

Paper Type: AD

**M. Prakash Academy Entrance Examination for
Foundation Program IX Std.**

April 17, 2016

10.00 am to 12.30 pm

Total marks: 200

Student's Name:

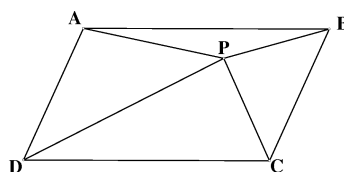
Receipt Number:

Section - Maths:

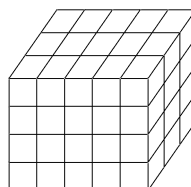
Q 1. If $n = (2 \times 10^{100}) + 3$, then find the sum of the digits of n^2 .

Q 2. n is a natural number divisible by 75. If n^2 is written in decimal notation as $5k05h25$, then find the value of $k^2 + 4h$.

Q 3. $ABCD$ is a parallelogram and P is a point in its interior. If the areas of $\triangle APB$, $\triangle BPC$ and $\triangle CPD$ are 18, 25 and 39 respectively, then find the area of $\triangle DPA$.



Q 4. Consider a wooden cuboid of size $3 \times 4 \times 5$. If a cubical block of size $1 \times 1 \times 1$ is cut away from each of its corners, find the total surface area of the resulting object. .



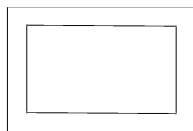
Q 5. Eleven batsmen score runs as follows:

- i. The first five players together score 4 times the total score of the remaining players;
- ii. The first six players together score 5 times the total score of the remaining players; and
- iii. The average score of all eleven players is 30.

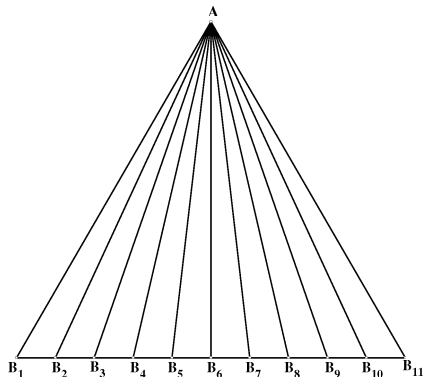
Find the score of the sixth batsman.

Q 6. From 3:00 AM to 3:00 PM, determine the number of times that the hour hand and minute hand are symmetrically placed with respect to line corresponding to six o'clock position.

Q 7. As shown in the figure, a strip with a constant width of 1 meter is paved along the boundary inside a rectangular ground, whose length and breadth are in the ratio 3 : 2. If the area of the paved region is 46 square meters, then find the outer perimeter of the ground in meters.



Q 8. As shown in the figure, B_1, B_2, \dots, B_{11} are eleven equidistant points lying on a straight line, in that order. Point A is chosen so that AB_1B_{11} is an equilateral triangle. A is joined to each of B_1 to B_{11} . Find the total number of acute-angled triangles in the given figure.



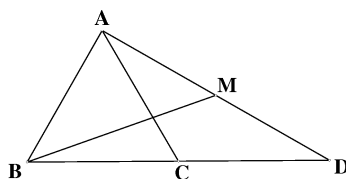
Q 9. A square array of numbers is said to be a magic square, if the sum of the numbers in each of its row, column and main diagonals is equal. In the following 4×4 magic square, find $(a + b + c + d)$ if the sum of the remaining 12 entries is 150.

a			
	b		
		c	
			d

Q 10. Find two digit natural number n such that the greatest common divisor of 2520 and $n + 100$ is 21.

Q 11. Hardik takes 50 minutes to reach his school from his home, when he walks at a constant speed. If he wants to reach his school in 40 minutes, then by what percent should he increase his walking speed?

Q 12. $\triangle ABC$ is an equilateral triangle. D is a point on line BC such that C is the midpoint of BD . Let M be the midpoint of AD . If $AB = 4$, then find BM^2 .



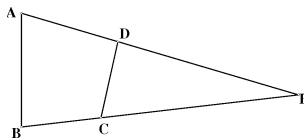
Q 13. Given a rhombus whose area is 240, and one of the diagonals is 16; find the perimeter of the rhombus.

Q 14. Let $a * b$ denote the length of the hypotenuse of a right-angled triangle whose remaining two sides have lengths a, b . If $(12 * 16) * k = 25$, then find the value of k .

Q 15. n is a natural number such that the least common multiple of n and 72 is 360. Find the average of all possible values of n between 52 and 98, which satisfy the above condition.

Q 16. Find the value of $\left[\frac{4}{\sqrt{7}-\sqrt{3}} + \frac{2}{\sqrt{5}+\sqrt{3}} \right]^2 - \sqrt{140}$.

Q 17. $ABCD$ is a cyclic quadrilateral. Lines AD and BC meet at point E . If $m\angle BAD = 75^\circ$ and $\angle ADC = 100^\circ$, then find $m\angle AEB$.



Q 18. n is a two-digit number whose ten's digit is a , and unit's digit is b . When we interchange the digits, the value of the number increases by 20%. Find the value of n .

Q 19. An ant is at point A of a segment AB , having length 12. The ant moves as follows: First it moves 3 units towards B , then moves 2 units towards A ; again moves 3 units towards B , then moves 2 units towards A , and so on. Find the total distance traveled by the ant, when it reaches point B for the first time.

Q 20. In a party, each boy dances with exactly three girls, and each girl dances with exactly four boys. If a total of 35 students are present at the party, how many boys are there?

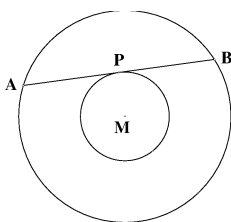
Q 21. If m, n are distinct natural numbers, then find the value of $\frac{1}{1+2025^{m-n}} + \frac{1}{1+2025^{n-m}} + \sqrt{2025}$.

Q 22. A bag contains several 50-paise, 1-rupee and 2-rupee coins, in the ratio 8:6:7 respectively. If the value of the contribution of 2-rupee coins is more by 12 rupees than the contribution of all the remaining coins, then find the total number of coins.

Q 23. In an examination, the ratio of the number of students who passed to the number of students who failed is 4:1. If 20 more students had appeared, and 2 more had passed, then the ratio would have been 2:1. Find the number of students who appeared in the exam originally.

Q 24. Person A can do a piece of work in 26 days. Person B is 30% more efficient than A . In how many days can B complete the same work?

Q 25. As shown in the diagram, two concentric circles have a common center M . P is a point on the smaller circle. A line is constructed perpendicular to MP at P , which meets the bigger circle in points A, B . Given $AB = 12$, and if the area of the region/ring between the two circles is $k\pi$, then find the value of k .



Section - Science:**Useful data:**

Atomic numbers: H:1; C:6; N:7; O:8; P:15; Cl:17; K:19; Ca:20; Cr: 24; Fe:26; Ni:28; Zn:30; S:32;

Atomic mass: H:1; C:12; N:14; O:16; P:31; Cl:35.5; K:39; Ca:40; Cr: 52; Fe:56; Ni:59; Zn:65; S:64.

Q 26. Following is the list of approximate values of the melting points and boiling points of some elements. Observe the values carefully. Find the difference in the boiling point and the melting point of the element that boils at the highest temperature. Enter the numerical part of your answer in the bubble sheet.

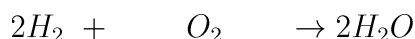
Name of the element	Melting point ($^{\circ}$ C)	Boiling point($^{\circ}$ C)
Hydrogen	-259	-252
Oxygen	-222	-182
Nitrogen	-210	-196

Q 27. Following is the list of some elements. Identify the element that forms a very strong acid, called as the “king of chemicals”. Write the number of neutrons in one atom of this element. Use the data above to furnish your answer. S, N, Cl, P.

Q 28. There are two samples of Methane gas. 1st sample has ^{12}C isotope of Carbon. 2nd sample has ^{14}C isotope of Carbon. Atomic number of Carbon is 6. Find the difference in the sum of total number of protons + neutrons + electrons of carbon in 10 molecules of 1st sample and 12 molecules of 2nd sample.

Q 29. Density of Acetic acid is 1049 Kg/m^3 . 100 ml of Benzene has a mass of 87.4 grams (Both at 25°C .) Use this data to find the densities of Acetic acid and Benzene in gm/cc . If the density of the heavier liquid is $K \text{ gm/cc}$ write the value of $10K$.

Q 30. In one experiment,



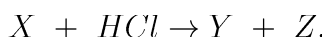
$$4 \text{ grams} + 32 \text{ grams} = 36 \text{ grams}$$

The molecular masses are obtained by appropriate addition of atomic masses.

In another experiment, when ‘p’ gms Potassium hydroxide has reacted with Nitric acid, 101 grams of the salt is obtained. Find ‘p’.

Q 31. Metal ' X ' is a light metal which is used in alloys to make aeroplane bodies . On reaction with HCl it forms XCl_3 .

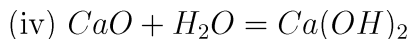
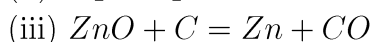
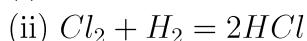
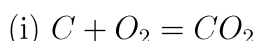
Identify ' X ' . Compute the balanced chemical equation of the complete reaction of



Write the sum of the coefficients of all the reactants and products in your bubble sheet.

Q 32. Find the average of the atomic numbers of the elements making stainless steel.

Q 33. Identify in which of the following reactions the first reactant is undergoing reduction. If the sum of the molecular masses of the species undergoing reduction in the above identified reactions is ' X ', find $\frac{X}{2}$.



Q 34. There are 2 beakers containing same quantity of water but at different temperatures . Beaker 1 is at 40°C and beaker 2 is at 80°C . Both are supplied with the same amount of heat for same duration. Beaker 1 shows temperature rise of 10°C . What will be the temperature rise in beaker 2 in $^\circ\text{C}$?

Q 35. A drop of water contains 1.7×10^{21} molecules. If the water evaporated at the rate of one million molecules per second, how many years would it take for the drop to completely evaporate? If your answer is expressed in scientific notation as $N \times 10^X$, write the value of X in your bubble sheet.

Q 36. The masses of the inner planets of the Solar System are;
Mercury: 3.3022×10^{23} kg,

Earth: 5.9722×10^{24} kg,

Venus: 4.8685×10^{24} kg, and

Mars: 6.4185×10^{23} kg,

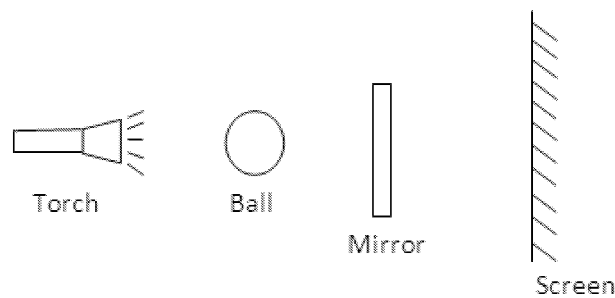
What is the average mass of all four inner planets? If your answer is expressed as $N \times 10^{23}$, write the integer part of number N in your bubble sheet.

Q 37. A metal block 'A' of 500 gms has dimensions $10 \times 20 \times 30$ cm and a metal block 'B' of 400 gms has dimensions $12 \times 15 \times 20$ cm. A and B can be placed on each other or side-by-side. They are placed such that there is maximum pressure on the ground. Calculate maximum pressure. Express your answer in Pascal.

Q 38. You are at a spot 20 km north of your house. You drive East from there at a constant speed of 60 km per hour toward the pizza shop and arrive there 45 minutes later to pick up your pizza. Then you travel 10 km north to reach your friends house. How far from your house are you?

Q 39. Mohan and Ramesh run a race between points *A* and *B*. Distance between *A* and *B* is 5000 meters. Mohan starts at 10:00 am from *A* at a speed of 5 km/hr, reaches *B* and returns to *A* at same speed. Ramesh starts at 10:45 am from *A* at a speed of 10km/Hr, reaches *B* and comes back at *A* at same speed. If they both meet each other at X:Y am, find Y.

Q 40. The figure below shows a beam of light from a torch shining on a ball and a Square mirror. A shadow is cast on the screen.



The shape of shadow as seen on the screen will be

- (11) Circular
- (22) Oval
- (33) Square
- (44) Can not be predicted