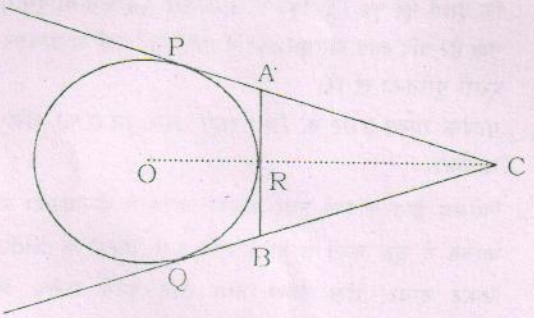
SSC Mains Test- 22

1. The bisector of interior $\angle A$ of ΔABC meets BC in D, and the bisector of exterior $\angle A$ meets BC produced in E. Then $\frac{BD}{BE}$ =?

(A) $\frac{CE}{CD}$ (B) $\frac{CD}{CE}$

(C) $\frac{AD}{AE}$ (D) $\frac{AE}{AD}$

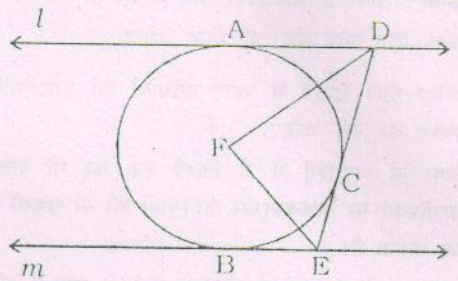
2. In figure, CP and CQ are tangents from an external point C to a circle with centre O. AB is another tangent which touches the circle at R. If CP = 11 cm and BR = 4 cm, find the length of BC.



(A) 7 cm (B) 8 cm

(C) 5 cm (D) 10 cm

3. In fig, l and m are two parallel tangents at A and B. The tangent at C makes an intercept DE between l and m. Find $\angle DFE$.



(A) 45° (B) 110°

(C) 90° (D) 20°

4. The distance of the point (12, –9) from the origin is –

(A) 13 units (B) 15 units

(C) 12 units (D) 17 units

5. A rectangular tank is 45 m long and 26 m broad. Water flows into it through a pipe whose cross-section is 13 cm^2, at the rate of 9 km/hour. How much will the level of the water rise in the tank in 15 min?

(A) 0.0016 m (B) 0.0020 m

(C) 0.0025 m (D) 0.0018 m

6. The diameters of the outer and inner circumference of a cylindrical ring are 10.75 cm and 9.5 cm respectively. Find the surface area of the ring

(A) 52.52 cm^2 (B) 62.52 cm^2

(C) 62.62 cm^2 (D) 52.62 cm^2

7. A rectangular sheet of paper, 36 cm × 22 cm, is rolled along its length to form a cylinder. Find the volume of the cylinder so formed.

(A) 2682 cm^3 (B) 6822 cm^3

(C) 2782 cm^3 (D) 1386 cm^3

8. A pyramid on a square base has four equilateral triangles on its four other faces, each edges being 10m. Find its volume.

(A) 235.7 m^3 (B) 253.7 m^3

(C) 532.7 m^3 (D) 352.7 m^3

9. If α, β, γ are the zeros of the polynomial $f(x) = ax^3 + bx^2 + cx + d$, then $(\alpha^2 + \beta^2 + \gamma^2) =$

(A) $\frac{b^2 - ac}{a^2}$ (B) $\frac{b^2 - 2ac}{a}$

(C) $\frac{b^2 + 2ac}{b^2}$ (D) $\frac{b^2 - 2ac}{a^2}$

10. Solve the following sytem of equations in x and y.

$(a - b)x + (a + b)y = a^2 - 2ab - b^2$

$(a + b)(x + y) = a^2 + b^2$

(A) $x = a + b, y = \frac{2ab}{a+b}$

(B) $x = a + b, y = \frac{-2ab}{a+b}$

(C) $x = a - b, y = \frac{-2ab}{a+b}$

(D) None of these

11. Find the values of a and b so that $x^4 + x^3 + 8x^2 + ax + b$ is divisible by $x^2 + 1$.
(A) $a = 1, b = 7$ (B) $a = 2, b = 5$
(C) $a = 2, b = 7$ (D) None of these

12. A two digit number is 4 times the sum of its digits and twice the product of the digits. Find the number.
(A) 54 (B) 63
(C) 45 (D) 36

13. If $2(\cos^2\theta - \sin^2\theta) = 1$, then the value of acute angle θ.
(A) 30° (B) 60°
(C) 45° (D) 90°

14. If $2\sin^2\theta = 3\cos\theta$, then find the positive angle θ.
(A) 45° (B) 30°
(C) 60° (D) 90°

15. If $\cos^2A - \sin^2A = \tan^2B$, then $\cos^2B - \sin^2B$ is
(A) 1 (B) $\tan^2A$
(C) 2 (D) $\sec^2A$

16. In a right triangle ABC if $\angle C = 90°$, then find the value of :
$\sin C(\sec A \operatorname{cosec} B - \tan A \cdot \cot B)$
(A) 1 (B) 2
(C) 3 (D) 4

17. If the equation $(1 + m^2)x^2 + 2mcx + (c^2 - a^2) = 0$ has equal roots, find the value of $a^2(1 + m^2)$.
(A) a^2 (B) m^2
(C) c^2 (D) None of these

18. An aeroplane left 50 minutes later than its scheduled time, and in order to reach the destination, 1250 km away, in time, it had to increase its speed by 250 km/hr from the usual speed. Find its usual speed.
(A) 300 km/hour (B) 500 km/hour
(C) 400 km/hour (D) 200 km/hour

19. Two circles of radii 5 cm and 3 cm intersect at two points and the distance between their centres is 4 cm. Find the length of the common chord.
(A) 6 cm (B) 5 cm
(C) 4 cm (D) 7 cm

20. Three girls Sangeeta, Namrata and Mandip are playing a game by standing on circle of radius 5 m drawn in a park. Sangeeta throws a ball to Namrata, Namrata to Mandip, Mandeep to Sangeeta. If the distance between Sangeeta and Namrata and between Namrata and Mandip is 6 m each, what is the distance between Sangita and Mandip?
(A) 7.6 m (B) 8.6 m
(C) 9.6 m (D) 4.6 m

21. A vertical pole fixed to the ground is divided in the ratio 1 : 9 by a mark on it, the two parts subtend equal angles at a place on the ground, 15 m from the base of the pole. If the lower part be shorter than the upper one, find the height of the pole.
(A) 133 m (B) 134 m
(C) 135 m (D) 132 m

22. If $\cos x = \sin 200°$, then the possible values of x is
(A) 160°, 20° (B) 110°, 250°
(C) 200°, 160° (D) 290°, 70°

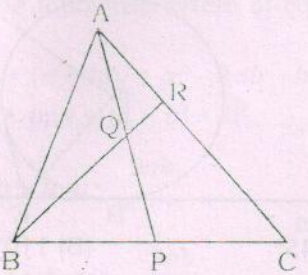
23. Two tangents drawn from an external point to a circle are at right angles and measure 3.5 cm each. The area of the circle is
(A) 38.5 cm^2 (B) 28 cm^2
(C) 31 cm^2 (D) Insufficient data

24. A right angled triangle of which the sides containing the right angles are 36 cm and 15 cm is made to turn round on its longer side. Find the curved surface area of the solid so generated.
(A) 2220 cm^2 (B) 2210 cm^2
(C) 1836.9 cm^2 (D) 2120 cm^2

25. If sin A and cos A are the roots of the equation $px^2 + qx + m = 0$, then find a relation among p, q and m.
(A) $q^2 + m^2 = (p + m)^2$
(B) $q^2 - m^2 = (p + m)^2$
(C) $q^2 + m^2 = (p - m)^2$
(D) None of these

26. If $(a - 3)$ is factor of $f(a) = a^3 - ba^2 + 4b - 12$, then find the remainder when the expression is divided by $(a + 3)$.
(A) 15 (B) –15
(C) –54 (D) 54

27. In the fig, P is the mid-point of BC and Q is the mid-point of AP. If BQ when produced meets AC at R, then $\frac{RA}{CA} = ?$



(A) $\frac{1}{3}$ (B) $\frac{1}{2}$
(C) 1 (D) $\frac{3}{4}$

28. Two circles with centres A and B of radii 3 cm and 4 cm respectively intersect at two points C and D such that AC and BC are tangents to the two circles. Find the length of the common chord CD.
(A) 4.2 cm (B) 8.4 cm
(C) 2.4 cm (D) 4.8 cm

29. From the top of a hill 200 m high, the angles of depression of the top and the bottom of a pillar are 30° and 60° respectively. Find the height of the pillar.
(A) 133.33 m (B) 111.11 m
(C) 122.22 m (D) 115.5 m

30. Two vertical poles are 40 m apart and the height of one is double that of the other. From the middle point of the line joining their feet, an observer find the angle of elevations of their tops to be complementary. Find their heights.
(A) 22.22 m, 11.11 m (B) 1.414 m, 2.828 m
(C) 28.28 m, 14.14 m (D) 44.44 m, 22.22 m

31. Fill in the blanks to make the statement true:-
$\left|\frac{3}{5}\times\frac{-5}{10}\right| = \left|\frac{3}{5}\right|\times.....$
(A) $\frac{-5}{8}$ (B) $\frac{4}{8}$
(C) $\frac{8}{5}$ (D) $\frac{3}{8}$

32. How many of the following numbers are divisible by 132?
264, 396, 4, 762, 792, 968, 2178, 5184, 6336
(A) 4 (B) 5
(C) 6 (D) 7

33. If the numerator and the denominator of a proper fraction are increased by the same quantity, then the resulting fraction is
(A) always greater than the original fraction
(B) always less than the original fraction
(C) always equal to the original fraction
(D) None of the above

34. HCF of $(41^{43} + 43^{43})$ and $(41^{41} + 43^{41})$ is
(A) (43 – 41) (B) $(41^{41} + 43^{41})$
(C) $(41^{43} + 43^{43})$ (D) (41 + 43)

35. Given that $4A = 333^{555} + 555^{333}$, then A is divisible by
(A) 2 (B) 3
(C) 37 (D) All of these

36. There are five numbers. HCF of each possible pair is 4 and LCM of all the five numbers is 27720. What will be the product of all the five numbers?
(A) 7096320 (B) 7906320
(C) 7096230 (D) 7903620

37. Given that $\sqrt[3]{3^x} = 5^{1/3}$ and $\sqrt[4]{5^y} = \sqrt{3}$, then find the value of $2xy$ –
(A) 2 (B) 3
(C) –3 (D) 5

38. If 1^x, 5^x and 7^x are in A.P. and also in G.P. then the value of 'x' is
(A) 0 (B) 1
(C) 2 (D) 4

39. In the class of 100 students, the number of students passed in English is 46, in Maths is 46 and in Commerce is 58. The number who passed in English and Maths is 16, Maths and commerce is 24 and English and commerce is 26, and the number who passed in all subjects is 7. Find the number of the students who failed in all the subjects.
(A) 13 (B) 8
(C) 9 (D) 7

40. The 6th term from the end of the geometric progression 8, 4, 2, 1, $\frac{1}{2}, \frac{1}{4}$ .... $\frac{1}{1024}$
(A) $\frac{1}{4}$ (B) $\frac{1}{16}$
(C) $\frac{1}{32}$ (D) $\frac{1}{64}$

41. On reducing the entry fee by 25% in a circus show, the number of viewers increased by 30%. The percent increase or decrease in the income from the entry fee is
(A) 2.5% increase (B) 0.5% decline
(C) 2.5% decline (D) 3% increase

42. If 60 is subtracted from a number it is reduced by 80%. The $\frac{2}{3}$rd of the number is
(A) 75 (B) 50
(C) 100 (D) 60

43. The value of
$\sqrt{10\% \text{ of } 20} + \sqrt{40\% \text{ of } 20} - \sqrt{90\% \text{ of } 20}$ is
(A) 0 (B) 10
(C) 5 (D) 20

44. A person bought certain quantity of rice at the rate of ₹ 150 per quintal. 10% of the rice was spoiled. At what price (per quintal) should he sell the remaining rice to earn 20% profit ?
(A) ₹ 200 (B) ₹ 180
(C) ₹ 225 (D) ₹ 175

45. A sells a good to B at a profit of 20% and B sells it to C at a profit of 25%. If C pays ₹ 225 for it, what is the cost price for A?
(A) ₹ 200 (B) ₹ 150
(C) ₹ 175 (D) ₹ 162.5

46. On selling an article for ₹ 270 the loss is equal to the profit, if the article is sold at 10% profit. The cost price of the article is
(A) ₹ 290 (B) ₹ 310
(C) ₹ 300 (D) ₹ 363

47. A factory has marked the price of the cycle at ₹ 725 each and allows a discount of 16% to the traders. If they gain 5%, find the cost of manufacturing each cycle.
(A) ₹ 680 (B) ₹ 580
(C) ₹ 575 (D) ₹ 480

48. A dishonest dealer professes to sell his goods at cost price by using a false weight and thus gains $11\frac{1}{9}\%$. For weighing a kilogram, he uses a weight of
(A) 960 gm. (B) 940 gm.
(C) 920 gm. (D) 900 gm.

49. By selling an article at 80% of its marked price, a trader makes a loss of 10%. What will be the profit percentage if he sells it at 95% of its marked price?
(A) 6.9 (B) 5
(C) 5.9 (D) 12.5

50. If the work done by $(x - 1)$ men in $(x + 1)$ days and the work done by $(x + 2)$ men in $(x - 1)$ days is in the ratio of 9 : 10, then x is equal to
(A) 5 (B) 6
(C) 7 (D) 8

51. Simple interest on a sum of money for 5 years is $\frac{2}{5}$ times the amounts, the rate of simple interest is
(A) 13% (B) $12\frac{1}{3}\%$
(C) $14\frac{1}{3}\%$ (D) $13\frac{1}{3}\%$

52. If the difference of compound interest and simple interest for 3 years at the rate of 5% per annum is ₹ 11.40, then the principal is
(A) ₹ 1500 (B) ₹ 1475
(C) ₹ 1395 (D) ₹ 1495

53. On what sum of money will the C.I. of 2 yrs be the same as the S.I. on ₹ 416 for 10 yrs, the rate of interest being 8% per annum?
(A) ₹ 2200 (B) ₹ 24000
(C) ₹ 2000 (D) ₹ 1600

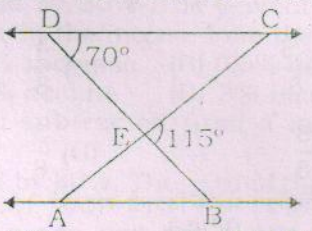
54. On compound interest a certain amount becomes p times in 'a' year, then in how many years it will become q times ?
(A) $\frac{\log q}{\log p}$ (B) $\frac{a \log q}{\log p}$
(C) $\frac{a \log p}{\log q}$ (D) $\frac{\log p}{\log q}$

55. The base of a rectangular solid is a square and its height is twice of its length. If its volume is 16000 m^3, find the surface area.
(A) 400 cm^3 (B) 4000 cm^3
(C) 2000 cm^3 (D) 2500 cm^3

56. The volume of a cylinderical ring is 800 cm^3 and the radius of cross-section is 12 cm. Find the surface area of the ring.
(A) 134.2 cm^3 (B) 131.2 cm^3
(C) 132.2 cm^3 (D) 133.2 cm^3

57. In ΔABC, the bisector of $\angle B$ meets AC at D. A line $PQ \| AC$ meets AB, BC and BD at P, Q and R respectively. Then $AB \times CQ = ?$
(A) $AP \times BC$ (B) $BC \times AB$
(C) $CQ \times AB$ (D) $RQ \times BA$

58. In the fig. if $\Delta EDC \sim \Delta EBA$, $\angle BEC = 115°$ and $\angle EDC = 70°$. Find the $\angle DCE$ and $\angle AEB$.



(A) 25°, 45° (B) 35°, 55°
(C) 15°, 25° (D) 45°, 65°

59. A man on the top of a vertical tower observes a car moving at a uniform speed coming directly towards it. If it takes 12 minutes for the angle of depression to change from 30° to 45°, how soon after this, will the car reach the tower?
(A) 16 min 23 sec (B) 17 min 34 sec
(C) 15 min 32 sec (D) 14 min 41 sec

60. A metal sphere, 14 cm in diameter, is dropped into a rectangular cistern whose base measures $49\text{cm} \times \frac{44}{3}\text{cm}$. If the sphere is totally submerged, by how much will surface of the water be raised.
(A) 2 cm (B) 1 cm
(C) 4 cm (D) 3 cm

61. The perimeter of one square exceeds that of another by 100 m and the area of the larger square exceeds three times that of smaller one by 325 m^2. The length of side of smaller square is
(A) 30 m (B) 55 m
(C) 60 m (D) 25 m

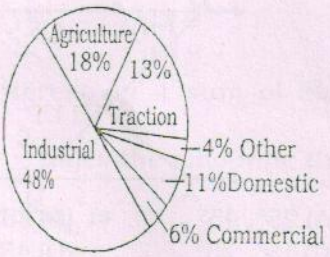
62. A right pyramid stands on a rectangular base 32 cm long and 10 cm in width. If the height of the pyramid is 12 cm, find its whole surface area.
(A) 933 cm^2 (B) 936 cm^2
(C) 934 cm^2 (D) 935 cm^2

63. Find the area of triangle whose vertices are $(t, t-2)$, $(t+2, t+2)$ and $(t+3, t)$.
(A) 7 sq. unit (B) 5 sq. unit
(C) 4 sq. unit (D) 8 sq. unit

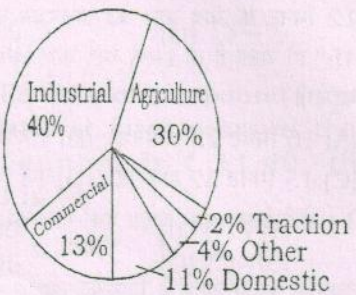
64. For what value of 'n', a students finds that $\frac{a^{n+1}+b^{n+1}}{a^{n/2}+b^{n/2}}$, is the arithmetic mean of 'a' and 'b'?
(A) $n = 1$ (B) $n = \frac{1}{2}$
(C) $n = 0$ (D) $n = -1$

Directions (65-70) Read the given information and answer the question based on it.

Electricity consumption by various sectors in 1980-81



Electricity consumption by various sectors in 1993-1994



65. By what percentage has the consumption of electricity by agriculture increased in 1993-1994 over 1980-1981?
(A) 66% (B) 33%
(C) 133% (D) Can't be determined

66. The electricity consumption of how many sectors has definitely increased over the given period?
(A) 1 (B) 2
(C) 3 (D) Can't be determined

67. If the total electricity consumption in 1993-94 is 1.2 times of the total electricity consumption in 1980-1981, then how many sectors have definitely- increased by more than 50% during the same period?
(A) 1 (B) 2
(C) 3 (D) 4

68. If the total electricity consumption in 1993-1994 is 13 times of the total electricity consumption in 1980-1981, then what is the percentage increase in the traction sector in the given period?
(A) 50% (B) 100%
(C) 150% (D) None of these

69. What is the minimum number of sectors required to 'be added up in order to be more than 50% the consumption for the period in 1993-1994 ?
(A) 1 (B) 2
(C) 3 (D) 4

70. The agricultural consumption of electricity doubled from 1980-81 to 1993-94 if the total electricity consumption grown from 1980-81 to 1993-94 by ?
(A) 20% (B) 25%
(C) 50% (D)Can't be determined

71. In a race of 600 m, A can beat B by 60 m and in a race of 500 m, B can beat C by 25 m. By how many metres will A beat C in a 400 m race ?
(A) 56 m (B) 60 m
(C) 58 m (D) 54 m

72. A sum of Rs. 370 is to be divided among A, B and C such that $\frac{A's\ share}{B's\ share} = \frac{B's\ share}{C's\ share} = \frac{3}{4}$.
Then, A's share is
(A) ₹ 240 (B) ₹ 120
(C) ₹ 100 (D) ₹ 90

73. The price of land passing through three hands, rises on the whole by 65%. If the first and second sellers earned 20% and 25% profit respectively. Find the profit earned by the third seller.
(A) 20% (B) 55%
(C) 10% (D) 25%

74. One year payment to the servant is ₹ 500 plus one shirt. The servant leaves after 10 months and receives ₹ 350 and a shirt. What is the price of the shirt?
(A) ₹150 (B) ₹ 350
(C) ₹400 (D) ₹ 500

75. A person purchased a certain number of articles at 11 articles for ₹ 10 and sold them at 10 articles for ₹ 11. Find the gain percentage.
(A) 22 (B) 20
(C) 1 (D) 21

76. Of the adult population in a certain city, 45% of men and 25% of women are married. Assuming that no man marries more than one women and vice versa, the percentage of total population of adults who are married, is
(A) 33.33 (B) 32.14
(C) 31.1 (D) 30

77. A garrison is provided with ration for 72 soldiers to last for 54 days. Find how long would the same amount of food last for 90 soldiers, if the individual ration is reduced by 10%?
(A) 48 days (B) 72 days
(C) 54 days (D) 126 days

78. In an examination paper of five questions, 5% of the candidates answered all of them and 5% answered none. Of the rest, 25% candidates answered only one question and 20% answered 4 questions. If 396 candidates answered either 2 questions or 3 questions, the number of candidates that appeared for the examination was
(A) 800 (B) 1000
(C) 850 (D) 900

79. In a test, A scored 10% more than B and B scored 5% more than C. If C scored 300 marks out of 400, then A's marks are
(A) 310 (B) 325
(C) 350 (D) 360

80. A train crosses a bridge of length 150 m in 15 s and a man standing on it in 9 s. The train is travelling at a uniform speed. Length of the train is
(A) 225m (B) 200m
(C) 135m (D) 90 m

81. Arun and Bhaskar start from place P at 6 am and 7:30 am respectively and run in the same direction. Arun and Bhaskar run at 8 km/h and 12/h, respectively. Bhaskar overtakes Arun at
(A) 10:30 am (B) 9 am
(C) 11:30 am (D) 11 am

82. A toy factory manufactured a batch of electronic toys. If the toys were packed in boxes of 115 each, 13 boxes would not be filled completely. If the toys were packed in boxes of 65 each, 22 such boxes would not be enough to pack all of them. Coincidentally, in the end, the toys were packed in n boxes containing n toys each, without any remainder. The total number of toys was
(A) 1424 (B) 1434
(C) 1444 (D) 1454

83. A and B started a business with ₹ 20000 and ₹ 35000 respectively. They agreed to share the profit in the ratio of their capital. C joins the partnership with the condition that A, B and C will share profit equally and pays ₹ 220000 as premium for this, to be shared between A and B. This is to be divided between A and B in the ratio of
(A) 10 : 1 (B) 1 : 10
(C) 9 : 10 (D) 10 : 9

84. A can completes a work in 20 days and B in 30 days. A worked alone for 4 days and then B completed the remaining work along with C in 18 days. In how many days can C working alone complete the work?
(A) 12 (B) 68
(C) 72 (D) 90

85. A pipe can fill a cistern in 12 min and another pipe can fill it in 15 min, but a third pipe can empty it in 6 min. The first two pipes are kept open for 5 min in the beginning and then the third pipe is also opened. Number of minutes taken to empty the cistern is
(A) 38 (B) 22
(C) 42 (D) 45

86. A and B can complete a job in 24 days working together. A alone can complete it in 32 days. Both of them worked together for 8 days and then A left. The number of days B will take to complete the remaining job is
(A) 16 (B) 32
(C) 64 (D) 128

87. In a factory, there are equal number of women and children. Women work for 6 h a days and children for 4 h a day. During festival time, the work load goes up by 50%. The government rule does not allow children to work for more than 6 h a day. If they are equally efficient and the extra work is done by women, then extra hours of work put in by women every day are
(A) 5 (B) 3
(C) 4 (D) 9

88. The average of the test scores of a class of 'm' students is 70 and that of 'n' students is 91. When the scores of both the classes are combined, the average is 80, What is n/m?
(A) 11/10 (B) 13/10
(C) 10/13 (D) 10/11

89. The average salary per head of all workers of an institution is ₹ 60. The average salary per head of 12 officers is ₹ 400. The average salary per head on the rest is ₹ 56. Then, the total number of workers in the institution is
(A) 1030 (B) 1032
(C) 1062 (D) 1060

90. If the ratio of sum and difference of two numbers is 7 : 1, then the ratio of these two numbers is
(A) 5 : 3 (B) 7 : 2
(C) 4 : 3 (D) 3 : 4

91. Average age of three boys is 16 years. If the ratio of their ages is 4 : 5 : 7, then the age of the youngest boy is
(A) 8 years (B) 9 years
(C) 12 years (D) 16 years

92. The ratio of Rita's age to the age of her mother is 3 : 11. The difference of their age is 24 years. What will be the ratio of their age after 3 years ?
(A) 2 : 3 (B) 1 : 2
(C) 1 : 3 (D) 3 : 5

93. If ₹ 370 are distributed among A, B and C in the ratio $\frac{1}{4}:\frac{1}{5}:\frac{1}{6}$, then what amount A will get
(A) ₹ 180 (B) ₹ 120
(C) ₹ 150 (D) ₹ 160

94. A man is late by 5 mintues to reach his office from his house when he moves with a speed of 4 km/hour. If he moves with a speed of 5 km/hour then he reaches his office 4 minutes earlier, then the distance of his office from his house is -
(A) 4 km (B) 3 km
(C) 5 km (D) 2 km

95. An aeroplane travels distances 2500km, 1200 km and 500 km at the rate of 500 km/hr, 400 km/hr and 250 km/hr respectively. The average speed is -
(A) 420km/hr (B) 410 km/hr
(C) 405km/hr (D) 575 km/hr

96. The quadrilateral, whose vertices are (–1, 1), (0, –3), (5, 2) and (4, 6) is
(A) a square (B) a rectangle
(C) a rhombus (D) a parallelogram

Directions (97-100): Study the table given below and answer the following questions.

Loans Disbursed by Four Banks in Crores of Rupees in Different Years

Banks	Years			
	2007	2008	2009	2010
A	18	23	45	30
B	27	33	18	41
C	29	29	22	17
D	13	19	28	32
Total	87	104	113	120

97. In which year the disbursement of loans by all the banks combined together was nearest to the average disbursement of loans over the years?
(A) 2007 (B) 2008
(C) 2009 (D) 2010

98. What was the percentage increase of disbursement of loans of all banks together from 2009 to 2010?
(A) 6% (B) $6\frac{22}{113}\%$
(C) $6\frac{11}{113}\%$ (D) $7\frac{11}{113}\%$

99. In which year was the total disbursement of loans of banks A and B exactly equal to the total disbursement of loans of banks C and D?
(A) 2007 (B) 2008
(C) 2010 (D) None of these

100. In which banks was the loan disbursement more than 30% of the disbursement of all banks combined together in 2010?
(A) A (B) B
(C) C (D) D