

Hudson Park High School

GRADE 11
MATHEMATICS
Paper 2

Time : 2 hours

Date : May 2016

Marks : 100

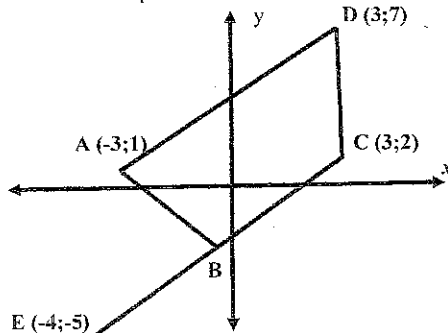
Examiner : SLK

INSTRUCTIONS

- Illegible work, in the opinion of the marker, will earn zero marks.
- Number your answers clearly and accurately.
- NB** Staple your answer pages on top followed by the question paper at the back.
- Employ relevant formulae and show all working out. Answers alone may not be awarded full marks.
- (Non programmable and non graphical) Calculators may be used, unless their usage is specifically prohibited.
- Round off answers to 2 decimal places, where necessary, unless instructed otherwise.

Question 1 (15 marks)

Points A (-3;1), C (3;2), D (3;7) and E(-4;-5) are found on the diagram below. AD, AB, EC and CD are straight lines. B is the midpoint of line CE.

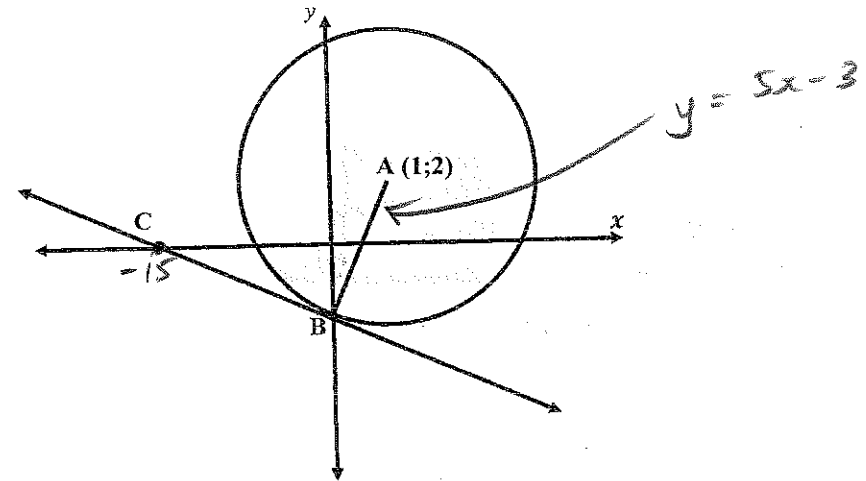


- 1.1 Find the length of AC. Leave your answer in surd form. (3)

- 1.2 Find the coordinates of B, the midpoint of EC. (2)
 1.3 Find the equation of AB (4)
 1.4 Find the gradient of EC (2)
 1.5 Show that ABCD is a trapezium. (4)
 [15]

Question 2 (10 marks)

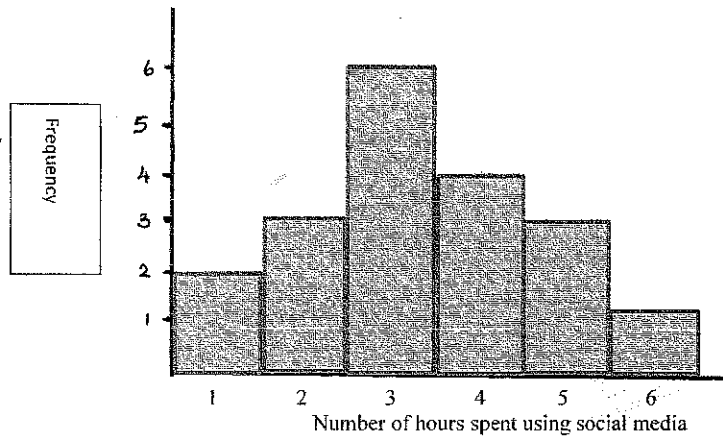
A circle is drawn on the Cartesian Plane with centre A (1;2). B is a point on the circumference of the circle. The equation of line AB is $y = 5x - 3$. C is a point on the x-axis with the coordinates (-15;0)



- 2.1 What are the coordinates of B? (2)
 2.2 What is the gradient of line BC? (2)
 2.3 Is BC a tangent to the circle at point B? Show all calculations and reasoning. (6)
 [10]

Question 3 (To be completed on Answer Sheet 1) (13 marks)

Grade 11 learners were asked how many hours per day they spend using social media during the holidays. Their responses are drawn onto the histogram below. Use the histogram to answer the questions that follow.



- 3.1 What is the range of responses? (1)
 - 3.2 How many learners were surveyed? (1)
 - 3.3 Complete the frequency table on the diagram sheet. (2)
 - 3.4 What is the mean number of hours spent on social media by this sample of learners? (3)
 - 3.5 What is the median number of hours spent on social media. (2)
 - 3.6 Calculate the semi-interquartile range for these responses. (4)
- [13]

Question 4 (16 marks)

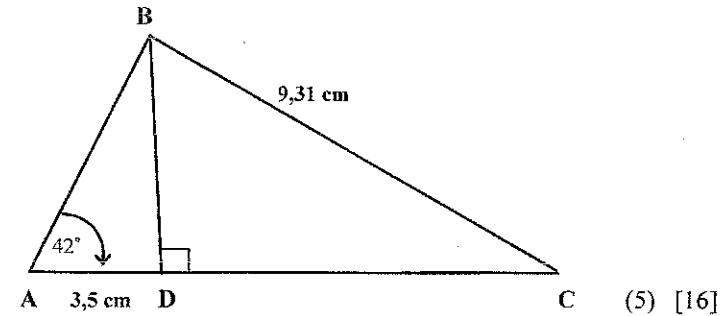
- 4.1 Find $\sin 70^\circ$ (1)
- 4.2 Solve for α : $3 \cos \alpha - 1 = 0$, $\alpha \in [0^\circ; 90^\circ]$ (2)
- 4.3 If $\tan 22^\circ = k$, find $\sin 22^\circ$ in terms of k , without using a calculator and with the aid of a suitable diagram. (3)
- 4.4 Draw the special triangles for:
 - 4.4.1 30° (1)
 - 4.4.2 45° (1)

4.4.3 90° (1)

4.5 USE THE SPECIAL TRIANGLES ABOVE and find the following WITHOUT USING A CALCULATOR.

- 4.5.1 $\tan 60^\circ$ (1)
- 4.5.2 $\cos 90^\circ$ (1)

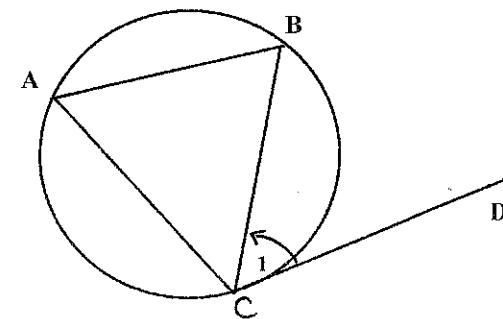
4.6 In the triangle below, $\hat{A} = 42^\circ$, $AD = 3,5$ cm and $BC = 9,31$ cm. Find the size of \hat{C} .



USE THE DIAGRAM SHEETS ATTACHED TO THE BACK OF THIS QUESTION PAPER TO ANSWER QUESTIONS 5 TO 9. REMEMBER TO ATTACH THESE SHEETS TO YOUR ANSWERS.

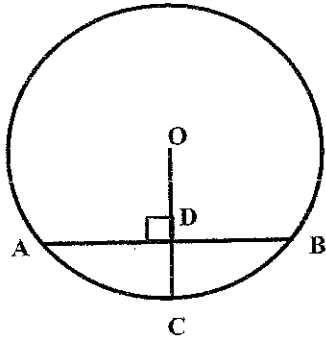
Question 5 (5 marks)

CD is a tangent to circle ABC. The point of contact of tangent CD with the circle is point C. Prove $\hat{C}_1 = \hat{A}$. (5)



Question 6 (6 marks)

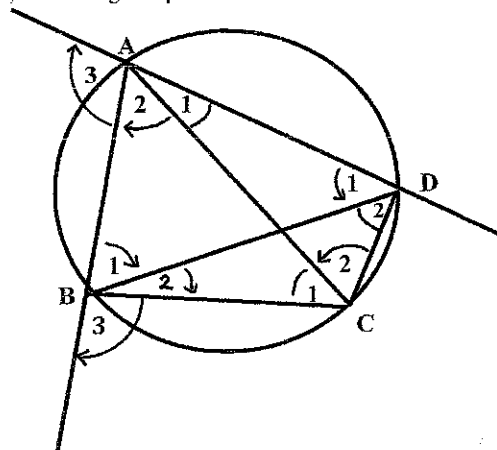
AB is a chord in circle, centre O. OD is perpendicular to AB and OD is produced to point C on the circumference of the circle. AB = 18 cm.



- 6.1 Calculate the length of DB, with reasons. (2)
 6.2 If $OD = x$ and $DC = 3$ cm, calculate the length of OC with reasons. (4)[6]

Question 7 (6 marks)

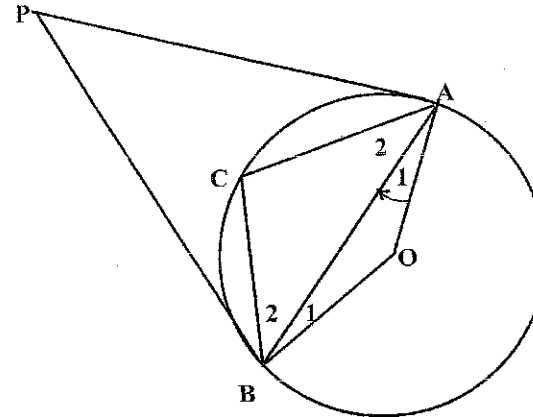
In circle ABCD below $AB \parallel CD$. $\hat{B}_3 = x$.
 Find, with reasons, 3 other angles equal to x .



(6)

Question 8 (15 marks)

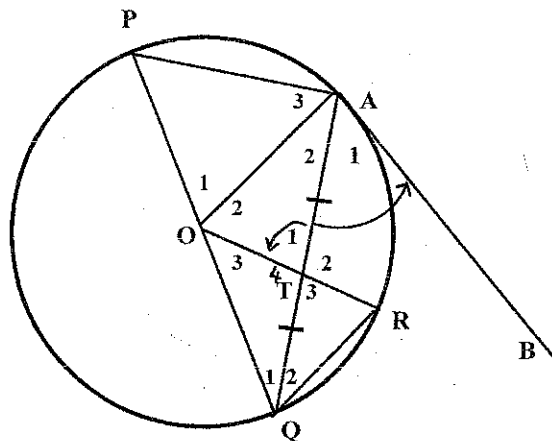
C is a point on the circumference of circle, centre O. PA and PB are tangents to the circle, meeting the circle at points A and B respectively. $\hat{A}_1 = 36^\circ$.



- 8.1 Prove that APBO is a cyclic quadrilateral. (4)
 8.2 Prove that APBO is a kite. (3)
 8.3 Find the size of \hat{P} with reasons. (4)
 8.4 Find the size of \hat{C} , with reasons. (4) [15]

Question 9 (14 marks)

In the figure A, P, Q and R are points on the circumference of the circle, centre O. AB is a tangent to the circle at A. OR and AQ intersect at T and $QT = TA$. $\hat{A}_1 = 56^\circ$



9.1 Give a reason for each statement:

9.1.1 $\hat{O}_1 \hat{A} B = 90^\circ$

(1)

9.1.2 $\hat{P} \hat{A} Q = 90^\circ$

(1)

9.2 Determine with reasons the size of each angle:

9.2.1 $\hat{A} P Q$

(2)

9.2.2 $\hat{A} O R$ (\hat{O}_2)

(4)

9.2.3 $\hat{A} Q R$ (\hat{Q}_2)

(2)

9.3 Is $PA \parallel OR$? Justify your answer.

(4)

[14]

[100 marks]