basic education

Department:
Basic Education
REPUBLIC OF SOUTH AFRICA

NATIONAL
SENIOR CERTIFICATE

GRADE 12

MATHEMATICAL LITERACY P2

NOVEMBER 2019

MARKS: 150

TIME: 3 hours

This question paper consists of 11 pages and an addendum with 5 annexures.

INSTRUCTIONS AND INFORMATION

1.   This question paper consists of FOUR questions. Answer ALL the questions.

2.   Use the ANNEXURES in the ADDENDUM to answer the following questions:

         ANNEXURE A for QUESTION 1.1
         ANNEXURE B for QUESTION 1.3
         ANNEXURE C for QUESTION 2.2
         ANNEXURE D for QUESTION 2.4
         ANNEXURE E for QUESTION 3.5

3.   Number the answers correctly according to the numbering system used in this question paper.

4.   Start EACH question on a NEW page.

5.   You may use an approved calculator (non-programmable and non-graphical), unless stated otherwise.

6.   Show ALL calculations clearly.

7.   Round off ALL final answers appropriately according to the given context, unless stated otherwise.

8.   Indicate units of measurement, where applicable.

9.   Maps and diagrams are NOT drawn to scale, unless stated otherwise.

10.   Write neatly and legibly.

QUESTION 1

1.1 | An annual agricultural show is held at NAMPO Park in the Free State in May. Farmers and other interested people visit this show to see the latest developments in farming.
ANNEXURE A shows the route map to NAMPO Park. |

Use ANNEXURE A to answer the questions that follow.

1.1.1   Name the TWO towns closest to NAMPO Park.   (2)

1.1.2   Give the TWO general compass directions that a visitor must use to travel by car from OR Tambo Airport, via Klerksdorp, to reach NAMPO Park.   (4)

1.1.3   The distance from Bloemfontein to Welkom is 152 km and the distance from Bloemfontein to Bultfontein is 100 km.

        Determine, with calculations, the route the organisers used to indicate the distance from Bloemfontein to NAMPO Park.   (3)

1.1.4   Alfred departs from NAMPO Park at 18:45 and travels to Sasolburg at an average speed of 88 km/h. He calls his wife to inform her that he will arrive in Sasolburg at 8 pm.

        Verify, with calculations, whether his timing is correct.

        You may use the formula:

        Distance = speed × time   (6)

1.2 | There are rectangular prism-shaped water troughs for cattle on display. The troughs are made of concrete, as shown in the picture below.

PICTURE OF A CONCRETE TROUGH	OUTER DIMENSIONS OF A TROUGH
	Length = 3 m Width = 685 mm Height = 40 cm

Volume of a rectangular prism = length × width × height

NOTE:
- A trough is a long, narrow, open container for animals to drink from.
- $1\ \ell = 1\ 000\ cm^3$

Use the information above to answer the questions that follow.

1.2.1   Calculate, in cm^3, the volume of concrete used to make this trough if the trough can hold a maximum of 485 ℓ of water.   (7)

1.2.2   A cow drinks 56 ℓ of water per day. Alfred stated that a full trough has enough water for 8 cows per day.

Verify, with calculations, whether this statement is CORRECT.   (3)

1.2.3   Determine how long, to the nearest minute, it will take to fill a half empty trough if the water flows in at a rate of 14,5 ℓ per minute.   (3)

1.3 | ANNEXURE B shows the floor plan of one of the exhibition halls at NAMPO Park, with distances given in metres.

Use ANNEXURE B to answer the questions that follow.

1.3.1   Determine the approximate distance from stand 14 to the nearest rolling door.   (2)

1.3.2   Measure the distance from the beginning of stand 10 to the end of stand 17 and hence, determine, to ONE decimal place, the scale of this plan.   (4)

1.3.3   The exhibitor's rate for a 4 m × 4 m stand is R22 942.

Cyril stated that he must pay exactly R25 000 for stand 26.

Verify, showing ALL calculations, whether this statement is valid.   (5)

[39]

QUESTION 2

2.1 | According to the SARS data for December 2017, South Africa's 148 266 millionaires earn between R1 million and R2 million per annum.
|
| The number of millionaires increased by 5,0065% compared to the previous year. The total annual taxable income for ALL the millionaires was R287,24 billion.
|
| [Source: *SARS Statistics*, released December 2017] |

Use the information above to answer the questions that follow.

2.1.1 It was stated that the mean monthly income per millionaire is exactly R161 000.

Verify, with calculations, whether this statement is CORRECT. (5)

2.1.2 Calculate the number of millionaires in South Africa in the previous year (2016). (3)

2.2 | ANNEXURE C shows the tax rates for individuals for the 2018/2019 tax year. John (68 years old) received a taxable income of R2 045 364 for the 2018/2019 tax year. He paid a monthly contribution towards a medical scheme for himself and his wife. |

Use the information above and ANNEXURE C to answer the questions that follow.

2.2.1 Calculate John's total medical scheme tax rebate for the year. (3)

2.2.2 Hence, calculate the amount of income tax he had to pay for the 2018/2019 tax year. (8)

2.3 | John's daughter, Megan, works in Denmark. She earns an annual gross salary of Kr600 000 (Kr is the unit for Danish kroner.) She informed her father that she had the following annual deductions from her salary:
|
| • Kr229 760 for investment policy
| • Kr48 000 for labour market contribution
| • Kr37 200 for employment deduction |

Use the information above to answer the questions that follow.

2.3.1 Calculate, in rand, Megan's annual gross salary using the following exchange rates:

| 1 euro = 15,64 South African rands |
| 1 euro = 7,47 Danish kroner |

(4)

2.3.2 John stated that Megan's total annual deductions (excluding tax) are more than 52% of her annual gross salary.

Verify, showing ALL calculations, whether this statement is valid. (4)

2.4   TABLE 1 on ANNEXURE D shows the top marginal tax rate for individuals in the G20 countries. This table provides present and past data of the top marginal tax rates. It was updated in January 2019.

Use the information in ANNEXURE D to answer the questions that follow.

2.4.1   Name the country that has the biggest range between 2019 and the past top marginal tax rates.   (2)

2.4.2   Determine, to THREE decimal places, the probability of randomly selecting one of the G20 countries where the latest tax rates changed from the previous tax rate.   (3)

2.4.3   Use the 2019 top marginal tax rate and answer the following questions:

(a)   Determine quartile 2   (2)

(b)   The interquartile range is given as 12.

Verify, showing ALL calculations, whether the given interquartile range is CORRECT.   (4)

[38]

QUESTION 3

3.1
> Franco is training to become a pilot. The following shows the approximate cost to get a private pilot's licence:
>
> - 28 hours' flying with an instructor @ R2 050 per hour
> - 18 hours' solo flying at a total cost of R31 050
> - 15 hours' theory lessons costing R1 242 per 3-hour lesson
> - 2-hour ground evaluation test costing R700
> - Flying-kit including notes costing R6 544
> - 7 examinations @ R190 per examination
>
> **NOTE:** Solo flying means to fly the airplane on your own.
>
> [Adapted from businesstech.co.za]

3.1.1 Calculate, in rand per minute, the rate for solo flying. (3)

3.1.2 Calculate the total approximate cost to get a private pilot's licence. (5)

3.2 Two years ago Franco had invested R90 000 at an interest rate of 8,5% per annum compounded yearly.

Verify, with calculations, whether this total amount with interest is enough to pay for a private pilot's licence. (6)

3.3 Franco noted that not all the students passed the examinations.

TABLE 2 and TABLE 3 show information regarding the same group of students that sat for the examinations. All students that failed, attempted the examinations again.

3.3.1 TABLE 2 below shows information regarding the percentage of students that passed or failed the examinations.

TABLE 2: PASS OR FAIL RATE PER ATTEMPT

	1ST ATTEMPT	2ND ATTEMPT
Failure rate	80%	70%
Pass rate	20%	30%

Give a possible reason why the probability of passing increased after the first attempt. (2)

3.3.2 TABLE 3 below shows the actual numbers of students listed in TABLE 2 that sat for the examinations. Some values have been omitted.

TABLE 3: TOTAL NUMBER OF STUDENTS AND RESULTS

	FAIL	PASS	TOTAL
1st attempt	A	24	B
2nd attempt	67	D	C

Determine, showing ALL calculations, the missing values **A**, **B**, **C** and **D** to calculate the total number of students that passed after both attempts. (6)

3.4   Franco's flying instructor has completed 26 000 hours of flying. It was stated that these hours can be converted to 154 weeks, 5 days and 8 hours of flying.

Verify, showing ALL calculations, whether this statement is valid.   (5)

3.5

> Franco assembles benches for their flying field. The benches are sold as loose parts contained in a box, ready to be assembled.
>
> **PICTURE OF AN ASSEMBLED BENCH**
>
>
>
> ANNEXURE E has the list of parts and the first THREE assembly illustrations.
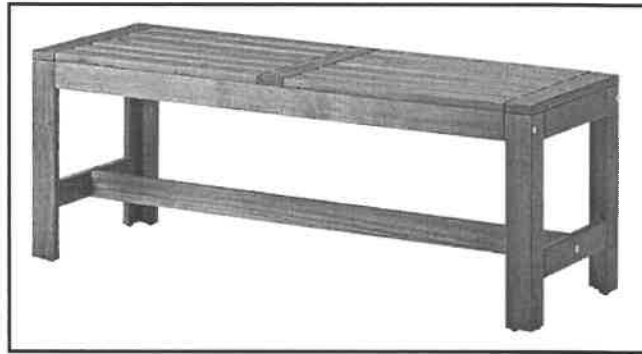
Use ANNEXURE E to answer the questions that follow.

3.5.1   Write down the total number of loose parts in a box.   (2)

3.5.2   Write down TWO instructions that will match the illustration in step 2.   (4)

3.5.3   Explain the purpose of the long panel.   (2)

[35]

QUESTION 4

4.1 The Republic of South Africa (RSA) conducts household censuses to collect information. The next census will take place in 2021.

Census information regarding household size is shown below.

HOUSEHOLD SIZE

HOUSEHOLD SIZE	CENSUS 1996	CENSUS 2001	CENSUS 2011
One	16%	19%	27%
Two	17%	18%	19%
Three	15%	15%	15%
Four	15%	15%	14%
Five or more	36%	33%	25%
Total number of households	**8,7 million**	**10,8 million**	**14,5 million**

[Source: statssa.gov.za]

NOTE:
- A census is an official count or survey.
- According to Stats SA, a household consists of a single person or a group of people who live together for at least four nights a week, who eat together and who share resources.

Use the data above to answer the questions that follow.

4.1.1 Determine the percentage increase in the total number of households from 2001 to 2011. (3)

4.1.2 State which household size matches EACH of the following trends:

(a) Increased every year, but only by a small percentage (2)

(b) Remained constant in every census from 1996 to 2011 (2)

4.1.3 It was stated that the percentage of households with five or more persons decreased from 2001 to 2011, therefore the number of households with five or more persons **decreased** by 0,060 million.

Verify, showing ALL calculations, whether this statement is CORRECT. (5)

4.1.4 Explain why the percentages for the 1996 census do not add up to 100%. (2)

4.1.5 Write down the probability of randomly choosing a household from the 2011 census with a household size fewer than four persons. (3)

4.2 The information below shows the per capita income of households in South Africa in 2011.

HOUSEHOLDS IN SOUTH AFRICA		
INCOME PER CAPITA PER DAY		**NUMBER OF HOUSEHOLDS**
R280 and more		11% 1,4 million
R80 to R279		24% 3,1 million
R20 to R79		41% 5,4 million
Less than R20		24% 3,2 million

[Source: Household survey 2011]

NOTE: Children under 10 years of age count as half a person for per capita calculations.

4.2.1 Write down the modal class for the income per capita per day. (2)

4.2.2 Determine the total number of households with a per capita income of less than R80 per day. (2)

4.2.3 The Wong Family has the following income per person:

- Mr Wong: R276 000 per year
- Mrs Wong: R541 500 per year

Calculate the Wong household income per capita per day if they have 2 children, aged 15 and 8 years old.

You may use the formula:

$$\text{Per capita income} = \frac{\text{Total income per household}}{\text{Household size}}$$

(6)

4.2.4 A household with an income of R280 per capita per day spends 4% of their income on cellphones.

Determine the total amount spent by this household on cellphones per year. (3)

4.3   TABLE 4 below shows the number of households that have access to amenities (services) in their houses. Some of the data have been omitted.

TABLE 4:   **NUMBER OF HOUSEHOLD WITH ACCESS TO AMENITIES FOR SELECTED YEARS**

	2001	2007	2011	2016
Flush toilets	5,8 million 53%	7,2 million 58%	8,7 million 60%	10,7 million ...
Tap water	6,9 million 62%	8,7 million 69%	10,6 million 73%	14,3 million 84,5%
Electricity	7,8 million 70%	10,0 million 80%	12,2 million 85%	14,8 million ...
Total households		H	14 450 161	16 923 309

[Source: Census 2001, 2011 and Community survey 2007 and 2016]

Use the information in the table above to answer the questions that follow.

4.3.1   To determine **H** in the table, two learners provided the following calculations:

IAN	NEO
$H = \dfrac{10,0 \text{ million}}{80} \times 100$ $= 12,5 \text{ million}$	$H = \dfrac{10,0 \text{ million}}{100} \times 80$ $= 8 \text{ million}$

        Give the name of the person whose answer was INCORRECT.   (2)

4.3.2   The average expenditure on electricity per household was R125 per month and for tap water R98 per month.

        Calculate, in millions, the total that was spent by all the households on electricity and tap water in 2011.   (4)

4.3.3   The graphs below show the same data for the number of households that have access to tap water.
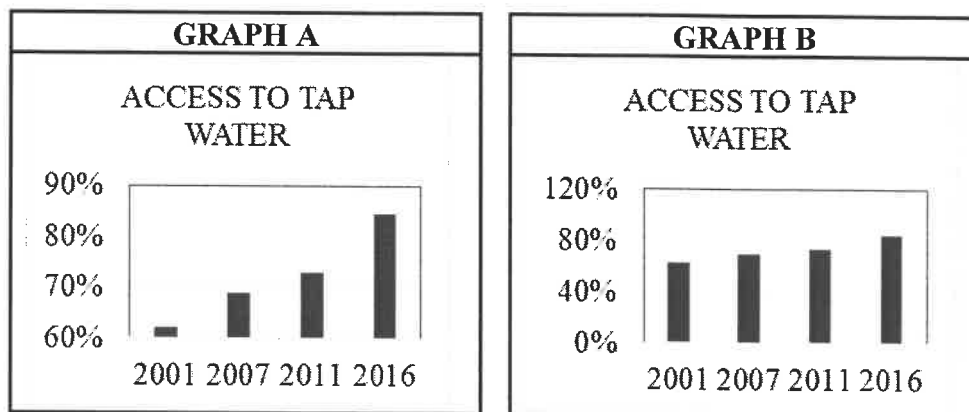
        Give ONE reason for the difference in the length of the bars for each of the graphs.   (2)

                                                            [38]

                                                    TOTAL: **150**

basic education

Department:
Basic Education
REPUBLIC OF SOUTH AFRICA

NATIONAL
SENIOR CERTIFICATE

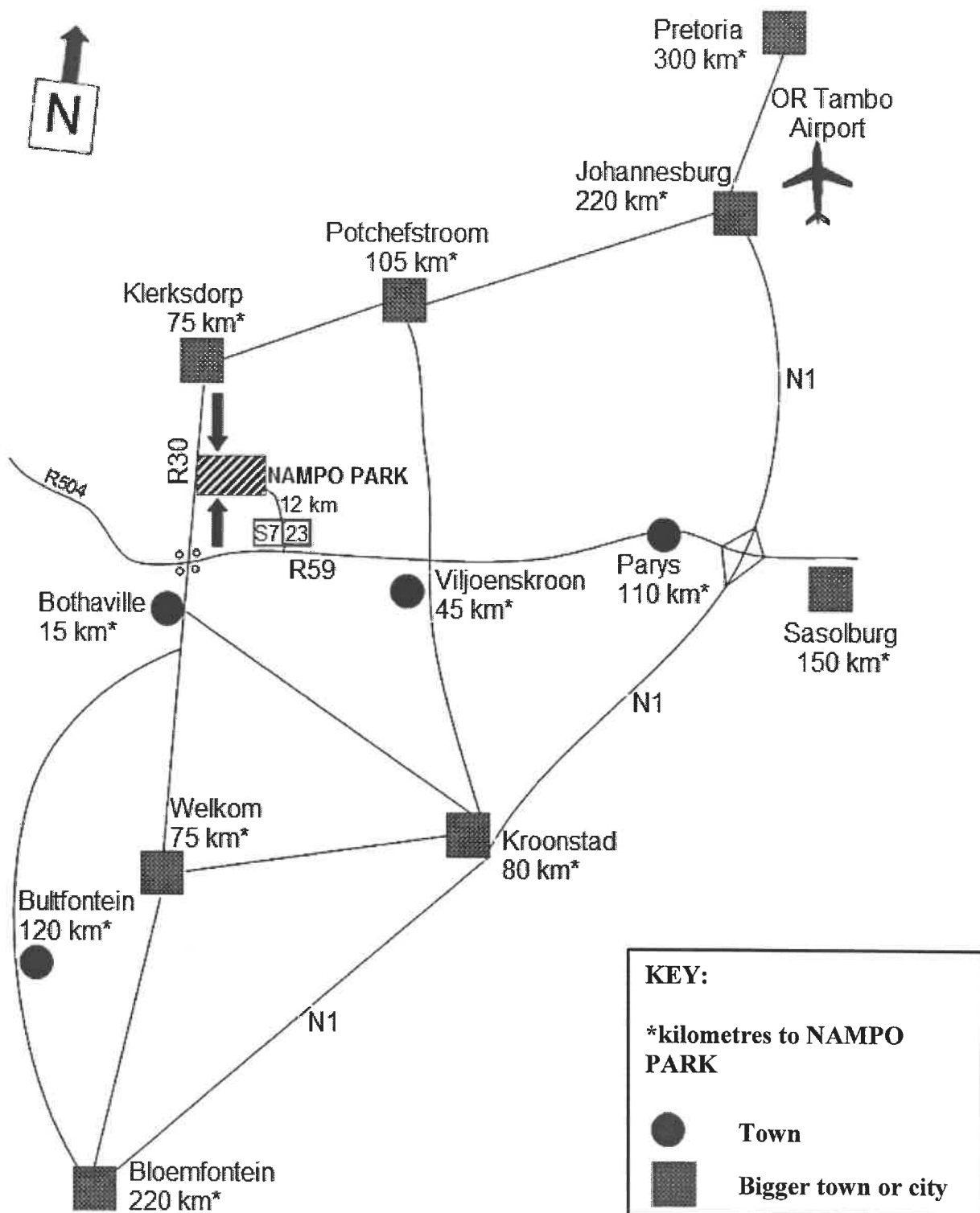## GRADE 12

MATHEMATICAL LITERACY P2

ADDENDUM

NOVEMBER 2019

This addendum consists of 6 pages with 5 annexures.

ANNEXURE A

QUESTION 1.1

ROUTE MAP TO NAMPO PARK

Pretoria
300 km*

OR Tambo
Airport

Johannesburg
220 km*

Potchefstroom
105 km*

Klerksdorp
75 km*

N1

R30

R504

NAMPO PARK
12 km
S7 23

R59

Bothaville
15 km*

Viljoenskroon
45 km*

Parys
110 km*

Sasolburg
150 km*

N1

Welkom
75 km*

Kroonstad
80 km*

Bultfontein
120 km*

N1

Bloemfontein
220 km*

KEY:

*kilometres to NAMPO PARK

●   **Town**

■   **Bigger town or city**

[Adapted from grainsa.co.za]

ANNEXURE B

QUESTION 1.3

FLOOR PLAN OF AN EXHIBITION HALL AT NAMPO PARK
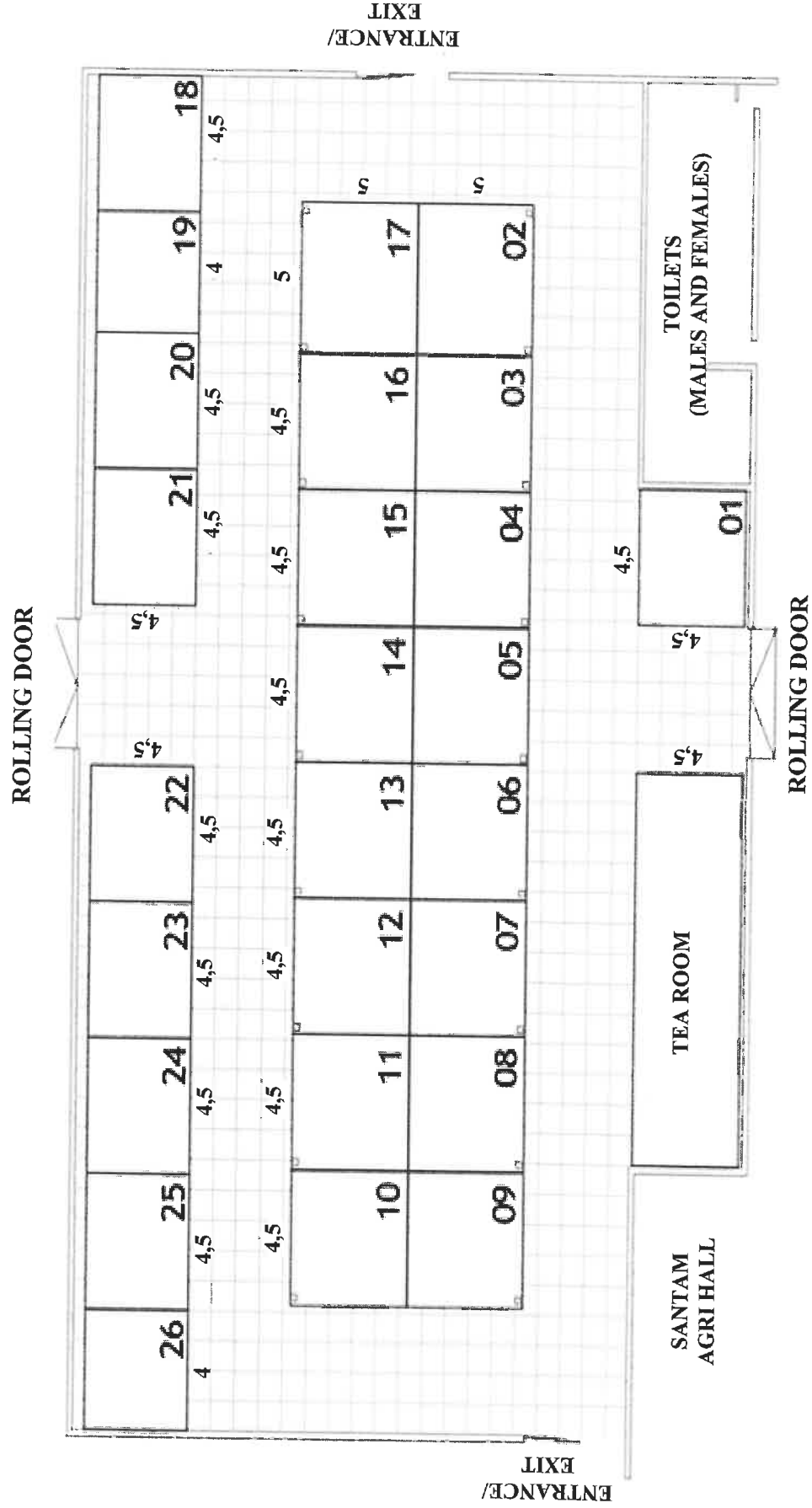
ANNEXURE C

QUESTION 2.2

TAX RATES FOR INDIVIDUALS

2018/2019 TAX YEAR (1 MARCH 2018–28 FEBRUARY 2019)

TAXABLE INCOME	RATES OF TAX
0–195 850	18% of taxable income
195 851–305 850	35 253 + 26% of taxable income above 95 850
305 851–423 300	63 853 + 31% of taxable income above 305 850
423 301–555 600	100 263 + 36% of taxable income above 423 300
555 601–708 310	147 891 + 39% of taxable income above 555 600
708 311– 1 500 000	207 448 + 41% of taxable income above 708 310
1 500 001 and above	532 041 + 45% of taxable income above 1 500 000

TAX REBATE	2019
Primary	R14 067
Secondary (65 and older)	R7 713
Tertiary (75 and older)	R2 574

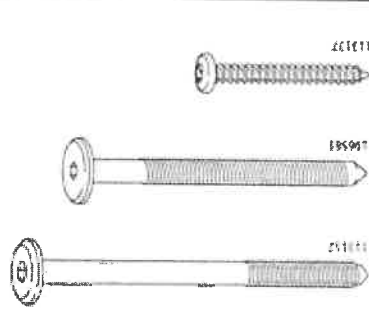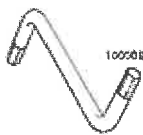| MEDICAL SCHEME TAX REBATES	
PER MONTH (R)	2019
For the tax payer who paid medical scheme contributions	R310
For the first dependant	R310
For each additional dependant	R209

[Source: sars.gov.za]
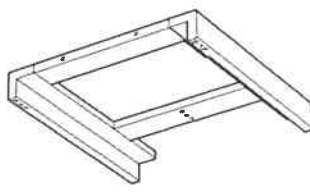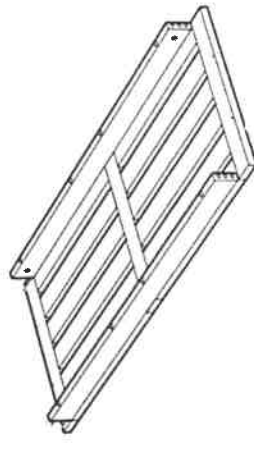
ANNEXURE D

QUESTION 2.4

TABLE 1: TOP MARGINAL TAX RATES FOR INDIVIDUALS IN THE G20 COUNTRIES

COUNTRY	UNIT %	
	2019	PREVIOUS
Japan	55,95	55,95
Netherlands	52,00	52
Germany	47,50	47,5
Australia	45,00	45
China	45,00	45
France	45,00	45
South Africa	45,00	45
Spain	45,00	45
United Kingdom	45,00	45
Italy	43,00	43
South Korea	40,00	40
Switzerland	40,00	40
United States of America	37,00	39,6
India	35,88	35,54
Argentina	35,00	35
Mexico	35,00	35
Turkey	35,00	35
Canada	33,00	33
Indonesia	30,00	30
Brazil	27,50	27,5
Singapore	22,00	22
Russia	13,00	13
Saudi Arabia	0,00	0

[Source: //tradingeconomics.com/country-list]

ANNEXURE E

QUESTION 3.5

LIST OF PARTS

SCREW	DOWEL	DOWEL NUT SLEEVE	ALLEN KEY	BENCH LEG	LONG PANEL	BENCH SEAT
4x 2x 4x	12x	2x 4x	1x	2x	1x	1x

STEP BY STEP ASSEMBLY INSTRUCTIONS

1

2

3