

Paper:	MATHEMATICS/APPLIED MATHEMATICS
Set Name:	SET 32
Exam Date:	30 Aug 2022
Exam Shift:	2
Language:	English

Section:	COMPULSORY
Item No:	1
Question ID:	481321
Question Type:	MCQ
Question:	Let A and B be two non zero square matrices and AB and BA both are defined. It means
A:	No. of columns of A \neq No. of rows of B
B:	No. of rows of A \neq No. of columns of B
C:	Both matrices (A) and (B) have same order
D:	Both matrices (A) and (B) does not have same order

Section:	COMPULSORY
Item No:	2
Question ID:	481322
Question Type:	MCQ
Question:	<p>If $A = \begin{bmatrix} 2 & -3 \\ 3 & 5 \end{bmatrix}$, then which of the following statements are correct?</p> <p>A. A is a square matrix B. A^{-1} exists C. A is a symmetric matrix D. $A = 19$ E. A is a null matrix</p> <p>Choose the correct answer from the options given below.</p>
A:	A, B, C only
B:	A, D, E only
C:	A, B, D only
D:	C, D, E only

Section:	COMPULSORY
Item No:	3
Question ID:	481323
Question Type:	MCQ
Question:	The number of all possible matrices of order 2×2 with each entry 0 or 1 is:
A:	27
B:	18
C:	16
D:	81

Section:	COMPULSORY
Item No:	4
Question ID:	481324
Question Type:	MCQ
Question:	If $y = \left(\frac{1}{x}\right)^x$, then value of $e^e \left(\frac{d^2y}{dx^2}\right)_{x=e}$ is:
A:	$2 - \frac{1}{e}$
B:	$4 - \frac{1}{e}$
C:	$\frac{1}{e}$
D:	$1 - \frac{1}{e}$

Section:	COMPULSORY
Item No:	5
Question ID:	481325
Question Type:	MCQ
Question:	The function $f(x) = x^2 - 2x$ is strictly decreasing in the interval
A:	$(-\infty, -1)$
B:	$(-1, \infty)$
C:	$(-\infty, 1)$
D:	$(-1, \infty)$

Section:	COMPULSORY
Item No:	6
Question ID:	481326
Question Type:	MCQ
Question:	$\int \frac{dx}{x(x^5 + 3)}$ is equal to
A:	$\frac{1}{3} \log \left \frac{x^5}{x^5 + 3} \right + C$
B:	$\frac{1}{15} \log \left \frac{x^5}{x^5 + 3} \right + C$
C:	$\frac{1}{5} \log \left \frac{x^5}{x^5 + 3} \right + C$
D:	$\frac{1}{25} \log \left \frac{x^5}{x^5 + 3} \right + C$

Section:	COMPULSORY
Item No:	7
Question ID:	481327
Question Type:	MCQ
Question:	If $\int \frac{x^3}{x+1} dx = q(x) - \log x+1 + C$ then $q(x)$ is equal to :

A:	$q(x) = \frac{x^3}{3} + x$
B:	$q(x) = \frac{x^2}{2} - x$
C:	$q(x) = x^2 - x + 1$
D:	$q(x) = \frac{x^3}{3} - \frac{x^2}{2} + x$

Section:	COMPULSORY
Item No:	8
Question ID:	481328
Question Type:	MCQ
Question:	$\int_{-1}^1 (x-2 + x) dx =$
A:	7
B:	5
C:	4
D:	6

Section:	COMPULSORY
Item No:	9
Question ID:	481329
Question Type:	MCQ
Question:	If a and b are order and degree of differential equation $y'' + (y')^2 + 2y = 0$, then value of $2a + 6b$, is :
A:	3
B:	4
C:	6
D:	10

Section:	COMPULSORY
Item No:	10
Question ID:	4813210
Question Type:	MCQ
Question:	The solution of the differential equation $xdy - ydx = 0$ represent family of
A:	Circles passing through origin.
B:	Straight line parsing through $(-1, 6)$.
C:	Straight line passing through the origin.
D:	Circle whose center is at the origin.

Section:	COMPULSORY
Item No:	11
Question ID:	4813211

Question Type:	MCQ
Question:	For differential equation $y e^{\frac{x}{y}} dx = \left(x e^{\frac{x}{y}} + y^2 \right) dy$, $y(0) = 1$, the value of $x(e)$ is equal to :
A:	0
B:	1
C:	2
D:	e

Section:	COMPULSORY
Item No:	12
Question ID:	4813212
Question Type:	MCQ
Question:	$\int_{-1}^1 e^{ x } dx =$
A:	$2(e^{-1}-1)$
B:	$2(e+1)$
C:	$e-1$
D:	$2(e-1)$

Section:	COMPULSORY
Item No:	13
Question ID:	4813213
Question Type:	MCQ
Question:	For two events A, B $P(A \cup B) = \frac{7}{12}$, $P(A) = \frac{5}{12}$, $P(B) = \frac{3}{12}$ Then $P(A \cap B) =$
A:	$\frac{1}{2}$
B:	$\frac{1}{12}$
C:	$\frac{1}{6}$
D:	$\frac{1}{3}$

Section:	COMPULSORY												
Item No:	14												
Question ID:	4813214												
Question Type:	MCQ												
Question:	<p>The probability distribution of X is :</p> <table border="1" style="margin-left: auto; margin-right: auto;"> <tr> <td>x</td> <td>0</td> <td>1</td> <td>2</td> <td>3</td> <td>4</td> </tr> <tr> <td>$P(X = x)$</td> <td>0.1</td> <td>2k</td> <td>k</td> <td>k</td> <td>2k</td> </tr> </table> <p>Then $\text{var}(X) =$</p>	x	0	1	2	3	4	$P(X = x)$	0.1	2k	k	k	2k
x	0	1	2	3	4								
$P(X = x)$	0.1	2k	k	k	2k								
A:	$\frac{3}{2}$												

	20
B:	$\frac{9}{4}$
C:	$\frac{141}{20}$
D:	$\frac{159}{80}$

Section:	COMPULSORY
Item No:	15
Question ID:	4813215
Question Type:	MCQ
Question:	The maximum value of $z = 4x + 2y$ subject to constraints $2x + 3y \leq 28$, $x + y \leq 10$, $x, y \geq 0$ is :
A:	36
B:	40
C:	$\frac{100}{3}$
D:	32

Section:	MATHEMATICS APPLIED
Item No:	16
Question ID:	4813216
Question Type:	MCQ
Question:	The number at unit place of number 17^{123} is :
A:	1
B:	3
C:	7
D:	9

Section:	MATHEMATICS APPLIED																				
Item No:	17																				
Question ID:	4813217																				
Question Type:	MCQ																				
Question:	Match List I with List II <table border="1" style="width: 100%; text-align: center;"> <thead> <tr> <th colspan="2">LIST I</th> <th colspan="2">LIST II</th> </tr> </thead> <tbody> <tr> <td>A.</td> <td>$3^3 \equiv b \pmod{9}$</td> <td>I.</td> <td>4</td> </tr> <tr> <td>B.</td> <td>$2^5 \equiv b \pmod{15}$</td> <td>II.</td> <td>0</td> </tr> <tr> <td>C.</td> <td>$4^3 \equiv b \pmod{10}$</td> <td>III.</td> <td>2</td> </tr> <tr> <td>D.</td> <td>$5^3 \equiv b \pmod{12}$</td> <td>IV.</td> <td>5</td> </tr> </tbody> </table> <p>Choose the correct answer from the options given below:</p>	LIST I		LIST II		A.	$3^3 \equiv b \pmod{9}$	I.	4	B.	$2^5 \equiv b \pmod{15}$	II.	0	C.	$4^3 \equiv b \pmod{10}$	III.	2	D.	$5^3 \equiv b \pmod{12}$	IV.	5
LIST I		LIST II																			
A.	$3^3 \equiv b \pmod{9}$	I.	4																		
B.	$2^5 \equiv b \pmod{15}$	II.	0																		
C.	$4^3 \equiv b \pmod{10}$	III.	2																		
D.	$5^3 \equiv b \pmod{12}$	IV.	5																		
A:	A - IV, B - III, C - II, D - I																				
B:	A - II, B - III, C - I, D - IV																				

C:	A - I, B - II, C - III D - IV
D:	A - III, B - I, C - IV, D - II

Section:	MATHEMATICS APPLIED
Item No:	18
Question ID:	4813218
Question Type:	MCQ
Question:	A mixture contains milk and water in the ratio 8 : x. If 3 liters of water is added in 33 liters of mixture, the ratio of milk and water becomes 2 : 1, then value of x is :
A:	3 Litres
B:	4 Litres
C:	2 Litres
D:	11 Litres

Section:	MATHEMATICS APPLIED
Item No:	19
Question ID:	4813219
Question Type:	MCQ
Question:	A motorboat can travel in still water at the speed 15km/h, while the speed of the current is 3km/h. Time taken by boat to go 36km upstream is:
A:	2 hr
B:	3 hr
C:	12 hr
D:	18 hr

Section:	MATHEMATICS APPLIED
Item No:	20
Question ID:	4813220
Question Type:	MCQ
Question:	Hari covers 100m distance in 36 seconds. Ram covers the same distance in 45 seconds. In a 100m race, Hari ahead from Ram is
A:	20m
B:	30m
C:	25m
D:	40m

Section:	MATHEMATICS APPLIED
Item No:	21
Question ID:	4813221
Question Type:	MCQ
Question:	A pipe can empty $\left(\frac{5}{6}\right)^{th}$ part of a cistern in 20 minutes. The part of cistern which will be empty in 9 minutes is:
A:	$\frac{3}{5}$

B:	$\frac{3}{8}$
C:	$\frac{4}{5}$
D:	$\frac{5}{9}$

Section:	MATHEMATICS APPLIED
Item No:	22
Question ID:	4813222
Question Type:	MCQ
Question:	The system of linear inequalities $2x - 1 \geq 3$ and $x - 3 > 5$ has solution:
A:	$(2, \infty)$
B:	$(2, 8)$
C:	$(8, \infty)$
D:	$(-\infty, 8)$

Section:	MATHEMATICS APPLIED
Item No:	23
Question ID:	4813223
Question Type:	MCQ
Question:	The values of x which satisfied $ 3x \geq 6 - 3x $ A. $(0, 1]$ B. $[1, 4]$ C. $(4, \infty)$ D. $(-1, 0)$ E. $(-\infty, 0)$ Choose the correct answer from the options given below:
A:	A and B only
B:	C and E only
C:	B and C only
D:	D and E only

Section:	MATHEMATICS APPLIED
Item No:	24
Question ID:	4813224
Question Type:	MCQ
Question:	If $\begin{bmatrix} x & y & z \\ 2 & u & v \\ -1 & 6 & w \end{bmatrix}$ is skew symmetric matrix, then value of $x^2 + y^2 + z^2 + u^2 + v^2 + w^2$ is :
A:	1
B:	4
C:	36
D:	41

Section:	MATHEMATICS APPLIED
Item No:	25
Question ID:	4813225
Question Type:	MCQ
Question:	If $y = e^{nx}$, then n^{th} derivative of y is :
A:	e^{nx}
B:	$n^2 e^{nx}$
C:	ny
D:	$n^n y$

Section:	MATHEMATICS APPLIED
Item No:	26
Question ID:	4813226
Question Type:	MCQ
Question:	The total revenue (in Rs.) received by selling 'x' units of a certain products is given by: $R(x) = 4x^2 + 10x + 3$. What is the marginal revenue on selling 20 such units?
A:	Rs. 130
B:	Rs. 170
C:	Rs. 173
D:	Rs. 360

Section:	MATHEMATICS APPLIED
Item No:	27
Question ID:	4813227
Question Type:	MCQ
Question:	If x is a real, then minimum value of $x^2 - 8x + 17$ is :
A:	-1
B:	0
C:	1
D:	2

Section:	MATHEMATICS APPLIED								
Item No:	28								
Question ID:	4813228								
Question Type:	MCQ								
Question:	If μ is mean of random variable X , with probability distribution distribution <table border="1" style="margin: 10px auto;"> <tr> <td>x</td> <td>0</td> <td>1</td> <td>2</td> </tr> <tr> <td>$P(X=x)$</td> <td>$\frac{4}{9}$</td> <td>$\frac{4}{9}$</td> <td>$\frac{1}{9}$</td> </tr> </table> then value of $9\mu + 4$ is:	x	0	1	2	$P(X=x)$	$\frac{4}{9}$	$\frac{4}{9}$	$\frac{1}{9}$
x	0	1	2						
$P(X=x)$	$\frac{4}{9}$	$\frac{4}{9}$	$\frac{1}{9}$						
A:	4								
B:	9								

C:	10
D:	17

Section:	MATHEMATICS APPLIED
Item No:	29
Question ID:	4813229
Question Type:	MCQ
Question:	In a game, a child will win Rs 5 if he gets all heads or all tails when three coins are tossed simultaneously and he will lose Rs 3 for all other cases. The expected amount to lose in the game is
A:	Rs. 0
B:	Rs. 0.8
C:	Rs. 1
D:	Rs. 2

Section:	MATHEMATICS APPLIED
Item No:	30
Question ID:	4813230
Question Type:	MCQ
Question:	The Probability mass functions of Random variable X is : $P(X = x) = (0.6)^x (0.4)^{1-x}; x = 0, 1$ The variance of X is :
A:	0.60
B:	0.124
C:	0.244
D:	0.240

Section:	MATHEMATICS APPLIED																				
Item No:	31																				
Question ID:	4813231																				
Question Type:	MCQ																				
Question:	<p>Match List I with List II</p> <table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th colspan="2">LIST I</th> <th colspan="2">LIST II</th> </tr> </thead> <tbody> <tr> <td style="text-align: center;">A.</td> <td>Quantity index</td> <td style="text-align: center;">I.</td> <td>Measures relative price change over a period of time.</td> </tr> <tr> <td style="text-align: center;">B.</td> <td>Time series</td> <td style="text-align: center;">II.</td> <td>Measures change in quantity of consumption of goods over a specific period of time.</td> </tr> <tr> <td style="text-align: center;">C.</td> <td>Price index</td> <td style="text-align: center;">III.</td> <td>Measures average value of goods for specific time period.</td> </tr> <tr> <td style="text-align: center;">D.</td> <td>Value index</td> <td style="text-align: center;">IV.</td> <td>Statistical observation taken at different points of time for specific period of time.</td> </tr> </tbody> </table> <p>Choose the correct answer from the options given below:</p>	LIST I		LIST II		A.	Quantity index	I.	Measures relative price change over a period of time.	B.	Time series	II.	Measures change in quantity of consumption of goods over a specific period of time.	C.	Price index	III.	Measures average value of goods for specific time period.	D.	Value index	IV.	Statistical observation taken at different points of time for specific period of time.
LIST I		LIST II																			
A.	Quantity index	I.	Measures relative price change over a period of time.																		
B.	Time series	II.	Measures change in quantity of consumption of goods over a specific period of time.																		
C.	Price index	III.	Measures average value of goods for specific time period.																		
D.	Value index	IV.	Statistical observation taken at different points of time for specific period of time.																		
A:	A - III, B - I, C - II, D - IV																				
B:	A - II, B - III, C - I, D - IV																				

C:	A - III, B - IV, C - I, D - II
D:	A - II, B - IV, C - I, D - III

Section:	MATHEMATICS APPLIED
Item No:	32
Question ID:	4813232
Question Type:	MCQ
Question:	Given that $\sum p_0q_0 = 700$, $\sum p_0q_1 = 1450$, $\sum p_1q_0 = 855$ and $\sum p_1q_1 = 1300$. Where subscripts 0 and 1 are used for base year and current year respectively. The Laspeyres price index number is :
A:	118.46
B:	119.35
C:	120.23
D:	122.14

Section:	MATHEMATICS APPLIED												
Item No:	33												
Question ID:	4813233												
Question Type:	MCQ												
Question:	If $y = a + b(x - 2005)$ fits the time series data <table border="1" style="margin: 10px auto;"> <tr> <td style="text-align: center;">x (year) :</td> <td style="text-align: center;">2003</td> <td style="text-align: center;">2004</td> <td style="text-align: center;">2005</td> <td style="text-align: center;">2006</td> <td style="text-align: center;">2007</td> </tr> <tr> <td style="text-align: center;">y (yield in tons) :</td> <td style="text-align: center;">6</td> <td style="text-align: center;">13</td> <td style="text-align: center;">17</td> <td style="text-align: center;">20</td> <td style="text-align: center;">24</td> </tr> </table> Then the value of $a + b$ is:	x (year) :	2003	2004	2005	2006	2007	y (yield in tons) :	6	13	17	20	24
x (year) :	2003	2004	2005	2006	2007								
y (yield in tons) :	6	13	17	20	24								
A:	16												
B:	20.3												
C:	43												
D:	80.3												

Section:	MATHEMATICS APPLIED
Item No:	34
Question ID:	4813234
Question Type:	MCQ
Question:	Which of the following statements are correct? A. If discount rate $>$ coupon rate, then present value of a bond $>$ face value B. An annuity in which the periodic payment begins on a fixed date and continues forever is called perpetuity C. The issuer of bond pays interest at fixed interval at fixed rate of interest to investor is called coupon payment D. A sinking fund is a fixed payment made by a borrower to a lender at a specific date every month to clear off the loan E. The issues of bond repays the principle i.e. face value of the bond to the investor at a later date termed as maturity date Choose the correct answer from the options given below:
A:	A, C, E only
B:	A, B, D only
C:	B, C, E only

D:	A, B, C only
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Section:	MATHEMATICS APPLIED
Item No:	35
Question ID:	4813235
Question Type:	MCQ
Question:	<p>Which of the following statements is true?</p> <p>A. EMI in flat rate method, $EMI = \frac{\text{Principle} + \text{Interest}}{\text{Number of Payment}}$</p> <p>B. EMI in reducing balance method, $EMI = P \times \frac{i}{1 + (1+i)^n}$ where P= Principle, i= interest rate, n= no. of payments</p> <p>C. In sinking fund, a fixed amount at regular intervals is deposited.</p> <p>D. Approximate Yield to Maturity = $\frac{\text{Coupon Payment} + \frac{\text{Face Value} + \text{Present Value}}{\text{Number of Payment}}}{\frac{\text{Face Value} + \text{Present Value}}{2}}$</p> <p>Choose the correct answer from the options given below:</p>
A:	A and B only
B:	B and C only
C:	A and C only
D:	C and D only

Section:	MATHEMATICS APPLIED
Item No:	36
Question ID:	4813236
Question Type:	MCQ
Question:	<p>Mr. Dev wishes to purchase an AC for Rs. 45,000 with a down payment of Rs. 5000 and balance in EMI for 5 years. If Bank charges 6% per annum compounded monthly then monthly EMI is: (use $\frac{0.005}{1 - (1.005)^{-60}} = 0.0194$)</p>
A:	Rs. 776
B:	Rs. 700
C:	Rs. 737
D:	Rs. 673

Section:	MATHEMATICS APPLIED
Item No:	37
Question ID:	4813237
Question Type:	MCQ
Question:	<p>The cost of a machine is Rs 20,000 and its estimated useful life is 10 years. The scrap value of the machine, when its value depreciates at 10% p.a, is :</p> <p>use $(0.9)^{10} = 0.35$</p>
A:	Rs. 9672
B:	Rs. 7000
C:	Rs. 6982
D:	Rs. 3500

Section:	MATHEMATICS APPLIED
Item No:	38
Question ID:	4813238
Question Type:	MCQ
Question:	One of the following is true for relation between sample mean (\bar{x}) and population mean (μ).
A:	$ \bar{x} - \mu $ increases when increases the size of samples
B:	$\bar{x} = \mu$, for all sample sizes
C:	$ \bar{x} - \mu $ do not change with size of samples
D:	$ \bar{x} - \mu $ decreases when increase the size of samples

Section:	MATHEMATICS APPLIED
Item No:	39
Question ID:	4813239
Question Type:	MCQ
Question:	Below are the stages for Drawing statistical inferences. A. Sample B. Population C. Making Inference D. Data tabulation E. Data Analysis Choose the correct answer from the options given below :
A:	B, D, A, E, C
B:	A, B, D, C, E
C:	B, A, D, E, C
D:	D, B, A, C, E

Section:	MATHEMATICS APPLIED
Item No:	40
Question ID:	4813240
Question Type:	MCQ
Question:	Corner points of the feasible region for an LPP, are (0, 2), (3, 0), (6, 0) and (6, 8). If $z = 2x + 3y$ is the objective function of LPP then $\max.(z) - \min.(z)$ is equal to :
A:	30
B:	24
C:	21
D:	9

Section:	MATHEMATICS APPLIED
Item No:	41
Question ID:	4813241
Question Type:	MCQ
Passage:	Sitaram, a money lender lent a part of Rs 200000 to Shyam at simple interest 6% p.a. and the remaining to Sushil at 10% p.a. at simple interest. Sitaram earned an annual interest income of Rs. 18000. Based on the given information answer the

following questions :

Question: What is the mean rate of interest?

A: 6% p.a.

B: 8% p.a.

C: 9% p.a.

D: 16% p.a.

Section: MATHEMATICS APPLIED

Item No: 42

Question ID: [4813242](#)

Question Type: MCQ

Passage: Sitaram, a money lender lent a part of Rs 200000 to Shyam at simple interest 6% p.a. and the remaining to Sushil at 10% p.a. at simple interest. Sitaram earned an annual interest income of Rs. 18000. Based on the given information answer the following questions :

Question: In what ratio did Sitaram lent the money at 6% p.a. and 10% p.a. respectively?

A: 1 : 3

B: 3 : 1

C: 2 : 3

D: 3 : 5

Section: MATHEMATICS APPLIED

Item No: 43

Question ID: [4813243](#)

Question Type: MCQ

Passage: Sitaram, a money lender lent a part of Rs 200000 to Shyam at simple interest 6% p.a. and the remaining to Sushil at 10% p.a. at simple interest. Sitaram earned an annual interest income of Rs. 18000. Based on the given information answer the following questions :

Question: How much money did Shyam borrow?

A: Rs 150000

B: Rs 75000

C: Rs 50000

D: Rs 12000

Section: MATHEMATICS APPLIED

Item No: 44

Question ID: [4813244](#)

Question Type: MCQ

Passage: Sitaram, a money lender lent a part of Rs 200000 to Shyam at simple interest 6% p.a. and the remaining to Sushil at 10% p.a. at simple interest. Sitaram earned an annual interest income of Rs. 18000. Based on the given information answer the following questions :

Question: What amount of money is lent at 10% p.a. simple interest?

A: Rs. 20,000

B: Rs. 50,000

C:	Rs. 75,000
D:	Rs. 1,50,000

Section:	MATHEMATICS APPLIED
Item No:	45
Question ID:	4813245
Question Type:	MCQ
Passage:	Sitaram, a money lender lent a part of Rs 200000 to Shyam at simple interest 6% p.a. and the remaining to Sushil at 10% p.a. at simple interest. Sitaram earned an annual interest income of Rs. 18000. Based on the given information answer the following questions :
Question:	What is the ratio of the interest paid by Shyam and Sushil respectively
A:	1:3
B:	1:5
C:	3:5
D:	2:3

Section:	MATHEMATICS APPLIED
Item No:	46
Question ID:	4813246
Question Type:	MCQ
Passage:	Item are based on the information below: A cable network provider in a small town has 500 subscribers and he used to collect Rs. 300 per month from each subscriber. He proposes to increase the monthly charges and it is believed from the past experience that for every increase of Rs. 1, one subscriber will discontinue the service. Based on the above information, answer the following question :
Question:	If Rs x is the monthly increase in subscription amount, then the number of subscribers are
A:	x
B:	$500 - x$
C:	$x - 500$
D:	500

Section:	MATHEMATICS APPLIED
Item No:	47
Question ID:	4813247
Question Type:	MCQ
Passage:	Item are based on the information below: A cable network provider in a small town has 500 subscribers and he used to collect Rs. 300 per month from each subscriber. He proposes to increase the monthly charges and it is believed from the past experience that for every increase of Rs. 1, one subscriber will discontinue the service. Based on the above information, answer the following question :
Question:	Total revenue 'R' is given by (in Rs.)
A:	$R = 300x + 300 (500 - x)$
B:	$R = (300 + x) (500 + x)$
C:	$R = (300 + x) (500 - x)$

D:	$R = 300x + 500(x + 1)$
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Section:	MATHEMATICS APPLIED
Item No:	48
Question ID:	4813248
Question Type:	MCQ
Passage:	<p>Item are based on the information below:</p> <p>A cable network provider in a small town has 500 subscribers and he used to collect Rs. 300 per month from each subscriber. He proposes to increase the monthly charges and it is believed from the past experience that for every increase of Rs. 1, one subscriber will discontinue the service. Based on the above information, answer the following question :</p>
Question:	The number of subscribers which gives the maximum revenue is
A:	100
B:	200
C:	300
D:	400

Section:	MATHEMATICS APPLIED
Item No:	49
Question ID:	4813249
Question Type:	MCQ
Passage:	<p>Item are based on the information below:</p> <p>A cable network provider in a small town has 500 subscribers and he used to collect Rs. 300 per month from each subscriber. He proposes to increase the monthly charges and it is believed from the past experience that for every increase of Rs. 1, one subscriber will discontinue the service. Based on the above information, answer the following question :</p>
Question:	What is increase in changes per subscriber that yields maximum revenue?
A:	100
B:	200
C:	300
D:	400

Section:	MATHEMATICS APPLIED
Item No:	50
Question ID:	4813250
Question Type:	MCQ
Passage:	<p>Item are based on the information below:</p> <p>A cable network provider in a small town has 500 subscribers and he used to collect Rs. 300 per month from each subscriber. He proposes to increase the monthly charges and it is believed from the past experience that for every increase of Rs. 1, one subscriber will discontinue the service. Based on the above information, answer the following question :</p>
Question:	The maximum revenue generated is
A:	Rs. 200000
B:	Rs. 180000
C:	Rs. 160000

Section:	MATHEMATICS CORE																				
Item No:	51																				
Question ID:	4813251																				
Question Type:	MCQ																				
Question:	<p>Match List I with List II</p> <table border="1"> <thead> <tr> <th colspan="2">LIST I</th> <th colspan="2">LIST II</th> </tr> </thead> <tbody> <tr> <td>A.</td> <td>$R = \{(x, y) : x \text{ and } y \text{ are student of the same school}\}$</td> <td>I.</td> <td>Symmetric</td> </tr> <tr> <td>B.</td> <td>$R = \{(L_1, L_2) : L_1 \perp L_2, L_1, L_2 \in L, \text{ where } L \text{ is a set of all lines}\}$</td> <td>II.</td> <td>one-one</td> </tr> <tr> <td>C.</td> <td>A function $f: R \rightarrow R$ defined by $f(x) = 2-3x$ is</td> <td>III.</td> <td>bijective</td> </tr> <tr> <td>D.</td> <td>A function $f: [0, 1] \rightarrow R$ defined by $f(x) = 1 + x^2$ is $f: [0, 1] \rightarrow R$</td> <td>IV.</td> <td>Equivalence</td> </tr> </tbody> </table> <p>Choose the correct answer from the options given below:</p>	LIST I		LIST II		A.	$R = \{(x, y) : x \text{ and } y \text{ are student of the same school}\}$	I.	Symmetric	B.	$R = \{(L_1, L_2) : L_1 \perp L_2, L_1, L_2 \in L, \text{ where } L \text{ is a set of all lines}\}$	II.	one-one	C.	A function $f: R \rightarrow R$ defined by $f(x) = 2-3x$ is	III.	bijective	D.	A function $f: [0, 1] \rightarrow R$ defined by $f(x) = 1 + x^2$ is $f: [0, 1] \rightarrow R$	IV.	Equivalence
LIST I		LIST II																			
A.	$R = \{(x, y) : x \text{ and } y \text{ are student of the same school}\}$	I.	Symmetric																		
B.	$R = \{(L_1, L_2) : L_1 \perp L_2, L_1, L_2 \in L, \text{ where } L \text{ is a set of all lines}\}$	II.	one-one																		
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D.	A function $f: [0, 1] \rightarrow R$ defined by $f(x) = 1 + x^2$ is $f: [0, 1] \rightarrow R$	IV.	Equivalence																		
A:	A - I, B - IV, C - II, D - III																				
B:	A - IV, B - I, C - III, D - II																				
C:	A - I, B - IV, C - III, D - II																				
D:	A - IV, B - I, C - II, D - III																				

Section:	MATHEMATICS CORE
Item No:	52
Question ID:	4813252
Question Type:	MCQ
Question:	The value of $\tan^{-1} \left[2 \sin \left\{ 2 \cos^{-1} \left(\frac{\sqrt{3}}{2} \right) \right\} \right]$, is :
A:	$\frac{\pi}{3}$
B:	$\frac{2\pi}{3}$
C:	$-\frac{\pi}{3}$
D:	$\frac{\pi}{6}$

Section:	MATHEMATICS CORE												
Item No:	53												
Question ID:	4813253												
Question Type:	MCQ												
Question:	<p>Match List I with List II</p> <table border="1"> <thead> <tr> <th colspan="2">LIST I</th> <th colspan="2">LIST II</th> </tr> </thead> <tbody> <tr> <td>A.</td> <td>The range of $\sin^{-1}x$ is</td> <td>I.</td> <td>$\left[\frac{-\pi}{2}, \frac{\pi}{2} \right] - \{0\}$</td> </tr> <tr> <td>B.</td> <td>The range of $\tan^{-1}x$ is</td> <td>II.</td> <td>$\left(-\frac{\pi}{2}, \frac{\pi}{2} \right)$</td> </tr> </tbody> </table>	LIST I		LIST II		A.	The range of $\sin^{-1}x$ is	I.	$\left[\frac{-\pi}{2}, \frac{\pi}{2} \right] - \{0\}$	B.	The range of $\tan^{-1}x$ is	II.	$\left(-\frac{\pi}{2}, \frac{\pi}{2} \right)$
LIST I		LIST II											
A.	The range of $\sin^{-1}x$ is	I.	$\left[\frac{-\pi}{2}, \frac{\pi}{2} \right] - \{0\}$										
B.	The range of $\tan^{-1}x$ is	II.	$\left(-\frac{\pi}{2}, \frac{\pi}{2} \right)$										

Question:			$(-2, 2)$
	C.	The range of $\operatorname{cosec}^{-1}x$ is	III. $[0, \pi] - \left\{\frac{\pi}{2}\right\}$
	D.	The range of $\sec^{-1}x$ is	IV. $\left[\frac{-\pi}{2}, \frac{\pi}{2}\right]$
Choose the correct answer from the options given below:			
A:	A - IV, B - III, C - II, D - I		
B:	A - IV, B - I, C - III, D - II		
C:	A - I, B - IV, C - II, D - III		
D:	A - IV, B - II, C - I, D - III		

Section:	MATHEMATICS CORE
Item No:	54
Question ID:	4813254
Question Type:	MCQ
Question:	If $A = \begin{bmatrix} \cos\alpha & \sin\alpha \\ -\sin\alpha & \cos\alpha \end{bmatrix}$, then:
A:	$A'A = I$
B:	$A'A = 0$
C:	$A'A = 2I$
D:	$A'A = -I$

Section:	MATHEMATICS CORE
Item No:	55
Question ID:	4813255
Question Type:	MCQ
Question:	If $A = \begin{bmatrix} 2 & 1 & 0 \\ 3 & 1 & 2 \\ 0 & 4 & -1 \end{bmatrix}$ then $ \operatorname{adj}(A) $ is equal to
A:	11
B:	12
C:	225
D:	-225

Section:	MATHEMATICS CORE
Item No:	56
Question ID:	4813256
Question Type:	MCQ
Question:	<p>Identify the correct option (s)</p> <p>A. A modulus function is continuous at every point in its domain.</p> <p>B. A modulus function may or may not be continuous at every point in its domain.</p> <p>C. Every rational function is continuous in its domain.</p> <p>D. If a function f is differentiable at a point then it is also continuous at that point.</p> <p>E. If a function f is continuous at a point then it is also differentiable at that</p>

point.

Choose the correct answer from the options given below:

A:	A and C only
B:	B and E only
C:	A, C and D only
D:	C and E only

Section:	MATHEMATICS CORE
Item No:	57
Question ID:	4813257
Question Type:	MCQ
Question:	If $f(x) = \begin{cases} \frac{\sqrt{1-\cos 2x}}{x\sqrt{2}}, & x \neq 0 \\ k, & x = 0 \end{cases}$, then the value of k will make function f continuous at $x = 0$ is:
A:	1
B:	-1
C:	0
D:	No value

Section:	MATHEMATICS CORE
Item No:	58
Question ID:	4813258
Question Type:	MCQ
Question:	If $y = \log(\sec e^{x^2})$, then $\frac{dy}{dx} =$
A:	$x^2 e^{x^2} \tan e^{x^2}$
B:	$e^{x^2} \tan e^{x^2}$
C:	$2x e^{x^2} \tan e^{x^2}$
D:	$x e^{x^2} \tan e^{x^2}$

Section:	MATHEMATICS CORE
Item No:	59
Question ID:	4813259
Question Type:	MCQ
Question:	If $y = e^{\log \sin^{-1} x} + e^{\log \cos^{-1} x}$, $0 < x < 1$, then
A:	$\frac{dy}{dx} = 0$
B:	$\frac{dy}{dx} = \frac{\pi}{2}$
C:	$\frac{dy}{dx} = \frac{\pi}{3}$
D:	does not exist

Section:	MATHEMATICS CORE																				
Item No:	60																				
Question ID:	4813260																				
Question Type:	MCQ																				
Question:	<p>Match List I with List II</p> <table border="1"> <thead> <tr> <th colspan="2">LIST I</th> <th colspan="2">LIST II</th> </tr> </thead> <tbody> <tr> <td>A.</td> <td>$\int \frac{1}{x+\sqrt{x}} dx$</td> <td>I.</td> <td>$2\sqrt{x} + C$</td> </tr> <tr> <td>B.</td> <td>$\int \frac{e^{\log \sqrt{x}}}{x} dx$</td> <td>II.</td> <td>$2(\sqrt{x}-1)e^{\sqrt{x}} + C$</td> </tr> <tr> <td>C.</td> <td>$\int \frac{dx}{4x^2-9}$</td> <td>III.</td> <td>$2\log(\sqrt{x}+1) + C$</td> </tr> <tr> <td>D.</td> <td>$\int e^{\sqrt{x}} dx$</td> <td>IV.</td> <td>$\frac{1}{12} \log \left \frac{2x-3}{2x+3} \right + C$</td> </tr> </tbody> </table> <p>Choose the correct answer from the options given below:</p>	LIST I		LIST II		A.	$\int \frac{1}{x+\sqrt{x}} dx$	I.	$2\sqrt{x} + C$	B.	$\int \frac{e^{\log \sqrt{x}}}{x} dx$	II.	$2(\sqrt{x}-1)e^{\sqrt{x}} + C$	C.	$\int \frac{dx}{4x^2-9}$	III.	$2\log(\sqrt{x}+1) + C$	D.	$\int e^{\sqrt{x}} dx$	IV.	$\frac{1}{12} \log \left \frac{2x-3}{2x+3} \right + C$
LIST I		LIST II																			
A.	$\int \frac{1}{x+\sqrt{x}} dx$	I.	$2\sqrt{x} + C$																		
B.	$\int \frac{e^{\log \sqrt{x}}}{x} dx$	II.	$2(\sqrt{x}-1)e^{\sqrt{x}} + C$																		
C.	$\int \frac{dx}{4x^2-9}$	III.	$2\log(\sqrt{x}+1) + C$																		
D.	$\int e^{\sqrt{x}} dx$	IV.	$\frac{1}{12} \log \left \frac{2x-3}{2x+3} \right + C$																		
A:	A - II, B - IV, C - I, D - III																				
B:	A - III, B - II, C - IV, D - I																				
C:	A - III, B - I, C - IV, D - II																				
D:	A - I, B - II, C - III, D - IV																				

Section:	MATHEMATICS CORE
Item No:	61
Question ID:	4813261
Question Type:	MCQ
Question:	The order of the differential equation whose general solution is $y = e^x (a \cos x + b \sin x)$, where a and b are arbitrary constants is :
A:	1
B:	3
C:	2
D:	6

Section:	MATHEMATICS CORE
Item No:	62
Question ID:	4813262
Question Type:	MCQ
Question:	$\frac{d}{dx} \left[\int_0^{2a} f(\sin 2x) dx \right] =$
A:	2a
B:	$f(\sin 2a)$
C:	$f(\cos 2a)$
D:	0

Section:	MATHEMATICS CORE
Item No:	63

Question ID:	4813263
Question Type:	MCQ
Question:	$\int \tan x(\sec x - \tan x)dx =$
A:	$\sec x - \tan x + x - C$
B:	$\sec x - \tan^2 x + C$
C:	$\sec x + \tan x + x + C$
D:	$\sec x - \tan x + C$

Section:	MATHEMATICS CORE
Item No:	64
Question ID:	4813264
Question Type:	MCQ
Question:	If $\cos \alpha, \cos \beta, \cos \gamma$ are the direction cosines of vector \vec{a} , then value of $\cos 2\alpha + \cos 2\beta + \cos 2\gamma$ is equal to:
A:	3
B:	0
C:	2
D:	-1

Section:	MATHEMATICS CORE
Item No:	65
Question ID:	4813265
Question Type:	MCQ
Question:	The value of $i.(j \times k) + j.(i \times k) + k.(i \times j)$ is
A:	0
B:	-1
C:	1
D:	3

Section:	MATHEMATICS CORE
Item No:	66
Question ID:	4813266
Question Type:	MCQ
Question:	The corner points of the feasible region for an L.P.P are (2, 0), (7, 0), (4, 5) and (0, 3) and $z = 2x + 3y$ is the objective function. The difference of the maximum and minimum values of z is-
A:	19
B:	4
C:	23
D:	14

Section:	MATHEMATICS CORE
Item No:	67

Question ID:	4813267
Question Type:	MCQ
Question:	The area of the parallelogram whose adjacent sides are $\hat{i} + \hat{k}$ and $2\hat{i} + \hat{j} + \hat{k}$ is
A:	3
B:	$\sqrt{2}$
C:	4
D:	$\sqrt{3}$

Section:	MATHEMATICS CORE
Item No:	68
Question ID:	4813268
Question Type:	MCQ
Question:	If $x(\hat{i} + \hat{j} + \hat{k})$ is a unit vector then value of x is :
A:	$\pm\sqrt{3}$
B:	$\pm\frac{1}{3}$
C:	± 3
D:	$\pm\frac{1}{\sqrt{3}}$

Section:	MATHEMATICS CORE
Item No:	69
Question ID:	4813269
Question Type:	MCQ
Question:	The point of intersection the lines $\frac{x-1}{2} = \frac{y-2}{3} = \frac{z-3}{4}$ and $\frac{x-4}{5} = \frac{y-1}{2} = z$, is :
A:	(1, 1, 1)
B:	(1, -1, -1)
C:	(-1, 1, -1)
D:	(-1, -1, -1)

Section:	MATHEMATICS CORE
Item No:	70
Question ID:	4813270
Question Type:	MCQ
Question:	The distance between the point (3, 4, 5) and the point where the line $\frac{x-3}{1} = \frac{y-4}{2} = \frac{z-5}{2}$ meets the plane $x + y + z = 17$, is
A:	3
B:	2
C:	1
D:	0

Section:	MATHEMATICS CORE
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Item No:	71
Question ID:	4813271
Question Type:	MCQ
Question:	<p>If events A and B are independent, then identify the correct statements</p> <p>(A) A and B must be mutually exclusive</p> <p>(B) The sum of their probabilities must be equal to 1</p> <p>(C) $P(A) \cdot P(B) = P(A \cap B)$</p> <p>(D) A' and B' are also independent</p> <p>Choose the correct answer from the options given below</p>
A:	A and B only
B:	B and C only
C:	C and D only
D:	A and D only

Section:	MATHEMATICS CORE
Item No:	72
Question ID:	4813272
Question Type:	MCQ
Question:	<p>The equation of plane passing through the point $(0, 7, -7)$ and containing the line $\frac{x+1}{-3} = \frac{y-3}{2} = \frac{z+2}{1}$, is:</p>
A:	$x - y - z = 0$
B:	$4x + y + z = 0$
C:	$x + y + z = 0$
D:	$3x + 2y + 2z = 0$

Section:	MATHEMATICS CORE
Item No:	73
Question ID:	4813273
Question Type:	MCQ
Question:	<p>If A and B are two independent events with $P(A) = \frac{3}{5}$ and $P(B) = \frac{4}{9}$, then $P(A' \cap B')$ is equal to</p>
A:	$\frac{4}{15}$
B:	$\frac{8}{45}$
C:	$\frac{1}{3}$
D:	$\frac{2}{9}$

Section:	MATHEMATICS CORE
Item No:	74
Question ID:	4813274
Question Type:	MCQ

Question:	A line L: $\frac{x-2}{1} = \frac{y-3}{2} = \frac{z-1}{-1}$ is perpendicular to a plane (P), which passing through the point (4, 3, 9). If the mirror image of point 'S' on the line (L) in the given plane (P) is (2, 3, 1), then co-ordinates of point S, is :
A:	(1, 0, 3)
B:	(0, -1, 3)
C:	(-2, -3, -1)
D:	(4, 7, -1)

Section:	MATHEMATICS CORE														
Item No:	75														
Question ID:	4813275														
Question Type:	MCQ														
Question:	<p>A biased dice is thrown once. If X denotes the number appearing on it and have probability distribution :</p> <table border="1" style="margin-left: auto; margin-right: auto;"> <tr> <td>x</td> <td>1</td> <td>2</td> <td>3</td> <td>4</td> <td>5</td> <td>6</td> </tr> <tr> <td>P(X = x)</td> <td>k</td> <td>k/2</td> <td>2k</td> <td>8k²</td> <td>1-5k</td> <td>k/2</td> </tr> </table> <p>where $k > 0$. Then consider the following statements :</p> <p>A. $P(X = 3)$. B. $P(X \leq 2)$. C. $P(X \geq 5)$. D. $P(X = 4)$. E. $P(X = 1) + P(X = 5)$.</p> <p>Choose the correct answer from the options given below:</p>	x	1	2	3	4	5	6	P(X = x)	k	k/2	2k	8k ²	1-5k	k/2
x	1	2	3	4	5	6									
P(X = x)	k	k/2	2k	8k ²	1-5k	k/2									
A:	C>D>B>A>E														
B:	E>C>D>A>B														
C:	E>C>A>B>D														
D:	C>E>A>B>D														

Section:	MATHEMATICS CORE
Item No:	76
Question ID:	4813276
Question Type:	MCQ
Passage:	<p>In a school, a auditorium was used for its cultural activities. The shape of the floor of the auditorium is rectangular with dimensions x and y ($x > y$), has fixed parameter p.</p> <p>Based on the above information answer the following questions.</p>
Question:	If x and y represent the length and breadth of the rectangular region, then:
A:	$p = x + y$
B:	$p^2 = x^2 + y^2$
C:	$p = 2(x + y)$
D:	$p = x + 2y$

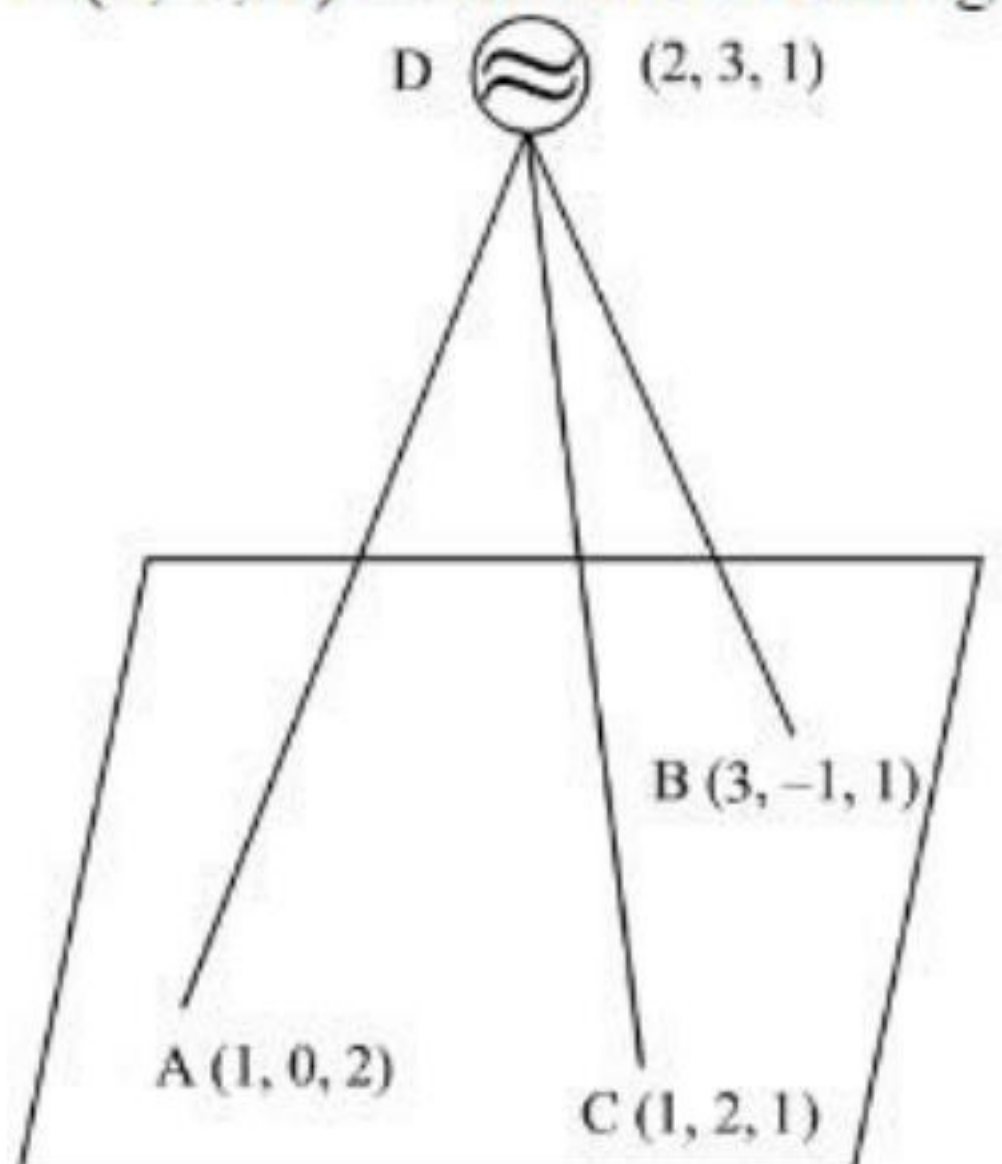
Section:	MATHEMATICS CORE
Item No:	77
Question ID:	4813277

Question Type:	MCQ
Passage:	In a school, a auditorium was used for its cultural activities. The shape of the floor of the auditorium is rectangular with dimensions x and y ($x > y$), has fixed parameter p. Based on the above information answer the following questions.
Question:	The area (A) of the floor, as a function of x can be expressed as:
A:	$A(x) = px + \frac{x}{2}$
B:	$A(x) = \frac{px + x^2}{2}$
C:	$A(x) = \frac{px - 2x^2}{2}$
D:	$A(x) = \frac{x^2}{2} + px^2$

Section:	MATHEMATICS CORE
Item No:	78
Question ID:	4813278
Question Type:	MCQ
Passage:	In a school, a auditorium was used for its cultural activities. The shape of the floor of the auditorium is rectangular with dimensions x and y ($x > y$), has fixed parameter p. Based on the above information answer the following questions.
Question:	The value of x, for which area of floor of auditorium is maximum is:
A:	$\frac{p}{4}$
B:	$\frac{p}{2}$
C:	p
D:	$\frac{p}{3}$

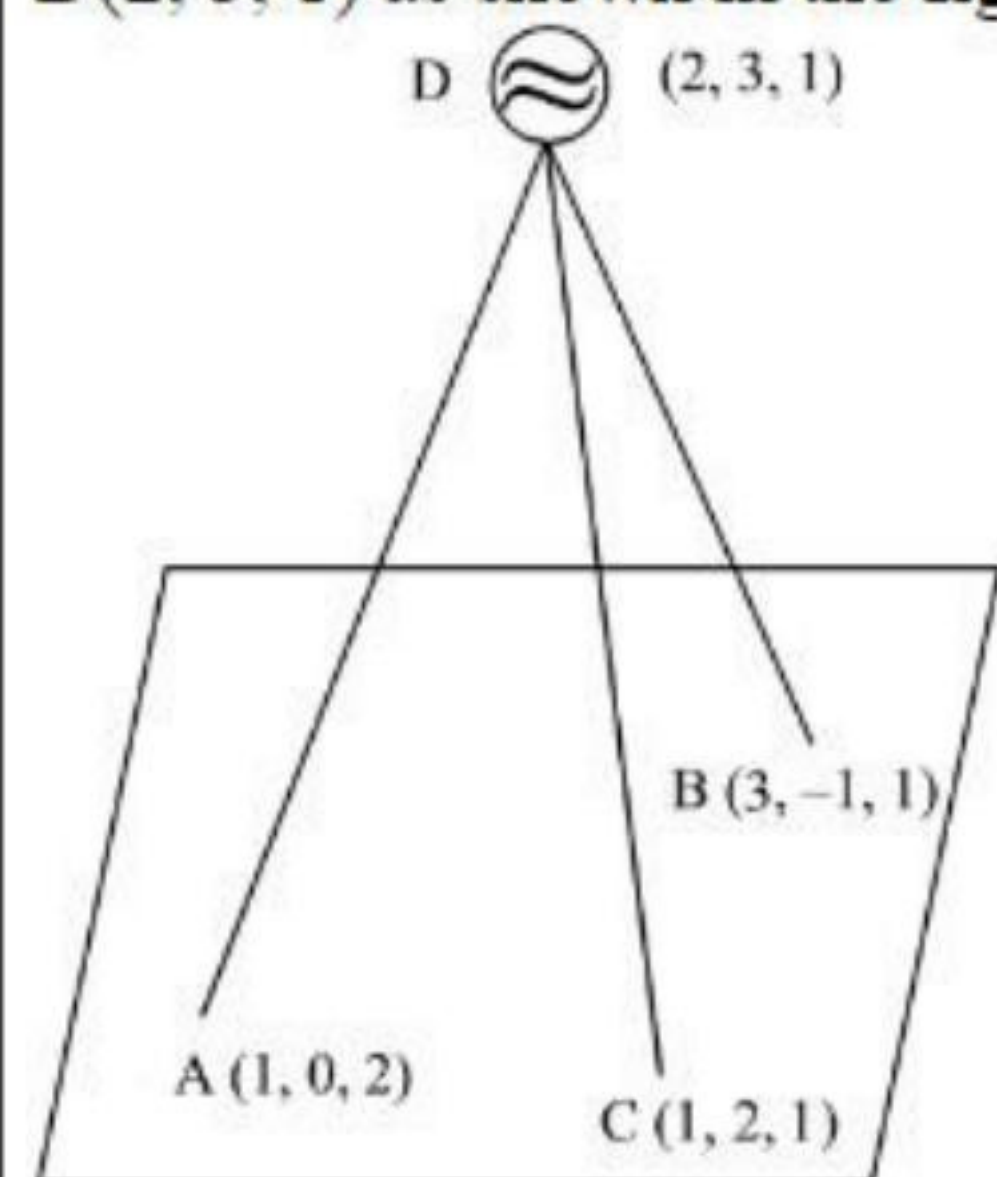
Section:	MATHEMATICS CORE
Item No:	79
Question ID:	4813279
Question Type:	MCQ
Passage:	In a school, a auditorium was used for its cultural activities. The shape of the floor of the auditorium is rectangular with dimensions x and y ($x > y$), has fixed parameter p. Based on the above information answer the following questions.
Question:	The value of y, for which the area of the floor of auditorium is maximum is :
A:	$\frac{p}{2}$
B:	$\frac{p}{3}$
C:	$\frac{p}{4}$
D:	$\frac{p}{16}$

Section:	MATHEMATICS CORE
Item No:	80
Question ID:	4813280
Question Type:	MCQ
Passage:	<p>In a school, a auditorium was used for its cultural activities. The shape of the floor of the auditorium is rectangular with dimensions x and y ($x > y$), has fixed parameter p.</p> <p>Based on the above information answer the following questions.</p>
Question:	Maximum area of floor is:
A:	$\frac{p^2}{4}$
B:	$\frac{p^2}{16}$
C:	$\frac{p^2}{28}$
D:	$\frac{p^2}{64}$

Section:	MATHEMATICS CORE
Item No:	81
Question ID:	4813281
Question Type:	MCQ
Passage:	<p>A ball is thrown upwards from the plane surface of the ground. Suppose the plane surface from which the ball is thrown also consists of the points $A(1, 0, 2)$, $B(3, -1, 1)$ and $C(1, 2, 1)$ on it. The highest point of the ball takes, is $D(2, 3, 1)$ as shown in the figure. Using this information answer the question.</p> 
Question:	The equation of the plane passing through the points A, B and C is:
A:	$3x - 2y + 4z = -11$
B:	$3x + 2y + 4z = 11$
C:	$3x - 2y - 4z = 11$
D:	$-3x + 2y + 4z = -11$

Section:	MATHEMATICS CORE
Item No:	82
Question ID:	4813282
Question Type:	MCQ
Passage:	<p>A ball is thrown upwards from the plane surface of the ground. Suppose the</p>

plane surface from which the ball is thrown also consists of the points A(1, 0, 2), B(3, -1, 1) and C(1, 2, 1) on it. The highest point of the ball takes, is D(2, 3, 1) as shown in the figure. Using this information answer the question.



Passage:

Question: The maximum height of the ball from the ground is

A: $\frac{5}{\sqrt{29}}$ units

B: $\frac{7}{\sqrt{29}}$ units

C: $\frac{6}{\sqrt{29}}$ units

D: $\frac{8}{\sqrt{29}}$ units

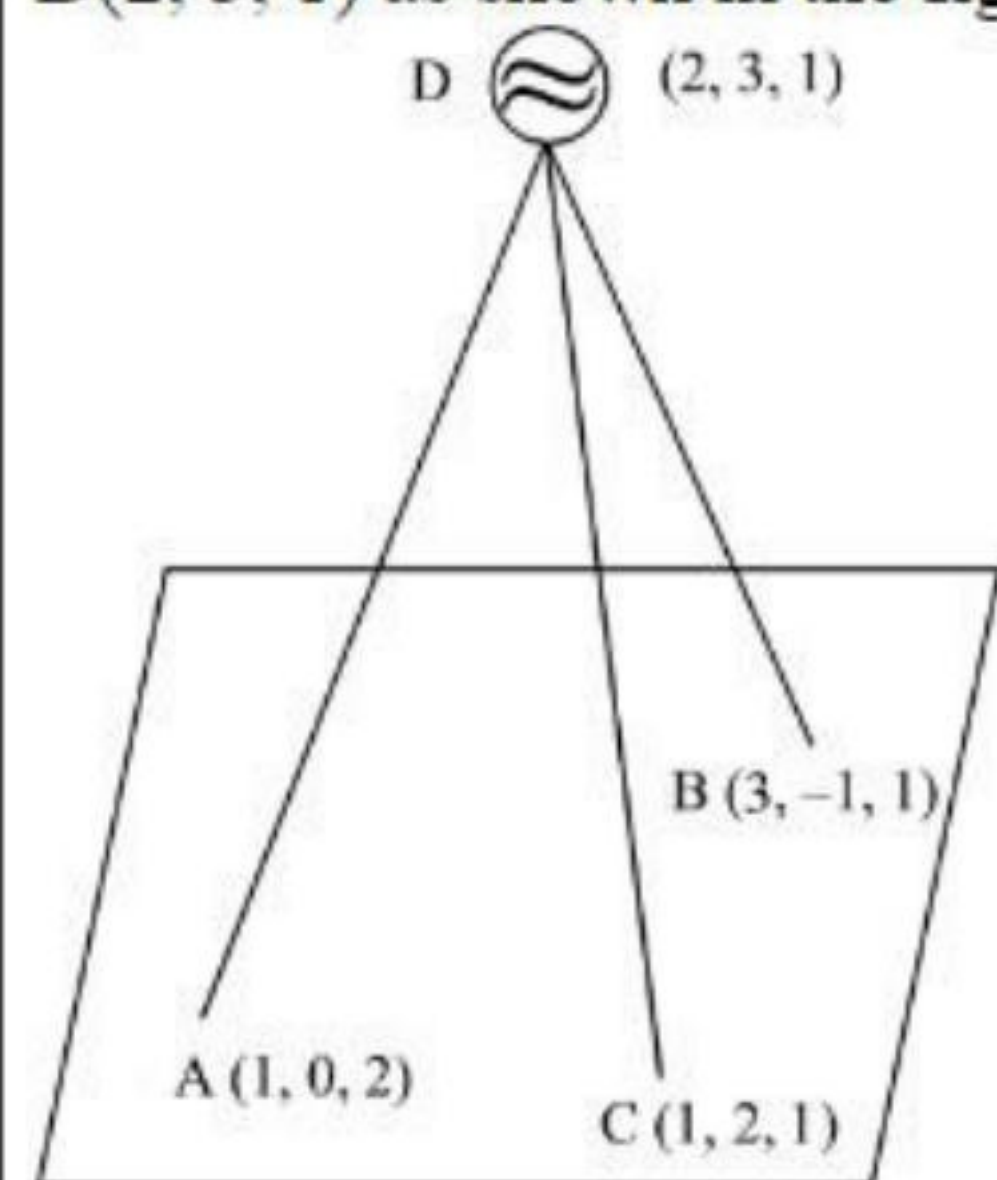
Section: MATHEMATICS CORE

Item No: 83

Question ID: 4813283

Question Type: MCQ

A ball is thrown upwards from the plane surface of the ground. Suppose the plane surface from which the ball is thrown also consists of the points A(1, 0, 2), B(3, -1, 1) and C(1, 2, 1) on it. The highest point of the ball takes, is D(2, 3, 1) as shown in the figure. Using this information answer the question.



Passage:

Question: The equation of the perpendicular line drawn from the maximum height of the ball to the ground, is :

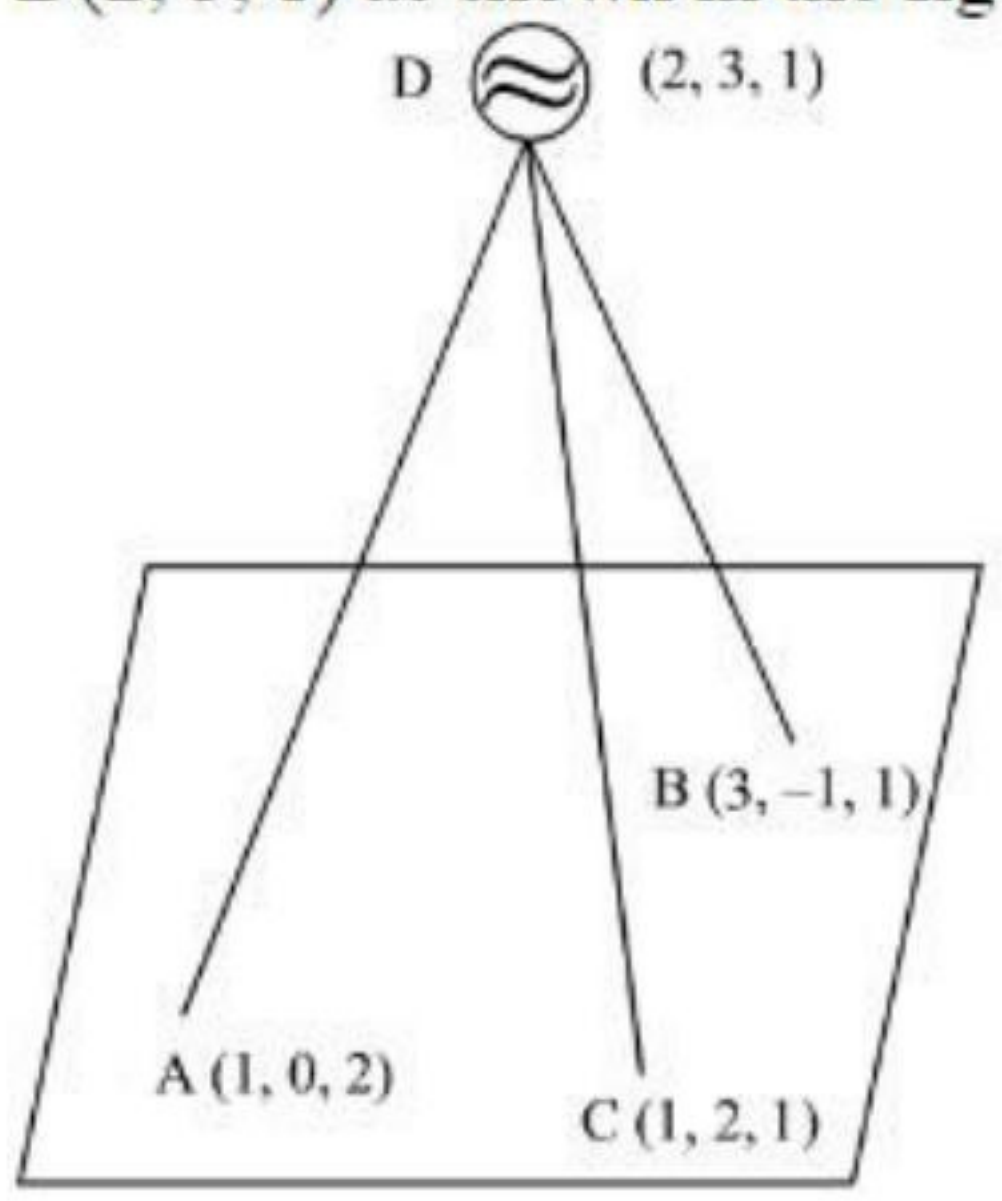
A: $\frac{x-1}{2} = \frac{y+3}{1} = \frac{z-5}{-2}$

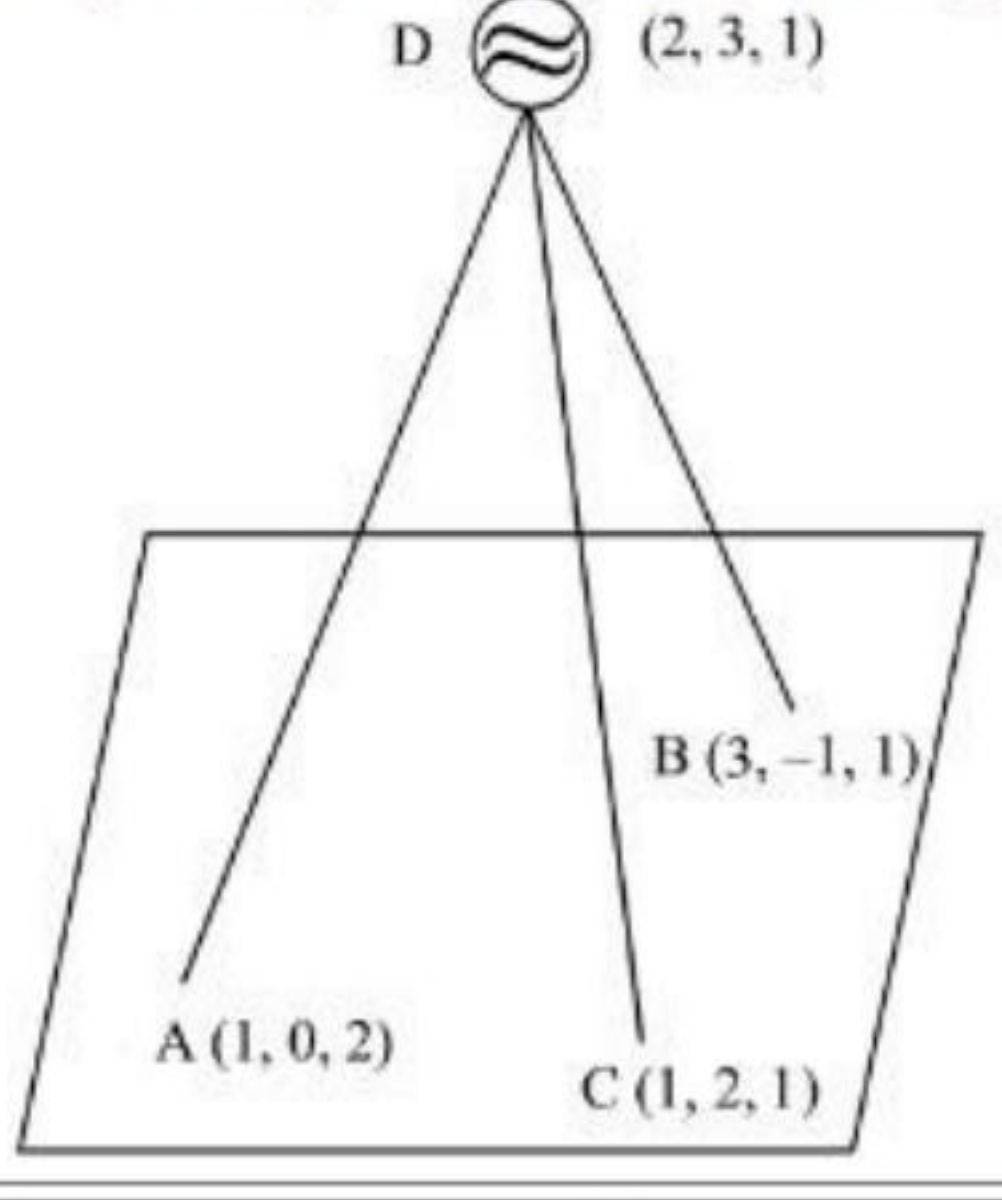
B: $\frac{x-2}{-3} = \frac{y-3}{2} = \frac{z-1}{-4}$

C: $\frac{x-2}{3} = \frac{y-3}{2} = \frac{z-1}{4}$

D: $\frac{x+1}{-2} = \frac{y+3}{-1} = \frac{z-5}{2}$

Section: MATHEMATICS CORE

Item No:	84
Question ID:	4813284
Question Type:	MCQ
Passage:	<p>A ball is thrown upwards from the plane surface of the ground. Suppose the plane surface from which the ball is thrown also consists of the points A(1, 0, 2), B(3, -1, 1) and C(1, 2, 1) on it. The highest point of the ball takes, is D(2, 3, 1) as shown in the figure. Using this information answer the question.</p> 
Question:	The co-ordinates of the foot of the perpendicular drawn from the maximum height of the ball to the ground are
A:	$\left(\frac{43}{29}, \frac{-77}{29}, \frac{-9}{29}\right)$
B:	$\left(\frac{9}{7}, \frac{-1}{7}, \frac{-10}{7}\right)$
C:	$\left(\frac{43}{29}, \frac{77}{29}, \frac{9}{29}\right)$
D:	$\left(-\frac{13}{29}, -\frac{7}{29}, -\frac{19}{29}\right)$

Section:	MATHEMATICS CORE
Item No:	85
Question ID:	4813285
Question Type:	MCQ
Passage:	<p>A ball is thrown upwards from the plane surface of the ground. Suppose the plane surface from which the ball is thrown also consists of the points A(1, 0, 2), B(3, -1, 1) and C(1, 2, 1) on it. The highest point of the ball takes, is D(2, 3, 1) as shown in the figure. Using this information answer the question.</p> 
Question:	The Area of ΔABC is:
A:	$\sqrt{29}$ sq. units
B:	$\frac{1}{4}\sqrt{29}$ sq. units
C:	$\frac{1}{16}\sqrt{29}$ sq. units

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D:

$$\frac{1}{2}\sqrt{29} \text{ sq. units}$$