



MACHAKOS UNIVERSITY

University Examinations 2019/2020

SCHOOL OF PURE AND APPLIED SCIENCES

DEPARTMENT OF MATHEMATICS, STATISTICS AND ACTUARIAL SCIENCE

SECOND YEAR SECOND SEMESTER EXAMINATION FOR

DIPLOMA IN BUILDING AND CIVIL ENGINEERING

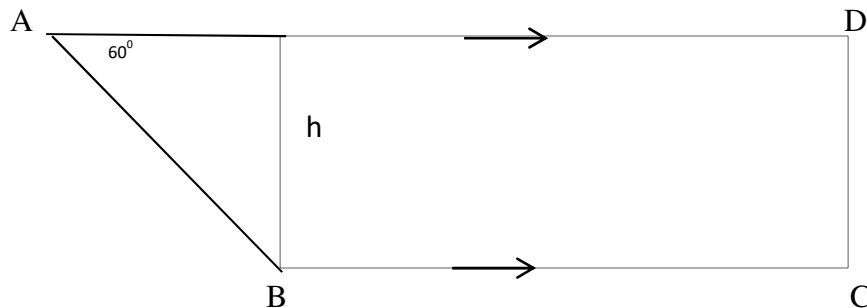
MATHEMATICS

DATE: 29/10/2020

TIME: 11:30 – 2:30 PM

INSTRUCTIONS: Answer Question One and Any Other Two Questions

1. a) The arch length of a circle with radius 14cm is 11cm. find the angle subtended at the Centre of the arc. (4 marks)
- b) A figure ABCD is a trapezium in which AD is parallel to BC. Given that AD=25cm, BC =15cm and angle DAB =60°, calculate the area of the trapezium. (4 marks)



- c) The first term of an AP is -3 and the last term is 41. The sum of the term is 228. Calculate the number of terms in the AP and the common difference. (5 marks)
- d) The third term of a G.P is 12 and the fifth term is 48. Find the sum of the first 8 terms of the G.P given that the G.P is increasing (5 marks)
- e) Using substitution method solves the following simultaneous equation:

$$2m-5n=1$$

$$3m+4n=13$$

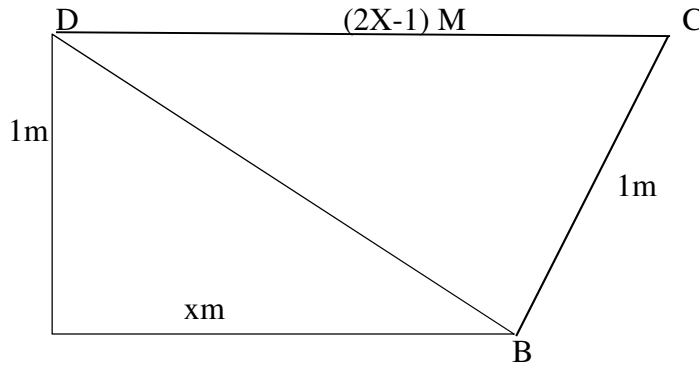
f) Without using mathematical tables or calculator, evaluate

$$\frac{\tan 30^\circ \cdot \tan 60^\circ}{\sin 60^\circ \cdot \cos 30^\circ}$$

$$\sin 60^\circ \cdot \cos 30^\circ$$

(4 marks)

g) The figure below represents a plot of land ABCD such that AB=85M, BC=75M, CD=60M, DA=50M and angle ACB=90°



Determine the area of the plot in hectares correct to 2 decimal places

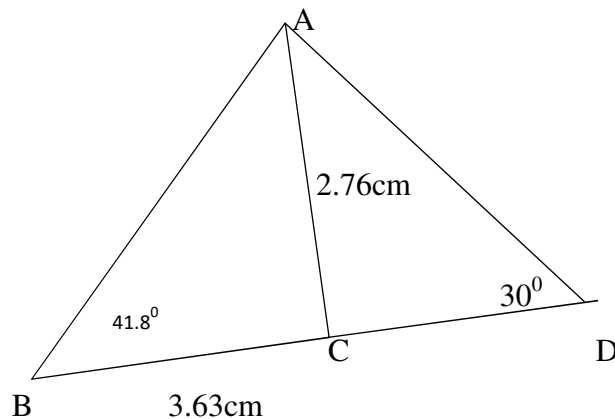
(4 marks)

2. a) solve the equation :

(5 marks)

$$\cos^2 \phi + \sin \phi + 1 = 0$$

b) Calculate the length AD in the figure below given that BC=3.63CM, AC=2.76cm, angle B=41.8° and angle D=30°



c) Use the data below to evaluate

2, 4, 6, 8, 11, 13.

(5 marks)

i. Mean

ii. Median

iii. Mode

d) Solve the equation

(5 marks)

$$7p-2=-2p^2$$

3. a) complete the table below for the function

$$Y=X^2-6X+7$$

X	1	2	3	4	5	6
X ²						
-6X						
+7						
Y=X ² -6X+7						

- b) On the grid provided draw the graph of $Y=X^2-6X+7$ (booklets with grids required)
 For $0 \leq X \leq 6$ and use it to estimate the roots to the equation (8 marks)
 $x^2-6x+7=0$
- c) Use the graph above to solve the equation (3 marks)
 $X^2-7x+9=0$
- d) Solve the equation (5 marks)
 $(a+1)^2+3a-1=0$
4. a) The third, fourth and fifth terms of a G.P are $t+4$, $t+10$ and $t+20$ respectively.
 Determine the (11 marks)
- i. Common ratio
 - ii. First term
 - iii. Sum of the first 12 terms
- b) The fifth and eleventh terms of an arithmetic progression are 27 and 45 respectively.
 Determine the;
- i. 30th term
 - ii. Sum of the first 16 terms (9 marks)