



Name and Surname: SV Maths Teacher: \_\_\_\_\_

Grade 11 Maths Exam Paper 2 12 June 2014

Marks: 100 Time: 2 hours Examiner: Mrs Selkirk

**Instructions**

1. Work clearly and neatly. Start each question at the top of a new side of a page.
2. Hand in answers and question paper separately.
3. Show all working out.
4. Non-programmable calculators may be used unless the question states that you may not use one.
5. Round all answers off to 2 decimal places, where necessary.

**Question 1 (8 marks)**

The data below represents the percentages obtained in a Maths test by a sample of 9 Grade 11 learners.

72	90	80	35	54	55	40	60	76
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- 1.1 Find the five number summary for this set of data. (4)
- 1.2 Use the five number summary to draw a box and whisker diagram for this data. (3)
- 1.3 Find the interquartile range for this set of data. (1) [8]

**Question 2 (10 marks)**

The following data represents the amount of time (in hours) that a sample of learners aged between 14 and 18 years of age, spent watching television during their 3 week holiday in July.

Time (hours)	f	Midpoint (x)	fx
$0 < t \leq 20$	25		
$20 < t \leq 40$	44		
$40 < t \leq 60$	60		
$60 < t \leq 80$	38		
$80 < t \leq 100$	15		

- 2.1 What is the modal class? (1)
- 2.2 Complete the table, a copy of which is on Diagram Sheet A (2)
- 2.3 Use the table to calculate the approximate mean for this set of data. (3)

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- 2.4 What percentage of the learners watched more than 60 hours of television during the holiday? (2)
- 2.5 In which interval will the 65<sup>th</sup> percentile be found? (2) [10]

**Question 3 (3 marks)**

The following terms represent 5 different data values.

$$2x \quad x + 3 \quad x - 1 \quad 2x - 3 \quad x + 5$$

The mean for the data set is 12. Determine the value of x. (3)

**Question 4 (26 marks)**

4.1 If  $A = 20^\circ$  and  $B = 30^\circ$ , determine the value of the following to 3 decimal places:

4.1.1  $\cos(A+B)$  (1)

4.1.2  $\sin^2 A + \cos^2 A$  (1)

4.2 If  $8 \tan \theta - 15 = 0$  and  $90^\circ < \theta < 360^\circ$ , determine the value of  $\sin \theta$  by using a diagram and without using a calculator. (4)

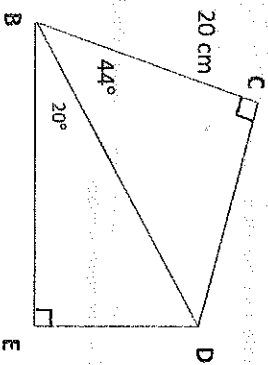
4.3 If  $\cos 15^\circ = t$ , use a diagram to determine  $\cos 75^\circ$  (3)

4.4.1 Sketch the special diagram used to evaluate trigonometric ratios of  $30^\circ$  without a calculator. (1)

4.4.2 Use the diagram to evaluate  $\frac{1}{\sin 30^\circ} + \cos^2 30^\circ$  without using a calculator. (3)

4.5 Without using a calculator, show that  $\sin 90^\circ = 2 \sin 45^\circ \cos 45^\circ$ . Any special angle diagrams that were used need to be shown. (3)

4.6 In the diagram below,  $\angle CBD = 44^\circ$ ,  $\angle DBE = 20^\circ$ ,  $BC = 20$  cm,  $BC \perp CD$  and  $DE \perp BE$



- Use the diagram above to calculate the length of
- 4.6.1 BD (3)
  - 4.6.2 and hence, the length of DE (2)

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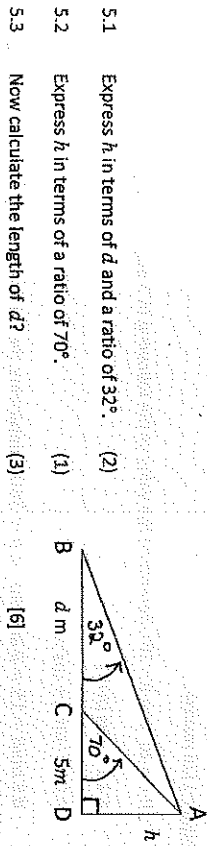
4.7 Solve for  $x$  in the following equations if  $x \in (0; 90^\circ)$

4.7.1  $\sin 2x = \frac{1}{2}$  (2)

4.7.2  $2 \tan x - 3 = \cos 32^\circ$  (3) [26]

Question 5 (6 marks)

The angle of elevation from B to the top of flagpole AD is  $32^\circ$ . An observer walks  $d$  m from B to C and finds the angle of elevation of A to be  $70^\circ$ . Let the height of the flagpole be  $h$  meters and the distance between the flagpole and the second point of observation, C, be 5 meters.



5.1 Express  $h$  in terms of  $d$  and a ratio of  $32^\circ$ . (2)

5.2 Express  $h$  in terms of a ratio of  $70^\circ$ . (1)

5.3 Now calculate the length of  $d$ ? (3) [6]

Question 6 (4 marks)

Complete the following statements:

6.1 If PQ is the perpendicular bisector of chord AB, then PQ passes through ..... (1)

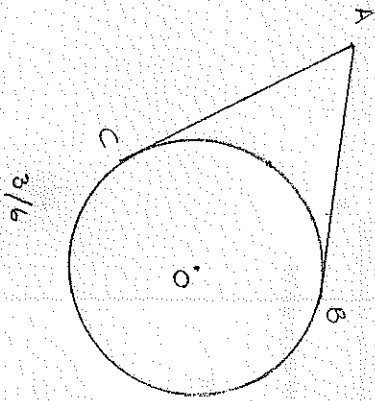
6.2 If a chord subtends a right angle on the circumference of a circle, then the chord is ..... (1)

6.3 The exterior angle of a cyclic quadrilateral equals ..... (1)

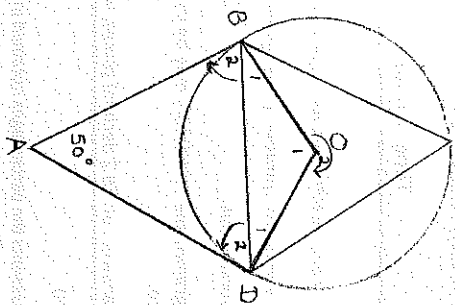
6.4 If a line is drawn through the end point of a chord, making with the chord an angle equal to an angle in the alternate segment of the circle, then the line is ..... (1) [4]

Question 7 (13 marks)

7.1 Given circle, centre O, with tangents AB and AC, coming from point A outside the circle, prove the theorem that states that AB and AC will be equal in length. (5)



7.2 AB and AD are tangents to the circle from A. O is the centre of the circle.  $\hat{A} = 50^\circ$



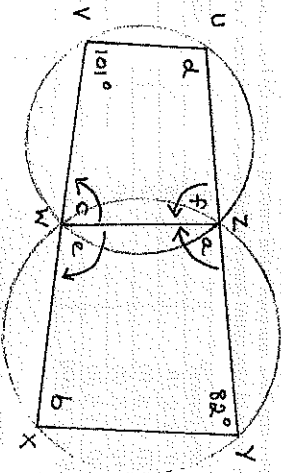
7.2.1 Determine the size of  $\hat{B}_2$ , with reasons. (4)

7.2.2 Determine the size of  $\hat{C}$ , with reasons. (2)

7.2.3 Determine the size of  $\hat{O}_1$  with reasons. (2) [13]

Question 8 (17 marks)

2 circles intersect at Z and W. U and V lie on the smaller circle. X and Y lie on the larger circle.  $\hat{V} = 101^\circ$  and  $\hat{Y} = 82^\circ$



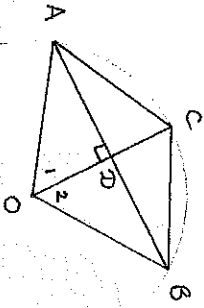
8.1 Determine the size of angles  $a, b, c, d, e, f$  with reasons. (12)

8.2 Is UV || WX? Justify your answer. (3)

8.3 Is UVXY a cyclic quadrilateral? Justify your answer. (2) [17]

Question 9 (13 marks)

O is the centre of the circle below



Ans: let  $OB = x$

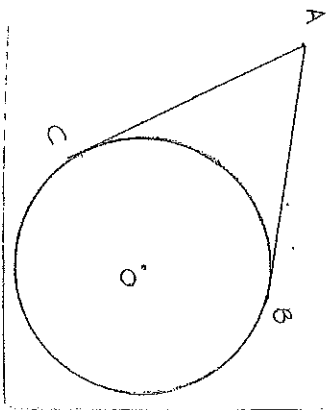
9.1 If  $AB = 54$  units and  $DC = 3$  units, determine with reasons, the length of the radius of the circle. (4)

9.2 Prove  $\triangle AOD \cong \triangle BOD$  (4)

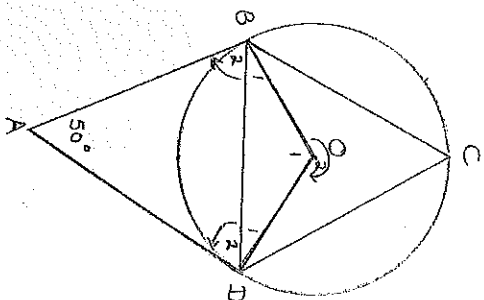
9.3 Hence, if  $\angle ABC = y$ , determine, with reasons, the size of  $\angle AOB$  in terms of  $y$ . (5)

TOTAL: 100 marks [13]

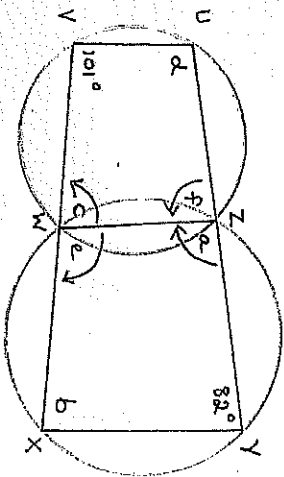
Question 7.1



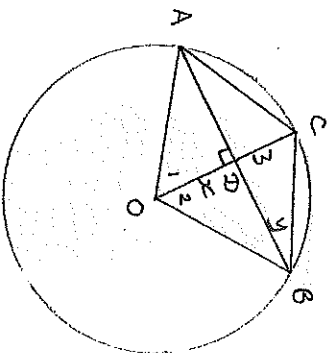
Question 7.2



Question 8



Question 9



**Diagram Sheet A**

**Question 1.1**

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**Question 2**

2.1 \_\_\_\_\_ (1)

2.2

Time (hours)	f	Midpoint (X)	f.X
$0 < t \leq 20$	25		
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$40 < t \leq 60$	60		
$60 < t \leq 80$	38		
$80 < t \leq 100$	16		

(2)

2.3 \_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_ (3)

2.4 \_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_ (2)

2.5 \_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_ (2)

[10]