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Your Personal Exams Guide

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SSC CGL 2016 (Tier-II: Quant) Previous Year Paper (30-Nov-2016)

Total Time: 2 Hour **Total Marks:** 200

Instructions

Sl No.	Section Name	No. of Question	Maximum Marks	Negative Marks	Positive Marks
1	Quantitative Aptitude	100	200	0.5	2

1.) A total of 120 minutes is allotted for the examination.

2.) The server will set your clock for you. In the top right corner of your screen, a countdown timer will display the remaining time for you to complete the exam. Once the timer reaches zero, the examination will end automatically. The paper need not be submitted when your timer reaches zero.

3.) There will, however, be sectional timing for this exam. You will have to complete each section within the specified time limit. Before moving on to the next section, you must complete the current one within the time limits.

Quantitative Aptitude

1. Each member of a club contributes as much rupees and as much paise as the number of members of the club. If the total contribution is Rs. 2525, then the number of members of the club is **(+2, -0.5)**

   a. 50

   b. 60

   c. 55

   d. 45

---

2. The numerator of a fraction is multiple of two numbers. One of the numbers is greater than the other by 2. The greater number is smaller than the denominator by 4. If the denominator 7 + C (C > −7) is a constant, then the minimum value of the fraction is **(+2, -0.5)**

   a. −1/5

   b. 5

   c. −5

   d. 1/5

---

3. A number when divided by the sum of 555 and 445 gives two times their difference as quotient and 30 as the remainder. The number is: **(+2, -0.5)**

   a. 1220

   b. 1250

   c. 220030

d. 22030

---

4. When a number x is divided by a divisor it is seen that the divisor = 4 times the quotient = double the remainder. If the remainder is 80 then the value of x is **(+2, -0.5)**

a. 4680

b. 6480

c. 8460

d. 9680

---

5. On dividing a certain number by 342 we get 47 as remainder. If the same number is divided by 18, what will be the remainder? **(+2, -0.5)**

a. 11

b. 17

c. 15

d. 13

---

6. The sum of three numbers is 252. If the first number is thrice the second and third number is two–third of the first, then the second number is **(+2, -0.5)**

a. 41

b. 42

c. 84

d. 21

---

7. The sum of squares of three positive integers is 323. If the sum of squares of two numbers is twice the third, their product is **(+2, -0.5)**

a. 265

b. 270

c. 255

d. 260

---

8. The sum of three numbers is 2, the 1st number is 1/2 times the 2nd number andthe 3rd number is 1/4 times the 2nd number. The 2nd number is **(+2, -0.5)**

a. 10/9

b. 7/6

c. 8/7

d. 9/8

---

9. Three numbers are in Arithmetic Progression (AP) whose sum is 30 and the product is 910. Then the greatest number in the AP is **(+2, -0.5)**

a. 17

b. 15

c. 13

d. 10

10. Simplify: **(+2, -0.5)**

$\sqrt[3]{-2197} \times \sqrt[3]{-125} \div \sqrt[3]{\frac{27}{512}}$

a. 520/3

b. 492/7

c. 571/5

d. 554/7

---

11. A canal of a village can be cleaned by 24 villagers in 12 days. The number of days in which 36 villagers can clean the canal is: **(+2, -0.5)**

a. 8

b. 18

c. 72

d. 16

---

12. A and B can do a piece of work in 18 days, B and C in 24 days, A and C in 36 days. Working together they can do the work in **(+2, -0.5)**

a. 13 days

b. 16 days

c. 26 days

d. 12 days

---

13. Ramesh and Rahman can do a work in 20 and 25 days respectively. After doing the work collectively for 10 days, they leave the work due to illness and Suresh completes the rest of the work in 3 days. How many days Suresh alone will take to complete the whole work? **(+2, -0.5)**

a. 32 days

b. 28 days

c. 30 days

d. 29 days

---

14. A can do as much work in 4 days as B can do in 5, and B can do as much work in 6 days as C in 7. In what time will C do a piece of work which A can do in a week? **(+2, -0.5)**

a. $4\frac{4}{5}$ days

b. $6\frac{8}{15}$ days

c. $10\frac{5}{24}$ days

d. $12\frac{6}{19}$ days

---

15. A can do a piece of work in 10 days and B can do it in 12 days. They work together for 3 days. Then B leaves and A alone continues. 2 days after that C joins and the work is completed in 2 days more. In how many days can C do it, if he works alone? **(+2, -0.5)**

a. 30 days

b. 40 days

c. 50 days

d. 60 days

---

16. The ratio of the amount of work done by (x – 1) labours in (x + 1) days and that done by (x + 1) labours in (x + 2) days is 5 : 6. Then the value of x is: **(+2, -0.5)**

a. 16

b. 15

c. 14

d. 17

---

17. A bookseller allowed 10% discount on printed price. He gets a 30% commission from the publisher. His profit in percent will be **(+2, -0.5)**

a. 25

b. $28\frac{4}{6}$

c. 20

d. $28\frac{4}{7}$

---

18. A dealer is selling an article at a discount of 5% on the Marked price. If the Marked price is 12% above the cost price and the article was sold for Rs. 532 then the cost price is (in Rs.) **(+2, -0.5)**

a. 500

b. 525

c. 520

d. 505

---

19. A shopkeeper increases the price of an object by 40% and then sells it at a 25% discount on the marked price. If the selling price of such an object be Rs. 2100, its cost price for the shopkeeper was? **(+2, -0.5)**

a. 3000

b. 1750

c. 1500

d. 2000

---

20. The marked price of an article is Rs. 5000. But due to a special festive offer, a certain percent of discount is declared. Mr. X availed this opportunity and bought the article at a reduced price. He then sold it at Rs. 5000 and thereby made a profit of $11\frac{1}{9}\%$. The percentage of discount allowed was: **(+2, -0.5)**

a. $7\frac{1}{2}$

b. 10

c. $3\frac{1}{3}$

d. $11\frac{1}{9}$

---

21. Find the fraction which bears the same ratio to 1/27 that 3/7 does to 5/9. **(+2, -0.5)**

a. 5/9

b. 45/7

c. 7/45

d. 1/35

---

22. The ratio of the number of boys to the number of girls in a school of 432 pupils is 5 : 4. When some new boys and girls are admitted, the number of boys increases by 12 and the ratio of the boys to girls changes to 7 : 6. The number of new girls admitted is: **(+2, -0.5)**

a. 14

b. 20

c. 24

d. 12

---

23. If the three numbers in the ratio 3 : 2 : 5 be such that the sum of the squares is equal to 1862 then which number is the middle one. **(+2, -0.5)**

a. 13

b. 16

c. 14

d. 15

---

24. Two bottles contain acid and water in the ratio 2 : 3 and 1 : 2 respectively. These are mixed in the ratio 1 : 3. What is the ratio of acid and water in the new mixture? **(+2, -0.5)**

a. 7 : 13

b. 11 : 57

c. 23 : 37

d. 1 : 3

---

25. The ratio of the number of boys and girls in a school is 3 : 2. If 20% of the boys and 25% of the girls are scholarship holders, the percentage of the school students who are not scholarship holders is: **(+2, -0.5)**

a. 78

b. 80

c. 70

d. 56

---

26. In two types of brass, the ratios of Copper to Zinc are 8 : 3 and 15 : 7 respectively. If the two types of brass are melted and mixed in the ratio 5 : 2 a new type of brass is obtained. The ratio of Copper to Zinc in this new type of brass is **(+2, -0.5)**

a. 5 : 2

b. 3 : 4

c. 2 : 3

d. 3 : 2

---

27. An hour-long test has 60 problems. If a student completes 30 problems in 25 minutes, then the required seconds he has taken on average for **(+2, -0.5)**

computing each of the remaining problems is

a. 30 seconds

b. 50 seconds

c. 40 seconds

d. 70 seconds

---

28. A and B have their annual average income Rs. 80,000. **(+2, -0.5)**

B and C have their annual average income Rs. 75,000.

C and A have their annual average income Rs. 78,000.

The annual income of A is?

a. Rs. 82000

b. Rs. 84000

c. Rs. 81000

d. Rs. 83000

---

29. A car travels from A to B with 40 Km/h and returns from B to A with 60 Km/h. Its average speed during the whole journey is **(+2, -0.5)**

a. 48 km/h

b. 45 km/h

c. 50 km/h

d. 60 km/h

30. In the first 10 overs of a cricket game, the run rate was only 3.2. The run rate in the remaining 40 overs to reach the target of 282 runs is **(+2, -0.5)**

a. 6.25

b. 6.6

c. 6.5

d. 6.3

e. 6.4

---

31. The average (arithmetic mean) amount of savings of ten students is Rs. 600. Three of the students have no savings at all and each of the others have at least Rs. 250 including Nihar, who has exactly Rs. 1300. The largest amount, in Rs., that anyone student could have is **(+2, -0.5)**

a. 3650

b. 3450

c. 3200

d. 3850

---

32. An Army of 12000 consists of Europeans and Indians. The average height of a European is 5ft 10 inches and that of an Indian is 5ft 9 Inches and that of the whole army is 5ft $9\frac{3}{4}$ inches. Then the number of Indians in the army is? **(+2, -0.5)**

a. 4000

b. 2700

c. 5500

d. 3000

---

33. By what fraction selling price (S. P.) must be multiplied to get the cost price (C. P.) if the loss is 20%? **(+2, -0.5)**

a. 4/5

b. 8/5

c. 5/4

d. 6/5

---

34. A, B and C together start a business. Three times the investment of A equals four times the Investment of B and the Capital of B is twice that of C. The ratio of the share of each in the profit. **(+2, -0.5)**

a. 8 : 3 : 6

b. 3 : 8 : 6

c. 3 : 6 : 8

d. 8 : 6 : 3

---

35. Ramesh sold a book at a loss of 30%. If he had sold it for Rs. 140 more, he would have made a profit of 40%. The cost price of the book is **(+2, -0.5)**

a. Rs. 200

b. Rs. 300

c. Rs. 280

d. Rs. 260

---

36. A shopkeeper purchased 510 eggs at the rate of Rs. 20 per dozen. 30 eggs were broken on the way. In order to make a gain of 20%, he must sell the remaining eggs at the rate of **(+2, -0.5)**

a. Rs. 22.50 per dozen

b. Rs. 25.50 per dozen

c. Rs. 26.50 per dozen

d. Rs. 26 per dozen

---

37. A sells a watch to B and makes a loss of 12%. B makes a profit of $12\frac{1}{2}\%$ by selling the watch to C. If A sells the watch to B at the cost of which C purchased it, then the percentage of loss or profit of A will be, **(+2, -0.5)**

a. 2% profit

b. 2% loss

c. 1% profit

d. 1% loss

---

38. A man buys 3 type-I cakes and 6 type-II cakes for Rs. 900. He sells type-I cakes at a profit of 15% and type-II cakes at a loss of 10%. If his overall profit is Rs. 30, the cost price (in Rs.) of a type-I and a type-II cake is: **(+2, -0.5)**

a. 160, 70

b. 120, 90

c. 100, 100

d. 180, 60

---

39. A number is increased by 20%. To get back to the original number, the increased number is to be reduced by **(+2, -0.5)**

a. 21%

b. $16\frac{2}{3}\%$

c. 20%

d. $14\frac{1}{3}\%$

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40. A Village lost 12% of its goats in a flood and 5% of remainder died from diseases. If the number left now is 8360. What was the original number before the flood? **(+2, -0.5)**

a. 1000

b. 8360

c. 1,00,000

d. 10000

---

41. A scored 72% in a paper with maximum marks of 900 and 80% in another paper with maximum marks of 700. If the result is based on the combined percentage of two papers, the combined percentage is **(+2, -0.5)**

a. 76.5%

b. 76%

c. 75.5%

d. 77%

---

42. An army lost 10% of its men in war, 10% of the remaining died due to disease and 10% of the rest were declared disabled. Thus the strength of the army was reduced to 7,29,000 active men. The original strength of the army was **(+2, -0.5)**

a. 1000000

b. 1200000

c. 1500000

d. 1100000

---

43. A bus travels 150 Km in 3 hours and then travel next 2 hours at 60 Km/hr. Then the average speed of the bus will be **(+2, -0.5)**

a. 50 Km/hr

b. 55 Km/hr

c. 54 Km/hr

d. 60 Km/hr

---

44. A man can cover a certain distance in 3 hours 36 minutes if he walks at a rate of 5 Km/hr. If he covers the same distance on cycle at the rate of 24 Km/hr, then the time taken by him in minutes is **(+2, -0.5)**

a. 50

b. 55

c. 45

d. 40

---

45. Due to inclement weather, an aeroplane reduced its speed by 300 Km/hr and reached the destination of 1200 km late by 2 hrs. Then the schedule duration of the flight was. **(+2, -0.5)**

a. 1 hour

b. 2 hour

c. 1.5 hour

d. 2.5 hour

---

46. Three runners A,B and C run a race, with runner A finishing 12 meters ahead of runner B and 18 meters ahead of runner C, while runner B finishes 8 meters ahead of runner C. Each runner travels the entire distance at a constant speed. The length of the race is **(+2, -0.5)**

a. 36 Metres

b. 72 Metres

c. 60 Metres

d. 48 Metres

---

47. The compound interest on Rs. 4000 for 4 years at 10% per annum will be **(+2, -0.5)**

a. Rs. 1756.60

b. Rs. 1856.40

c. Rs. 1856

d. Rs. 1600

---

48. A sum of Rs. 4000 is lent out in two parts, one at 8% simple interest and the other at 10% simple interest. If the annual interest is Rs. 352. The sum lent at 8% is **(+2, -0.5)**

a. Rs. 2200

b. Rs. 3100

c. Rs. 2400

d. Rs. 2900

---

49. If the difference of the compound interest and the simple interest on a sum of money for 3 years is Rs. 186. Find the sum of money, if the rate of interest in both cases be 10% **(+2, -0.5)**

a. Rs. 7200

b. Rs. 6000

c. Rs. 5500

d. Rs. 6500

---

50. A sum of money is invested at 20% compound interest (compounded annually). It would fetch Rs. 723 more in two years if interest is compounded half-yearly. The sum is **(+2, -0.5)**

a. Rs. 7,500

b. Rs. 15,000

c. Rs. 20,000

d. Rs. 30,000

---

51. The height of an equilateral triangle is 18 cm. Its area is: **(+2, -0.5)**

a. $96\sqrt{3}$ sq. m.

b. 108 sq. cm.

c. $36\sqrt{3}$ sq. m.

d. $108\sqrt{3}$ sq. cm.

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52. If the sum of radius and height of a solid cylinder is 20 cm and its total surface area is 880 cm^2 then its volume is: **(+2, -0.5)**

a. 4804 cm^3

b. 8800 cm^3

c. 2002 cm^3

d. 1760 cm^3

---

53. A solid sphere and a solid hemisphere have the same total surface area. The ratio of their volumes is: (Take $\pi = 22/7$) **(+2, -0.5)**

a. $1 : 12\sqrt{3}$

b. $3\sqrt{3} : 4$

c. $3 : 4\sqrt{3}$

d. $4 : 3\sqrt{3}$

---

54. The sides of a triangle are in the ratio $1/2 : 1/3 : 1/4$ and its perimeter is 104 cm. The length of the longest side (in cm) is: **(+2, -0.5)**

a. 32

b. 26

c. 52

d. 48

---

55. The four walls and ceiling of a room of length 25 m, breadth 12 m and height 10 m are to be painted. Painter A can paint 200 m^2 in 5 days, Painter B can paint 250 m^2 in 2 days. If A and B work together, they will finish the job in: **(+2, -0.5)**

a. 8 days

b. $6\frac{10}{33} days$

c. $7\frac{10}{33} days$

d. 6 days

---

56. The base of a right prism is a trapezium whose the length of parallel sides are 25 cm and 11 cm and the perpendicular distance between the parallel sides is 16 cm. If the height of the prism is 10 cm, then the volume of the prism is: **(+2, -0.5)**

a. 960 cu.cm

b. 1540 cu.cm

c. 1440 cu.cm

d. 2880 cu.cm

---

57. The external and the internal radii of a hollow right circular cylinder of height 15 cm are 6.75 cm and 5.25 cm respectively. If it is melted to form a solid cylinder of height half of the original cylinder, then the radius of the solid cylinder is: **(+2, -0.5)**

a. 7 cm

b. 7.25 cm

c. 6 cm

d. 6.5 cm

---

58. The length and breadth of a rectangular piece of a land area in a ratio 5 : 3. The owner spent Rs. 6000 for surrounding it from all sides at Rs. 7.50 per metre. The difference between its length and breadth is: **(+2, -0.5)**

a. 150 metres

b. 50 metres

c. 100 metres

d. 250 metres

---

59. The ratio between the area of a square and that of a circle, when the length of a side of the square is equal to that of the diameter of the circle, is: (take π = 22/7) **(+2, -0.5)**

a. 22 : 7

b. 7 : 22

c. 28 : 11

d. 14 : 11

---

60. A piece of wire 132 cm long is bent successively in the shape of an equilateral triangle, a square and a circle. Then the area will be the longest in the shape of: **(+2, -0.5)**

a. Circle

b. Square

c. Equal in all the shapes

d. Equilateral triangle

---

61. If a cone is divided into two parts by drawing a plane through the midpoints of its axis, then the ratio of the volume of the 2 parts of the cone is: **(+2, -0.5)**

a. 1 : 2

b. 1 : 7

c. 1 : 8

d. 1 : 4

62. Two regular polygons are such that the ratio between their number of sides is 1 : 2 and the ratio of measures of their interior angles is 3 : 4. Then the number of sides of each polygon is: **(+2, -0.5)**

a. 10, 20

b. 4, 8

c. 3, 6

d. 5, 10

---

63. In an isosceles triangle, the length of each equal side is twice the length of the third side. The ratio of areas of the isosceles triangle and an equilateral triangle with the same perimeter is: **(+2, -0.5)**

a. $36\sqrt{5} : 100$

b. $32\sqrt{5} : 100$

c. $42\sqrt{5} : 100$

d. $30\sqrt{5} : 100$

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64. A right circular cylinder is partially filled with water. Two iron spherical balls are completely immersed in the water so that the height of the water in the cylinder rises by 4 cm. If the radius of one ball is half of the other and the diameter of the cylinder is 18 cm, then the radii of the spherical balls are: **(+2, -0.5)**

a. 3 cm and 6 cm

b. 6 cm and 12 cm

c. 2 cm and 4 cm

d. 4 cm and 8 cm

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65. The whole surface area of a pyramid whose base is a regular polygon is 340 cm^2 and area of its base is 100 cm^2. Area of each lateral face is 30 cm^2. Then the number of lateral faces is: **(+2, -0.5)**

a. 8

b. 10

c. 7

d. 9

---

66. If P = 99, then the value of $P(P^2 + 3P + 3)$ is: **(+2, -0.5)**

a. 999999

b. 9999

c. 9999999

d. 99999

---

67. If $x + 1/x = c + 1/c$ then the value of x is: **(+2, -0.5)**

a. c, 1/c

b. c, c^2

c. c, 2c

d. 0, 1

---

68. If the sum of squares of two real numbers is 41 and their sum is 9. Then the sum of cubes of these two numbers is: **(+2, -0.5)**

a. 198

b. 189

c. 209

d. 169

---

69. A complete factorisation of $x^4 + 64$ is: **(+2, -0.5)**

a. $(x^2 + 8)^2$

b. $(x^2 + 8)(x^2 - 8)$

c. $(x^2 - 4x + 8)(x^2 - 4x - 8)$

d. $(x^2 + 4x + 8)(x^2 - 4x + 8)$

---

70. If $a + b = 1$, then $a^4 + b^4 - a^3 - b^3 - 2a^2b^2 + ab$ is equal to: **(+2, -0.5)**

a. 0

b. 2

c. 4

d. 1

---

71. If $x^2 + y^2 + 6x + 5 = 4(x - y)$ then $x - y$ is: **(+2, -0.5)**

a. -1

b. 0

c. 1

d. 4

---

72. If $a = 299, b = 298, c = 297$ then the value of $2a^3 + 2b^3 + 2c^3 - 6abc$ is: **(+2, -0.5)**

a. 5364

b. 5154

c. 5267

d. 5456

---

73. If $x + 1/x = \sqrt{3}$, then the value of $x^{18} + x^{12} + x^6 + 1$ is: **(+2, -0.5)**

a. 1

b. 0

c. 3

d. 2

---

74. If $x = 1 + \sqrt{2} + \sqrt{3}$, then the value of $2x^4 - 8x^3 - 5x^2 + 26x - 28$ is: **(+2, -0.5)**

a. $6\sqrt{6}$

b. 2√2

c. 3√3

d. 5√5

---

75. If $2r = h + \sqrt{r^2 + h^2}$ then the ratio r : h (r ≠ 0) is: **(+2, -0.5)**

a. 2 : 3

b. 3 : 5

c. 1 : 2

d. 4 : 3

---

76. In an equilateral triangle ABC, G is the centroid. Each side of the triangle is 6 cm. The length of AG is: **(+2, -0.5)**

a. 3√2 cm

b. 3√3 cm

c. 2√2 cm

d. 2√3 cm

---

77. PQ is a tangent to the circle at T. If TR = TS where, R and S are points on the circle and ∠RST = 65°, the ∠PTS = ? **(+2, -0.5)**

a. 55°

b. 130°

c. 45°

d. 115°

---

78. In ΔABC, AC = BC and ∠ABC = 50°, the side BC is produced to D so that BC = CD then the value of ∠BAD is: **(+2, -0.5)**

a. 40°

b. 50°

c. 90°

d. 80°

---

79. In a circle, a diameter AB and a chord PQ (which is not a diameter) intersect each other at X perpendicularly. If AX : BX = 3 : 2 and the radius of the circle is 5 cm, then the length of chord PQ is **(+2, -0.5)**

a. $2\sqrt{6}$ cm

b. $5\sqrt{3}$ cm

c. $4\sqrt{6}$ cm

d. $6\sqrt{5}$ cm

---

80. ABC is a triangle, PQ is line segment intersecting AB in P and AC in Q and PQ ∥ BC. The ratio of AP : BP = 3 : 5 and length of PQ is 18 cm. The length of BC is: **(+2, -0.5)**

a. 28 cm

b. 84 cm

c. 42 cm

d. 48 cm

---

81. If the parallel sides of a trapezium are 8 cm and 4 cm, M and N are the midpoints of the diagonals of the trapezium, then the length of MN is: **(+2, -0.5)**

a. 1 cm

b. 12 cm

c. 2 cm

d. 6 cm

---

82. ΔABC is isosceles having AB = AC and ∠A = 40°. Bisectors PO and OQ of the exterior angles ∠ABD and ∠ACE formed by producing BC on both sides, meet at O. The value of ∠BOC is: **(+2, -0.5)**

a. 55°

b. 80°

c. 70°

d. 110°

---

83. An equilateral triangle of side 6 cm is inscribed in a circle,then the radius of the circle is: **(+2, -0.5)**

a. $4\sqrt{3}$ cm

b. $2\sqrt{3}$ cm

c. √3 cm

d. 3√2 cm

---

84. In a circle with centre O, AB is diameter and CD is a chord which is equal to the radius OC. AC and BD are extended in such a way that they intersect each other at a point P, exterior to the circle. The measure of ∠APB is: **(+2, -0.5)**

a. 45°

b. 30°

c. 90°

d. 60°

---

85. Two chords AB and CD of a circle with centre O intersect at P. If ∠APC = 40°,then the value of ∠AOC + ∠BOD is: **(+2, -0.5)**

a. 60°

b. 50°

c. 80°

d. 120°

---

86. If $x \tan 60° + \cos 45° = \sec 45°$ then the value of $x^2 + 1$ is: **(+2, -0.5)**

a. 5/6

b. 6/5

c. 6/7

d. 7/6

---

87. x, y be two acute angles, x + y < 90° and sin(2x - 20°) = cos(2y + 20°), the value of tan(x + y) is: **(+2, -0.5)**

a. 2 + √2

b. 1

c. 1/√3

d. √3

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88. If $a^2\sec^2 x - b^2\tan^2 x = c^2$ then the value of $\sec^2 x + \tan^2 x$ is equal to (assume $b^2 \neq a^2$) **(+2, -0.5)**

a. $\frac{b^2-a^2+2c^2}{b^2+a^2}$

b. $\frac{b^2-a^2-2c^2}{b^2+a^2}$

c. $\frac{b^2+a^2-2c^2}{b^2-a^2}$

d. $\frac{b^2-a^2}{b^2+a^2+2c^2}$

---

89. (1 + sec 20° + cot 70°)(1 - cosec 20° + tan70°) is equal to: **(+2, -0.5)**

a. 2

b. 3

c. 1

d. 0

90. If $\tan^4\theta + \tan^2\theta = 1$ then the value of $\cos^4\theta + \cos^2\theta$ is: **(+2, -0.5)**

a. -1

b. 2

c. 1

d. 0

---

91. The value of $8(\sin^6\theta + \cos^6\theta) - 12(\sin^4\theta + \cos^4\theta)$ is equal to: **(+2, -0.5)**

a. 20

b. 4

c. -20

d. -4

---

92. An aeroplane flying horizontally at a height of 3 km. above the ground is observed at a certain point on earth to subtend an angle of 60°. After 15 sec flight, its angle of elevation is changed to 30°. The speed of the aeroplane (taking $\sqrt{3} = 1.732$) is: **(+2, -0.5)**

a. 230.93 m/sec

b. 235.85 m/sec

c. 236.25 m/sec

d. 230.63 m/sec

---

93. If the angle of elevation of the sun decreases from 45° to 30°, then the length of the shadow of a pillar increases by 60 m. The height of the pillar is: **(+2, -0.5)**

a. 30(√3 + 1) m

b. 30(√3 - 1) m

c. 60(√3 + 1) m

d. 60(√3 - 1) m

---

94. The angle of elevation of the top of a tower, vertically erected in the middle of a paddy field, from two points on a horizontal line through the foot of the tower and opposite side of the tower are given to be α and β (α > β). The height of the tower is h unit. A possible distance (in the same unit) between the points is: **(+2, -0.5)**

a. h(cot α - cot β)

b. $\frac{h(\cot\beta-\cot\alpha)}{\cos(\alpha+\beta)}$

c. $\frac{h(\tan\beta-\tan\alpha)}{\tan\alpha\tan\beta}$

d. h(cot α + cot β)

---

95. The angle of elevation of the top of an unfinished pillar from a point 150 metres from its base is 30°. The height (in metres) that the pillar must be raised so that its angle of elevation at the same point may be 45°, is (taking √3 = 1.732) **(+2, -0.5)**

a. 126.8

b. 173.2

c. 86.6

d. 63.4

---

96. Following table shows the number of sales of Hindi and English newspapers in 5 localities. Read the table carefully and answer the following questions **(+2, -0.5)**

Localities	English Newspaper	Hindi Newspaper
A	2500	3500
B	2000	2400
C	1800	3600
D	3000	2500
E	200	4000

What is the difference between the total sale of English newspapers and the total sale of Hindi newspapers in all the localities together?

a. 5600

b. 5700

c. 7500

d. 6500

97. Following table shows the number of sales of Hindi and English newspapers in 5 localities. Read the table carefully and answer the following questions (+2, -0.5)

Localities	English Newspaper	Hindi Newspaper
A	2500	3500
B	2000	2400
C	1800	3600
D	3000	2500
E	200	4000

What is the difference between the average sales of Hindi and English newspapers in all localities?

a. 2100

b. 1300

c. 2000

d. 2200

98. Following table shows the number of sales of Hindi and English newspapers in 5 localities. Read the table carefully and answer the following questions (+2, -0.5)

Localities	English Newspaper	Hindi Newspaper
A	2500	3500
B	2000	2400
C	1800	3600
D	3000	2500
E	200	4000

What is the sum of the ratios of sales of total English and total Hindi newspapers in all localities?

a. 47

b. 50

c. 32

d. 51

---

99. Following table shows the number of sales of Hindi and English newspapers in 5 localities. Read the table carefully and answer the following questions **(+2, -0.5)**

Localities	English Newspaper	Hindi Newspaper
A	2500	3500
B	2000	2400
C	1800	3600
D	3000	2500
E	200	4000

What is the ratio of the average number of English newspapers from the localities B, C and E to the average number of Hindi newspapers from the localities A and D?

a. 11 : 9

b. 4 : 9

c. 9 : 10

d. 9 : 11

---

100. Following table shows the number of sales of Hindi and English newspapers in 5 localities. Read the table carefully and answer the following questions **(+2, -0.5)**

Localities	English Newspaper	Hindi Newspaper
A	2500	3500
B	2000	2400
C	1800	3600
D	3000	2500
E	200	4000

What is the ratio of the average number of sale of English newspapers in localities B and D together to the average sale of Hindi newspapers in all the localities?

a. 33 : 40

b. 34 : 43

c. 25 : 32

d. 32 : 25

Answers

1. **Answer: a**

Explanation:

Let the number of members = x

$X \times X + X \times X/100 = 2525$

$\Rightarrow X^2 + X^2/100 = 2525$

$\Rightarrow 101 x^2 = 252500$

$\Rightarrow x^2 = 2500$

$\Rightarrow x = 50$

$\therefore$ Number of members = 50

---

2. **Answer: a**

Explanation:

Let the number be x and the other number be (x + 2)

According to the question

$\Rightarrow x + 2 = 7 + C - 4$

$\Rightarrow x = C + 1$

Fraction = $x (x + 2)/(7 + c)$

$\Rightarrow [(1 + C)(3 + C)]/(7 + C)$

By using the wavy curve method

first find out the point of discontinuity of the given function i.e. 7

Now, take each factor equal to zero we get values of C = -1, -3, -7

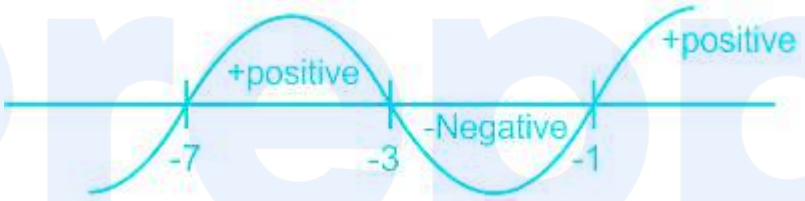
Plot it on number line the values of C

solving the term $(1 + C)(3 + C) = C^2 + 4C + 1$

check the coefficient of C^2 if the coefficient of C^2 is positive then we start by making curve with sign from positive to negative otherwise start from negative and the curve from upward to downward

So, here in the expression the coefficient of C^2 is positive

∴



So, the minimum value will be $-3 < C < -1$

For minimum value = $-3 < C < -1$

So, C = –2

∴ Fraction = $(1 - 2)(3 - 2)/(7 - 2) = -1/5$

---

3. Answer: c

Explanation:

Divisor = 555 + 445 = 1000

Quotient = 2 (555 – 445) = 220

Remainder = 30

As we know,

Dividend = Divisor × Quotient + Remainder

Dividend = 1000 × 220 + 30

Dividend = 220000 + 30

∴ Dividend = 220030

---

4. **Answer: b**

Explanation:

Given,

Divisor = 4 × Quotient = 2 × Remainder

Remainder = 80

Divisor = 2 × 80 = 160

Quotient = 160/4 = 40

As we know,

Dividend = Divisor × Quotient + Remainder

Dividend = 160 × 40 + 80

Dividend = 6400 + 80

∴ Dividend = 6480

---

5. **Answer: a**

Explanation:

Short Trick:

47 ÷ 18, then remainder will be 11

Detailed Method:

Let the number = 342 + 47 = 389

When we divide 389 by 18 we get remainder 11.

---

6. Answer: b

Explanation:

Let the second number be x,

First number = 3x

Third number = 3x × 2/3 = 2x

3x + x + 2x = 252

6x = 252

x = 42

∴ Second number is 42.

---

7. Answer: c

Explanation:

Let the three number be a, b and c.

$\Rightarrow a^2 + b^2 + c^2 = 323$

$\Rightarrow a^2 + b^2 = 2c$

$\Rightarrow c^2 + 2c = 323$

$\Rightarrow c^2 + 2c - 323 = 0$

$\Rightarrow c^2 + 19c - 17c - 323 = 0$

$\Rightarrow c(c + 19) - 17(c + 19) = 0$

$\Rightarrow (c + 19)(c - 17) = 0$

Taking,

$\Rightarrow c - 17 = 0$

$\Rightarrow c = 17$

$\Rightarrow a^2 + b^2 = 2c$

$\Rightarrow a^2 + b^2 = 2 \times 17$

$\Rightarrow a^2 + b^2 = 34$

Let a = 3 and b = 5

$\Rightarrow a^2 + b^2 = 34$

$\Rightarrow 9 + 25 = 34$

$\Rightarrow 34 = 34$ (satisfied)

$\therefore$ Product of abc = $3 \times 5 \times 17 = 255$

---

8. Answer: c

Explanation:

Let the second number be x

First number = x/2

Third number = x/4

$\Rightarrow x/2 + x + x/4 = 2$

$\Rightarrow (2x + 4x + x) = 8$

$\Rightarrow 7x = 8$

$\Rightarrow x = 8/7$

Second number is = 8/7

---

9. Answer: c

Explanation:

Sum of three number which are in AP is = 30

Let the number are (a – d), a, (a + d)

$\Rightarrow a - d + a + a + d = 30$

$\Rightarrow 3a = 30$

$\Rightarrow a = 10$

$\Rightarrow (a - d) \times a \times (a + d) = 910$

$\Rightarrow (10 - d) \times 10 \times (10 + d) = 910$

$\Rightarrow 100 - d^2 = 91$

$\Rightarrow d^2 = 100 - 91$

$\Rightarrow d = \sqrt{9}$

$\Rightarrow d = 3$

Third number of AP = (a + d) = 10 + 3 = 13

Short Trick:

Second term = 30/3 = 10

From the option, let third number be 13, then AP will be 7, 10, 13

⇒ 7 × 10 × 13

⇒ 910 (satisfied)

---

10. Answer: a

Explanation:

$\sqrt[3]{-2197} \times \sqrt[3]{-125} \div \sqrt[3]{27/512}$

⇒ (–13) × (–5) × (8/3)

⇒ 520/3

---

11. Answer: a

Explanation:

As we know,

⇒ $M_1 \times D_1 = M_2 \times D_2$

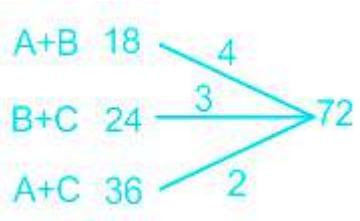
⇒ $24 \times 12 = 36 \times D_2$

⇒ $D_2 = 8$

---

12. Answer: b

Explanation:



Total work = 72

Efficiency of A + B + C = (4 + 3 + 2)/2 = 9/2

∴ A, B and C together complete the work in = 72/(9/2) = 8 × 2 = 16

---

13. **Answer: c**

Explanation:

Given:

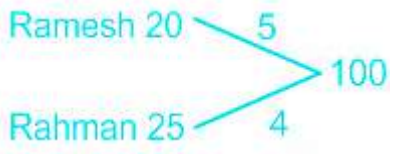
Time taken by Ramesh is 20 days

Time taken by Rahman is 25 days

Concept Used:

Work done = Time × Efficiency

Calculation:



Total work = 100

Work done by Ramesh and Rahman in 10 days = (5 + 4) × 10 = 90

Remaining work = 100 – 90 = 10

Let the efficiency of Suresh be x, then

⇒ 3x = 10

⇒ x = 10/3

∴ Suresh complete the whole work in = 100/(10/3) = 10 × 3 = 30 days

---

14. Answer: c

Explanation:

4A = 5B

Efficiency ratio of A : B = 5 : 4

6B = 7C

Efficiency ratio of B : C = 7 : 6

Efficiencies ratio of A, B and C = 35 : 28 : 24

Let C will complete the work in x days that A complete in 7 days

⇒ 7 × 35 = 24 × x

⇒ x = 245/24

∴ x = $10\frac{5}{24}$

---

15. Answer: b

Explanation:

According to the question

⇒ 10 A = 12 B

Efficiency ratio of A : B = 6 : 5

Total work = 10 × 6 = 60

Work done by A and B in 3 days = (6 + 5) × 3 = 33

A will work 4 more days

Work done by A alone in 4 days = 4 × 6 = 24

Remaining work = 60 – 33 – 24 = 3

Let the efficiency of C be x, then

⇒ 2x = 3

⇒ x = 3/2

∴ C complete the whole work in = 60/(3/2) = 40 days.

---

16. **Answer: a**

Explanation:

Calculation:

According to the question

$[(x-1)(x+1)]/[(x+1)(x+2)] = 5/6$

$\Rightarrow (x-1)/(x+2) = 5/6$

$\Rightarrow 6x - 6 = 5x + 10$

$\Rightarrow x = 16$

∴ The value of x is 16.

17. **Answer: d**

Explanation:

Let the MP of the book be Rs. 100

Cost of book for book seller after getting 30% commission = 100 × (30/100) = Rs. 70

SP of the book = 100 × 90/100 = Rs. 90

Profit of book seller = 90 – 70 = 20

∴ Profit percentage of book seller = 20/70 × 100 = $28\frac{4}{7}$ %

18. **Answer: a**

Explanation:

5% = 1/20 and 12% = 3/25

SP of the book = 532

MP of the book = 532 × (20/19)

∴ CP of the book = 532 × (20/19) × (25/28) = Rs. 500

19. **Answer: d**

Explanation:

25% = 1/4 and 40% = 2/5

SP of the article = Rs. 2100

MP of the book = 2100 × (4/3)

∴ CP of the book = 2100 × (4/3) × (5/7) = Rs. 2000

---

20. Answer: b

Explanation:

$11\frac{1}{9}\% = \frac{1}{9}$

Let Mr X bought the article in = Rs. 9

Mr X sold the article at = 9 × (10/9) = Rs. 10

As SP of Mr. X and MP of the article is same, then

Mr X got the discount = 10 – 9 = 1

∴ Discount percent = 1/10 × 100 = 10%

---

21. Answer: d

Explanation:

Let the fraction be x, then according to the question

⇒ x : 1/27 = 3/7 : 5/9

⇒ x × 27 = 3/7 × 9/5

⇒ 27x = 27/35

∴ x = 1/35

---

22. Answer: c

Explanation:

Given:

The ratio of the number of boys to the number of girls in a school of 432 pupils is 5 : 4.

When some new boys and girls are admitted, the number of boys increases by 12.

The ratio of boys to girls changes to 7 : 6.

Concept Used:

Properties of ratio.

Calculation:

Total number of students = 432

Ratio of boys to girls = 5 : 4

Number of boys = $5/9 \times 432$

$\Rightarrow 240$

Number of girls = $432 - 240$

$\Rightarrow 192$

Let the number of new girls admitted be x,

$(240 + 12)/(192 + x) = 7/6$

$\Rightarrow 252 \times 6 = 1344 + 7x$

$\Rightarrow 7x = 1512 - 1344$

$\Rightarrow x = 168/7$

$\Rightarrow x = 24$

∴ The number of new girls admitted is 24.

Shortcut Trick

Number of boys = 5/9 × 432 = 240

Number of girls = 432 – 240 = 192

Let the number of new girls admitted be x,

(240 + 12)/(192 + x) = 7/6

⇒ 252 = 7 unit

⇒ 1 Unit = 252/7 = 36

⇒ 6 unit = 36 × 6 = 216

⇒ 192 + x = 216

⇒ x = 216 - 192

⇒ x = 24

∴ The number of new girls admitted is 24.

---

23. Answer: c

Explanation:

Given:

The three numbers in the ratio 3 : 2 : 5

The sum of the squares is equal to 1862.

Concept Used:

Properties of ratio.

Calculation:

Ratio of three numbers are = 3x : 2x : 5x

$(3x)^2 + (2x)^2 + (5x)^2 = 1862$

$\Rightarrow 9x^2 + 4x^2 + 25x^2 = 1862$

$\Rightarrow x^2 = 1862/38$

$\Rightarrow x = \sqrt{49} = 7$

The middle number is = 2 × 7

⇒ 14

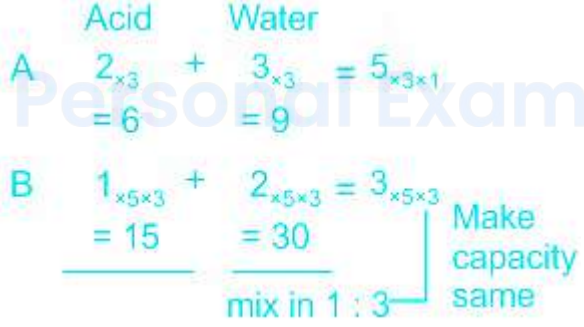
∴ The middle one is 14.

---

24. Answer: a

Explanation:

Short Trick:



Detailed Solution:

Ratio of acid and water in first bottle = 2 : 3 ------ (1) (2 + 3 = 5)

Ratio of acid and water in second bottle = 1 : 2 ------ (2) (1 + 2 = 3) × 5

∴ Ratio of acid and water in new bottle = (2 + 5) : (3 + 10) = 7 : 13

---

25. **Answer: a**

Explanation:

Ratio of the number of boys and girls in a school is = 3 : 2 or 30 : 20

Let number of boys = 30 and number of girls = 20

Total students = 30 + 20 = 50

Number of boys who did not get scholarship = 30 × (80/100) = 24

Number of girls who did not get scholarship = 20 × (75/100) = 15

Total number of students who did not get scholarship = 24 + 15 = 39

∴ Percentage of students who did not get scholarship = 39/50 × 100 = 78%

---

26. **Answer: a**

Explanation:

Ratio of copper to zinc in first alloy of brass = 8 : 3 ---(1) (8/11 + 3/11) × 5 = (40 + 15)/11 = 5

Ratio of copper to zinc in second alloy of brass = 15 : 7 ---(2) (15/22 + 7/22) × 2 = (30 + 14)/22 = 2

∴ The ratio of copper to zinc in the new alloy of brass = 5 : 2

---

27. **Answer: d**

Explanation:

Total number of question = 60

If a student completes 30 questions in 25 minutes,

Remaining minutes = 60 - 25 = 35

Remaining questions = 60 - 30 = 30

30 question complete in = 35 min

1 question complete in = 35/30 × 60 = 70 sec

---

28. Answer: d

Explanation:

Total income of A and B in 1 year = 2 × 80000 = 160000

Total income of B and C in 1 year = 2 × 75000 = 150000

Total income of C and A in 1 year = 2 × 78000 = 156000

According to the question

2 (A + B + C) = 160000 + 150000 + 1560000

⇒ (A + B + C) = 466000/2 = 233000

1 year income of A = 233000 - 150000 = 83000

---

29. Answer: a

Explanation:

As we know,

Average speed = 2xy/(x + y)

∴ Average speed = (2 × 40 × 60)/(40 + 60) = 48 km/hr

---

30. **Answer: a**

Explanation:

Total run makes in first 10 overs = 10 × 3.2 = 32

Run will have to complete in 40 overs = 282 - 32 = 250

∴ Required run rate = 250/40 = 6.25

---

31. **Answer: b**

Explanation:

Average savings of 10 students = Rs. 600

Sum of savings of 10 students = 600 × 10 = Rs. 6000

Average savings of 6 students = 250

Sum of savings of 6 students = 250 × 6 = 1500

Savings of 1 student is 1300 and savings of 3 students is 0, then

∴ Savings of students whose savings is greatest all = 6000 - 1300 - 1500 = 3200

The largest amount of student = 3200 + 250 = Rs. 3450

---

32. **Answer: d**

Explanation:

Using Allegation method

5 feet is common so ignore 5.

10 inch 9 inch

$9\frac{3}{4}$

3/4 1/4

Ratio of army of European to that of India = 3/4 : 1/4 = 3 : 1

⇒ 3 + 1 = 4 unit

⇒ 4 unit = 12000

⇒ 1 unit = 3000

∴ Number of Indians in the army is 3000.

---

33. Answer: c

Explanation:

CP × 4/5 = SP

CP = SP × 5/4

So correct option is 5/4

---

34. Answer: d

Explanation:

According to the question

3A = 4B

⇒ A : B = 4 : 3 ---(1) × 2

B = 2C

⇒ B : C = 2 : 1 ---(2) × 3

A : B : C = 8 : 6 : 3

Short Trick:

As given, Capital of B is twice that of C, Only options 4 satisfied the condition.

---

35. Answer: a

Explanation:

Let cost price of the book be Rs. x, then according to the question

140x/100 - 70x/100 = 140

⇒ 70x/100 = 140

⇒ x = Rs. 200

Short Trick:

Let the cost price of the article be 100%

⇒ 30 + 40 = 70%

⇒ 70% = 140

⇒ 1% = 2

⇒ 100% = 200

---

36. Answer: b

Explanation:

510 eggs = 510/12 dozen

Cost of 510 dozen = 510/12 × 20 = 850

If 30 eggs were broken, then

Remaining eggs = 510 - 30 = 480

480 eggs = 40 dozen eggs

SP of 40 dozen eggs = 850 × 120/100

∴ SP of 1 dozen eggs = 850 × 120/100 × 1/40 = 25.50

---

37. Answer: d

Explanation:

Let A bought a watch be Rs. 100

A sold the watch to B = 100 × 88/100 = Rs. 88

B sold the watch to C = 88 × 9/8 = Rs. 99

Loss for A = 100 - 99 = 1

∴ Loss for A = 1/100 × 100 = 1%

---

38. Answer: a

Explanation:

Total profit = 30

Average profit = 30/900 × 100 = 10/3%

Using allegation Method

15 - 10

10/3

40/3 35/3

Ratio of type-1 cakes to type-2 cakes = 40/3 : 35/3 = 8 : 7

⇒ 8 + 7 = 15 unit

⇒ 15 unit = 900

⇒ 1 unit = 60

⇒ 8 unit = 480

⇒ 7 unit = 420

Total cost of type-1, 3 cakes = 480

Cost of type-1, 1 cake = 480/3 = 160

Total cost of type-2, 6 cakes = 420

Cost of type-2, 1 cake = 420/6 = 70

---

39. Answer: b

Explanation:

Let the number be = 100

Number after increased = 100 × (120/100) = 120

Increased number = 120 - 100 = 20

∴ Required percentage = 20/120 × 100 = $16\frac{2}{3}\%$

---

40. Answer: d

Explanation:

12% = 3/25 and 5% = 1/20

Let the total number of goats be x, then

⇒ x × (22/25) × (19/20) = 8360

⇒ x = 8360 × (25/22) × (20/19)

⇒ x = 10,000

---

41. Answer: c

Explanation:

Total maximum number of both subjects = 900 + 700 = 1600

A scored in first paper = 900 × (72/100) = 648

A scored in second paper = 700 × (80/100) = 560

Total scored in both subjects = 648 + 560 = 1208

∴ Required percentage = 1208/1600 × 100 = 75.5%

---

42. Answer: a

Explanation:

Let the total number of men in an army be x, then

⇒ x × (9/10) × (9/10) × (9/10) = 729000

⇒ x × 729/1000 = 729000

⇒ x = 1000000

---

43. Answer: c

Explanation:

Distance covered in 2 hrs with the speed of 60 km/hr = 2 × 60 = 120

Total distance = 150 + 120 = 270

Total time = 2 + 3 = 5 hrs

As we know,

Average speed = Total distance/Total Time

∴ Average speed = 270/5 = 54 km/hr

---

44. Answer: c

Explanation:

3 hr + 36 min = 3 + 36/60 = 3 + 3/5 = 18/5 hr

As we know,

Let the time taken by him covered the distance by cycle be x hr,

Distance is same, then

5 × 18/5 = x × 24

⇒ x = 18/24 × 60

⇒ x = 45 min

---

45. **Answer: b**

Explanation:

Detailed Method:

Let the speed of the flight be x km/hr

$\Rightarrow 1200 [1/(x - 300) - 1/x] = 2$

$\Rightarrow 600 (x - x + 300) = x (x - 300)$

$\Rightarrow x (x - 300) = 600 \times 300$

$\Rightarrow x^2 - 300x - 180000 = 0$

$\Rightarrow x^2 - 600x + 300x - 180000 = 0$

$\Rightarrow x (x - 600) + 300 (x - 600) = 0$

$\Rightarrow (x - 600) (x + 300) = 0$

Taking,

$\Rightarrow x - 600 = 0$

$\Rightarrow x = 600$ km/hr

Required time = 1200/600 = 2 hr

---

46. **Answer: d**

Explanation:

Let A finishes x meter which is required distance
According to question,
B finishes (x - 12)m

C finishes (x - 18)m when A covers x m

Now, When B finishes x m then C finishes (x - 8) m

Calculation:

⇒ A / B = x / (x - 12)

⇒ A / C = x / (x - 18)

⇒ B / C = (x - 12) / (x - 18) ----- (i)

⇒ B / C = x / (x - 8) -----(ii)

Equate equation (i) and (ii)

⇒ (x - 12) / (x -18) = x / (x - 8)

⇒ x^2 - 8x - 12x + 96 = x^2 - 18x

⇒ -20x + 96 = -18x

⇒ 2x = 96

⇒ x = 48

---

47. **Answer: b**

Explanation:

P = 4000, r = 10% and time = 4 years

As we know,

CI = P $[(1 + r/100)^t - 1]$

CI = 4000 $[1 + 10/100)^4 - 1]$

CI = 4000 $[(11/10)^4 - 1]$

CI = 4000 [14641/10000 - 1]

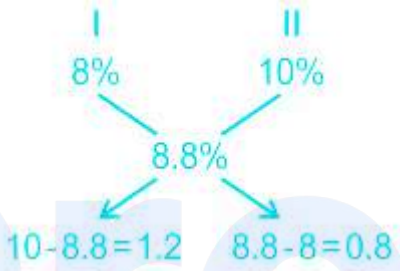
CI = 4000 × 4641/10000

∴ CI = 1856.4

---

48. Answer: c

Explanation:



P = 4000

Total interest = 352

Average interest = 352/4000 × 100 = 8.8%

Using allegation method:

8% 10%

8.8%

1.2 0.8

Ratio of money given by 8% to that to 10% = 1.2 : 0.8 = 3 : 2

⇒ 3 + 2 = 5 unit

⇒ 5 unit = 4000

⇒ 1 unit = 800

⇒ 3 unit = 3 × 800 = 2400

∴ The sum lent at 8% is Rs. 2400.

---

49. Answer: b

Explanation:

As we know,

Difference between CI and SI for 3 years = $[Pr^2(300 + r)]/100^3$

$\Rightarrow 186 = [P \times 10^2(300 + 10)]/100 \times 100 \times 100$

$\Rightarrow 186 = P \times 100 \times 310/100 \times 100 \times 100$

$\Rightarrow P = 186/31 \times 1000 = 6000$

---

50. Answer: d

Explanation:

Rate = 20%, time = 2 year and if interest compounded yearly, then

Total interest rate at the end of 2 years = 20 + 20 + (20 × 20)/100 = 40 + 4 = 44%

If interest rate compounded half-yearly, then

Rate = 20/2 = 10%

Total interest rate for first 2 years = 10 + 10 + (10 × 10)/100 = 21%

Similarly,

Total interest rate for last 2 years = 10 + 10 + (10 × 10)/100 = 21%

Total interest rate for 4 years = 21 + 21 + (21 × 21)/100 = 42 + 4.41 = 46.41%

Difference of interest rate = 46.41% - 44% = 2.41%

⇒ 2.41% = 723

⇒ 1% = 723/2.41

⇒ 1% = 300

⇒ 100% = 30,000

---

51. Answer: d

Explanation:

Height of an equilateral triangle = 18 cm

As we know,

$\sqrt{3}/2 \times a = 18$

$\Rightarrow a = 18 \times 2/\sqrt{3}$

$\Rightarrow a = 12\sqrt{3}$

Area of equilateral triangle = $\sqrt{3}/4 \times a^2$

$\Rightarrow \sqrt{3}/4 \times 12\sqrt{3} \times 12\sqrt{3}$

$\Rightarrow 108\sqrt{3}$

---

52. Answer: c

Explanation:

As we know,

Total surface area of the cylinder = $2\pi r (r + h)$

$2 \pi r (r + h) = 880$

⇒ 2 × 22/7 × r × 20 = 880

⇒ r = (880 × 7) /880

⇒ r = 7 cm

⇒ r + h = 20 cm

⇒ h = 20 – 7 = 13 cm

Volume of the cylinder = $\pi r^2 h$

⇒ 22/7 × 7 × 7 × 13

⇒ 2002 cm^3

---

53. Answer: b

Explanation:

As we know,

Total surface area of sphere = $4 \pi R^2$

Total surface area of hemisphere = $3 \pi r^2$

Volume of sphere = $4/3 \pi R^3$

Volume of hemisphere = $2/3 \pi r^3$

Let the radius of sphere and hemisphere be R cm and r cm respectively,

According to the question

⇒ $4 \pi R^2 = 3 \pi r^2$

⇒ $R^2/r^2 = 3/4$

⇒ $R/r = \sqrt{3}/2$

Ratio of the volume of a sphere to hemisphere = $4/3\ \pi\ (\sqrt{3})^3 : 2/3\ \pi\ (2)^3 = 3\sqrt{3} : 4$

---

54. Answer: d

Explanation:

Perimeter of the triangle = 104 cm,

Ratio of sides of triangle = $1/2 : 1/3 : 1/4 = 12/2 : 12/3 : 12/4 = 6 : 4 : 3$

$\Rightarrow 6 + 4 + 3 = 13$ unit

$\Rightarrow 13$ unit $= 104$

$\Rightarrow 1$ unit $= 104/13$

$\Rightarrow 1$ unit $= 8$

$\Rightarrow 6$ unit $= 8 \times 6 = 48$ cm

---

55. Answer: b

Explanation:

Length = 25 m, breadth = 12 m and height = 10 m.

As we know,

Area of four wall and roof = $2\ (l + b) \times h + lb$

$\Rightarrow 2(25 + 12)\ 10 + 25 \times 12$

$\Rightarrow 2 \times 37 \times 10 + 300$

$\Rightarrow 740 + 300$

$\Rightarrow 1040\ m^2$

Painter A can paint in 5 days on = 200 m^2

Painter A can paint in 1 day on = 200/5 = 40 m^2

Painter B can paint in 2 days on = 250 m^2

Painter B can paint in 1 day on = 250/2 = 125 m^2

Painter A and B both can paint in 1 day on = 125 + 40 = 165 m^2

165 m^2 area paint in = 1 days

1 m^2 area paint in = 1/165 days

1040 m^2 area paint in = 1040/165 = $6\frac{10}{33} days$

---

56. Answer: d

Explanation:

As we know,

Volume of trapezium prism = 1/2 × (Sum of parallel sides) × (distance between parallel) × height

⇒ 1/2 × (25 + 11) × 16 × 10

⇒ 36 × 8 × 10

⇒ 2880 cm^2

---

57. Answer: c

Explanation:

Internal radius (r) and external radius (R) of the cylinder is 5.25 cm and 6.75 cm.

Height of the cylinder h = 15 cm

Radius of newly formed cylinder be x cm and height of cylinder be y = 15/2 cm.

According to the question

$\pi x^2 \times y = \pi (R^2 - r)^2 h$

$\Rightarrow x^2 \times 15/2 = (6.75^2 - 5.25^2) \times 15$

$\Rightarrow x^2 = (6.75 + 5.25)(6.75 - 5.25) \times 2/15 \times 15$

$\Rightarrow x^2 = 12 \times 1.5 \times 2$

$\Rightarrow x^2 = 36$

$\Rightarrow x = 6$ cm

---

58. Answer: c

Explanation:

In Rs. 7.50 fencing on = 1 m

In Rs. 6000 fencing on = 1/7.50 × 6000 = 800 m

Ratio of length to breadth = 5x : 3x

Perimeter of the rectangle = 2 (l + b)

$\Rightarrow 2(5x + 3x) = 800$

$\Rightarrow 2 \times 8x = 800$

$\Rightarrow x = 50$ m

Difference between length and breadth = 5x – 3x = 2x = 2 × 50 = 100 m

---

59. **Answer: d**

Explanation:

Let the diameter of circle and sides of the square be 14 cm, then

Radius of the circle r = 14/2 = 7 cm

Side of the square a = 14 cm

Ratio of area of the square to that of circle = 14^2: 22/7 × 7 × 7 = 14 : 11

As we know,

Area of square = a^2

Area of circle = πr^2

---

60. **Answer: a**

Explanation:

Length of wire = 132 cm

Side of equilateral triangle = 132/3 = 44 cm

Area of equilateral triangle = $\sqrt{3}/4 \times a^2 = \sqrt{3}/4 \times 44 \times 44 = 484 \times 1.7 = 822.8$ cm^2

Side of square = 132/4 = 33 cm

Area of square = $a^2 = 33 \times 33 = 1089$ cm^2

Circumference of circle = 2 πr

⇒ 2 π r = 132

⇒ 2 × 22/7 × r = 132

$\Rightarrow r = 132 \times 7/22 \times 1/2$

$\Rightarrow r = 21$ cm

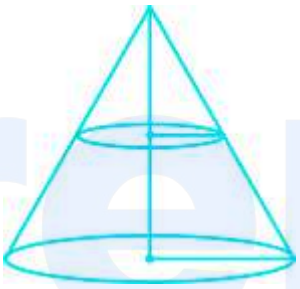
Area of the circle = $\pi r^2 = 22/7 \times 21 \times 21 = 1386$ cm^2

Area of circle > Area of square > Area of triangle,

---

61. Answer: b

Explanation:



Radius and Height of bigger cone r cm and h cm respectively,

Radius and height of smaller cone r/2 cm and h/2 cm respectively,

Volume of bigger cone = $\pi r^2 h/3$

Volume of smaller cone = $(1/3) \times \pi (r/2)^2 \times h/2 = \pi r^2 h/24$

Ratio of volume of bigger cone to smaller one = $\pi r^2 h/3 : \pi r^2 h/24 = 8 : 1$

Let the volume of smaller cone = 1 unit

Volume of remaining solid = 8 – 1 = 7 unit

Ratio of the smaller cone to remaining solid = 1 : 7

Short Trick:

Let the height of bigger cone be = 2 unit

Height of smaller cone = 2/2 = 1 unit

Ratio of volume of bigger cone to smaller cone = $2^3 : 1^3 = 8 : 1$

Remaining volume of solid = 8 – 1 = 7

Ratio of the smaller cone to remaining solid = 1 : 7

---

62. Answer: d

Explanation:

Ratio of side's two polygons = x : 2x

As we know,

Each interior angles of having n sides = [2 (n – 2)] /n × 90

According to the question

$\Rightarrow \frac{\frac{2(x-2)}{x}}{\frac{2(2x-2)}{2x}} = \frac{3}{4}$

$\Rightarrow \frac{2(x-2)}{x} \times \frac{2x}{4(x-1)} = \frac{3}{4}$

⇒ (x – 2) / (x – 1) = 3/4

⇒ 4x – 8 = 3x – 3

⇒ x = 5

Sides of two polygons are 5 and 10.

Short Trick:

Using option

Let the sides of two polygons are 5 and 10, then

Each exterior angles of first polygon = (2 × 3 × 90) /5

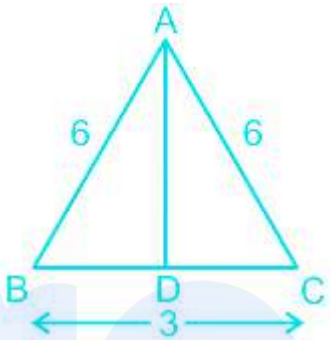
Each exterior angles of second polygon = (2 × 8 × 90) /10

Ratio = (2 × 3 × 90) /5 : (2 × 8 × 90) /10 = 3 : 4 (satisfied)

---

63. Answer: a

Explanation:



Perimeter of equilateral triangle = isosceles triangle = 15 cm

Side of equilateral triangle = 15/3 = 5 cm

Area of equilateral triangle = $\sqrt{3}/4 \times 5^2 = \sqrt{3}/4 \times 25$

Each equal side of triangle is 6 cm and length of third side is 3 cm.

AB = AC = 6 cm, BC = 3 cm and BD = 3/2

In right angled ΔADB

$AB^2 = AD^2 + BD^2$

$\Rightarrow 6^2 = AD^2 + (3/2)^2$

$\Rightarrow AD^2 = 36 - 9/4$

$\Rightarrow AD = \sqrt{135}/4$

$\Rightarrow AD = 3\sqrt{15}/2$

Area of triangle ABC = 1/2 × BC × AD = 1/2 × 3 × (3√15/2) = 9√15/4

Ratio of Area of isosceles triangle = $9\sqrt{15}/4 : \sqrt{3}/4 \times 25 = 36\sqrt{5} : 100$

---

64. Answer: a

Explanation:

Let the radii of the spherical balls be r cm and r/2 cm.

Radius of the cylinder R = 18/2 = 9 cm.

According to the question

$(4/3)\pi [r^3 + (r/2)^3] = \pi R^2 h$

$\Rightarrow (4/3) [r^3 + r^3/8] = 9 \times 9 \times 4$

$\Rightarrow 9r^3/8 = 9 \times 9 \times 3$

$\Rightarrow r^3 = 9 \times 3 \times 8$

$\Rightarrow r = \sqrt[3]{[3 \times 3 \times 3 \times 2 \times 2 \times 2]}$

$\Rightarrow r = 3 \times 2$

$\Rightarrow r = 6$ cm

$\Rightarrow r/2 = 3$ cm

So, radii of the cylinder are 3 cm and 6 cm.

---

65. Answer: a

Explanation:

Total surface area = Lateral surface area + Area of Base

340 = Lateral surface area + 100

Lateral surface area = 340 – 100 = 240 cm^2

Area of each lateral face = 30 cm^2

Number of lateral faces = 240/30 = 8

---

66. Answer: a

Explanation:

$\Rightarrow P(P^2 + 3P + 3)$

$\Rightarrow P^3 + 3P^2 + 3P$

$\Rightarrow P^3 + 3P(p + 1) + 1^3 - 1^3$

$\Rightarrow (P + 1)^3 - 1$

$\Rightarrow (99 + 1)^3 - 1$

$\Rightarrow 100^3 - 1$

$\Rightarrow 1000000 - 1$

$\Rightarrow 999999$

---

67. Answer: a

Explanation:

Short Trick:

From option 1 put x = c and x = 1/c, then condition satisfied.

Detailed Method:

$x + 1/x = c + 1/c$

$\Rightarrow x - c = 1/c - 1/x$

$\Rightarrow x - c = (x - c)/xc$

$\Rightarrow (x - c) - (x - c)/xc = 0$

$\Rightarrow (x - c)[1 - 1/xc] = 0$

Taking,

$\Rightarrow (x - c) = 0$

$\Rightarrow x = c$

$\Rightarrow [1 - 1/xc] = 0$

$\Rightarrow 1/xc = 1$

$\Rightarrow x = 1/c$

---

68. **Answer: b**

Explanation:

Short Trick:

Let the number are 5 and 4, all condition satisfied.

Sum of cubes of these two numbers = $5^3 + 4^3 = 125 + 64 = 189$

Detailed Method:

Let the two number are a and b

According to the question

$a^2 + b^2 = 41$

$\Rightarrow a + b = 9$

$\Rightarrow (a + b)^2 = a^2 + b^2 + 2ab$

$\Rightarrow 9^2 = 41 + 2ab$

$\Rightarrow 2ab = 81 - 41$

$\Rightarrow ab = 40/2$

$\Rightarrow ab = 20$

As we know,

$(a^3 + b^3) = (a + b)^3 - 3ab\,(a + b)$

$\Rightarrow (a^3 + b^3) = 9^3 - 3 \times 20 \times 9 = 729 - 540 = 189$

---

69. Answer: d

Explanation:

$x^4 + 64$

$\Rightarrow (x^2)^2 + 8^2$

As we know, $(x^2 + y^2) = (x + y)^2 - 2xy$

$\Rightarrow (x^2)^2 + 8^2$

$\Rightarrow (x^2 + 8)^2 - 2 \times x^2 \times 8$

$\Rightarrow (x^2 + 8)^2 - (4x)^2$

$\Rightarrow (x^2 + 8 + 4x)\,(x^2 + 8 - 4x)$

Short trick:

$\Rightarrow x^4 + 64$

Put x = 1, then

⇒ 1 + 64

⇒ 65

From option 4

⇒ $(x^2 + 4x + 8)(x^2 - 4x + 8)$

⇒ 13 × 5

⇒ 65 (satisfied)

---

70. Answer: a

Explanation:

$a^4 + b^4 - a^3 - b^3 - 2a^2b^2 + ab$

$\Rightarrow a^4 + b^4 - 2a^2b^2 - (a^3 + b^3) + ab$

$\Rightarrow (a^2 - b^2)^2 - (a^3 + b^3) + ab$

$\Rightarrow (a + b)^2(a - b)^2 - (a + b)(a^2 + b^2 - ab) + ab$

As we know, a + b = 1, then

$\Rightarrow (a - b)^2 - (a - b)^2$

⇒ 0

Short Trick:

If a + b = 1, then put x = 1 and y = 0

$\Rightarrow a^4 + b^4 - a^3 - b^3 - 2a^2b^2 + ab$

⇒ 1 − 1

⇒ 0

71. **Answer: c**

Explanation:

$x^2 + y^2 + 6x + 5 = 4(x - y)$

$\Rightarrow x^2 + y^2 + 6x + 5 - 4x + 4y = 0$

$\Rightarrow x^2 + 1 + 2 \times x \times 1 + y^2 + 4 + 2 \times y \times 2 = 0$

$\Rightarrow (x + 1)^2 + (y + 2)^2 = 0$

So,

$x = -1$ and $y = -2$

Now,

$\Rightarrow (x - y)$

$\Rightarrow (-1) + 2$

$\Rightarrow 1$

72. **Answer: a**

Explanation:

Given:

a = 299

b = 298

c = 297

Formula used:

$[a^3+b^3+c^3-3abc] = 1/2 \times (a+b+c)[(a-b)^2+(b-c)^2+(c-a)^2]$

Calculation:

$2a^3+2b^3+2c^3-6abc$

$= 2[a^3+b^3+c^3-3abc]$

$= 2 \times 1/2 \times (a+b+c)[(a-b)^2+(b-c)^2+(c-a)^2]$

$= (299+298+297)[(299-298)^2+(298-297)^2+(297-299)^2]$

$= 894[1^2+1^2+2^2]$

$= 894 \times 6$

$= 5364$

---

73. Answer: b

Explanation:

Given:

$x + 1/x = \sqrt{3}$

Formula Used:

$(x + 1/x)^3 = x^3 + 1/x^3 + 3(x + 1/x)$

Calculation:

$x + 1/x = \sqrt{3}$

$\Rightarrow (x + 1/x)^3 = (\sqrt{3})^3$

$\Rightarrow x^3 + 1/x^3 + 3(x + 1/x) = 3\sqrt{3}$

$\Rightarrow x^3 + 1/x^3 = 3\sqrt{3} - 3\sqrt{3}$

$\Rightarrow x^3 + 1/x^3 = 0$

$\Rightarrow x^6 + 1 = 0$

$\Rightarrow x^6 = -1$

Now,

$\Rightarrow x^{18} + x^{12} + x^6 + 1$

$\Rightarrow (x^6)^3 + (x^6)^2 + x^6 + 1$

$\Rightarrow (-1)^3 + (-1)^2 + (-1) + 1$

$\Rightarrow -1 + 1 - 1 + 1$

$\Rightarrow 0$

∴ The value of $x^{18} + x^{12} + x^6 + 1$ is 0.

---

74. Answer: a

Explanation:

$\Rightarrow x = 1 + \sqrt{2} + \sqrt{3}$

$\Rightarrow x - 1 = \sqrt{2} + \sqrt{3}$

Squaring on both sides

$\Rightarrow (x - 1)^2 = (\sqrt{2} + \sqrt{3})^2$

$\Rightarrow (x^2 - 2x + 1) = 2 + 3 + 2\sqrt{6}$

$\Rightarrow (x^2 - 2x - 4) = (2\sqrt{6})$ ...1)

Squaring on both sides

$\Rightarrow (x^2 - 2x - 4)^2 = (2\sqrt{6})^2$

$\Rightarrow x^4 + 4x^2 + 16 - 4x^3 + 16x - 8x^2 = 24$

$\Rightarrow x^4 - 4x^3 - 4x^2 + 16x - 8 = 0$

Multiply by 2

$\Rightarrow 2x^4 - 8x^3 - 8x^2 + 32x - 16 = 0$

$\Rightarrow 2x^4 - 8x^3 - 5x^2 + 26x - 28 - 3x^2 + 6x + 12 = 0$

$\Rightarrow 2x^4 - 8x^3 - 5x^2 + 26x - 28 = 3x^2 - 6x - 12$

$\Rightarrow 2x^4 - 8x^3 - 5x^2 + 26x - 28 = 3(x^2 - 2x - 4)$

From equation (1)

$2x^4 - 8x^3 - 5x^2 + 26x - 28 = 3\ (2\sqrt{6})$

$2x^4 - 8x^3 - 5x^2 + 26x - 28 = 6\sqrt{6}$

---

75. Answer: d

Explanation:

$2r = h + \sqrt{(r^2 + h^2)}$

$\Rightarrow 2r - h = \sqrt{(r^2 + h^2)}$

Squaring on both sides

$\Rightarrow (2r - h)^2 = \sqrt{(r^2 + h^2)}^2$

$\Rightarrow 4r^2 + h^2 - 4rh = r^2 + h^2$

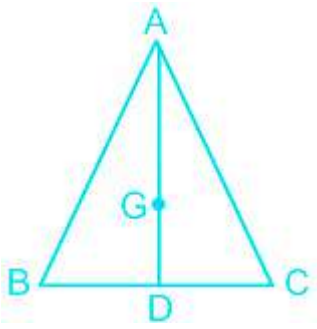
$\Rightarrow 3r^2 = 4rh$

$\Rightarrow 3r = 4h$

$\Rightarrow r : h = 4 : 3$

76. **Answer: d**

Explanation:



Side of equilateral triangle, a = 6 cm

Height of the equilateral triangle, AD = √3/2 × 6 = 3√3

As we know,

Ratio of AG and GD = 2 : 1

2 + 1 = 3 units

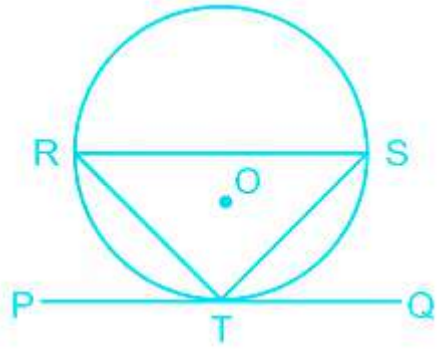
⇒ 3 units = 3 √3

⇒ 1 unit = √3

Hence, AG = 2 units = 2√3 cm

77. **Answer: d**

Explanation:



∠SRT = ∠TSR = 65° [TR = TS]

Now, ∠SRT + ∠TSR + ∠STR = 180°

∠STR = 180° - 65° - 65° = 50°

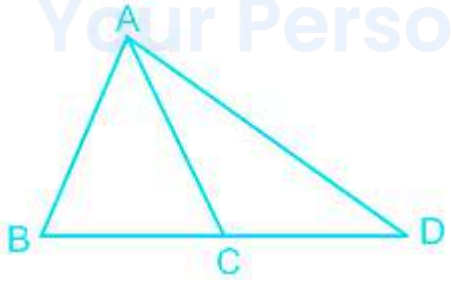
∠PTR = ∠STQ = 130°/2 = 65°

∴ ∠PTS = 65° + 50° = 115°

---

78. **Answer: c**

Explanation:



∠ABC = ∠BAC = 50° [AC = BC]

In ΔABC

∠ABC + ∠BAC + ∠ACB = 180°

⇒ 50° + 50° + ∠ACB = 180°

⇒ ∠ACB = 180° - 100°

⇒ ∠ACB = 80°

Now, ∠ACB + ∠ACD = 180°

⇒ ∠ACD = 180° - 80° = 100°

Now, ∠CAD = ∠CDA [AC = BC = CD]

In ΔACD

∠CAD + ∠CDA + ∠ACD = 180°

⇒ 2∠CAD + 100° = 180°

⇒ 2∠CAD = 180 - 100 = 80

⇒ ∠CAD = 80°/2 = 40°

Now, ∠BAD = ∠BAC + ∠CAD

∴ ∠BAD = 50° + 40° = 90°

---

79. **Answer: c**

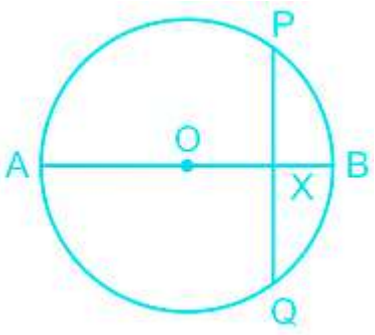
Explanation:

Given:

Ratio of AX : BX = 3 : 2

Radius of circle = 5 cm

Calculation:



AX : BX = 3 : 2

AB = 2 × 5 = 10 cm

⇒ AX = 3/5 × 10 = 6 cm

⇒ BX = 10 - 6 = 4 cm

PX = XQ (AB is the diameter of given circle and PQ is the perpendicular on AB)

As we know,

PX × XQ = AX × XB

⇒ PX × PX = 6 × 4

⇒ $PX^2 = 24$

⇒ PX = √24

⇒ PX = 2√6

Now, PQ = 2PX

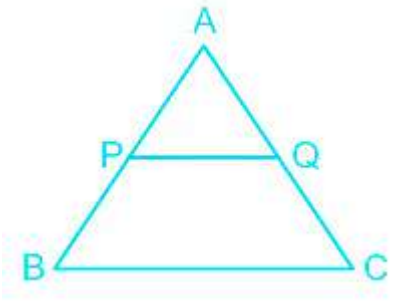
⇒ PQ = 2 × 2√6

∴ PQ = 4√6

---

80. Answer: d

Explanation:



AP : BP = 3 : 5

AB = 3 + 5 = 8 units

As we know,

ΔAPQ~ΔABC

AP/AB = PQ/BC

⇒ 3/8 = 18/BC

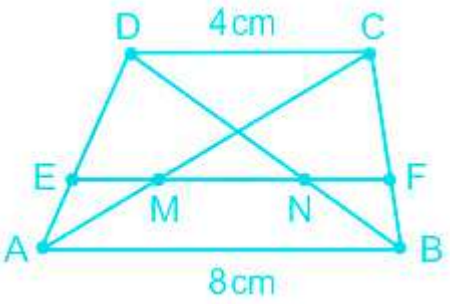
⇒ BC = 18 × 8/3

⇒ BC = 48 cm

---

81. Answer: c

Explanation:



From the above figure

Lets extend the line MN such that it meet AD at E and BC at F. As lines AB, MN and CD are parallel hence, E and F will be mid-point of AD and BC.

Now, in ΔACD

AM/AC = EM/CD

⇒ 1/2 = EM/4

⇒ EM = 2 cm

Similarly,

FN = 2 cm

Also, EF is a mid segment of the trapezium

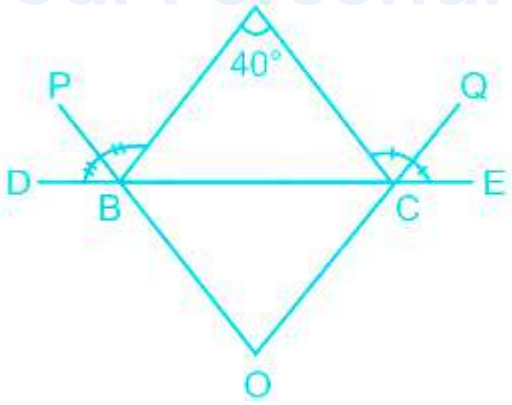
Hence, EF = (4+8)/2 = 6 cm.

∴ MN = 6 - 2 - 2 = 2 cm.

---

82. Answer: c

Explanation:



Short Trick:

∠BOC = 90° - ∠A/2 = 90° - 40°/2 = 90° - 20° = 70°

Detailed Method:

In ΔABC

∠B = ∠C

∠A + ∠B + ∠C = 180°

⇒ 2 ∠B = 180° - 40° = 140°

⇒ ∠B = 140°/2 = 70°

∠ABC = ∠ACB = 70

Now, ∠ABD + ∠ABC = 180°

∠ABD = 180° - 70° = 110°

Now, ∠PBD = ∠ABD/2 = 110°/2 = 55°

Similarly,

∠QCE = 55°

∠PBD = ∠CBO = 55°

∠QCE = ∠BCO = 55°

In ΔBCO

∠BOC + ∠CBO + BCO = 180°

⇒ ∠BOC + 55° + 55° = 180°

⇒ ∠BOC = 180° - 110° = 70°

---

83. **Answer: b**

Explanation:

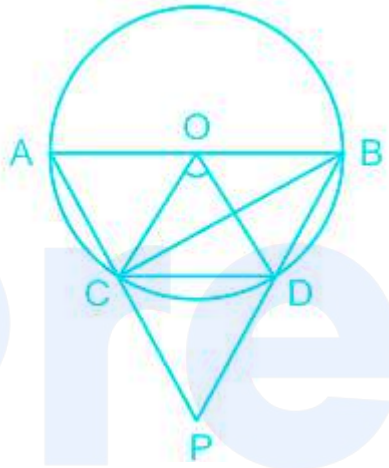
Side of the equilateral a = 6 cm

Radius of circum-circle = a/√3 = 6/√3 = 2 √3 cm

---

84. Answer: d

Explanation:



In ΔOCD

∠O = ∠C = ∠D [OC = OD = CD]

∠O = ∠C = ∠D = 60°

∠CBD = ∠COD/2 = 60°/2 = 30°

As we know,

∠ACB = 90° (Angle made by diameter at circumference)

∠BCP = 180° - 90° = 90° [Straight line]

In ΔBCP

∠B + ∠C + ∠P = 180

⇒ ∠P = 180° - 90° - 30° = 60°

⇒ ∠APB = 60°

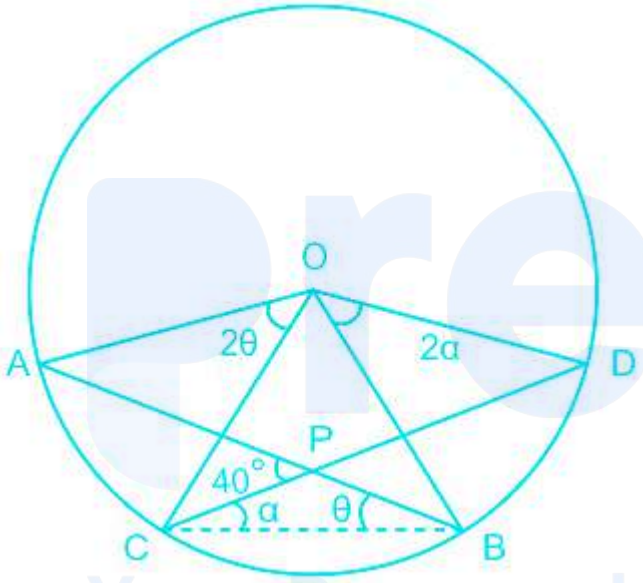
Short Trcik:

∠APB = 90° - ∠COD/2 = 90° - 30° = 60°

---

85. Answer: c

Explanation:



From the following figure

∠APC = 40°

∠BPC = 180° - 40° = 140° [straight line]

Let ∠ABC = θ and ∠BCD = α

In ΔPCB

∠ABC + ∠BCD + ∠BPC = 180°

θ + α + 140° = 180°

⇒θ + α = 40°

As we know,

$\angle AOC = 2\angle ABC$ and $\angle BOD = 2\angle BCD$

$\angle AOC = 2\theta$ and $\angle BOD = 2\alpha$

$\angle AOC + \angle BOD$

$\Rightarrow 2\theta + 2\alpha$

$\Rightarrow 2(\theta + \alpha)$

$\Rightarrow 2 \times 40^\circ$

$\Rightarrow 80^\circ$

---

86. Answer: d

Explanation:

$x \tan 60^\circ + \cos 45^\circ = \sec 45^\circ$

$\Rightarrow x \times \sqrt{3} + 1/\sqrt{2} = \sqrt{2}$

$\Rightarrow \sqrt{3}x = \sqrt{2} - 1/\sqrt{2}$

$\Rightarrow \sqrt{3}x = 1/\sqrt{2}$

$\Rightarrow x = 1/\sqrt{6}$

$\Rightarrow x^2 = 1/6$

$\Rightarrow x^2 + 1 = 1/6 + 1$

$\therefore x^2 + 1 = 7/6$

---

87. Answer: b

Explanation:

$\sin(2x - 20°) = \cos(2y + 20°)$

$\Rightarrow \sin(2x - 20°) = \sin[90 - (2y + 20°)]$

$\Rightarrow 2x - 20 = 90 - 2y - 20$

$\Rightarrow 2x + 2y = 90$

$\Rightarrow x + y = 90/2$

$\Rightarrow x + y = 45$

Now,

$\tan(x + y)$

$\Rightarrow \tan 45$

$\Rightarrow 1$

---

88. Answer: c

Explanation:

$a^2\sec^2x - b^2\tan^2x = c^2$

$\Rightarrow a^2(1 + \tan^2x) - b^2\tan^2x = c^2$

$\Rightarrow a^2 + a^2\tan^2x - b^2\tan^2x = c^2$

$\Rightarrow \tan^2x (a^2 - b^2) = c^2 - a^2$

$\Rightarrow \tan^2x = (c^2 - a^2)/(a^2 - b^2)$

Now,

$\sec^2 x + \tan^2 x$

$\Rightarrow 1 + \tan^2 x + \tan^2 x$

$\Rightarrow 1 + 2\tan^2 x$

$\Rightarrow 1 + 2(c^2 - a^2)/(a^2 - b^2)$

$\Rightarrow (a^2 - b^2 + 2c^2 - 2a^2)/(a^2 - b^2)$

$\Rightarrow (-b^2 + 2c^2 - a^2)/(a^2 - b^2)$

$\Rightarrow (b^2 - 2c^2 + a^2)/(b^2 - a^2)$

---

89. Answer: a

Explanation:

$(1 + \sec 20° + \cot 70°)(1 - \operatorname{cosec} 20° + \tan 70°)$

$\Rightarrow (1 + \sec 20° + \tan 20°)(1 - \operatorname{cosec} 20° + \cot 20°)$

$\Rightarrow \left(1 + \frac{1}{cos20} + \frac{sin20}{cos20}\right)\left(1 - \frac{1}{sin20} + \frac{cos20}{sin20}\right)$

$\Rightarrow \left(\frac{cos20+1+sin20}{cos20}\right)\left(\frac{sin20-1+cos20}{sin20}\right)$

$\Rightarrow \frac{(sin20^\circ+cos20^\circ+1)(sin20^\circ+cos20^\circ-1)}{sin20^\circ cos20^\circ}$

$\Rightarrow \frac{(sin20^\circ+cos20^\circ)^2-1^2}{sin20^\circ cos20^\circ}$

$\Rightarrow \frac{sin^2 20^\circ+cos^2 20^\circ+2sin20^\circ cos20^\circ-1}{sin20^\circ ccos20^\circ}$

$\Rightarrow \frac{1+2sin20cos20-1}{sin20ccos20}$

$\Rightarrow \frac{2sin20^\circ cos20^\circ}{sin20^\circ cos20^\circ}$

$\Rightarrow 2$

---

90. **Answer: c**

Explanation:

$\tan^4\theta + \tan^2\theta = 1$

$\Rightarrow \tan^2\theta (\tan^2\theta + 1) = 1$

$\Rightarrow \tan^2\theta \sec^2\theta = 1$

$\Rightarrow \tan^2\theta = 1/\sec^2\theta$

$\Rightarrow \tan^2\theta = \cos^2\theta$

Now,

$\Rightarrow \cos^4\theta + \cos^2\theta$

$\Rightarrow \tan^4\theta + \tan^2\theta$

$\Rightarrow 1$

---

91. **Answer: d**

Explanation:

Short Trick:

$8(\sin^6\theta + \cos^6\theta) - 12(\sin^4\theta + \cos^4\theta)$

Put $\theta = 90°$

$8(\sin^6 90 + \cos^6 90) - 12(\sin^4 90 + \cos^4 90)$

$\Rightarrow 8 - 12$

$\Rightarrow -4$

Detailed Method:

$8(\sin^6\theta + \cos^6\theta) - 12(\sin^4\theta + \cos^4\theta)$

As we know.

$x^3 + y^3 = (x + y)^3 - 3xy(x + y)$

And, $x^2 + y^2 = (x + y)^2 - 2(x + y)$

$8(\sin^6\theta + \cos^6\theta) - 12(\sin^4\theta + \cos^4\theta)$

$\Rightarrow 8[(\sin^2\theta + \cos^2\theta)^3 - 3\sin^2\theta\cos^2\theta(\sin^2\theta + \cos^2\theta)] - 12[(\sin^2\theta + \cos^2\theta)^2 - 2\sin^2\theta\cos^2\theta]$

$\Rightarrow 8[1 - 3\sin^2\theta\cos^2\theta] - 12[1 - 2\sin^2\theta\cos^2\theta]$

$\Rightarrow 8 - 24\sin^2\theta\cos^2\theta - 12 + 24\sin^2\theta\cos^2\theta$

$\Rightarrow 8 - 12$

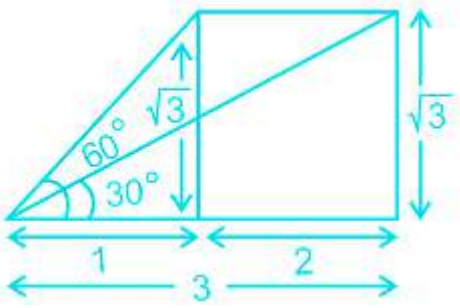
$\Rightarrow (-4)$

---

92. Answer: a

Explanation:

Short Trick:



$\sqrt{3}$ unit = 3000 m

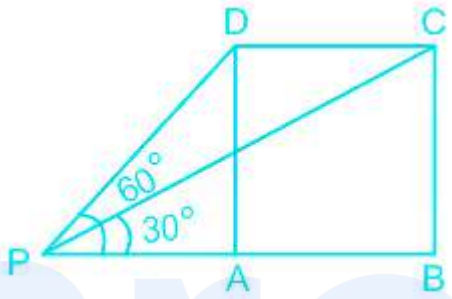
1 unit = 1000√3

2 unit = 2000√3 = 2000 × 1.732 = 3464 m

Distance covered by plane in 15 sec = 3464 m

∴ Speed of the plane = 3464/15 = 230.93 m/sec

Detailed Method:



AD = BC = 3 km = 3000 m

In ΔPDA

tan 60 = AD/PA

⇒ √3 = 3000/PA

⇒ PA = 1000√3

In ΔPCB

tain30 = BC/PB

⇒ 1/√3 = 3000/PB

⇒ PB = 3000√3

AB = PB - PA

AB = 3000√3 - 1000√3 = 2000√3 = 2 × 1.732 = 3464 m

Distance covered by plane in 15 sec = 3464 m

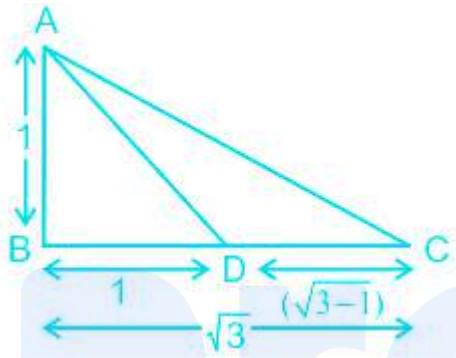
∴ Speed of the plane = 3464/15 = 230.93 m/sec

---

93. **Answer: a**

Explanation:

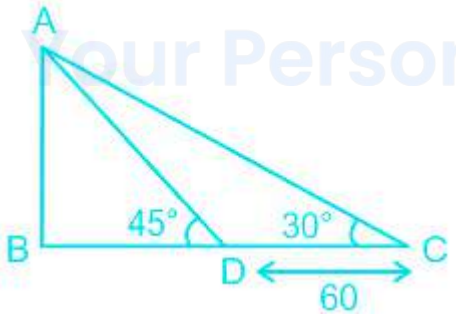
Short Trick:



(√3 - 1) unit = 60 m

1 unit = 60/(√3 - 1) or 30 (√3 + 1) m

Detailed Method:



In ΔABD

tan 45 = AB/BD

⇒ 1 = AB/BD

⇒ BD = AB

In ΔABC

tan 30 = AB/BC

⇒ 1/√3 = AB/BC

⇒ BC = √3 BD

Now, BC = BD + CD

⇒√3 BD = BD + 60

⇒BD (√3 - 1) = 60

⇒ BD = 60/(√3 - 1)

⇒ BD = 60/(√3 - 1) × [(√3 + 1)/(√3 + 1)]

⇒ BD = 60(√3 + 1)/2

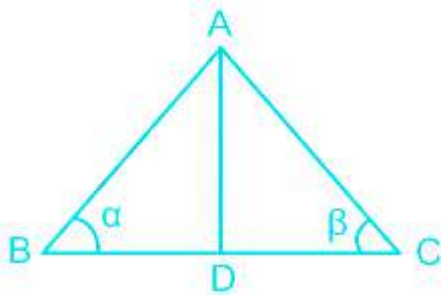
⇒ BD = 30 (√3 + 1)

∴ AB = 30 (√3 + 1)

---

94. Answer: d

Explanation:



AD = h cm

In ΔADB

tan α = AD/BD

⇒ tan α = h/BD

⇒ BD = h cot α ---(1)

In ΔADC

tan β = AD/DC

⇒ tan β = h/DC

⇒ DC = h cot β ---(2)

Now, BC = BD + DC

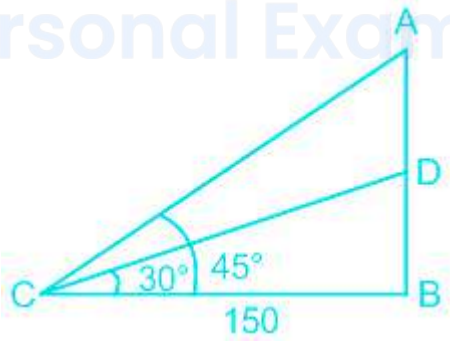
⇒ BC = h cot α + h cot β

⇒ BC = h (cot α + cot β)

---

95. **Answer: d**

Explanation:



In ΔABC

tan 30 = DB/BC

⇒ 1/√3 = DB/150

⇒ DB = 150/√3

⇒ DB = 50 √3 ---(1)

In ΔABC

tan 45 = AB/BC

⇒ AB = 150 ---(2)

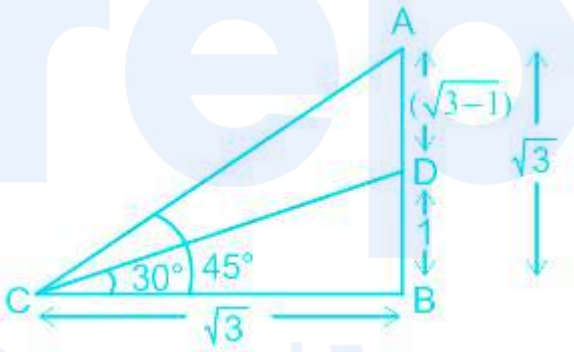
Now, AD = AB - DB

⇒ AD = 150 - 50 √3

⇒ AD = 150 - 50 × 1.732

⇒ AD = 150 - 86.6 = 63.4

Short trick:



√3 unit = 150 m

1 unit = 150/√3 = 50 √3

∴ (√3 - 1) unit = 50 √3 (√3 - 1) = 50 (3 - √3) = 50 (3 - 1.732) = 50 × 1.268 = 63.4 m

---

96. Answer: d

Explanation:

Total sales of English newspapers = 2500 + 2000 + 1800 + 3000 + 200 = 9500

Total sales of Hindi newsapaers = 3500 + 2400 + 3600 + 2500 + 4000 = 16000

Required difference = 16000 - 9500 = 6500

---

97. **Answer: b**

Explanation:

Total sales of English newspapers = 2500 + 2000 + 1800 + 3000 + 200 = 9500

Average sales of English newspaper = 9500/5 = 1900

Total sales of Hindi newsapaers = 3500 + 2400 + 3600 + 2500 + 4000 = 16000

Average sales of Hindi Newspaper = 16000/5 = 3200

Required difference = 3200 - 1900 = 1300

---

98. **Answer: d**

Explanation:

Total sales of total English newspapers = 2500 + 2000 + 1800 + 3000 + 200 = 9500

Total sales of total Hindi newsapaers = 3500 + 2400 + 3600 + 2500 + 4000 = 16000

Required ratio = 9500 : 16000 = 19 : 32

Sum of ratios = 32 + 19 = 51

---

99. **Answer: b**

Explanation:

Average number of English newspapers from B, C and E = (2000 + 1800 + 200)/3 = 4000/3

Average number of Hindi newspapers from A and D = (3500 + 2500)/2 = 6000/2 = 3000

Requried ratio = 4000/3 : 3000 = 4 : 9

---

100. Answer: c

Explanation:

Total sales of Hindi newsapaers in all localities = 3500 + 2400 + 3600 + 2500 + 4000 = 16000

Average sales of Hindi newspapers in all localities = 16000/5 = 3200

Averag sales of English newspapers in localitites B and D = (2000 + 3000)/2 = 5000/2 = 2500

Required ratio = 2500 : 3200 = 25 : 32