Real Numbers

1

LEVEL 1

1. If a and b are two positive integers such that $a = 14b$. Find the HCF of a and b.
2. Using Euclid's division algorithm, find whether the pair of numbers 847, 2160 are co-primes or not.
3. "The product of three consecutive positive integers is divisible by 6". Is this statement true or false? Justify your answer.
4. Find the pairs of natural numbers whose least common multiple is 78 and the greatest divisor is 13.
5. There are 576 boys and 448 girls in a school that are to be divided into equal sections of either boys or girls alone. Find the total number of sections thus formed.
6. Can we have any $n \in N$, where $7n$ ends with the digit zero?
7. What will be the least possible number of the planks, if three pieces of timber 42 *m*, 49 *m* and 63 *m* long have to be divided into planks of the same length?
8. On a morning walk, three persons step off together and their steps measure 40 *cm*, 42 *cm*, 45 *cm*, what is the minimum distance each should walk so that each can cover the same distance in complete steps?
9. Can two numbers have 18 as their HCF and 380 as their LCM? Give reasons.
10. Determine the values of p and q so that the prime factorisation of 2520 is expressible as $2^3 \times 3^p \times q \times 7$.

LEVEL - II

11. Show that p^2 will leave a remainder 1 when divided by 8, if p is an odd positive integer.
12. Three sets of English, Hindi and mathematics books have to be stacked in such a way that all the books are stored topic wise and the number of books in each stack is the same. The number of English book is 192, the number of Hindi books is 240 and the number of mathematics books is 168. Determine the number of stacks of English, Hindi and mathematics books.
13. Write whether $\frac{2\sqrt{45}+3\sqrt{20}}{2\sqrt{5}}$ on simplification gives a rational or an irrational number.

14. Prove that $15 - 17\sqrt{3}$ be an irrational number.

15. Show that $\sqrt[3]{6}$ is an irrational number.

LEVEL - III

16. Express the HCF of 234 and 111 as $234x + 111y$, where x and y are integers.

17. Find the LCM of 2.5, 0.5 and 0.175.

18. In a seminar the number of participants in Chemistry, Physics and Biology are 336, 240 and 96. Find the minimum number of rooms required if in each room same number of participants is to be seated and all of them being in the same subject.

19. A charitable trust donates 28 different books of maths, 16 different books of science and 12 different books of social science to poor students. Each student is given maximum number of books of only one subject of their interest and each student got equal number of books.

(a) Find the number of books each student got.

(b) Find the total number of students who got books.

(c) How it help you society?

20. Prove that $\sqrt{p} + \sqrt{q}$ is irrational, where p, q are primes.

HIGHER ORDER THINKING SKILLS (H.O.T.S.)

1. Show that the square of any positive integer is either of the form 3n or $3n + 1$ for some integer n.
2. Prove that $3 + 5\sqrt{2}$ is irrational number.
3. Show that $n^2 - 1$ is divisible by 8, if n is an odd positive integer.
4. Find the largest positive number which divides 398, 436 and 842 leaving remainders 7, 11, 9 respectively.

PREVIOUS YEARS BOARD QUESTIONS

1. Show that every positive odd integer is of the form $(4q + 1)$ or $(4q + 3)$, where q is some integer. **(Delhi 2019)**
2. Show that any positive odd integer is of the form $6m + 1$ or $6m + 3$ or $6m + 5$, where m is some integer. **(AI 2019)**
3. What is the HCF of smallest prime number and the smallest composite number? **(2018)**
4. Show that any number of the form $6n$, where $n \in N$ can never end with digit O. **(Board Term I, 2017)**
5. The HCF of two numbers is 27 and their LCM is 162, if one of the number is 54, find the other number. **(Board Term I, 2017)**

Polynomials

2

LEVEL - I

1. Find the zeros of the polynomial $(x-2)^2 + 4$.
2. $p(x) = ax^2 + bx + c$. If $a + b + c = 0$, then find one of its zero.
3. Find the zeros of the quadratic polynomial $9t^2 - 6t + 1$ and verify the relationship between the zeros and the coefficients.
4. If the product of the zeros of the polynomial $ax^2 - 6x - 6$ is 4, then find the value of a. Also find the sum of zeros of the polynomial.
5. If one root of the quadratic polynomial $2x^2 - 3x + p$ is 3, find the other root. Also, find the value of p.
6. Latesh engages a labour to get some repair work. Charges to be paid for this work are zeros of the polynomial $x^2 - 300x + 22500$.

   (*a*) Find the zeros of the polynomial.

   (*b*) Labour claims Rs. 125 for the whole work. Latesh paid the actual amount. What value is depicted by Latesh.
7. Sum of zeroes of the polynomial $2x^2 - 4x + 5$ is 4. Nisha at once said "it is false".

   (*a*) Do you agree with Nisha ?

   (*b*) What value are depicted by Nisha ?
8. Find the zeros of the quadratic polynomial $\sqrt{3}x^2 - 8x + 4\sqrt{3}$.
9. If α, β are zeros of polynomial $p(x) = 5x^2 + 5x + 1$, then find the value of

   (*i*) $\alpha^2 + \beta^2$ (*ii*) $\alpha^{-1} + \beta^{-1}$
10. Show that $\frac{1}{2}$ and $\frac{-3}{2}$ are the zeros of the polynomial $4x^2 + 4x - 3$ and verify the relationship between zeros and co-efficients of polynomial.

LEVEL - II

11. If one zero of the quadratic polynomial $f(x) = 4x^2 - 8kx + 8x - 9$ is negative of the other, then find zeros of $kx^2 + 3kx + 2$.
12. If product of the zeros of the polynomial $kx^2 + 41x + 42$ is 7, then find the zeros of the polynomial $(k-4)x^2 + (k + 1)x + 5$.
13. Find a quadratic polynomial, whose zeroes are $5 + \sqrt{2}$ and $5 - \sqrt{2}$.

14. Find a cubic polynomial with the sum, sum of the product of its zeros taken two at a time, and product of its zeros are 5, –6 and –20 respectively.
15. If the polynomial $6x^4 + 8x^3 + 17x^2 + 21x + 7$ is divided by another polynomial $3x^2+4x+1$, the remainder comes out to be $(ax + b)$, find a and b.

LEVEL - III

16. a, b, c are co-prime $a \neq 1$ such that $2b = a + c$. If $ax^2 - 2bx + C$ and $2x^3 - 5x^2 + kx + 4$ has one integral root common, then find the value of K.
17. If –1 and 2 are two zeros of the polynomial $2x^3 - 2x - 5x - 2$, find its third zero.
18. If 1 and –1 are zeroes of polynomial $Lx^4 + Mx^3 + Nx^2 + Rx + P = 0$, show that $L + N + P = M + R = 0$.
19. Find the polynomial of least degree which should be added to the polynomial $x^4 + 2x^3 - 4x^2 + 6x - 3$ so that it is exactly divisible by $x^2 - x + 1$.
20. Given that the zeroes of the cubic polynomial $x^3 - 6x^2 + 3x + 10$ are of the form a, $a+b$, $a + 2b$ for some real numbers a and b, find the values of a and b as well as the zeroes of the given polynomial.

HIGHER ORDER THINKING SKILLS (H.O.T.S.)

1. Find all the zeros of polynomial $5x^3 - 15x^2 - 3x + 9$, if two of its zeros are $\sqrt{\frac{3}{5}}$ and $-\sqrt{\frac{3}{5}}$.
2. If the polynomial $p(x) = x^4 - 6x^3 + 16x^2 - 25x + 10$ is divided by another polynomial $x^2 - 2x + k$, the remainder is $x + a$, find k and a.
3. Find all the zeros of polynomial $f(x) = x^4 - 6x^3 - 26x^2 + 138x - 35$, if two of its zeros are $2 \pm \sqrt{3}$.
4. Find the zeros of polynomial $p(x) = 5\sqrt{5}x^2 + 30x + 8\sqrt{5}$, and verify the relationship between zeros and its coefficients.
5. If one zero of the polynomial $(k+1)x^2 - 5x + 5$ is multiplicative inverse of the other, then find the zeroes of $kx^2 - 3kx + 9$, where k is constant.
6. α, β, γ are zeros of cubic polynomial $px^3 - 5x + 9$. If $\alpha^3 + \beta^3 + \gamma^3 = 27$, find the value of p.
7. Find k so that $x^2 + 2x + k$ is a factor of $2x^4 + x^3 - 14x^2 + 5x + 6$. Also find all the zeroes of the two polynomials.

PREVIOUS YEARS BOARD QUESTIONS

1. Apply division algorithm to check if $g(x) = x^2 - 3x + 2$ is a factor of the polynomial $f(x) = x^4 - 2x^3 - x + 2$.
(AI 2019)
2. Find the value of k such that the polynomial $x^2 - (k + 6)x + 2(2k - 1)$ has sum of its zeroes equal to half of their product.
(Delhi 2019)
3. If $x = 3$ is one root of the quadratic equation $x^2 - 2kx - 6 = 0$, then find the value of k.
(2018)
4. Find all zeroes of the polynomial $(2x^4 - 9x^3 + 5x^2 + 3x - 1)$ if two of its zeroes are $(2 + \sqrt{3})$ and $(2 - \sqrt{3})$.
(2018)
5. If α and β are zeroes of $4x^2 - x - 4$, find quadratic polynomial whose zeroes are $\frac{1}{2}\alpha$ and $\frac{1}{2}\beta$.
(Board Term I, 2017)

14. Find a cubic polynomial with the sum, sum of the product of its zeros taken two at a time, and product of its zeros are 5, –6 and –20 respectively.
15. If the polynomial $6x^4 + 8x^3 + 17x^2 + 21x + 7$ is divided by another polynomial $3x^2+4x+1$, the remainder comes out to be $(ax + b)$, find a and b.

LEVEL - III

16. a, b, c are co-prime $a \neq 1$ such that $2b = a + c$. If $ax^2 - 2bx + C$ and $2x^3 - 5x^2 + kx + 4$ has one integral root common, then find the value of K.
17. If –1 and 2 are two zeros of the polynomial $2x^3 - 2x - 5x - 2$, find its third zero.
18. If 1 and –1 are zeroes of polynomial $Lx^4 + Mx^3 + Nx^2 + Rx + P = 0$, show that $L + N + P = M + R = 0$.
19. Find the polynomial of least degree which should be added to the polynomial $x^4 + 2x^3 - 4x^2 + 6x - 3$ so that it is exactly divisible by $x^2 - x + 1$.
20. Given that the zeroes of the cubic polynomial $x^3 - 6x^2 + 3x + 10$ are of the form a, $a+ b$, $a + 2b$ for some real numbers a and b, find the values of a and b as well as the zeroes of the given polynomial.

HIGHER ORDER THINKING SKILLS (H.O.T.S.)

1. Find all the zeros of polynomial $5x^3 - 15x^2 - 3x + 9$, if two of its zeros are $\sqrt{\frac{3}{5}}$ and $-\sqrt{\frac{3}{5}}$.
2. If the polynomial $p(x) = x^4 - 6x^3 + 16x^2 - 25x + 10$ is divided by another polynomial $x^2 - 2x + k$, the remainder is $x + a$, find k and a.
3. Find all the zeros of polynomial $f(x) = x^4 - 6x^3 - 26x^2 + 138x - 35$, if two of its zeros are $2 \pm \sqrt{3}$.
4. Find the zeros of polynomial $p(x) = 5\sqrt{5}x^2 + 30x + 8\sqrt{5}$, and verify the relationship between zeros and its coefficients.
5. If one zero of the polynomial $(k+1)x^2 - 5x + 5$ is multiplicative inverse of the other, then find the zeroes of $kx^2 - 3kx + 9$, where k is constant.
6. α, β, γ are zeros of cubic polynomial $px^3 - 5x + 9$. If $\alpha^3 + \beta^3 + \gamma^3 = 27$, find the value of p.
7. Find k so that $x^2 + 2x + k$ is a factor of $2x^4 + x^3 - 14x^2 + 5x + 6$. Also find all the zeroes of the two polynomials.

PREVIOUS YEARS BOARD QUESTIONS

1. Apply division algorithm to check if $g(x) = x^2 - 3x + 2$ is a factor of the polynomial $f(x) = x^4 - 2x^3 - x + 2$. **(AI 2019)**
2. Find the value of k such that the polynomial $x^2 - (k + 6)x + 2(2k - 1)$ has sum of its zeroes equal to half of their product. **(Delhi 2019)**
3. If $x = 3$ is one root of the quadratic equation $x^2 - 2kx - 6 = 0$, then find the value of k. **(2018)**
4. Find all zeroes of the polynomial $(2x^4 - 9x^3 + 5x^2 + 3x - 1)$ if two of its zeroes are $(2 + \sqrt{3})$ and $(2 - \sqrt{3})$. **(2018)**
5. If α and β are zeroes of $4x^2 - x - 4$, find quadratic polynomial whose zeroes are $\frac{1}{2}\alpha$ and $\frac{1}{2}\beta$. **(Board Term I, 2017)**

Pair of Linear Equations in Two Variables

3

LEVEL - I

1. Find whether the lines representing the following pair of linear equations intersect at a point, are parallel or coincident: $2x - 3y + 6 = 0$; $4x - 5y + 2 = 0$
2. Solve $2x + 3y = 11$ and $2x - 4y = -24$ and hence find the value of m for which $y = mx + 3$.
3. Solve the following pair of linear equations by substitution method: $2x - y = -10$; $-6x + 3y = 30$.
4. Solve the following pair of linear equations for x and y:

   $$2(ax-by)+(a+4b)=0,\ 2(bx+ay)+(b-4a)=0$$
5. A number consists of two digits. Where the number is divided by the sum of its digits, the quotient is 7. If 27 is subtracted from the number, the digits interchange their places, find the number.
6. For what value of p will the following pair of linear equations have infinitely many solution:

   $$(p-3)x + 3y = p;\quad px + py = 12$$
7. Find the value of α for which the following pair of equation has infinitely many solution:

   $$x - 4y - 9 = 0,\ 2x - \alpha y - 27 = 0$$
8. $\frac{x}{a}+\frac{y}{b}=2;\qquad ax-by=a^2-b^2$
9. Find the value of α and β for which the following pair of linear equations has finite number of solutions:

   $$2x + 3y = 7;\ 2\alpha x + (\alpha+\beta)y = 28$$
10. Solve for x and y: $\frac{148}{x}+\frac{231}{y}=\frac{527}{xy};\qquad \frac{231}{x}+\frac{148}{y}=\frac{610}{xy},\ x\neq y,\ y=0$

LEVEL - II

11. Solve for x and y using substitution method: $\frac{ax}{b}-\frac{by}{a}=a+b;\ ax-by=2ab$
12. A man travels 600 *km* partly by train and partly by car. It can take 8 hours and 40 minutes if he travels 320 *km* by train and the rest by car. It would take 30 minutes more if he travels 200 *km* by train and the rest by car. Find the speed of the train and car separately.

6. Solve for x and y. $3x + 2y = 2x + y + 3 - 4x + 3y - 3$.

7. One kilogram of tea and 4 kg of sugar together cost ₹ 220. If the price of sugar increase by 50% and the price of tea increases by 10%, the cost would be ₹ 266. Find the origina cost per kilogram of each.

8. Solve the following system of equations in x and y.

$$ax + by = 1$$

$$bx + ay = \frac{(a+b)^2}{a^2+b^2} - 1 \qquad \text{or} \qquad bx + ay = \frac{2ab}{a^2+b^2}$$

PREVIOUS YEARS BOARD QUESTIONS

1. Find the value of k for which the following pair of linear equations have infinitely many solutions: $2x + 3y = 7$, $(k + l)x + (2k - 1)y = 4k + 1$ **(Delhi 2019**

2. For what value of k, does the system of linear equations

$$2x + 3y = 7$$

$$(k - l)x + (k + 2)y = 3k$$

have an infinite number of solutions? **(AI 2019)**

3. 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. **(Delhi 2019)**

4. A part of monthly hostel charges in a college hostel are fixed and the remaining depends on the number of days one has taken food in the mess. When a student A takes food for 25 days, he has to pay ₹ 4,500, whereas a student B who takes food for 30 days, has to pay ₹ 5,200. Find the fixed charges per month and the cost of food per day. **(AI 2019)**

5. Three lines $3x + 5y = 15$, $6x - 5y = 30$ and $x = 0$ are enclosing a beautiful triangular park. Find the points of intersection of the lies graphically and the area of the park if all measurements are in km. What type of behaviour should be expected by public in this type of park? **(Board Term I, 2017)**

Quadratic Equations

4

LEVEL I

1. Two numbers differ by 3 and their product is 504. Find the numbers.
2. Solve for x:
$$\frac{1}{x+1}+\frac{2}{x+2}=\frac{4}{x+4}, \quad x\neq-1,-2,-4$$
3. Solve the following equation using by quadratic formula:
$$x^2+5x+5=0$$
4. Three consecutive positive integers are such that the sum of the square of the first and the product of the other two is 46, find the integers.
5. Solve the following equation by factorisation: $36x^2-60x+25=0$
6. If $2x^2-(2+k)x+k=0$, where k is a real number, find the roots of the equation.
7. Find the value of p so that the quadratic equation $px(x-3)+9=0$ has two equal roots.
8. Find the positive value of k, for which the equation $x^2+kx+64=0$ and $x^2-8x+k=0$ will both have real roots.
9. Solve the quadratic equation $2x^2+ax-a^2=0$ for x.
10. In the following determine whether the given values are solutions of the equation or not:
$$x^2+\sqrt{2}x-4=0; \qquad x=\sqrt{2}; x=-2\sqrt{2}$$

LEVEL II

11. A speed of a boat in still water is 11 *km/hour*. It can go 12 *km* upstream and return downstream to the original point in 2 hours 45 minutes. Find the speed of the stream.
12. Two water taps running together can empty a tank in $3\frac{1}{13}$ minutes. If the tap of larger diameter takes 3 minutes less than the other to empty the tank separately, find the time taken for each tap to empty the tank separately.
13. Solve for x : $2\left(\frac{2x-1}{x+3}\right)-3\left(\frac{x+3}{2x-1}\right)=5$, given that $x\neq-3, x\neq\frac{1}{2}$.
14. Solve the following for x : $\frac{1}{2a+b+2x}=\frac{1}{2a}+\frac{1}{b}+\frac{1}{2x}$

15. For what value of k, the given equation $(4-k)x^2 + (2k+4)x + (8k+1) = 0$ is a perfect square.

LEVEL III

16. If equation $x^2 - (2+m)x + (-m^2 - 4m - 4) = 0$ has coincident root, then find the value of m.
17. If the roots of the equation $(b-c)x^2 + (c-a)x + (a-b) = 0$ are equal, then prove that $2b = a + c$.
18. Sachin wishes to fit three rods together in the shape of a right triangle. The hypotenuse is to be 2 *cm* longer than the base and 4 *cm* longer than the altitude. What should be the lengths of the rods?
19. Find the value of p for which the quadratic equation:
$$(2p+1)x^2 - (7p+2)x + (7p-3) = 0$$
has equal roots. Also find the roots.
20. If α, β are roots of $x^2 + 5x + a = 0$ and $2\alpha + 5\beta = -1$, then find the value of a.

HIGHER ORDER THINKING SKILLS (H.O.T.S.)

1. Solve for x : $9x^2 - 9(a+b)x + (2a^2 + 5ab + 2b^2) = 0$.
2. A train takes 2 *hr*. less for a journey of 300 *km*. If its speed is increased by 5 *km/hr*. Find the usual speed of the train.
3. One fourth of a herd of camels was seen in the forest. Twice the square root of the herd had gone to mountains and remaining 15 camels were seen on the bank of a river. Find the total number of camels.
4. The product of digits of a two digit number is 18. When 63 is subtracted from the number, the digits interchange their places, find the number.
5. If $x = \sqrt{7 + 4\sqrt{3}}$, then find the value of $x^2 + \frac{1}{x^2}$.
6. One pipe can fill a cistern in $(x+2)$ hours and the other pipe can fill the same cistern in $(x+7)$ hours. If both the pipes, when opened together take 6 hours to fill the empty cistern, find the value of x
7. If the roots of the equation $x^2 + 2cx + ab = 0$ are real and unequal, prove that the equation $x^2 - 2(a+b)x + a^2 + b^2 + 2c^2 = 0$ has no real roots.
8. If the roots of the equation $(c^2 - ab)x^2 - 2(a^2 - bc)x + (b^2 - ac) = 0$ are equal, prove that either $a = 0$ or $a^3 + b^3 + c^3 = 3abc$.

PREVIOUS YEARS BOARD QUESTIONS

1. Two water taps together can fill a tank in $1\frac{7}{8}$ hours. The tap with longer diameter take 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. **(Delhi 2019**
2. A train travels 360 *km* at a uniform speed. If the speed had been 5 *km/hr* more, it would have taken 1 hr less for the same journey. Find the speed of the train. **(AI 2019**
3. Solve for x :
$$\frac{1}{a+b+x} = \frac{1}{a} + \frac{1}{b} + \frac{1}{x}; \quad a \neq b \neq 0, x \neq 0, x \neq -(a+b)$$ **(AI 2019**
4. For what values of k, the roots of the equation $x^2 + 4x + k = 0$ are real? **(Delhi 2019**
5. Find the value of k for which the roots of the equation $3x^2 - 10x + k = 0$ are reciprocal of each other. **(Delhi 2019**

Arithmetic Progression

5

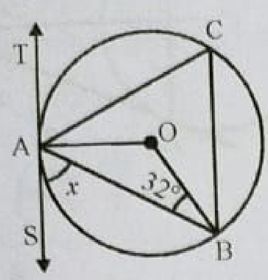
LEVEL I

1. For what value of p are $2p + 1$, 13, $5p - 3$ three consecutive terms of an A.P.?
2. Is –150 a term of the A.P. 17, 12, 7, 2, ... ?
3. In an A.P., the 24th term is twice the 10th term. Prove that the 36th term is twice the 16th term.
4. Write the n^{th} term of the A.P. $\frac{1}{m}, \frac{1+m}{m}, \frac{1+2m}{m}, \ldots\ldots\ldots$.
5. Find $a_{30} - a_{20}$ for the AP –9, –14, –19, –24, ...
6. The 8th term of an arithmetic progression is zero. Prove that its 38th term is triple of its 18th term.
7. In an AP, the sum of first n terms is $\frac{5n^2}{2} + \frac{3n}{2}$. Find its 20th term.
8. The sum of three numbers of an AP is 27 and their product is 405. Find the numbers.
9. For what value of k, are the numbers x, $2x + k$, and $3x + 6$ three consecutive terms of an AP.
10. The first and the last terms of an AP are 8 and 350 respectively. If its common difference is 9, how many terms are there and what is their sum?

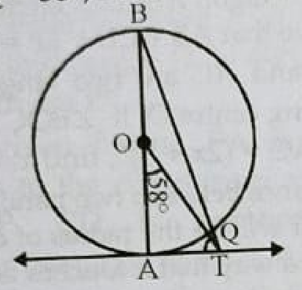
LEVEL II

11. The 2nd, 31st and the last term of an AP are $7\frac{3}{4}, \frac{1}{2}$ and $-6\frac{1}{2}$ respectively. Find the first term and the number of terms.
12. If the p^{th}, q^{th}, r^{th} terms of an A.P. be x, y, z respectively, show that $x(q-r) + y(r-p) + z(p-q) = 0$
13. The 8th term of an AP is half of its 2nd term and the 11th term exceeds one-third of its 4th term by 1. Find the 15th term.
14. An AP consists of 21 terms. The sum of three terms in the middle is 129 and of the last three is 237. Find the AP.
15. Along a road lies an odd number of stones placed at intervals of 10 metres. These stones have to be assembled around the middle stone. A person can carry only one stone at a time. A man carried the job with one of the end stones by carrying them in succession. In carrying all the stones he covered a distance of 3 km. Find the number of stones.

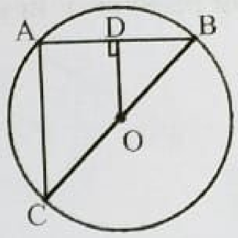
7. In the given figure, TAS is a tangent to the circle, with centre O, at the point A. If ∠OBA = 32°, find the value of x.



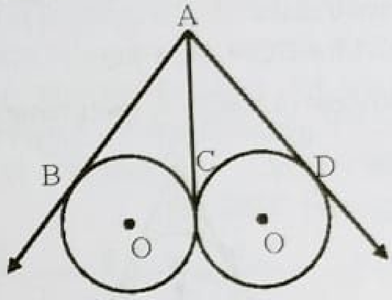
8. In figure, AB is the diameter of the circle with centre O and AT is a tangent. If ∠AOQ = 58°, Find ∠ATQ.



9. In the given figure, OD is perpendicular to the chord AB of a circle whose centre is O. If BC is a diameter, find $\frac{CA}{OD} = ?$

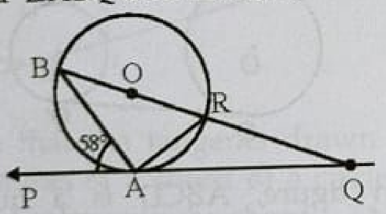


10. In the given fig., AB, AC and AD are tangents. If AB = 5 *cm*, find AD.

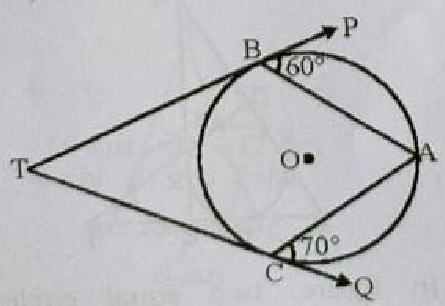


LEVEL II

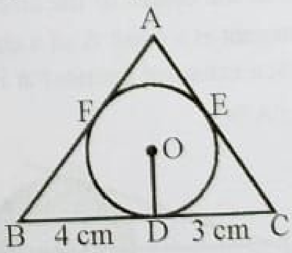
11. In figure, O is the centre of the circle, PQ is a tangent to the circle at A. If ∠PAB = 58°, find ∠ABQ and ∠AQB .



12. In the given figure, TBP and TCQ are tangents to the circle whose centre is O. Also ∠PBA = 60° and ∠ACQ = 70°. Determine ∠BAC and ∠BTC.



13. In figure, a triangle ABC is drawn to circumscribe a circle of radius 2 *cm* such that the segments BD and DC into which BC is divided by the point of contact D are the lengths 4 *cm* and 3 *cm* respectively. If area of ΔABC = 21cm^2, then find the lengths of sides AB and AC.



14. PQR is a right angled triangle right angled at Q. PQ = 5 *cm*, QR = 12 *cm*. A circle with cenre O is inscribed in ΔPQR, touching its all sides. Find the radius of the circle.

2. If the 17^{th} term of an A.P. exceeds its 10^{th} term by 7, find the common difference. **(AI 2019)**

3. In an AP, if the common difference $(d) = -4$, and the seventh term (a_7) is 4, then find the first term. **(2018)**

4. The sum of four consecutive numbers in an A.P. is 32 and the ratio of the product of the first and the last term to the product of two middle terms is 7 : 15. Find the numbers. **(2018)**

5. Find the sum of first 8 multiples of 3. **(2018)**