

SAMPLE PAPER 2014-15





The actual test paper has 50 questions. Time allowed: 60 minutes. There are 3 sections: 15 questions in section I, 30 in section II and 5 in section III.

SYLLABUS

Section – I (Logical Reasoning): Verbal and Non-Verbal Reasoning.

Section — II (Computers and IT): History, Generation and Types of Computers, Working with OS, Input, Output & Memory Devices, Data Representation, Basics of IT, Internet Services and Protocols, Introduction to XML, Networking, Viruses and Antiviruses, Introduction to C++ till Data Structures.

Section – III (Achievers Section) : Syllabus as per Section II.

The actual test paper has 50 questions. Time allowed: 60 minutes. There are 3 sections: 25 questions in section I (Physics and Chemistry), 5 in section II (Achievers Section) and 20 questions in section III (Mathematics or Biology)

SYLLABUS





NATIONAL SCIENCE OLYMPIAD

Section – I (Physics & Chemistry) : *Physics:* Units & Measurements, Mechanics, Properties of Matter, Heat & Thermodynamics, Oscillations, Waves.

Chemistry: Some Basic Concepts of Chemistry, Structure of Atom, Classification of Elements and Periodicity in Properties, Chemical Bonding and Molecular Structure, States of Matter, Thermodynamics, Equilibrium, Redox Reactions, Hydrogen, The \mathfrak{S} -Block Elements, The ρ -Block Elements (Groups 13 and 14), Organic Chemistry - Some Basic Principles and Techniques, Hydrocarbons, Environmental Chemistry.

Section – II (Achievers Section) : Syllabus as per Section I.

Section – III (Mathematics): Sets, Relations and Functions, Principle of Mathematical Induction, Logarithms, Complex Numbers & Quadratic Equations, Linear Inequations, Sequences and Series, Trigonometry, Straight Lines, Conic Sections, Permutations and Combinations, Binomial Theorem, Statistics, Mathematical Reasoning, Limits and Derivatives, Probability, Introduction to 3-D Geometry, Verbal and Non-Verbal Reasoning.

OR

Section – III (Biology): Diversity in the Living World, Structural Organisation in Plants and Animals, Cell: Structure and Functions, Plant Physiology, Human Physiology.



The actual test paper has 50 questions. Time allowed: 60 minutes. There are 4 sections, 15 questions in section I, 20 in section II, 10 in section III and 5 in section IV.

Section II: Logical Reasoning **Section III:** Mathematical Reasoning **Section III:** Everyday Mathematics

Section IV: Achievers Section

SYLLABUS

Sets, Relations and Functions, Principle of Mathematical Induction, Logarithms, Complex Numbers & Quadratic Equations, Linear Inequations, Sequences and Series, Trigonometry, Straight Lines, Circles, Conic Sections, Permutations and Combinations, Binomial Theorem, Statistics, Mathematical Reasoning, Limits and Derivatives, Probability, Introduction to 3-D Geometry, Verbal and Non-Verbal Reasoning.



IN ASSOCIATION WITH BRITISH COUNCIL

OPEN SYLLABUS

National Cyber Olympiad

1.	Pointing to a person, Madhu says, "He is the son of my father's brother's only sister-in-law". How					
	is the person relat	ed to Madhu?	-			
	(A) Son	(B) Brother	(C) Nephew	(D) Uncle		
2.	If 1 is coded as Y, 2 is following is the coded (A) DNPMHLP		D, 4 as H, 5 as T, 6 as L (C) DNPMHLT	., 7 as P, 8 as V and 9 as N, which	ch of the	
3.	Which letter will be alphabets?	the sixth to the rig	ht of the nineteenth le	tter from the right end of the f	ollowing	
			HIJKLMNOPQRS			
	(A) N	(B) M	(C) Y	(D) F		
4.		s did not participate	•	e bottom among those who pa five failed in the examination. Ho (D) 40		
5.	•		ere in the word 'EXPE they have in the Engli (C) Two	RIMENT', each of which has a sh alphabet? (D) Three	as many	
6.	If '+' stands for subtraction; '-' stands for multiplication and 'x' stands for division, then which one of the following equations is correct? (A) $265 + 11 - 2 \times 14 = 22$ (B) $2 - 14 \times 4 + 11 = 16$ (C) $46 - 10 + 10 \times 5 = 92$ (D) $66 \times 3 - 11 + 12 = 230$					
		COMPUTERSA	ND INFORMATION TEC	HNOLOGY		
7.	A device that uses laser-beam scanning technology to read a combination of adjacent vertical lines based on their varying width and spaces between them is					
	(A)	(B)	(C)	(D)		
8.	Which of the follow directly to drives?	ring is a point-to-p	oint serial storage into	erface in which controllers ar	e linked	
	(A) SCSI	(B) RARP	(C) IGMP	(D) IMAP		
9.	 Which of the following is not correct? (A) E-commerce includes all business activities involved in the development, facilitation and implementation of business communications and transaction through electronic media (B) The Intranet is a restricted version of the Internet within a group of users (C) The Extranet is a closed online network connecting two or more organisations (D) None of these. 					
10.	An element can conta		/IL. (C) Attributes	(D) All of these		

11. Computers can be protected from virus by using (A) Software (B) Hardware (C) Software and hardware (D) Cannot be protected at all 12. In MS-Excel 2010, how will you restrict the values of a cell so that only whole numbers between 9 and 99 can be entered in a cell? (A) Formulas tab \rightarrow Data Tools group \rightarrow Data validation (B) View tab \rightarrow Data Tools group \rightarrow Data validation (C) Data tab \rightarrow Data Tools group \rightarrow Data validation (D) Formulas tab → Data Tools group → Data Restriction **13.** $(2AB)_{16} = ($ (D) 001010101010 (A) 00101010111 (B) 0010101011 (C) 111000110101 14. Which of the following are super computers developed by Indian Scientists? 1. PARAM 2. ANURAG 3. GIST CDAC Answer choices (A) 1 & 2 only (B) 1 only (C) All except 3 (D) 1 and 4 15. In printing process, when the output lines temporarily get stored in the disk drive until they are printed is called _____ (A) Buffering (B) Spooling (C) Paging (D) Indexing National Science Olympiad **MATHEMATICS** 1. A man moving on a parabolic path finds the angle of elevation of a pole, standing on the focus of path, to be 75°. If the directrix of path is at a distance of 7 metres from him then height of pole is (B) $\frac{(2+\sqrt{3})}{7}$ m (C) $(14-7\sqrt{3})$ m (D) $\frac{(2-\sqrt{3})}{7}$ m (A) $(14+7\sqrt{3})$ m Three ladies have each brought a child for admission to a school. The head of the school wishes to interview the six people one by one, taking care that no child is interviewed before its mother. The number of ways of doing this is (B) 36 (C) 72 (D) 90 3. A refrigerator is offered for sale at Rs. 250.00 with successive discounts of 20% and 15%. The sale price of the refrigerator is (A) 35% less than Rs. 250.00 (B) 65% of Rs. 250.00 (C) 77% of Rs. 250.00 (D) 68% of Rs. 250.00 4. The number of revolutions of a wheel, with fixed centre and with an outside diameter of 6 m, required to cause a point on the rim to go one km is (A) 880 (B) $440/\pi$ (C) $500/3\pi$ (D) 440π OR **BIOLOGY** Which of the following statements are true for photosynthetic bacteria (PB) and chemosynthetic bacteria (a) obtain energy from the oxidation of inorganic molecule such as ammonium salt (b) obtain energy from sunlight (c) contain photosynthetic pigments (d) are autotrophs. (A) PB - b, c, d; CB - a, d (B) PB - a, c; CB - b, d

(D) PB - a, b, c; CB - b, c, d

(C) PB - b, d; CB - a, b

	 (B) Ethyl alcohol is a source of energy (C) Carbon dioxide is released (D) Less energy is required by fermenting organisms 					
3.	Three bean seedlings were grown in three culture solutions. After six weeks, X had yellow leaves and short internodes, Y has red patches on the stem and Z had green leaves and stem. It can be deduced that (A) X lacked magnesium, Y lacked calcium and Z lacked molybdenum (B) X lacked calcium, Y lacked nitrogen and Z lacks chlorine (C) X lacked calcium, Y lacked nitrogen and Z had all nutrients (D) X lacked magnesium, Y lacked nitrogen and Z had all nutrients					
4.	In the life cycle of a fern the meiosis occurs during the (A) Formation of spores (B) Formation of gametes (C) Germination of a spore (D) Development of a zygote					
	PHYSICS & CHEMISTRY					
5.	$\label{eq:hydrogen} \begin{tabular}{ll} Hydrogen sulphide (H_2S) contains 94.11% sulphur, water (H_2O) contains 11.11% hydrogen and sulphur dioxide (SO_2) contains 50% oxygen. Find the ratio of all given elements. After your calculations which law has been verified? \\ (A) Law of multiple proportion (B) Law of reciprocal proportion (C) Law of constant components (D) Law of combining volumes \\ \end{tabular}$					
6.	An astronaut in the space shuttle orbiting the earth performs a trick for a television audience. She inflates a helium filled balloon within the shuttle's controlled atmosphere and lets go of it. To the astonishment of all watching, the balloon (A) Hovers in place where it was released. (B) Rises noticeably away from the earth. (C) Falls noticeably towards the earth. (D) Drifts backwards opposite to the direction of the shuttle's velocity.					
7.	A boy throws a table tennis ball of mass 20 g upwards with a velocity of u_0 = 10 m/s at an angle θ_0 with the vertical. The wind imparts a horizontal force of 0.08 N, so that the ball returns to the starting point. Then, the angle θ_0 must be such that, $\tan \theta_0$ is (A) 0.2 (B) 0.4 (C) 2.5 (D) 1.2					
	(A) 0.2 (B) 0.4 (C) 2.5 (D) 1.2					
8.	A weight is attached to the free end of a sonometer wire. It gives resonance at a length 40 cm when it is resonanced with a tuning fork of frequency 51Hz. The weight is then immersed wholly in water, the resonant length is reduced to 30 cm. The relative density in which weight suspended is (A) 16/9 (B) 16/7 (C) 16/5 (D) 16/3					
9.	A tank of water has a pinhole leak in the side, 1 m below the water line. If the tank is open to the atmosphere (air pressure = 1.013×10^5 pa), how fast is the water leaving the pinhole? (A) $\sqrt{g/4}$ (B) $\sqrt{g/0.1}$ (C) $\sqrt{2g}$ (D) \sqrt{g}					
10.	One mole of an ideal monatomic gas expands till its temperature doubles under the process V^2T constant. If the initial temperature is 400 K, the work done by the gas is (A) 400 R (B) 200 R (C) -200 R (D) Indeterminate					
11. In the reaction,						
	$4NH_{3(g)} + 5O_{2(g)} \rightarrow 4NO_{(g)} + 6H_2O_{(l)}$					
	when 1 mole of ammonia and 1 mole of O ₂ are made to react to completion:					
	 (A) 1.0 mole of H₂O is produced (B) 2.0 mole of NO will be produced (C) All the oxygen will be consumed (D) All the ammonia will be consumed 					
	(5) The trib definition will be defined the					
	4					

2. Anaerobic respiration releases less energy than aerobic respiration because

(A) Energy from oxygen is not made available

International Mathematics Olympiad

LOGICAL REASONING

1. Tony and Sunil are participating in a jog-a-thon to raise money for charity. Tony will raise Rs. 20, plus Rs. 2 for each lap he jogs. Sunil will raise Rs. 30, plus Rs.1.50 for each lap he jogs. The total amount of money each will raise can be calculated using the following expressions where *n* represents the number of laps run:

Tony: 20 + 2n; Sunil: 30 + 1.50n

After how many laps will they have raised the same amount of money?

- (A) 3
- (B) 6.5
- (C) 14.5
- (D) 20
- **2.** A formula for computing a value r is $r = \frac{mx + my}{wz}$, where m, x, y, w and z are positive integers. An increase in which variable would result in a corresponding decrease in r?
 - (A) m
- (B) x
- (C) y
- (D) z
- **3.** The Venn diagram below shows the types of novels the literature club members read during their summer break.

Which of the following is NOT supported by the information in the Venn diagram?

- (A) 21 members read both an adventure novel and a romance novel
- (B) 64 members read only an adventure novel or a mystery novel
- (C) 26 members read all three types of novels
- (D) 67 members read a romance novel

Adventure Romance

36 14 43
2 73
28

Mystery

Literature Club Summer Reading

- **4.** A guitar manufacturer uses a computer-controlled machine to make electric guitars. The table shows the total number of guitars made after 2, 4, 8 and 16 hours. If *g* represents the total number of guitars made after *h* hours, which equation represents the pattern shown in the table?
 - (A) g = 12h 6
- (B) g = 12h
- (C) $q = 3h^2 6$
- (D) $g = 3h^2 + 6$

Hours (h)	Total Number of Guitars Made (g)	
2	18	
4	42	
8	90	
16	186	

MATHEMATICAL REASONING

5. What is the solution to the system of equations shown below?

$$\begin{cases} 2x - y + 3z = 8 \\ x - 6y - z = 0 \\ -6x + 3y - 9z = 24 \end{cases}$$

- (A) (0, 4, 4)
- (B) $\left(1, 4, \frac{10}{3}\right)$
- (C) No solution
- (D) Infinitely many solutions

6. What is the *n*th term in the arithmetic series below?

- (A) 4*t*
- (B) 3 + 4n
- (C) 2n + 1
- (D) 4n-1
- **7.** A train is made up of a locomotive, 7 different cars, and a caboose. If the locomotive must be first, and the caboose must be last, how many different ways can the train be ordered?
 - (A) 5040
- (B) 181,440
- (C) 362 880
- (D) 823,543
- **8.** If $A + B = \frac{\pi}{4}$ then value of $(1 + \tan A) (1 + \tan B)$ equals
 - (A) 1
- (B) 2
- (C) -2
- (D) -1
- **9.** What are the coordinates of the image of point P(-3, -7) after a reflection about the line y = 2?
 - (A) (-3, 9)

(B) (-3, 11)

(C) (5, -7)

(D) (7, -7)

10. Look at this function

As the value of x increases, the y-values form a repeating pattern.

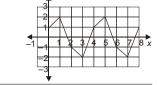
If this pattern continues, what is the y-value when x = 26?

(A) -2

(B) -1

(C) 1

(D) 2



- **11.** What is the range of the function $f(x) = x^2 + 3$ if the domain is $\{-3, 0, 3\}$?
 - (A) {3, 12}

(B) {-6, 3, 12}

(C) All real numbers

- (D) All real numbers greater than or equal to 3
- **12.** The sum of three consecutive odd integers is 21. If *x* is the least of these odd integers, which equation must be true?
 - (A) 3x = 21
- (B) 3x + 3 = 21
- (C) 3x + 4 = 21
- (D) 3x + 6 = 21

EVERYDAY MATHEMATICS

13. Julie works at the amusement park with the maintenance crew. She needs to replace a string of burned-out lights along the arc shown between seat 1 and seat 6. The arc makes up 1/4 of the Giant Wheel.

The 20 seats of the wheel are equally spaced, and the supports from the centre of the wheel to each seat are 15 feet in length. How long, to the nearest foot, does the string of replacement lights need to be?



- (A) 24 feet
- (B) 30 feet
- (C) 47 feet
- (D) 90 feet
- **14.** The typical wingspan of the little blue heron is 4 inches more than half the typical wingspan of the great blue heron. If *g* represents the typical wingspan of the great blue heron, which expression represents the typical wingspan of the little blue heron?
 - (A) $4\left(\frac{1}{2}g\right)$
- (B) $\frac{1}{2}g + 4$
- (C) 2g + 4
- (D) $\frac{1}{2}(g+4)$
- **15.** This diagram shows the angle of inclination of the triangular faces of the Great Pyramid in Egypt.

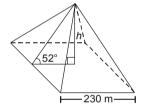
When it was built, the length of each side of the square base was 230 meters. Which equation represents the height, *h*, of the Great Pyramid when it was built?

(A) $h = 115 \sin 52^{\circ}$

(B) $h = 115 \tan 52^{\circ}$

(C) $h = \frac{115}{\sin 52^{\circ}}$

(D) $h = \frac{115}{\tan 52^{\circ}}$





International English Olympiad

WORD AND STRUCTURE KNOWLEDGE

Choose the correct option.

- 1. The project manager wanted to know the _____ of the project I was working on.
 - (A) Hunky-dory
- (B) Spic and span
- (C) Nook and cranny (D) Nitty-gritty

- 2. A teetotaller is one who
 - (A) Sells total tea

- (B) Is an accountant in a tea shop
- (C) Is a T-shirt manufacturer
- (D) Does not drink alcoholic drinks
- 3. The famished beggar the food.
 - (A) nibbled
- (B) gobbled
- (C) pecked
- (D) drank

- **4.** The meeting due to the heavy rains.
 - (A) postponed
- (B) was postponed
- (C) is postpone
- (D) is postponing

5.	Identify the error and Michael Phelp is / the	-	nile Bolt is / the fast ru	nner					
	(A)	(B)	(C) (D)						
6.	My father always (A) stand up	my mother's decis		(D) takes after					
7.	Choose one word tha	at would fit in both the I	olanks.						
	(i) During the cyclor	ne the of the tro	ee fell off.						
	(ii) The new bank ha	s opened three	_ in rural areas.						
	(A) leaves	(B) offices	` '	(D) routes					
		er, A, B, C or D, to co	-						
8.	•	automatic payment (B) we're using	systems instead of cas (C) We use	sh. (D) we must be used					
	For each pair of words, find two words with the same sound but different spelling. Choose from A, B,C or D.								
9.	I cannot to see an (A) bare,beer	y animal suffering. The (B) bare, bear	giant pulled the roof of (C) bear, bare	f the house with his hands. (D) bear,beer					
Coi	mplete the sentence	using the right form	of the verb . Choos	e from A,B,C or D.					
10.	I didn't know where _ (A) sending	the book, so I left (B) send	it on your desk. (C) to send	(D) sent					
		RI	EADING						
		and answer the ques	No.of teenagers of facebook	India ■ USA ■ Japan ■ Germany					
11.	Which European cou (A) India	ntry has the least no. o (B) USA	of teens on Facebook? (C) Japan	(D) Germany					
12.	Which country follows (A) Japan	s India closely? (B) USA	(C) Germany	(D) None of them					
13.	Japan and Germany (A) True	put together have more (B) False	e teens on the Faceboo (C) Cannot say						
		SPOKEN AND W	RITTEN EXPRESSION						
Wh	Which is the right word in each of these sentences? Choose from A, B, C or D.								
	What does your midd (A) letter		(C) initial	(D) not given					
15.	His first book was pul (A) pseudonym		(C) IIIIIIai (C) synonym	(D) fiot given					
	· / F	· / j	· / - J J	· /					

