

S.6 APPLIED MATHEMATICS PAPER 2 REVISION QUESTIONS

1. A body of mass 10 kg rests on a smooth horizontal table. Horizontal forces of magnitude $2\sqrt{3}N$, $16N$, $5N$ and $15N$ act on the body on the bearings of 030° , 120° , 000° and 270° respectively. Find the resultant force on the body and the magnitude of the acceleration.
2. A vehicle traveling on a straight horizontal track joining two points A and B accelerates at a constant rate of 0.25 ms^{-2} and decelerates at a constant rate of 1 ms^{-2} . It covers a distance of 2.0 km from A to B by accelerating from rest to a speed of $v \text{ ms}^{-1}$ and traveling at that speed until it starts to decelerate to rest.
 - (a) Express in terms of v the times for acceleration and deceleration.
 - (b) Given that the total time for the journey is 2.5 minutes, find a quadratic equation for v and determine v .
3.
 - (a) Given that A and B are two independent events such that $P(A) = 0.64$ and $P(A \cup B) = 0.80$, find : (i) $P(B)$ (ii) $P(A \cup B')$.
 - (b) A bag contains 5 red beads, 3 blue beads, and 2 yellow beads. Two beads are drawn from the bag, one after the other, without replacement. Find the probability of drawing:
 - (i) two red beads.
 - (ii) one blue and one yellow bead.
 - (iii) beads of same colours.Construct a probability distribution for the number of red beads drawn and find the expected value.
4. During winter a family requests bottles of milk everyday, and they are left on the door steps. The probability distribution of X, the number of bottle tops removed on a given day is given by

$$f(x) = \begin{cases} kx & : x = 1, 2, 3, 4, 5 \\ k(10 - x) & : x = 6, 7, 8, 9 \end{cases}$$

- (i) Find the expected number of bottle tops removed on any given day.
(ii) Find $\text{Var}(2X - 3)$.
5. (a) Two events A and B are such that $P(A) = 0.20$, $P(A' \cap B) = 0.22$ and $P(A \cap B) = 0.18$. Find : (i) $P(A \cap B')$ (ii) $P(A \cup B)'$.
- (b) Soldiers A, B and C each fire one shot at a target. The probability that A will hit it is $\frac{1}{5}$, B hits it is $\frac{1}{4}$ and C hits it is $\frac{1}{3}$. If they fire together, calculate the probability that:
- (i) all the soldiers' shots hit the target,
(ii) soldier B's shot hits the target,
(iii) exactly two shots hit the target,
(iv) at least one shot hits the target.
6. (a) Two events are such that $P(A) = 0.45$, $P(A' \cap B) = 0.36$ and $P(A \cap B) = 0.25$. Find : (i) $P(A \cap B')$ (ii) $P(B)$ (iii) $P(A \cup B)'$.
7. (a) Use the trapezium rule with five sub-intervals to find the following correct to three decimal places: (i) $\int_1^2 e^{-2x} dx$ (ii) $\int_0^1 \frac{1}{1 + \sin x} dx$.
- (b) The table below shows the cost y in shillings for hiring a motorcycle for a distance x kilometers.
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|---|------|------|------|------|
| x | 10 | 20 | 30 | 40 |
| y | 2800 | 3600 | 4400 | 5200 |
- Use the linear interpolation or extrapolation to find:
- (i) the cost of hiring the motorcycle for a distance of 45 km,
(ii) the distance travelled if one pays sh. 4000.