

# Mathematics

Part D

Årskurs

9

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Elevens namn och klass/grupp



## Instructions

Complete solutions are required for all the tasks except for one.

A complete solution means that your presentation has to be so clear that someone else can read and understand what you mean. It is important that you present all your work. You can get points for a partly solved task.

No points are given for correct answers alone except for task 19, which is marked *Only the answer is required*.

The maximum number of points you can get for your solution is shown after each task. For example (2/1/0) means that the task can give 2 E-points, 1 C-point and 0 A-points.

Aids: calculator and formula sheet.  
Time for the part: 100 minutes.

Name: \_\_\_\_\_

School: \_\_\_\_\_ Class: \_\_\_\_\_

Date of birth (year/month/day): \_\_\_\_\_

Girl       Boy

*The solutions and answers must not be written in the student booklet but must be written on a separate sheet of paper instead. The student booklet has to be handed in along with the solutions.*

Illustrations: Jens Ahlbom

Good luck!

## A trip to South Africa

Kevin and Veronica are travelling from Stockholm to Cape Town. Cape Town is in the southern part of South Africa. Cape Town has the Table Mountain, which was named as one of the seven wonders of the natural world in 2012. In the northern part of South Africa there are lots of mines where they mine gold and diamonds. In South Africa it is also possible to see lots of wild animals.



19.

Stockholm and Cape Town are in the same time zone, which means that the time is the same in both cities.

Kevin and Veronica travel from Stockholm to Cape Town. Their journey starts at 17:25. They arrive at 12:55 the next day. How long does their journey take? *Only the answer is required.*

(2/0/0)

20. In 2010 South Africa had almost 50 million inhabitants. 7.5 per cent of them lived in Cape Town. How many people lived in Cape Town?

(2/0/0)

21. One of the largest diamonds found in South Africa weighed 3 106 carat. A carat corresponds to 200 mg.



The carat is the unit that gives the weight of a diamond.

a) How many grams did the diamond weigh?

(2/0/0)

b) Before the diamond was polished, it was divided up into 11 different large diamonds. The largest diamond was called the Great Star of Africa. It weighed 106 grams. How many carats does that correspond to?

(1/1/0)

22. Kevin had SEK 5 500 in his travel funds. After 12 full days he had SEK 1 900 left. Kevin expects to use his money at the same rate as up to now. So how many days will what Kevin has left of his travel funds last? (3/0/0)

23. A rhinoceros can have very large horns. A horn grows at about 0.5 cm per month. A rhinoceros horn can be 1.55 m. Roughly how long does it take for a horn to get that long? (2/1/0)



24. Veronica and Kevin are standing on a viewpoint about 200 m above sea level and watching the sun as it sets at the horizon. Veronica says that the horizon is about 100 km away. Kevin knows a formula that you can use to calculate the distance to the horizon.



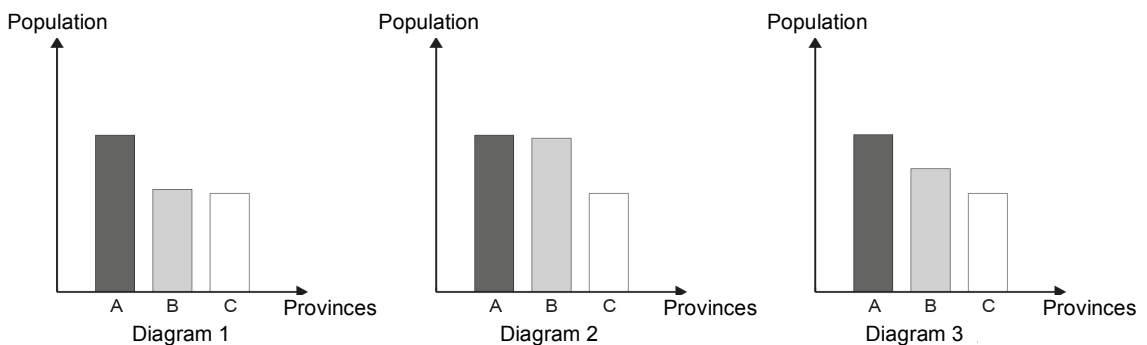
If you are  $h$  metres above sea level, it is  $S$  kilometres to the horizon,  $S = \sqrt{13h}$ . Is Veronica's statement correct? Motivate your answer by showing calculations. (0/3/0)

25. South Africa consists of 9 provinces. In the table you can see the population and area of each province.

*Population and area of South Africa's provinces and of Sweden*

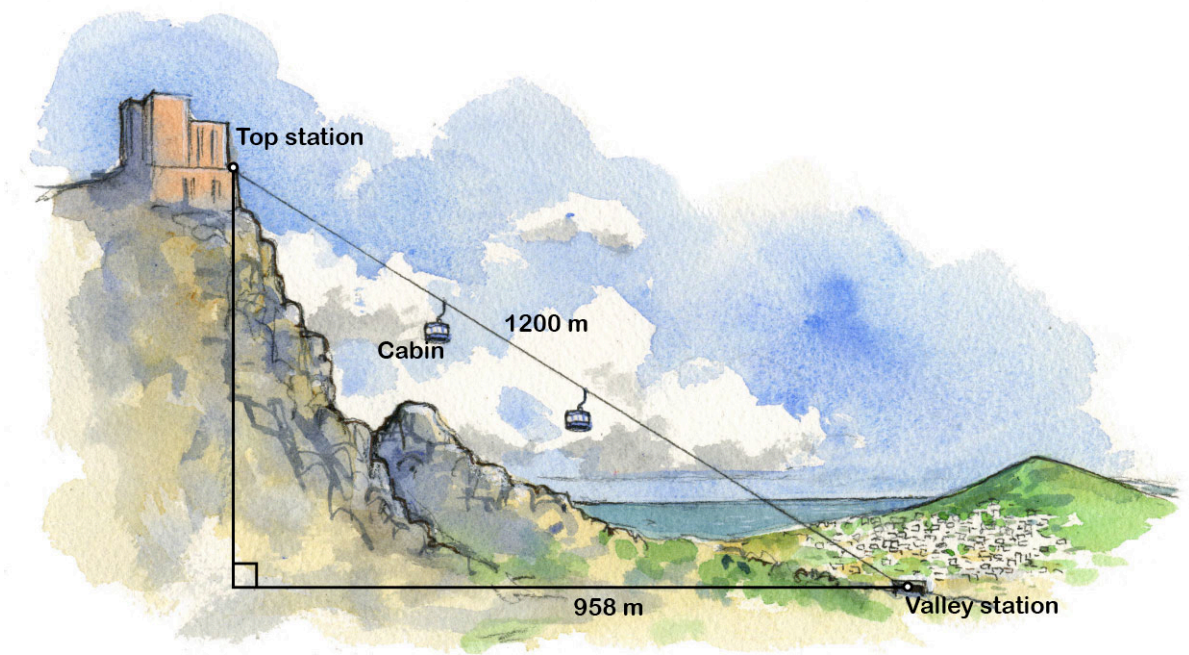
Provinces	Population (millions)	Area (1 000 km <sup>2</sup> )
Eastern Cape	6.6	169
Free State	2.8	129
Gauteng	10.5	17
KwaZulu-Natal	10.3	92
Limpopo	5.2	123
Mpumalanga	3.7	79
North West	3.3	116
Northern Cape	1.1	362
Western Cape	5.3	129
Country	Population (millions)	Area (1 000 km <sup>2</sup> )
Sweden	9.2	450

- a) Kevin and Veronica discuss which province is biggest. Kevin says that it is Gauteng while Veronica thinks that it is Northern Cape. How are they interpreting the table when they give such different answers? (1/0/0)
- b) Three different suggestions for diagrams of the provinces' populations are shown below.



Which diagram shows the three provinces that have the biggest population? Motivate your answer. (2/0/0)

- c) Gauteng is the province with the highest population density. About how many people would live in Sweden if we had the same population density as Gauteng? (0/3/0)



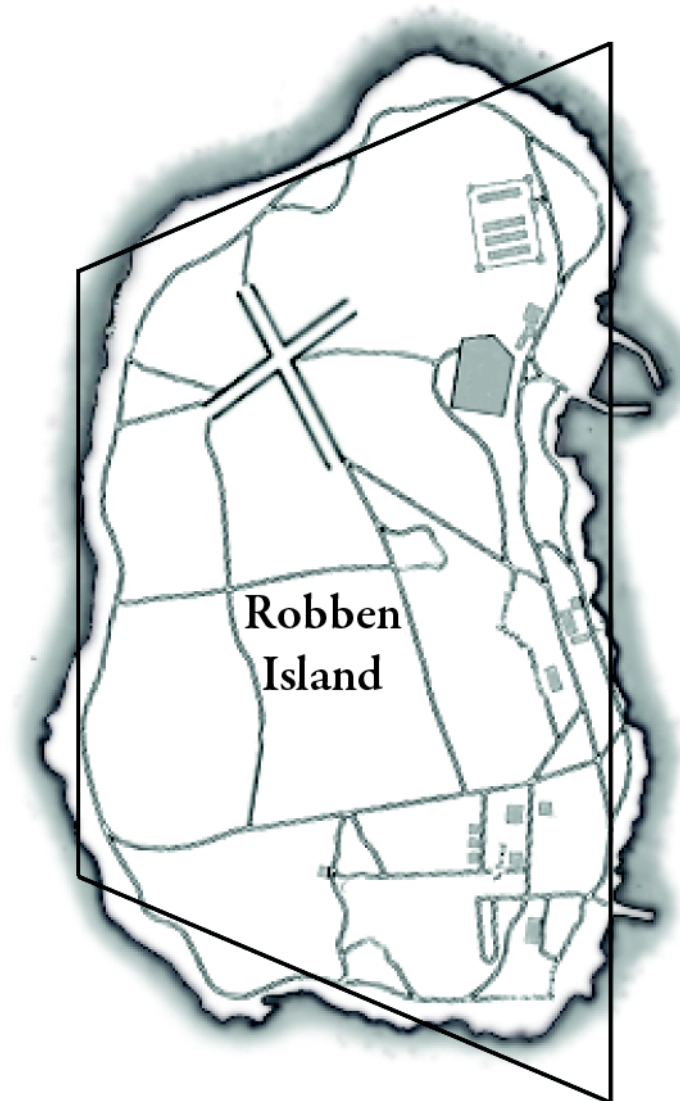
26. There is a fantastic view from Table Mountain in Cape Town. To get up to the top of the mountain you can take a cableway from the valley station to the top station. The picture shows a sketch of the cableway.

- a) The cableway is 1 200 m long and the trip to the top takes 5 minutes. What is the average speed of the cableway? Answer in m/s. (2/0/0)
- b) The car on the cableway is cylindrical and can hold up to 65 people. A person needs a floor area of at least  $0.20 \text{ m}^2$ . What must the smallest diameter of the base of the cabin be so that there is room for 65 people? (1/1/1)
- c) The valley station is 363 m above sea level. At what height above sea level is the top station? (0/1/3)

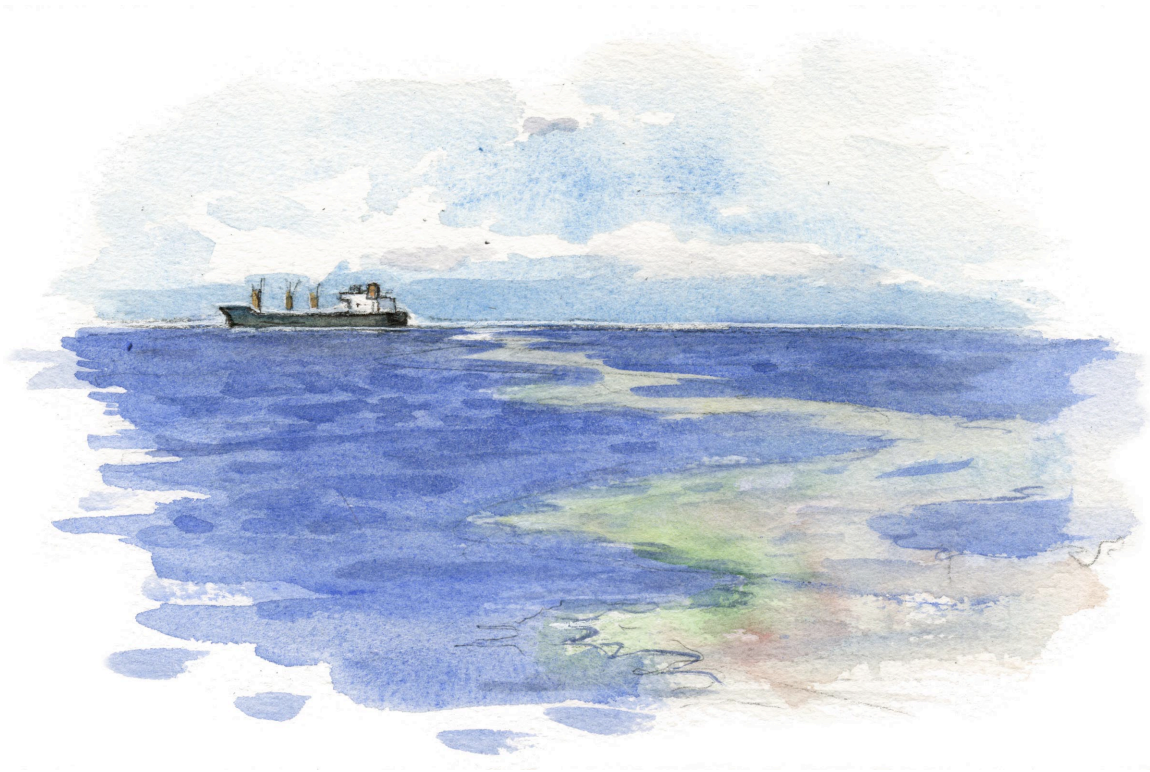


27. Robben Island is a well-known prison island outside Cape Town. The form of the island can be compared to a trapezium. Make measurements on the map and calculate approximately how big the area of Robben Island actually is.

(1/2/1)



Scale 1:25 000



28. When oil from a ship leaks into the sea, a thin film with an average thickness of 0.002 mm is formed on the water. There is a leak of 6 m<sup>3</sup> of oil from a ship. How many square kilometres does the oil cover? (0/2/2)
29. The black rhinoceros has long been threatened with extinction on account of poaching. Attempts have been made in various ways to stop the poaching and the number of rhinoceroses therefore increased by 60 per cent from 1995 to 2005. In 2005 there were about 4 000 black rhinoceroses.
- a) How many black rhinoceroses were there in 1995? (0/3/0)
- b) Assume that the *percentage increase* will continue at the same rate. How many black rhinoceroses can we expect there will be in 2035? (0/2/1)





