VIDYAPEETH ACADEMY
IIT JEE | NEET | OLYMPIAD | KVPY | NTSE

VMAT
Vidyapeeth Mental Aptitude Test
A Talent Search Exam 2019
4th Edition

SAMPLE TEST PAPER
A TALENT SEARCH EXAM 2019

Time : 2 hours | **Class : 9th_ STAGE - 2** | **Max. Marks : 240**

Name : _____ **Roll No.:** ☐☐☐☐

INSTRUCTIONS

Please read the instructions carefully. You are allotted 5 minutes specifically for this purpose.
You are not allowed to leave the examination hall before the end of the test.

[A] General :

1. Attempt ALL the questions. Answer have to be marked on the **OMR** sheets
2. This question paper contains **60 questions**.
3. The question paper consists of **FIVE Parts Mathematics (Q.No. 1 to 20), Physics (Q.No. 21 to 30), Chemistry (Q.No. 31 to 40), Biology (Q.No. 41 to 50) & Mental Ability (Q.No. 51 to 60)**
4. Blank spaces are provided at the bottom of each page for rough work. No additional sheets will be provided for rough work.
5. Blank paper, clipboard, log tabes, silde rules, calculators, cellular phones, pagers and electronic gadgets in any form are **NOT** allowed.
6. Do not Tamper / multilate the **OMR sheet** or this booklet.
7. Do not break the seals of the question-paper booklet before instructed to do so by the invigilator.
8. SUBMIT the OMR sheet to the invigilator after completing the test & take away the test paper with you.

[B] Filling of OMR Sheet :

9. In all the parts, each question will have 4 choices out of which **only one choice is correct**
10. Use only Black/Blue ball point pen for filling the OMR sheet.
11. On the OMR sheet, darken the appropriate bubble for each character of your name, Registration No., Phone No. etc.

[C] Marking Scheme :

12. For each right answer you will be **awarded 4 marks** if you darken the bubble corresponding to the corrrect answer and **zero marks** if no bubble is darkened. In case of bubbling of incorrect answer, **minus one (-1)** mark will be awarded.

Best of Luck

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PART - I (MATHEMATICS)

(SINGLE CORRECT ANSWER TYPE)

This section contains **(1-15) multiple choice questions.** Each questions has four choices (A), (B), (C) and (D) out of which **ONLY ONE** is correct.

Q.1 $\dfrac{(125)^n \times 5^2 \times \left(5^{-\frac{n}{2}}\right)^3 - (5^n)^{3/2}}{5^{3m} \times 2^3 \times 3} = \dfrac{1}{125}$ then which of the following is true

(A) $2m - n + 2 = 0$ (B) $n - 2m - 2 = 0$

(C) $2m + n - 2 = 0$ (D) $n - 2m + 2 = 0$

Q.2 Find the value of $300[0.09]^{1/2} \times [0.027]^{1/3}$

(A) 25 (B) 9 (C) 27 (D) 3

Q.3 If $x = \sqrt[3]{2\dfrac{93}{125}}$ then the value of x is

(A) $2\dfrac{1}{5}$ (B) $1\dfrac{2}{5}$ (C) $3\dfrac{4}{5}$ (D) $4\dfrac{4}{5}$

Q.4 If the polynomial $f(x) = x^4 - 6x^3 + 16x^2 - 25x + 10$ is divided by another polynomial $x^2 - 2x + k$, the remainder comes out to be $x + a$, find $k + a$.

(A) 5 (B) 0 (C) 10 (D) -10

Space for rough work

Q.5 A cube with a side 1 m long has been cut into cubes of a side 1 dm each. All small cubes have been put one on top of the other, to form a vertical structure. What is the height of this structure ?

(A) 100 m (B) 1 km (C) 10 km (D) 1000 km

Q.6 An equilateral triangle BPC is drawn inside a square ABCD. What is the value of the angle APD in degrees.

(A) 75 (B) 90 (C) 12 (D) 150

Q.7 The ratio of marks obtained by Vindod and Basu is $6 : 5$. If the combined average of their percentage is 68.75 and their sum of the marks is 275, find the total marks for which exam was conducted.

(A) 150 (B) 200 (C) 400 (D) None of these

Q.8 Factorize : $2\sqrt{2}x^3 + 3\sqrt{3}y^3 + \sqrt{5}(5 - 3\sqrt{6}xy)$

(A) $(\sqrt{2}x + \sqrt{3}y + \sqrt{5})(2x^2 + 3y^2 + 5 - \sqrt{6}xy - \sqrt{15}y - \sqrt{10}x)$

(B) $(\sqrt{2}x - \sqrt{3}y + \sqrt{5})(2x^2 + 3y^2 + 5 - \sqrt{6}xy - \sqrt{15}y - \sqrt{10}x)$

(C) $(\sqrt{2}x - \sqrt{3}y - \sqrt{5})(2x^2 + 3y^2 + 5 - \sqrt{6}xy - \sqrt{15}y - \sqrt{10}x)$

(D) None of these

Q.9 If $x + y = a$ and $xy = b$ then the value of $\frac{1}{x^3} + \frac{1}{y^3}$ is equal to :

(A) $a^3 - 3ab$ (B) $\frac{a^3 - 3ab}{b^3}$ (C) $\frac{a^3 + 3ab}{b^3}$ (D) $a^3 + 3ab$

Space for rough work

Q.10 A contractor empolyed 18 labourers at Rs. 12 per day, 10 labourers at Rs. 13.50 per day, 5 labourers at Rs. 25 per day and 2 laboures at Rs. 42 per day. The average wege paid :

(A) Rs. 16 (B) Rs. 20 (C) Rs. 24 (D) Rs. 28

Q.11 A bag contains Rs.225 in the format coins of 1 Rupee, 50 paise and 25 paise in the ratio of $3:4:5$. The number of 25 paise coins are

(A) 108 (B) 144 (C) 180 (D) 225

Q.12 If V is the volume of a cuboid of dimensions a, b and c and 'S' is the surface area, then the relation betwen them is

(A) $\frac{1}{V}=\frac{2}{S}\left(\frac{1}{a}+\frac{1}{b}+\frac{1}{c}\right)$ (B) $\frac{1}{S}=\frac{2}{V}\left(\frac{1}{a}+\frac{1}{b}+\frac{1}{c}\right)$

(C) $\frac{2}{S}=\frac{1}{S}\left(\frac{1}{a}+\frac{1}{b}+\frac{1}{c}\right)$ (D) $\frac{2}{S}=\frac{1}{V}\left(\frac{1}{a}+\frac{1}{b}+\frac{1}{c}\right)$

Q.13 How many zeroes are there in the product of $1\times 2\times 3\times 4.....49\times 50$:

(A) 10 (B) 11 (C) 12 (D) 13

Q.14 If $\frac{p}{q}=\left(\frac{2}{3}\right)^2\div\left(\frac{6}{7}\right)^0$ then the value of $\left(\frac{q}{p}\right)^2$

(A) $\frac{16}{81}$ (B) $\frac{4}{9}$ (C) $\frac{2}{3}$ (D) $\frac{81}{16}$

Space for rough work

Q.15 In an examination there were 1100 Boys and 900 Girls. 50% of the boys and 40% girls passed the examination. The percentage of candidates who failed is :

(A) 45% (B) 54.5% (C) 45.5% (D) 55%

Q.16 If $\sqrt{14 + 6\sqrt{5}} = a + \sqrt{b}$, then find value of $a + b$.

(A) $3 + \sqrt{5}$ (B) $3\sqrt{5}$ (C) 8 (D) $5\sqrt{5}$

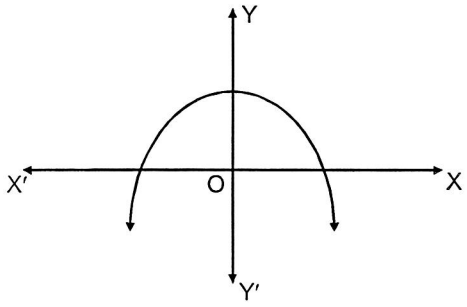
Q.17 A right circular cone is enveloping a right circular cylinder such that the base of the cylinder rests on the base of the cone. If the radius and the height of the cone is 4 cm and 10 cm respectively, then the largest possible curved surface area of the cylinder of radius r is

(A) $20\pi r^2$ (B) $5\pi r(4 - r)$ (C) $5\pi(r - 4)$ (D) $5\pi r(2 - r)$

Comprehension (Q. No. 18 to Q.No. 20)

Zero of a polynomial is that value of x for which the value of the polynomial becomes zero. Number of zeroes of any polynomial is equal to the degree of the polynomial. The zeroes may be real (equal or unequal) or unreal.

Q.18 According to the adjoining graph, the product of the zeroes of the polynomial will be



(A) positive

(B) negative

(C) zero

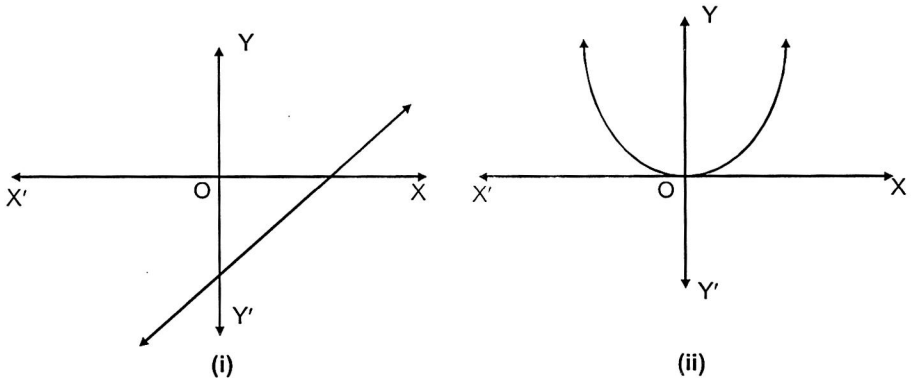
(D) cannot be determined

Space for rough work

Q.19 The ratio of sum of zeroes and product of zeroes of polynomial $2(x-1)(x-3)$ is

(A) $\frac{3}{4}$ (B) $\frac{3}{2}$ (C) $\frac{2}{3}$ (D) $\frac{4}{3}$

Q.20 Consider graphs



If a and b represent number of zeroes respectgively for given figures

(A) $a < b$ (B) $a > b$ (C) $a = b$ (D) cannot say

Space for rough work

PART - II (PHYSICS)

(SINGLE CORRECT ANSWER TYPE)

This section contains **(21-30) multiple choice questions.** Each questions has four choices (A), (B), (C) and (D) out of which **ONLY ONE** is correct.

Q.21 If the value of 'g' (acceleration due to gravity) at

a height h above the surface of the earth is the same as at a depth d below it, then (Assume that h and $d << R$ earth radius) :

(A) $h = d$ (B) $h = d/2$ (C) $d = \frac{h}{2}$ (D) $d = h^2$

Q.22 A force of 20 N acts on a body and the body moves through 1 m at an angle of 45° to the direction of force. The work done by the force is :

(A) $10\sqrt{2}\,J$ (B) $\frac{10}{\sqrt{2}}J$ (C) $-10\sqrt{2}\,J$ (D) $-\frac{10}{\sqrt{2}}J$

Q.23 In which of the following the work done is zero.

(A) Stretaching of a spring

(B) Work done by force of gravity when object is moving upward

(C) Work done by the string when it whirls a stone tied to it, in a circle.

(D) Lifting a weight upwards applying upwards force.

Space for rough work

Q.24 Power of a moving body is stored in the form of :

(A) Work and distance (B) force and distance

(C) force and velocity (D) force and time

Q.25 A manufacturer marks the thermometer wrongly.

At $0^{\circ}C$ it reads $-10^{\circ}C$, at $100^{\circ}C$ it reads $85^{\circ}C$. Then the reading at $50^{\circ}C$ will be :

(A) $40^{\circ}C$ (B) $32.5^{\circ}C$ (C) $37.5^{\circ}C$ (D) $42.5^{\circ}C$

Q.26 The S.I. unit of linear (α), superficial (β) and cubical (γ) expansion coefficient are respectively :

(A) per °C, per $°C^2$, per $°C^3$ (B) all are dimensionless

(C) all has same unit of per °C (D) all has same unit of per K

Q.27 The resultant of mixing equal masses of ice at $-10^{\circ}C$ and water at $60^{\circ}C$ is :

(The specific heat of ice $= 0.5$ cal $g^{-1}X°C^{-1}$)

(A) temperature $0^{\circ}C, \frac{11}{16}$ of total mass of ice melts (B) temperature $0^{\circ}C, \frac{16}{11}$ of total mass of ice melts

(C) temperature $10^{\circ}C, \frac{11}{6}$ of total mass of ice melts (D) data given are not sufficient

Space for rough work

Q.28 Ultrasonic, infrasonic and audible waves travel

through a medium with speeds v_u, v_i and v_a respectively, then :

(A) $v_u < v_i < v_a$ (B) $v_u > v_i > v_a$ (C) $v_u = v_i = v_a$ (D) $v_i < v_a < v_u$

Q.29 A sonar echo takes 4.4s to return from a submarine. If the speed of sound in water is $1500\ ms^{-1}$, then the distance of submarine from the sonar is :

(A) 1500 m (B) 3000 m (C) 3300 m (D) 3600 m

Q.30 A person is listening to a tone of $500\,Hz$ sitting at a distance of 450 m from the source of the sound. What is the time interval between the successive compression from the source ?

(A) 2×10^{-3} s (B) 2×10^{-2} s (C) 2s (D) 0

Space for rough work

PART - III (CHEMISTRY)

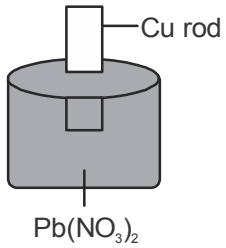
(SINGLE CORRECT ANSWER TYPE)

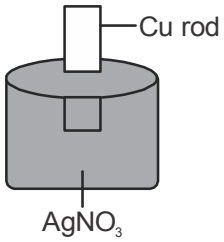
This section contains **(31-40) multiple choice questions.** Each questions has four choices (A), (B), (C) and (D) out of which **ONLY ONE** is correct.

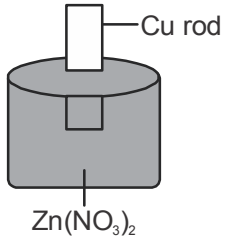
Q.31 Which metal oxide shows amphoteric nature ?

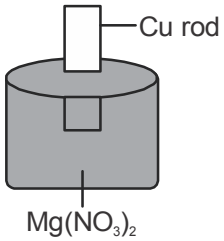
(A) Calcium (B) Zinc (C) Magnesium (D) Bothe (1) and (3)

Q.32 Four colourless salt solutions are placed in separate containers and copper rod is dipped in each. In which container solution turns blue ?

(A) 

(B) 

(C) 

(D) 

Space for rough work

Q.33 Choose the correct option :

Statement - I : It is difficult to cook food at hill.

Statement - II : The boiling point of water increases at hill.

(A) Statement I and II are correct and statement II is the correct explanation of statement I

(B) Statement I and II are incorrect.

(C) Statement I is correct but statement II is incorrect.

(D) Statement I is incorrect but statement II is correct.

Q.34 In liquids, intermolecular forces of attraction are

(A) very weak compared with kinetic energies of the molecules

(B) strong enough to hold molecules relatively close together

(C) strong enough to keep the molecules confined to vibrating about their fixed lattice points

(D) strong enough to hold molecules relatively close together but not strong enough to keep molecules from moving past each other

Q.35 The weight of a china dish with a saturated solution of sodium nitrate at $40^{\circ}C$ is 80 g. After evaporating the whole solution the dish's weight along with the crystals is 40 g and solubility of $NaNO_3$ at $40^{\circ}C$ is 20 g. What is the weight of empty china dish ?

(A) 30 g (B) 28 g (C) 34 g (D) None of these

Space for rough work

Q.36 The heat energy is required to change the state of a substance causes

(A) rise in temperature

(B) no rise in its temperature

(C) separation of forces of attraction between the particles

(D) Both (2) and (3)

Q.37 Calaculate the final mass percentage of the solution obtained by mixing of 200 gm of 30% mass/mass solution and 300 gm of 20% mass/mass solution ?

(A) 24 % (B) 25 % (C) 26 % (D) 27 %

Comprehension (Q. No. 38 to Q. 40)

The term mole was introduced by Ostwald in 1896. A mole (mol) is defined as the number of atoms in 12.01g of carbon-12. The number of atoms in 12g of carbon-12 has been found experimentally to be 6.02×10^{23}. The number is also known as Avogadro's number named in honour of Amedeo Avogadro. A mole of oxygen atoms contains 6.02×10^{23} oxygen atoms and a mole of oxygen molecules contains 6.02×10^{23} oxygen molecules. Therefore, a mole of oxygen molecules is equal to two moles of oxygen atoms, i.e., $2 \times 6.02 \times 10^{23}$ oxygen atoms.

The mass of one mole atoms of any element is exactly equal to the atomic mass in grams (gram-atomic mass of gram atom) of that element. Similarly, the mass of 6.02×10^{23} molecules (1 mole) of a substance is equal to its molecular mass in grams or gram-molecular mass or gram molecule.

Space for rough work

It has also been established by Avogadro's hypothesis that one gram-molecular mass of any gaseous substance occupies a volume of 22.4 litres at NTP. Thus, one mole, i.e., 6.02×10^{23} molecules of any Therefore, number of mole of substance

$$= \frac{\text{Mass of substance in gram}}{\text{Mass of one mole of the substance in gram}}$$

$$\text{Further, Number of moles} = \frac{\text{No. of particles}}{6.02 \times 10^{23}}$$

The molecular formula of a substance may be determined from the empirical formula if the molecular mass of the substance is known. The molecular formula is always a simple multiple of empirical formula and the value of simple multiple is obtained by dividing molecular mass with empiricla formula mass. Hence, empirical formula of a compound can be defined as the simplest whole number ratio formula of the compound.

Consider the following table for compound 'X':

Element	Percentage	Atomic Mass	Relative No. of atoms	Simplest ratio
Carbon	66.67%	12	$\frac{66.67}{12} = 5.55$	$\frac{5.55}{1.85} = 3$
Hydrogen	7.4%	1	$\frac{7.4}{1} = 7.4$	$\frac{7.4}{1.85} = 4$
Nitrogen	25.9%	14	$\frac{25.9}{14} = 1.85$	$\frac{1.85}{1.85} = 1$

Now based on the data given above, answer the following questions.

Space for rough work

Q.38 The empirical formula of the compound 'X' (as per given data) is

(A) $C_{12}H_{16}N_4$ (B) $C_6H_8N_2$ (C) C_3H_4N (D) $C_3H_4N_2$

Q.39 If the molecular mass of the compound 'X' is found to be 108 g/mol, them its molecular formula is :

(A) $C_{12}H_{16}N_4$ (B) $C_9H_{12}N_3$ (C) $C_6H_6N_2$ (D) $C_6H_8N_2$

Q.40 Calculate the total number of atomes present in 54 g of the compound 'X' (N_A = avogadro's number)

(A) N_A (B) 16 N_A (C) 0.5 N_A (D) 8 N_A

Space for rough work

PART - IV (BIOLOGY)

(SINGLE CORRECT ANSWER TYPE)

This section contains **(41-50) multiple choice questions.** Each questions has four choices (A), (B), (C) and (D) out of which **ONLY ONE** is correct.

Q.41 Some farmers were seen adding a type of algae to paddy field to support crop growth. Which algae could they be using ?

(A) Red algae (B) Green algae

(C) Blue green algae (D) Brown algae

Q.42 Which is the correct sequence of arrangement of types of W.B.C. in decreasing order in terms of number per mm^3 of human blood ?

(A) Eosinophils > Basophils > Neutrophils (B) Basophils > Eosinophils > Neutrophils

(C) Neutrophils > Eosinophils > Basophils (D) Eosinophils > Neutrophils > Basophils

Q.43 Which of the following types of human body cells would likely have a high number of lysosomes ?

(A) Heart cells (B) Retinal cells

(C) Muscle cells (D) White blood cells

Q.44 A cell has mitochondria, ribosomes, endoplasmic reticulum and other organelles. Based on this information, it could not be

(A) A cell from a pine tree (B) A bacterium

(C) A grasshopper cell (D) A protozoan

Space for rough work

Q.45 Which of the following methods should be used to increase food production to meet the demand of an increasing population ?

I. Practising efficient land management for agriculture.

II. Continuous research to ensure sustainable development.

III. Using more chemical pesticides to centrol pests.

(A) I and II only (B) I and III only (C) II and III only (D) I, II and III

Q.46 Study the following chart and identify X and Y.

Deforestation → Natural cause → Yes → X
↓
NO
↓
Y

(A) X = Agiculture; Y = Grazing (B) X= Forest fire; Y = Agriculture

(C) X= Forest fire; Y = Drought (D) Both (1) and (2)

Q.47 Choose the wrong statement.

(A) The nature of matrix differs according to the function of the tissue.

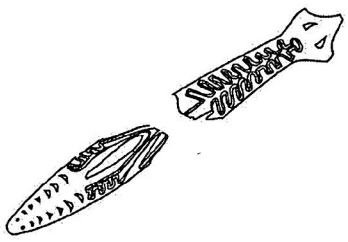
(B) Fats are stored below the skin and in between the internal organs.

(C) Epithelial tissues have large intercellular spaces between them.

(D) Skeletal muscle fibres are multinucleate and unbranched.

Space for rough work

Q.48 What can you conclude about the animal's reproduction shown below ?



(A) It is sexual reproduction (B) It is mimicry.

(C) It is asexual reproduction. (D) It requires both an egg and a sperm.

Q.49 What happens during menopause?

I. Ovulation and menstruation stops. II. Loss of functioning ovarian follicles.

III. Ovarian activity will be reduced.

IV. Increased level of estrogen and progesterone in blood.

(A) I and II (B) III and IV (C) I, II and IV (D) I, II and III

Q.50 A high surface area to volume ratio in cells is important because it

(A) Enables efficient transfer of wastes, nutrients and gases across the cell membrane

(B) Prevents overproduction of cell proteins due to structural limitations.

(C) Allows many antigens on the surface for identification of self and non self

(D) Provides for better structural support ot cope with external physical pressure

Space for rough work

PART - V (MENTAL ABILITY)

(SINGLE CORRECT ANSWER TYPE)

This section contains **(51-60) multiple choice questions.** Each questions has four choices (A), (B), (C) and (D) out of which **ONLY ONE** is correct.

Q.51 In context of France, what was 'tithes'?

(A) A tax levied by the church

(B) Direct tax levied by the state.

(C) The tax levied on the articles of everyday consumption

(D) None of these

Q.52 Who was the leader of Jacobins?

(A) Robespierre (B) Rousseau (C) Locke (D) Montesquieu

Q.53 Who among the following proposed the social contract theory?

(A) Locke (B) Thomas paine (C) Montesquieu (D) Rousseau

Q.54 The book 'Two Treatises on Government' was written by:

(A) Rousseau (B) John Locke (C) Montesquieu (D) Karla Marx

Q.55 Which revolution gave the ideas of liberty, Freedom and Equality to the world?

(A) The American Revolution (B) The French Revolution

(C) The Russian Revolution (D) None of these.

Space for rough work

Q.56 Facing towards South, Ram started walking and turned left after walking 30 m, he walked 25 m and turned left and walked 30 m. How far is he from his starting position and in which direction ?

(A) At the starting point only (B) 25 m, West

(C) 25 m, East (D) 30 m, East

Q.57 If CURVE is written as XFIEV, what stands for THEORY ?

(A) MUTPGK (B) GSVLIB (C) GKPQUM (D) GKNSPF

Q.58 In a row of boys, Mukesh is 8th from the right and Suresh is 8th from rthe left. When Mukesh and Suresh interchange their positions, Suresh becomes 16th from the left. What will be Mukesh's new position from the right?

(A) 15 (B) 16 (C) 17 (D) 18

Q.59 A cube painted red on two adjacent faces and pink on the faces opposite to the orange faces and violet on the remaining faces is cut into sixty-four smaller cubes of equal size. How many cubes have less than three but atleast one face painted ?

(A) 8 (B) 24 (C) 28 (D) 48

Q.60 Choose the missing terms out of the given alternatives.

Z, Y, X, U, T, S, P, O, N, K, ?, ?

(A) HG (B) GF (C) IH (D) JI

Space for rough work

SAMPLE TEST PAPER
ANSWER KEY

1. (D)	2. (C)	3. (B)	4. (B)
5. (A)	6. (D)	7. (B)	8. (A)
9. (B)	10. (A)	11. (C)	12. (A)
13. (C)	14. (D)	15. (B)	16. (C)
17. (B)	18. (B)	19. (D)	20. (C)
21. (B)	22. (A)	23. (C)	24. (C)
25. (C)	26. (D)	27. (A)	28. (C)
29. (C)	30. (A)	31. (B)	32. (B)
33. (C)	34. (D)	35. (A)	36. (D)
37. (A)	38. (C)	39. (D)	40. (D)
41. (C)	42. (C)	43. (D)	44. (B)
45. (A)	46. (B)	47. (C)	48. (C)
49. (D)	50. (A)	51. (A)	52. (A)
53. (D)	54. (B)	55. (B)	56. (C)
57. (B)	58. (B)	59. (D)	60. (C)

V-MAT REWARDS & RECOGNITION

V-MAT- 2016 Glimpses

V-MAT- 2017 Glimpses

V-MAT -2018 Glimpse

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