Exercise – 6
(Time and Work)

Directions for questions 1 to 50: For the Multiple Choice Questions, select the correct alternative from the given choices. For the Non-Multiple Choice Questions, write your answer in the box provided.

1. A can do a work in 9 days and B can do the same work in 18 days. If they work together, in how many days will they complete the work?

2. A, B and C can do a work in 90, 30 and 45 days respectively. If they work together, in how many days will they complete the work?
(A) 15 (B) 10 (C) 20 (D) 25

3. A can do a work in 12 days and working together A and B can do the work in 8 days. In what time can B alone do the work?
(A) 22 days (B) 26 days
(C) 20 days (D) 24 days

4. A and B can do a work in 18 days, B and C in 30 days, A and C in 22 ½ days. In how many days can A, B and C individually do the work?
(A) 30, 45, 60 (B) 30, 45, 90
(C) 45, 60, 90 (D) 60, 90, 120

5. A and B together can do a work in 15 days. If B alone can do the work in $37\frac{1}{2}$ days, then in how many days can A alone do the work?
(A) 25 (B) 27 (C) 29 (D) 32

6. A, B and C can do a work in 7, 14 and 21 days respectively. They completed the work together and got ₹220. The share (in ₹) of C is .

7. Ram and Prakash can do a work in 16 days and 28 days respectively. They start the work together and Prakash leaves after 7 days. In how many days can Ram do the remaining work?
(A) 6 (B) 4 (C) 3 (D) 5

8. A, B and C together can do a work in 20 days. If A and C can do the work in 40 and 60 days respectively, B alone can do the work in days.

9. A, B and C can do a work in 15, 30 and 45 days respectively. C started the work. A and B joined after one day. In how many days was the total work completed?
(A) 6 (B) 8 (C) 7 (D) 9

10. A is twice as fast as B. If B alone can do the work in 30 days, A and B together can complete the work in days.

11. If A is thrice as fast as B. Together they can do a work in 27 days. A alone can do the work in days.

12. Avinash is twice as fast as Bharat, and Bharat is one-third as fast as Chandra. If they together can complete the work in 30 days, in how many days can Avinash, Bharat and Chandra individually do the work?
(A) 60, 180, 240 (B) 90, 180, 60
(C) 180, 90, 60 (D) 90, 60, 180

13. A, B and C can do a work in 12, 24 and 48 days respectively. They started the work together but B left 3 days before and C left 2 days before the completion of work. The total work was completed in days.

14. Vinay and Varma can do a work in 30 days and 60 days respectively. If they work on alternate days beginning with Vinay in how many days will the work be completed?

15. A and B can do a work in 8 and 16 days respectively. If they work on alternate days beginning with A, in how many days will the work be completed?

16. Twenty four men can do a work in 35 days. How many men are required to complete the work in 21 days?

17. Sixty men can stitch 200 shirts in 30 days working 8 hours a day. In how many days 45 men can stitch 300 shirts working 6 hours a day?
(A) 60 (B) 90 (C) 70 (D) 80

18. x men can do a work in 120 days. If there were 20 men less, the work would have taken 60 days more. The value of x is .

19. Thirty men can do a work in 24 days. In how many days can 20 men do the work, given that time spent per day is increased by $\frac{1}{3}$ of the previous time?
(A) 30 (B) 27 (C) 24 (D) 33

20. If 12 men or 20 women can do a work in 54 days, then 9 men and 12 women can together do the work in days.

21. Six men or eight women can do a work in 15 days. How many men should work along with four women to complete the work in 10 days?
(A) 6 (B) 7 (C) 5 (D) 4

22. Five men and nine women can do a work in 10 days. Six men and twelve women can do the same work in 8 days. 3 men and 3 women can do the work in days.

23. Eight men and six boys can do a work in eleven days, and nine men and twelve boys can do the work in nine days. In how many days can six men and thirty boys together do the work?

24. A hostel has provision for 800 men for 42 days at the rate of 2 kg per day per man. For how many days will the provision last for 600 men at the rate of 4 kg per day per man?
(A) 28 (B) 29 (C) 30 (D) 27

25. Two pipes can fill a tank in 30 minutes and 20 minutes respectively. If they are opened simultaneously, in what time will the tank become full?
(A) 15 minutes (B) 12 minutes
(C) 18 minutes (D) 9 minutes

26. Two pipes can fill a tank in 18 minutes and 15 minutes. The outlet pipe can empty the tank in 45 minutes. If all the pipes are opened when the tank is empty, then in how many minutes will it take to fill the tank?

27. Pipe A can fill a tank in 6 hours. Due to a leak at the bottom it takes 9 hours to fill the tank. In what time the leak alone can empty the tank?
(A) 16 hours (B) 15 hours
(C) 18 hours (D) 17 hours

28. Pipe A can fill a tank in 16 minutes and pipe B can empty it in 24 minutes. If both pipes are opened, after how many minutes should pipe B be closed, so that the tank is filled in 30 minutes?

29. A and B can do a work in 30 days and 40 days respectively. A worked for 9 days, then B joined and they together completed the remaining work. If they earn ₹210 for the work, then what is the share of A?
(A) ₹147 (B) ₹175 (C) ₹168 (D) ₹155

30. Sreedhar, and Sravan together can do a work in 25 days, with the help of Pavan, they completed the work in 8 days and earn ₹225. What is the share of Sravan if Sreedhar alone can do the work in 75 days?
(A) ₹64 (B) ₹52 (C) ₹48 (D) ₹58

31. A and B can do a work in $7\frac{1}{2}$ days and 30 days respectively. In how many days can they complete the work if they work together?
(A) 5 (B) 4 (C) 6 (D) 3

32. A, B and C together can do a work in 22 days. B and C can do $\frac{3}{4}$ of the work in 30 days. In how many days can A alone do the work?
(A) $47\frac{8}{9}$ (B) $48\frac{7}{9}$ (C) $48\frac{8}{9}$ (D) $47\frac{7}{9}$

33. A can do a work in 24 days. B and C together can do the same work in 18 days. In how many days can A, B and C together do a work which is $3\frac{1}{2}$ times the previous work?

34. A and B can do a work in 30 days. B and C can do the same work in 50 days. A, B and C together can do the same work in 20 days. In how many days can A, B and C individually complete the work?
(A) $300, 60, 33\frac{1}{3}$ (B) $60, 33\frac{1}{3}, 300$
(C) $33\frac{1}{3}, 300, 60$ (D) 75, 150, 300

35. P and Q together can do a work in 32 days, P and R together in 48 days, R and Q together in 24 days. In how many days can P alone do the same work?
(A) 64 (B) 192 (C) 128 (D) 84

36. A can do a work in 21 days and B in 28 days. Together they started the work and B left after 4 days. In how many days A alone can do the remaining work?
(A) 12 (B) 10 (C) 16 (D) 14

37. A can do a work in 7 days less than what B takes to do the work. Working together, A and B can complete the work in $8\frac{2}{5}$ days. In how many days can A alone do the work?

38. A is $\frac{3}{2}$ times as fast as B. A alone can do the work in 20 days. If A and B work on alternate days, beginning with A, in how many days will the work be completed?
(A) $23\frac{3}{4}$ (B) 22 (C) $23\frac{1}{4}$ (D) 24

39. A, B and C can do a work in 30, 24 and 15 days respectively. They started the work together, A left 7 days before and B left 1 day before the completion of the work. In how many days was the work completed?
(A) 8 (B) 9 (C) 11 (D) 10

40. Avinash, Bharat and Chandu can do a work in 40, 25 and 60 days respectively. Bharat and Chandu start the work and Avinash joined after 3 days. If Chandu left 9 days before the completion of the work, in how many days was the work completed?
(A) 18 (B) 15 (C) 16 (D) 17

41. P and Q can do a work in 14 and 21 days respectively. P started the work and after 9 days Q joined him. If the total earnings for the work are ₹280, what is the share of P, in rupees?

42. A worked for 6 days and then B joined him. After 10 more days A left and B took 2 more days to complete the work. If A and B together can do the work in $14\frac{2}{5}$ days, how many days would each of them take to do the work individually?
(A) 24, 32 (B) 15, 30 (C) 18, 27 (D) 24, 36

43. P, Q and R together can do a work in 25 days. P and Q worked for 38 days, then R joined and the work was completed in 6 more days. In how many days can R alone do the work?
(A) 50 (B) 40 (C) 45 (D) 55

44. 215 men can construct a 677 m long wall in 13.5 days. How many men are required to construct a wall twice the length of the previous wall in half the time?

45. 22 skilled men can do a work in 10 days and 45 unskilled men can do the work in 30 days. In how many days can 45 unskilled and 22 skilled men do the work?
(A) 10 (B) 9 (C) 8.5 (D) 7.5

46. 8 men or 10 boys can do a work in 36 days. In how many days can 16 men and 5 boys do the work?

47. 12 men and 15 boys can do a work in 6 days 10 men and 24 boys can do the same work in 5 days. In how many days 8 men and 30 boys can do the work?

48. 8 men or 12 women or 20 boys can do a work in 36 days. In how many days can 6 men, 12 women and 10 boys together do the work?
(A) 14 (B) 12 (C) 10 (D) 16

49. Dharani and Dharma can do a work in 10 days and 17 days respectively. With the help of Bhanu they complete the work in 5 days and earn ₹221. What is the share of Dharma in rupees?

50. A and B can do a work in 12 days and 36 days, respectively. If they work on alternate days beginning with B, in how many days will the work be completed?
(A) $20\frac{2}{3}$ (B) 18 (C) 24 (D) $26\frac{5}{9}$

Exercise – 7
(Averages – Mixtures – Alligations)

Directions for questions 1 to 40: For the Multiple Choice Questions, select the correct alternative from the given choices. For the Non-Multiple Choice Questions, write your answer in the box provided.

1. The average of the first ten two-digit natural numbers is .

2. The average height of the students in a class is 155 cm. If each student's height is 1 cm more, the average height of the students becomes _____.
(A) 153 cm (B) 158 cm (C) 156 cm (D) 157 cm

3. A student scored an average of 80 marks in 3 subjects: Physics, Chemistry and Mathematics. If his average marks in Physics and Mathematics is 90 and that in Physics and Chemistry is 70, what is the marks in Physics?

4. The average weight of a group of boys is 30 kg. After a boy of weight 35 kg joins the group, the average weight of the group goes up by 1 kg. Find the number of boys in the group originally.
(A) 5 (B) 4 (C) 6 (D) 7

5. The average runs scored by a batsman in 20 matches is 40. In the next 10 matches, the batsman scored an average of 13 runs. Find his average score in all the 30 matches is .

6. The average mark of the students of a class in a particular exam is 80. If 5 students whose average mark in that exam is 40 are shifted to another class the average mark of the remaining students would be 90. The number of students who wrote the exam is .

7. In an exam, the average mark of the students of a class was calculated as 20. But as the marks of two students were wrongly recorded as 70 and 85 instead of 60 and 77, the actual average was 2 marks less. The number of students who wrote the exam is .

8. The students of section A and section B have average weights of 30 kg and 45 kg respectively. Find the average weight, in kg, of both the sections together given that the students in the sections A and B are in the ratio 9 : 1.

9. The average of all the even natural numbers less than 50 is .

10. The average of 11 consecutive natural numbers is x. If the sixth number is 12, x = .

11. The average score of a batsman in x innings is 36. After another innings of 80, his average increases by 4.
x + 1 = .

12. The average age of a class of 20 students is 20 years. If the age of their class teacher is included, the average age of the class becomes 21 years. Find the age of the class teacher.
(A) 40 years (B) 41 years
(C) 49 years (D) 50 years

13. A group consists of 11 men. If two men whose ages are 29 and 31 years are replaced by two other men named Amar and Bhavan, the average age of the group drops by one year. The average age of Amar and Bhavan (in years) is .

14. Ajay has written a total of seven examinations in a sequence. He scored 90 marks in one exam and a total of 330 marks in the other six exams. If his average score in the first six exams is 60, then his score in the last exam was .

15. In a certain season, the Indian player Anil Kumble played a total of 30 matches. In the first 29 matches, his average was 36 runs. If he scored 30 runs in last match, the average score at the end of that season (in runs/match) is .

16. Two vessels P and Q contain 50% and 75% of alcohol respectively. If 2 litres from vessel P is mixed with 4 litres from vessel Q, the ratio of alcohol and water in the resulting mixture is _____.
(A) 3 : 2 (B) 3 : 1 (C) 5 : 3 (D) 2 : 1

17. In what ratio should a variety of rice costing ₹6 per kg be mixed with another variety of rice costing ₹8.75 per kg to obtain a mixture costing ₹7.50 per kg?
(A) 8 : 9 (B) 3 : 4 (C) 7 : 8 (D) 5 : 6

18. In what ratio should water be mixed with 80% wine so that a 60% wine solution is formed?
(A) 7 : 6 (B) 2 : 3 (C) 5 : 4 (D) 1 : 3

19. A mixture of 70 litres of milk and water contains 10% water. How many litres of water should be added to the mixture so that the resulting mixture contains $12^1/_2$% water?

20. A total of 300 chocolates were distributed among 120 boys and girls such that each boy received 2 chocolates and each girl received 3 chocolates. Find the respective number of boys and girls.
(A) 70, 50 (B) 60, 60
(C) 50, 70 (D) None of these

21. ₹6,000 is lent out in two parts. One part is lent at 7% p.a simple interest and the other is lent at 10% p.a. simple interest. The total interest at the end of one year was ₹450. Find the ratio of the amounts lent at the lower rate and the higher rate of interest.
(A) 5 : 1 (B) 4 : 1 (C) 3 : 2 (D) 2 : 1

22. A trader purchased two colour televisions for a total of ₹35,000. He sold one colour television at 30% profit and the other at 40% profit. Find the difference in the cost prices of the two televisions if he made an overall profit of 32%.
(A) ₹21,000 (B) ₹17,500 (C) ₹14,000 (D) ₹24,500

23. Two varieties of wheat A and B costing ₹9 per kg and ₹15 per kg respectively were mixed in the ratio 3 : 7. If 5 kg of the mixture is sold at 25% profit, find the profit made (in ₹).

24. In a group there were 19 boys. One boy named Bhavan ate 18 chocolates more than the average number of chocolates eaten by all the boys. If the remaining 18 boys ate an average of 5 chocolates, find the number of chocolates eaten by Bhavan.

25. The average weight of 20 students of a class is 25 kg. If one student named Amar leaves the class, the average weight of the class decreases by 0.2 kg. Find the weight of Amar. (in kg)

26. Twenty numbers written in ascending order have an average of 40. The average of the last 19 numbers is 42. Find the first number.
(A) 1 (B) 2 (C) 4 (D) 6

27. Two solutions A and B having 30% milk and 80% milk are mixed to form a mixture which contains 50% milk. Find the ratio of the quantities of A and B mixed.
(A) 4 : 1 (B) 3 : 5 (C) 5 : 2 (D) 3 : 2

28. How many litres of water must be added to 10 litres of milk costing ₹12 per litre, so that on selling the mixture at ₹12.50 per litre, 25% profit is made?

29. A trader, who claimed to sell milk at cost price, mixes it with water and makes a profit of 25%. Find the concentration of milk in the mixture.
(A) 60% (B) 70% (C) 75% (D) 80%

30. A class has 40 students. A total of ₹250 was distributed among them. Each boy got ₹8 and each girl got ₹5.50. Find the number of boys.

31. A mixture is formed by mixing two varieties of wheat P and Q whose quantities are in the ratio 4 : 3. The cost of P exceeds the cost of Q by ₹7 per kg. The cost of the mixture is ₹23 per kg. Find the cost of Q (in ₹ per kg)
(A) 20 (B) 19 (C) 22 (D) 18

32. Vijay purchased 1 dozen mangoes at ₹6 per dozen, 2 dozen mangoes of another variety at ₹10 per dozen and 5 dozen mangoes of a third variety at ₹6 per dozen. Find the average cost (in ₹) per dozen of mangoes purchased by Vijay.

33. The average weight of a group of 4 girls is 25 kg. A girl joined them and the average weight of the group went up by 1 kg. Find the weight of the girl who joined.
(A) 30 kg (B) 25 kg (C) 27 kg (D) 32 kg

34. 4 kg of rice costing ₹6 per kg is mixed with 8 kg of rice costing ₹12 per kg. Find the cost (in ₹ per kg) of the mixture.

35. Find the quantity of tea costing ₹12 per kg to be mixed with 18 kg of tea costing ₹9 per kg to form a mixture costing ₹10.2 per kg.
(A) 24 kg (B) 27 kg (C) 16 kg (D) 12 kg

36. Alok purchased 16 items. The average cost of those 16 items is ₹59. He then returned four items with an average price of ₹60 and three other items costing ₹39, ₹49 and ₹40. Find the average cost of the remaining items. (in ₹)

37. A dealer sells a mixture of two varieties A and B of tea at ₹30 per kg making 25% profit. Variety A costs ₹22 per kg. If the two varieties were mixed in the ratio 1 : 1, find the cost of variety B (in ₹ per kg).
(A) 24 (B) 26 (C) 28 (D) 20

38. Three numbers have an average of 20. If two of the numbers are 14 and 28, the third number is _____.

39. A vessel of capacity 90 litres is fully filled with pure milk. 9 litres of milk is removed from the vessel and replaced with water. 9 litres of the solution thus formed is removed and replaced with water. Find the quantity of pure milk in the final milk solution (in litres).

40. A can contains 200 litres of pure milk. 20 litres was taken out and replaced with water. How many times should this procedure be followed for the can to contain 145.8 litres of pure milk?

Exercise – 8
(Numbers)

Directions for questions 1 to 100: For the Multiple Choice Questions, select the correct alternative from the given choices. For the Non-Multiple Choice Questions, write your answer in the box provided.

1. Find the units digit of $6054 \times 216 \times 312$.

2. (a) Which of the following numbers is divisible by both 4 and 9?
(A) 2368 (B) 2736 (C) 3954 (D) 3814

(b) Which of the following numbers is divisible by 8 and 9?
(A) 2458 (B) 2244 (C) 2448 (D) 3968

(c) Which of the following numbers is divisible by 6?
(A) 2842 (B) 2425 (C) 2547 (D) 2730

(d) Which of the following numbers is divisible by 11 and 12?
(A) 4830 (B) 2640 (C) 3584 (D) 4686

(e) Which of the following numbers is divisible by 15 and 24?
(A) 4680 (B) 3630 (C) 2460 (D) 5460

3. (a) Which of the following numbers is divisible by 36?
(A) 3368 (B) 3672 (C) 2542 (D) 2850

(b) Which of the following numbers is divisible by 33 and 2?
(A) 3732 (B) 5280 (C) 4120 (D) 5242

(c) Which of the following numbers is divisible by 12 and 18?
(A) 7524 (B) 3654 (C) 3027 (D) 5136

(d) Which of the following numbers is/are divisible by 25?
(A) 3075 (B) 2150
(C) 5000 (D) All the above

4. What least natural number should be added to the following numbers to make them divisible by 9?
(a) 51234
(A) 6 (B) 4 (C) 3 (D) 5

(b) 96346
(A) 8 (B) 0 (C) 9 (D) 7

(c) 79325
(A) 8 (B) 7 (C) 1 (D) 6

(d) 123456
(A) 3 (B) 6 (C) 5 (D) 4

(e) 491
(A) 4 (B) 5 (C) 3 (D) 6

5. In each of the following numbers, what should be the missing digit in the indicated place such that the number is a multiple of 11?
(a) 945678_
(A) 3 (B) 2 (C) 8 (D) 5

(b) 37679_
(A) 4 (B) 7 (C) 5 (D) 2

(c) 4_56369
(A) 2 (B) 3 (C) 4 (D) 9

(d) 65428_1
(A) 1 (B) 2 (C) 3 (D) 4

(e) 129_
(A) 4 (B) 3 (C) 6 (D) 8

6. Express the following numbers as product of powers of prime factors.

(a) 1680
(A) $2^4 \times 5 \times 3 \times 7$ (B) $2^5 \times 5 \times 3 \times 7$
(C) $2^4 \times 5^2 \times 3 \times 7$ (D) $2^5 \times 5^2 \times 3^2 \times 7$

(b) 676
(A) $2^2 \times 13^2$ (B) $2^3 \times 13$
(C) 2×13^3 (D) None of these

(c) 2860
(A) $11 \times 13 \times 2^2 \times 5$ (B) $11 \times 13^2 \times 2 \times 5$
(C) $11 \times 13 \times 2 \times 5^2$ (D) $11^2 \times 13 \times 2 \times 5$

(d) 2160
(A) $2^5 \times 3^3 \times 5$ (B) $2^4 \times 3^3 \times 5$
(C) $2^6 \times 3^3 \times 5$ (D) $2^5 \times 3^2 \times 5^2$

7. Express the following numbers as product of powers of prime factors.
(a) 765
(A) $5 \times 17 \times 3^2$ (B) $5^2 \times 17 \times 3$
(C) $17^2 \times 5$ (D) $17 \times 5 \times 7$

(b) 1521
(A) $3^2 \times 13^2$ (B) $3^3 \times 13$
(C) 3×13^2 (D) $3^2 \times 13$

(c) 2244
(A) $2^2 \times 3 \times 17 \times 11$ (B) $2 \times 3^2 \times 17 \times 11$
(C) $2^2 \times 3^2 \times 17 \times 11$ (D) $2 \times 3 \times 17 \times 11$

(d) 5776
(A) $2^3 \times 19^2$ (B) $2^4 \times 19^2$
(C) $2^5 \times 19^2$ (D) $2^4 \times 19^3$

(e) 11979
(A) $11^3 \times 3^2$ (B) $11^2 \times 3^3$
(C) 11×3^4 (D) 11×3^5

8. Simplify the following.

(a) $56 \times 445 + 77 \times 555 + 21 \times 445 =$ ☐ .

(b) $6\frac{1}{6} + 4\frac{5}{6} - 3\frac{3}{4} - 6\frac{1}{4} =$ ☐ .

(c) $\frac{3.36 - 2.34}{3} \times \frac{2.79 + 4.34 + 4.77}{3.4} =$ ☐ .

9. Simplify the following.

(a) $221 \times 650 + 442 \times 175 =$ ☐ .

(b) $3\frac{5}{6} + 6\frac{1}{7} - 2\frac{1}{3} - 1\frac{1}{2} =$ _____ .

(A) $6\frac{1}{7}$ (B) $6\frac{1}{21}$ (C) $6\frac{1}{14}$ (D) $6\frac{5}{28}$

(c) $\frac{(2.45)^3 + 7.35(1.55)^2 - 4.65(2.45)^2 - (1.55)^3}{(2.45)^2 - 2 \times 2.45 \times 1.55 + (1.55)^2}$

☐ .

10. Find the square roots of the following numbers.

(a) 18769
(A) 131 (B) 133 (C) 137 (D) 139

(b) 222.01
(A) 14.3 (B) 14.1 (C) 14.7 (D) 14.9

(c) 8836
(A) 92 (B) 94 (C) 96 (D) 98

11. Find the square root of each of the following numbers.

(a) 32041 = ☐ .

(b) 5929 = ☐ .

(c) 151.29 = ☐ .

(d) 63001 = ☐ .

(e) 45796 = ☐ .

12. For what values of 'n' where n is a natural number are the following statements true?

(a) $7^n + 6^n$ is divisible by 13
(A) All values (B) Even values
(C) Odd values (D) No value

(b) $11^n - 2^{3n}$ is divisible by 3
(A) All values (B) Even values
(C) Odd values (D) No value

(c) $2^{4n} + 3^n$ is divisible by 13
(A) All values (B) Even values
(C) Odd values (D) No value

(d) $7^n - 6^n$ is divisible by 13
(A) All values (B) Even values
(C) Odd values (D) No value

13. If n is a natural number, then for what values of n are the following statements true?

(a) $5^{2n} - 1$ is divisible by 8 for
(A) even values of n (B) odd values of n
(C) all values of n (D) no value of n

(b) $8^n + 1$ is divisible by 3 for
(A) odd values of n (B) even values of n
(C) all values of n (D) no value of n

14. A number when divided by 162 leaves a remainder of 29. Find the remainder when the same number is divided by 27.

☐

15. A number when divided by 204 leaves the remainder 60. Find the remainder when the same number is divided by 34.

☐

16. Express $0.46\overline{7}$ as a fraction.

(A) $\frac{462}{900}$ (B) $\frac{421}{900}$ (C) $\frac{421}{990}$ (D) $\frac{461}{990}$

17. $1.2\overline{78} =$

(A) $\frac{211}{165}$ (B) $\frac{41}{33}$ (C) $\frac{400}{301}$ (D) $\frac{630}{493}$

18. Which of the following pairs of numbers are relative primes?

(a) 24, 25 (b) 133, 285
(c) 210, 255 (d) 15, 91
(e) 123, 164

(A) Only (a) (B) Only (a), (d) and (e)
(C) Only (a) and (d) (D) Only (d) and (e)

19. Which of the following pairs of numbers are not relative primes?

(A) 77, 85 (B) 29, 203
(C) 103, 205 (D) 109, 242

20. $\frac{89 \times 89 \times 89 + 11 \times 11 \times 11}{89 \times 89 - 89 \times 11 + 11 \times 11} =$ ☐ .

21. Which of the following numbers is/are exactly divisible by 3, 5, 9, 11 and 19?

(a) 9405 (b) 1584 (c) 9216
(d) 6490 (e) 9310

(A) only (a) and (d) (B) only (a)
(C) only (d) and (e) (D) only (a), (d) and (e)

22. Which of the following numbers are exactly divisible by 18, 27, 36 and 48?

(a) 432 (b) 1296 (c) 1728
(d) 3556 (e) 2160

(A) (a), (b), (c) and (e) only
(B) (a), (c) and (e) only
(C) (b), (c) and (e) only
(D) (a), (b) and (e) only

23. Find the least natural number to be added to the following numbers to make them multiples of 9.

(a) 24151
(A) 5 (B) 3 (C) 6 (D) 4

(b) 335672
(A) 2 (B) 3 (C) 4 (D) 1

(c) 765413
(A) 1 (B) 2 (C) 3 (D) 8

(d) 567491
(A) 1 (B) 2 (C) 4 (D) 7

(e) 765436
(A) 4 (B) 5 (C) 6 (D) 7

24. Find the least natural number to be added to the following numbers to make them multiples of 11.
(a) 42361
(A) 2 (B) 3 (C) 4 (D) 11

(b) 896656
(A) 1 (B) 2 (C) 9 (D) 11

(c) 584560
(A) 2 (B) 3 (C) 4 (D) 5

(d) 504215
(A) 3 (B) 4 (C) 5 (D) 10

25. The smallest natural number with which 9000 is to be multiplied to make it a perfect square is ☐.

26. What is the smallest natural number with which 1080 should be multiplied to make it a perfect cube?
☐

27. Find the smallest number with which 520 should be multiplied to make it a perfect square.
☐

28. Find the least number with which 16200 should be multiplied to make it a perfect cube.
(A) 36 (B) 48 (C) 45 (D) 360

29. Given that L.C.M of two numbers is 608 and the product of the numbers is 2432. Find the H.C.F of the two numbers.
☐

30. The H.C.F of two numbers is 16 and their product is 2560. Find the L.C.M of the two numbers.
(A) 140 (B) 150 (C) 160 (D) 170

31. The LCM of two numbers is 20 and their product is 80. The HCF of the numbers is ☐.

32. The sum of two numbers is 98 and their LCM is 168. What is the difference between the numbers?
(A) 35 (B) 28 (C) 21 (D) 14

33. The LCM of 1/2, 2/3, 4/7, 9/20 is
(A) 36 (B) 1/36 (C) 1/420 (D) 420

34. The HCF of 2/5, 4/3, 11/6 is
(A) 30 (B) 44 (C) 1/44 (D) 1/30

35. Find the LCM of $\frac{2}{7}, \frac{4}{9}$ and $\frac{6}{11}$ ☐.

36. Three bells toll every 30 minutes, 45 minutes and 60 minutes. If they toll together at 9:30 a.m., what is the next time they toll together?
(A) 11:30 a.m. (B) 10:00 p.m.
(C) 12:30 a.m. (D) 1:00 p.m.

37. Four bells toll at intervals of 10 seconds, 15 seconds, 20 seconds and 30 seconds respectively. If they toll together at 10:00 a.m., at what time will they toll together for the next time?
(A) 10:01 a.m. (B) 10:02 a.m.
(C) 10:00:30 a.m. (D) 10:00:45 a.m.

38. Four persons P, Q, R and S start running from the same point around a circular track simultaneously. If they complete one round in 10 minutes, 8 minutes, 12 minutes and 18 minutes respectively, after how much time will they next meet at the starting point?
(A) 180 minutes (B) 270 minutes
(C) 360 minutes (D) 450 minutes

39. Find the least number which when divided by 11, 24 and 26 leaves a remainder of 4 in each case.
(A) 3436 (B) 3432 (C) 3428 (D) 6852

40. Find the smallest four-digit number which is exactly divisible by 13, 15 and 23 when increased by 9 ☐.

41. The smallest number which leaves respective remainders of 7 and 3 when divided by 22 and 16 is ☐.

42. Find the least number which when divided by 35 and 11 leaves a remainder of 1 in each case ☐.

43. Find the least and greatest three-digit numbers which when increased by 6 are exactly divisible by 9, 27 and 15.
(A) 192 and 939 (B) 192 and 993
(C) 129 and 939 (D) 129 and 993

44. Find the smallest number which when divided by 13 and 16 leaves respective remainders of 2 and 5.
(A) 187 (B) 197 (C) 207 (D) 219

45. The smallest number, which, when divided by 13 leaves a remainder of 7 and when divided by 8 leaves a remainder of 3, is
(A) 56 (B) 53 (C) 59 (D) 52

46. The smallest number, which, when divided by 12 and 17 leaves remainders 5 and 10 respectively is ☐.

47. The smallest number, which, when divided by 8 or 7 leaves a remainder of 3 in each case is
(A) 59 (B) 18 (C) 53 (D) 40

48. The greatest number that divides 407 and 327, leaving remainders of 5 and 3 respectively, is ☐.

49. The largest number, which, divides 350, 470 and 890 and leaves the same remainder in each case is ☐.

50. The largest number, which divides 149 and 261, leaving respective remainders of 5 and 9 is ☐.

51. The least natural number divisible by $2.3.5^3$, $3.5.7^2$ and $5.7^2.11$ has x distinct prime factors. x = ☐.

52. The greatest number which divides 106, 241 and 286 leaving the same remainder in each case is ☐.

53. The greatest number which divides 2053 and 3909 leaving remainders of 3 and 9 respectively is ☐.

54. Find the greatest number which divides 83, 125 and 209 leaving the same remainder in each case.
(A) 19 (B) 17 (C) 42 (D) 23

55. Arrange the following fractions in descending order $\frac{5}{9}, \frac{4}{7}$ and $\frac{1}{2}$
(A) $\frac{4}{7} > \frac{5}{9} > \frac{1}{2}$ (B) $\frac{4}{7} > \frac{1}{2} > \frac{5}{9}$
(C) $\frac{5}{9} > \frac{4}{7} > \frac{1}{2}$ (D) $\frac{5}{9} > \frac{1}{2} > \frac{4}{7}$

56. $(2.25)^3 + 6.75 \times (2.75)^2 - 8.25 \times (2.25)^2 - 2.75^3$
(A) 0.625 (B) 0.125 (C) –0.125 (D) –0.725

57. $\frac{5.71x5.71x5.71 - 3.21x3.21x3.21}{5.71x5.71 + 5.71x3.21 + 3.21x3.21}$ = ☐.

58. Five bells ring at intervals of 2, 3, 4, 5 and 6 seconds respectively. How many times do they ring together in two hours?
☐

59. Two wires of lengths 7 m 84 cm and 8 m 12 cm are cut into pieces of length x cm each where x is an integer. Find the maximum value of x ☐.

60. Two numbers have an H.C.F of 8 and an L.C.M of 1960. Find the number of such possible pairs.
(A) One (B) Two (C) Three (D) Four

61. Find the index of the highest power of 7 in 100!.
☐

62. Find the index of the largest power of 3 in 120! ☐.

63. Find the index of the highest power of 5 in 200! ☐.

64. The index of the highest power of 6 in 100! is
(A) 94 (B) 97 (C) 48 (D) 145

65. The index of the highest power of 5 in 167! is
(A) 50 (B) 47 (C) 40 (D) 41

66. If the six-digit number 56x4y2 is divisible by 9, then the least value of x + y is ☐.

67. Which of the following numbers is exactly divisible by 33?
(A) 356974 (B) 548672
(C) 237698 (D) 568722

68. What should be the least value of x so that the number 143 x 5 is divisible by 9?
☐

69. The number $(10^n + 1)$ is divisible by 9 for
(A) all values of n. (B) odd values of n.
(C) even values of n. (D) no value of n.

70. The least number which is a perfect square and has 60 as a factor is ☐.

71. How many numbers less than 1,000 are there that are divisible by 7, 9 and 16?
☐

72. The least six digit number exactly divisible by 323 is ☐.

73. The number of zeroes at the end of 400! is ☐.

74. The number of divisors of 1200 is ☐.

75. Find the number of divisors of 1764 excluding 1 and itself.
(A) 18 (B) 27 (C) 25 (D) 12

76. In how many ways can 3663 be resolved into two factors?
(A) 6 (B) 8 (C) 12 (D) 18

77. Number of factors of 1476 is ☐.

78. Find the number of prime factors of $2^{13} \times 3^{14} \times 5^{15}$.
(A) 3 (B) 42
(C) 56 (D) None of these

79. The number of ways in which 960 can be expressed as a product of two different factor is
(A) 21 (B) 28 (C) 7 (D) 14

80. What is the remainder, when 3^{91} is divided by 11?
(A) 3 (B) 9 (C) 5 (D) 4

81. What is the remainder, when 5^{37} is divided by 6?
☐

82. P is a prime number greater than 3. The remainder of P^2 divided by 24 must be ☐.

83. Find the remainder when 3^{21465} is divided by 4.
(A) 0 (B) 1 (C) 2 (D) 3

84. Find the remainder when 2^{2400} is divided by 9.
(A) 3 (B) 5 (C) 6 (D) 1

85. A number when divided by a certain divisor leaves a remainder of 13. Also when thrice the number is divided by the same divisor, the remainder is 1. Find the divisor.
(A) 38
(B) 19
(C) Either (A) or (B)
(D) Neither (A) nor (B)

86. Find the sum of all the possible remainders when 3^n is divided by 5 where n is an integer.

87. The last digit of the following multiplication

(a) $8452 \times 7156 \times 2143 \times 1567$ is .

(b) $2^{48} \times 7^{40} \times 4^{48}$ is .

(c) $3^{4n} \times 9^{2n} \times 6^n$, where n is any natural number is .

88. What is the units digit of $6^{25} + 9^{16} + 5^{40}$?
(A) 2 (B) 4 (C) 5 (D) 7

89. The last digit of $4^n + 7^n$, when n = 99 is .

90. Which of the following represents a value of y such that $\sqrt[4]{y}$ is rational?
(A) 343 (B) 3430 (C) 3725 (D) 1296

91. A number when divided successively by 7 and 5 leaves respective remainders of 6 and 4. Find the remainder when the smallest such number is divided by 20.
(A) 18 (B) 14 (C) 9 (D) 15

92. A number, when successively divided by 3 and 8, leaves respective remainders of 2 and 7. What is the remainder when the number is divided by 6?

93. A number, when successively divided by 4, 5, and 6 leaves respective remainders of 3, 4, and 2. Find the least possible number .

94. X denotes the units place of the product 31.32.33…….39. X = .

95. 7.999 ….. is a/an
(A) rational number.
(B) is on fraction.
(C) irrational number.
(D) non-real number.

96. 5.555….. is a/an
(A) integer.
(B) irrational number.
(C) not a real number.
(D) rational number.

97. $\frac{24^3 - 12^3}{24 - 12} =$.

98. Which of the following is a four digit perfect square whose first two digits and last two digits represent perfect squares.
(A) 3649 (B) 1681
(C) 4909 (D) 6436

99. Find the respective values of the L.C.M. and H.C.F of the following numbers

(a) 54, 72, 48
(A) 216,2 (B) 432,6
(C) 324,2 (D) 648,9

(b) 51, 119, 187
(A) 3213,17 (B) 3927,17
(C) 3027,17 (D) 3215,17

(c) $2^2 \times 3 \times 7$, $2 \times 3^2 \times 5 \times 7^2$
(A) 8820,42 (B) 8820,21
(C) 4410,42 (D) 4410,21

(d) $\frac{7}{18}, \frac{2}{15}, \frac{8}{9}$
(A) $\frac{56}{3}, \frac{1}{180}$ (B) $\frac{56}{3}, \frac{1}{90}$
(C) $\frac{1}{180}, \frac{56}{3}$ (D) $\frac{1}{90}, \frac{56}{3}$

(e) 72, 96, 64
(A) 792, 8 (B) 456, 16
(C) 612, 8 (D) 576, 8

100. Find the respective L.C.M and H.C.F of the following set of numbers.

(a) 18, 27, 36.
(A) 108, 9 (B) 108, 3
(C) 144, 3 (D) 144, 9

(b) 81, 216.
(A) 944, 3 (B) 648, 27
(C) 5256, 3 (D) 5256, 9

(c) $\frac{9}{13}, \frac{7}{11}, \frac{3}{8}$.
(A) 189, $\frac{1}{1144}$ (B) 63, $\frac{1}{1144}$
(C) $\frac{1}{1144}$, 189 (D) $\frac{1}{1144}$, 378

(d) $\frac{5}{6}, \frac{13}{9}, \frac{7}{12}$.
(A) $\frac{455}{3}, \frac{1}{36}$ (B) $\frac{385}{3}, \frac{1}{18}$
(C) $\frac{1}{36}, \frac{385}{3}$ (D) $\frac{1}{18}, \frac{385}{3}$

(e) 14, 25.
(A) 350, 1 (B) 175, 1
(C) 700, 1 (D) 875, 1

Exercise – 9
(Number Systems)

Directions for questions 1 to 15: For the Multiple Choice Questions, select the correct alternative from the given choices. For the Non-Multiple Choice Questions, write your answer in the box provided.

1. The hexa-decimal equivalent of the binary number 11001111010 is _____.
(A) $(67A)_{16}$ (B) $(A76)_{16}$ (C) $(6A7)_{16}$ (D) $(7A6)_{16}$

2. The duo-decimal equivalent of the septenary number 5126 is ☐.

3. The octal equivalent of the binary number $(101111011111)_2$ is ☐.

4. Which of the following is equivalent to $(137)_{10}$?
(A) $(254)_7$ (B) $(B5)_{12}$
(C) $(211)_8$ (D) All the above

5. The decimal equivalent of $(BAD)_{16}$ is ☐.

6. Binary equivalent of the decimal number 575 is _____.
(A) $(111111000)_2$ (B) $(1111110001)_2$
(C) $(1000111111)_2$ (D) $(100111111)_2$

7. The hexadecimal equivalent of the decimal number 2571 is_____.
(A) $(A0B)_{16}$ (B) $(B0A)_{16}$ (C) $(B00)_{16}$ (D) $(100B)_{16}$

8. The decimal equivalent of $(2EFA)_{16}$ is _____.
(A) 12192 (B) 12208 (C) 12026 (D) 12160

9. Which of the following is equivalent to $(3AC)_{13}$?
(A) $(3105)_8$ (B) $(3001)_6$ (C) $(416)_{12}$ (D) $(3CA)_{14}$

10. $(A12)_{12} - (839)_{12}$ = _____.
(A) $(195)_{10}$ (B) $(195)_{12}$ (C) $(295)_{12}$ (D) $(295)_{10}$

11. $(325)_8 \times (12)_8 = (x)_8.x$ = ☐.

12. The square root of the nonary number 121in base 9 is ☐.

13. The square of $(312)_6$ in base 6 is ☐.

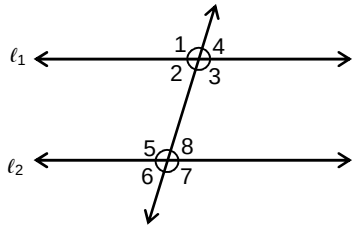
14. The LCM of $(44)_8$ and $(12)_7$ is _____.
(A) $(44)_{10}$ (B) $(36)_{10}$ (C) $(13)_{16}$ (D) $(26)_{10}$

15. $(452)_8 + (AE2)_{16}$ = _____.
(A) $(111100001100)_2$ (B) $(110000001100)_2$
(C) $(100111010010)_2$ (D) $(101000001100)_2$

Exercise – 10
(Geometry)

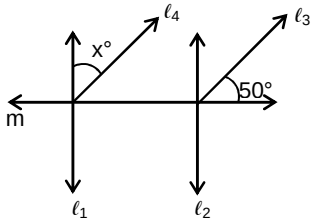
Directions for questions 1 to 50: For the Multiple Choice Questions, select the correct alternative from the given choices. For the Non-Multiple Choice Questions, write your answer in the box provided.

1. In the figure, ℓ_1 and ℓ_2 are parallel lines. The sum of the angles 2 and 4 is 80°.



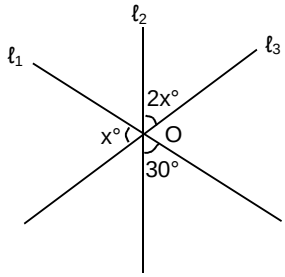
Which of the following is/are true?
(A) $\angle 1 = \angle 3 = \angle 5 = \angle 7 = 100°$
(B) $\angle 2 = \angle 4 = \angle 6 = \angle 8 = 40°$
(C) Both (A) and (B)
(D) Neither (A) nor (B)

2.



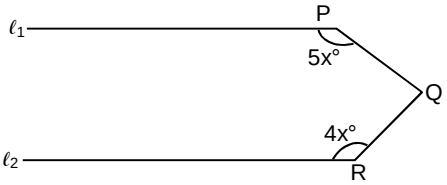
In the figure, ℓ_1 and ℓ_2 are perpendicular to m. If ℓ_4 is parallel to ℓ_3 what is the value of x?
(A) 30° (B) 40° (C) 50° (D) 60°

3. In the figure, ℓ_1, ℓ_2 and ℓ_3 are intersecting at O. What is the measure of x in degrees?



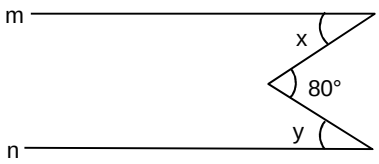
☐

4.

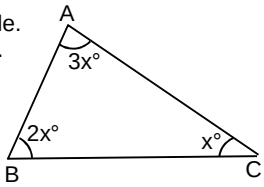


In the figure, ℓ_1 and ℓ_2 are parallel lines and $\angle PQR = 90°$. What is x?
(A) 10° (B) 20° (C) 30° (D) 40°

5. In the figure, lines m and n are parallel. If y – x = 20°, what is the measure of x, in degree s?

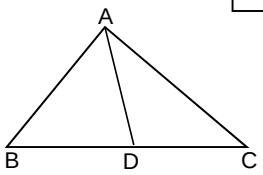


6. ABC, is a/an _____.
(A) acute angled triangle.
(B) right angled triangle.
(C) obtuse triangle.
(D) isosceles triangle.

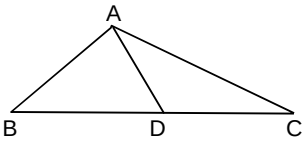


7. In triangle ABC, AD, BE and CF are the medians. G is the centroid. What is the ratio of the area of the quadrilateral FBDG to the area of triangle ADC?
(A) 2 : 1 (B) 1 : 3 (C) 3 : 2 (D) 2 : 3

8. In the figure, ∠BAC = 90°and AD, a median, is 10 cm long. If AB = 12 cm, AC (in cm) = ☐.



9. In the figure, AB = 5 cm, BC = 8 cm and AC = 7 cm. If AD is a median, then the length of AD lies between _____.



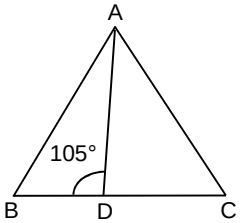
(A) 3 cm and 4 cm (B) 4 cm and 5 cm
(C) 5 cm and 6 cm (D) 6 cm and 7 cm

10. In an isosceles triangle ABC, BC = 40 cm, AB = AC = 25 cm. What is the length of the median drawn from A to BC? (in cm)

☐

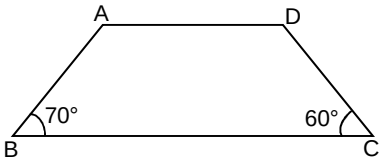
11. In ΔABC, $AB^2 + AC^2 < BC^2$ and $\angle BAC = x°$. Which of the following is true?
(A) x < 90° (B) x = 90°
(C) x > 90° (D) None of these

12. In the figure, ABC is an equilateral triangle and ∠ADB = 105°. What is the measure of ∠DAC in degrees?



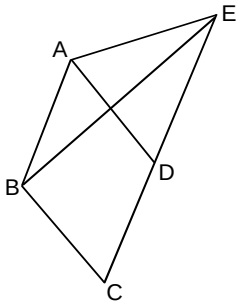
☐

13. In the figure, ABCD is a trapezium. If AD is parallel to BC, which of the following is true?



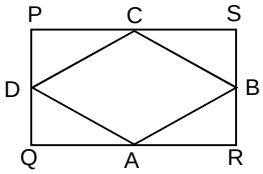
(A) ∠A + ∠C > ∠B + ∠D
(B) ∠A + ∠C = ∠B + ∠D
(C) ∠A + ∠C < ∠B + ∠D
(D) None of the above

14.



In the figure, ABCD is a rhombus and ADE is an equilateral triangle and E is on $\overline{CD}$ produced. What is the measure of ∠AEB?
(A) 40° (B) 30° (C) 45° (D) 50°

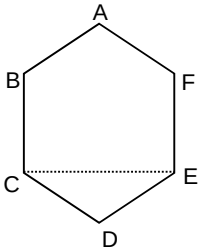
15.



In the figure, PQRS is a rectangle A, B, C, D are the midpoints of the sides of PQRS. If the length and breadth of the rectangle are 20 cm and 10 cm respectively, what is the perimeter of the quadrilateral ABCD?
(A) $10\sqrt{2}$ cm (B) $5\sqrt{10}$ cm
(C) $10\sqrt{5}$ cm (D) $20\sqrt{5}$ cm

16. The side of a square is equal to the side of a rhombus ABCD. If ∠ABC = 30°, then what is the ratio of the area of the square to the area of the rhombus?
(A) $\sqrt{2}$: 1 (B) $\sqrt{3}$: 1 (C) 2 : 1 (D) 1 : 1

17. In the figure, ABCDEF is a regular hexagon. What is the measure of ∠CED in degrees?



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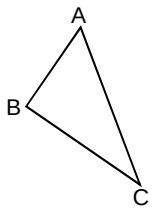
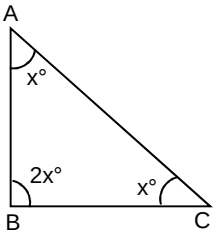
18.



(a) In the above triangle ABC, the sides AB, BC and CA are 3 cm, $3\sqrt{3}$ cm and 6 cm respectively. What is the measure of ∠ABC in degrees?

(b) In the figure, if AC=10 cm, what is the area of triangle ABC?



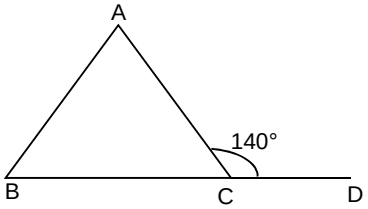
(A) 100 cm^2 (B) 75 cm^2
(C) 25 cm^2 (D) 50 cm^2

(c) In triangle ABC, AB = 12 cm and BC = 21 cm. What is the range of the perimeter (p) of triangle ABC?
(A) 3 cm < p < 21 cm
(B) 9 cm < p < 33 cm
(C) 33 cm < p < 66 cm
(D) 42 cm < p < 66 cm

19. The length of a rectangle and the base of a triangle are equal. What is the ratio of the breadth of the rectangle to the height of the triangle if their areas are equal?
(A) $\sqrt{2}:1$ (B) 2 : 1 (C) 1 : 2 (D) $1:\sqrt{2}$

20. One side and one diagonal of a rhombus measures 13 cm and 24 cm respectively. What is the area of the rhombus (in cm^2)?

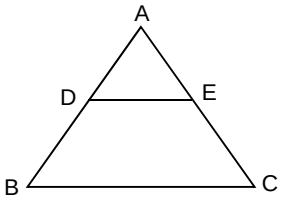
21. In the given figure, ∠ACD = 140° and AC = BC. Find the respective angles A, B and C of the triangle ABC.



(A) 40°, 40°, 100° (B) 70°, 70°, 40°
(C) 100°, 50°, 30° (D) 70°, 30°, 80°

22. In triangle PQR, angle bisectors of angles Q and R meet at point I. If ∠P = 80°, find ∠QIR.
(A) 130° (B) 120° (C) 140° (D) 135°

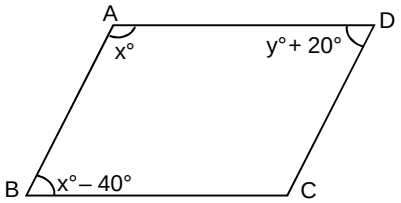
23.



In the given figure, AD : DB = 1 : 3 and DE is parallel to BC. If the area of the triangle ABC is 432 cm^2, what is the area of triangle ADE in cm^2?

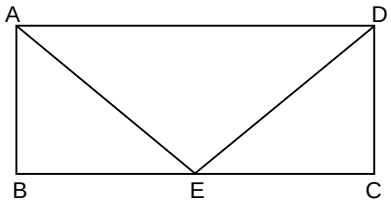
24. In triangle ABC, right angled at B, D is the mid point of AC. If AB = 5 cm and BC = 12 cm, what is the length of BD?

25.



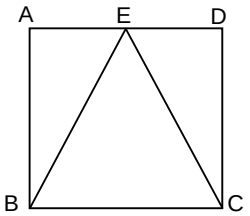
The given figure ABCD is a parallelogram, what is the value of y in degrees?

26.



In the given figure, ABCD is a rectangle where BC = 80 cm and DC = 9 cm. If E is the mid point of BC, then what is the perimeter of triangle AED?
(A) 169 cm (B) 165 cm (C) 162 cm (D) 158 cm

27.

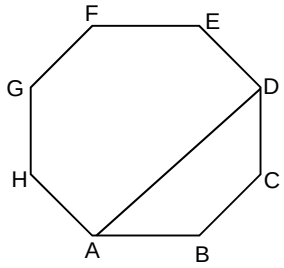


In the given figure, ABCD is a square and BCE is an isosceles triangle such that BE = CE. If AB = 10 cm, what is the length of BE?
(A) $5\sqrt{2}$ cm (B) $5\sqrt{5}$ cm
(C) 10 cm (D) $10\sqrt{2}$ cm

28. The length and breadth of a rectangle are respectively equal to the adjacent sides of a parallelogram. If the angle between the given adjacent sides of a parallelogram is 30°, what is the ratio of the area of the rectangle to that of the parallelogram?

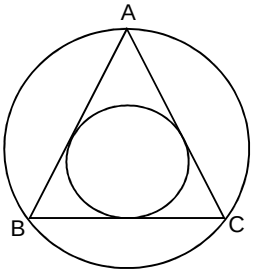
29. What is the measure of each interior angle of a regular polygon with 12 sides?
(A) 30° (B) 120° (C) 150° (D) 210°

30. In the given figure, ABCDEFGH is a regular octagon. Find ∠ADC.



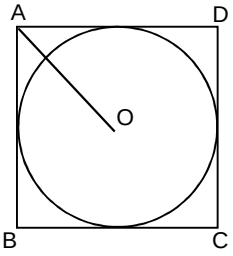
(A) 30° (B) 45° (C) 60° (D) 90°

31.



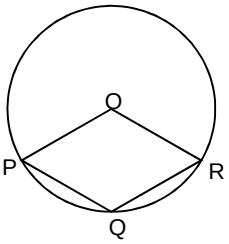
In the given figure, ABC is an equilateral triangle. The circumference of the circle inscribed in the triangle is 154 cm. What is the circumference of the circle circumscribing the triangle ABC (in cm)?

32. In the following figure, ABCD is a square of side 10 cm. A circle is inscribed in the square. If O is the centre of the circle, what is the length of AO?



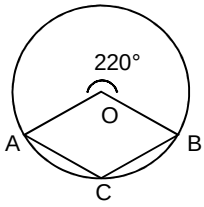
(A) 5 cm (B) $5\sqrt{2}$ cm (C) $5\sqrt{3}$ cm (D) $4\sqrt{5}$ cm

33.



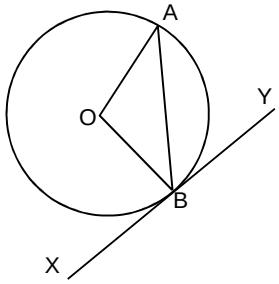
In the figure, O is the centre of the circle. If OP = PQ = QR, then ∠POR = _____.
(A) 90°
(B) 135°
(C) 120°
(D) Cannot be determined

34.



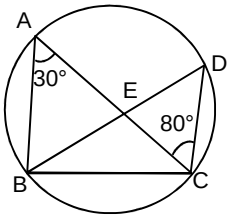
In the figure given, O is the centre of the circle. What is the measure of ∠ACB in degrees?

35.

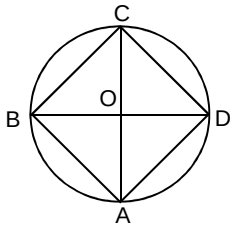


In the figure, O is the centre of the circle and XY is the tangent to the circle. If ∠ABY = 30°, what is the measure of ∠AOB?
(A) 30° (B) 45° (C) 60° (D) 75°

36. In the following figure, ABC and BCD are two triangles inscribed in the circle. ∠BAC = 30° and ∠ACD = 80°. What is the measure of ∠AEB in degrees?

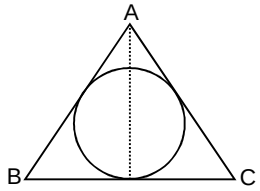


37. In the figure, O is the centre of the circle and ∠OBA = 40°. What is the measure of ∠BCA?

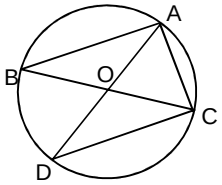


(A) 30° (B) 40° (C) 50° (D) 60°

38. In the figure, ABC is an equilateral triangle. The radius of the circle inscribed in the triangle is $3\sqrt{3}$ cm. What is the perimeter of the triangle ABC in cm?

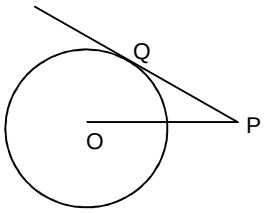


39.



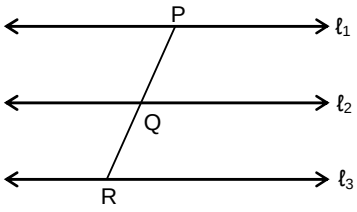
In the figure, O is the centre of the circle and OC = AC. Find ∠ADC.
(A) 30° (B) 45° (C) 60° (D) 90°

40. In the figure, PQ is a tangent and OP is 12 cm long. If O is the centre of the circle and ∠OPQ = 30°, what is the length of the radius?



(A) $4\sqrt{3}$ cm (B) $6\sqrt{3}$ cm
(C) 6 cm (D) 9 cm

41. In the given figure, line ℓ_2 is parallel to line ℓ_1 and ℓ_3 is equidistant from them. If line segment PR measures 12 cm, find the length of PQ. (in cm)

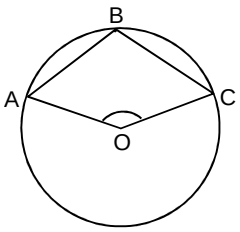


42. Point A lies in the rectangle PQRS, then $(QA)^2 + (AS)^2$ is equal to _____
(A) PR^2 (B) $(PQ)^2 + (QR)^2$
(C) QS^2 (D) $(PA)^2 + (AR)^2$

43. The perimeter of a square is equal to the perimeter of an equilateral triangle. What is the ratio of their areas?
(A) $3\sqrt{3} : 4$ (B) $\sqrt{3} : 2$
(C) $3\sqrt{3} : 8$ (D) $2\sqrt{3} : 5$

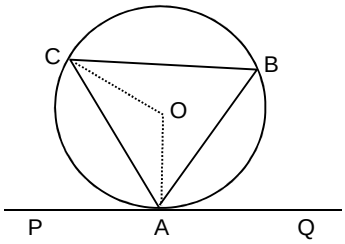
44. What is the number of diagonals in a nonagon?

45.



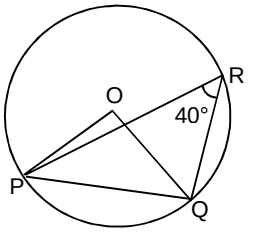
In the given figure, O is the centre of the circle and ∠AOC = 150° in the quadrilateral OABC. What is the measure of ∠ABC?
(A) 30° (B) 55° (C) 75° (D) 105°

46.



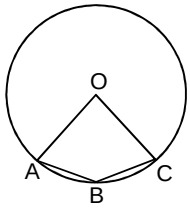
In the given figure, PAQ is a tangent to the circle with centre O. If ∠PAC = 80°, find ∠AOC
(A) 160° (B) 120° (C) 130° (D) 140°

47.



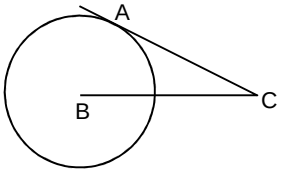
In the given figure, O is the centre of the circle. If ∠PRQ = 40°, then what is the measure of ∠OPQ?
(A) 30° (B) 40° (C) 80° (D) 50°

48.



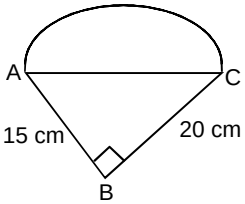
In the given figure, O is the centre of the circle, ∠OAB = 80° and ∠OCB = 70°. What is the measure of ∠AOC in degrees?

49.



In the circle shown with centre B, AC is the tangent 24 cm long. If the radius of the circle is 18 cm, what is the length of BC (in cm)?

50.



In the given figure, ABC is a right-angled triangle, right angled at B and a semi-circle attached to it has the diameter as AC. If AB = 15 cm and BC = 20 cm, what is the perimeter (in cm) of the figure?
(A) $25\pi + 35$ (B) $12.5\pi + 35$
(C) $15\pi + 35$ (D) $20\pi + 35$