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PYQs

Which term of the AP 3, 15, 27, 39, will be 120 more than its 21st term ?

Or

If S_n , the sum of first n terms of an AP is given by $S_n = 3n^2 - 4n$, find the n th term.

A father's age is three times the sum of the ages of his two children. After 5 years his age will be two times the sum of their ages. Find the present age of the father.

Or

A fraction becomes $\frac{1}{3}$ when 2 is subtracted from the numerator and it becomes $\frac{1}{2}$ when 1 is subtracted from the denominator. Find the fraction.

In Fig. 2, PQ is a chord of length 8 cm of a circle of radius 5 cm and centre O. The tangents at P and Q intersect at point T. Find the length of TP.

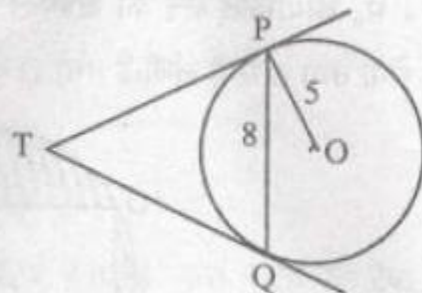


Fig. 2

Water in a canal, 6 m wide and 1.5 m deep, is flowing with a speed of 10 km/hour. How much area will it irrigate in 30 minutes; if 8 cm standing water is needed ?

Find the mode of the following frequency distribution.

Class	0-10	10-20	20-30	30-40	40-50	50-60	60-70
Frequency	8	10	10	16	12	6	7

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Two water taps together can fill a tank in $1\frac{7}{8}$ hours. The tap with longer diameter takes 2 hours less than the tap with smaller one to fill the tank separately. Find the time in which each tap can fill the tank separately.

Or

A boat goes 30 km upstream and 44 km downstream in 10 hours. In 13 hours, it can go 40 km upstream and 55 km downstream. Determine the speed of the stream and that of the boat in still water.

If the sum of first four terms of an AP is 40 and that of first 14 terms is 280. Find the sum of its first n terms.

A man in a boat rowing away from a light house 100 m high takes 2 minutes to change the angle of elevation of the top of the light house from 60° to 30° . Find the speed of the boat in metres per minute. [Use $\sqrt{3} = 1.732$]

Or

Two poles of equal heights are standing opposite each other on either side of the road, which is 80 m wide. From a point between them on the road, the angles of elevation of the top of the poles are 60° and 30° respectively. Find the height of the poles and the distances of the point from the poles.

Construct a ΔABC in which $CA = 6$ cm, $AB = 5$ cm and $\angle BAC = 45^\circ$. Then construct a triangle whose sides are $\frac{3}{5}$ of the corresponding sides of ΔABC .

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If the median of the following frequency distribution is 32.5. Find the values of f_1 and f_2 .

Class	0-10	10-20	20-30	30-40	40-50	50-60	60-70	Total
Frequency	f_1	5	9	12	f_2	3	2	40

Or

The marks obtained by 100 students of a class in an examination are given below.

Marks	No. of Students
0-5	2
5-10	5
10-15	6
15-20	8
20-25	10
25-30	25
30-35	20
35-40	18
40-45	4
45-50	2

Draw 'a less than' type cumulative frequency curves (ogive). Hence find median.

6. The value of x for which $2x, (x+10)$ and $(3x+2)$ are the three consecutive terms of an AP, is

- (a) 6 (b) -6 (c) 18 (d) -18

7. The first term of an AP is p and the common difference is q , then its 10th term is

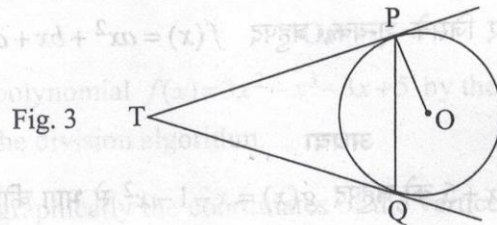
- (a) $q+9p$ (b) $p-9q$ (c) $p+9q$ (d) $2p+9q$

16. The ratio of the length of a vertical rod and the length of its shadow is $1:\sqrt{3}$. Find the angle of elevation of the sun at that moment?

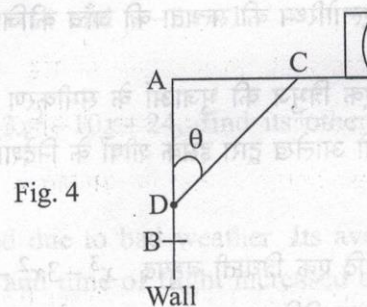
20. If the mean of the first n natural number is 15, then find n .

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In Fig. 3, two tangents TP and TQ are drawn to a circle with centre O from an external point T. Prove that $\angle PTQ = 2 \angle OPQ$.



23. The rod AC of a TV disc antenna is fixed at right angles to the wall AB and a rod CD is supporting the disc as shown in Fig. 4. If AC = 1.5 m long and CD = 3 m, find (i) $\tan \theta$ (ii) $\sec \theta + \operatorname{cosec} \theta$



26. Find the mean of the following distribution :

Class :	3-5	5-7	7-9	9-11	11-13
Frequency :	5	10	10	7	8

Or

Find the mode of the following data :

Class :	0-20	20-40	40-60	60-80	80-100	100-120	120-140
Frequency	6	8	10	12	6	5	3

29. In a flight of 600 km, an aircraft was slowed due to bad weather. Its average speed for the trip was reduced by 200 km/hr and time of flight increased by 30 minutes. Find the original duration of flight.

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36. The sum of four consecutive numbers in AP is 32 and the ratio of the product of the first and last terms to the product of two middle terms is 7:15. Find the numbers.

Or

Solve : $1 + 4 + 7 + 10 + \dots + x = 287$

37. Draw a line segment AB of length 7 cm. Taking A as centre, draw a circle of radius 3 cm and taking B as centre, draw another circle of radius 2 cm. Construct tangents to each circle from the centre of the other circle.

38. A vertical tower stands on a horizontal plane and is surmounted by a vertical flag-staff of height 6 m. At a point on the plane, the angle of elevation of the bottom and top of the flag-staff are 30° and 45° respectively. Find the height of the tower. (Take $\sqrt{3} = 1.73$)

40. The following table gives production yield per hectare (in quintals) of wheat of 100 farms of a village :

Production yield/hect.	40-45	45-50	50-55	55-60	60-65	65-70
No. of farms	4	6	16	20	30	24

Change the distribution to 'a more than' type distribution and draw its ogive.

Or

The median of the following data is 525. Find the values of x and y , if total frequency is 100 :

Class :	0-100	100-200	200-300	300-400	400-500	500-600	600-700	700-800	800-900	900-1000
Frequency :	2	5	x	12	17	20	y	9	7	4

6. The common difference of the A.P. $\frac{1}{p}, \frac{1-p}{p}, \frac{1-2p}{p}, \dots$ is

(a) 1 (b) $\frac{1}{p}$ (c) -1 (d) $-\frac{1}{p}$

7. The n^{th} term of the A.P. $a, 3a, 5a, \dots$ is

(a) na (b) $(2n-1)a$ (c) $(2n+1)a$ (d) $2na$

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12. In given Fig. 2, the length PB = _____ cm.

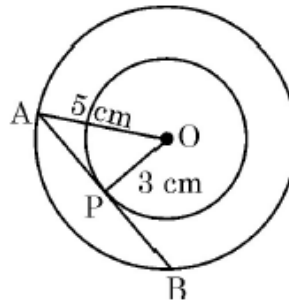


Fig.-2

15. In fig. 3, the angles of depressions from the observing positions O_1 and O_2 respectively of the object A are _____.

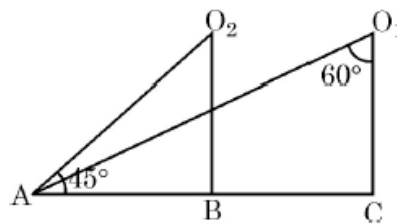


Fig.-3

19. Find the class-marks of the classes 10-25 and 35-55.
24. The volume of a right circular cylinder with its height equal to the radius is $25 \frac{1}{7} \text{ cm}^3$. Find the height of the cylinder. (Use $\pi = \frac{22}{7}$)
26. Compute the mode for the following frequency distribution :

Size of items (in cm)	0 - 4	4 - 8	8 - 12	12 - 16	16 - 20	20 - 24	24 - 28
Frequency	5	7	9	17	12	10	6

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27. If $2x + y = 23$ and $4x - y = 19$, find the value of $(5y - 2x)$ and $\left(\frac{y}{x} - 2\right)$.

OR

Solve for x : $\frac{1}{x+4} - \frac{1}{x+7} = \frac{11}{30}$, $x \neq -4, 7$.

28. Show that the sum of all terms of an A.P. whose first term is a , the second term is b and the last term is c is equal to $\frac{(a+c)(b+c-2a)}{2(b-a)}$

OR

Solve the equation :

$$1 + 4 + 7 + 10 + \dots + x = 287.$$



29. In a flight of 600 km, an aircraft was slowed down due to bad weather. The average speed of the trip was reduced by 200 km/hr and the time of flight increased by 30 minutes. Find the duration of flight.

32. If a circle touches the side BC of a triangle ABC at P and extended sides AB and AC at Q and R, respectively, prove that

$$AQ = \frac{1}{2} (BC + CA + AB)$$

36. It can take 12 hours to fill a swimming pool using two pipes. If the pipe of larger diameter is used for four hours and the pipe of smaller diameter for 9 hours, only half of the pool can be filled. How long would it take for each pipe to fill the pool separately ?

37. Draw a circle of radius 2 cm with centre O and take a point P outside the circle such that $OP = 6.5$ cm. From P, draw two tangents to the circle.

OR

Construct a triangle with sides 5 cm, 6 cm and 7 cm and then construct another triangle whose sides are $\frac{3}{4}$ times the corresponding sides of the first triangle.

38. From a point on the ground, the angles of elevation of the bottom and the top of a tower fixed at the top of a 20 m high building are 45° and 60° respectively. Find the height of the tower.

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40. The mean of the following frequency distribution is 18. The frequency f in the class interval 19 – 21 is missing. Determine f .

Class interval	11 – 13	13 – 15	15 – 17	17 – 19	19 – 21	21 – 23	23 – 25
Frequency	3	6	9	13	f	5	4

OR

The following table gives production yield per hectare of wheat of 100 farms of a village :

Production yield	40 – 45	45 – 50	50 – 55	55 – 60	60 – 65	65 – 70
No. of farms	4	6	16	20	30	24

Change the distribution to a 'more than' type distribution and draw its ogive.

3. The common difference of an AP, whose n^{th} term is $a_n = (3n + 7)$, is
 (a) 3 (b) 7 (c) 10 (d) 6
4. The value of λ for which $(x^2 + 4x + \lambda)$ is a perfect square, is
 (a) 16 (b) 9 (c) 1 (d) 4
5. The value of k , for which the pair of linear equations $kx + y = k^2$ and $x + ky = 1$ have infinitely many solutions is
 (a) ± 1 (b) 1 (c) -1 (d) 2
6. The value of p for which $(2p + 1)$, 10 and $(5p + 5)$ are three consecutive terms of an AP is
 (a) -1 (b) -2 (c) 1 (d) 2

OR

The number of terms of an AP 5, 9, 13, 185 is

- (a) 31 (b) 51 (c) 41 (d) 40



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13. In Fig. 2, PA and PB are tangents to the circle with centre O such that $\angle APB = 50^\circ$, then the measure of $\angle OAB$ is _____.

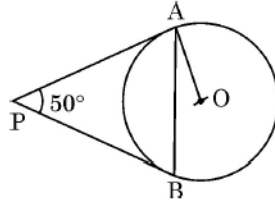


Fig. 2

OR

- In Fig. 3, PQ is a chord of a circle and PT is tangent at P such that $\angle QPT = 60^\circ$, then the measure of $\angle PRQ$ is _____.

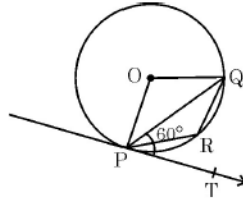


Fig. 3

17. Two right circular cones have their heights in the ratio 1 : 3 and radii in the ratio 3 : 1, what is the ratio of their volumes ?
18. Using the empirical formula, find the mode of a distribution whose mean is 8.32 and the median is 8.05.
19. The probability that it will rain tomorrow is 0.85. What is the probability that it will not rain tomorrow ?
20. What is the arithmetic mean of first n natural numbers ?

Section - B

Q. Nos. 21 to 26 carry 2 marks each.

21. Find the 11th term from the last term (towards the first term) of the AP 12, 8, 4, ..., -84.

OR

Solve the equation :

$$1 + 5 + 9 + 13 + \dots + x = 1326$$

22. In Fig. 4 AB is a chord of circle with centre O, AOC is diameter and AT is tangent at A. Prove that $\angle BAT = \angle ACB$.

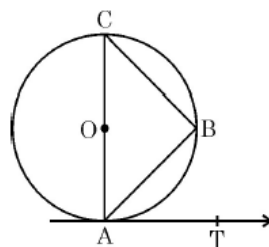


Fig. 4

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26. Find the value of p , if the mean of the following distribution is 7.5.

Classes	2-4	4-6	6-8	8-10	10-12	12-14
Frequency (f_i)	6	8	15	p	8	4

Section – C

Q. Nos. 27 to 34 carry 3 marks each.

27. Find a , b and c if it is given that the numbers a , 7, b , 23, c are in AP.

OR

If m times the m^{th} term of an AP is equal to n times its n^{th} term, show that the $(m + n)^{\text{th}}$ term of the AP is zero.

28. Find the values of k , for which the quadratic equation $(k + 4)x^2 + (k + 1)x + 1 = 0$ has equal roots.
31. Prove that, a tangent to a circle is perpendicular to the radius through the point of contact.

OR

Prove that the angle between the two tangents drawn from an external point to a circle is supplementary to the angle subtended by the line segment joining the points of contact at the centre.

34. 500 persons are taking dip into a cuboidal pond which is 80 m long and 50 m broad. What is the rise of water level in the pond, if the average displacement of the water by a person is 0.04 m^3 ?
36. A train covered a certain distance at a uniform speed. If the train would have been 6 km/hr. faster, it would have taken 4 hours less than the scheduled time and if the train were slower by 6 km/hr., it would have taken 6 hrs. more than the scheduled time. Find the length of the journey.

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38. If the angle of elevation of a cloud from a point 10 metres above a lake is 30° and the angle of depression of its reflection in the lake is 60° , find the height of the cloud from the surface of lake.

OR

A vertical tower of height 20 m stands on a horizontal plane and is surmounted by a vertical flag – staff of height h . At a point on the plane, the angle of elevation of the bottom and top of the flag staff are 45° and 60° respectively. Find the value of h .

39. A solid iron cuboidal block of dimensions $4.4 \text{ m} \times 2.6 \text{ m} \times 1 \text{ m}$ is cast into a hollow cylindrical pipe of internal radius 30 cm and thickness 5 cm. Find the length of the pipe.
40. For the following frequency distribution, draw a cumulative frequency curve of 'more than' type and hence obtain the median value.

Classes	0-10	10-20	20-30	30-40	40-50	50-60	60-70
Frequency	5	15	20	23	17	11	9

