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NATIONAL SENIOR CERTIFICATE EXAMINATION
NOVEMBER 2017

MATHEMATICAL LITERACY: PAPER II

Time: 3 hours | 150 marks

PLEASE READ THE FOLLOWING INSTRUCTIONS CAREFULLY

1. This question paper consists of:
   - 11 pages
   - 4 questions
   - an Answer Sheet of 3 pages (i–iii)
   - an Appendix with 2 annexures
     - Annexure A – CDC Growth Chart
     - Annexure B – Projection on the cost of Education

2. Please check that your question paper is complete.

3. **Remove the Answer Sheet** from the centre of the question paper. Hand it in with your Answer Book.

4. Answer ALL the questions.

5. **Please start each question on a new page in the Answer Book.**

6. It is strongly suggested that all working details be shown.

7. Round all the final answers off to TWO decimal places, unless stated otherwise OR where the context requires rounding up or down.

8. Approved non-programmable calculators may be used in all questions.

9. It is in your own interest to write legibly and to present your work neatly.

10. Maps and diagrams are not necessarily drawn to scale, unless stated otherwise.

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QUESTION 1

It is January and Ms Hegter has just started a new job. She will earn a gross monthly salary of R18 000.

She knows how important it is to save for her retirement and is surprised to learn that you should save at least 15% of your gross salary for approximately 40 years to provide for your retirement.

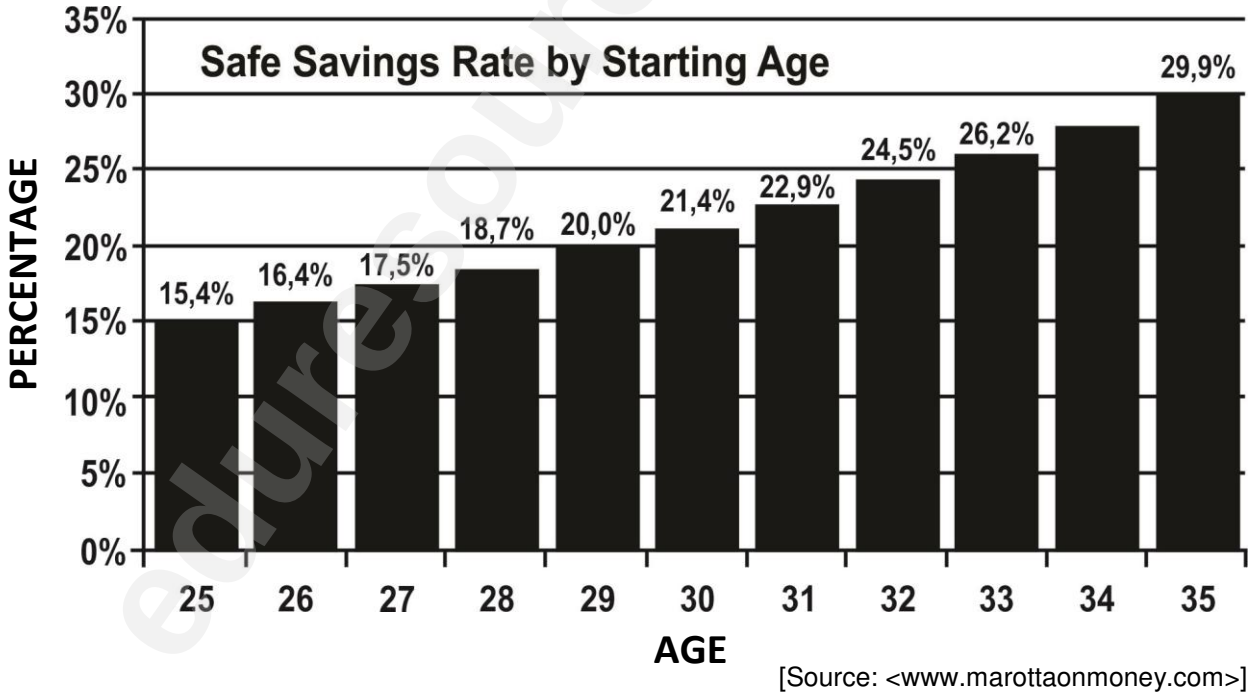
1.1 Refer to the table found on the Answer Sheet when answering this question.

If Ms Hegter's salary increases by 6% each year for the next 3 years, calculate what her salary will be at the beginning of year 3 by completing the table on your Answer Sheet. (5)

1.2 Determine how much Ms Hegter would save if she were to save 15% of her salary for years 1, 2 and 3. (4)

1.3 The graph below shows the percentage of your salary that you should be saving for your retirement based on the age at which you begin saving for it.

E.g. If you start saving for your retirement when you are 25 years old then you would need to save 15,4% of your monthly salary.



[Source: <www.marottaonmoney.com>]

1.3.1 Ms Hegter has been working for a while and is now earning R20 800 per month. She is saving the recommended amount of R3 640 per month for her retirement. Determine how old Ms Hegter was when she started saving. (4)

1.3.2 If Ms Hegter were to only start saving for her retirement when she was 30, determine the amount of money she would be saving that year if her annual salary was R290 000. (3)

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1.3.3 By using the **scale of the graph**, determine, to one decimal place, as accurately as possible, the safe rate for a 34-year-old person to start saving. Show all your working. (3)

1.3.4 Ms Hegter notices a pattern by which the safe saving rate increases annually.

(a) Describe or illustrate the pattern. (2)

(b) Assuming the pattern remains the same, predict the safe saving rate for a 37-year-old person. (3)

1.4 Ms Hegter's 68-year-old father is retiring this year. He has an annuity of R2,25 million which has matured. As per the law, he may only take out one third of his annuity as a lump sum and must reinvest the rest.

1.4.1 Calculate the amount that Ms Hegter's father is able to "withdraw"/ take as a lump sum now. (3)

1.4.2 Unfortunately Ms Hegter's father must pay tax on the one third that he takes as a lump sum.

The lump sum portion of the retirement amount is taxed using special tax rates, as indicated below:

Retirement Fund Lump Sum Benefits

2017 tax year (1 March 2016 – 28 February 2017)

Taxable income (R)	**Rate of tax (R)**
0 – 500 000	0%
500 001 – 700 000	18% of taxable income above 500 000
700 001 – 1 050 000	36 000 + 27% of taxable income above 700 000
1 050 001 and above	130 500 + 36% of taxable income above 1 050 000

[Source: <http://www.sars.gov.za/>]

Show that he has approximately 93% of his lump sum left once he has paid his taxes. (8)

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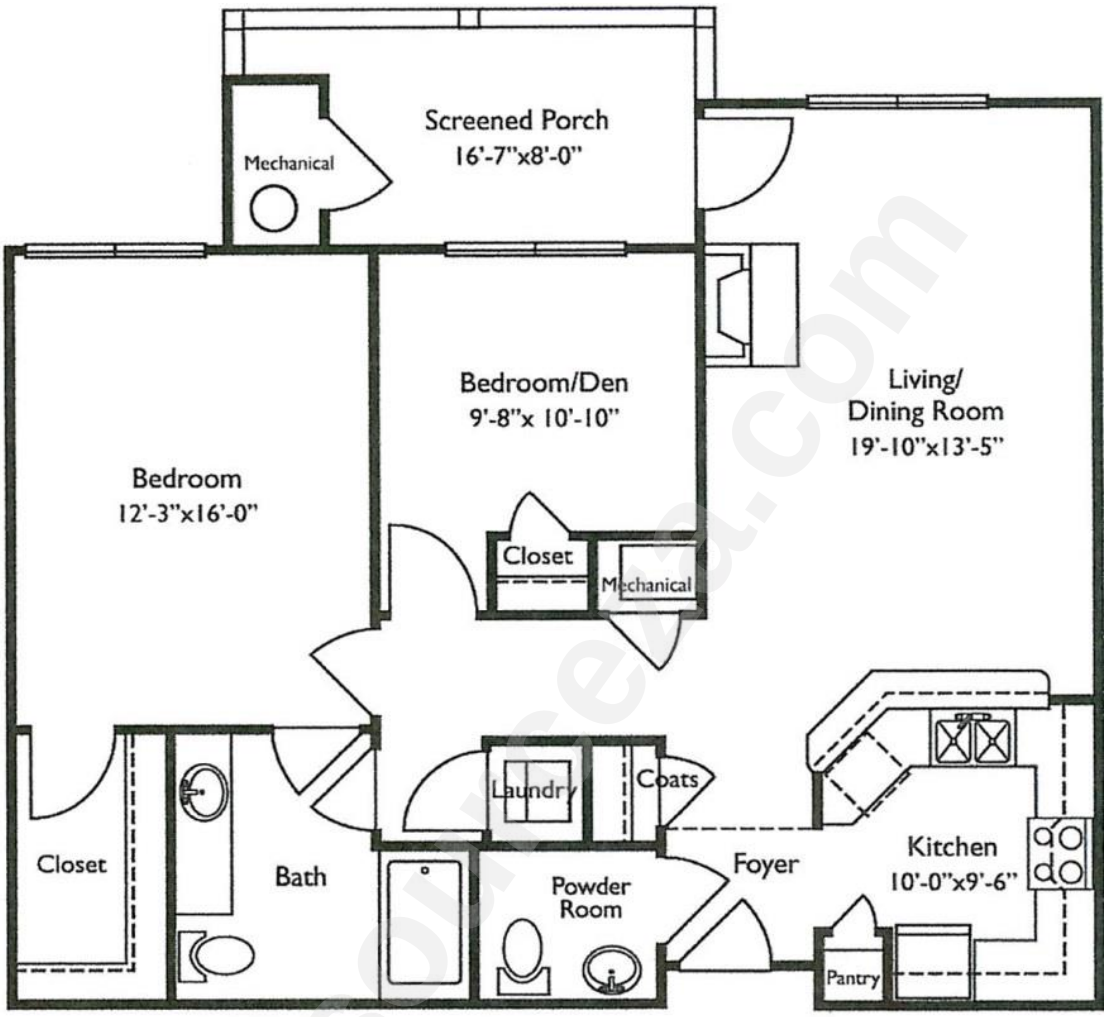
1.5 Mr Hegter will be moving into a retirement home. The floor plan of his new home is shown below.



[Source: <http://housedesignidea.info/floor-plans-retirement-homes.html>]

1.5.1 The dimensions of his bedroom will be 12 feet 3 inches by 16 feet.

Convert 12 feet 3 inches to metres using the conversions given in the table below. Show all working. (5)

Inches	Centimetres		Feet	Metres
1	2,5		1	0,3

[Source: <http://www.mylearning.org>]

1.5.2 Mr Hegter would like to carpet the entire floor of his bedroom from wall to wall. Determine how much carpeting must be bought if carpets are sold in full m^2. (4)

1.5.3 When Mr Hegter measured the width of the screened porch on the plan he got 3 cm. (*8 feet = 2,4 metres or 8' = 2,4 metres.*) Determine the scale of the plan in unit form, i.e.1 : …… (4)

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1.5.4 Mr Hegter will be staying in Doone Village. When his daughter comes to visit she will stay at the La Familia Guesthouse.

Write a set of directions that she could follow to get from the Guesthouse to the entrance of Doone Village. (3)

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QUESTION 2

2.1 Mr and Mrs Naidoo have a son, Rajesh. Mrs Naidoo kept a record of Rajesh's growth pattern over the first few years of his life.

By making use of the percentile chart given on **ANNEXURE A**, and the information from Mrs Naidoo, complete the paragraph by finding the missing values.

*When Rajesh was born he weighed more than 25% of other boy babies, placing him on the ___**(2.1.1)**___ percentile. We were a little worried but when he weighed ___ **(2.1.2)**___ kg eight months later, placing him on the 50th percentile, we felt much better. Over the next ___**(2.1.3)**___ months he gained even more weight. He was then 24,5 lb (pounds) and 25% of boys his age weighed more than him. By the time Rajesh was one year and nine months old he weighed 31 lb. He had gained ___**(2.1.4)**___ kg in the last 9 months. Three months after his second birthday he was 15,1kg. He was then placed on the ___**(2.1.5)**___ percentile, which means he now weighed more than ___**(2.1.6)**___ percent of other boys his age. He was a very healthy toddler☺.*

(10)

2.2 Mr and Mrs Naidoo are researching the cost of education for Rajesh. They find some useful information on an Old Mutual Website, some of which is found on **ANNEXURE B**. Use ANNEXURE B to answer the questions that follow.

2.2.1 Show that the projected percentage increase in the cost of Private High Schools from 2016 to 2021 is approximately 54%. (4)

2.2.2 The projected percentage increase for Private High Schools from 2029 to 2034 is also 54%. Explain why the projected percentage increase is not the same from 2021 to 2029. (2)

2.2.3 Mr and Mrs Naidoo know that costs do not remain the same every year but are keen to get an estimate of what their son's education might cost them.

Rajesh started Grade 1 in 2016. He currently goes to a Public School and will remain there until the end of his Grade 7 year. His parents would like to send him to a Private High School (from Grade 8–Grade 12) and are hoping he studies further at a University. Assume he passes every grade and studies for 3 years at University.

Calculate the estimated cost that Rajesh's parents can expect to pay for his education using the projected figures given in the graph. (6)

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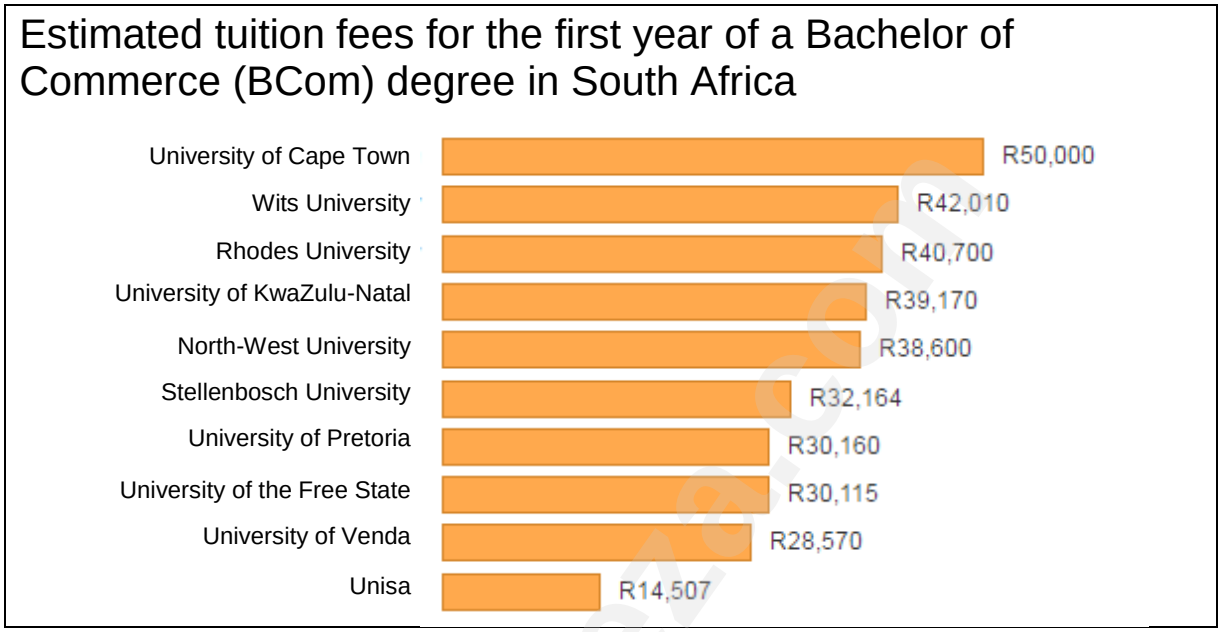
2.3 The estimated cost of completing a first year Bachelor of Commerce degree (BCom) at various South African universities in 2015 is shown below. Refer to the graph when answering the questions that follow.



[Source: <http://buzzsouthafrica.com/ & Africacheck.org>]

2.3.1 Determine the mean (average) cost of completing a first year BCom degree. (4)

2.3.2 Calculate the range in costs for a first year BCom degree. (2)

2.3.3 The cost of completing the first year of a BCom at the University of Limpopo was R21 390. If this cost was included in the graph, which university would represent the median cost of completing the first year of a BCom at a South African university in 2015? (2)

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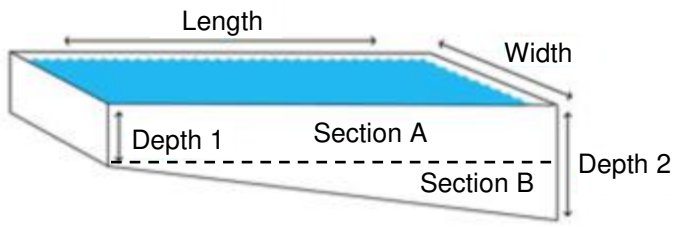
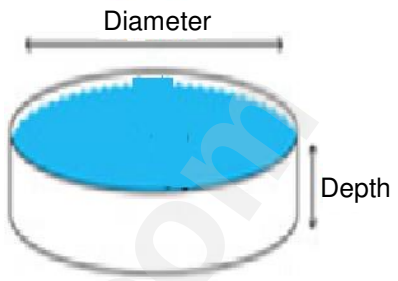
QUESTION 3

Helena and Jay-Jay are comparing the size of their pools. Helena's pool is rectangular in shape with the depth increasing uniformly from 0,6 to 1,2 m. Jay-Jay's pool is cylindrical in shape with a diameter of 4,8 m.





Helena's Pool

Length: 7 m
Width: 4,8 m
Depth 1: 0,6 m
Depth 2: 1,2 m

Jay-Jay's Pool

Diameter: 4,8 m
Depth: ?

1 m³ = 1 000 litres

Some formulas you may find useful:

Area of a Rectangle = length × width

Area of a Triangle = ½ × base × height (depth)

Area of a Circle = π × radius² (let π = 3,14)

Volume = area of base × height (depth)

Circumference = π × diameter (let π = 3,14)

3.1 Helena calculates that her pool can hold over 30 000 litres of water. If the volume of water for part/section A of her pool is 20 160 ℓ, determine whether Helena is correct. (8)

3.2 If Jay-Jay's pool also holds 30 000 litres of water, then calculate, rounded to one decimal place, the depth of his pool. (7)

3.3 Jay-Jay and Helena both need to replace the tubing that runs around the top edge of their pools. They know they can get a better deal if they buy in bulk so they combine the length of tubing they each need and then add an extra 10% to be safe. Show, by means of calculations, that together they will need more than 40 m of tubing. (6)

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3.4 Both Helena and Jay-Jay are interested in the costs to keep their pool water clean and clear. They investigate the cost of HTH (a chemical pool cleaner). They find the following information on www.google.com:

HTH Chlorine Granular 10 kg Buy Bulk & Save Bulk

Be the first to review this product

R325.00

Availability: In stock

Qty: 0

Add to Cart

Wish list Compare

If Jay-Jay used the product shown above, determine how much it would cost him to maintain his 30 000 litre pool for a 31-day month. The daily recommendation is 40 g of HTH granules per 10 000 litres. (6)

3.5 Helena's neighbour, Siyethaba, complains that her pool water is too cold to swim in. The temperature of Siyethaba's pool water is currently 19 °C and she says she will only swim if the temperature of the pool water is 25 °C. Calculate what the temperature change would be in °F. (5)

°C to °F	Multiply by 9, then divide by 5, then add 32

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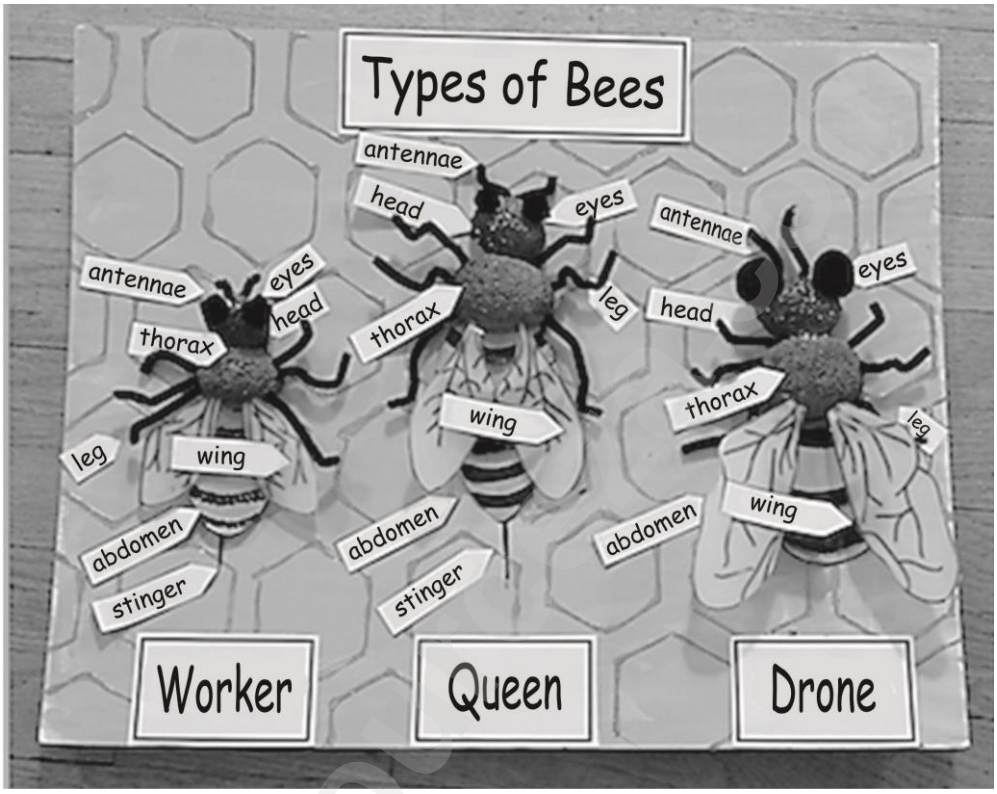
QUESTION 4

4.1 George is doing a school project on bees.

He learns that there are 3 kinds of honey bees, namely the Worker Honey Bee, the Drone Honey Bee and the Queen Honey Bee. As part of his project George builds scale models of the honey bees.



[Source: <the classroomcrative.com> A photo of the models George built.]

4.1.1 A Queen bee is approximately 2 cm in length. The length of George's model is 15 inches.

(a) Show that the model George built is 19 times bigger than the actual bee.

0,5 inch = 12,7 mm (5)

(b) Write down the ratio scale for this enlargement. (2)

4.1.2 Use the scale diagram given on the **Answer Sheet** and clearly add in all the millimetre lines between 1 cm and 2 cm. Hence, determine the actual length of the drone bee. (4)

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4.1.3 A honeybee flies at an average speed of 24 km per hour. Its wings beat 200 times per second, causing their famous, distinctive buzz. Show by means of calculations, that a bee's wings would beat 300 000 times if it flew 10 km. (5)

4.2 Wangui is doing her school project on the different eye colours of learners in her grade. She organises her data in the table below.

EYE COLOUR	Black	Brown	Blue	Green	Grey	Total
Female	(a)	30	10	15	10	(c)
Male	25	15	(b)	20	10	82
Total	45	45	22	35	20	(d)

[Source: <http://www.mathandstatistics.com/>]

4.2.1 Determine the missing values (a), (b), (c) and (d) in the table above. (4)

4.2.2 State the probability that if a student from her grade randomly sat next to her, the student would be a male with green eyes. (2)

4.2.3 State the probability that a female chosen at random in her grade would have blue eyes. (2)

4.2.4 If the probabilty is $\frac{25}{82}$, what would it be stating in terms of gender and eye colour? (2)

4.2.5 What percentage of the students involved in this survey had either green or grey eyes? (3)

4.2.6 Draw a stacked bar graph to illustrate the information given in the table. Use the axes given on the **Answer Sheet**. The first bar has been drawn for you. (8)

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Total: 150 marks

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