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- Please check that this questionnaire contains **15** printed pages.
- Code A, B or C given on the right hand top corner of the questionnaire should be written on the answer sheet in the space provided.
- Please check that this questionnaire contains **60** questions.

34th ARYABHATTA INTER-SCHOOL MATHEMATICS COMPETITION – 2017

CLASS - VIII

Time Allowed: **2 Hours**

Max. Marks: **100**

GENERAL INSTRUCTIONS:

1. Do not write your name on the questionnaire.
 2. Write your roll no. on the questionnaire and the Answer Sheet in the space provided.
 3. All the questions are compulsory.
 4. Read questions carefully; think twice before you write the answer. **No overwriting or cutting is allowed on the Answer Sheet.** Another copy of the questionnaire or answer sheet will not be provided.
 5. Do your rough work in the space provided in the questionnaire.
 6. The questionnaire contains four sections. Section A contains **10** questions on Logical Reasoning of 1 mark each, Section B contains **20** Multiple Choice Questions of 1 mark each, Section C contains **20** Free Response Type Questions of 2 marks each and Section D contains **10** Free Response Type Questions of 3 marks each.
 7. No working or descriptive answers of any question is to be given. Only the Answers are to be written on the Separate Answer sheet provided to you.
 8. Use Blue or Black pens to write the answer on the Answer Sheet.
 9. Answers should be written clearly in the space provided on the Answer sheet.
 10. Use of calculator is not allowed.
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SECTION-A

Write the correct option (a, b, c or d) in the Answer sheet.

1. The alphabets a, b, c, d, e, f, g, h and i are assigned numbers 1 to 9 but not in that order. Number 6 is assigned to alphabet f. The difference between f and c is 3 and the difference between e and c is 4. What is the number assigned to 'e' ?
a) Neither 2 nor 3 b) either 2 or 3 c) neither 5 nor 7 d) either 5 or 7
2. If $8 \div 5 = 12564$, $9 \div 6 = 21681$, $3 \div 2 =$
a) 827 b) 89 c) 927 d) 98
3. In the following question some numbers are given in the shape of figures
 $\square \div \square = 2$, $\square \div \square = 5$, $\square + \square = 7$, $\square \times \square = 18$, What is the value of \square ?
a) 9 b) 6 c) 3 d) 2
4. Which of the interchanges of sign(s) and numerals would make the following equation correct?
 $3 + 5 - 2 = 4$
a) + and - ; 2 and 3 b) + and - ; 2 and 5 c) only + and - d) + and - ; 3 and 5
5. The capital letters in each of the following words are coded and written in small letters on the right side of each word. But these letters are not in order.
PROBLEM grcatsd
ROMAN cftxs
LAME fgat
BOLD gcdz
What would be the code for the word 'MODE' ?
a) tfzc b) ctzf c) ftcz d) ctaz

SPACE FOR THE ROUGH WORK

6. Find the missing number :

50	1	7
111	11	10
435	111	?

- a) 20 b) 18 c) 16 d) 14
7. Five police booths A,B,C,D and E are situated in the following manner : A is 1 km East of D , B is 2 km South of E , C is 2 km South of A and E is 3 km West of D. Distance between A and E is _____km.
- a) 2 b) 5 c) 3 d) 4
8. P, Q, R and S are playing carom. P, R and S, Q are the partners. S is to the right of R who is facing West. To which direction Q is facing?
- a) East b) West c) North d) South
9. Next two numbers of the sequence: 28, 121, 35, 144, 42, 169, . . . are:
- a) 49,196 b) 196,49 c) 56,199 d) 56,225
10. How many 9's are there which come after 6 or a multiple of 3?
699969796979592989696999979896978
- a) 7 b) 9 c) 11 d) 6

SPACE FOR THE ROUGH WORK

SECTION-B

Write the correct option (a, b, c or d) in the Answer sheet.

11. The cost of diamond varies directly as the square of its weight. A diamond weighing 10 decigram costs Rs. 8000. If it is broken into two pieces, whose weights are in the ratio of 3:2, then the loss incurred is _____.

- a) 3840 b) 3960 c) 4040 d) 4160

12. If the mean of 4,3,x+2,7 and 11 is 6, the mean of the mode and the median of the data 13,4,3,5,x,7,11,15,10 is _____.

- (a) 0 b) 4 c) 5 d) 3

13. If the sum of digits of a number $(10^n - 1)$ is 4707, where n is a natural number, then the value of n is :

- a) 477 b) 523 c) 532 d) 704

14. Which of the following is equal to 1?

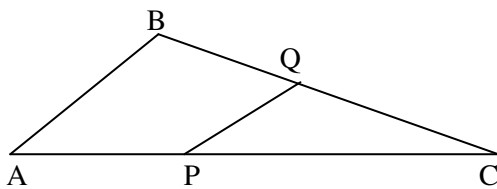
- a) $\frac{0.0121}{1.21 \times 0.1}$ b) $\frac{0.0121}{0.121}$ c) $\frac{(0.011)^2}{(1.1)^2 (0.01)^2}$ d) $\frac{(0.11)^2}{(11)^2 \cdot 0.01}$

15. The number $\frac{1}{1+\sqrt{5}}$ lies between the numbers :

- a) $\frac{1}{3}$ and $\frac{1}{2}$ b) $\frac{1}{2}$ and $\frac{1}{\sqrt{2}}$ c) $\frac{1}{4}$ and $\frac{1}{3}$ d) $\frac{1}{4}$ and $\frac{1}{5}$

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21. Runs scored by B in a match are 10 more than the balls faced by A. The number of balls faced by B is 5 more than the runs scored by A. Together they scored 50 runs and B has faced 15 balls less than A. What is the number of runs scored by A per ball?
 a) 2.67 b) 2.33 c) 0.5 d) 0.33
22. An equilateral triangle and a regular hexagon has equal perimeters .If the area of the triangle is 12 sq. cm, then the difference of their areas (in sq. cm) is _____.
 a)2 b) 4 c) 6 d) 8
23. In a rhombus ABCD , $\angle DAB = 60^\circ$ and diagonals $AC=d_1$ and $BD=d_2$ then $d_1 : d_2$ is _____
 a)1:2 b) $\sqrt{3} : 1$ c) $\sqrt{3} : 2$ d) $2\sqrt{3} : 1$
24. In a right triangle ABC , with right angle at C , $AB = c$, $BC= a$, $CA=b$ and $CL=p$, where $CL \perp AB$, then which one of the following is true:
 a) $\frac{1}{p} = \frac{a}{bc} + \frac{c}{ab} + \frac{b}{ca}$ b) $\frac{1}{p} = \frac{c}{ab} + \frac{a}{bc}$ c) $\frac{1}{p} = \frac{b}{ca} + \frac{c}{ab}$ d) $\frac{1}{p} = \frac{a}{bc} + \frac{b}{ca}$
25. In triangle ABC, $AP = c$, $PC = b$, $PQ = a$, $AB = x$ and $AB \parallel PQ$, then :



- a) $x = a + \frac{ab}{c}$ b) $x = a + \frac{bc}{a}$ c) $x = a + \frac{ac}{b}$ d) $x = b + \frac{ac}{b}$

SPACE FOR THE ROUGH WORK

26. The ratio of rates of doing work of P, Q and R is 3:4:5. If they completed a job working together, what part of it did P complete?
 a) $\frac{1}{4}$ b) $\frac{20}{47}$ c) $\frac{1}{3}$ d) None of these
27. ABCD is a cyclic quadrilateral and $\angle BCD = 2\angle BAD$. The angle made by the diagonal BD at the centre(in degrees) is :
 a) 100 b) 120 c) 75 d) 150
28. What is the time when the hands of a clock coincides between 12:00 noon and 2:00 p.m. ?
 a) $1:05\frac{5}{11}$ p.m. b) $1:06\frac{5}{11}$ p.m. c) $1:07\frac{5}{11}$ p.m. d) $1:05$ p.m.
29. The volume and surface area of a cylindrical solid of radius 'r' units are V and S respectively. If the height of the cylinder is 1 unit , then $\frac{V}{S}$ is_____.
 a) $\frac{1}{2}\left(1-\frac{1}{r+1}\right)$ b) $\frac{1}{2}\left(1+\frac{1}{r+1}\right)$ c) $\frac{1}{2}\left(1-\frac{1}{r}\right)$ d) $\frac{1}{2}\left(1+\frac{1}{r}\right)$
30. In a parallelogram ABCD, BP=PC. (where P is a point on BC). Line DP intersects AC at Q and meets side AB produced to X at R, then DQ: QP: PR is equal to _____.
 a) 1:2:3 b) 1:3:2 c) 2:1:3 d) 3:2:1

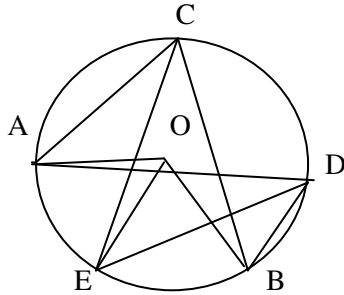
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SECTION-C

Write the Answers only in the space provided on the Answer sheet.

31. Vishal goes to a shop to buy a radio costing Rs.2568. The rate of sales tax is 7%. He tells the shopkeeper to reduce the price of radio to such an extent that he has to pay Rs. 2568 inclusive of sales tax. Find the reduction in the price of the radio.
32. A field is in the shape of a square with area $11\frac{2}{3}$ sq.m. Find the side of the field (in m) correct to two places of decimal.

33.



In the given figure $\angle AOE = 65^\circ$, $\angle AOB = 95^\circ$, then find $\angle ACE + \angle ACB - \angle ECB$.

34. If $\frac{x}{2a-3b} = \frac{y}{3b-4c} = \frac{z}{4c-2a} = 2$, then evaluate $x^3 + y^3 + z^3$.

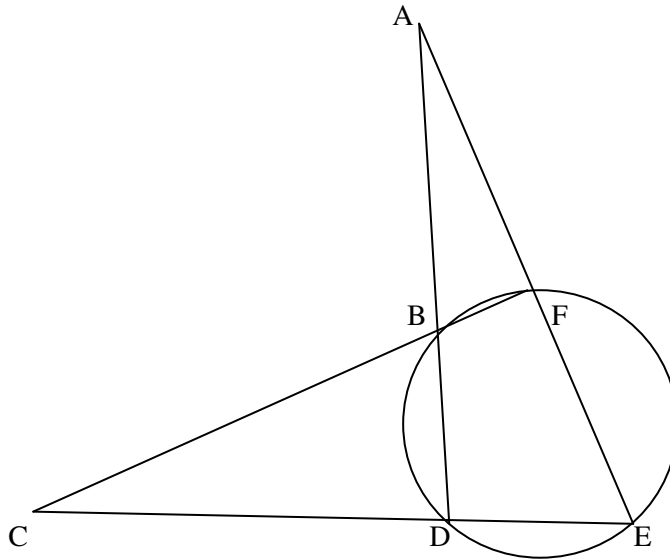
35. Find the value of $\sqrt[3]{\frac{-2197}{1331}} + \sqrt[3]{\frac{27}{-512}} + \sqrt{4\frac{29}{49}}$.

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36. If -2 and 1 are zeros of the polynomial $p(x) = x^3 + 10x^2 + px + q$, then find the value of $q^2 - p^2$.
37. The average of n numbers is 'a'. If one of the number 'y' is replaced by 'x', the average becomes 'b'. Find the value of n .
38. Evaluate: $\sqrt[3]{1+3+5+7+\dots+53}$.
39. Vessels A and B contain mixtures of milk and water. The ratios of milk and water in A and B are 4:5 and 3:1 respectively. In what ratio should the contents of A and B be drawn and mixed, to obtain a mixture having milk and water in the ratio 3:2?
40. If $2^a + 3^b = 17$, $2^{a+2} - 3^{b+1} = 5$, then find the value of $a + b$.
41. Factorize: $x^2 - y^2 + z^2 - a^2 + 2(xz + ay)$.
42. A sum triples in four years under compound interest at a certain rate of interest, interest being compounded annually. In how many years it would take to become 9 times itself.

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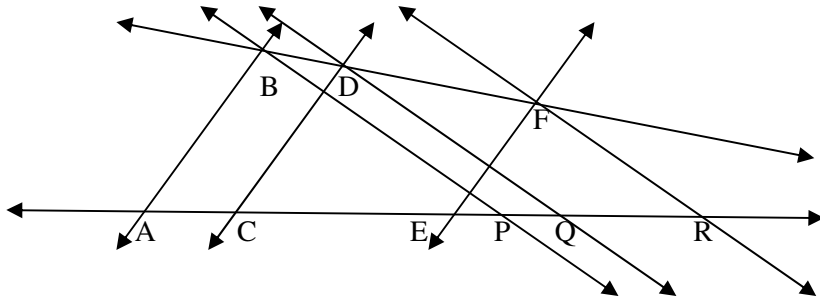
43. If $\frac{9^n \times 3^2 \times \left(3^{\frac{n}{2}}\right)^{-2} - 27^n}{3^{3m} \times 2^3} = \frac{1}{27}$, then find the value of $m - n$.
44. If $x^2 - 1$ is a factor of $ax^4 - bx^3 + cx^2 + dx + e$, then find the value of $a + c + e$.
45. If the digits of a three digit number are reversed, then the number so obtained is less than the original number by 297. If the sum of the digits of the number is 8 and its ten's digit has the least value, then find the ten's digit of the number.
46. If there are n numbers of which one is $\left(1 - \frac{1}{n}\right)$ and all others are 1's, then the arithmetic mean of these numbers is less than 1 by _____.
47. In the given figure, $\angle A = 60^\circ$, $\angle C = 40^\circ$, then find $\angle DBF - \angle DEF$.



SPACE FOR THE ROUGH WORK

48. A cube of largest volume is carved out of a solid sphere. If V and v are volumes of the sphere and the cube respectively, then find the ratio $V:v$ (in terms of π) .

49. $AB \parallel CD \parallel EF, BP \parallel DQ \parallel FR, AC = a, CE = b, CE$ is thrice of AC , then $\frac{PQ}{QR} + 1$ is _____ .



50. A sum takes two years to become 40% more under the simple interest at a certain rate of interest. If it was lent at the same interest rate for the same time under compound interest, interest being compounded annually, it would amount $x\%$ more than itself. Find x .

SPACE FOR THE ROUGH WORK

SECTION-D

Write the Answers only in the space provided on the Answer sheet.

51. With the vertices A, B and C of a triangle ABC as centres, arcs of radii 5cm each are cut off. If AB=14 cm, BC= 48 cm and CA=50 cm, then calculate the area of the remaining triangle (in sq.cm).
(use $\pi = 3.14$)
52. Two solutions of sulphuric acid are mixed in the ratio 2:3. The concentration of sulphuric acid in the first and the second solutions are 10% and 20% respectively. Find the concentration of the sulphuric acid in the final mixture.
53. If $(a^2 + b^2)^3 = (a^3 + b^3)^2$ and $ab \neq 0$, then find $\left(\frac{a}{b} + \frac{b}{a}\right)^6$.

SPACE FOR THE ROUGH WORK

54. A solid metal cylinder of height h cm and diameter 14 cm is melted and re-cast into two cones of the same height in the proportion of 3:4 of volume. Find the percentage change in the surface area (excluding the curved surfaces).

55. If $y = \sqrt{5 - 2\sqrt{6}} + \sqrt{10 - 2\sqrt{21}}$ then find the value of $y + \frac{5}{y}$.

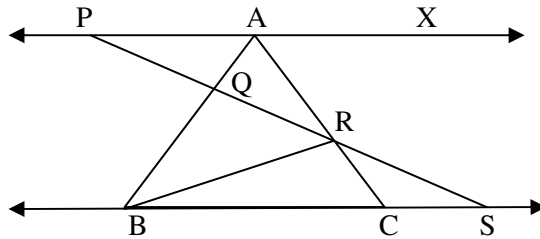
56. 15 men can complete a work in 210 days. They started the work but at the end of 10 days, 15 additional men with double efficiency, were included. How many hours in all did they take to finish the work?

SPACE FOR THE ROUGH WORK

57. Two trains are travelling in opposite direction at uniform speed 60 kmph and 50 kmph respectively. They take 9 seconds to cross each .If the two trains had travelled in the same direction, then a passenger sitting in the faster train would have overtaken the other train in 18 seconds. What is the difference of the lengths of the trains (in metres).
58. A circular road is constructed outside a square field. The perimeter of the square field is 200 ft. If the width of the road is $7\sqrt{2}$ ft and cost of construction is Rs.100 per sq. ft., find the lowest possible cost of construction of 50% of the total road.(use $\pi = \frac{22}{7}$)

SPACE FOR THE ROUGH WORK

59. Triangle ABC is an equilateral triangle with its sides equal to $6a$ units. AX is a line parallel to BC. P is a point on AX. From P, a line is drawn to intersect AB, AC and BC produced in points Q, R and S respectively. If $PQ = QR = RS$, then find the length of BR .



60. A building is in the form of a cylinder surmounted by a hemispherical dome. The base diameter of the dome is equal to $\frac{2}{3}$ of the total height of the building. If it contains $67\frac{1}{21}m^3$ of air, then find the height of the building (in m). (use $\pi = \frac{22}{7}$)

SPACE FOR THE ROUGH WORK
