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

Section:	COMPULSORY
Item No:	1
Question ID:	481321
Question Type:	MCQ
Question:	Let A and B be two non zero square matrics and AB and BA both are defined. It means
A:	No. of columns of A ≠ No. of rows of B
B:	No. of rows of A ≠ 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:	If $A = \begin{bmatrix} 2 & -3 \\ 3 & 5 \end{bmatrix}$, then which of the following statements are correct? A. A is a square matrix B. A^{-1} exists C. A is a symmetric matrix D. $\lvert A \rvert = 19$ E. A is a null matrix Choose the correct answer from the options given below.
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 $y = \left(\dfrac{1}{x}\right)^x$, then value of $e^e \left(\dfrac{d^2 y}{dx^2}\right)_{x=e}$ is:
A:	$2 - \dfrac{1}{e}$
B:	$4 - \dfrac{1}{e}$
C:	$\dfrac{1}{e}$
D:	$1 - \dfrac{1}{e}$

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:	$\displaystyle\int \dfrac{dx}{x(x^5 + 3)}$ is equal to
A:	$\dfrac{1}{3} \log\left|\dfrac{x^5}{x^5 + 3}\right| + C$
B:	$\dfrac{1}{15} \log\left|\dfrac{x^5}{x^5 + 3}\right| + C$
C:	$\dfrac{1}{5} \log\left|\dfrac{x^5}{x^5 + 3}\right| + C$
D:	$\dfrac{1}{25} \log\left|\dfrac{x^5}{x^5 + 3}\right| + C$

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

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

Section:	COMPULSORY
Item No:	8
Question ID:	481328
Question Type:	MCQ
Question:	$\displaystyle\int_{-1}^{1} \left(|x-2| + |x| \right) dx =$
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 $x\,dy - y\,dx = 0$ 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 $ye^{\frac{x}{y}}dx = \left(xe^{\frac{x}{y}} + y^2\right)dy$, $y(0) = 1$, 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:	$\int\limits_{-1}^{1} e^{|x|}dx =$
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:	The probability distribution of X is :

x	0	1	2	3	4
P(X = x)	0.1	2k	k	k	2k

Then var(X) =

A:	$\frac{3}{?}$

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

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:	$\dfrac{100}{3}$
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

	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

Choose the correct answer from the options given below:

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 $\left(\dfrac{5}{6}\right)^{th}$ part of a cistern in 20 minutes. The part of cistern which will be empty in 9 minutes is:
A:	$\dfrac{3}{5}$

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

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 statisfied $\lvert 3x \rvert \geq \lvert 6 - 3x \rvert$ 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><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:
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:	Match List I with List II

	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.

Choose the correct answer from the options given below:

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 $\sum p_0 q_0 = 700$, $\sum p_0 q_1 = 1450$, $\sum p_1 q_0 = 855$ and $\sum p_1 q_1 = 1300$. Where subscripts 0 and 1 are used for base year and current year respectively. The Laspeyer's 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 date

x (year) :	2003	2004	2005	2006	2007
y (yield in tons) :	6	13	17	20	24

Then the value of $a + b$ is:

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

Section:	MATHEMATICS APPLIED
Item No:	35
Question ID:	**4813235**
Question Type:	MCQ
Question:	Which of the following statements is true? A. EMI in flat rate method, $\text{EMI} = \dfrac{Principle + Interest}{Number\ of\ Payment}$ B. EMI in reducing balance method, $\text{EMI} = P \times \dfrac{i}{1+(1+i)^n}$ where P= Principle, i= interest rate, n= no. of payments C. In sinking fund, a fixed amount at regular intervals is deposited. D. Approximate Yield to Maturity $= \dfrac{Coupen\ Payment + \dfrac{Face\ Value + Present\ Value}{Number\ of\ Payment}}{\dfrac{Face\ Value + Present\ Value}{2}}$ Choose the correct answer from the options given below:
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:	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 $\dfrac{0.005}{1-(1.005)^{-60}} = 0.0194$)
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:	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 depriciates at 10% p.a, is : use $(0.9)^{10} = 0.35$
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:	$\left\|\bar{x} - \mu\right\|$ increases when increases the size of samples
B:	$\bar{x} = \mu$, for all sample sizes
C:	$\left\|\bar{x} - \mu\right\|$ do not change with size of samples
D:	$\left\|\bar{x} - \mu\right\|$ 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 in formation, 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 in formation, 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:	$R = 300x + 500\,(x + 1)$

Section:	MATHEMATICS APPLIED
Item No:	48
Question ID:	**4813248**
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 in formation, answer the following question :
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:	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 in formation, answer the following question :
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:	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 in formation, answer the following question :
Question:	The maximum revenue generated is
A:	Rs. 200000
B:	Rs. 180000
C:	Rs. 160000

D:	Rs. 150000

Section:	MATHEMATICS CORE
Item No:	51
Question ID:	4813251
Question Type:	MCQ
Question:	Match List I with List II

	LIST I		LIST II
A.	R = {(x, y): x and y are student of the same school}	I.	Symmetric
B.	R = {(L₁, L₂) : L₁ ⊥ L₂, L₁, L₂ ∈ L, where L is a set of all lines}	II.	one-one
C.	A function f: R → R defined by $f(x) = 2 - 3x$ is	III.	bijective
D.	A function f: [0, 1] → R defined by $f(x) = 1 + x^2$ is f : [0, 1] → R	IV.	Equivalence

Choose the correct answer from the options given below:

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 $\tan^{-1}\left[2\sin\left\{2\cos^{-1}\left(\dfrac{\sqrt{3}}{2}\right)\right\}\right]$, is :
A:	$\dfrac{\pi}{3}$
B:	$\dfrac{2\pi}{3}$
C:	$-\dfrac{\pi}{3}$
D:	$\dfrac{\pi}{6}$

Section:	MATHEMATICS CORE
Item No:	53
Question ID:	4813253
Question Type:	MCQ
Question:	Match List I with List II

	LIST I		LIST II
A.	The range of $\sin^{-1}x$ is	I.	$\left[\dfrac{-\pi}{2}, \dfrac{\pi}{2}\right] - \{0\}$
B.	The range of $\tan^{-1}x$ is	II.	$\left(-\dfrac{\pi}{2}, \dfrac{\pi}{2}\right)$

Question:				
	C.	The range of $\csc^{-1}x$ is	III.	$[0, \pi] - \left\{\dfrac{\pi}{2}\right\}$
	D.	The range of $\sec^{-1}x$ is	IV.	$\left[\dfrac{-\pi}{2}, \dfrac{\pi}{2}\right]$

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 $\lvert \text{adj}(A) \rvert$ is equal to
A:	11
B:	12
C:	225
D:	–225

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

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 $f(x) = \begin{cases} \dfrac{\sqrt{1-\cos 2x}}{x\sqrt{2}}, & x \neq 0 \\ k, & x = 0 \end{cases}$, 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 $y = \log\left(\sec e^{x^2}\right)$, then $\dfrac{dy}{dx} =$
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:	$\dfrac{dy}{dx} = 0$
B:	$\dfrac{dy}{dx} = \dfrac{\pi}{2}$
C:	$\dfrac{dy}{dx} = \dfrac{\pi}{3}$
D:	does not exist

Section:	MATHEMATICS CORE
Item No:	60
Question ID:	**4813260**
Question Type:	MCQ
Question:	Match List I with List II

	LIST I		LIST II
A.	$\int \dfrac{1}{x+\sqrt{x}}\,dx$	I.	$2\sqrt{x}+C$
B.	$\int \dfrac{e^{\log \sqrt{x}}}{x}\,dx$	II.	$2\left(\sqrt{x}-1\right)e^{\sqrt{x}}+C$
C.	$\int \dfrac{dx}{4x^2-9}$	III.	$2\log\left(\sqrt{x}+1\right)+C$
D.	$\int e^{\sqrt{x}}\,dx$	IV.	$\dfrac{1}{12}\log\left|\dfrac{2x-3}{2x+3}\right|+C$

Choose the correct answer from the options given below:

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:	$\dfrac{d}{dx}\left[\displaystyle\int_0^{2a} f(\sin 2x)\,dx\right] =$
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 $i.\left(\hat{j} \times \hat{k}\right) + j.\left(\hat{i} \times \hat{k}\right) + k.\left(\hat{i} \times \hat{j}\right)$ 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 $x\left(\hat{i}+\hat{j}+\hat{k}\right)$ is a unit vector then value of x is :
A:	$\pm\sqrt{3}$
B:	$\pm\dfrac{1}{3}$
C:	± 3
D:	$\pm\dfrac{1}{\sqrt{3}}$

Section:	MATHEMATICS CORE
Item No:	69
Question ID:	4813269
Question Type:	MCQ
Question:	The point of intersection the lines $\dfrac{x-1}{2}=\dfrac{y-2}{3}=\dfrac{z-3}{4}$ and $\dfrac{x-4}{5}=\dfrac{y-1}{2}=z$, 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 $\dfrac{x-3}{1}=\dfrac{y-4}{2}=\dfrac{z-5}{2}$ meets the plane $x+y+z=17$, is
A:	3
B:	2
C:	1
D:	0

Section:	MATHEMATICS CORE

Item No:	71
Question ID:	4813271
Question Type:	MCQ
Question:	If events A and B are independent, then identify the correct statements (A) A and B must be mutually exclusive (B) The sum of their probabilities must be equal to 1 (C) $P(A) \cdot P(B) = P(A \cap B)$ (D) A′ and B′ are also independent Choose the correct answer from the options given below
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:	The equation of plane passing through the point (0, 7, −7) and containing the line $\dfrac{x+1}{-3} = \dfrac{y-3}{2} = \dfrac{z+2}{1}$, is:
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:	If A and B are two independent events with $P(A) = \dfrac{3}{5}$ and $P(B) = \dfrac{4}{9}$, then $P(A' \cap B')$ is equal to
A:	$\dfrac{4}{15}$
B:	$\dfrac{8}{45}$
C:	$\dfrac{1}{3}$
D:	$\dfrac{2}{9}$

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:	A biased dice is thrown once. If X denotes the number appearing on it and have probability distribution :

x	1	2	3	4	5	6
P(X = x)	k	k/2	2k	$8k^2$	1–5k	k/2

where k > 0. Then consider the following statements :

    A. P(X = 3).
    B. P(X ≤ 2).
    C. P(X ≥ 5).
    D. P(X = 4).
    E. P(X = 1) + P(X = 5).

Choose the correct answer from the options given below:

A:	C>D>B>A>E
B:	E>C>D>A>B
C:	E>C>A>B>D
D:	C>E>A>B>D

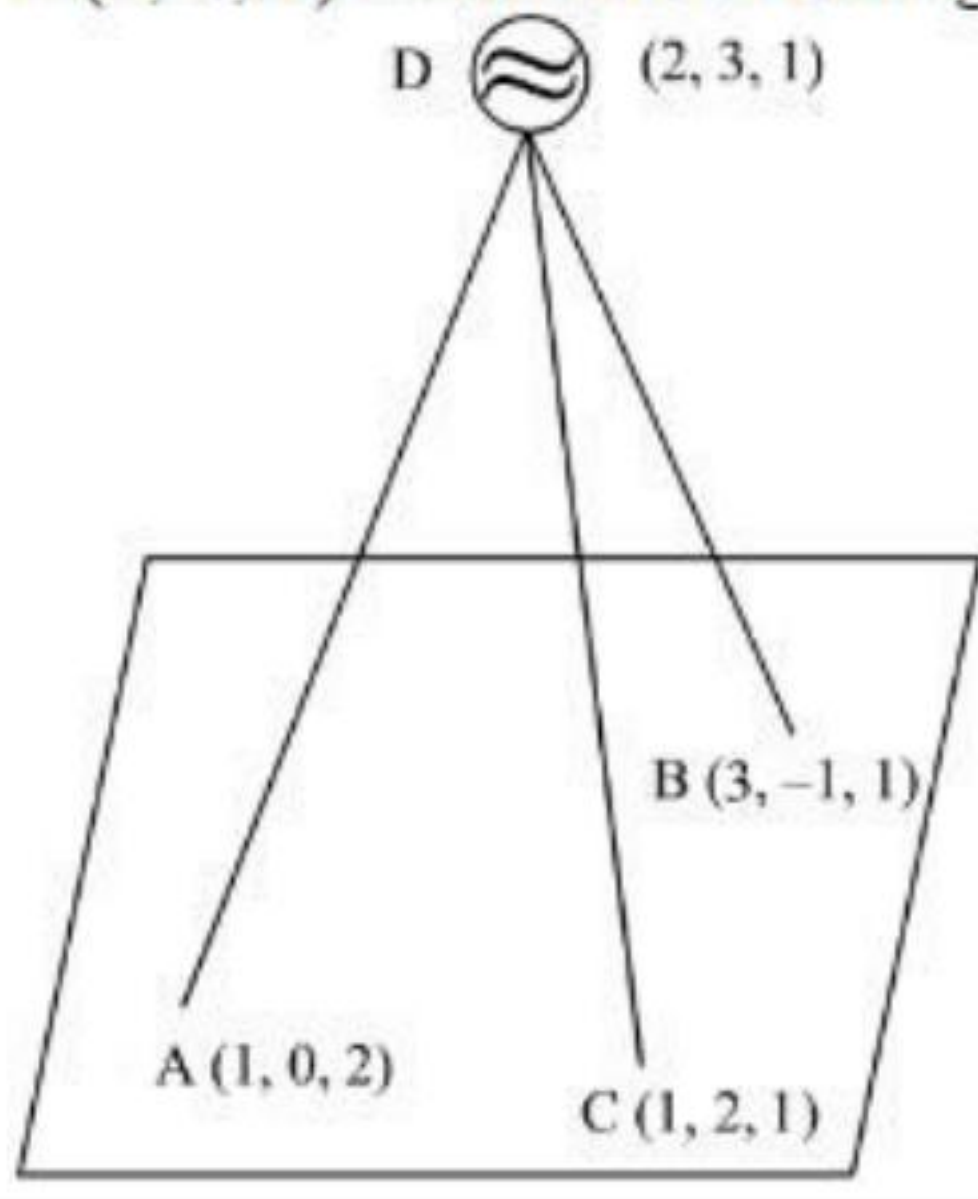| Section:	MATHEMATICS CORE
Item No:	76
Question ID:	4813276
Question Type:	MCQ
Passage:	In a school, a auditorium was used for its cultural activities. The shape of the floor of the auditorium is rectangular with dimensions x and y (x > y), has fixed parameter p. Based on the above information answer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

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:	$\dfrac{p}{4}$
B:	$\dfrac{p}{2}$
C:	p
D:	$\dfrac{p}{3}$

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:	$\dfrac{p}{2}$
B:	$\dfrac{p}{3}$
C:	$\dfrac{p}{4}$
D:	$\dfrac{p}{16}$

Section:	MATHEMATICS CORE
Item No:	80
Question ID:	**4813280**
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:	Maximum area of floor is:
A:	$\dfrac{p^2}{4}$
B:	$\dfrac{p^2}{16}$
C:	$\dfrac{p^2}{28}$
D:	$\dfrac{p^2}{64}$

Section:	MATHEMATICS CORE
Item No:	81
Question ID:	**4813281**
Question Type:	MCQ
Passage:	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. D ≈ (2, 3, 1) B (3, −1, 1) A (1, 0, 2) C (1, 2, 1)
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
	A ball is thrown upwards from the plane surface of the ground. Suppose the
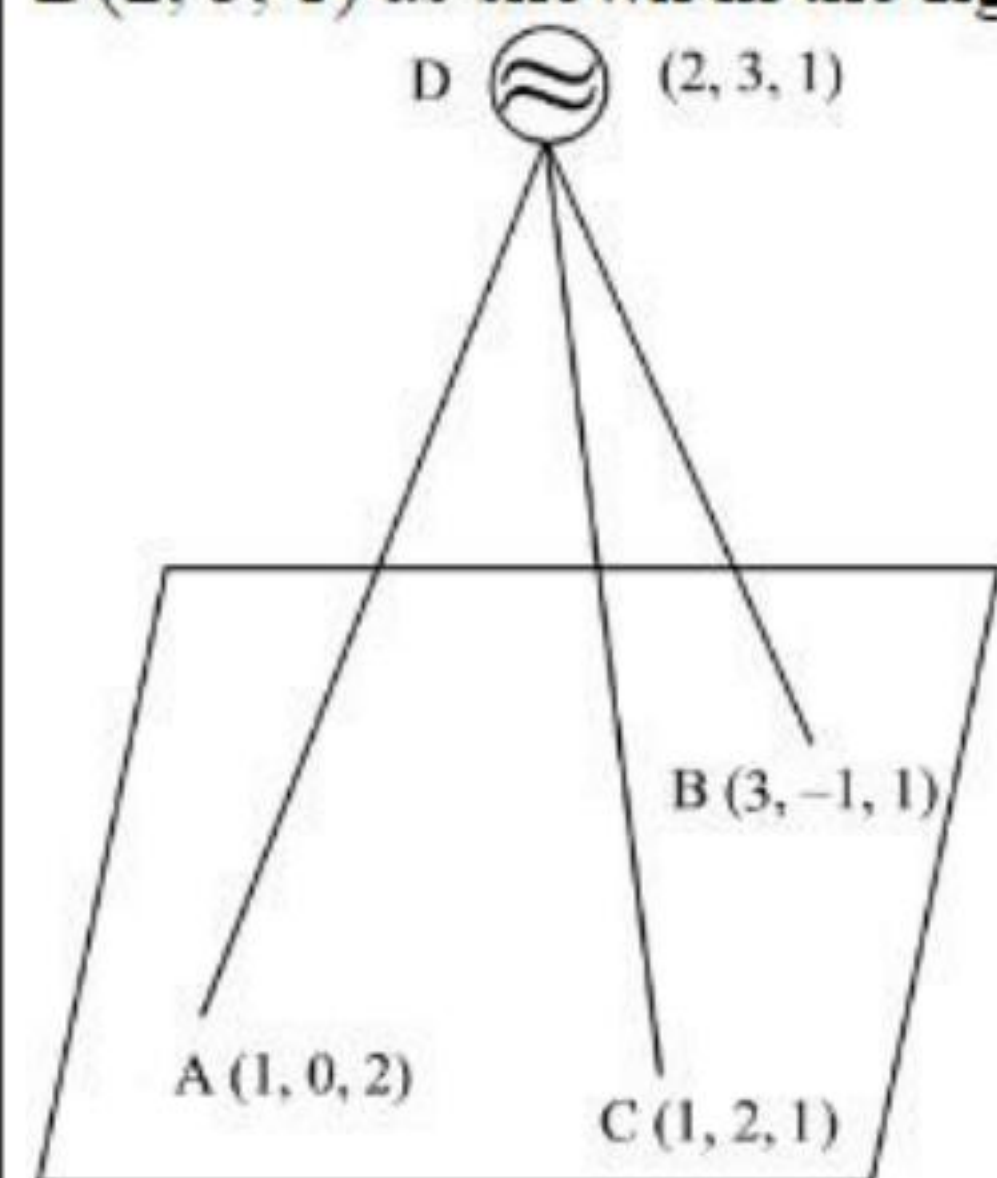
Passage:	

Question:	The maximum height of the ball from the ground is
A:	$\dfrac{5}{\sqrt{29}}$ units
B:	$\dfrac{7}{\sqrt{29}}$ units
C:	$\dfrac{6}{\sqrt{29}}$ units
D:	$\dfrac{8}{\sqrt{29}}$ units
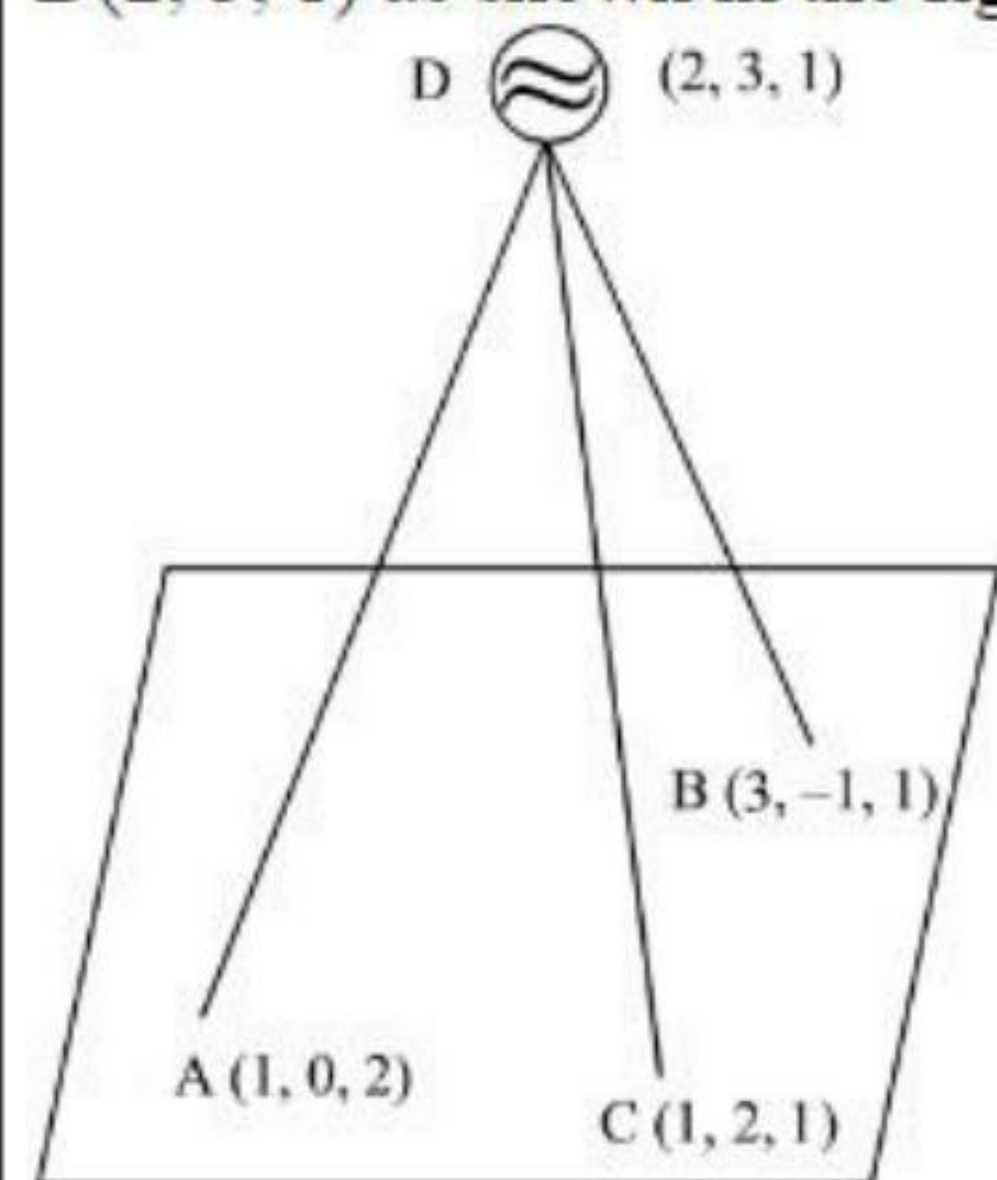
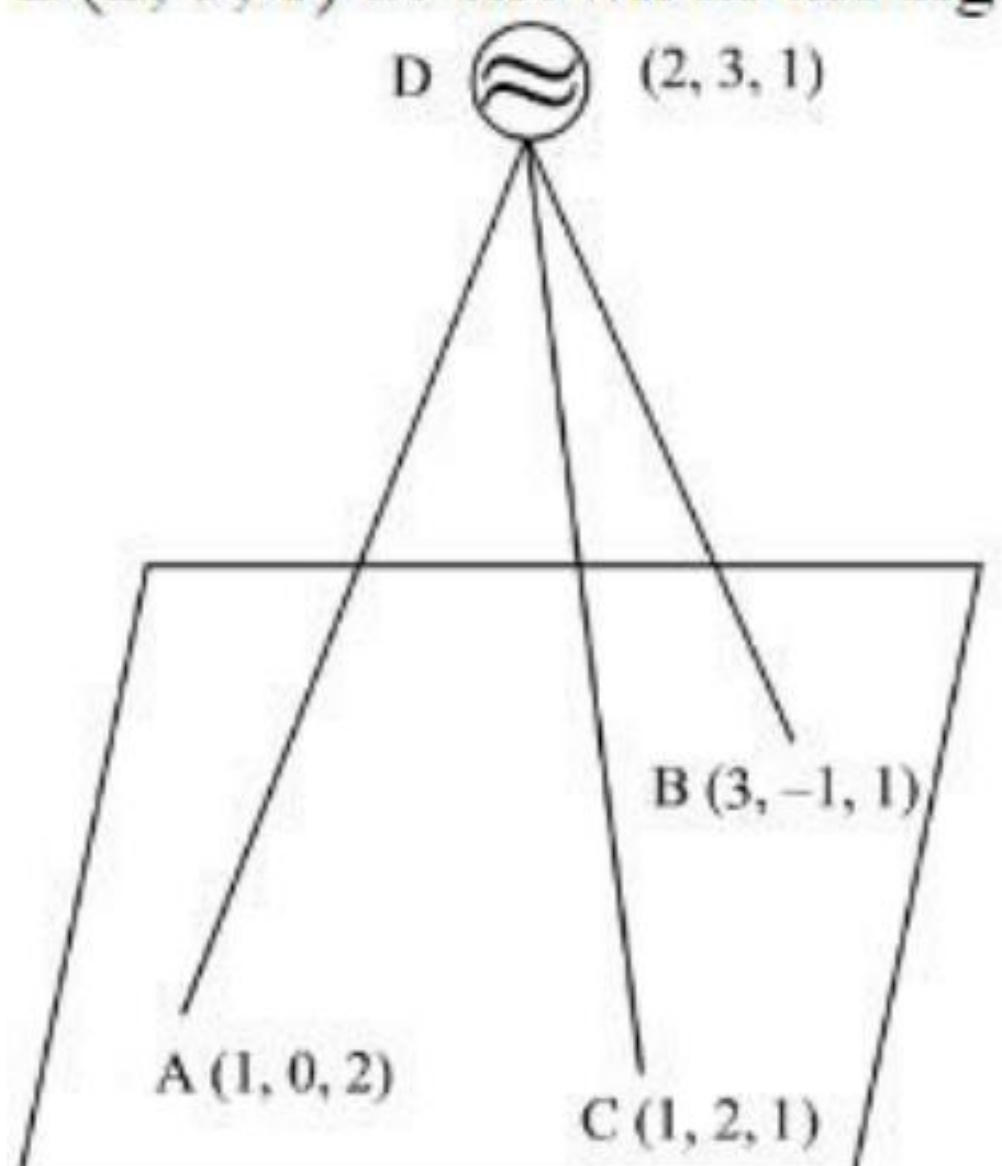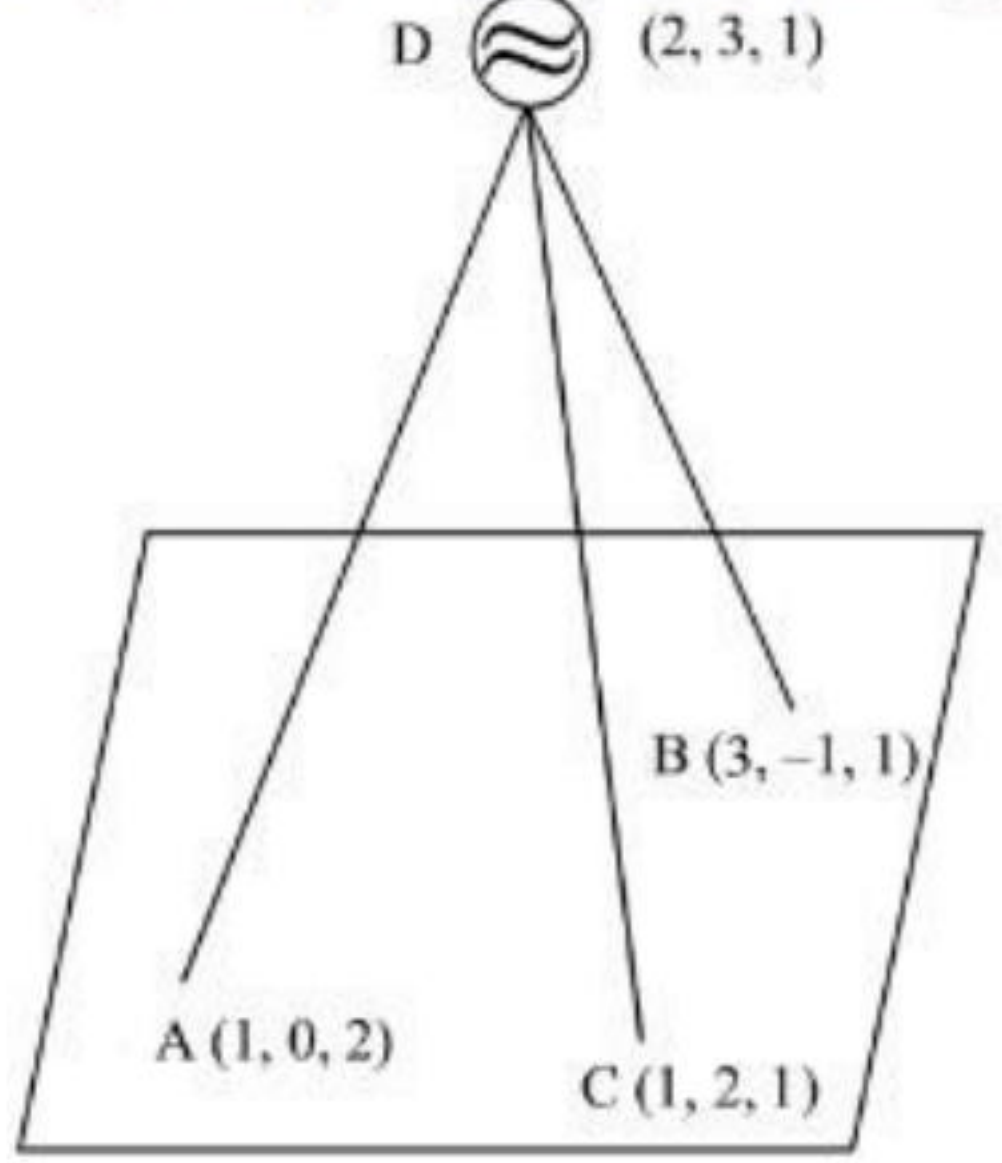|	
Section:	MATHEMATICS CORE
Item No:	83
Question ID:	4813283
Question Type:	MCQ
Passage:	A ball is thrown upwards from the plane surface of the ground. Suppose the plane surface from which the ball is thrown also consists of the points A(1, 0, 2), B(3, −1, 1) and C(1, 2, 1) on it. The highest point of the ball takes, is D(2, 3, 1) as shown in the figure. Using this information answer the question.
Question:	The equation of the perpendicular line drawn from the maximum height of the ball to the ground, is :
A:	$\dfrac{x-1}{2} = \dfrac{y+3}{1} = \dfrac{z-5}{-2}$
B:	$\dfrac{x-2}{-3} = \dfrac{y-3}{2} = \dfrac{z-1}{-4}$
C:	$\dfrac{x-2}{3} = \dfrac{y-3}{2} = \dfrac{z-1}{4}$
D:	$\dfrac{x+1}{-2} = \dfrac{y+3}{-1} = \dfrac{z-5}{2}$

Section:	MATHEMATICS CORE

Item No:	84
Question ID:	**4813284**
Question Type:	MCQ
Passage:	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.
Question:	The co-ordinates of the foot of the perpendicular drawn from the maximum height of the ball to the ground are
A:	$\left(\dfrac{43}{29}, \dfrac{-77}{29}, \dfrac{-9}{29}\right)$
B:	$\left(\dfrac{9}{7}, \dfrac{-1}{7}, \dfrac{-10}{7}\right)$
C:	$\left(\dfrac{43}{29}, \dfrac{77}{29}, \dfrac{9}{29}\right)$
D:	$\left(-\dfrac{13}{29}, -\dfrac{7}{29}, -\dfrac{19}{29}\right)$

Section:	MATHEMATICS CORE
Item No:	85
Question ID:	**4813285**
Question Type:	MCQ
Passage:	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.
Question:	The Area of ΔABC is:
A:	$\sqrt{29}$ sq. units
B:	$\dfrac{1}{4}\sqrt{29}$ sq. units
C:	$\dfrac{1}{16}\sqrt{29}$ sq. units

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