



# Primrose Schools

Affiliated to the CISCE Board for ICSE & ISC  
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An ISO 9001:2015 Certified Institution

## NATIONAL PRIMTALENT OLYMPIAD EXAMINATIONS MATHEMATICS

**CLASS  
10**

Name :

Section :

Roll no :

### Guidelines for the Candidates

1	Please check your Name, Class and Section on the OMR sheet provided to you.
2	In case, OMR sheet with your name is missing, please fill in information about yourself in the blank sheet provided before start of exam.
3	All questions are compulsory. There is no negative marking. Use of calculator is not permitted.
4	There is only <b>ONE</b> correct answer. Choose only ONE option for an answer.
5	To mark your choice of answers by darkening the circles in OMR sheet, use <b><u>HB Pencil or Blue/Black ball point pen</u></b> only.
6	Rough work should be done in the blank space provided in the booklet.
7	Return the OMR sheet to the invigilator at the end of the exam
8	Please fill in your personal details in space on the top of this page before attempting the paper

## SECTION A – LOGICAL REASONING

1. If in a certain code language 'GRADUATE' is written as '2092623626722', then how will 'LITERATE' be written in that language?

- (A) 1618722926722  
(C) 1518722926722

- (B) 1518722826722  
(D) 1617722825722

W
T
Q
N

K	?	E	B
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2. What letter replaces the question mark in

- (A) H  
(C) G

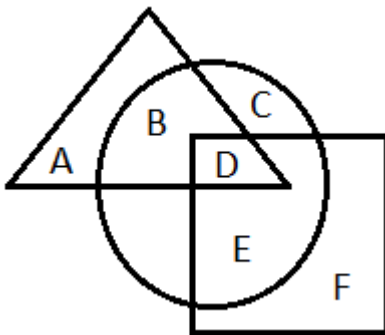
- (B) L  
(D) F

3. P, Q, R and S are four females. P is the eldest in the group but she is not the poorest, R is the richest but not the eldest, Q is elder than S but she is not elder than P or R, P is richer than Q but she is not richer than S. How the four persons can be arranged in decreasing order of their age and money?

- (A) PQRS, RPSQ  
(C) PRQS, RSQP

- (B) PRQS, RSPQ  
(D) PRSQ, RSPQ

4. In the given figure, the circle represents boys, triangle represents players and square represents rurals. What portion represents rural sports boys?



- (A) E  
(C) D

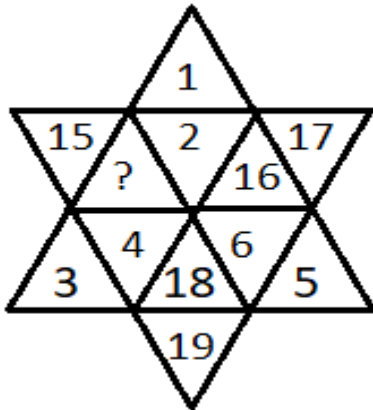
- (B) F  
(D) B

5. You are standing at the centre of a circular field. You go down south to the edge of the field and then turning left, you walk along the boundary of the field equal to three-eighths of its length. Then, you turn left and go right across to the opposite point on the boundary. In which direction are you from the starting point?

- (A) North-West  
(C) South-West

- (B) North  
(D) West

6. Six children A, B, C, D, E and F are standing in a row. B is between F and D. E is between A and C. A does not stand next to either F or D. C does not stand next to D. F is between which of the following pairs of children?  
 (A) B and E (B) B and C  
 (C) B and D (D) B and A
7. Which sequence of letters when placed at the blanks one after another will complete the given letter series?  
**ba \_ b \_ aab \_ a \_ b**  
 (A) abaa (B) abba  
 (C) baab (D) babb
8. Amy, Bella and Claire are sisters. Daren is the brother of Elise and Elise is the daughter of Bella. How is Amy related to Daren?  
 (A) Sister (B) Cousin  
 (C) Niece (D) Aunt
9. What number replaces the question mark?



- (A) 13 (B) 14  
 (C) 20 (D) 21
10. Which sequence of mathematical symbols can replace \* in the given equation to balance the equation?  
 $7 * 7 * 2 * 1 = 12$   
 (A)  $\times - +$  (B)  $+ - \times$   
 (C)  $\times - +$  (D)  $+ \times -$

### SECTION B – MATHEMATICAL REASONING

1. What is the units digit of  $133^{133}$ ?  
 (A) 3 (B) 7  
 (C) 9 (D) 1

2. When a ball bounces, it rises to  $\frac{3}{4}$ <sup>th</sup> of the height from which it fell. If the ball is dropped from a height of 32m, how high will it rise at the third bounce?  
 (A) 13 m (B)  $13\frac{1}{2}$  m  
 (C)  $14\frac{1}{2}$  m (D) none of these
3. The least number which when divided by 2, 3, 4, 5 and 6, leaves in each case, a remainder 1, but when divided by 7 leaves no remainder. The number is \_\_\_\_\_  
 (A) 121 (B) 181  
 (C) 241 (D) 301
4. For the same amount of work, A takes 6 hours less than B. If together they complete the work in 13 hours 20 minutes; find how much time will B alone take to complete the work?  
 (A) 25 hours (B) 30 hours  
 (C) 35 hours (D) 10 hours
5. The average mark of a class of students is 64. When eight new students with an average mark of 73 join the class, the new average of the entire class is a whole number. Find the number of students now in the class, given that n lies between 25 and 60.  
 (A) 36 (B) 28  
 (C) 54 (D) 72
6. Find the probability of selecting a black card or a 6 from a deck of 52 cards.  
 (A)  $\frac{7}{13}$  (B)  $\frac{6}{13}$   
 (C)  $\frac{4}{13}$  (D)  $\frac{5}{13}$
7. Find the value of p, if the mean of following distribution is 20.

$x$	15	17	19	$20+p$	23
$f$	6	9	12	$15p$	18

- (A)  $p = 2$  (B)  $p = 3$   
 (C)  $p = 5$  (D)  $p = 1$
8. What is the smallest integer that satisfies the inequality  $\frac{x-3}{x^2-8x-20} > 0$ ?  
 (A) -2 (B) -10  
 (C) -1 (D) 0

9. If the diagonal of a square is doubled, then its area will be \_\_\_\_\_  
 (A) doubled (B) four times  
 (C) same (D) three times

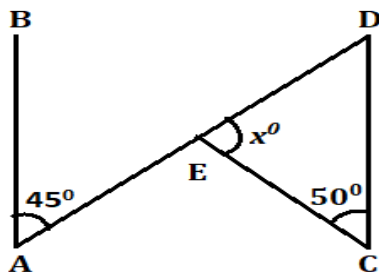
10. The value of  $\frac{\cos^3 \theta + \sin^3 \theta}{\cos \theta + \sin \theta} + \frac{\cos^3 \theta - \sin^3 \theta}{\cos \theta - \sin \theta}$  is equal to \_\_\_\_\_  
 (A) -1 (B) 1  
 (C) 2 (D) 0

11. If  $2^x = 4^y = 8^z$ , find the value of  $x$   
 (A)  $\frac{11}{30}$  (B)  $\frac{11}{32}$   
 (C)  $\frac{10}{31}$  (D)  $\frac{10}{32}$

12. 10% of green balls were added to 20% of yellow balls and the total number balls were 24. Yet three times the number of green balls exceeds the number of yellow balls by 20. How many were green balls and how many were yellow balls?  
 (A) 40, 100 (B) 100, 40  
 (C) 50, 50 (D) 40, 90

13.  $\left(\frac{x^m}{x^n}\right)^{m+n} \left(\frac{x^n}{x^l}\right)^{n+l} \left(\frac{x^l}{x^m}\right)^{l+m} =$  \_\_\_\_\_  
 (A) 0 (B)  $x$   
 (C) 1 (D)  $m + n + l$

14. In the given figure,  $AB \parallel CD$ ,  $\angle BAE = 45^\circ$ ,  $\angle DCE = 50^\circ$ ,  $\angle CED = x^\circ$ , then find the value of  $x$



- (A)  $85^\circ$  (B)  $95^\circ$   
 (C)  $60^\circ$  (D)  $20^\circ$

15. A tile measures  $4m \times 50cm \times 20cm$ . How many such tiles can be stored in a container of dimension 16m long, 12m wide and 4m deep?  
 (A) 1900 (B) 1920  
 (C) 1800 (D) 1840

16. If  $A = \begin{bmatrix} 8 & 9 \\ 5 & -1 \end{bmatrix}$ ,  $B = \begin{bmatrix} -2 & 3 \\ 4 & 0 \end{bmatrix}$ , then  $AB = ?$

- (A)  $\begin{bmatrix} 20 & 21 \\ -14 & 15 \end{bmatrix}$  (B)  $\begin{bmatrix} 20 & 24 \\ 15 & -14 \end{bmatrix}$   
 (C)  $\begin{bmatrix} 20 & -14 \\ 24 & 15 \end{bmatrix}$  (D)  $\begin{bmatrix} 20 & 24 \\ -14 & 15 \end{bmatrix}$

17. Find the value of  $a$  for which the equation  $ax^2 + 2x + 1 = 0$  has real and unequal roots

(A)  $a > 1, a \in R$

(B)  $a < 1, a \in W$

(C)  $a < 1, a \in R$

(D)  $a = 1$  only

18. Find the value of  $x$  if  $\sin x = \sin 60^\circ \cos 30^\circ - \cos 60^\circ \sin 30^\circ$

(A) 1

(B) 0

(C)  $\frac{1}{2}$

(D)  $\frac{1}{4}$

19. Find the value of  $p$  for which the following equation has equal roots

$$x^2 + 4kx + (k^2 - k + 2) = 0$$

(A) 1

(B)  $\frac{2}{3}$

(C) -1

(D) B or D

20. Find the third proportional of  $2x^2, 3xy$

(A)  $\frac{9y^2}{2}$

(B)  $\frac{9y}{2}$

(C)  $6x^3y$

(D) none of these

### SECTION C – EVERYDAY MATHEMATICS

1. Father's age is four less than five times the age of his son and the product of their ages is 288. Find the father's age.

(A) 40 years

(B) 36 years

(C) 30 years

(D) 32 years

2. In the month of January, the police caught 4000 thieves. In February, the number rise by 5%. However, due to constant vigil by the police, the number reduced by 5% and in

April it further reduced by 10%. The total number of thieves caught in the month of April was \_\_\_\_\_

(A) 3125

(B) 3256

(C) 3575

(D) 3591

3. A bag contains Rs 2, Rs 5 and 50 paise coins in the ratio 8 : 7 : 9. The total amount is \$ 555. Find the number of each denomination.

(A) 70, 50, 90

(B) 80, 70, 90

(C) 70, 90, 100

(C) 75, 85, 90

4. A train traveling at 72 kmph crosses a platform in 30 seconds and a man standing on the platform in 18 seconds. What is the length of the platform in meters?

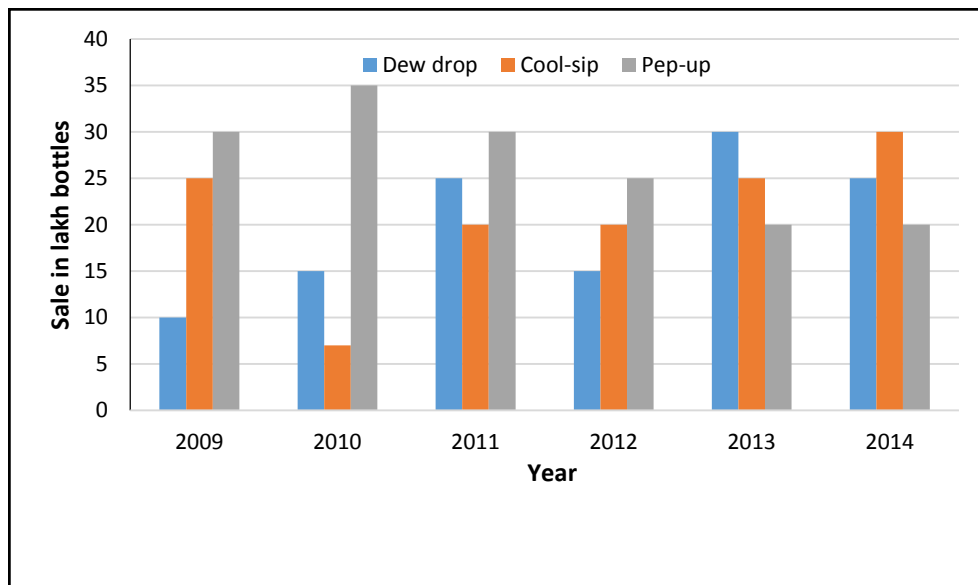
(A) 240 m

(B) 360 m

(C) 420 m

(D) 600 m

5. The graph below shows the sale of soft drink bottles (in lakhs) from 2009 to 2014. According to the graph, in case of which soft drink was the average annual sale maximum in the given period?

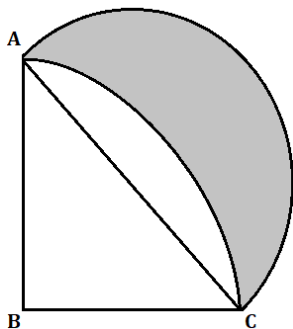


- (A) Pep-up only  
(B) Cool-sip only  
(C) Dew drop only  
(D) Cool-sip and Dew-drop
6. A kite is flying at a height of 50 metres. If the length of string is 100 metre then the inclination of string to the horizontal ground in degree measure is \_\_\_\_  
(A)  $90^\circ$   
(B)  $60^\circ$   
(C)  $45^\circ$   
(D)  $30^\circ$
7. The length of a hall is double its breadth. Its height is 3 metres. The area of its four walls (including the doors) is  $108 \text{ m}^2$ . Find its volume.  
(A)  $215 \text{ m}^2$   
(B)  $216 \text{ m}^2$   
(C)  $217 \text{ m}^2$   
(D)  $218 \text{ m}^2$
8. A boat, while going downstream in a river covered a distance of 50 miles at an average speed of 60 miles per hour. While returning, because of the water resistance, it took one hour fifteen minutes to cover the same distance. What was the average speed of the boat during the whole journey?  
(A) 40 mph  
(B) 48 mph  
(C) 50 mph  
(D) 55 mph
9. Five kg of rice was bought by a shopkeeper for Rs. 300. One kg becomes unsaleable. He sells the remaining in such a way that on the whole he incurs a loss of 10%. At what price per kg was the rice sold?  
(A) Rs 67.50  
(B) Rs 52.50  
(C) Rs 60  
(D) Rs 72.50

10. Ryan gave Rs. 1200 on loan. Some amount he gave at 4% per annum simple interest and remaining at 5% per annum simple interest. After two years, he got Rs. 110 as interest. Then the amounts given at 4% and 5% interests are, respectively \_\_\_\_\_
- (A) Rs 500, Rs 700 (B) Rs 400, Rs 800  
(C) Rs 900, Rs 300 (D) Rs 1100, Rs 1100

### SECTION D -- HIGHER ORDER THINKINGS

1. Determine whether the statements given below are sufficient to answer this question: Is  $kw > 0$ ?  
Statement (1):  $k - w = 10$   
Statement (2):  $k^2 = w^2$   
(A) Statement (1) alone sufficient to answer the question  
(B) Statement (2) alone sufficient to answer the question  
(C) Both statements are needed to answer the question  
(D) Both statements are inadequate to answer the question
2. If  $a + \frac{1}{a} = 3$ , find  $a^2 + \frac{1}{a^2}$   
(A) 6 (B) 7  
(C) 9 (D) 5
3. Find three consecutive largest positive integers such that the sum of one-third of first, one-fourth of second and one-fifth of third is at most 20.  
(A) 23, 24, 25 (B) 20, 21, 22  
(C) 24, 25, 26 (D) 25, 26, 27
4. A bag contains 5 white socks and some black socks. The probability of drawing a black sock is double that of a white sock. How many black socks are there in the bag?  
(A) 10 (B) 3  
(C) 9 (D) 5
5. ABC is a quadrant of a circle of radius 14 cm and a semicircle is drawn with BC as diameter. Find the area of the shaded portion.

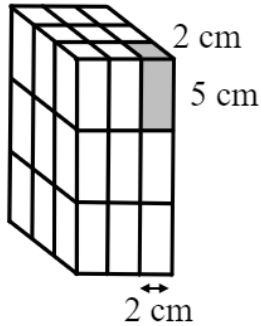


- (A)  $49 \text{ cm}^2$  (B)  $98 \text{ cm}^2$   
(C)  $100 \text{ cm}^2$  (D)  $90 \text{ cm}^2$



6. The mean score of a student in 9 subjects is 58. Find out how much he should score in the tenth subject to raise the mean score to 61.
- (A) 85 (B) 86  
(C) 87 (D) 88

7. What is the volume of the following 3d figure?



- (A)  $500 \text{ cm}^3$  (B)  $540 \text{ cm}^3$   
(C)  $250 \text{ cm}^3$  (D)  $600 \text{ cm}^3$
8. Lia wants to order a gift for her mother from an online retailer. Due to festival season, there is a huge demand for online shopping and eventually deliveries are delayed. She estimates the probability of receiving the gift, in time, from the retailers P, Q, R and S would be 0.6, 0.8, 0.9 and 0.5 respectively. Playing safe, she orders from all four retailers simultaneously. What would be the probability that her mother would receive the gift in time?
- (A) 0.004 (B) 0.994  
(C) 0.216 (D) 0.996
9. A class of 29 students were made to stand in a row, in the increasing order of their heights. The average height of the last 15 students was 102 cm and the average height of the first 15 students was 96 cm. What is the height of the student who is standing in the middle of the row?
- (A) 100 cm (B) 90 cm  
(C) 60 cm (D) 120 cm
10. Which of the following has the largest area?
- (A) a circle of radius  $\sqrt{2}$  (B) an equilateral triangle of side length 4  
(C) a triangle of sides 3, 4 and 5 (D) both A & B