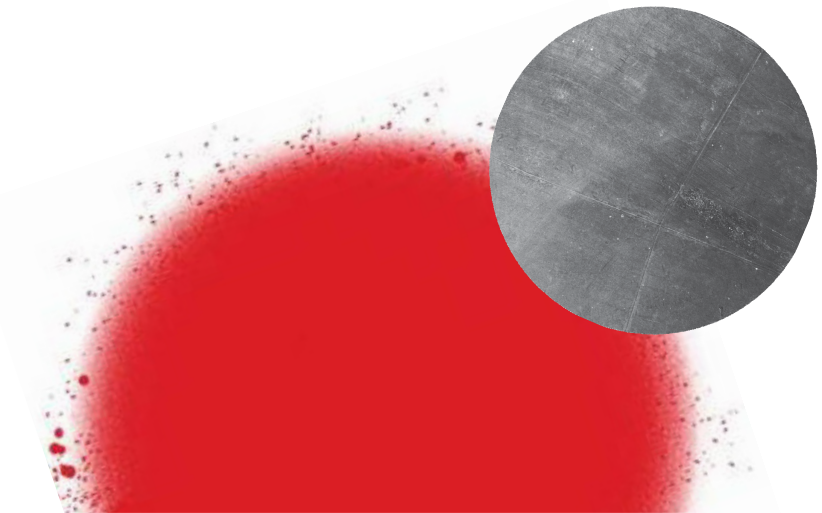
Grade 12 Maths 2-in-1
p. 53, Exercise 12.5
Question 3

Question 16

Consider the word MILLION.

16.1 Determine the number of seven-letter words that can be made.

16.2 Determine the probability that the vowels will be next to each other.



Question 17

Consider the word CALCULATOR.

17.1 How many different word arrangements can be made?

17.2 Determine the probability that a word arrangement starts and ends with C.

For similar examples see

Grade 12 Maths 2-in-1

Exercise 12.5, Questions 9 and 10

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Question 18

Six friends go to watch a movie. They will sit next to each other in a straight row. Themba and Linna have had an argument and refuse to sit next to each other.
How many possible seating arrangements are there?

Question 19

Suppose a five-digit PIN can be made up by selecting digits at random and that the digits can be repeated. What is the probability that such a PIN will contain at least one 9?
Give your answer correct to two decimal places.

DBE 2012

Question 20

In a certain province vehicle number plates have the following format: @@@### (three letters followed by three digits) where @ represents a letter of the alphabet, and # a digit from 0 to 9. For each number plate that is assigned to a vehicle, the following conditions must be met:

- All letters except E, G and O can be used and no letter can be repeated.
- No number plate code can start with a vowel.
- All digits can be used, and each digit can be repeated.

20.1 How many vehicles can be assigned a number plate code according to this system?

20.2 Calculate the probability that a number plate code chosen from the number plates in 20.1 at random contains only one vowel and ends with an even digit.

Eastern Cape September 2021

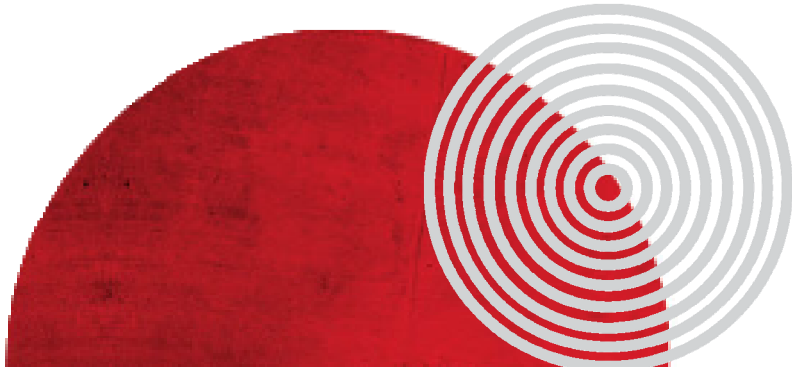
Question 21

A three-digit number is made up by using three randomly selected digits from 0 to 9. No digit may be repeated.

21.1 Determine the total number of possible three-digit numbers, greater than 100, that can be formed.

21.2 Determine the total number of possible three-digit numbers, both even and greater than 600, that can be formed.

DBE June 2021



Question 22

Seven guitar players, each with a different name, participate in a concert.

22.1 In how many different ways can the names of the guitar players be listed, one below the other, in the programme?

22.2 After the performance, the guitar players wait backstage. There is a bench with only room for four to sit on.

What will be the probability that the four guitar players will be sitting in alphabetical order, from left to right?

22.3 During the performance, the seven guitar players sit in a line on stage. Four guitar players are female and three are male.

In how many different ways can they be seated if the males may not sit next to each other?

Question 23

Consider the letters AHMST. If all five letters are used, and all the possible arrangements that can be formed are placed in alphabetical order, in which position is the word MATHS?

Question 24

Simplify $\dfrac{2023! + 2022!}{2024!}$

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Question 25

Given: $\dfrac{((3!)!)!}{3!} = a \times b!$ where a and b are positive integers and b is as large as possible. Determine the value of $a + b$.

Question 26

Determine the units digit of $\sum_{i=1}^{2023} (i!)^2$

THANK YOU!

CONTACT US

Maths queries:
jenny@theanswerseries.co.za

General queries:
info@theanswerseries.co.za

(021) 671 0837

064 371 8715

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