basic education

Department:
Basic Education
REPUBLIC OF SOUTH AFRICA

NATIONAL SENIOR CERTIFICATE

GRADE 12

MATHEMATICAL LITERACY P1

FEBRUARY/MARCH 2013

MARKS: 150

TIME: 3 hours

This question paper consists of 16 pages and 2 annexures.

INSTRUCTIONS AND INFORMATION

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

2. Answer QUESTION 3.1.3(d) on the attached ANNEXURE A. Write your centre number and examination number in the spaces on the ANNEXURE and hand in the ANNEXURE 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 the calculations clearly.

7. Round off ALL the final answers to TWO decimal places, unless stated otherwise.

8. Indicate units of measurement, where applicable.

9. Diagrams and maps are NOT necessarily drawn to scale, unless stated otherwise.

10. Write neatly and legibly.

QUESTION 1

1.1 1.1.1 Simplify: $\frac{3}{4} \times (1{,}764 + 2{,}346) - \sqrt{1{,}44 - 0{,}95}$ (2)

1.1.2 Write 6,25% as a common fraction. (2)

1.1.3 Convert 1 260 seconds to hours. (2)

1.1.4 Determine the price per gram (rounded off to the nearest cent) if 200 g of peanuts cost R9,96. (2)

1.1.5 The perimeter of a rectangle is 150 m with a length of 50 m.

Calculate the breadth of the rectangle using the following formula:

$$\textbf{Breadth} = \frac{\textbf{perimeter}}{\textbf{2}} - \textbf{length}$$ (2)

1.2 Maxine Fraser plans to bake 12 dozen peanut butter cookies. She will use a recipe in imperial units. The cookies are baked at 360 °F for 20 minutes.

Ingredients (to make 3 DOZEN)

$\frac{1}{2}$ cup peanut butter	$\frac{3}{4}$ cup chopped peanuts
4 ounces butter	2 eggs
5 ounces light brown sugar	1 teaspoon bicarbonate of soda
$\frac{1}{2}$ pound cake flour	pinch of salt

Conversion Table

1 pound = 16 ounces = 480 g
1 teaspoon = 5 mℓ
1 cup = 250 mℓ

1.2.1 Convert $\frac{3}{4}$ cup to millilitres. (2)

1.2.2 Convert 5 ounces to grams. (2)

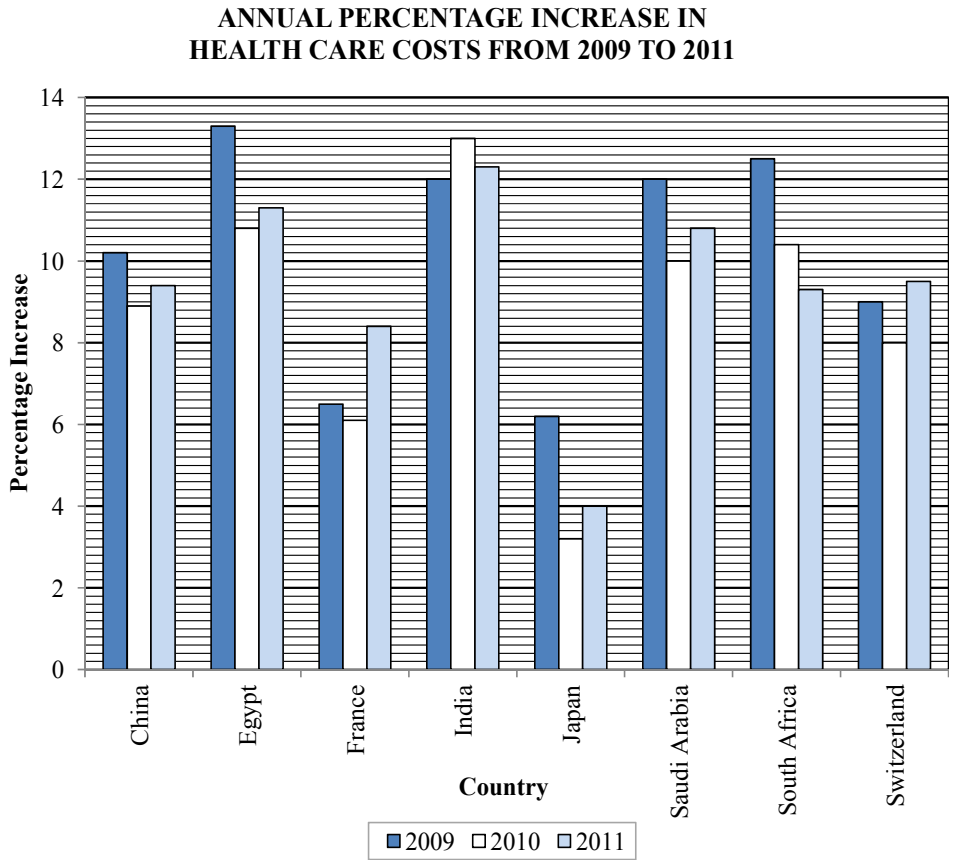
1.2.3 Convert 360 °F to °C, rounded off to the nearest 10 °C.

Use the formula:

$$\textbf{Temperature in } ^{\circ}\textbf{C} = \frac{\textbf{°F} - \textbf{32°}}{\textbf{1,8}}$$ (3)

1.2.4 Calculate how many grams of cake flour are needed to make 12 dozen cookies. (3)

1.3 In most countries there is generally an annual increase in health care costs. The bar graph below shows the annual percentage increase in health care costs for eight countries from 2009 to 2011.



[Adapted from *2011 Global Medical Trends Survey Report*]

1.3.1 Give India's percentage increase in health care costs during 2010. (2)

1.3.2 Which country's percentage increase in health care costs was 8% during 2010? (2)

1.3.3 Identify the country which had the highest percentage increase in health care costs during 2009. (2)

1.3.4 Which country showed a decrease in health care costs from 2009 to 2011? (2)
[28]

QUESTION 2

2.1 Thabo Mkhize is a businessman who visits various capital cities in Africa.

TABLE 1 below shows the exchange rate between eleven African currencies, United States dollar (US$) and the South African rand (ZAR).

TABLE 1: Exchange rate table for African currencies

CURRENCY	AMOUNT IN US$	AMOUNT IN ZAR
1 Algerian dinar	0,013592	0,10380
1 Angolan kwaza	0,010524	0,08160
1 Botswana pula	0,136131	1,05500
1 Egyptian pound	0,165683	1,28500
1 Ghanaian cedi	0,568235	4,41000
1 Kenyan shilling	0,012040	0,09340
1 Mozambican metical	0,036394	0,00030
1 Malawian kwacha	0,006009	0,04665
1 Nigerian naira	0,006345	0,04925
1 South African rand	0,128990	1,00000
1 Zambian kwacha	0,000189	0,00150

[Source: www.coinmill.com, 1 May 2012]

2.1.1 Which country had an exchange rate of US$ 0,012040 to ONE unit of its currency? (1)

2.1.2 Which of the currencies above gives you the largest amount in US$ for ONE unit of the currency? (2)

2.1.3 Thabo's accommodation in Zambia costs 25 976,87 kwacha.

Convert this amount to US$. (2)

2.1.4 Thabo bought goods in Ghana to the value of 1 345 cedi.

Calculate the value, in rand, of the goods Thabo had bought. (2)

2.2 Navin's company collected information during 2011 relating to the cost of producing television advertisements. The company released the following information:

- 640 advertisements were produced in 1 760 shoot days*.
- 219 of the advertisements were produced in high definition**.
- The average cost of producing an advertisement is R1 349 531.

* A shoot day refers to the number of regulated working hours per day to film an advertisement.
** High definition pictures are of a better quality than ordinary pictures.

[Source: www.cpasa.tv]

2.2.1 Calculate the average number of shoot days it takes to produce ONE advertisement. (2)

2.2.2 Calculate the total cost of producing advertisements in high definition if the cost per advertisement is the same as the average cost. (2)

2.2.3 Determine how many advertisements were NOT produced in high definition. (2)

2.2.4 In 2011, the hiring cost of equipment used for the filming of one television advertisement was 16% of the cost of producing the advertisement.

Calculate the hiring cost during 2011. (2)

2.2.5 The average cost of producing an advertisement in 2011 was 40% more than the average cost of producing an advertisement in 2005.

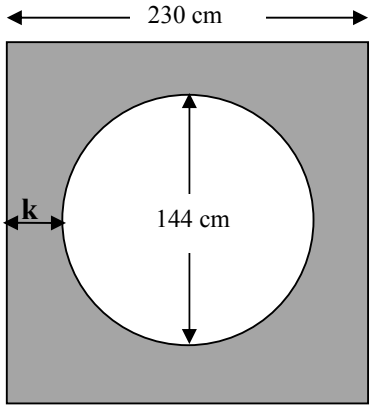
Calculate the average cost of producing an advertisement during 2005. (3)

2.3 Mr Buthelezi installed a circular window in the centre of a square wall, as shown in the diagram below. He intends painting the wall.

The diameter of the circular window is 144 cm.

The length of each side of the square wall is 230 cm.

The shortest distance between the edge of the window and the edge of the wall is shown as **k** in the sketch.



2.3.1 Determine the length of the radius of the window. (1)

2.3.2 Determine the value of **k** in centimetres. (3)

2.3.3 Calculate the circumference of the window.

Use the formula:

Circumference of a circle $= \pi \times \mathbf{d}$,
where **d** = the diameter of the window, and using $\pi = 3{,}14$ (3)

2.3.4 Calculate the area of the wall that he needs to paint.

Use the formulae:

Area of a circle $= \pi \times \left(\frac{\mathbf{d}}{\mathbf{2}}\right)^2$

Area of a square $= \mathbf{s}^2$

where **d** = diameter of the circle, and using $\pi = 3{,}14$,
s = length of the side of the square (4)

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QUESTION 3

3.1 Nandi is considering changing her hairstyle and visits a local hair salon to determine the cost of styling her hair. She has a choice between hair extensions or hair relaxing.

The pictures below compare relaxed hair and hair extensions.

Original hair **Relaxed hair**

Original hair **Hair extensions**

The cost of the two choices is shown below.

COST OF HAIR RELAXING	COST OF HAIR EXTENSIONS
R140,00 per treatment, including moisturising gel and one hair wash	R500,00, including one hair wash
Weekly hair wash at R40,00, including moisturising gel	Weekly hair wash at R40,00
Treatment must be repeated every four weeks or monthly.	Extensions last for 6 months or 24 weeks.

3.1.1 Calculate the cost of hair relaxing for the first four weeks.

Use the formula:

Cost for the first four weeks (in rand) = 140 + (3 × cost of a hair wash) (2)

3.1.2 Calculate the cost of hair extensions for the first four weeks.

Use the formula:

Cost for the first four weeks (in rand) = 500 + (3 × cost of a hair wash) (2)

3.1.3 Nandi wants to convince her father that in the long run, the cost of hair extensions will be cheaper than the cost of hair relaxing.

The accumulated cost for each choice over a 37-week period is given in the table below.

TABLE 3: Comparison of accumulated costs after the first week of each month

Time period (in weeks)	1	5	**B**	21	25	29	37
Accumulated cost of hair relaxing (in rand)	140	**A**	920	1 440	1 700	1 960	2 480
Accumulated cost of hair extensions (in rand)	500	660	980	1 300	1 920	2 080	2 400

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

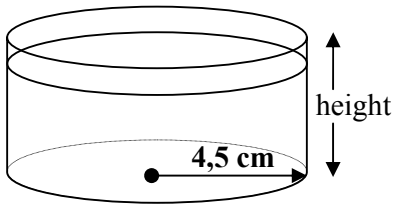
(b) Which hairstyle will be cheaper over the first 21 weeks? (2)

(c) Calculate how much more Nandi will pay over a 37-week period for relaxing her hair compared to wearing hair extensions. (2)

(d) The graph showing the cost of hair relaxing over a period of 9 months is given on ANNEXURE A.

Draw a labelled line graph of the cost of hair extensions over a period of 37 weeks on ANNEXURE A. (6)

3.2 The moisturising gel that the hairdresser uses when relaxing hair is sold in cylindrical containers with a volume of 500 mℓ and a radius of 4,5 cm.



3.2.1 The hairdresser needs to calculate the height of each container in order to determine how many containers she can stack on a shelf.

Calculate the height using the following formula:

$$\textbf{Height of a container} = \frac{\textbf{volume}}{\pi \times \textbf{r}^2}, \text{ using } \pi = 3{,}14 \text{ and } 1 \text{ m}\ell = 1 \text{ cm}^3$$

(3)

3.2.2 The wholesalers have a promotion on the moisturising gel. They are now selling 600 mℓ of the moisturising gel for the same price as 500 mℓ of the same gel.

Calculate the percentage increase in the volume of the moisturising gel using the following formula:

$$\textbf{Percentage increase} = \frac{\textbf{new volume} - \textbf{original volume}}{\textbf{original volume}} \times 100\%$$

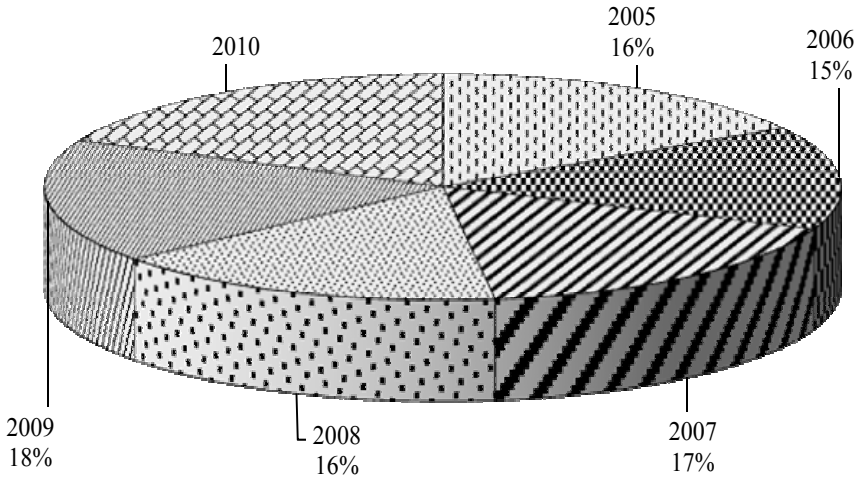
(2)
[23]

QUESTION 4

4.1 In 1994, the South African government introduced the Reconstruction and Development Programme (RDP) to address the socio-economic backlog of affordable housing.

The pie chart below shows the percentage of RDP houses that was built between 2005 and 2010.

PERCENTAGE OF RDP HOUSES BUILT BETWEEN 2005 AND 2010



Between January 2005 and December 2010, a total of 909 275 RDP houses was built.

[Source: www.escr-net.org]

4.1.1 Determine the percentage RDP houses built during 2010. (2)

4.1.2 In which year was the smallest percentage of RDP houses built? (1)

4.1.3 In which other year was the same percentage of RDP houses built as in 2005? (1)

4.1.4 Determine the number of RDP houses built during 2005. (3)

4.2 A construction company who built a number of RDP houses employed workers for 8 hours per day working a 5-day week. They were paid a normal rate of R40 per hour.

4.2.1 Determine the normal weekly wage per employee.

Use the formula:

Weekly wage (in rand)
= number of days worked × number of hours per day × rate per hour (2)

4.2.2 The owner paid the employees an overtime rate of R50 per hour.

(a) Write the ratio of the overtime rate to the normal rate in simplified form. (2)

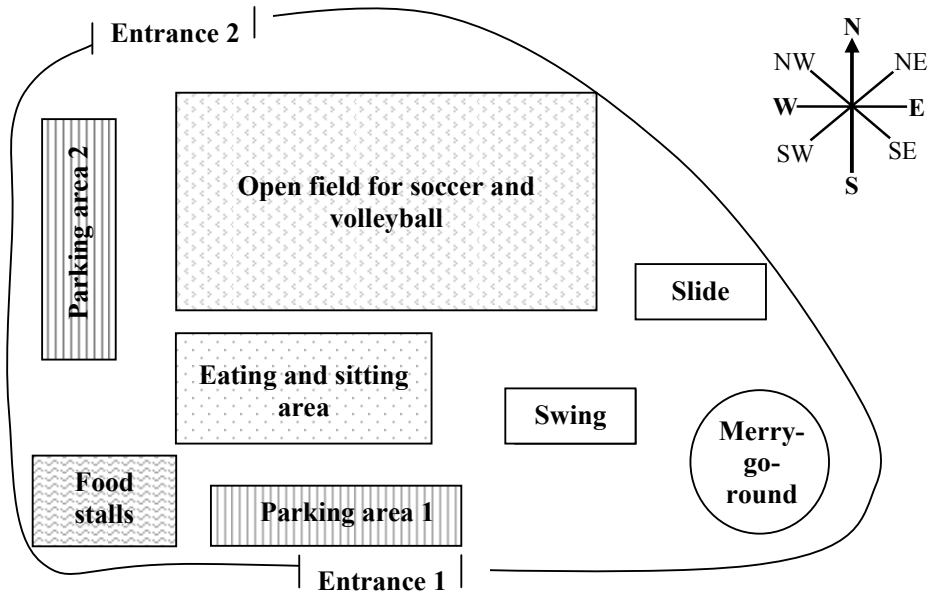
(b) If one of the employees received R350 for overtime worked in a given week, determine the number of hours he worked overtime. (2)

4.2.3 Ferdi planned to take 2 hours unpaid leave, but still wanted to earn a weekly wage of R1 920. If he worked 38 normal working hours, calculate how many hours he had to work overtime to earn this wage.

Use the formula:

$$\textbf{Number of overtime hours} = \frac{\textbf{weekly wage} - \textbf{(number of normal working hours} \times \textbf{40)}}{\textbf{50}}$$ (3)

4.3 The construction company decided to donate a new swing, slide and merry-go-round for the park next to the RDP houses. The sketch below shows the layout of the park.



4.3.1 Use the layout above to answer the following questions:

(a) Which games are normally played on the open field? (1)

(b) Which entrance is north of Parking area 1? (1)

(c) What playground equipment is situated in the south-eastern corner of the park? (2)

4.3.2 A teacher drew a scale drawing of the park using the scale 1 : 250. If the actual length of Parking area 2 is 15 m, determine the length (in cm) of Parking area 2 on the teacher's scale drawing. (2)

4.3.3 The children using the slide, slide into a rectangular sandpit, as shown in the picture alongside.

The length of the sandpit is 2,5 m and its width is 1,5 m.

The sandpit is filled with sand to a depth of 0,4 m.

Calculate the volume of sand used to fill the pit.

Use the formula:

Volume of a rectangular prism = length × width × height (3)

[25]

QUESTION 5

5.1 Mrs Botha conducted a survey each day for a week to determine the approximate number of minutes that her Grade 8 and Grade 12 learners watched television.

She recorded the results (in minutes) of her survey as follows:

GRADE 8

30	45	60	60	60
90	95	95	120	120
120	120	150	150	180

GRADE 12

0	30	30	30
40	45	45	50
60	60	60	60
60	150	150	180

5.1.1 Determine the sample size of the survey. (2)

5.1.2 How many learners did not watch any television during the week? (1)

5.1.3 Calculate the range of the time spent by the Grade 8 learners watching television. (2)

5.1.4 Write down the modal time the Grade 8 learners spent watching television. (2)

5.1.5 Determine the median time the Grade 8 learners spent watching television. (2)

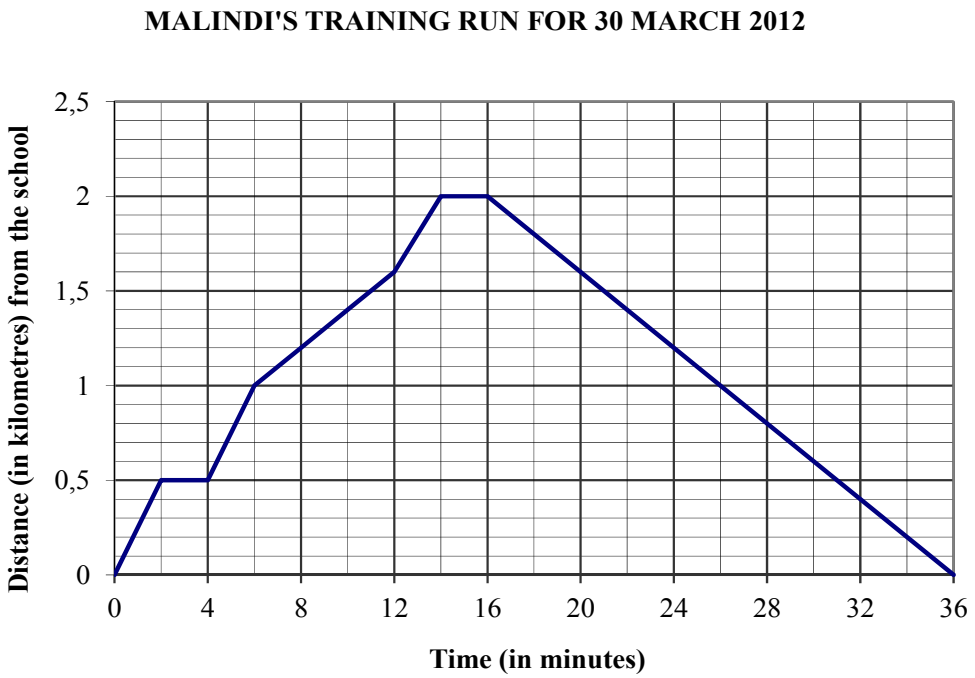
5.1.6 Calculate the average (mean) time the Grade 12 learners spent watching television. (3)

5.1.7 One of the Grade 12 learners is randomly selected.

Determine the probability that this learner spent 45 minutes daily watching television. (2)

5.2 Mrs Botha prepared a training route for the cross-country athletes. Malindi, one of the athletes, left the school grounds, ran for 2 km and then returned to the school grounds. She rested on her run from school, but ran at a constant pace on her trip back to school.

The distance-time graph below shows her run for 30 March 2012.



Use the graph above to answer the following questions:

5.2.1 Exactly how many minutes did the training session last? (1)

5.2.2 Determine the total distance (in km) that Malindi ran. (2)

5.2.3 How far from school was Malindi after she had run for 12 minutes? (2)

5.2.4 How many times did Malindi rest during the training run? (2)

5.2.5 After how many minutes was Malindi a distance of 1 km from the school? (2)
[23]

QUESTION 6

Peter plans to take part in the 2013 Cape Argus Cycle Tour, which is a cycle race that is 110 kilometres long.

He did research and obtained the following useful information on the Internet about this cycle tour:

- Cyclists are grouped according to their cycling ability. The groups start the cycle tour at different times, with the fastest cyclists starting first.
- There are cut-off points en route. These are points that cyclists must pass by at a stipulated time, otherwise they are not allowed to continue the cycle tour.
- The maximum time allowed to complete the cycle tour is 7 hours.

6.1 Refer to the map on ANNEXURE B and answer the following questions:

6.1.1 Write down the cut-off time at Boyes Drive. (1)

6.1.2 Identify TWO sponsors indicated on ANNEXURE B for this cycle tour. (2)

6.1.3 According to the map, if a cyclist reaches Perdekloof, he/she still has to cycle 52,2 km to finish the cycle tour.

How many kilometres has he/she already cycled? (2)

6.1.4 If a cyclist has only 30 km left to complete the cycle tour, what was the last cut-off point that he/she has passed? (2)

6.1.5 Determine the distance between the Steenberg cut-off point and the Noordhoek cut-off point. (2)

6.1.6 Determine the time (in hours) it will take a cyclist to finish the cycle tour if his/her average speed for the whole cycle tour was 15,9 km/h.

Use the formula:

$$\textbf{Time} = \frac{\textbf{distance covered}}{\textbf{average speed}}$$ (2)

6.2 Reinhardt Janse van Rensburg won the cycle tour in 2012 in a time of 2:36:17. In the previous six years, the winners finished the cycle tour in the following times:

2:39:55 2:37:50 2:34:28 2:29:59 2:31:57 2:39:35

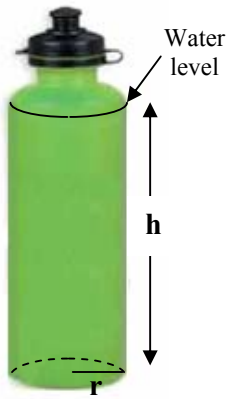
6.2.1 Arrange the times for the past seven years in ascending order. (2)

6.2.2 Convert Reinhardt Janse van Rensburg's winning time to seconds. (2)

6.3 A cyclist is advised to drink at least 0,5 ℓ of water for every hour cycled.

The water bottle that he uses is mostly cylindrical.

The radius (**r**) of the cylindrical part of the water bottle is 3,25 cm and it is filled with water to a height (**h**) of 15,1 cm, as shown in the sketch alongside.



6.3.1 Determine the minimum volume of water the cyclist must drink if he/she cycles for 7 hours. (2)

6.3.2 Determine the surface area of the cylindrical section of the water bottle.

Use the formula:

Surface area of the cylindrical section = $2 \times \pi \times r \times h$,
using $\pi = 3{,}14$ where **r** is the radius and **h** is the height (2)

6.3.3 A cyclist decides to use a bigger bottle with a volume of 750 mℓ.

How many 750 mℓ bottles of water will be needed if he/she uses a total of 4 200 mℓ of water? (3)

[22]

TOTAL: 150

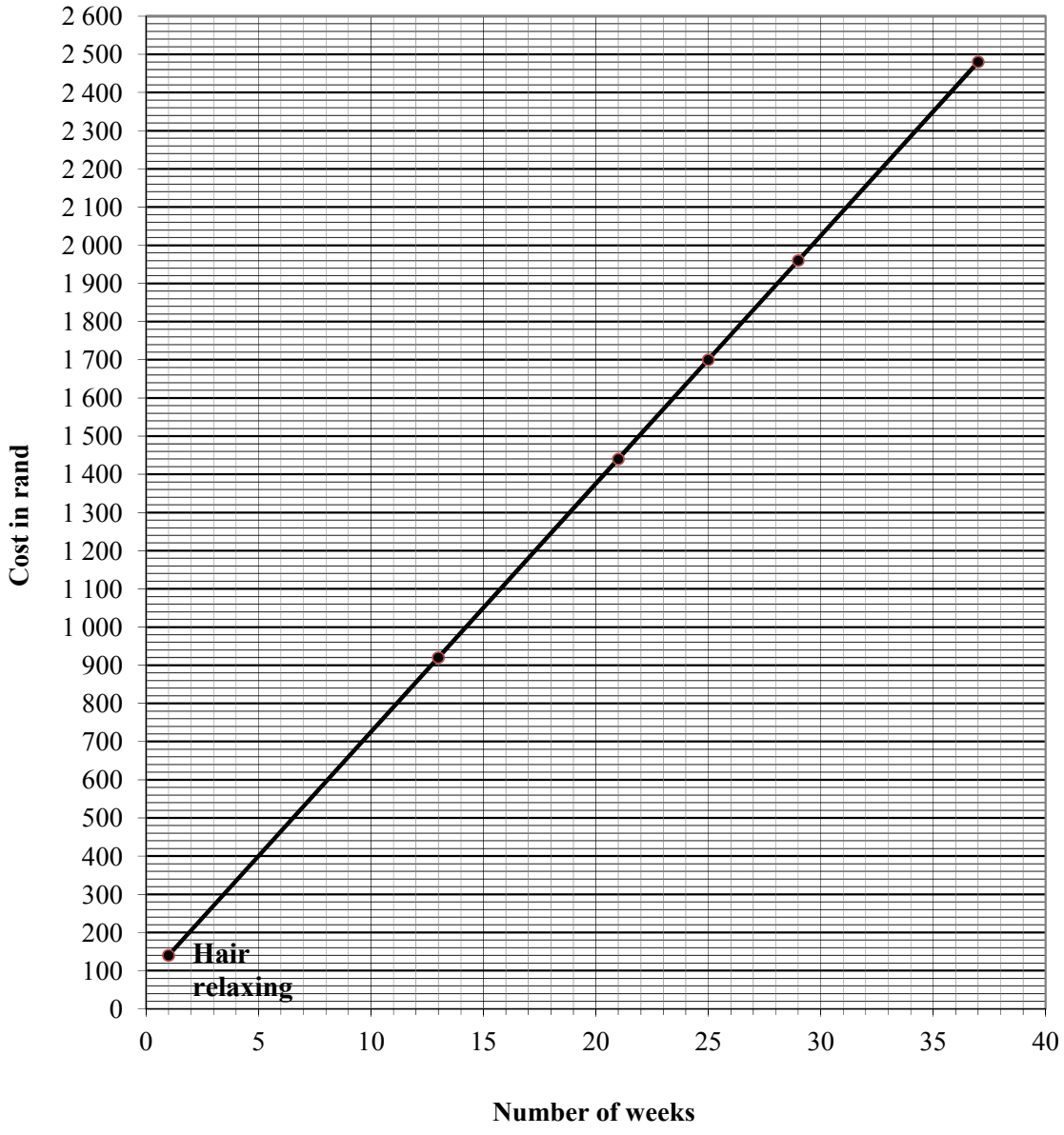
CENTRE NUMBER:

EXAMINATION NUMBER:

ANNEXURE A

QUESTION 3.1.3(d)

COMPARISON OF ACCUMULATED COSTS

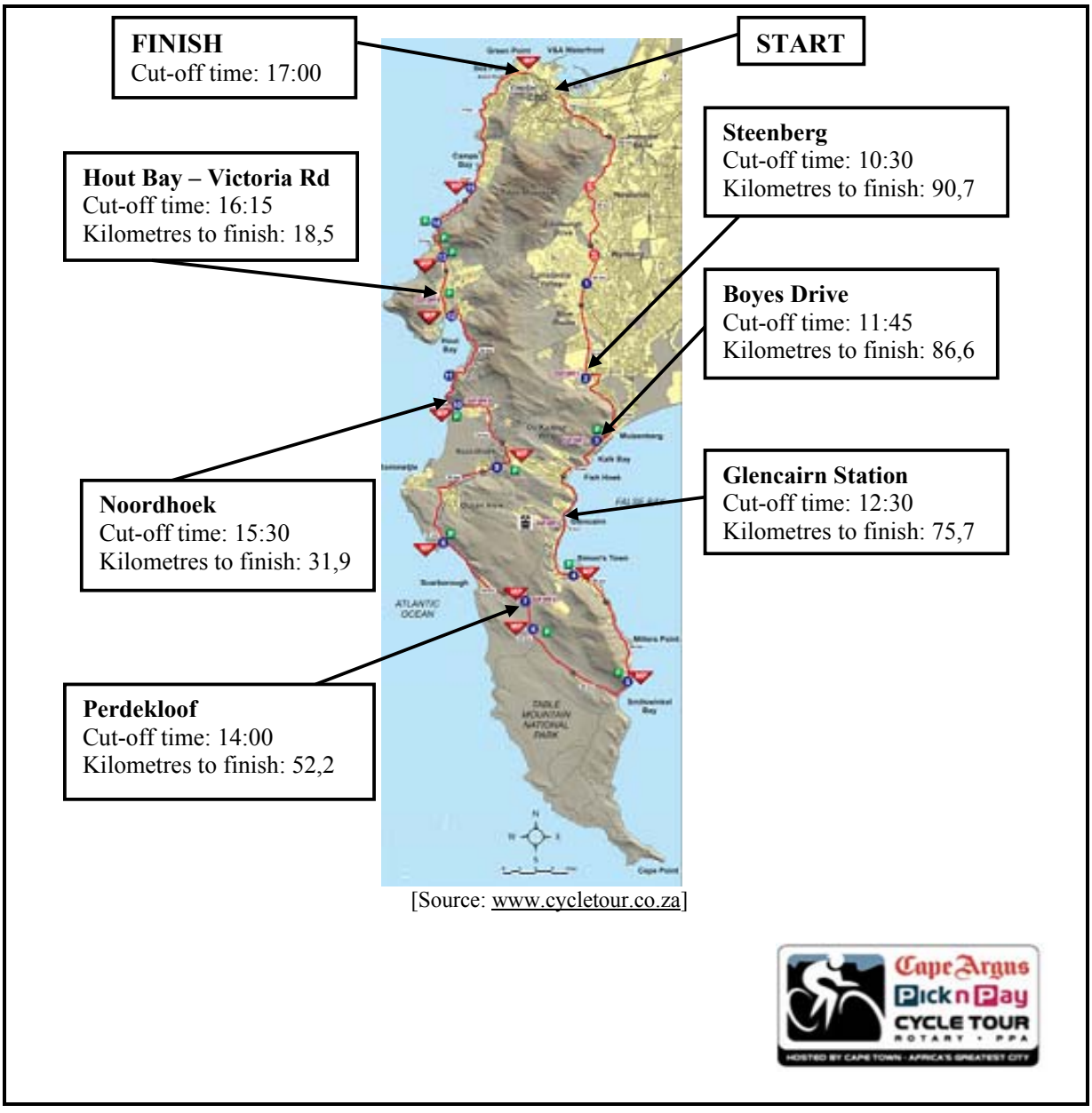


ANNEXURE B

QUESTION 6.1

MAP OF THE ROUTE OF THE CAPE ARGUS CYCLE TOUR

The map below shows the names of the six different cut-off points and the distance still left to cycle from that point to the end of the cycle tour.



[Source: www.cycletour.co.za]