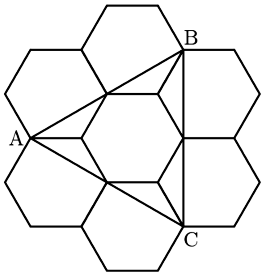
ACE OF PACE OBJECTIVE SECTION
(QUESTION PAPER)

01. Six regular hexagons surround a regular hexagon of side length 1 as shown. What is the area of ΔABC?



(A) $2\sqrt{3}$ (B) $3\sqrt{3}$ (C) $1+3\sqrt{2}$ (D) $2+2\sqrt{3}$

02. By inserting parenthesis (brackets), it is possible to give the expression $2\times3+4\times5$ several values. The number of possible different values can be

(A) 2 (B) 3 (C) 4 (D) 5

03. Convex quadrilateral ABCD has AB = 9 and CD = 12. Diagonals AC and BD intersect at E, AC = 14, and ΔAED and ΔBEC have equal areas. What is AE?

(A) $\frac{9}{2}$ (B) $\frac{50}{11}$ (C) $\frac{21}{4}$ (D) 6

04. Given that the unit digit of A^3 and A are same, where A is a single digit natural number. How many possibilities can A assume?

(A) 6 (B) 5 (C) 4 (D) 3

05. Two bells toll every 45 seconds and 60 seconds. If they toll together at 8:00 am, then which of the following is a time at which they will toll together?

(A) 8:55 am (B) 8:50 am (C) 8:45 am (D) 8:40 am

06. The semi perimeter of a triangle exceeds each of its side by 5, 3 and 2 respectively. What is the perimeter of the triangle?

(A) 12 (B) 10 (C) 15 (D) 20

SPACE FOR ROUGH WORK

07. The average weight of the students of a class is 60 kg. If eight new students of average weight 64 kg join the class, the average weight of the entire class becomes 62 kg. How many students were there in the class initially?

(A) 12 (B) 10 (C) 8 (D) 14

08. A rectangular box has integer side lengths in the ratio 1 : 3 : 4. Which of the following could be the volume of the box?

(A) 48 (B) 144 (C) 64 (D) 96

09. The function E(n) is defined for each positive integer n to be the sum of the even digits of n. For example, E(5681) = 6 + 8 = 14. What is the value of E(1) + E(2) + · · · + E(100)?

(A) 1000 (B) 500 (C) 600 (D) 400

10. Let $f(x)=\frac{x+1}{x-1}$. Then for $x^2 \neq 1, f(-x)$ is

(A) $\frac{1}{f(x)}$ (B) $\frac{1}{f(-x)}$ (C) $\frac{-1}{f(x)}$ (D) $-f(-x)$

11. Five students have first names Clark, Donald, Jack, Robin and Steve, and have the last names (in a different order) Clarkson, Donaldson, Jackson, Robinson and Steveson. It is know that Clark is 1 year older than Clarkson, Donald is two years older than Donaldson, Jack is three year older than Jackson, Robin is four year older than Robinson. Who is older, Steve or Steveson and what is the difference between their ages?

(A) Steveson is ten year older than Steve (B) Steve is fifteen year older than Steveson

(C) Steve is Ten year older than Steveson (D) Steveson is five year older than Steve

12. A triangular array of 2016 coins has 1 coin in the first row, 2 coins in the second row, 3 coins in the third row, and so on up to N coins in the N^{th} row. What is the sum of the digits of N?

(A) 6 (B) 7 (C) 8 (D) 9

13. Trickster Rabbit agrees with Foolish Fox to double Fox's money every time Fox crosses the bridge by Rabbit's house, as long as Fox pays 40coins in toll to Rabbit after each crossing. The payment is made after the doubling, Fox is excited about his good fortune until he discovers that all his money is gone after crossing the bridge three times. How many coins did Fox have at the beginning?

(A) 20 (B) 30 (C) 35 (D) 40

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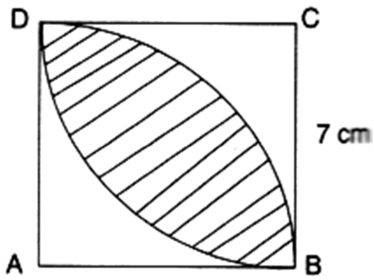
14. What is the value of $\dfrac{2a^{-1}+\dfrac{a^{-1}}{2}}{a}$ when $a=\dfrac{1}{2}$?

(A) 1 (B) 2 (C) $\dfrac{5}{2}$ (D) 10

15. Zoey read 15 books, one at a time. The first book took her 1 day to read, the second book took her 2days to read, the third book took her 3 days to read, and so on, with each book taking her 1 more day to read than the previous book. Zoey finished the first book on a Monday, and the second on a Wednesday. On what day the week did she finish her 15th book?

(A) Sunday (B) Monday (C) Wednesday (D) Friday

16. In the figure given below, ABCD is a square of side 7 cm .BD is an arc of a circle of radius AB. What is the area of the shaded region? (Take $\pi=\dfrac{22}{7}$)



(A) 14 cm^2
(B) 21 cm^2
(C) 28 cm^2
(D) 35 cm^2

17. The base of a pyramid is an n-sided regular polygon of area 360 cm^2. The total surface area of the pyramid is 900 cm^2. Each lateral face of the pyramid has an area of 30 cm^2. Find n.

(A) 20 (B) 18 (C) 16 (D) 24

18. Amit drives from a place A to a place B with the speed 40 km/h and then drives from B to A with the speed 60 km/h. What is his average speed for the journey, in km/h?

(A)52 (B)48 (C)49 (D)50

19. ABCD is a rectangle. P, Q, R, S lie on the sides AB, BC, CD, DA respectively so that PQ = QR = RS = SP. PB = 15, BQ = 20, PR = 40, QS = 30. The perimeter of ABCD is

(A) 200 (B) 140 (C) 210 (D) information is not sufficient.

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20. In a tennis tournament 16 players are playing. In first round each player will play with each other exactly once. After the completion of the first round the top 8 players will go for second round. Each one of the 8 of second round will play with each other exactly once. The top 4 will go for next round. Continue in this manner. At the end the final match is played between the top two of the previous round. At the completion of the final round how many total matches were played altogether?

(A) 135 (B) 145 (C) 155 (D) 165

21. In a magical swamp there are two species of talking amphibians: toads, whose statements are always true, and frogs, whose statements are always false. Four amphibians, Brian, Chris, LeRoy, and Mike live together in the swamp, and they make the following statements:

Brian: "Mike and I are different species."

Chris: "LeRoy is a frog."

LeRoy: "Chris is a frog."

Mike: "Of the four of us, at least two are toads.", then , the number of these amphibians that are frogs is

(A) 0 (B) 1 (C) 2 (D) 3

22. ΔABC has integer side lengths, BD is an angle bisector, AD = 3, and DC = 8. What is the smallest possible value of the perimeter?

(A) 30 (B) 33 (C) 35 (D) 36

23. Let n be the smallest positive integer such that n is divisible by 20, n^2 is a perfect cube, and n^3 is a perfect square. What is the number of digits of n?

(A) 3 (B) 4 (C) 5 (D) 7

24. The number of zeros at the end of the decimal representation of product of first hundred natural numbers is

(A) 23 (B) 24 (C) 25 (D) 17

25. The difference between the sum of the first 2017 even natural numbers and the sum of the first 2017 odd natural numbers is

(A) 1 (B) 2 (C) 4034 (D) 2017

26. If the sum of two numbers is 55 and the HCF and LCM of these numbers are 5 and 120 respectively, then the sum of the reciprocals of the numbers is equal to:

(A) $\frac{55}{601}$ (B) $\frac{601}{55}$ (C) $\frac{11}{120}$ (D) $\frac{120}{11}$

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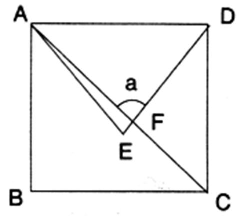
27. In the following figure, ABCD is a square and AED is an equilateral triangle. Find the value of a.



(A) 30^o (B) 45^o (C) 60^o (D) 75^o

28. Points A and B are 90 km apart from each other on a highway. A car starts from A and another from B at the same time. If they go in the same direction, they meet in 9 hours, and if they go in opposite directions, they meet in $\frac{9}{7}$ hours. The speed of the faster car is (in km/hr)

(A) 30 km/hr (B) 40 km/hr (C) 36 km/hr (D) 42 km/hr

29. Consider the equation $ax^2 + bx + c = 0$. If a and c are of opposite signs, what can you say about the nature of the roots of the equation? (a, b, c are real numbers)

(A) Real and unequal
(B) Real and equal
(C) Non – real
(D) Nothing can be said – the information is insufficient

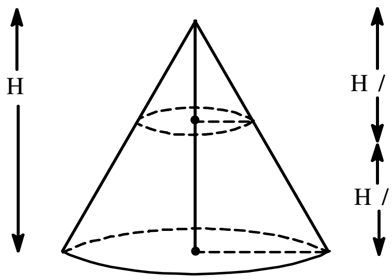
30. The 15^{th} , 18^{th} and 21^{st} terms of a GP are a, b and c. Which of the following is correct?

(A) $ab = bc$ (B) $b = \frac{a+c}{2}$ (C) $b^2 = ac$ (D) None of these

31. The length of the longest pole which can be put in a room of dimensions $10\,m \times 10\,m \times 5m$ is

(A) 12 m (B) 15 m (C) 20 m (D) 25 m

32. For a cone of radius R, the ratio of its height to radius is 2 : 1. The cone is vertically halved:



The ratio of the volume of the bottom half to that of the top half will be

(A) 5 : 1 (B) 6 : 1 (C) 7 : 1 (D) 8 : 1

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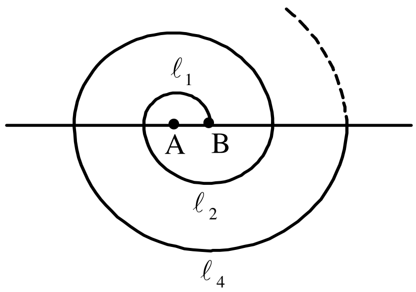
33. If $(-1)^n + (-1)^{4n} = 0$, then n can be

(A) any positive number (B) any negative integer
(C) any odd natural number (D) any even natural number

34. The area of a rectangle increases by 76 square units, if the length and breadth is increased by 2 units. However, if the length is increased by 3 units and breadth is decreased by 3 units, the area gets reduced by 21 square units. Find the length of the rectangle.

(A) 10 (B) 20 (C) 19 (D) 21

35. A spiral is made up of successive semi – circles, with centres alternately at A and B, starting with centre at A, of radii 0.5 cm, 1.0 cm, 1.5 cm, 2.0 cm, …….. as shown in figure. What is the total length of such a spiral made up of thirteen consecutive semi – circles? (Take $\pi = \frac{22}{7}$)

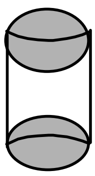


(A) 91 (B) 66.5 (C) 143 (D) 101

[Where length of successive semi – circles is $\ell_1, \ell_2, \ell_3, \ell_4, ...$with centres at A, B, A, B, ………. Respectively.]

36. A wooden article was made by scooping out a hemisphere from each end of a solid cylinder as shown in the following figure. If the height of the cylinder is 10 cm, and its base is of radius 3.5 cm, find the total surface area of the article. (Take $\pi = \frac{22}{7}$)

(A) 220
(B) 374
(C) 154
(D) 574



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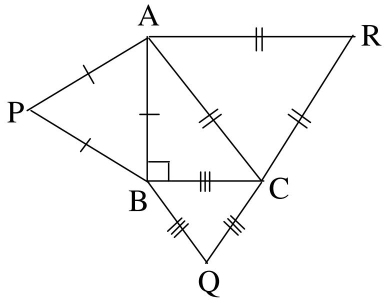
37. The value of k such that the quadratic polynomial $x^2-(k+6)x+2(2k+1)$ has sum of the zeros as half of their product, is

(A) 2 (B) 3 (C) – 5 (D) 5

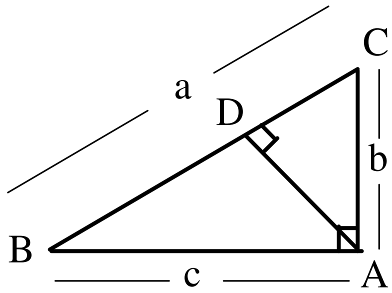
38. Equilateral triangles are drawn on the sides of a right triangle as shown in figure.



The ratio $\frac{\text{Area}[\Delta APB]+\text{Area}[\Delta BCQ]}{\text{Area}[\Delta ACR]}$ is

(A) 1 : 2 (B) 2 : 1 (C) 1 : 1 (D) 3 : 1

39. ΔABC is a right triangle, right angled at A and $AD \perp BC$, then, AD is equal to



(A) $\frac{bc}{\sqrt{b^2+c^2}}$ (B) $\frac{bc}{b^2+c^2}$ (C) $\frac{b^2c}{\sqrt{b^2+c^2}}$ (D) None of these

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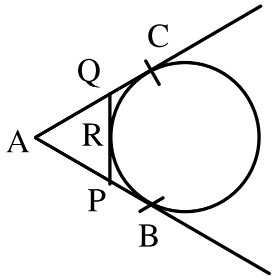
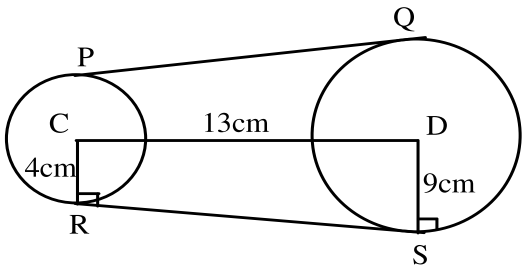
40. In the given figure AB, AC, PQ are the tangents at points B, C and R respectively, to the circle and $AB = 5cm$, then perimeter of ΔAPQ is



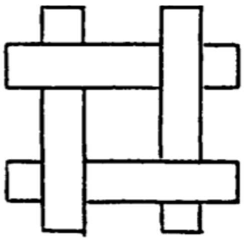
(A) 5 cm (B) 7 cm (C) 8 cm (D) 10 cm

41. In the given figure PQ and RS are common tangents to the 2 circles with centres C and D, then the length of the common tangent PQ is



(A) 10 cm (B) 13 cm (C) 12 cm (D) 14 cm

42. Four rectangular paper strips of length 10 and width 1 are put flat on a table and overlap perpendicularly as shown. How much area of the table is covered?



(A)36 (B)40 (C)96 (D)100

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43. A drawer contains red, green, blue, and white socks with at least 2 of each color. What is the minimum number of socks that must be pulled from the drawer to guarantee a matching pair?
(A) 3 (B) 4 (C) 5 (D) 8

44. The sum of two nonzero real numbers is 4 times their product. What is the sum of the reciprocals of the two numbers?
(A) 1 (B) 2 (C) 4 (D) 8

45. In a certain population the ratio of the number of women to the number of men is 11 to 10. If the average (arithmetic mean) age of the women is 34 and the average age of the men is 32, then the average age of the population is
(A) $32\frac{9}{10}$ (B) $32\frac{20}{21}$ (C) 33 (D) $33\frac{1}{21}$

46. A triangle has side lengths 10, 10, and 12. A rectangle has width 4 and area equal to the area of the triangle. What is the perimeter of this rectangle?
(A) 16 (B) 24 (C) 28 (D) 32

47. For any natural number n, "n factorial" is defined as $n! = 1\times 2 \times 3 \cdot \cdot \cdot \times n$. What is the value of $\frac{11!-10!}{9!}$?
(A) 99 (B) 100 (C) 110 (D) 121

48. If two is 10% of x and 20% of y, then the value of $x - y$ is
(A) 20 (B) 4 (C) 40 (D) 10

49. In quadrilateral ABCD, AB = 5, BC = 17, CD = 5, DA = 9, and BD is an integer. The possible value of BD is
(A) 11 (B) 12 (C) 13 (D) 14

50. Kimaya has two older twin brothers. The product of their ages (ie product of all 3 siblings) is 128. What is the sum of their ages (all three children)? (Ages are integral values in years)
(A) 10 (B) 12 (C) 16 (D) 18

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