Name and Surname

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

2018

GRADE 11

MATHEMATICS

June Examination Paper 2

Marks

————
100

Time : 2 Hours

INSTRUCTIONS

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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   - Start each QUESTION at the *top of a page.*
             - Leave *2 lines* open between each of your answers.

4.   NB   Fill in the details requested on the front of this Question Paper and *HAND IN* your submission in the following manner :
             - Question Paper (on top)
             - Answer Book (below).

5.   NB   DO NOT staple your question paper to your answer book please

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

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

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

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

QUESTION 1: [20 marks]

1.1. The heights of a sample of 24 plants were measured after one year of growth and the results were recorded.

6	7	7	9	34	56	85	89
89	90	90	91	92	92	93	93
93	94	95	95	96	97	97	99

Calculate:

    1.1.1. a) the mean height of the plants   2

    1.1.1. b) the median height of the plants   1

    1.1.1. c) the interquartile range of the plants' heights   3

    1.1.2. Draw a box and whisker diagram for the above information   4

1.2. Below is a histogram showing results of a sample of 50 students and the hours spent on their cellphones on one particular day.
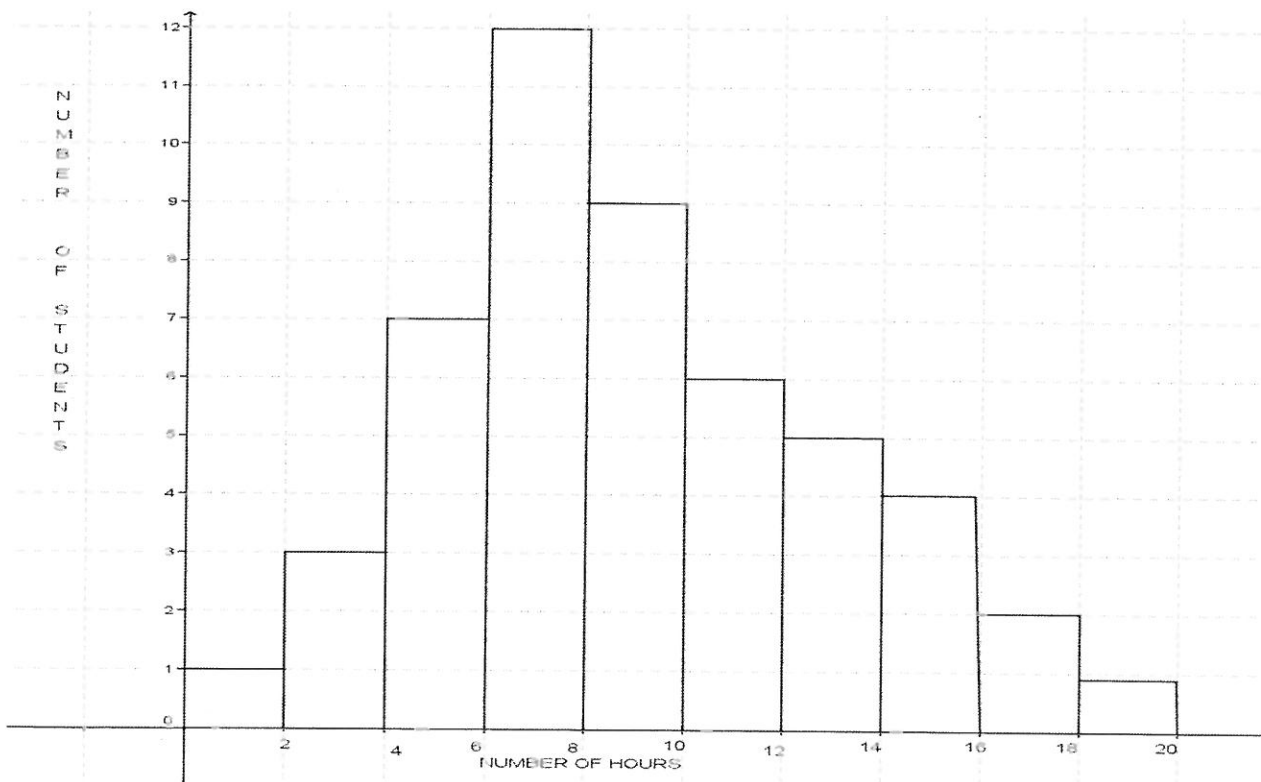
1.2.1. Estimate the range of the data?   1

1.2.2. What is the modal class?   1

1.2.3. Estimate the mean of the data. (Show all calculations)   5

1.3.   The marks below were recorded for a grade 11 maths test out of 40.

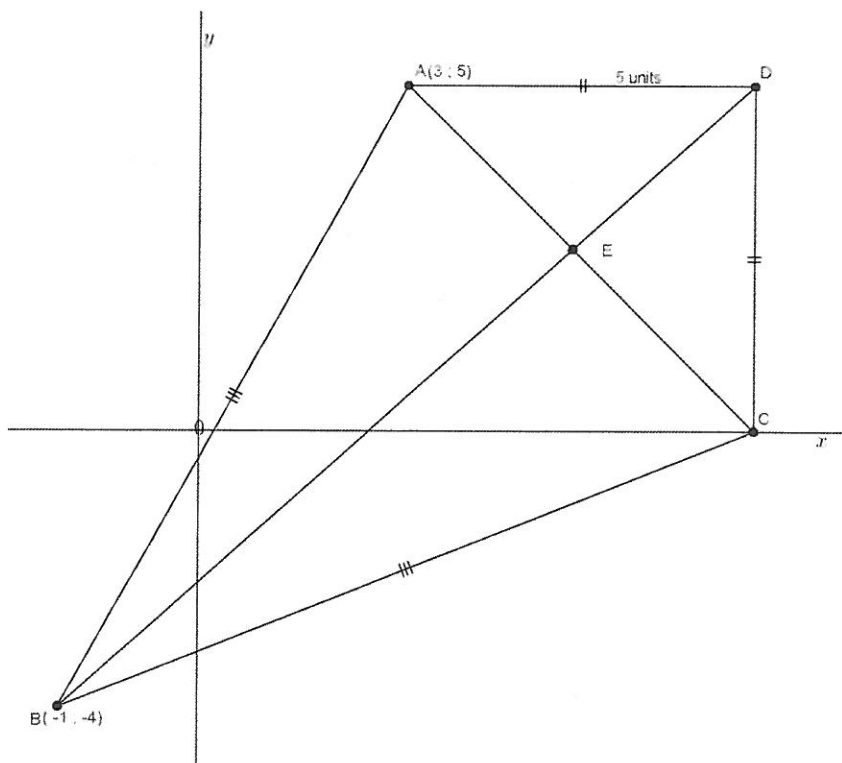| 12 | 17 | 20 | x | 30 | 34 | 29 | 12 | 35 | x | 19 | 23 |

If the average is 23,75 , determine the value of x <u>3</u>

QUESTION 2: [19 marks]

2.1. In the diagram below, ABCD is a kite with A (3 ; 5) and B (-1 ; -4).

AB = BC and AD = DC. AD is parallel to the x axis and CD is perpendicular to x axis.

The diagonals bisect at E. AD = 5 units

2.1.1. Show that the coordinates of C are (8 ; 0)   <u>1</u>
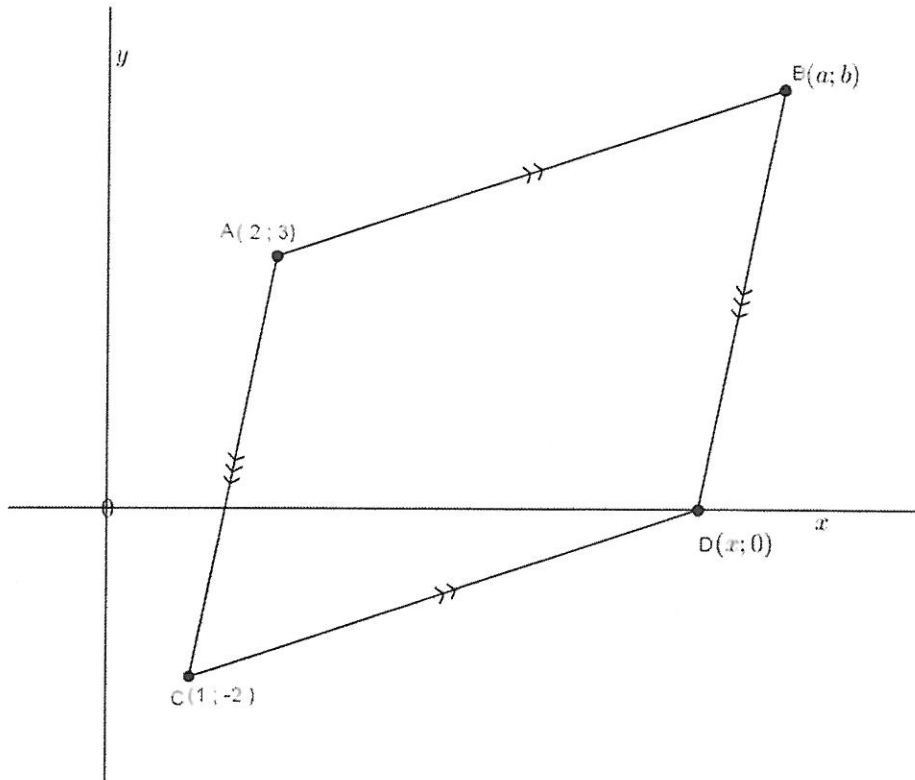
2.1.2. Write down the coordinates of point E   <u>2</u>

2.1.3. Calculate the gradient of line BD   <u>2</u>

2.1.4. Calculate the length of AB   <u>2</u>

2.1.5. Prove, using analytical geometry that AC $\perp$ BD   <u>3</u>

2.2. In the diagram below, ACDB is a parallelogram. A (2 ; 3) and C (1 ; -2) are given. D is on the x axis.

2.2.1. If the length of $CD = \sqrt{40}$, calculate the value of x.   4

2.2.   If $x = 7$

2.2.2. a)   Determine the coordinates of point B   2

2.2.2. b)   Determine the equation of line AD   3

QUESTION 3: [7 marks]

CALCULATORS MAY NOT BE USED IN THIS QUESTION

P is a point (3 ; - 4) in the Cartesian plane and OP makes an angle of ϑ with the positive x axis.

3.1.1. Represent the given information on the sketch in your answer book. Label ϑ.   2

3.1.2. Determine the length of the radius.   1

3.2.   Determine the value of:

3.2.1. $\tan \vartheta$ 1

3.2.2. $2 \sin \vartheta + 3 \cos \vartheta$ 3

QUESTION 4: [6 marks]

Solve for ϑ:

4.1. $\cos \vartheta = 0{,}673$ where $\vartheta \in [0°\,;90°]$ 1

4.2. $8 \tan \vartheta - \sin 80^0 = 0$ where $\vartheta \in [0°\,;90°]$ 2

4.3. $7 \sin (2\vartheta - 34^0) = 5$ where $2\vartheta - 34° \in [0°\,;90°]$ 3
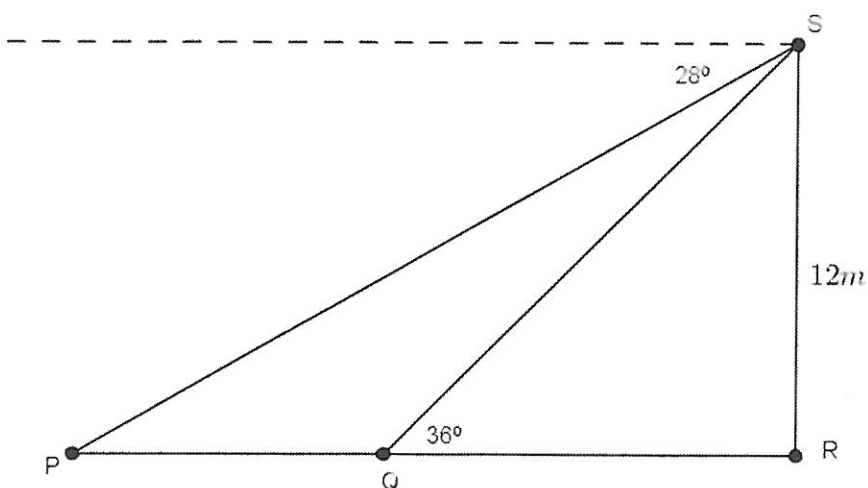
QUESTION 5: [8 marks]

CALCULATORS MAY NOT BE USED IN THIS QUESTION

5.1. Draw the diagrams used to deal with special angles of $45°\,, 60°\,, 30°\,$ and $0°$ 3

5.2. Now determine the value of $\dfrac{\tan 45° . \cos 60°}{\sin 30°} + \cos^2 0°$ 5

QUESTION 6: [6 marks]

In the sketch below, SR is a flagpole. The angle of elevation of the top of the pole from a person standing at Q is 36°. From S, the angle of depression of a person standing at P is 28°.

Determine the following:

6.1.   the size of $\hat{P}$ 1

6.2.   The distance between the people, ie. PQ   5

QUESTION 7: [7 marks]

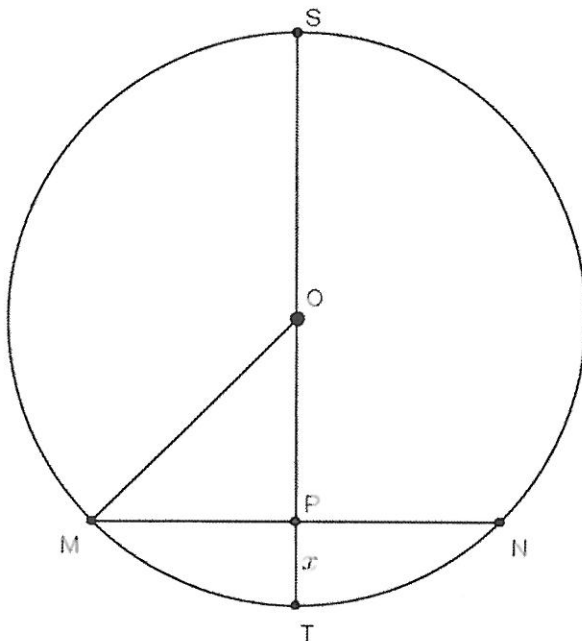7.1. Complete the following theorem. Write down only the correct words.

The line drawn from the center of the circle 7.1.1. ....

to the chord, will 7.1.2. .... the chord $\quad$ 2

7.2. In the diagram MN is a chord of circle center O. Diameter ST is perpendicular to MN at P.

PT = x and PS = 4. PT

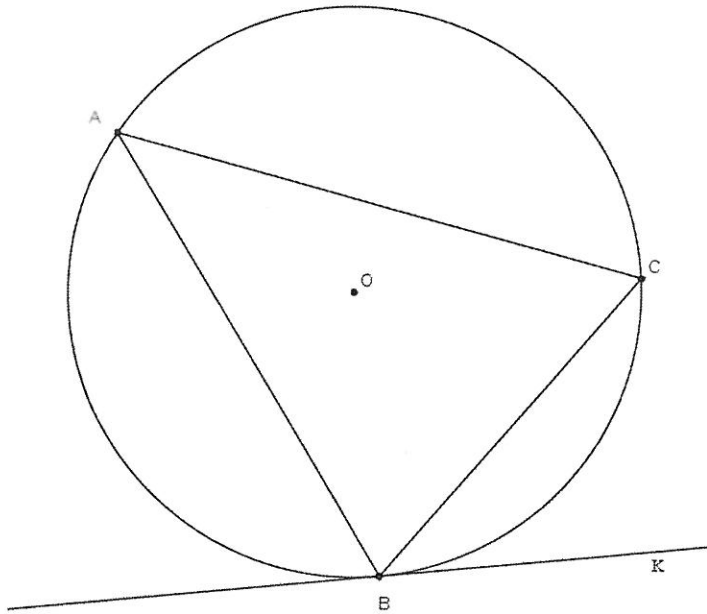Determine the length of MN in terms of x. $\quad$ 5

QUESTION 8: [16 marks]

8.1. BK is a tangent to the circle center O at point B.
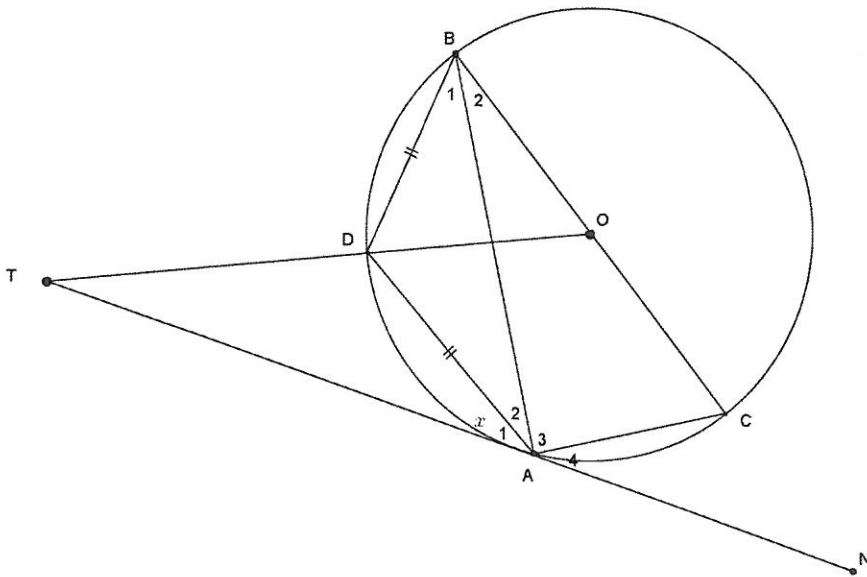
Prove the THEOREM that states that $K\hat{B}C = B\hat{A}C$ 4

8.2. In the diagram below, TAN is a tangent to circle center O. Diameter BOC // DA.

TDO is a straight line. BD = DA.

8.2.1. If $\widehat{A_1} = x$, determine 4 other angles that are equal to x 8

8.2.2. Hence, or otherwise, calculate the value of x 4
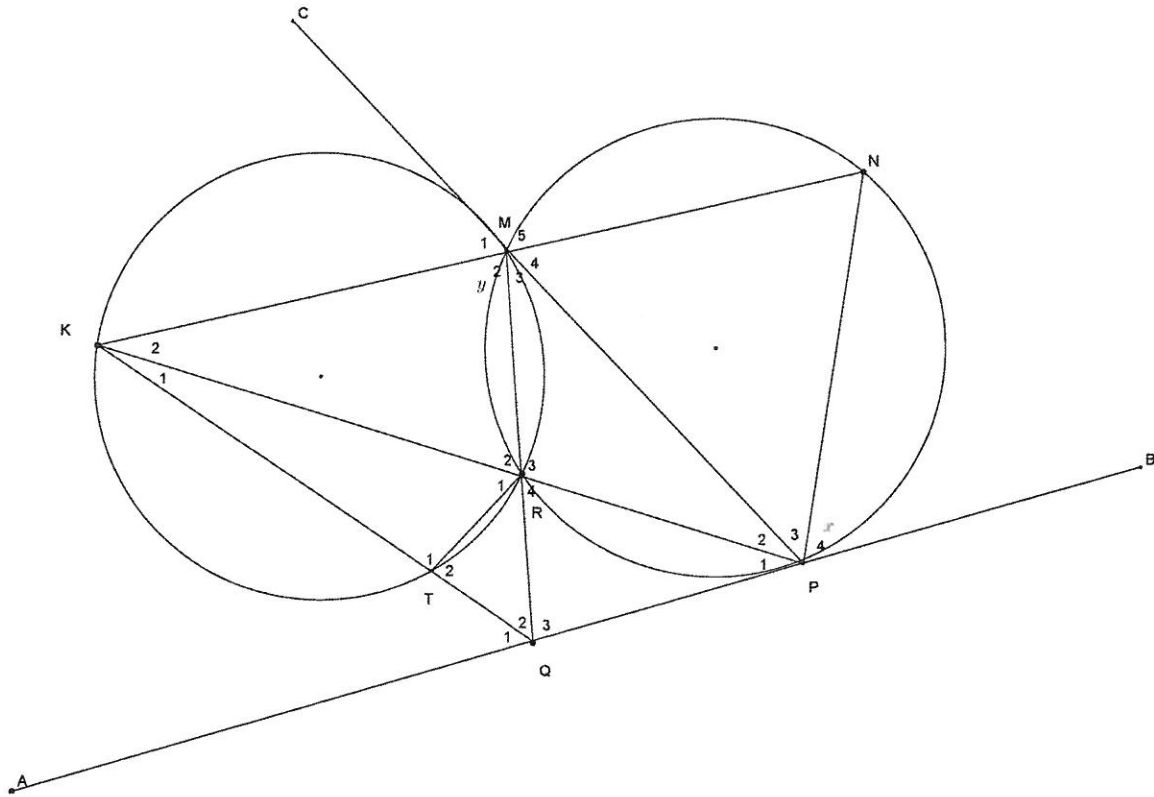
In the diagram below, two circles intersect at M and R.

AB is a tangent to one circle at P and CP is a tangent to the other at M.

Let $P_4 = x$ and $M_2 = y$

Prove, giving reasons:

9.1. KN // AB   6

9.2. PM = PN   2

9.3. PQ is a tangent to circle QRT   3