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Education

KwaZulu-Natal Department of Education
REPUBLIC OF SOUTH AFRICA

**NATIONAL
SENIOR CERTIFICATE**

GRADE 12

**MATHEMATICAL LITERACY
COMMON TEST
MARCH 2018**

MARKS: 100

TIME: 2 hours

This question paper consists of 11 pages, an Addendum with 1 Annexure
and 2 Answer Sheets.

INSTRUCTIONS AND INFORMATION

1. This question paper consists of **FOUR** questions. Answer **ALL** the questions.
2.
 - 2.1 Use the ANNEXURE A in the ADDENDUM to answer QUESTION 3.
 - 2.2 Answer QUESTION 2.5.2 on ANSWER SHEET 1.
 - 2.3 Answer QUESTION 3.4.2 on ANSWER SHEET 2.
 - 2.4 Write your surname and name in the spaces provided on the ANSWER SHEETS. and hand in the ANSWER SHEETS with your ANSWER BOOK.
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 approximately according to the given context, unless stated otherwise.
8. Indicate units of measurement, where applicable.
9. Write neatly and legibly.

QUESTION 1

A certain district municipality in KwaZulu – Natal buys Jojo water tanks from the manufacturers. Water tanks will be supplied to 84 272 households within the municipality to harvest rain water. 1 000ℓ water tank costs R1 922,00, 2 500ℓ costs R3 089,50 and 5 000ℓ costs R5 993,00. A photo of Jojo water tanks is shown below.

Photo of Jojo water tanks



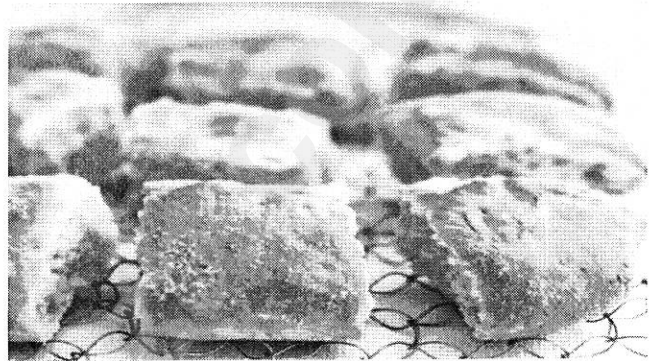
Source: www.jojotanks.co.za

- 1.1 Determine the total cost of water tanks if the municipality buys 2 500ℓ water tanks for all households in the municipality. (3)
- 1.2 Calculate the difference in total cost of buying 1 000ℓ water tanks for all households and buying 5 000 ℓ water tanks for all households in the municipality. Show all calculations. (6)
- 1.3 Write down the ratio in simplest form (in ascending order) of the capacity of three water tanks mentioned in the context above. (2)
- 1.4 Determine the number of households that will receive water tanks if the manufacturers deliver 84 272 water tanks in equal quantities four times in one year. (2)
- 1.5 The prices for water tanks are VAT inclusive. Calculate the VAT amount when buying 84 272 (2 500ℓ) water tanks. Show all calculations (6)
- 1.6 An average household is estimated to consume 144ℓ per day. Calculate the number of days it will take an average household to consume almost all water in a 2500ℓ tank. Round off the answer to the nearest whole number. (3)
- 1.7 Water tank manufacturers predict that prices will increase by 3,3% the following year. Calculate the new price of a 5 000ℓ water tank. (3)

[25]

QUESTION 2

Mrs Vilakazi is a retired Consumer Studies educator. She owns a small business of selling different types of cakes including scones. The cost price for ingredients plus water and electricity is R0,53 per scone. She sells scones at R2,00 each. The recipe for baking scones is given below.

Photo of scones**INGREDIENTS (makes 12 scones)**

2½ cups all-purpose flour
 1 tablespoon baking powder
 ½ teaspoon salt
 8 tablespoons cold butter
 ¼ cup sugar (use ⅓ cup for sweeter scones)
 ⅔ cup milk.

1 cup = 250 ml
 1 inch = 2,54 cm
 1 tablespoon = 15 ml

METHOD

Mix dry ingredients in a large bowl. Add butter until crumbs are formed. Add milk. Place dough on floured counter pat or roll into circle about 1½ inches thick. Cut into 12 squares. Place on a greased tray and bake for 12 minutes.

Use the information above to answer the questions that follow.

2.1 Determine:

2.1.1 the number of millilitres of all-purpose flour needed to make 36 scones. (3)

2.1.2 the thickness of the dough in centimetres. (2)

2.2 Calculate the millilitres of sugar needed to make 12 sweeter scones. (2)

2.3 Mrs Vilakazi baked 48 scones, determine the following ingredients required:

2.3.1 number of teaspoons of salt (2)

2.3.2 ml of butter (2)

- 2.4 Calculate the profit Mrs Vilakazi will make if she bakes 204 scones and sells 171. (4)
- 2.5 Mrs Vilakazi keeps daily records of the scones sold. The table below shows her records of sales.

Table 1: Showing Mrs Vilakazi's six day records of scones sales for 4 weeks.

Day	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
Week 1	205	153	244	201	500	312
Week 2	180	210	150	200	480	250
Week 3	170	180	220	215	380	260
Week 4	146	168	206	185	490	210

- 2.5.1 Calculate the total sales for Mondays and Fridays for 4 weeks. (4)
- 2.5.2 A broken line graph for week 1 has been drawn on Answer sheet 1, on the same set of axes draw line graphs for week 2 and week 3. Label the graphs accordingly. (7)

[26]

QUESTION 3

3.1

In 2015 the Human Sciences Research Council (HSRC) conducted a survey on Trends in International Mathematics and Science Study (TIMSS). A sample of schools offering Grade 9 was drawn from:

- 9 provinces of South Africa,
- 292 schools,
- 12 500 learners,
- 330 mathematics and science educators.

Source: www.timss-sa.org.za

Use the information above and ANNEXURE A to answer the questions that follow:

3.1.1 Which method of collecting data was used to get the data in ANNEXURE A? Justify your answer. (3)

3.1.2 Is the data in the horizontal axis discrete, continuous or categorical? Support your choice. (3)

3.2 The stacked graph in ANNEXURE A displays the Grade 9 learners' performance in Mathematics.

3.2.1 Identify the province which has more percentage of learners that obtained above 325 points. (2)

3.2.2 Calculate the mean percentage of learner performance (rounded off to the nearest 10) of scores below 325. (3)

- 3.3 **TABLE 2** below shows education expenditure by provinces as a percentage of total provincial expenditure (2015/2016)

TABLE 2: EDUCATION EXPENDITURE

Province	% Expenditure on education	Education Expenditure (R million)
Eastern Cape	46%	29 756
Free State	41%	12 125
Gauteng	38%	36 361
Kwazulu-Natal	43%	42 573
Limpopo	47%	25 590
Mpumalanga	44%	17 469
Northern Cape	32%	5 043
North West	39%	13 511
Western Cape	34%	17 677
TOTAL		200 105

Source: www.statssa.gov.za

Use the above information to answer the following questions

- 3.3.1 Determine the total provincial expenditure of Free State if it spends 41% on education. (3)
- 3.3.2 In 2015 Limpopo Province spent 47% on education whereas Gauteng spent 38% of its total expenditure on education. Verify, with calculations, that Gauteng spent over R10 000 000 000 (R10 billion) more than Limpopo province from its provincial expenditure on education. (3)
- 3.3.3 The average inflation rate in South Africa in 2016, 2017 and 2018, was 6.6%. Explain why the inflation rate affects the government expenditure negatively. (2)

- 3.4 TABLE 3, below, shows percentage of learners performing between 325 and 400 points per province at the TIMSS benchmarks. Some data in the table has been omitted.

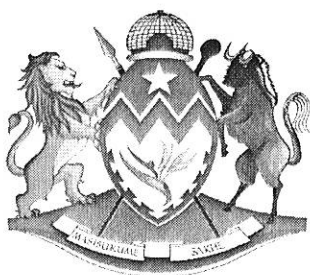
TABLE 3: PERCENTAGE OF LEARNERS PERFORMING (Between 325 and 400) AT THE TIMSS BENCHMARKS FOR MATHEMATICS BY PROVINCES IN 2015

PROVINCE	% of Learner performance (325 – 400 points), TIMSS 2015
Free State	36%
Gauteng	33%
Kwazulu-Natal	A
Limpopo	35%
Northern Cape	40%
Western Cape	39%

Use ANNEXURE A, TABLE 2, TABLE 3 and the ANSWER SHEET 2 to answer the following questions.

- 3.4.1 Determine the missing value labelled A. (2)
- 3.4.2 Draw a scatter plot graph to represent the percentage expenditure on education and the learners' points between 325 and 400 points. (6)
- 3.4.3 Identify the province that does not follow the trend. Justify your answer. (3)

[30]



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MATHEMATICAL LITERACY

ADDENDUM

COMMON TEST

MARCH 2018

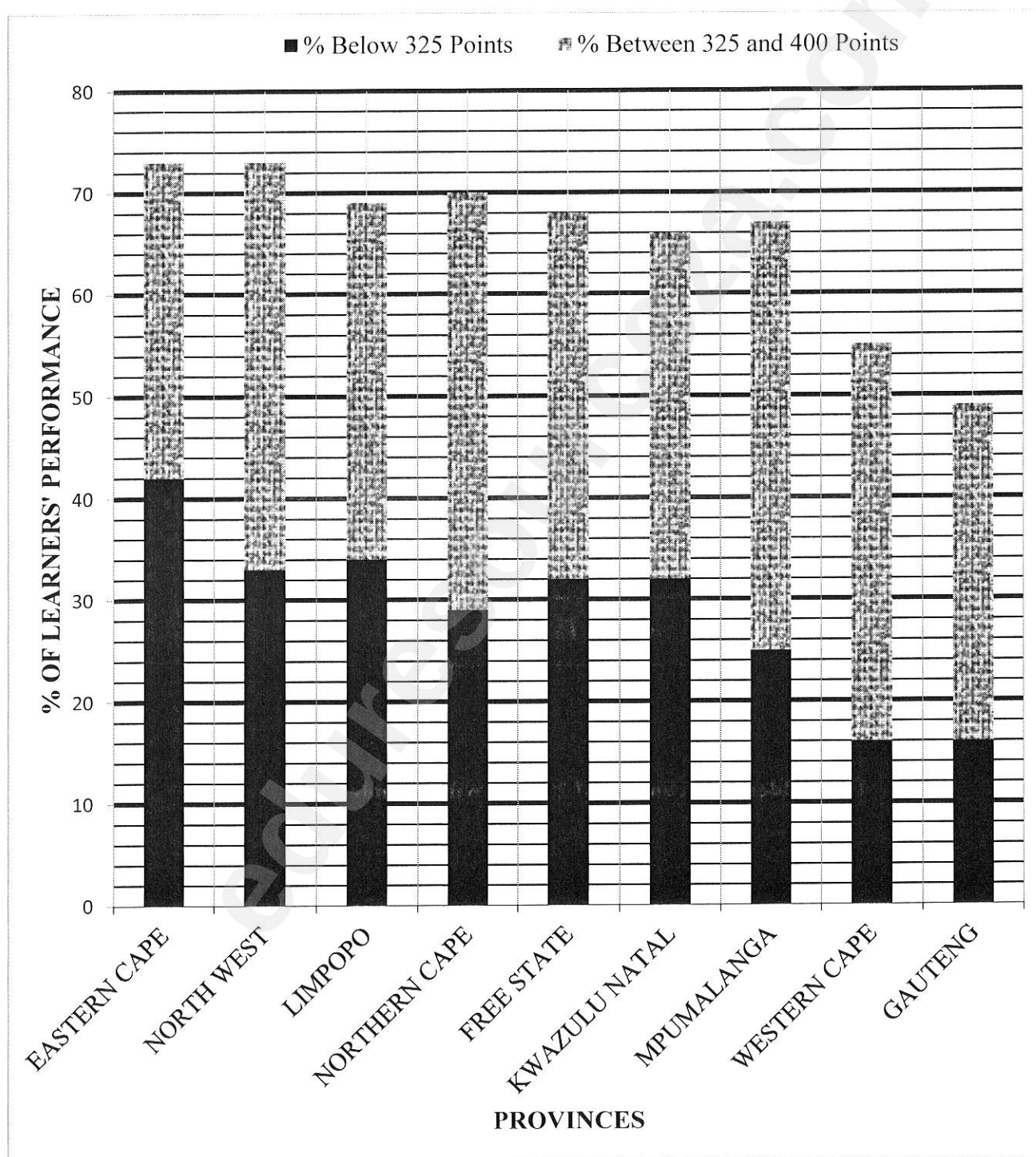
**NATIONAL
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GRADE 12

This Addendum consists of 2 pages with 1 Annexure.

ANNEXURE A

QUESTION 3.2

PERCENTAGE OF LEARNERS PERFORMING AT THE TIMSS BENCHMARKS
FOR MATHEMATICS BY PROVINCES IN 2015

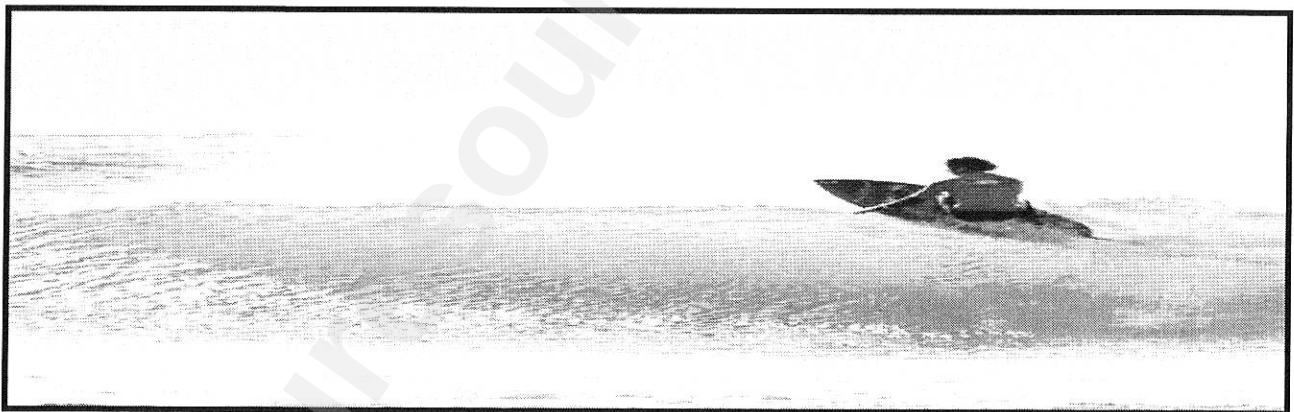
QUESTION 4

4.1

The South African Weather Services provide times and heights of tides for surfers and fishermen. The table below shows the tide times in Durban beaches on Monday 08 January to Thursday, 11 January 2018.

TABLE 4: TIDE TABLE FOR DURBAN BEACHES

	Monday (08/01/2018)	Tuesday (09/01/2018)	Wednesday (10/01/2018)	Thursday (11/01/2018)
High Tide	08:11	09:13	10:34	12:01
Low Tide	14:24	02:38	03:49	05:20
High Tide	20:22	21:23	23:10	00:41
Low Tide	02:00	15:35	17:09	18:37



NB: Surfers are more interested in high tides which are during the day because no surfing is allowed at night.

Source: www.google.co.za/search

- 4.1.1 The time between the day and the night high tides is **ALMOST** the same. Verify, the correctness of this statement by calculating the difference between day and night tides of Tuesday and Wednesday. (4)
- 4.1.2 Determine the time surfers had to wait for another high tide between Monday and Tuesday to come. (2)

4.2

Peter is running a surfing academy, training professional and amateur surfers. His monthly budget is as follows.

TABLE 5: Peter's monthly Budget

No	INCOME		EXPENSES	
	Item	Amount (R)	Item	Amount (R)
1	Membership Fee (30 Members)	15 500,00	Wages	10 900,00
2	Tournaments affiliation	6 000,00	Electricity	690,00
3	Surfboard hire	3 000,00	Telephone	890,00
4			Office Rent	2 500,00
5			Fuel, repairs material, etc.	2 000,00
	Total	24 500,00	Total	16 980,00

4.2.1 Calculate Peter's total variable expenses. (2)

4.2.2 Peter has three casual employees. Their monthly wages are paid in the ratio of 7: 5: 2 respectively. Determine the amount of the lowest wage. (3)

4.3

Table 6 below shows Ethekwini Municipality electricity tariff structure for businesses since 01 July 2017.

TABLE 6: Ethekwini municipality electricity tariff structure for business

SCALE 1			
SERVICE CHARGE (R) All seasons		ENERGY RATE (c/kWh)	
Excluding VAT	Including VAT	Excluding VAT	Including VAT
209.68	239.03	160.24	182.67

NOTE:

Service Charge: The service charge is a fixed charge and is charged on a monthly basis (not necessarily a calendar month per point of supply).

Energy Charge: The energy charge is a flat rate charge.

Source: www.durban.gov.za

Use Table 6 to answer following questions:

4.3.1 Write the equation for electricity cost for businesses (including VAT). (3)

4.3.2 Peter budgeted R600 per month for electricity. Verify, with calculations whether Peter's budget for electricity will be enough if his business uses an average of 300 kWh of electricity per month. (5)

[19]

TOTAL: [100]

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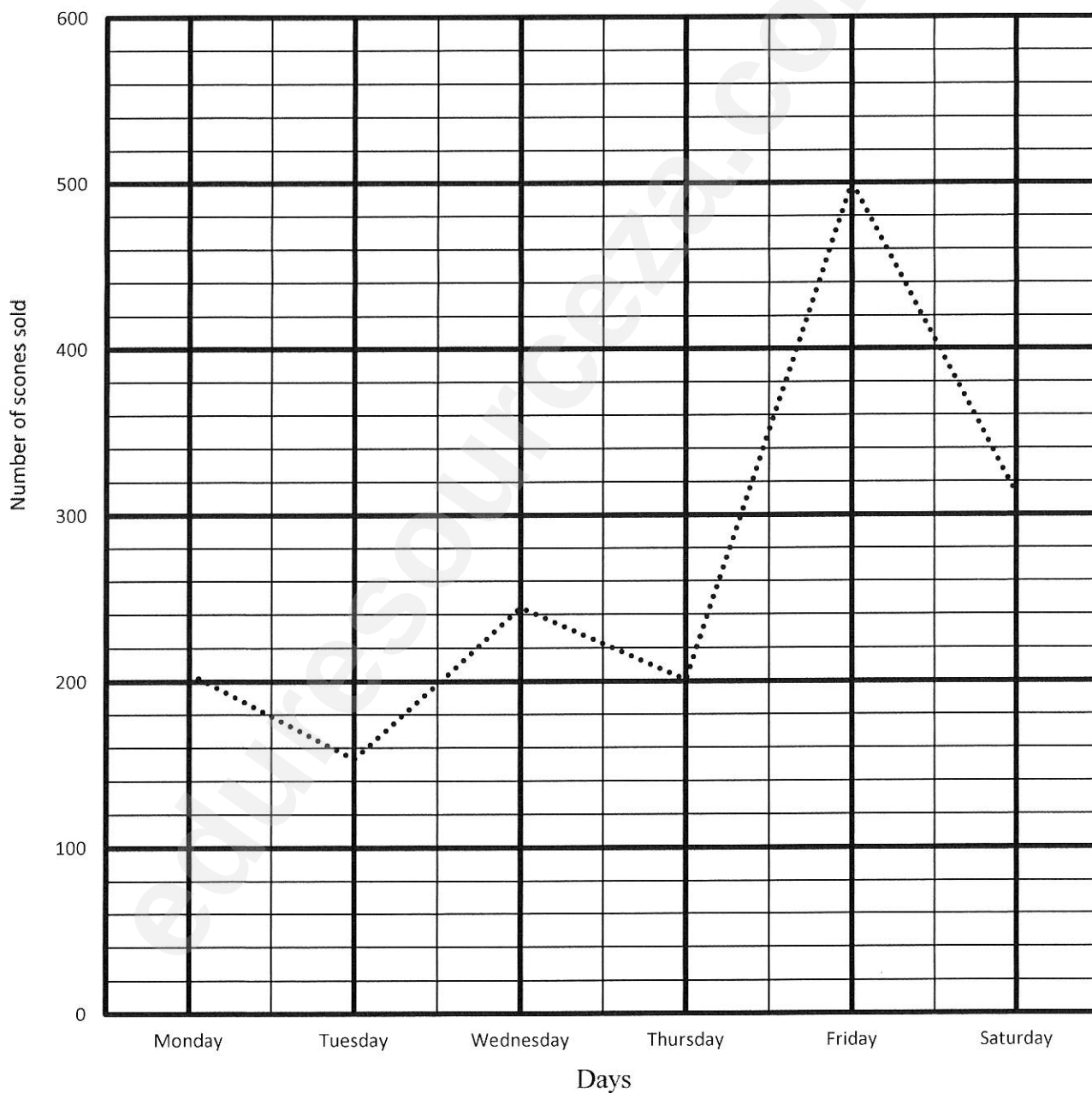
ANSWER SHEET 1

QUESTION 2.5 (b)

NAME: _____

CLASS: _____

Six day records of scone sales for week 1



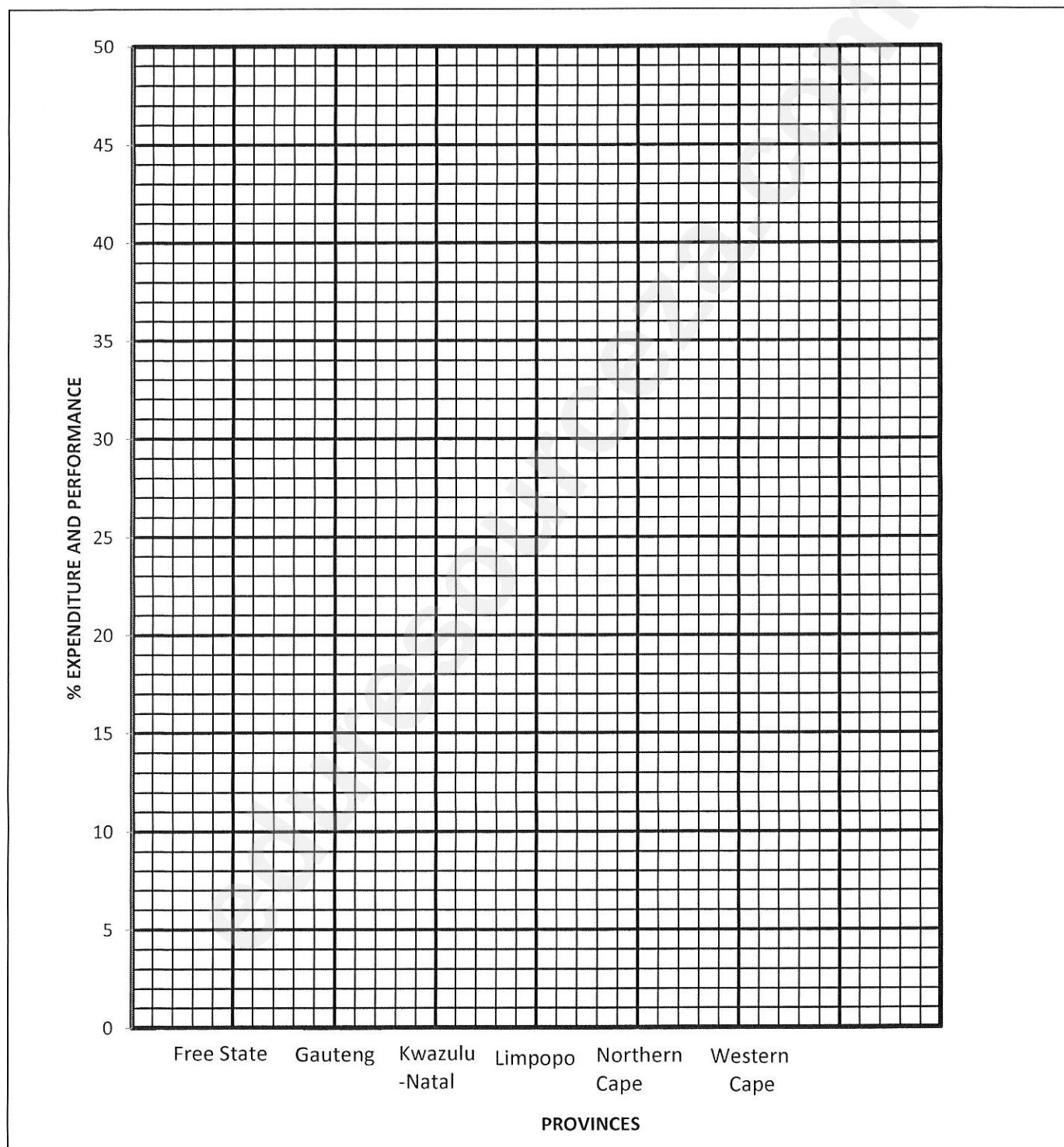
..... Week 1

ANSWER SHEET 2

QUESTION 3.4.2

NAME: _____

CLASS: _____





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COMMON TEST

MARKING GUIDELINE

MARCH 2018

NATIONAL SENIOR CERTIFICATE

GRADE 12

MARKS: 100

SYMBOL	EXPLANATION
M	Method
MA	Method with accuracy
CA	Consistent accuracy
A	Accuracy
C	Conversion
S	Simplification
RT/RG/RD/RM	Reading from a table/ graph/ diagram/Map
SF	Correct substitution in a formula
O	Opinion/ reason/deduction/example/Explanation
J	Justification
R	Rounding off
F	deriving a formula
AO	Answer only full marks
P	Penalty e.g. for units, incorrect rounding off etc.
NPR	No penalty for rounding / units

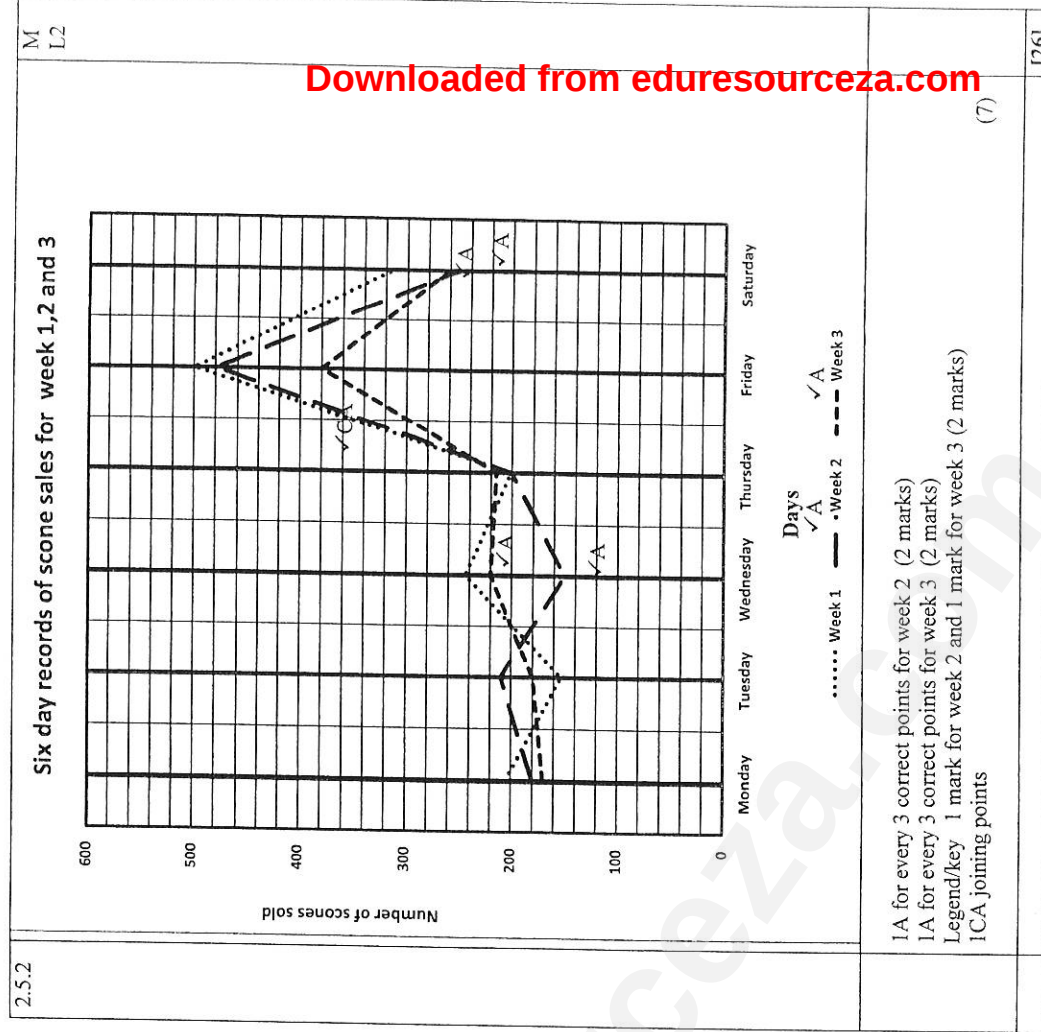
This memorandum consists of 11 pages.

QUESTION 1 [25 MARKS]

Ques	Solution	Explanation	T & L
1.1	$\checkmark M$ Total cost = $84\,272 \times R3\,089,50 \checkmark A$ = $R260\,358\,344,00 \checkmark CA$	IM Multiplication 1A Correct values 1CA Total cost AO (3)	F L1
1.2	Total cost of 5 000ℓ water tanks = $84\,272 \times R5\,993,00 \checkmark M$ = $R505\,042\,096,00 \checkmark A$ Total cost of 1 000ℓ water tanks = $84\,272 \times R1\,922,00 \checkmark M$ = $R161\,970\,784 \checkmark A$ Difference = $R505\,042\,096,00 - R161\,970\,784 \checkmark M$ = $R343\,071\,312,00 \checkmark CA$ OR $\checkmark A$ $\checkmark M$ $\checkmark A$ Difference = $R5\,993,00 - R1\,922,00$ = $R4\,071 \checkmark A$ Total = $R4\,071 \times 84\,272 \checkmark M$ = $R343\,071\,312,00 \checkmark CA$	IM Multiplying by $R5\,993,00$ 1A Total cost IM Multiplying by $R1\,922,00$ 1A Total cost IM Subtraction 1CA difference OR 2A Identifying $R5\,993,00$ & $R1\,922,00$ IM Subtraction 1A Difference IM Multiplying by $84\,272$ 1CA Total cost (6)	F L2
1.3	$1\,000 : 2\,500 : 5\,000 \checkmark M$ $2 : 5 : 10 \checkmark S$ <i>wing order → only give 1 mark</i>	IM Ascending order 1S Simplification AO (2)	F L1
1.4	No. of households = $\frac{84\,272}{4} \checkmark MA$ = $21\,068 \checkmark CA$ <i>If $84\,272 \rightarrow 2$ marks.</i>	1MA Dividing $84\,272$ by 4 1CA Answer AO (2)	F L1
1.5	Total including VAT = $84\,272 \times R3\,089,50 \checkmark M$ = $R260\,358\,344,00 \checkmark A$ Total excluding VAT = $\frac{R260\,358\,344,00}{1,14} \checkmark M$ = $R228\,384\,512,30 \checkmark A$ VAT amount = $R260\,358\,344,00 - R228\,384\,512,30 \checkmark M$ = $R31\,973\,831,70 \checkmark CA$ <i>OR</i> $3089,50 \times \frac{14}{114} \times 84\,272$ $= 319\,73831,72$	IM Multiplying by correct value 1A Total cost IM Dividing by 1,14 or 114% 1A Total cost IM Subtraction 1CA Answer	F L2

QUESTION 2 [26 MARKS]				
2.1	No. of millilitres of flour for 12 scones = $2 \frac{1}{2} \times 250 \text{ ml}$ = 625 ml ✓A		1A No. of millilitres	M L1
2.1.1	No. of millilitres of flour for 36 scones = $625 \text{ ml} \times 3$ ✓M = 1 875 ml ✓A	OR	1M Multiplying by 3 1A Total	
	No. of millilitres of flour for 36 scones = $2 \frac{1}{2} \times 250 \text{ ml} \times 3$ ✓M = 1 875 ml ✓A	OR	1M Multiplying by 250 1M Multiplying by 3 1A Total	
	No. of millilitres of flour for 12 scones = $2 \frac{1}{2} \times 250 \text{ ml}$ = 625 ml	(3)	1M Dividing by 12	
	No. of millilitres of flour per scone = $\frac{625 \text{ ml}}{12}$ ✓M = 52,08333333		1M Multiplying by 36 1A Total	
	No. of millilitres of flour for 36 scones = $52,08333333 \times 36$ ✓M = 1 875 ml ✓A	OR	1M Multiplying by 36 1M Multiplying by 250 ml 1A total AO (3)	
2.1.2	Thickness of the dough in centimetres = $1 \frac{1}{2} \times 2,54 \text{ cm}$ ✓M = 3,81 cm ✓A	OR	1M Multiplication 1A No. of centimetres	M L1
	Thickness of the dough in centimetres = $2,54 \text{ cm} + 1,27 \text{ cm}$ ✓M = 3,81 cm ✓A	(2)	1M Adding 1A No. of centimetres AO (2)	

2.2	No. of millilitres of sugar = $\frac{1}{3} \times 250 \text{ ml} \checkmark \text{M}$ = 83,33 ml $\checkmark \text{CA}$ (2)	IM Multiplying by $\frac{1}{3}$ or 0,125 $\checkmark \text{M}$ 1CA No. of millilitres $\checkmark \text{CA}$ (2)	M L1
2.3.1	Number of teaspoons = $0,5 \times 4 \checkmark \text{M}$ = 2 teaspoons $\checkmark \text{A}$ OR Number of teaspoons = $\frac{0,5 \times 48}{12} \checkmark \text{M}$ = 2 teaspoons $\checkmark \text{A}$	IM Multiplying by 4 1A Number of teaspoons OR IM Multiplying by 48 1A Number of teaspoons AO (2)	M L1
2.3.2	No of ml of butter = $8 \times 15 \text{ ml} \times 4 \checkmark \text{M}$ = 480 ml $\checkmark \text{A}$ OR No of ml of butter = $\frac{8 \times 48}{12}$ = $32 \times 15 \checkmark \text{M}$ = 480 $\checkmark \text{A}$	IM Multiplying by 4 1A Number of ml OR IM Multiplying 1A Number of ml AO (2)	M L1
2.4	Profit = Income – Expenses $\checkmark \text{M}$ = $(171 \times R2,00) - (204 \times R0,53)$ = $R342 - R108,12 \checkmark \text{M}$ = $R233,88 \checkmark \text{A}$ (4)	IM Calculating income IM Calculating expenses IM Subtraction 1A Profit (4)	F L1
2.5	Week 1 to 4 Monday sales = $205 + 180 + 170 + 146 \checkmark \text{M}$ = 701 $\checkmark \text{A}$ Week 1 to 4 Friday sales = $500 + 480 + 380 + 490 \checkmark \text{M}$ = 1 850 $\checkmark \text{A}$ Total = $701 + 1850$ = 2551 $\checkmark \text{CA}$ (4)	IM Adding sales for Mondays 1A Answer IM Adding sales for Fridays 1A Answer (4)	M L3



QUESTION 3 [30 MARKS]

Ques	Solution	Explanation	T&L
3.1 3.1.1	Questionaire Observation ✓ A Data used was collected from records of test results. ✓✓ J	1A Observation 2J Justification (3)	DH L2
3.1.2	Categorical data ✓ A Because they are names of provinces. ✓✓ J OR They are not numbers or numerical data ✓✓ J	1A Categorical 2J Justification (3)	DH L2
3.2 3.2.1	Mpumalanga ✓✓ A	2A Answer (2)	DH L2
3.2.2	Mean % = $\frac{42 + 33 + 34 + 29 + 32 + 32 + 25 + 16 + 16}{9}$ ✓MA = 28.78% = 30% ✓CA OR Mean % = $\frac{259}{9}$ ✓MA = 28.78% = 30% ✓CA	1MA Adding correct values 1MA Dividing by 9 1CA Mean rounded off OR 1M Adding correct values 1MA Dividing by 9 1CA Mean rounded off (3)	DH L3
3.3 3.3.1	Total Provincial expenditure = $\frac{100 \times R12\,125\,000\,000}{41}$ ✓M = R29 573 170 731 ✓A OR Total Provincial expenditure (in millions) = $\frac{100 \times 12125}{41}$ ✓M = R29 573,170 73 ✓A	2M Concept of percentage 1A Answer ACCEPT: R29 573 170 73 As shown on calculator OR R29 573 170 73, 73 x 10 ³ (3)	F L3

3.3.2	Difference (Education Expenditure) = R36 361 000 000 – R25 590 000 000 ✓MA = R10 771 000 000 ✓CA Yes, it is true Gauteng spent over R10 billion more than Limpopo Province ✓J OR Difference (Education Expenditure) = R36, 361 billion – R25, 590 billion ✓MA = R10, 771 billion ✓CA Yes, it is true Gauteng spent over R10 billion more than Limpopo. OR Difference (Education Expenditure) = R36 361 million – R25 590 million ✓MA = R10 771 million ✓CA = R10 771 000 000 Yes, it is true Gauteng spent over R10 billion more than Limpopo. 3	1MA Subtracting the correct values 1CA Difference 1J Verification OR 1MA Subtracting the correct values 1CA Difference 1J Verification OR 1MA Subtracting the correct values 1CA Difference 1J Verification NB: Justification must include billion (3)	F L4
3.3.3	Because inflation reduces the value of money. ✓✓ E OR The inflation reduces the buying power. ✓✓ E OR Inflation increases the prices of goods and services. ✓✓ E OR Any other valid point	2E Explanation (2)	F L2
3.4 3.4.1	A = 66% – 32% ✓MA = 34% ✓CA OR A = (2% × 17) ✓MA = 34% ✓CA 2	1MA Subtracting correct values 1CA Answer OR 1MA Multiplying correct values 1CA Answer AO (2)	DH L1

3.4.2	"Answer Sheet 2"	1A 2A 2A 1A	Scatter plot Any 4 correct points (learner performance) Any 4 correct points (education expenditure) Legend /Key (6)	DH L3
3.4.3	Western Cape or Northern Cape ✓ CA They are spending less on education but their learners are performing better than other provinces. ✓ ✓ E	1CA 2E	Answer Explanation (3)	DH L4
			[30]	

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QUESTION 4 [19 MARKS]

Ques	Solution	Explanation	T & L
4.1 4.1.1	Tuesday = 21:23 – 09:13 ✓ MA = 12:10 Wednesday = 23:10 – 10:34 ✓ MA = 12:36 Yes it is true the difference is almost the same ✓ ✓ OR Any other valid point Time = 09:13 (Tuesday) – 08:11 (Monday) ✓ MA = 23 hours 2 mins ✓ CA 25 hours 2 mins	2MA Subtracting correct values 2J Justification Accept NO if working is correct and they talk about 26 mins diff.	M L4
4.1.2		1MA Subtracting correct values 1CA Duration	M L2
4.2 4.2.1	Variable costs = R690 + R890 + R2000 ✓ MA = R3 580 ✓ CA	1MA Adding correct values 1CA Answer AO	F L3
4.2.2	Lowest wage = $\frac{2}{14} \times R10\ 900$ ✓ A = R1 557,14 ✓ CA	1M Concept of proportion 1A Multiplying by R10 900 1CA Answer	F L3
4.3 4.3.1	Electricity cost = R239,03 + 182,67 cents x no of kWh OR Electricity cost = R239,03 + R1,83 x no of kWh	3F Equation	F L3

OK (in words)

cost = service charge + energy charge x no. of kWh
(full marks)

4.3.2	✓CA Electricity cost = R239,03 + 182,67 cents × 300kWh = R239,03 + 54801cents = R239,03 + R548,01✓C =R787,04✓S It is not enough. It is short by R187,04✓✓J	1CA From 4.3.1 1C Converting cents to Rands 1S Simplification 2J Justification	F L4
	OR ✓CA ✓C Electricity cost = R239,03 + R1,8267 × 300kWh = R239,03 + R548,01 =R787,04✓S It is not enough. It is short by R187,04✓✓J	OR 1CA From 4.3.1 1C Converting cents to Rands 1S Simplification 2J Justification	(5) [19]
TOTAL: 100			

4.3.2) { worked. In Reverse }

$(R600 - R239,03) \div R1,8267$

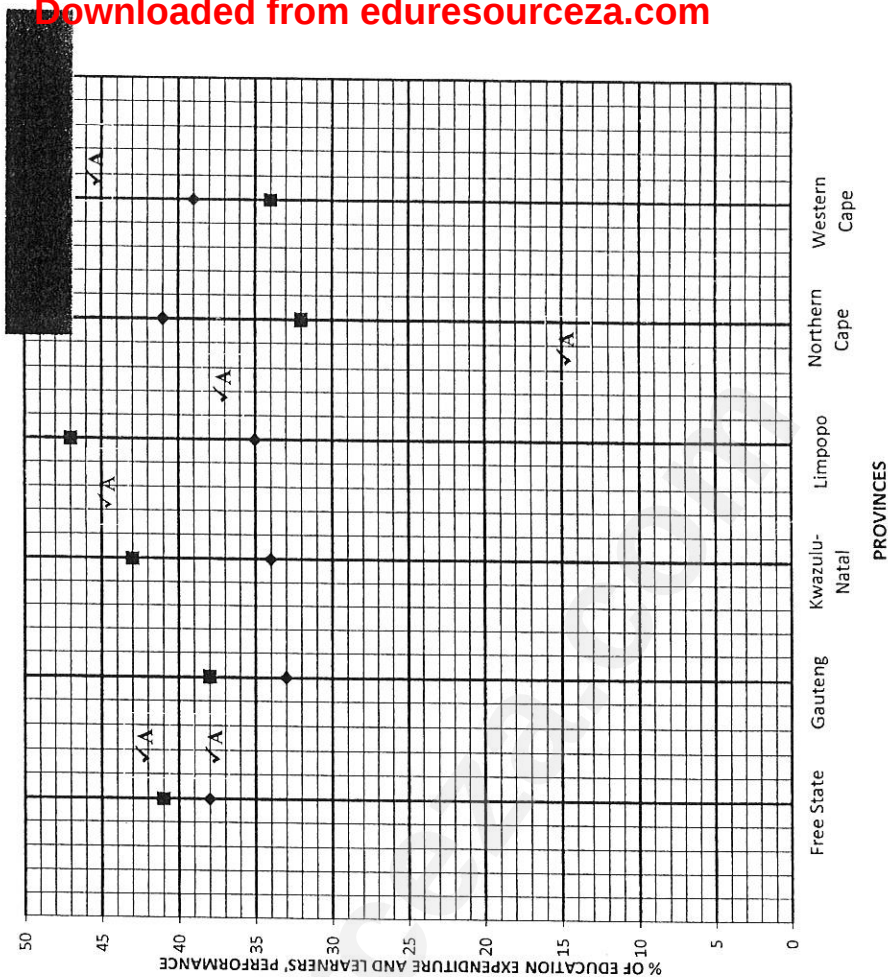
$= 197,61 \text{ kWh.}$

No → R600 can only pay

for 197,61 kWh; NOT 300 kWh.

QUESTION 3.4.2

PERCENTAGE OF EDUCATION EXPENDITURE AND LEARNERS PERFORMING
(Between 325 and 400) AT THE TIMSS BENCHMARKS FOR MATHEMATICS
BY PROVINCES IN 2015



- 1A Scatter plot
- 2A Any 4 correct points (learners' performance).
- 2A Any 4 correct points (Education expenditure).
- 1A Legend or Key