

# Bergvliet High School

Grade 11

Mathematics

December 2010

2 hours

Paper 3

100 Marks

Set by: C Benson

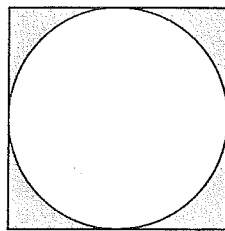
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## INSTRUCTIONS:

- This paper consists of **7** question pages and **10** questions, and **2** diagram sheet pages. Answer ALL the questions
- Clearly show all diagrams, calculations, graphs etc. that you have used in determining your answer.
- An approved scientific calculator (non-programmable) may be used unless otherwise stated.
- Diagrams are not necessarily drawn to scale
- It is in your own interest to write legibly and present the work neatly
- **Diagram sheet 1** has been provided for **questions 2.1 and 3.1**, hand this in with your answers.
- **Diagram sheet 2** has been provided for your rough work on **questions 7-10**. You do not need to hand this in.
- Round all your answers to 2 decimal places

### Question 1

- 1.1 You have three different kinds of chocolates, suppose you want to eat not more than 2 chocolates at a time. In how many different ways can you combine the chocolates to eat them? (1)
- 1.2 The probability that Event A will occur is 0,3. The probability that event B will occur is 0,5. The probability that event A or B will occur is 0.65
- 1.2.1 Calculate the probability that both events A and B will occur. (3)
- 1.2.2 Are events A and B independent? Give a reason for your answer. (2)
- 1.3 A circle is inscribed in a square of length 50cm.



Calculate the probability of randomly choosing a point in the shaded area, rounded to two decimal places.

(4)

[10]

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### Question 2

250 people have been asked to state what they drink: Coke (C), Sprite (S) or Fanta (F). 27 indicated that they do not drink any of the three, 145 drink coke, 130 drink Sprite 90 drink Fanta, 25 drink all three, 60 drink coke and Sprite and 35 drink Fanta and Sprite, 72 drink Fanta and Coke.

- 2.1 Use the diagram sheet provided to draw a Venn diagram of this information (7)
- 2.2 Determine the following probabilities from your Venn diagram, that a person:
- 2.2.1 Only drinks coke (2)
- 2.2.2 Drinks Fanta or Sprite (3)
- 2.2.3 Drinks neither Coke or Sprite (3)

[15]

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### Question 3

Below is a **table** showing data on the use of two cellphone networks. These are the only two networks in the region. The table includes the following information:

- The probability of all calls made in the region on each network,
- The probability that calls were made on contracts or on prepaid
- **For each network** the probability of calls made from stolen or not stolen cell phones.

Network A 0.55		Network B 0.45	
Contract 0.60	Prepaid 0.40	Contract 0.30	Prepaid 0.70
Stolen phone 0.20	Phone not stolen 0.80	Stolen Phone 0.10	Phone not stolen 0.90

Use the table above to answer the following questions:

- 3.1 On the answer sheet provided, draw a tree diagram of the above table. (4)
- 3.2  $P(\text{Network A and prepaid})$  (2)
- 3.3  $P(\text{Network B and prepaid and not stolen})$  (3)
- 3.4 Are the events *Network A* and *Prepaid* Independent or dependant events?  
Give a reason for your answer. (2)

[11]

### Question 4

For the police station in Vanderbijlpark the following was recorded for the period 2001 to 2007:  
[Information management – South African Police Force]

Period	April to September 2001	April to September 2002	April to September 2003	April to September 2004	April to September 2005	April to September 2006	April to September 2007
Common assaults reported	505	702	621	838	539	415	341

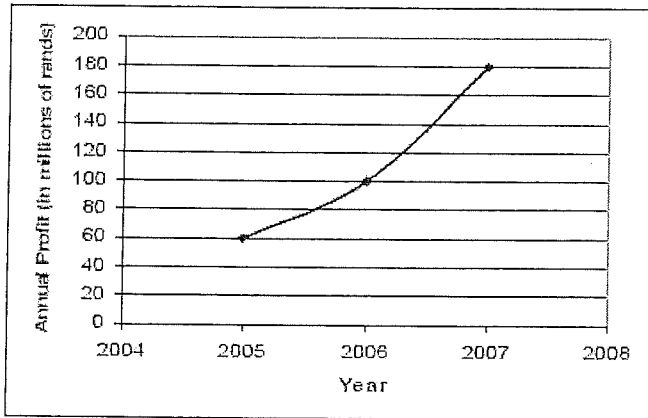
Use the above table to answer the questions that follow:

- 4.1 Determine the average number of common assaults that were reported over the 7 years at the Vanderbijlpark police station. (2)
- 4.2 One of the numbers of assaults is noticeably higher than the rest of the entries. If this outlier is not taken into account and the average over the remaining 6 years is determined, what will be the effect of this outlier on the average of the 7 years? (2)
- 4.3 Use the information above to comment on the trend in common assaults in South Africa over the seven year period. (2)

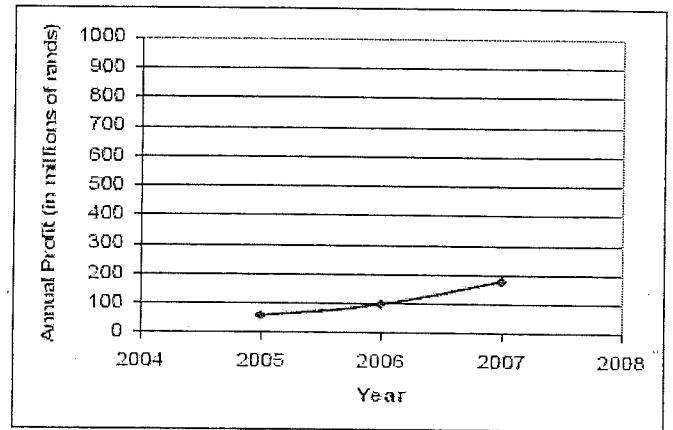
[6]

**Question 5**

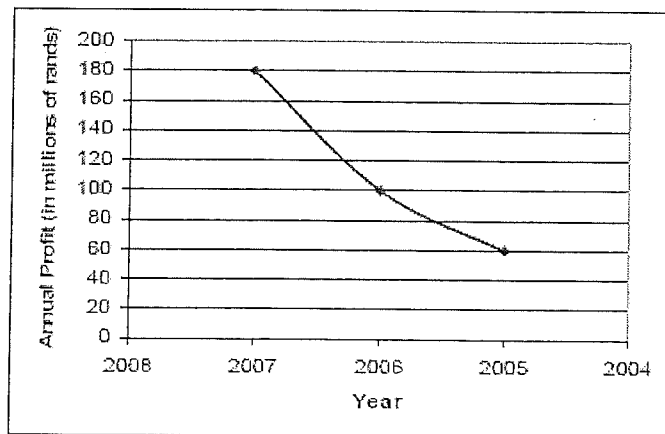
The following graphs show the annual profit of a certain company.



**Graph 1**



**Graph 2**



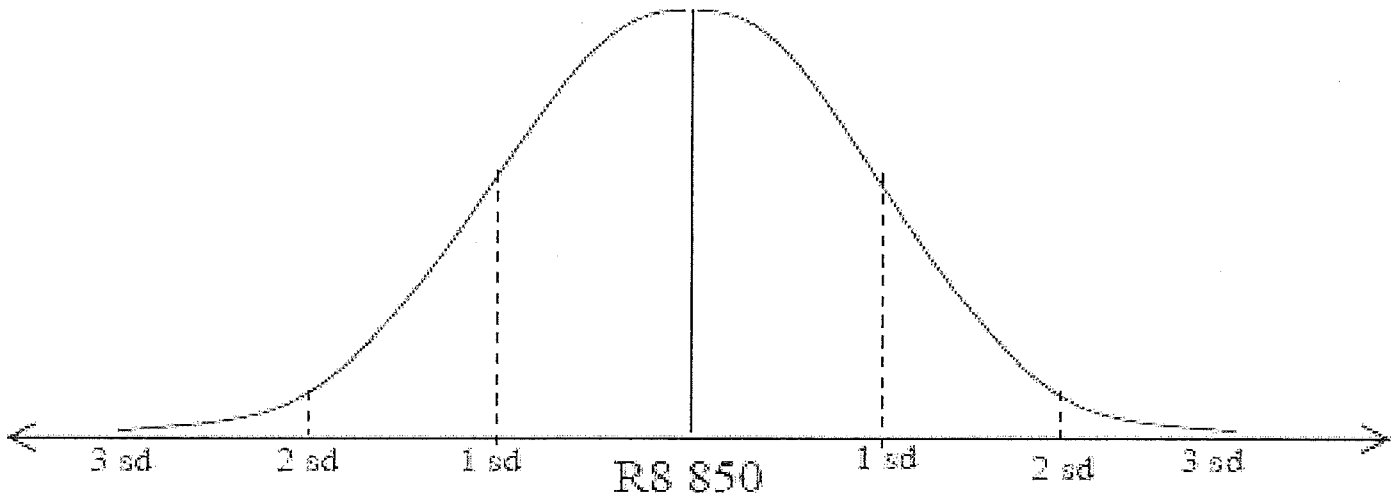
**Graph 3**

- 5.1 Do the graphs display the same information? Justify your answer (2)
- 5.2 Explain the impression created by graphs 2 and 3 when compared with graph 1. (2)
- 5.3 Which graph would you recommend for the director to use in the annual report for the company? Explain your answer. (2)

[6]

### Question 6

After protracted union protests, a company analysed its salary structure for employees. They found that the salaries are symmetrically distributed with a mean of R8 850 per month and a standard deviation of R2 950 per month. Research has indicated that if the monthly salary is below R3 000, the employee will not maintain an acceptable quality of life



It is also known that:

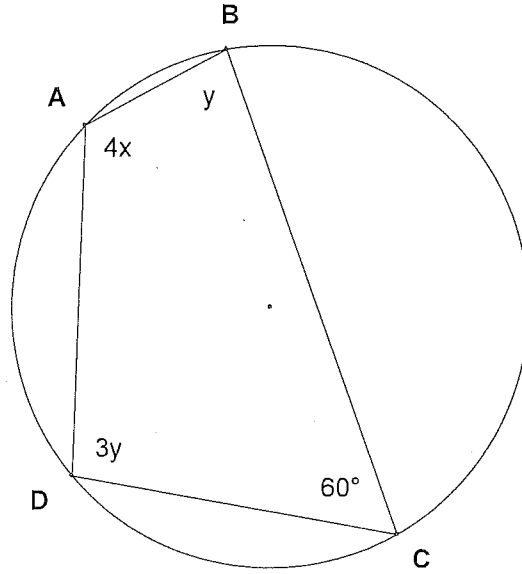
- Approximately 68% of the monthly salary recorded is within one standard deviation of the mean: 34% above and 34% below.
- Approximately 96% of the monthly salary recorded is within two standard deviations of the mean: 48% above and 48% below.
- Approximately 100% of the monthly salary recorded is within three standard deviations of the mean: 50% above and 50% below

- 6.1 Estimate the percentage of employees who will struggle to maintain an acceptable quality of life. (3)
- 6.2 Estimate the percentage of employees who earn more than R11 800 per month. (3)
- 6.3 Do you think that the company has a fair salary structure?  
Use the given data to motivate your answer. (2)

[8]

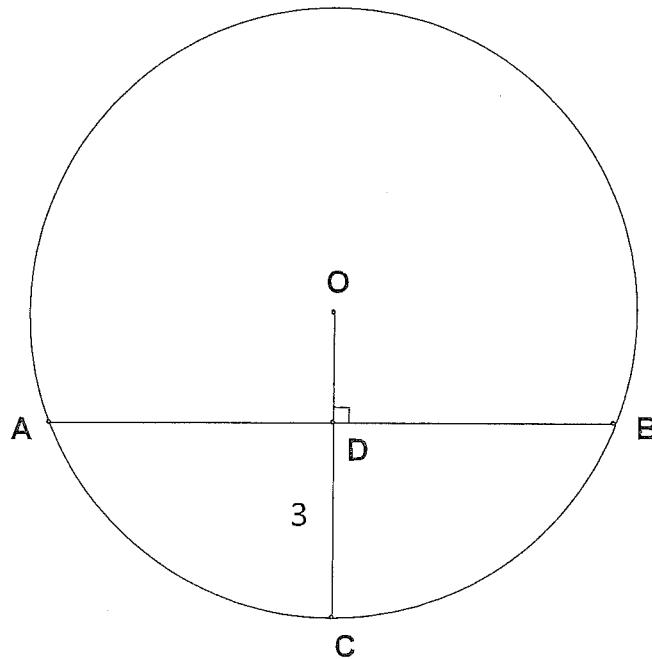
**Question 7**

7.1 In the figure below, ABCD is a cyclic quad.



Determine, with reasons, the values of  $x$  and  $y$ . (5)

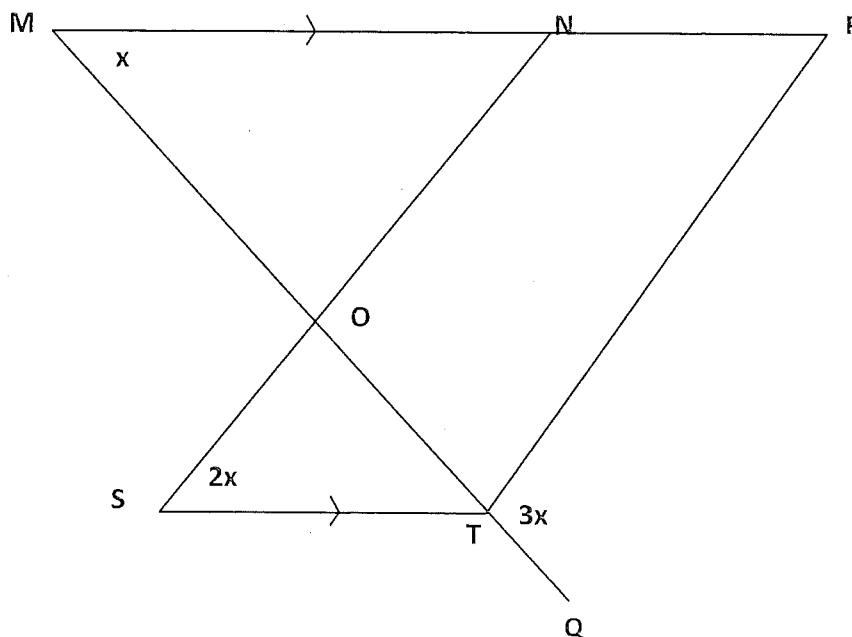
7.2 O is the centre of the circle below with a radius of 5 units. OC is perpendicular to AB, and DC is 3 units.



Find, giving reasons, the length of  $AB$ . (6)

**Question 8**

In the diagram below,  $MN \parallel ST$

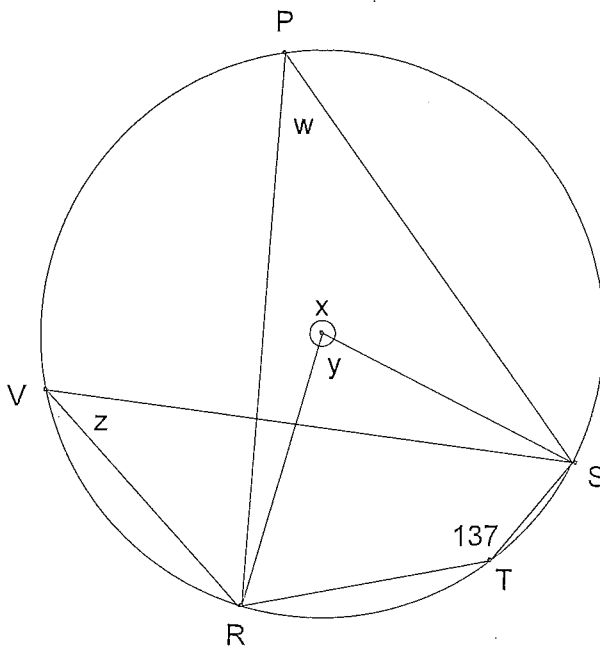


- 8.1 Prove that  $SN \parallel PT$  (5)
- 8.2 If  $\widehat{STQ} = 110^\circ$  determine the value of  $x$ . (4)

[9]

**Question 9**

O is the centre of the circle

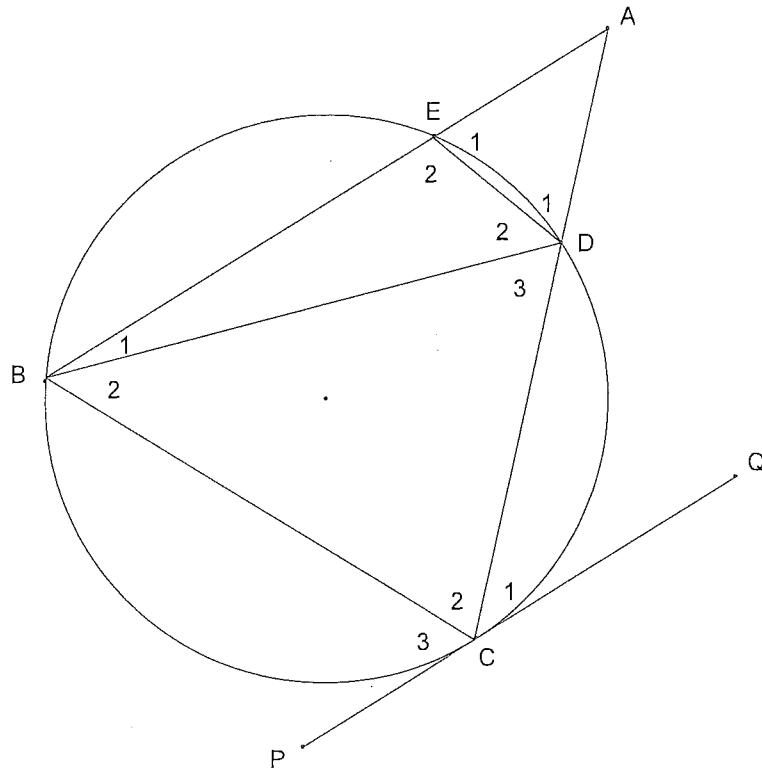


- 9.1 Which of the following is a cyclic quad: PROS or RTSP? Give a reason for your answer. (2)
- 9.2 Find, giving reasons, the value of  $w$ ,  $x$ ,  $y$  and  $z$ . (8)

[10]

**Question 10**

Given the circle below, with BE extended to A and CD extended to A. The line PQ is a tangent to the circle at point C.  $PQ \parallel AB$ . Use the diagram below to answer the following questions:



Prove the following giving reasons:

10.1  $\hat{A} = B_2$  (5)

10.2  $B_1 = B_2 = D_3$  (5)

10.3  $D_1 = D_3$  (4)

[14]

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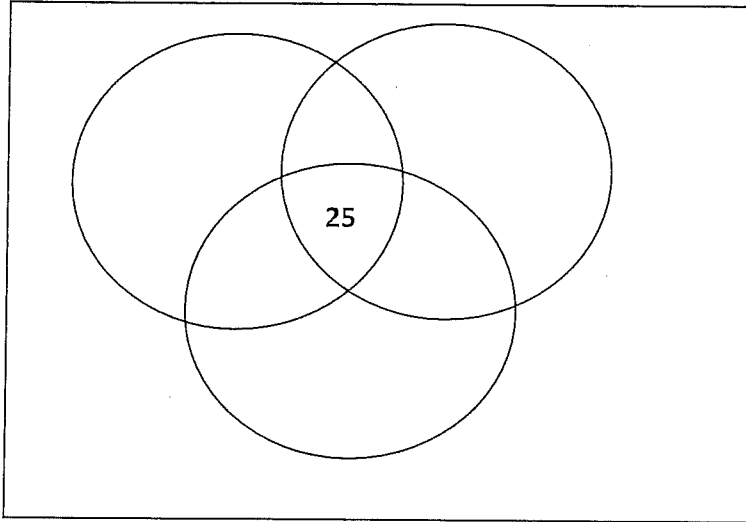
Total: 100 marks

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Diagram sheet 1 – THIS SHEET MUST BE HANDED IN WITH YOUR ANSWERS

Question 2.1



Question 3

3.1

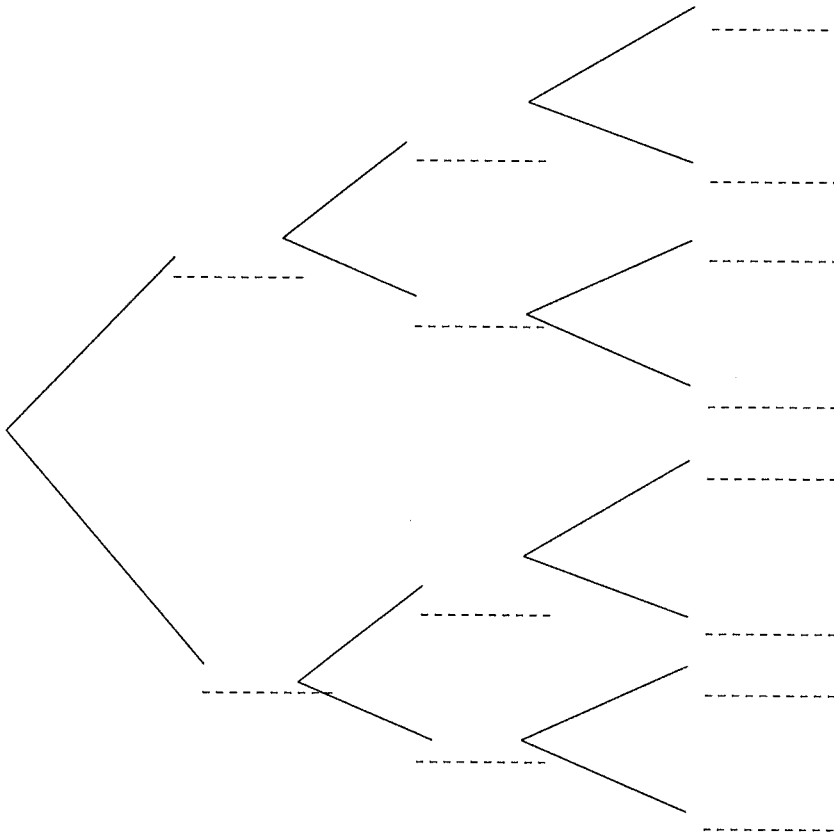
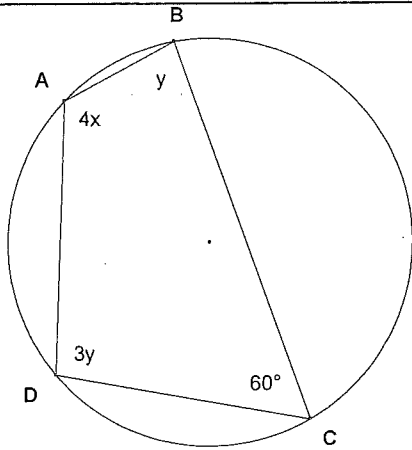
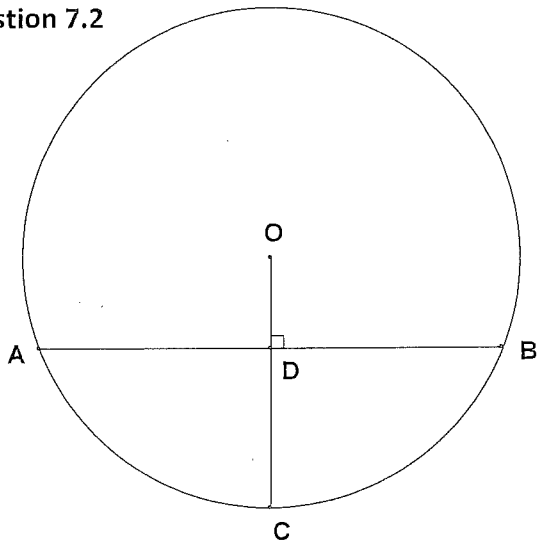


Diagram sheet 2 – This sheet is to be used as a rough

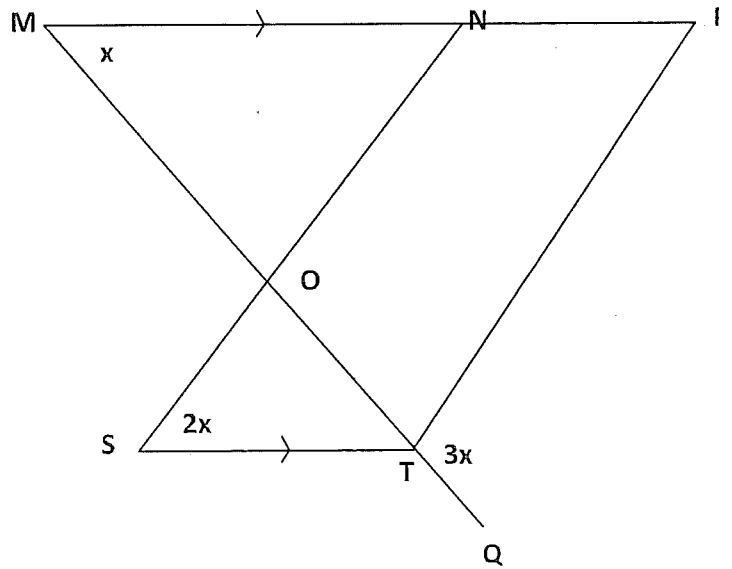
Question 7.1



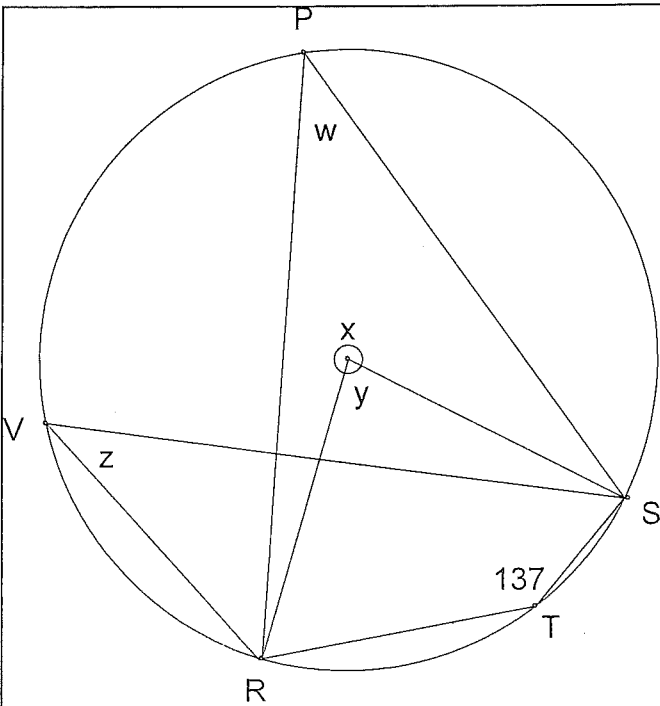
Question 7.2



Question 8



Question 9



Question 10

