Name and Surname : ....

Grade/Class : 11/.......... Mathematics Teacher : ....

Hudson Park High School

GRADE 11
MATHEMATICS
Paper 2

Marks :

_____
100

Time : 2 hours
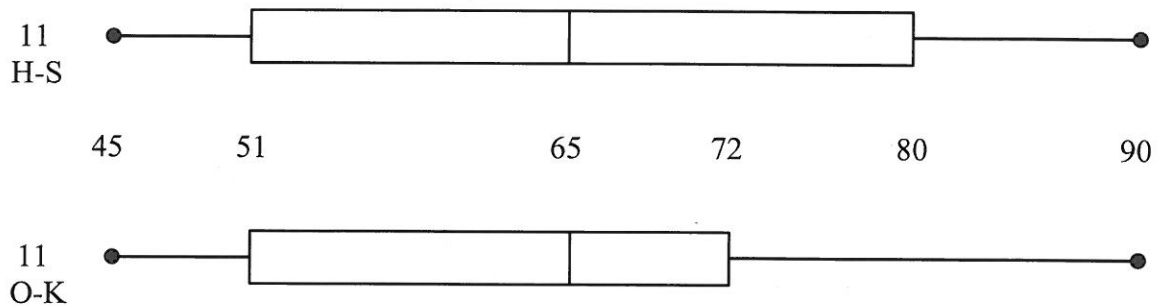Examiner : SLT

Date : 5 June 2017
Moderator(s) : FRD, PHL and GRC

INSTRUCTIONS

1. Illegible work, in the opinion of the marker, will earn zero marks.

2. Number your answers clearly and accurately, exactly as they appear on the question paper.

3. **NB** ◦ **Leave *1 line* open between each of your answers.**

4. **NB** **Fill in the details requested on the front of this Question Paper and the Answer Booklet.**
   Hand in your submission in the following manner :
   ◦ **Question Paper (on top)**
   ◦ **Answer Booklet (below)**
   *Do **not** staple your Question Paper and Answer Booklet together.*

5. Employ relevant formulae and show all working out. Answers alone may not be awarded full marks.

6. (Non-programmable and non-graphical) Calculators may be used, unless their usage is specifically prohibited.

7. Round off answers to 2 decimal places, where necessary, unless instructed otherwise.

8. If (Euclidean) Geometric statements are made, reasons must be stated appropriately.

QUESTION 1 [5 marks]

1. Two Mathematics combos, 11 H-S and 11 O-K, both taught by the same teacher and each having 30 learners, had their final Mathematics marks for the year (out of 100) represented as a box and whisker diagram, as shown below :

11 H-S					
45	51	65	72	80	90

11 O-K

1.1. What is the interquartile range for 11 H-S ? (2)

1.2. What percentage of the learners in 11 O-K achieved between
51 % and 65 % ? (1)

1.3. The teacher examined the results and commented that there was no significant difference in the performances of the two combos. Give two statistical reasons that the teacher could use to support their comment. (2)


QUESTION 2 [6 marks]

2. The heights (in metres) of a group of learners from a certain school were surveyed and summarized into the following frequency table :

Height (in m)	$1,3 \leq h < 1,5$	$1,5 \leq h < 1,7$	$1,7 \leq h < 1,9$	$1,9 \leq h < 2,1$
Frequency	24	73	16	5

2.1. State the modal height interval. (1)

2.2. Estimate the mean height of the learners. (3)

2.3. State the position of the upper quartile. (1)

2.4. In which interval will the seventh decile lie ? (1)
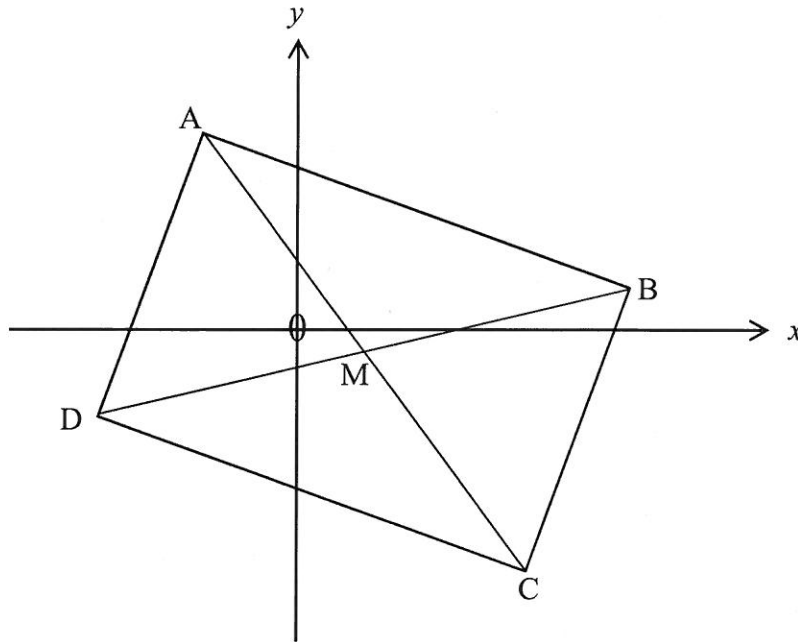
3.   AB is the diameter of the circle with centre M($-3; 2$), A($2; 5$) and C($6; -1$).
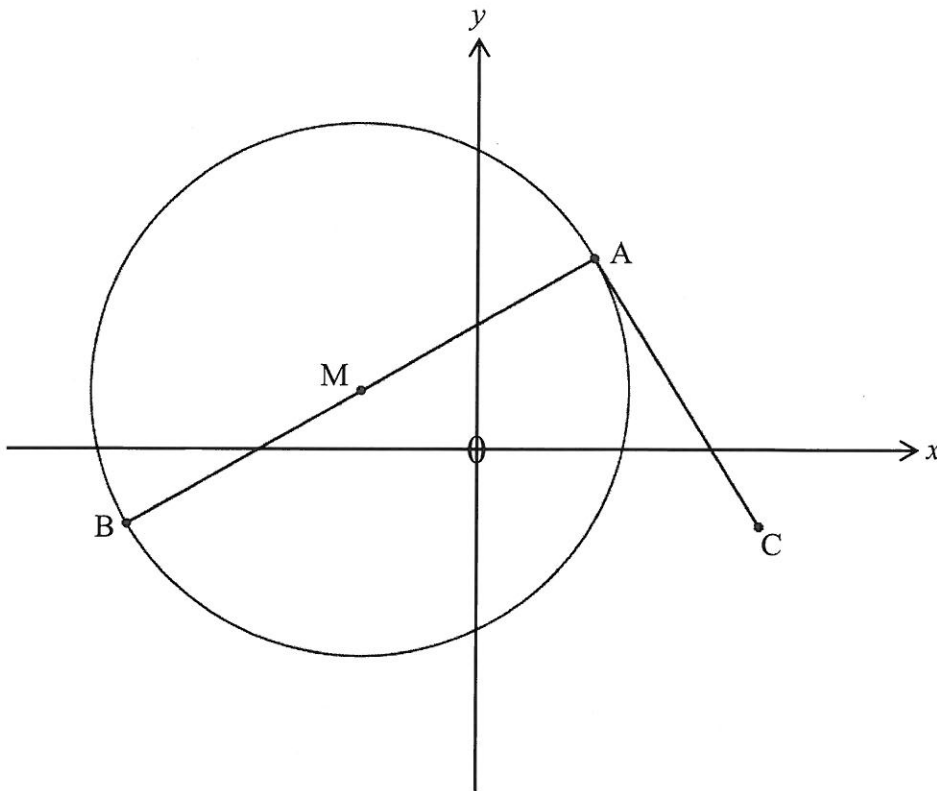
3.1.   Determine the coordinates of B.   (2)

3.2.   Calculate the gradient of AM.   (1)

3.3.   Is AC a tangent to the circle at point A ? Justify your answer.   (5)

3.4.   If M, A and D($16; d$) are collinear, calculate the value(s) of d. (3)

4.   ABCD is a rectangle whose diagonals intersect at M. A$(-2; 4)$ and C$(5; -5)$.
       The equation of BC is $y - 3x + 20 = 0$.

4.1.   What are the coordinates of M ?   (3)

4.2.   Determine the equation of AB.   (4)

4.3.   Calculate the length of DB.   (3)

QUESTION 5 [8 marks]

5.   Calculate x :

5.1. $x = \dfrac{\sin 15° + 10}{3\cos^2 25°}$ (2)

5.2. $\dfrac{x}{\sin 10,33°} = \dfrac{30,82}{\sin 50,75°}$ (1)

5.3. $15^2 = 14^2 + 10^2 - 2.14.10.\cos x$ where $x \in (0°; 90°)$ (2)

5.4. $8 - 3\tan 7(x - 20°) = \tan 80°$ where $7(x - 20°) \in (0°; 90°)$ (3)

QUESTION 6 [15 marks]

CALCULATORS MAY <u>NOT</u> BE USED IN THIS QUESTION

6.1.   Evaluate the following :

6.1.1. $\sin 45°$ <u>2</u>

6.1.2. $\cos 0°$ <u>2</u>

6.1.3. $\tan 30°$ <u>2</u>   (6)

6.2.   If : $\sin 16° - p = 0$, where $0 < p < 1$,
            determine $\tan 16°$ in terms of p.   (3)

6.3.   Given : $\tan \theta = \dfrac{4}{3}$ and $\sin \theta < 0$

6.3.1.   In which quadrant(s) is

6.3.1.1. $\tan \theta > 0$?   <u>1</u>

6.3.1.2. $\sin \theta < 0$?   <u>1</u>   <u>2</u>

6.3.2.   Now, use the given information and determine the values of x, y and r
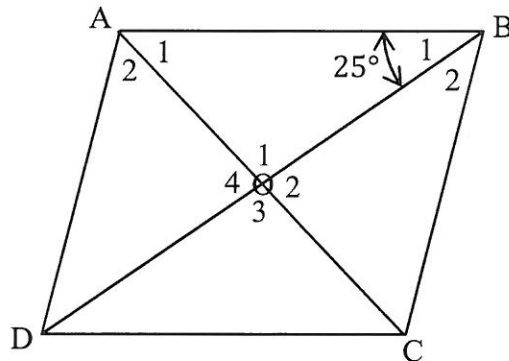   (associated with point P) in the diagram below :
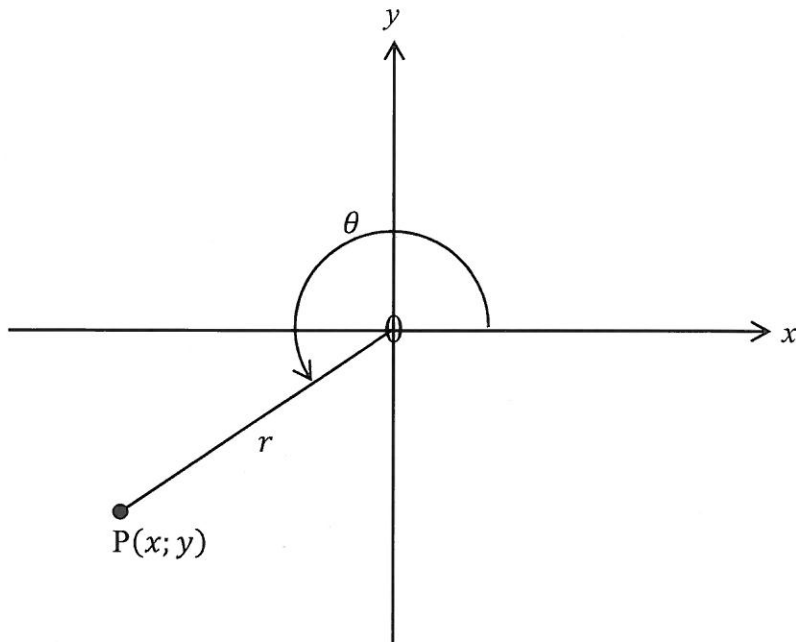
                                                                               <u>3</u>

6.3.3.   Hence, write down the value of $\cos \theta$.   <u>1</u>   (6)

IN THIS QUESTION, EUCLIDEAN GEOMETRY REASONS
DO NOT HAVE TO BE STATED IN YOUR ANSWERS.
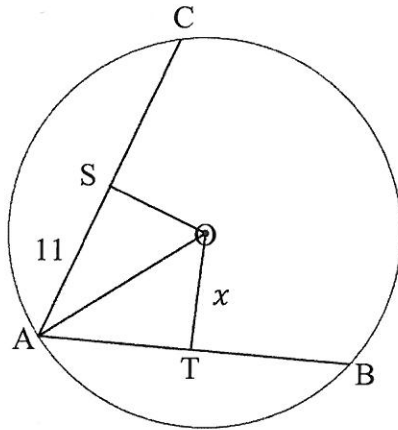
7.   ABCD is a rhombus whose diagonals intersect at O.
      BD = 8 units and $\widehat{B}_1 = 25°$.

|		
7.1.	Write down the	
7.1.1.	length of OB	1
7.1.2.	size of $\widehat{O}_1$	1 (2)
7.2.	Calculate AO.	(2)
7.3.	Determine the area of rhombus ABCD.	(2)
7.4.	Determine the sizes of	
7.4.1.	$\widehat{B}_2$	1
7.4.2.	$\widehat{A}_2$	1 (2)

QUESTION 8 [7 marks]

8.   O is the centre of the circle, $OS \perp AC$ and $OT \perp AB$, $AS = 11$ units, $AB = 18$ units and $OS = \frac{2}{3} OT$. Let $OT = x$ units.

8.1   Determine AT.   (2)

8.2.   Calculate the radius of the circle, OA.   (5)

QUESTION 9 [5 marks]

9.   AC is a tangent to the circle (at point B) and BF // CD.
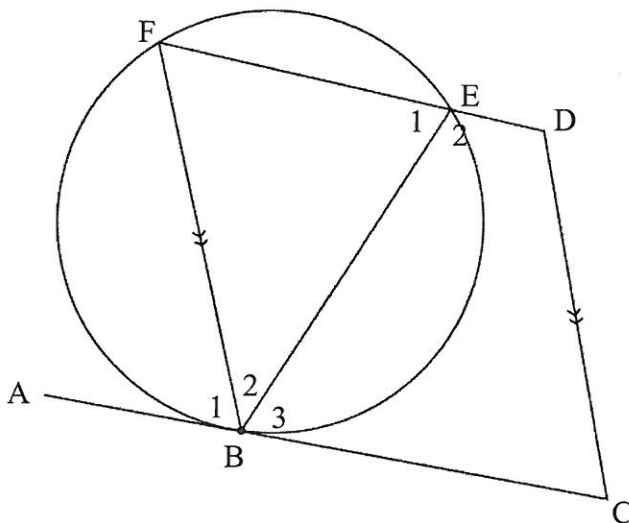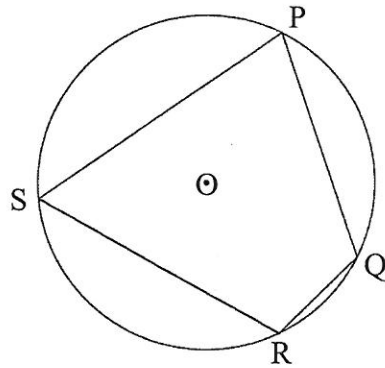

Prove that BEDC is a cyclic quadrilateral.   (5)
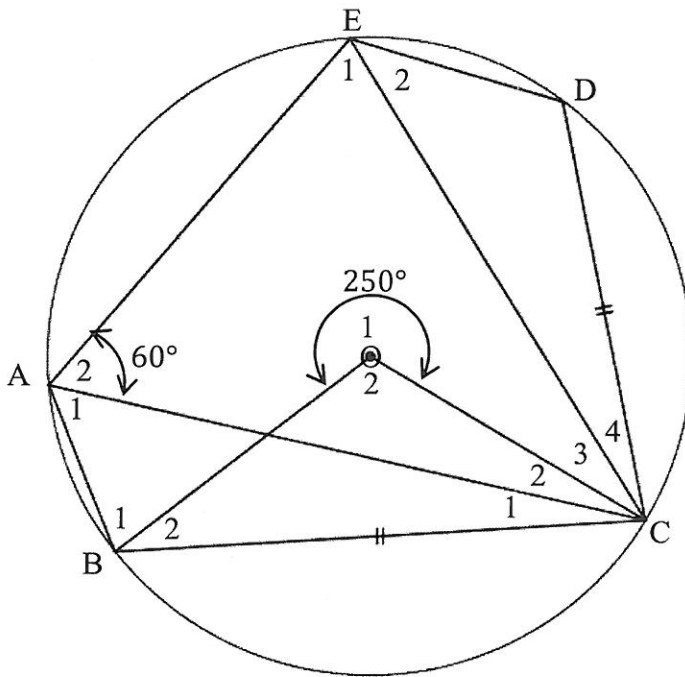
QUESTION 10 [14 marks]

10.1.   O is the centre of the circle.

Prove the theorem which states that : $\hat{S} + \hat{Q} = 180°$.   (5)

10.2.   O is the centre of the circle. $B\hat{O}C$ (reflex) = 250°, $C\hat{A}E = 60°$ and BC = CD.

10.2.   Determine

10.2.1. $\hat{D}$ 2

10.2.2. $\hat{B}_2$ 3

10.2.3. $\hat{A}_1$ 2

10.2.4. $\hat{E}_2$ 2   (9)

QUESTION 11 [11 marks]

11. Two equal circles are given. CD is the diameter of the one circle.
AB and AD are tangents to the one circle at points B and D.
$A\hat{B}D = 70°$ and $D\hat{B}F = 30°$.
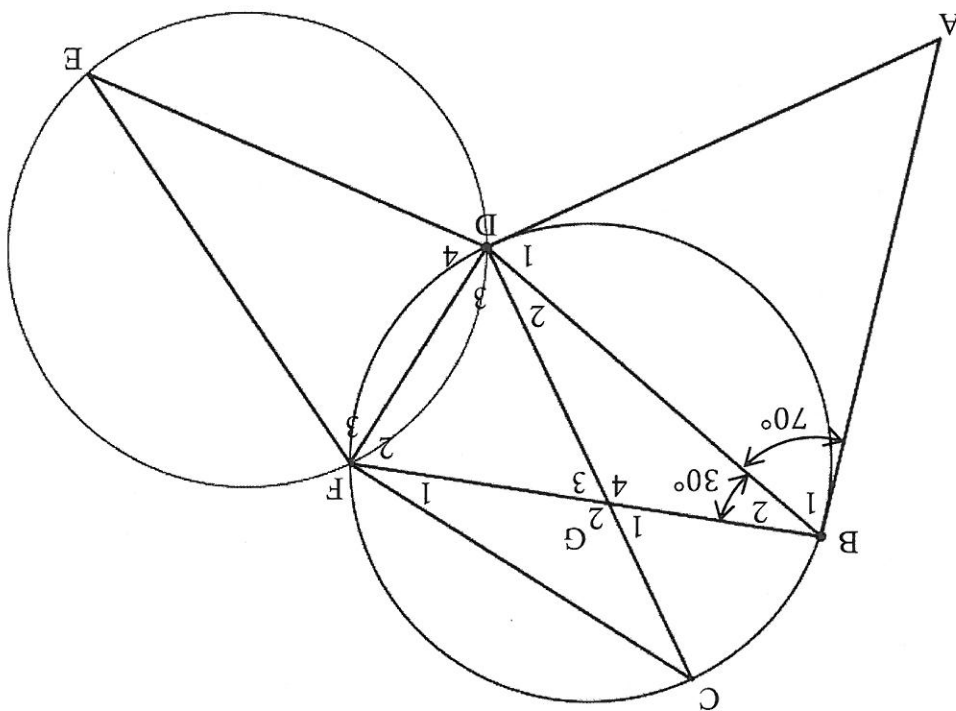
Calculate :

11.1. $\hat{A}$ (3)

11.2. $\hat{F}_2$ (2)

11.3. $\hat{F}_1$ (2)

11.4. $\hat{C}$ (2)

11.5. $\hat{E}$ (2)

TOTAL [100]