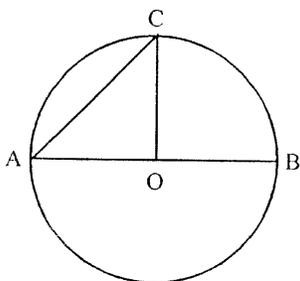# Quantitative Aptitude

Solved Paper of MAT 2001 Examination

Directions: There are four options to each question. Choose the correct option:

1. In the accompanying figure, AB is one of the diameters of the circle and OC is perpendicular to it through the centre O. If AC is $7\sqrt{2}$ cms., what is the area of the circle in sq cms.?
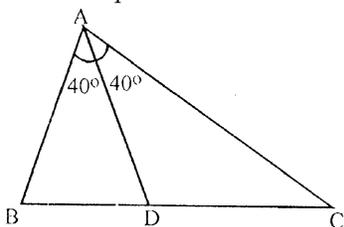

(*a*) 24.5   (*b*) 49   (*c*) 98   (*d*) 154

2. The circumcentre of a triangle is always the point of intersection of the:
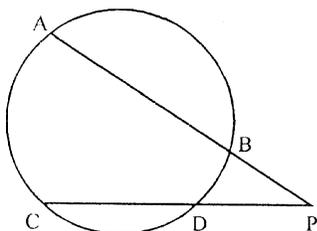   (*a*) medians
   (*b*) bisectors
   (*c*) perpendicular bisectors
   (*d*) perpendiculars dropped from the vertices on opposite sides of the triangle.

3. In the adjoining figure, BC = 8 cm, AB = 6 cm, AC = 9 cm, then DC is equal to:

(*a*) 7 cm   (*b*) 7.2 cm   (*c*) 4.8 cm   (*d*) 4.5 cm

4. If, in the figure, PA = 8 cm, PD = 4 cm, CD = 3 cm, then AB is equal to:

(*a*) 3.0 cm   (*b*) 3.5 cm   (*c*) 4.0 cm   (*d*) 4.5 cm

5. The number of tangents that can be drawn to two non-intersecting circles is:
   (*a*) 4   (*b*) 3   (*c*) 2   (*d*) 1

6. With the vertices of a $\triangle$ABC as centres, three circles are described each touching the other two externally. If the sides of the triangle are 4, 6 and 8 cm respectively, the sum of the radii of the three circles equals:
   (*a*) 10   (*b*) 14   (*c*) 12   (*d*) 9

7. If 6440 soldiers were asked to stand in rows to form a perfect square, it was found that 40 soldiers were left out. What was the number of soldiers in each row?
   (*a*) 40   (*b*) 80   (*c*) 64   (*d*) 60

8. The speed of a metro train is 54 km/hr excluding stoppage time and if including stoppage the speed is 45 km/hr then for how many minutes does it stop per hour?
   (*a*) 9   (*b*) 10   (*c*) 20   (*d*) 11

9. A cone, a hemisphere and a cylinder have equal bases and same heights. Their volumes will be in ratio:
   (*a*) 1 : 2 : 3   (*b*) 3 : 4 : 1
   (*c*) 3 : 2 : 1   (*d*) None of these

10. The weights in kilograms of 10 students are 52, 45, 31, 35, 40, 55, 60, 38, 44, 36. If 44 is replaced by 46 and 40 is replaced by 35 then new median will be:
    (*a*) 42   (*b*) 40.5   (*c*) 40   (*d*) 41.5

11. For an acute angle θ, sin θ + cos θ takes the greatest value when θ is:
    (*a*) 30°   (*b*) 45°   (*c*) 60°   (*d*) 90°

12. The angle of elevation of the sun when the length of the shadow of a pole is $\sqrt{3}$ times, the height of the pole is:
    (*a*) 30°   (*b*) 45°   (*c*) 60°   (*d*) 75°

13. If the fractions $\frac{9}{13}, \frac{2}{3}, \frac{8}{11}, \frac{5}{7}$ are arranged in ascending order, then the correct sequence is:

(*a*) $\frac{9}{13}, \frac{2}{3}, \frac{8}{11}, \frac{5}{7}$ (*b*) $\frac{2}{3}, \frac{9}{13}, \frac{5}{7}, \frac{8}{11}$

(*c*) $\frac{2}{3}, \frac{8}{11}, \frac{5}{7}, \frac{9}{13}$ (*d*) $\frac{5}{7}, \frac{8}{11}, \frac{2}{3}, \frac{9}{13}$

14. $9^6 + 7$ when divided by 8 would have a remainder of:
    (*a*) 0   (*b*) 6   (*c*) 5   (*d*) None of these

15. HCF of 3240, 3600 and a third number is 36 and their LCM is $2^4 \times 3^5 \times 5^2 \times 7^2$. The third number is:
    (*a*) $2^2 \times 5^3 \times 7^2$ (*b*) $2^2 \times 3^5 \times 7^2$
    (*c*) $2^3 \times 3^5 \times 7^2$ (*d*) $2^5 \times 5^2 \times 7^2$

16. There are four prime numbers written in ascending order. The product of the first three is 385 and that of the last three is 1001. Find the first number.

(a) 5   (b) 7   (c) 11   (d) 17

17. Three men A, B and C go walking round a circle 1 kilometre in circumference at the rates of 10, 20 and 40 metres per minute respectively. If they all start together and walk in the same direction, when will they again be together at the same place?

(a) After 50 minutes   (b) After 240 minutes
(c) After 800 minutes   (d) After 100 minutes

18. Which one of the following is the largest?

$$2\sqrt{5}, 6\sqrt{3}, 3\sqrt{7} \text{ and } 8\sqrt{2}$$

(a) $8\sqrt{2}$ (b) $2\sqrt{5}$ (c) $6\sqrt{3}$ (d) $3\sqrt{7}$

19. If A's salary is 25% higher than B's salary, how much per cent is B's salary lower than A's?

(a) 15%   (b) 20%   (c) 25%   (d) $33\frac{1}{3}\%$

20. A number is increased by 10% and then reduced by 10%. After this operation, the number:

(a) Does not change   (b) Decreases by 1%
(c) Increases by 1%   (d) Increases by 0.1%

21. A reduction of 20% in the price of sugar enables a purchaser to obtain $2\frac{1}{2}$ kg more for Rs 160. Find the original price per kg of sugar.

(a) Rs 12   (b) Rs 15   (c) Rs 16   (d) Rs 18

22. Successive discounts of 20% and 15% are equivalent to a single discount of:

(a) 35%   (b) 32%   (c) 17.5%   (d) 17%

23. The difference between the simple interest and the compound interest compounded annually at the rate of 12% per annum on Rs 5,000 for two years will be:

(a) Rs 17.50   (b) Rs 36   (c) Rs 45   (d) Rs 72

24. Two equal sums of money were invested, one at 4% and the other at $4\frac{1}{2}\%$. At the end of 7 years, the simple interest received from the latter exceeded that received from the former by Rs 31.50. Each sum was:

(a) Rs 1,000   (b) Rs 500   (c) Rs 750   (d) Rs 900

25. If the cost of 12 pencils is equal to selling price of 10 pencils, the profit per cent in the transaction is:

(a) $16\frac{2}{3}\%$ (b) 18%   (c) 20%   (d) 25%

26. Two motor cars were sold for Rs 9,900 each gaining 10% on one and losing 10% on the other. The gain or loss per cent in the whole transaction is:

(a) neither loss nor gain   (b) 1% profit
(c) $\frac{100}{99}\%$ profit   (d) 1% loss

27. A sum of Rs 370 is to be divided among A, B and C such that:

$$\frac{\text{A's share}}{\text{B's share}} = \frac{\text{B's share}}{\text{C's share}} = \frac{3}{4}$$

Then A's share is

(a) Rs 240   (b) Rs 120   (c) Rs 100   (d) Rs 90

28. If the ratio of boys to girls in a class is B and the ratio of girls to boys is G, then 3(B + G) is:

(a) equal to 3   (b) less than 3
(c) more than 3   (d) less than $\frac{1}{3}$

29. Tea worth Rs 126 per kg and Rs 135 per kg are mixed with a third variety in the ratio 1 : 1 : 2. If the mixture is worth Rs 153 per kg the price of the third variety per kg will be:

(a) Rs 169.50   (b) Rs 170   (c) Rs 175.50   (d) Rs 180

30. The average of 11 numbers is 10.9. If the average of the first six numbers is 10.5 and that of the last six numbers is 11.4, then the middle (6th) number is:

(a) 11.5   (b) 11.4   (c) 11.3   (d) 11.0

31. There are 30 students in a class. The average age of the first 10 students is 12.5 years. The average age of the next 20 students is 13.1 years. The average age of the whole class is:

(a) 12.5 years   (b) 12.7 years
(c) 12.8 years   (d) 12.9 years

32. The perimeter of one face of a cube is 20 cm. Its volume must be:

(a) 8000 cm³   (b) 1000 cm³
(c) 125 cm³   (d) 400 cm³

33. The number of revolutions made by a wheel of diameter 56 cm in covering a distance of 1.1 km is: (use $\pi = \frac{22}{7}$)

(a) 31.25   (b) 56.25   (c) 625   (d) 62.5

34. The length of the longest rod that can be placed in a room which is 12 m long, 9 m broad and 8 m high is:

(a) 27 m   (b) 19 m   (c) 17 m   (d) 13 m

35. The curved surface of a right circular cone of height 15 cm and base diameter 16 cm is:

(a) $120 \, \pi \, \text{cm}^2$ (b) $60 \, \pi \, \text{cm}^2$
(c) $136 \, \pi \, \text{cm}^2$ (d) $68 \, \pi \, \text{cm}^2$

36. A circular well is dug to a depth of 14 metres with a diameter of 2 metres. What is the volume of the earth dug out?

(use $\pi = \frac{22}{7}$)

(a) 32 cubic metres   (b) 36 cubic metres
(c) 40 cubic metres   (d) 44 cubic metres

37. If Ajit can do $\frac{1}{4}$ of a work in 3 days and Sujit can do $\frac{1}{6}$ of the same work in 4 days, how much will Ajit get if both

work together and are paid Rs 180 in all?

(*a*) Rs 120   (*b*) Rs 108   (*c*) Rs 60   (*d*) Rs 36

38. Two pipes can fill a tank in 10 hours and 12 hours respectively, while the third can empty it in 20 hours. If all the pipes are opened together, then the tank will be filled in:

(*a*) $7\dfrac{1}{2}$ hours   (*b*) 10 hours

(*c*) 8 hours   (*d*) $9\dfrac{1}{10}$ hours

39. A and B weave a carpet in 10 days and 15 days respectively. They begin to work together but B leaves after 2 days. In what time will A complete the remaining work?

(*a*) $6\dfrac{1}{3}$ days   (*b*) $6\dfrac{2}{3}$ days

(*c*) 7 days   (*d*) 8 days

40. X and Y start from the same point and run around a circular stadium, whose circumference is 4200 m, at the rate of 500 m and 700 m per minute respectively in the opposite directions. They will meet each other in:

(*a*) 3.5 min   (*b*) 6.0 min

(*c*) 8.4 min   (*d*) 21 min

ANSWERS AND EXPLANATIONS

1. (*d*) $AO^2 + OC^2 = AC^2 \Rightarrow r^2 + r^2 = (7\sqrt{2})^2$

$$\Rightarrow 2r^2 = 98 \Rightarrow r = 7 \text{ cm}$$

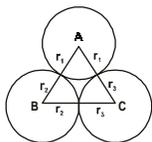Area of a circle $= \pi r^2 = \dfrac{22}{7} \times 7 \times 7 = 154 \text{ cm}^2$

2. (*c*)

3. (*c*) AD is the bisector of $\angle A$ of $\triangle ABC$

$$\therefore \dfrac{AB}{AC} = \dfrac{BD}{DC}$$

$$\dfrac{6}{9} = \dfrac{BC-DC}{DC} \Rightarrow \dfrac{2}{3} = \dfrac{8-DC}{DC} \Rightarrow DC = 4.8 \text{ cm}$$

4. (*d*) Chords AB and CD intersect (on producing) at P

$\therefore$ PA × PB = PC × PD

or 8(PA – AB) = (CD + PD) × PD

8(8 – AB) = (3 + 4) × 4 $\Rightarrow$ AB = 4.5 cm

5. (*a*)

6. (*d*) $r_1 + r_2 = 4$ .... (*i*)

$r_2 + r_3 = 6$ .... (*ii*)

$r_3 + r_1 = 8$ .... (*iii*)

Adding (*i*), (*ii*) and (*iii*)

$2(r_1 + r_2 + r_3) = 18 \Rightarrow r_1 + r_2 + r_3 = 9$

7. (*b*) Reqd. no. of soldiers in each row $= \sqrt{6440-40} = 80$

8. (*b*) The time taken in stopping/hr is the same as the time taken to travel further a distance of (54 – 45) km or 9 km at the rate of 54 km/hr

$\therefore$ train stops/hr $= \dfrac{9}{54} = \dfrac{1}{6}$ hr = 10 minutes

9. (*a*) Vol. of a cone : Vol. of a hemisphere : Vol. of a cylinder

$$= \dfrac{1}{3}\pi r^2 h : \dfrac{2}{3}\pi r^3 : \pi r^2 h \qquad (h = r)$$

$$= \dfrac{1}{3}\pi r^3 : \dfrac{2}{3}\pi r^3 : \pi r^3 = 1 : 2 : 3$$

10. (*d*) Rearranging the weights 31, 35, 35, 36, <u>38, 45,</u> 46, 52, 55, 60

Two Middle terms are 38, 45

$\therefore$ New Median $= \dfrac{38+45}{2} = 41.5$

11. (*b*)

12. (*a*) $\tan\theta = \dfrac{h}{\sqrt{3}h} = \dfrac{1}{\sqrt{3}} = \tan 30°$

$\therefore \theta = 30°$
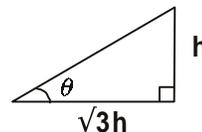
13. (*b*) Change into decimal form

14. (*a*) $9^6 + 7 = 9^6 - 1 + 8$ $x^n - 1$ is exactly divisible by $x - 1$ whether n is even or odd

$\therefore (9^6 - 1)$ is exactly divisible by $(9 - 1)$ *i.e.* 8

$\therefore 9^6 - 1 + 8$ is also divisible by 8

Let $9^6 - 1 = 8k$ where k is an integer

$\therefore 9^6 - 1 + 8 = 8k + 8 = 8(k + 1)$ which is divisible by 8

$\therefore R = 0$

15. (*b*) $3240 = 2^3 \times 3^4 \times 5$, $3600 = 2^4 \times 3^2 \times 5^2$

HCF $= 36 = 2^2 \times 3^2$

LCM $= 2^4 \times 3^5 \times 5^2 \times 7^2$

$\therefore$ Third no. $= 2^2 \times 3^5 \times 7^2$

16. (*a*) $385 = 5 \times 7 \times 11$, $1001 = 7 \times 11 \times 13$

$\therefore$ First no. $= 5$ (5, 7, 11, 13)

17. (*d*) Time taken by A to complete one round

$$= \dfrac{1000}{10} = 100 \text{ minutes}$$

Time taken by B to complete one round

$$= \dfrac{1000}{20} = 50 \text{ minutes}$$

and by C, $\dfrac{1000}{40} = 25$ minutes

Reqd. time = L.C.M. of 25, 50 and 100 = 100 minutes

18. (*a*) The square of a largest no. is greatest

$(2\sqrt{5})^2, (6\sqrt{3})^2, (3\sqrt{7})^2, (8\sqrt{2})^2$

or 20, 108, 63, 128

Greatest = 128 $\therefore$ Reqd. no. $= 8\sqrt{2}$

19. (*b*) Let B's salary be Rs 100 $\therefore$ A's salary = Rs 125

If A's salary = Rs 125, then B's salary is less by Rs 25

If A's salary is Rs 100, then B's salary is less by

$\dfrac{25}{125} \times 100 = 20\%$

20. (*b*) Let no. = 100

$\therefore$ No. after operation $= 100 \times \dfrac{110}{100} \times \dfrac{90}{100} = 99$

$\therefore$ No. is reduced by $(100 - 99)\% = 1\%$

21. (c) Reduction on Rs 160 = $\dfrac{20}{100} \times 160$ = Rs 32

$\therefore$ Reduced price of $2\dfrac{1}{2}$ kg of sugar = 32

Reduced price of 1 kg of sugar = $32 \times \dfrac{2}{5} = Rs\dfrac{64}{5}$

If reduced price is Rs 80, then original = Rs 100

If reduced price is Rs $\dfrac{64}{5}$, then original = $\dfrac{100}{80} \times \dfrac{64}{5}$ = Rs 16

22. (b) Reqd single discount

$$= (100 - 100 \times \dfrac{80}{100} \times \dfrac{85}{100})\% = 32\%$$

23. (d) Diff. = $P\left[(1+\dfrac{R}{100})^n - 1\right] - \dfrac{P \times R \times T}{100} = 5000$

$\left[(1+\dfrac{12}{100})^2 - 1\right] - \dfrac{5000 \times 12 \times 2}{100}$ = Rs 72

24. (d) $4\dfrac{1}{2}\% - 4\% = \dfrac{1}{2}\%$

Let sum be Rs x

A.T.S. $\dfrac{x}{100} \times \dfrac{1}{2} \times 7 = 31.50 \Rightarrow x = 900$

$\left[\because \text{ diff. in interest is due to } \dfrac{1}{2}\%\right]$

25. (c) Let S.P. of 1 pencil = Re 1

$\therefore$ S.P. of 12 pencils = Rs 12

C.P. of 12 pencils = S.P. of 10 pencils = Rs 10

Gain = 12 − 10 = Rs 2, Gain% = $\dfrac{2}{10} \times 100 = 20$

26. (d) If S.P. in two cases is same, there is always a loss
= x% of x = 10% of 10 = 1%

27. (d) Let C's share be Rs x $\therefore$ B's share = $\dfrac{3x}{4}$

A's share = $\dfrac{3}{4} \times \dfrac{3x}{4} = \dfrac{9x}{16}$

A.T.S. $\dfrac{9x}{16} + \dfrac{3x}{4} + x = 370 \Rightarrow x$ = Rs 160

$\therefore$ A's share = $\dfrac{9}{16} \times 160$ = Rs 90

28. (c) $\dfrac{\text{Boys}}{\text{Girls}} = B, \quad \dfrac{\text{Girls}}{\text{Boys}} = G \quad \therefore BG = 1 \text{ or } B = \dfrac{1}{G}$

$B + G = \dfrac{1}{G} + G > 2 \quad \because$ The sum of a real no. and

its reciprocal is always > 2

$\therefore$ 3 (B + G) > 3 × 2 *i.e.* 6

29. (c) $\dfrac{126 \times 1 + 135 \times 1 + x \times 2}{1+1+2} = 153 \Rightarrow$ x = 175.50

30. (a) 6th no. = 6 × 10.5 + 6 × 11.4 − 11 × 10.9 = 11.5

31. (d) Reqd. average = $\dfrac{1}{30}[10 \times 12.5 + 20 \times 13.1] = 12.9$

32. (c) Side of a cube = $\dfrac{P}{4} = \dfrac{20}{4} = 5$

$\therefore$ Vol= (side)^3 = 5^3 = 125 cm^3

33. (c) C = πd = $\dfrac{22}{7} \times 56 = 176$cm

No. of revolutions = $\dfrac{1.1 \times 1000 \times 100}{176}$ = 625

[In 1 revolution, distance covered = C]

34. (c) Length of longest rod = $\sqrt{12^2 + 9^2 + 8^2}$ = 17 m

35. (c) C.S.A. of a cone = $\pi r l = \pi \times \dfrac{16}{2} \times \left(\sqrt{15^2 + 8^2}\right)$

$l = \sqrt{h^2 + r^2}$

$= 136\pi$ cm^2

36. (d) Vol. of the earth dug out

$= \pi r^2 h = \dfrac{22}{7} \times (\dfrac{2}{2})^2 \times 14 = 44$ cubic metres

37. (a) Ajit can do the whole work in 3 × $\dfrac{4}{1}$ = 12 days

Sujit can do in 4 × 6 = 24 days

Ajit's one day's work : Sujit's one day's work

$= \dfrac{1}{12} : \dfrac{1}{24} = 2 : 1$

$\therefore$ Ajit gets = $\dfrac{2}{2+1} \times 180$ = Rs 120

38. (a) Work done by the three pipes in one hour

$= \dfrac{1}{10} + \dfrac{1}{12} - \dfrac{1}{20} = \dfrac{2}{15}$

$\therefore$ Tank will be filled in $\dfrac{15}{2}$ *i.e.* $7\dfrac{1}{2}$ hours

39. (b) (A + B)'s 2 days' work = 2 × $(\dfrac{1}{10} + \dfrac{1}{15}) = \dfrac{1}{3}$

$\therefore$ Remaining work = $1 - \dfrac{1}{3} = \dfrac{2}{3}$

A completes $\dfrac{2}{3}$ of work in $\dfrac{2}{3} \times 10 = 6\dfrac{2}{3}$ days

40. (a) D = s × t

A.T.S. 500 × t + 700 × t = 4200

$\therefore$ t = 3.5 minutes