Basic Education

KwaZulu-Natal Department of Basic Education
REPUBLIC OF SOUTH AFRICA

MATHEMATICAL LITERACY

COMMON TEST

MARCH 2016

NATIONAL SENIOR CERTIFICATE

GRADE 12

MARKS: 100

TIME: 2 hours

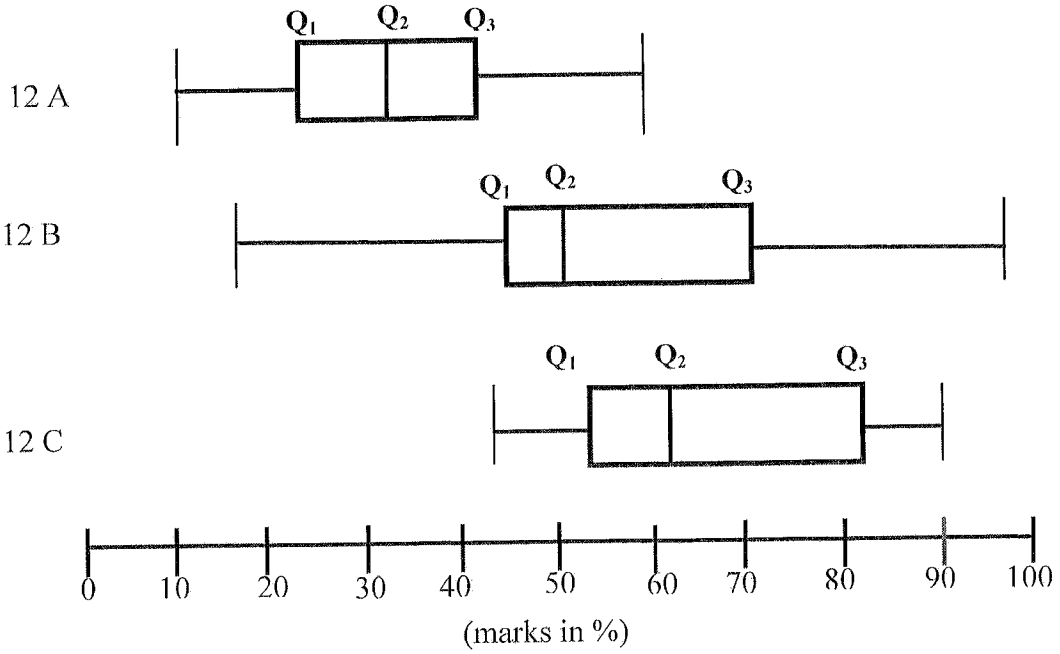
This question paper consists of 11 pages.

INSTRUCTIONS AND INFORMATION

1. This question paper consists of **FIVE** questions. Answer **ALL** the questions.
2. Number the answers correctly according to the numbering system used in this question paper.
3. Start **EACH** question on a **NEW** page.
4. An approved calculator (non-programmable and non-graphical) may be used, unless stated otherwise.
5. **ALL** the calculations must be clearly shown.
6. **ALL** the final answers must be rounded off to **TWO** decimal places, unless stated otherwise.
7. Units of measurement must be indicated where applicable.
8. Write neatly and legibly.

QUESTION 1

Mrs Coetzee teaches Mathematical Literacy in three grade 12 classes (12A, 12B and 12C) at Newtown High School. She administered the class test and analysed the performance of the learners in three classes. The box and whisker plots below represent the marks as percentages for the classes. There are 30 learners in 12A, 25 learners in 12B and 22 in 12C. Refer to graph and answer the questions that follow.



1.1 Estimate the median for 12A. (2)

1.2 From which class is the top learner? (2)

1.3 Which of the three classes had the best test performance? Justify your answer. (3)

1.4 Determine the interquartile range for 12B. (2)

1.5 Determine the number of learners who got less than 70% in a test in 12B? (3)

1.6 Between which marks is the middle 50% of grade 12C learners? (2)

1.7 Mrs Coetzee told her HOD that 50 out of 77 learners achieved more than 40% in the test. Is Mrs Coetzee correct? Verify her argument by calculating the total number of learners who obtained more than 40% in the test. (6)

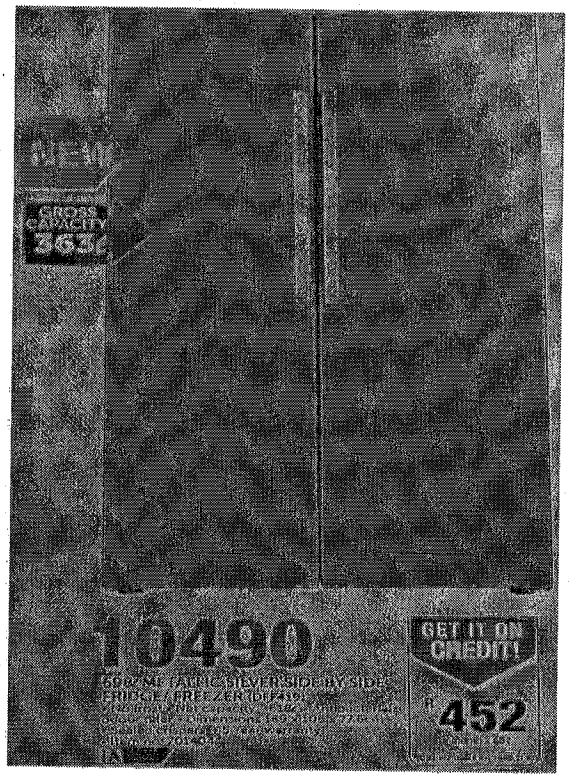
[20]

QUESTION 2

Mrs Makhaye has a single door fridge in her kitchen and she wants to replace it with a double door fridge.

She saw the advertisement of the fridge from Game Stores catalogue and planned to buy it cash. She started saving money for five years to buy the fridge.

The bank gives her two quotations which have a growth rate of 5,3% per annum.



Source www.gamestores.co.za

Table 2: Quotations on two types of investment from a bank

Year	0	1	2	3	4	5
Investment A	R8 000,00	R8 424,00	R8 848,00	R9 272,00	**A**	R10 120,00
Investment B	R8 000,00	R8 424,00	R8 870,47	R9 340,61	R9 835,66	**B**

2.1 Identify the type of interests represented by investments **A** and **B** and justify answer. (4)

2.2 Calculate the missing values of **A** and **B**. (4)

2.3 Is it wise for Mrs Makhaye to invest for a fridge for 5 years? Justify your answer (2)

2.4 Mr Simon Makhaye works at Fusion Chain Stores. According to law employees must contribute 1% of the basic salary to the UIF and the employer also contributes likewise. However, there is a ***UIF threshold*** which stipulates the maximum contribution by the employer or employee. In October 2012, the Minister of Finance Mr Pravin Gordhan adjusted ***UIF threshold*** from R124.78 to R147.82 per month.

FUSION CHAIN STORES

PAYSLIP

Employee: Simon Makhaye Pay Period: January 2016

Position: Manager

ID number: 750928 5753 084 Pay Cycle: Monthly

Bank Details: Old Mutual Bank

Account Number: 9056207255

Tax Number: 3093013331

Earnings	Amount	Deductions	Amount
Basic Salary	15 000,00	Tax	R2 700,00
		UIF	----------
Gross Earnings	R15 000,00	**Total Deductions**	----------
Net salary			----------

2.4.1 If the Fusion Chain stores has 32 employees earning the basic salary similar to Simon Makhaye, how much **more** is the total employer's new annual contribution to UIF as from 2012? (4)

2.4.2 Show by calculations that Mr Simon Makhaye's net salary (excluding bonuses and other allowances) is R12 152.18 per month. (4)

2.4.3 By what percentage was the UIF threshold increased in 2012? (3)

[21]

QUESTION 3

Mr Botha is a renting a vending stall in Wimbledon (London) selling pies and pastry. The following table shows the cost (in South African Rands) of making these products.

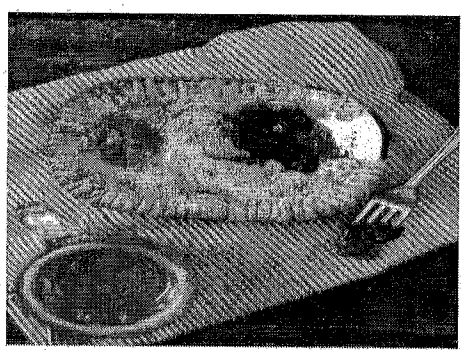


TABLE 4: INGREDIENTS

Item	Price	Quantity needed to make 8 pies
plain flour	R75.95/10kg	4 heaped tablespoons of flour (10g)
beef	R49.95/kg	800g
1 whole nutmeg,	R5.95/g	1 gram
large carrots	R8.99for 8 carrots	2 carrots
large egg	R42 for 30 eggs	2 eggs
red onions	Free	2 grams
button mushrooms	R4.50/500g	250g

source: http: www.jamieoliver.com/recipes/

3.1 Determine the cost of eggs to make 8 pies. (2)

3.2 During the tournament, Mr Botha makes hundreds of pies. Therefore, he uses *ml* to measure the flour instead of tablespoons. Determine how many *ml* of flour will he get from a bag of 10kg if **15*ml* = 9g** (Round off you answer to a nearest millilitres) (2)

3.3 Determine the total cost of making **ONE** pie. (8)

3.4 Mr Botha was advised at the training that the main factor that affects the profit is the number of workers employed. He was given the following formula to calculate the number of workers for his business.
Profit(per month) = R50 (30 - number of workers^2)

TABLE 5: WORKERS AS AGAINST PROFIT

Number of workers	0	1	2	.....	B	8
Profit / Month (in Rands)	1500	**A**	1300	.....	250	-1700

3.4.1 Use the suggested formula to calculate the values of:
(a) A (2)
(b) B (3)

3.4.2 Provide the possible reason why Mr Botha must keep workers to a **minimum.** (2)

3.5 The severe drought that is affecting South Africa has forced municipalities to a adjust water tariffs.

The following water tariff structure is for Chris Hani District Municipality.

TABLE 6: WATER TARIFF STRUCTURE FOR CHRIS HANI DISTRICT MUNICIPALITY

	Number of kl	**Rate per kl (excluding VAT)**
		November 2015
1	0 to 6	R8.66
2	7 to 15	R10.07
3	16 to 30	R12.28
4	31 to 45	R15.29
5	46 to 60	R16.70
6	Above 60	R18.85

Source: ***www.chrishanidm.gov.za***

3.5.1 Calculate the cost (including VAT) for consuming 30 kl of water in November 2015. (4)

3.5.2 Mr Botha was shocked when he received a water bill of R1 204.16 (including VAT) in December 2015. Determine how many kl of water did he use in December. (5)

[28]

QUESTION 4

The Wimbledon Tennis Championship hosted by All England Lawn Tennis Club attracts thousands of spectators from all over the world.

Figure 1: Men's Final

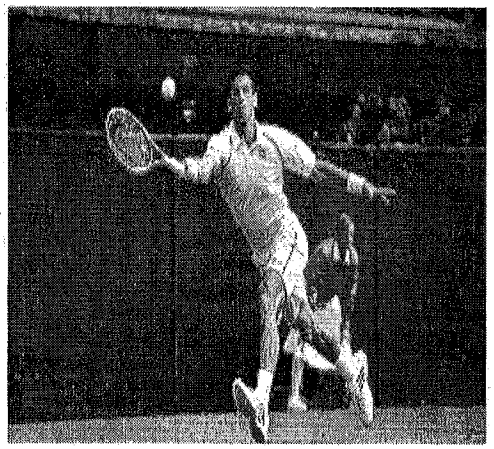
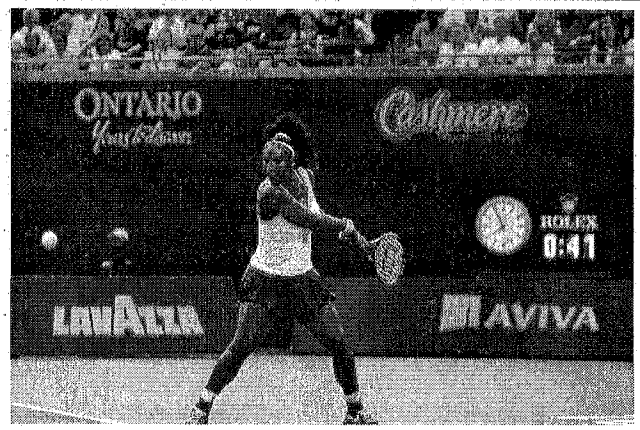
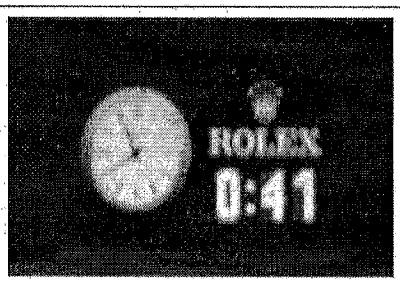


Figure 2: Women's Final





Entrance ticket prices have doubled each year due to the number of spectators who wish to watch this tournament. In 2015 ticket prices were as follows:

	CENTRE COURT	£GBP
1ST 2 DAYS	Monday 29 / Tuesday 30 June	50
3RD & 4TH DAY	Wednesday 01 / Thursday 02 July	65
	Friday 03 / Saturday 04 July	84
	Monday 06 / Tuesday 07 July	98
	Wednesday 08 / Thursday 09 July	119
	Friday 10 / Saturday 11 July	133
FINAL DAY	Sunday 12 July	160

£GBP = Great British Pound

www.britishtennis.com/tickets/wprices.

4.1 By what percentage did the ticket price increase from first day to the last day? (2)

4.2 Some wealthy people and businesses buy **debentures** which are tickets for Centre and Number One Courts.

NOTE: **Debentures** ***are tickets bought for five years and allow holders to attend matches for the entire 10 days of the tournament.***

(a) In 2015 they were sold at £3 185.19 each and total of £46,3 million was generated. Determine how many debentures were sold. (3)

(b) The Wimbledon market department claims that the entrance fee to final matches is half the normal ticket price. Verify the validity of this claim. (5)

(c) Provide an advantage and a disadvantage of buying tickets using this method. (4)

4.3 The wall clock in Figure 2 shows the time in which the match was being played and 0:41 indicates duration of the match in minutes. Estimate the time this match started. (2)

[16]

QUESTION 5

Ms Kubheka is a teacher at Hopewell High School. She is 53 years old and has 30 years teaching experience. Her monthly **basic salary is R28 375,00** and has a **housing allowance of R900,00** per month. She contributes **7,5% of the basic salary** towards her pension fund. She gets the bonus (13th cheque) which is equal to the monthly basic salary. **The tax for the bonus is spread equally over twelve months.** She contributes towards medical aid fund and has **three dependants**. Use table 7 to answer the following questions.

TABLE 7: INCOME TAX: INDIVIVUALS AND TRUSTS 2015/2016

Taxable income (R)	**Rate of Tax (R)**	**Tax bracket**
0 – 181 900	18% of taxable income	1
181 901 – 284 100	32 742 + 26% of taxable income above 181 900	2
284 101 – 393 200	59 314+ 31% of taxable income above 284 100	3
393 201 – 550 100	93 135+ 36% of taxable income above 393 200	4
550 101 – 701300	149 619+ 39% of taxable income above 550 100	5
701 301 and above	208 587+ 41% of taxable income above 701 300	6
TAX REBATES		
Primary	R13 257	
Secondary (Persons 65 and older)	R7 407	
Tertiary (Persons 75 and older)	R2 466	
TAX THRESHOLDS		
AGE	**TAX THRESHOLD**	
Below age 65	R70 700	
Age 65 to below 75	R114 800	
Age 75 and over	R128 500	
MEDICAL TAX CREDIT RATES 2015/2016 YEAR OF ASSESSMENT		
R270 per month for the taxpayer paying the medical scheme contributions		
R270 per month for the first dependant		
R181 per month for each additional dependant (s)		

Source: ***www.sars.gov.za***

5.1 Ms Kubheka's gross monthly salary is R29 275.00. Determine how it was calculated. (2)

5.2 Calculate Ms Kubheka's monthly pension fund contribution. (2)

5.3 Determine Ms Kubheka's annual taxable income including the bonus.

NOTE:
Annual taxable income = (Annual gross salary – annual pension fund contribution) + bonus (4)

5.4 Use the tax rates table given above to determine the monthly tax payable by Ms Kubheka.

NOTE:
Annual tax payable = annual tax calculated- rebates – medical tax credits. (7)
[15]

TOTAL: 100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QUESTION 1 **[20 MARKS]**

Ques	Solution	Explanation	Level
1.1	Median 12A = 32✓✓ RG	2RG median Accept 31 and 33 (2)	L1
1.2	Grade 12 B✓✓RG	2RG answer (2)	L1
1.3	✓RG 12C , because all learners obtained more than 40% ✓✓2J **OR** More than 75% of learners achieved above 50% in the test ✓✓2J **OR** the minimum mark is way above the minimums of other two classes. ✓✓2J **OR** Median for 12 C is higher **OR** 50% of learners in 12C are above 60% **OR** (Any other valid point or reason).	1RG 12C 2J Justification (3) IF 12B GIVEN AS ANSWER (NO MARK) BUT JUSTIFICATION: THE HIGHEST MARK COMES FROM 12B (TWO MARKS)	L4
1.4	71 IQR (12B) = 70% - 45% ✓M = 25% ✓A 24	1M subtracting Q1 from Q3 1A Answer Accept 24% to 26% Answer only full marks (2)	L2
1.5	Learners below70% = 75% x 25 ✓MA = 18.75✓S ≈19✓R	1MA multiplying by 75% 1S Simplification 1R Rounding off A maximum of 2 if the answer is rounded down to18 (3)	L1
1.6	✓RG ✓RG 53 and 82	2 RG reading from the graph Accept 54 and 83 (2)	L1
1.7	Total (above 70%) ✓A ✓A ✓A = (more than 25% x30) +(more than75% x 25) + (100% x 22) = more than 7.5 + more than 18.75 + 22 = more than 48✓ CA Mrs Coetzee's argument is incorrect because 48 out 77 learners got more than 40%✓C A ✓ J ✓ CA **OR** ✓J She is correct because in 12B more than 75% of learner got more than 40%. The graph of 12B is inconclusive	3A concept of quartiles 1CA answer 1CA incorrect 1J justification **OR** 1CA correct 1J justification (6)	L3

[20]

QUESTION 2 **[21 MARKS]**

Ques	Solution	Explanation	level
2.1	Investment A is a simple interest✓A whereas investment B is compound interest✓ A because in investment A the same interest is added ✓J whereas in investment B the interest increases. ✓J every year	2A Identifying simple and compound interest 2J Justification (4)	L1
2.2	A = R9 272,00 + R424,00 ✓MA = R9 696,00 ✓A **OR** A = R10 120,00 – R424.00 = R9 696,00	1MA adding R424,00 **or** subtracting R424,00 from R10 120,00 1A answer **Answer only full marks** (2)	L2
	B= R9 835,66 + ($\frac{5,3}{100}$ x R9 835,66) ✓M = R10 356,95 ✓A	1M adding 5.3% of R9 835,66 1A answer **Answer only full marks** (2)	L2
2.3	✓ CA ✓ J	1CA for Yes or No	L4

	No, it is not wise because prices keep on rising **OR** No, ✓ new types of fridges are coming into the market ✓J **OR** Any other valid reason **OR** ✓ CA ✓ J Yes., the fridge will be bought in cash ~~and she will have less money to add.~~ by adding a little more money. **OR** Any other valid reason	1J valid justification (2)	
2.4.1 UIF	New Annual contribution = new UIF contribution – old contribution x employees x months. ✓MA ✓MA x ✓MA = (R147.82-R124.78) x 32 x 12 = R23.04 x 32 x 12 = R8 847.36✓CA **OR** New Annual UIF Contribution = new UIF contribution – old UIF contribution x employees x months. ✓MA ✓MA ✓MA = R147.82 x 32 x12 -R124.78 x 32 X 12 = R56 762.88 - R47 915.52 = R8 847.36✓CA	1MA Subtracting old from new UIF 1MA Multiplying by 32 1MA Multiplying by 12 1CA Answer **OR** 1MA Subtracting old from new UIF 1MA Multiplying by 32 1MA Multiplying by 12 1CA Answer Answer only full marks (4)	L3
2.4.2	Net salary = Gross salary – deductions ✓M ✓MA = R15 000 - (R2700 + 147.82) = R15 000 -R2847.82✓S = R12 152.18✓CA	1M subtracting deductions from gross 1MA adding UIF 1S Simplification 1CA answer for using UIF R150,00 or R124,78 (4)	L2

2.4.3	$\%\ \text{increase} = \frac{R147.82 - R124.78}{R124.78} \times 100\%$ ✓✓M = 18.46% ✓A	2M Concept of percentage increase 1A Answer **Answer only full marks** No penalty for rounding (3)	L2
		[21]	

QUESTION 3 (28 MARKS)

Ques	Solution	Explanation	level
3.1	30 eggs = R42 2 eggs = $\frac{2 \times R42}{30}$ ✓M = R 2.80 ✓A or 1 egg = R42/30 = R1,40 ✓M ∴ 2 eggs = R1,40 x 2 = R2,80 ✓A	1M dividing by 30 and multiplying by 2 1A Answer **Answer only full marks** (2)	L2
3.2	15ml = 9g ml = 10 000g ✓C ml = $\frac{15 \times 10000}{9}$ = 16 667ml CA✓	1C converting 10kg to g 1CA answer **Answer only full marks** No rounding off – no mark for CA (2)	L2
3.3	Total cost = Cost of 10g flour + 800g beef + 1g whole nutmeg + 2large carrots + 2 large eggs + 250g button mushrooms ✓A ✓A ✓A ✓A ✓A ✓A =R0.08 + R39.96 + R5.95 + R 2.25 + R2.80 + R2.25 = R53.29 ✓MA Therefore one pie = R53.29÷ 8 =R6.66 ✓CA	6A cost of each Ingredient 1MA Dividing by 8 1CA answer (8)	L3
3.4.1 (a)	A = R50(30 - workers^2)✓SF = R50(30- 1^2) = R50(29) A = R1 450✓A	1SF substitution 1A R1450 **Answer only full marks**	L2

3.4.1 (b)	$250 = R50(30 - B^2)$ ✓SF $250 \div 50 = 30 - B^2$ $5 = 30 - B^2$ ..... ✓S $\sqrt{25} = \sqrt{B^2}$ $\therefore B = 5$ ✓A	(2) 1SF substitution 1S Simplification 1A answer **Answer only full marks** (3)	
3.4.2	The less workers are employed the more profit is generated. ✓✓O **OR** If fewer or smaller number of workers are employed more profit is generated	2O opinion (2)	L4
3.5.1	Cost = (6kl x R8.66)+(9kl x R10.07)+(15kl x R12.28) ✓M = R51.96 + R90.63 + R184.20 = R326.79 ✓S = R326.79 + VAT ✓M = R326.79 + R45.75 = R372.54 ✓CA **OR** 30kl -6 kl x R8.66 = R51.96 24kl - 9kl x R10.07 = R90.63 15kl 15kl x 12.28 = R184.20 ✓M 0 Cost = R51.96 + R90.63 + R184.20 = R326.79 ✓S = R326.79 + VAT ✓M = R326.79 + R45.75 = R372.54 ✓CA	1M Calculating cost per category 1S addition of cost per category 1M adding VAT 1CA answer **OR** 1M Calculating cost per category 1S addition of cost per Category 1M adding VAT 1CA answer (4)	L3

3.5.2 i)	No. of kl = R1 204.16 -VAT COST EXCLUDING VAT $= R1\,204.16 - \left(\frac{14 \times R1\,204.16}{114}\right)$ = R1 204.16 - R147.88 ✓MA = R 1056.28	1MA Subtracting VAT	L3
ii)	R1056.28 - R51.96 (cost of category 1) ✓MA (6kl) =1004.32 - R90.63 (cost of category 2) (9kl) = 913.69 - R184.20 (cost of category 3) (15 kl) =R729.49 -229.35 (cost of category 4) (15 kl) = R500.14- R250.50 (cost of category 5) (15kl) = R249.64 ÷ R18.85 ✓M (13,24kl = 13,24kl Total kl = 13.24kl + 15 kl +15 kl +15 kl +9 kl + 6 kl ✓M = 73,24kl ✓CA	1MA subtracting cost of categories 1M dividing by R18.85 1M adding all kl 1CA answer accept 74kl (5)	
		[28]	

OR

i) Cost Excluding vat = $\frac{R1204,16}{114} \times 100 = R1056,28$ ✓MA

QUESTION 4 **[16 MARKS]**

4.1	Percentage increase = $\frac{£160 - £50}{£50} \times 100\%$ ✓M = 220% ✓A	1M concept of % 1A 220% **Answer only full marks** (2)	L2
4.2	✓C ✓MA (a) Debentures sold = £46 300 000 ÷ £ 3 185.19 = 14 536.02 =14 536 ✓C A	1C 46.3 to millions in figures 1MA diving by £ 3 185.19 1CA answer Accept 14 537 **Answer only full marks** (3)	L2
	✓MA ✓MA (b) Ticket price (final) = £3185.19 ÷ 10 ÷ 5 = £63.70 ✓S Normal ticket price : £160 ÷ 2 = £ 80 ✓CA The claim is valid the ticket price is less than half of £160 ✓O	1MA diving by 10 1MA diving by 5 1S simplification 1CA £80 1O Justification (5)	L4
	(c) **ADVANTAGE:** Ticket prices are discounted. ✓✓ **OR** You can budget for other things since tickets have been bought prior to the tournament ✓✓ **OR** Ticket price remains the same for 5 years. ✓✓ **OR** Debenture ticket holders are not affected by price hikes ✓✓ **OR** Any other valid point **DISADVANTAGE:** If the match is abandoned due to any natural causes you do not get a refund ✓✓ **OR** If you cannot attend due to illness or any other reason there is no refund. ✓✓ **OR** If ticket prices are discounted you cannot get a discount on your ticket. ✓✓ **OR** Any other valid point ✓✓	2 O valid advantage 2 O valid disadvantage (4)	L4

4.3	Time of the match = 19:55 - 41min ✓MA = 19:14 ✓A or 7:14pm ✓A	1MA subtraction of 41 minutes 1A 19:14 or 7:14pm **Answer only full marks** (2)	L1
		[16]	

QUESTION 5 [15 MARKS]

5.1	Gross monthly salary = Basic salary + housing allowance =R28 375.00 + R900.00 ✓MA = R29 275.00 ✓ A	1MA adding basic salary 1A Answer (2)	L1
5.2	Pension fund contribution = 7,5% x R28 375.00 ✓MA = R2 128.13 ✓A	1MA calculating % of basic salary 1A answer **Answer only full marks** (2)	L1
5.3	Annual taxable income = (Annual gross salary – annual pension fund contribution) + bonus =(R29 275.00 x 12) – (R2 128.13 x 12)+ R28 375.00 ✓A ✓CA ✓A = R351 300.00- R25 537.56 + R28 375.00 = R354 137.44 ✓CA **OR** Annual taxable income = (Annual gross salary – annual pension fund contribution) + bonus = R29 275.00 - R2 128.13 ✓CA = R27 146.87 x 12 ✓A ✓A =R325 762.44 + R28 375.00 =R354 137.44 ✓CA	1A annual gross 1CA annual pension fund 1A Bonus 1CA answer (4) **OR** 1CA monthly pension fund 1A monthly gross 1A Bonus 1CA answer (4)	L2

5.4	Annual Tax payable = annual tax calculated- rebates –medical tax credits) = R59 314 +31% of taxable income above R284 100 = R59 314 +31% x R70 037.44 ✓SF = R59 314 + R21 711.61 = R81 025.81 ✓S = R81 025.81 - Rebates - Medical ax credits = R81 025.81 -R13 257 -(R270 x 2 + R181 x 2) ✓M = R81 025.81 -R13 257 – (R902 x 12) ✓M = R81 025.81 -R13 257 – R10 824 ✓S ✓MA = R 56 944, 81 ÷ 12 = R4745,40✓CA	1SF substituting in correct tax bracket 1S simplification 2M subtracting rebates and tax credits 1S Simplification 1MA dividing annual tax by 12 1CA answer (7)	L3
		[15]	

TOTAL: 100