

- e) The state of inspection agency announced that last semester, of all cars inspected, 12% were rejected for faulty brakes, 8% were rejected for defective tyres and 4% were faulty brakes and defective tyres. Find the percentage of cars rejected due to faulty brakes or defective tyres. (4 marks)
- f) Given $\tan \theta = \frac{12}{5}$, find $\sin \theta$, and $\cos \theta$ (4 marks)
- g) Use binomial theorem to expand $(3x - y)^4$ (5 marks)
- h) Solve the equation $M = Q - 5 \log\left(\frac{d}{10}\right)$, calculate d if $M=15$ and $Q=5$. (4 marks)

QUESTION TWO [20 marks]

- a) Prove that an empty set is a subset of any set. (3 marks)
- b) Let $U = \{a, b, c, d, e, f, g, h\}$ be the universal set, $A = \{a, b, h\}$, $B = \{c, d, g, h\}$ and $C = \{a, b, e, f, h\}$. (7 marks)
- $A \cap B$
 - $A \cup B \cup C$
 - A^c
 - $Card(B)$
 - $P(A)$
- c) Given A and B are two events so that $P(A) = \frac{2}{3}$, $P(A \cup B) = \frac{3}{4}$ and $P(A \cap B) = \frac{5}{12}$. Find $P(B)$. (3 marks)
- d) In a survey of 120 people, it was found that 65 read newsweek magazine, 42 read fortune and 45 read time. Out of the above population, it was realized that 20 people read both newsweek and time, 25 read both newsweek and fortune, 15 read time and fortune while 8 read all three magazines.
- Represent the above information using Venn diagram. (3 marks)
 - Find the number of people who read atleast one of the three magazines (2 marks)
 - Fill in the correct number of people in each of the regions of the venn diagram where N, T and F denote the set of people who read newsweek, time and fortune respectively. (2 marks)

QUESTION THREE [20 marks]

- a) The first three terms of an infinite geometric progression are 16, 12 and 9. Write down the common ratio and find the sum of the terms of the geometric progression. (4 marks)
- b) Evaluate 5C_3 and 8P_4 (4 marks)
- c) Use binomial expansion to write down the first four terms in ascending powers of x $(2 - 3x)^7$ and evaluate the coefficient of x^4 in the above expansion. (5 marks)
- d) Prove $\frac{\cos \theta}{1 - \sin \theta} - \frac{1}{\cos \theta} = \tan \theta$ (4 marks)
- e) Simplify $\frac{5!}{2} + \frac{4!}{3}$ (3 marks)

QUESTION FOUR [20 marks]

- a) It is known $P(X) = \frac{1}{2}$ and $P(Y) = \frac{1}{4}$. Given X and Y are mutually exclusive. Find (6 marks)
- $P(X \cup Y)$
 - $P(X \cap Y)$
 - $P(X \cap Y)^c$
- b) Prove that $\sin^2 \theta + \cos^2 \theta = 1$ (4 marks)
- c) Given $n-2$, n , $n+3$ are three consecutive terms of geometric progression. Find n and the next one term. (3 marks)
- d) How many different committees of seven people can be chosen from ten people if three people qualify for chairmanship. (4 marks)
- e) Solve $\log(x - 2) = 6.6064$. (3 marks)

QUESTION FIVE [20 marks]

- a) Jamila starts part time job on a salary of Kshs. 90,000 per year and increases by an annual increment of ksh. 10,000. Assuming, apart from increment, Jamila does not have any other increment. Find (6 marks)
- Her salary in the 10th year
 - The length that she has been working when her total earning shall be Kshs. 1,000,000.
- b) Find the real solution of: $2x^2 - 3x + 1 = 0$ (5 marks)
- c) Use logarithms to compute (5 marks)
- $$\frac{43.68(13.8)^3(0.00128)}{(3.142)^{954}}$$

d) Convert 270° and 125° into radian (2 marks)

e) Convert $\frac{7\pi}{4}$ and $\frac{5\pi}{3}$ radians into degrees (2 marks)