



DEPARTMENT OF MATHEMATICS AND APPLIED MATHEMATICS

MODULE	MAFT0B1 MATHEMATICS FOR TEACHERS	
CAMPUS	APK	
EXAM	NOVEMBER 2021	WRITTEN SECTION

DATE:	8 NOVEMBER 2021
ASSESSOR:	MS. S. RICHARDSON
INTERNAL MODERATOR:	DR T MUDZIIRI-SHUMBA
DURATION:	1 HOUR
MARKS:	30
NUMBER OF PAGES:	2 + 2

PLEASE READ THE FOLLOWING INSTRUCTIONS CAREFULLY:

1. READ ALL THE QUESTIONS CAREFULLY (FROM START TO FINISH) BEFORE ATTEMPTING TO SOLVE THEM.
2. ANSWER ALL QUESTIONS.
3. SHOW ALL CALCULATIONS AND MOTIVATE ALL ANSWERS.
4. YOU MUST DOWNLOAD THE QUESTIONS YOURSELF AND ARE NOT ALLOWED TO OBTAIN THEM BY ANY OTHER MEANS THAN VIA BLACKBOARD. YOU ARE NOT ALLOWED TO SHARE YOUR DOWNLOADED COPY OF THE QUESTIONS WITH ANY OTHER STUDENT. YOU MUST COMPLETE AND SUBMIT THE TEST ALLOCATED TO YOU.
5. YOU WILL ONLY BE ALLOWED 3 OPPORTUNITIES TO UPLOAD A FILE. THE LAST ONE UPLOADED WILL BE MARKED. PLEASE MAKE SURE THAT YOU SELECT THE CORRECT FILE.
PLEASE SUBMIT A SINGLE PDF FILE IN WHICH ALL PAGES HAVE THE SAME ORIENTATION.
PHOTO FILES AND FILES THAT ARE SIDEWAYS WILL NOT BE MARKED.
6. ABSOLUTELY NO TEAMWORK OR EXTERNAL ASSISTANCE IS ALLOWED. IF THERE IS ANY INDICATION THAT YOUR WORK RESEMBLES ANOTHER STUDENT'S WORK, OR IS NOT YOUR OWN WORK, THE CASE WILL BE SENT FOR ANALYSIS AND A DISCIPLINARY HEARING AND POSSIBLE EXPULSION MAY RESULT.
7. THE TEST IS OPEN-BOOK, SO YOU MAY CONSULT YOUR TEXTBOOK, SLIDES, VIDEOS ETC.
8. PLEASE DO NOT LEAVE IT UNTIL THE LAST MINUTE TO START WORKING ON THE TEST. IF YOU DO, YOU MAY NOT HAVE ENOUGH TIME TO COMPLETE IT. PLEASE NOTE THAT NO EXTENSIONS OR LATE SUBMISSIONS WILL BE GRANTED.
9. PLEASE ALLOW SOME TIME FOR UPLOADING AND SUBMITTING YOUR SOLUTIONS. THAT IS, DO NOT LEAVE IT TO THE LAST MINUTE TO SUBMIT IN CASE YOU FIND THAT YOU HAVE CONNECTIVITY ISSUES.
10. GOOD LUCK!

Question 1 [7]

In the diagram, circle O passes through F, S, H and G.

- DF and DS are tangents to the circle at F and S respectively.
- $DF \parallel SG$
- FOH intersects SG at R.

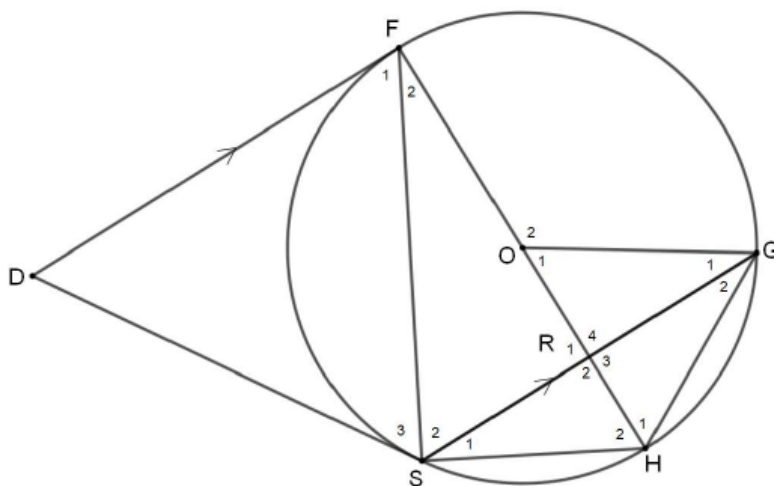
a. Prove that $\triangle DSF \parallel \triangle OHG$

(4)

b. Prove that

$$2DF = \frac{SF \times FH}{HG}$$

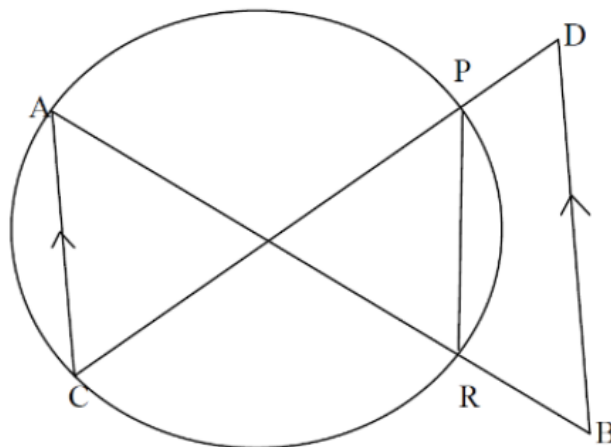
(3)



Question 2 [3]

In the diagram A, C, P and R are points on the circle. AR is extended to B and CP is extended to D such that $AC \parallel DB$.

Prove that PRBD is a cyclic quadrilateral.



Question 3 [6]

a. On the same set of axes, sketch the curves of functions f and g defined by $f(x) = 4 \cos x$ and $g(x) = \sin x$ for $x \in [0; 2\pi]$.

(3)

b. What is the amplitude of $-2f(x)$?

(1)

c. Give the x-values for which $\frac{f(x)}{g(x)}$ is undefined.

(2)

Question 4 [9]

- a. If $\sin 43^\circ = A$ and $\cos(90^\circ - k) \cos 23^\circ + \cos 246^\circ \sin 23^\circ = B$, then find the value of k when $A = B$ and $0^\circ \leq k \leq 90^\circ$. (4)
- b. Given: $5 \tan x + 4 = 0$, $x \in [\pi; 2\pi]$
- Use a diagram to represent the information. (1)
 - Evaluate $2 \cos(\pi - x)$ (2)
 - Evaluate $\sin^2\left(x - \frac{\pi}{2}\right) - \sin^2 x$ (2)

Question 5 [5]

In the diagram, $\angle K\hat{L}N = \alpha$, $\angle K\hat{N}L = \beta$,
 $KL = x$ metres and $KN = y$ metres.
 Also $KL \perp LM$ and $NM \perp LM$.

- a. Prove that:

$$MN = \frac{x \sin \alpha \cos \beta}{\sin(\alpha + \beta)}$$

(3)

- b. Find the area of $\triangle KLN$ in terms of x and y .

(2)

