

Students Name:

School Name:..... Index Number

P425/2
PURE MATHS
PAPER 2
3HOURS
JULY/AUGUST 2025



HES MOCK EXAMINATIONS 2025

UGANDA ADVANCED CERTIFICATE OF EDUCATION

**APPLIED MATHS
PAPER 2
3 HOURS**

INSTRUCTIONS

- *Answer all eight questions in section A and any five in section b*
- *Begin each answer on a fresh sheet of paper*
- *In numerical work take acceleration due to gravity $g=9.8\text{ms}^{-2}$*

SECTION A

1. A stone projected at an angle α to the horizontal with speed, μms^{-1} just clears a vertical wall 4m high and 10m from the point of projection when travelling horizontally. Find the;
 - (i) Angle of projection
 - (ii) Time taken to reach that point (5 marks)

2. An electronic scale is corrupted such that the actual weights of 30g and 60g are recorded as 40g and 65g respectively. Find;
 - (i) Estimated weight which is one and a half times the actual weight.
 - (ii) Reading of the device when unloaded (5 marks)

3. A particle executing simple Harmonic motion about a point O takes 3 seconds to move from a point P 4m on one side from O to a point Q 4m on the opposite side of O. from a point O it takes 2 more seconds to reach the extreme end. Determine the amplitude of oscillation of the particle. (5 marks)

4. It is known that events A and B are independent, show that events A^1 and B^1 are also independent hence, evaluate the probability that one and only one of the events A and B occurs given that $P(A) = \frac{1}{3}$ and $P(B) = \frac{3}{5}$ (5 marks)

5. The table below shows the temperature of patients recorded in a certain week.

Temperature	10-15	15-20	20-30	30-50	50-55	55-60
Frequency density	1	2.4	3.0	2.0	2.2	0.2

Calculate the mode and average temperature

6. Two forces of magnitude 12N and 9N act on a particle while inclined at 60° to each other. What angle does the resultant force make with 9N force? (5 marks)

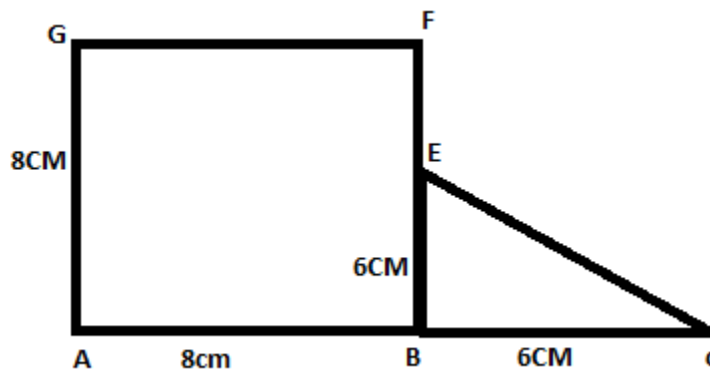
7. The table below shows the adjudication ranks for two competing camps in 8 items.

Items	A	B	C	D	E	F	G	H
Paul	3	1	4	5	8	2	6	7
peter	2	4	6	8	3	1	5	7

Calculate the correlation co-efficient between the judgments of the two adjudication and hence comment on your result at 1% level of significance (5 marks)

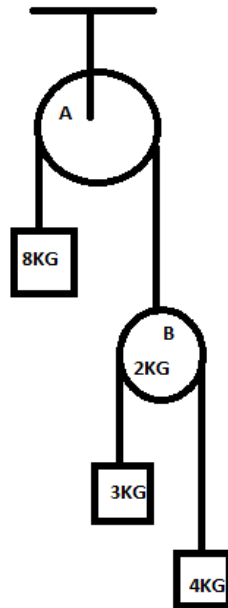
8. The number of cars accommodated in a parking lot in a night is uniformly distributed with an average of 10 and a variance of $\frac{25}{3}$. Find the probability that on a particular night, more than 8 cars are accommodated. (5 marks)
9. a) The random variable X has a normal distributed with mean 20 and standard deviation 4, find the value of d such that $P(20 < x < d) = 0.4332$.
- b) The length of certain trees in a given forest were normally distributed with a standard deviation of 5.5m. A sample of 100 such trees checked on a particular day had a mean length of 5.6m. Determine;
- (i) A 97.5% confidence interval for the mean length of all such trees in the forest.
- (ii) The probability that the trees were of mean length between 5.4m and 5.8m. (12 marks)
10. a) Using the trapezium rule, estimate $\int \frac{1}{\sqrt{1+\cos x}} dx$ for $0 \leq x \leq \frac{\pi}{2}$ correct to 3 decimal place.
- b) Determine the percentage error made in your estimation in a) above. (12 marks)
11. a) The quantities a and b were measured with errors Δa and Δb respectively show that the percentage error in calculating $Z = a\sqrt{b}$ is $\left(\left| \frac{\Delta a}{a} \right| + \frac{1}{2} \left| \frac{\Delta b}{b} \right| \right) \times 100$
- b) Given that a =2.5 and b=0.16 were estimated with percentage errors of 4 and 5 respectively, calculate the absolute error in evaluating $a\sqrt{b}$.
12. a) Show that the root of the equation $f(x) = \ln x - \sin x - 2 = 0$ lies between 3 and 4.
- b) By using the Newton Raphson method, find the root to 2 decimal places.
13. a) A pigeon is released from a point which is at a distance of 80m on a bearing of 300° from a shooter. The pigeon travels with a constant speed of 40ms^{-1} on a bearing of 050° . Given that as soon as the pigeon is released, the gun is fired and the bullet has a speed of 200ms^{-1}

- a) Determine the direction in which the gun must be fired so as to hit the pigeon.
- b) Find how long it takes to bullet to hit the bird.
14. A container contains two boxes A and B. box A contains 6 blue counters and 4 red counters while box B contains 4 blue counters and 3 red counters. A box is selected and two counters are removed from the box one at a time without replacement, if box A is thrice as likely to be picked as B;
- a) Find the probability ;
- That the last counter chosen is red, given that the box B was chosen.
 - Of getting at most one blue counter.
- b) Construct a probability distribution table for red counters and use it to find the;
- Mean
 - $\text{Var}(2x+5)$
15. The diagram shows a uniform square ABFG and an isosceles triangle BCE joined together.



- a) Find the center of gravity of the composite body.
- b) If the body is suspended freely at G, determine the angle AG makes with the horizontal.

16. The figure shows a light inextensible string passing over a smooth fixed pulley A to one end of which is attached a mass of 8kg and to the other end is attached pulley B of mass 2kg. Over B passes a second light inextensible string which carries masses of 3kg and 4kg its free ends.



The system is released from rest. Determine the;

- a) Acceleration of the movable pulley, 3kg mass and 4kg mass
- b) Tensions in the strings

END