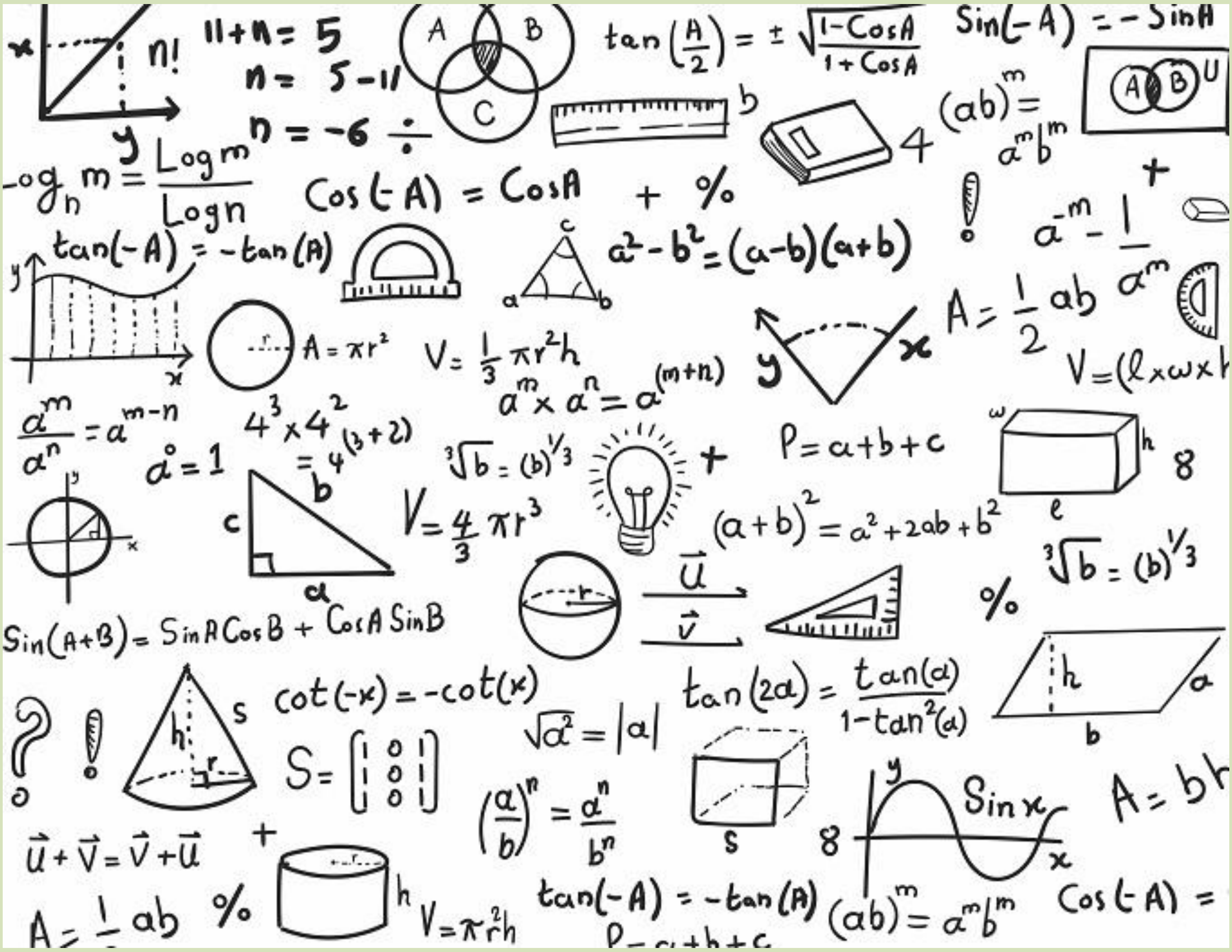
केन्द्रीय विद्यालय संगठन

KENDRIYA VIDYALAYA SANGATHAN

तत् त्वं पूषन् अपावृणु

केन्द्रीय विद्यालय संगठन

STUDENT SUPPORT MATERIAL



CLASS IX

MATHEMATICS

2021-22

STUDENT SUPPORT MATERIAL

Class -IX Mathematics

Session 2021-22

KENDRIYA VIDYALAYA SANGATHAN

NEW DELHI

यथा शिखा मयूराणां नागानां मणयो यथा।
तद्वद् वेदांगशास्त्राणां गणितं मूर्ध्नि संस्थितम्।।

(वेदांग ज्योतिष - ५)

(जिस प्रकार मोरों के सिर पर शिखा और नागों के सिर में मणि सर्वोच्च स्थान में होते हैं उसी प्रकार वेदांगशास्त्रों में गणित का स्थान सबसे उपर (मूर्धन्य) है।

इसी प्रकार,

बहुभिर्प्रलापैः किम्, त्रयलोके सचरारे।
यद् किंचिद् वस्तु तत्सर्वम्, गणितेन् बिना न हि ॥

— महावीराचार्य, गणितसारसंग्रह मे

(बहुत प्रलाप करने से क्या लाभ है ? इस चराचर जगत में जो कोई भी वस्तु है वह गणित के बिना नहीं है / उसको गणित के बिना नहीं समझा जा सकता)

STUDENT SUPPORT MATERIAL
CLASS – IX
Session :2021-2022

ADVISORS

- Mr. Nagendra Goyal, *Deputy Commissioner ,Delhi Region*
- Mr.Sanjit Kumar , Assistant Commissioner ,Delhi Region

CONVENER

- Mr. Vivek Kumar ,Vice-Principal ,Dr.Rajendra Prasad Kendriya Vidyalaya , President Estate, Content Developer

CONTENT DEVELOPMENT COMMITTEE

- Mr.Ram Mukesh Sharma (*TGT Maths – Delhi Region*)
- Mrs. Kalpana Bharti (*TGT Maths – Delhi Region*)
- Mrs. Geeta Arora (*TGT Maths – Delhi Region*)
- Mrs.Sapna Grover (*TGT Maths – Delhi Region*)
- Mrs Harpreet Kaur (*TGT Maths – Delhi Region*)
- Km. Sudha (*TGT Maths – Delhi Region*)
- Ms.Savita Singh (*TGT Maths – Delhi Region*)
- Ms. Priyanka Sharma (*TGT Maths – Delhi Region*)

SAMPLE PAPER FORMATION COMMITTEE

- Mr.Yogender Gyan (*TGT Maths – Delhi Region*)
- Mrs. Jyotsna Yadav (*TGT Maths – Delhi Region*)
- Ms. Renu Singh (*TGT Maths – Delhi Region*)
- Smt. Bharti Kumari (*TGT Maths – Delhi Region*)
- Sh. Naveen Bansal (*TGT Maths – Delhi Region*)
- Ms. Divya (*TGT Maths – Delhi Region*)

COMPILED AND COORDINATED BY

- Mrs. Swarn Lata Sharma (*TGT Maths – Delhi Region*)
- Mr.Aditya Narayan Mishra (*TGT Maths – Delhi Region*)

CLASS – IX
Session 2021-22
MATHEMATICS (CODE NO. 041)
SECOND TERM SYLLABUS

No.	UNIT NAME	CHAPTER	MARKS
I	**ALGEBRA**	POLYNOMIALS	**12**
II	**GEOMETRY**	QUADRILATERALS CIRCLES CONSTRUCTIONS	**15**
III	**MENSURATION**	SURFACE AREAS AND VOLUMES	**9**
IV	**STATISTICS& PROBABILITY**	PROBABILITY	**4**
	Total		**40**
	INTERNAL ASSESSMENT		**10**
	TOTAL		**50**

UNIT-ALGEBRA 1. POLYNOMIALS

Definition of a polynomial in one variable, with examples and counter examples. Coefficients of a polynomial, terms of a polynomial and zero polynomial. Degree of a polynomial. Constant, linear, quadratic and cubic polynomials. Monomials, binomials, trinomials. Factors and multiples. Zeros of a polynomial. Factorization of $ax^2 + bx + c$, $a \neq 0$ where a, b and c are real numbers, and of cubic polynomials using the Factor Theorem.

Recall of algebraic expressions and identities. Verification of identities and their use in factorization of polynomials.

$(x + y + z)^2 = x^2 + y^2 + z^2 + 2xy + 2yz + 2zx$

$(x \pm y)^3 = x^3 \pm y^3 \pm 3xy(x \pm y)$

$x^3 \pm y^3 = (x \pm y)(x^2 \mp xy + y^2$

UNIT-GEOMETRY

2. QUADRILATERALS

1. (Prove) The diagonal divides a parallelogram into two congruent triangles.
2. (Motivate) In a parallelogram opposite sides are equal, and conversely.
3. (Motivate) In a parallelogram opposite angles are equal, and conversely.
4. (Motivate) A quadrilateral is a parallelogram if a pair of its opposite sides is parallel and equal.
5. (Motivate) In a parallelogram, the diagonals bisect each other and conversely.

6. (Motivate) In a triangle, the line segment joining the mid points of any two sides is parallel to the third side and in half of it and (motivate) its converse.

3. CIRCLES

Through examples, arrive at definition of circle and related concepts-radius, circumference, diameter, chord, arc, secant, sector, segment, subtended angle.

1. (Prove) Equal chords of a circle subtend equal angles at the centre and (motivate) its converse.
2. (Motivate) The perpendicular from the centre of a circle to a chord bisects the chord and conversely, the line drawn through the centre of a circle to bisect a chord is perpendicular to the chord.
3. (Motivate) Equal chords of a circle (or of congruent circles) are equidistant from the centre (or their respective centres) and conversely.
4. (Motivate) The angle subtended by an arc at the centre is double the angle subtended by it at any point on the remaining part of the circle.
5. (Motivate) Angles in the same segment of a circle are equal.
6. (Motivate) The sum of either of the pair of the opposite angles of a cyclic quadrilateral is 180° and its converse.

4. CONSTRUCTIONS

1. Construction of bisectors of line segments and angles of measure 60˚, 90˚, 45˚ etc., equilateral triangles.
2. Construction of a triangle given its base, sum/difference of the other two sides and one base angle.

UNIT-MENSURATION 5. SURFACE AREAS AND VOLUMES

Surface areas and volumes of cubes, cuboids, spheres (including hemispheres) and right circular cylinders/cones.

UNIT-STATISTICS & PROBABILITY

6. PROBABILITY

History, Repeated experiments and observed frequency approach to probability. Focus is on empirical probability. (A large amount of time to be devoted to group and to individual activities to motivate the concept; the experiments to be drawn from real - life situations, and from examples used in the chapter on statistics).

MATHEMATICS
QUESTION PAPER DESIGN
CLASS – IX (2021-22)

Time: 90 Mins **Max. Marks: 80**

S. No.	Typology of Questions	Total Marks	% Weightage (approx.)
1	**Remembering:** Exhibit memory of previously learned material by recalling facts, terms, basic concepts, and answers. **Understanding:** Demonstrate understanding of facts and ideas by organizing, comparing, translating, interpreting, giving descriptions, and stating main ideas	22	55
2	**Applying:** Solve problems to new situations by applying acquired knowledge, facts, techniques and rules in a different way.	9	22.5
3	**Analysing :** Examine and break information into parts by identifying motives or causes. Make inferences and find evidence to support generalizations **Evaluating:** Present and defend opinions by making judgments about information, validity of ideas, or quality of work based on a set of criteria. **Creating:** Compile information together in a different way by combining elements in a new pattern or proposing alternative solutions	9	22.5
	Total	40	100

Table of Content

POLYNOMIALS

POLYNOMIALS:- Polynomials are **expressions with one or more terms with a non-zero coefficient**. In mathematics, a polynomial is an expression that consists of variables and coefficients, involving the operations of addition, subtraction, multiplication, and exponentiation of variables. The word "polynomial" contains two words, namely, “poly" and “nomials”. "Poly" means many, and "nomials" means terms. Hence an expression containing many terms is called polynomials, having variables and coefficients. A polynomial can have more than one term.

In the polynomial, each expression in it is called a term. Suppose $x^2 + 5x + 2$ is polynomial, then the expressions x^2, $5x$, and 2 are the terms of the polynomial.

Each term of a polynomial has a **coefficient**. So, in $x^2 + 5x + 2$, the coefficient of x^2 is 1, the coefficient of 5x is 5, and 2 is the coefficient of x^0

Constant Polynomial :-A polynomial having 0 as the degree of the polynomial is termed as zero or constant polynomial

$x^2 + 5x + 2$

Here 2 is called constant polynomial (As you can write $2= 2x^0$, you know $x^0 =1$)

The constant polynomial 0 is called the zero polynomial.

Linear Polynomial:-A polynomial with 1 as the degree of the polynomial is termed a linear polynomial.

Example:- $3y - 27$, $7z + 17/2$

Quadratic Polynomial:-A quadratic polynomial is a polynomial of degree 2, i.e, the highest exponent of the variable is 2.

Examples - $x^2 + 7x + 12$, $2m^2 - 5m + 32$, $8y^2 - 2$

Cubic Polynomial:-A cubic polynomial is a polynomial of degree 3, i.e, the highest exponent of the variable is 3.

Examples - $4y^3 - 8$, $x^3 + 5x^2 - 6x - 4$

Polynomials in One Variable:- Polynomials in one variable are those expressions in which there is only one variable present.

Some examples of polynomials in one variable are given below:

- $x^3 + 3x - 2$
- $3y^4 + 2y^2 - y + 1$

Degree of a polynomial:-The highest power of the variable in a polynomial is called the degree of the polynomial. For example, in the following equation: $x^5 + 2x + 4$, the degree of the polynomial is 5.

The degree of a non-zero constant polynomial is zero.

Zeroes of a Polynomial:- Zeroes of a polynomial p(x) is **real number 'a'** for which polynomial p(x) if p(a) = 0. In this case, a is also called a root.

E.g.: For equation

1.P(x)= x+2, Zero is -2 since P(-2)=0

2. P(x) = x^2-4, Zeroes are 2 & -2 since P(2)= P(-2)=0.

A non-zero constant polynomial has no zero.

Every real number is a zero of the zero polynomial.

Remainder Theorem:- Let p(x) be any polynomial of degree greater than or equal to one and let a be any real number. If p(x) is divided by the linear polynomial x – a, then the remainder is p(a).

Example:- Find the remainder when $P(x)=2x^2-5x-1$ is divided by $x-5$

Zero of x-5 is 5

So P(5)= 2x5x5-5x5-1

=24

The remainder is 24

Factor Theorem : If p(x) is a polynomial of degree n > 1 and a is any real number, then (i) x – a is a factor of p(x), if p(a) = 0, and (ii) p(a) = 0, if x – a is a factor of p(x).

Example:- check whether x-4 is a factor of P(x)= x^2-3x-4

Zero of x-4 is 4

So P(5)= 4x4-3x4-4 = 0

So x-4 is a factor.

Algebraic Identities

1. $(a + b)^2 = a^2 + 2ab + b^2$
2. $(a - b)^2 = a^2 - 2ab + b^2$
3. $a^2 - b^2 = (a + b)(a - b)$
4. $(x + a)(x + b) = x^2 + (a + b)x + ab$
5. $(x + a)(x - b) = x^2 + (a - b)x - ab$
6. $(x - a)(x + b) = x^2 + (b - a)x - ab$
7. $(x - a)(x - b) = x^2 - (a + b)x + ab$
8. $(a + b)^3 = a^3 + b^3 + 3ab(a + b)$
9. $(a - b)^3 = a^3 - b^3 - 3ab(a - b)$
10. $(x + y + z)^2 = x^2 + y^2 + z^2 + 2xy + 2yz + 2xz$
11. $(x + y - z)^2 = x^2 + y^2 + z^2 + 2xy - 2yz - 2xz$
12. $(x - y + z)^2 = x^2 + y^2 + z^2 - 2xy - 2yz + 2xz$
13. $(x - y - z)^2 = x^2 + y^2 + z^2 - 2xy + 2yz - 2xz$
14. $x^3 + y^3 + z^3 - 3xyz = (x + y + z)(x^2 + y^2 + z^2 - xy - yz - xz)$
15. $x^3 + y^3 = (x + y)(x^2 - xy + y^2)$
16. $x^3 - y^3 = (x - y)(x^2 + xy + y^2)$

POLYNOMIALS, MCQ (1 MARK EACH)

1. The degree of the polynomial $3x^3 - x^4 + 5x + 3$ is

   (a) –4 (b) 4 (c) 1 (d) 3

2. The degree of 3 is:

   (a) 0 (b) 1 (c) 2 (d) 3

3. The value of $p(t) = 2 + t + 2t^2 - t^3$ for p(2) is:

   (a) 4 (b) –4 (c) 6 (d) 7

4. Which are the zeroes of $p(x) = x^2 - 1$:

   (a) 1, –1 (b) – 1, 2 (c) –2, 2 (d) –3, 3

5. Without actual calculating the cubes the value of $28^3 + (-15)^3 + (-13)^3$ is:

   (a) 16380 (b) –16380 (c) 15380 (d) –15380

6. On dividing $x^3 + 3x^2 - 3x + 1$ by $x-1$ we get remainder:

   (a) 1 (b) 0 (c) – 1

   (d) 2

7. If $x + y + z = 0$ then $x^3 + y^3 + z^3$ is equal to

   a. 3xyz (b) – 3xyz (c) xy (d) –2xy

8. The factors of $3x^2 – x – 4$ are:
   (a) $(3x – 4)(x – 1)$ (b) $(3x – 4)(x + 1)$
   (c) $(3x + 4)(x – 1)$ (d) $(3x + 4)(x + 1)$
9. The number of zeroes of the polynomial
   $x^3+x– 3 – 3x^2$ is
   (a) 1 (b) 2 (c) 0 (d) 3
10. The value of 104 x 96 is:
   (a) 9984 (b) 9624 (c) 9980 (d) 9986

POLYNOMIALS, (2 MARKS EACH)

1. Simplify using identity:- $(2x – 5y)^3$
2. Find the value of $P(x) = (x – 1)(x + 1)$ for $x=1$.
3. If $x – 2$ is a factor of $x^3 – 3x +5a$, then find the value of a.
4. Write Zero and degree of the polynomial $p(x) = a^2x$, a □ 0
5. Give one example each of a binomial of degree 35, and of a monomial of degree 100.
6. Expand:- $(4a – 2b – 3c)^2$
7. Factorise: $1- 64x^3$
8. Using Remainder Theorem find the remainder, when $p(x)$ is divided by $g(x)$, where $p(x) = x^3 – 2x^2 – 4x – 1$, $g(x) = x + 1$
9. Verify whether 2 and 0 are zeroes of the polynomial $x^2 – 2x$
10. Solve using identity:- $a b^3 - a^3 b$

POLYNOMIALS, (3 MARKS EACH)

1. If polynomials $ax^3 + 3x^2 – 3$ and $2x^3 – 5x + a$, leaves the same remainder when each is divided by $x – 4$, find the value of a.
2. If both $x – 2$ and $x –1/2$ are factors of $px^2 + 5x + r$, show that $p = r$.
3. Simplify using identity :- $(x – 2y)^3 – (x + 2y)^3$
4. If $x + y = 12$ and $xy = 27$, find the value of $x^3 + y^3$.
5. Without actual division, prove that $2x^4 – 6x^3 +3x^2 +3x – 2$ is exactly divisible by $x^2 – 3x + 2$.
6. Factorise: $x^3 + 216y^3 + 8z^3 – 36xyz$
7. If $x + y + 2 = 0$, then find the value of $x^3 + y^3 + 8$.
8. Find the remainder when $x^3 – ax^2 + 6x – a$ is divided by $x – a$
9. Find the factors of polynomial, $P(x)= x^3 – 2x^2 – x + 2$.

10. Using suitable identity evaluate the following:
(i) 103^3 (ii) 101×102 (iii) 999^2

POLYNOMIALS, (5 MARKS EACH)

1. If (x + 2) and (x – 2) are factors of $ax^4 + 2x - 3x^2 + bx - 4$, then find the value of a+b.
2. Factorise:- $x^3 - 23x^2 + 142x - 120$.
3. Without actual division, prove that $2x^4 - 6x^3 + 3x^2 + 3x - 2$ is exactly divisible by $x^2 - 3x + 2$.
4. If the polynomials $2x^3 + ax^2 + 3x - 5$ and $x^3 + x^2 - 2x + a$ leave the same remainder when dividedby (x – 2), find the value of a. Also, find the remainder in each case.
5. Find the value of $x^3 + y^3 - 12xy + 64$, when $x + y = -4$
6. Without finding the cubes, factorise $(x - 2y)^3 + (2y - 3z)^3 + (3z - x)^3$
7. Verify : (i) $x^3 + y^3 = (x + y)(x^2 - xy + y^2)$ (ii) $x^3 - y^3 = (x - y)(x^2 + xy + y^2)$
8. Give possible expressions for the length ,breadth and height of a cuboid, in which its volume is given by$35y^2 + 13y - 12$
9. If $a + b + c = 5$ and $ab + bc + ca = 10$, then prove that $a^3 + b^3 + c^3 - 3abc = -25$.
10. If $x^3 + ax^2 + bx + 6$ has (x – 2) as a factor and leaves a remainder 3 when divided by (x – 3), findthe values of a and b.

POLYNOMIALS, (ASSERTION AND REASONING)

DIRECTION : In each of the following questions, a statement of Assertion is given followed by a corresponding statement of Reason just below it. Of the statements, mark the correct answer as

(a) Both assertion and reason are true and reason is the correct explanation of assertion.
(b) Both assertion and reason are true but reason is not the correct explanation of assertion.
(c) Assertion is true but reason is false.
(d) Assertion is false but reason is true.

Q1. Assertion : If $P(x) = -3x^7 + ax^2 + bx + 6$ is a polynomial, then its degree is 7.
Reason : Degree of a polynomial is the highest power of the variable in it.

Now mark the correct answer as

(a) Both assertion and reason are true and reason is the correct explanation of assertion.
(b) Both assertion and reason are true but reason is not the correct explanation of assertion.
(c) Assertion is true but reason is false.
(d) Assertion is false but reason is true.

Q2. Assertion : The expression $3x^4 - 4x^{3/2} + x + 6 = 2$ is not a polynomial because the term $-4x^{3/2}$ contains a rational power of x .
Reason : The highest exponent in various terms of an algebraic expression in one variable is called its degree.
Now mark the correct answer as
(a) Both assertion and reason are true and reason is the correct explanation of assertion.
(b) Both assertion and reason are true but reason is not the correct explanation of assertion.
(c) Assertion is true but reason is false.
(d) Assertion is false but reason is true.

Q3. Assertion : (x + 2) is a factor of $x^3 + 3x^2 + 5x + 6$ and of (2x+4) .
Reason : If p (x) be a polynomial of degree greater than or equal to one, then (x- a) is a factor of p (x), if p (a) = 0
Now mark the correct answer as
(a) Both assertion and reason are true and reason is the correct explanation of assertion.
(b) Both assertion and reason are true but reason is not the correct explanation of assertion.
(c) Assertion is true but reason is false.
(d) Assertion is false but reason is true.

Q4. Assertion : The degree of the polynomial (x-2)(x-3)(x-4) is 4.
Reason : The number of zeroes of a polynomial is the degree of that polynomial.
Now mark the correct answer as
(a) Both assertion and reason are true and reason is the correct explanation of assertion.
(b) Both assertion and reason are true but reason is not the correct explanation of assertion.
(c) Assertion is true but reason is false.
(d) Assertion is false but reason is true.

Q5. Assertion : If (p)= ax+ b , a # 0 is a linear polynomial, then x= -b/a is the only zero of p (x). Reason : A linear polynomial has one and only one zero.
Now mark the correct answer as
(a) Both assertion and reason are true and reason is the correct explanation of assertion.
(b) Both assertion and reason are true but reason is not the correct explanation of assertion.
(c) Assertion is true but reason is false.
(d) Assertion is false but reason is true.

MULTIPLE CHOICE QUESTIONS

Q1. If x + 1 is a factor of the polynomial $2x^2 + kx$, then the value of k is:
a. -3
b. 4
c. 2
d. -2
Ans : (d) 2

Q2. The coefficient of x^2 in $3x^3+2x^2-x+1$ is:
a. 1
b. 2
c. 3
d. -1
Ans : (b) 2

Q3. The degree of $4x^3-12x^2+3x+9$ is
a. 0
b. 1
c. 2
d. 3
Ans : (d) 3

Q4. 1+3x is a _________ polynomial.
a. Linear
b. Quadratic
c. Cubic
d. None of the above
Ans : (a) Linear

Q5. If $y^{97} + 97$ is divided by y + 1, the remainder is:
a. 0
b. 1
c. 95
d. 96
Ans : (d) 96

Q6. $x^2 – x$ is ________ polynomial.
a. Linear
b. Quadratic
c. Cubic
d. None of the above
Ans: (b) Quadratic

Q7. x^2-2x+1 is a polynomial in:
a. One Variable
b. Two Variables

c. Three variable
d. None of the above
Ans: (a) One Variable

Q8. The value of $p(t) = 2+t+2t^2-t^3$ when t=0 is
a. 2
b. 1
c. 4
d. 0
Ans : (a) 2

Q9. The zero of the polynomial f(x) = 2x+7 is
a. 2/7
b. -2/7
c. 7/2
d. -7/2
Ans : (d) -7/2

Q11. The value of $99^2 – 98^2$ is:
a. 1
b. 197
c. 187
d. 207
Ans : (b) 197

Q12. One of the factors of $(1 + 7x)^2 + (49x^2 – 1)$ is:
a. x – 7
b. 7 – x
c. 7x – 1
d. 14x
Ans : (d) 14x

Q13. What is the degree of a zero polynomial?
a. 0
b. 1
c. Any natural number
d, Not defined
Ans : (d) Not defined

Q14. If one factor of $5+8x-4x^2$ is (2x+1), then the second factor is
a. (5+2x)
b. (2x-5)
c. (5-2x)
d. –(5+2x)
Ans : (c) (5-2x)
Q15. Degree of polynomial p(x)=(x+2)(x-2) is
a. 2
b. 1

c. 0
d. 3
Ans : (a) 2

Q16. If a+b+c =0, then $a^3+b^3+c^3=$
a. abc
b. 3abc
c. 2abc
d. -3abc
Ans : (b) 3abc

Q17. If x=2, y=-1, them the value of $x^2+4xy+4y^2$ is
a. 0
b. 1
c. -1
d. 2
Ans : (a) 0

Q18. Factors of x^4-x^2-12 are
a. (x+2), (x-2), (x^2+3)
b. (x+3), (x-3), (x^2+2)
c. (x+2), (x-2), (x^2-3)
d. (x^2+2), (x^2-6)
Ans : (a) (x+2), (x-2), (x^2+3)

Q19. The polynomial $q(z) = z^3 - 4z + a$ when divided by the polynomial (z-3) leaves remainder 5. What is the value of a?
a. -10
b. -3
c. 3
d. 10
Ans : (a) -10

Q20. Which of the following identities can be used to factorize the expression $4x^2 – 19x + 16$?
a. $(x – a)^2 = x^2 – 2a + a^2$
b. $(x + a)^2 = x^2 + 2a + a^2$
c. $(x – a)(x – b) = x^2 – (a+b)x + ab$
d. $(x – a)^2 = x^2 – a^2$
Ans : (c) $(x – a)(x – b) = x^2 – (a+b)x + ab$

Q21. The volume of a cube is given by the expression $27x^3 + 8y^3 + 54x^2y+36y^2x$. What is the expression for the side length of the cube?
a. 3x+2y
b. 3x-2y
c. 9x-8y
d. 9x+8y
Ans : (a) 3x+2y

Q22. The zeroes of the polynomial $p(x) = x^2 – (2k+1)x + 16$ are positive integers. Given that *k* is an integer, which of these are equivalent to the polynomial?
a. $(x – 1)(x + 16)$
b. $(x – 1)(x – 16)$
c. $(x – 2)(x – 8)$
d. $(x – 4)(x – 4)$
Ans : (b) $(x – 1)(x – 16)$

Q23. Which of these identities can be used to find the value of the expression 97×103?
a. $(x – y)^2 = x^2 – 2y + y^2$
b. $(x + y)^2 = x^2 + 2y + y^2$
c. $(x + y + z)^2 = x^2 + y^2 + z^2 + 2xy +2yz + 2zx$
d. $(x – y)(x – y) = x^2 - y^2$
Ans : (d) $(x – y)(x – y) = x^2 - y^2$

Q24. Factorise $x^3 + 13x^2 + 32x + 20$
a. $(x + 1) (x + 2) (x + 10)$
b. $(x + 1) (x – 5) (x+1)$
c. $(x – 1) (x + 1) (x – 2)$
d. $(y – 1) (y + 1) (2y +1)$
Ans : (a) $(x + 1) (x + 2) (x + 10)$

Q25. Use suitable identities to find the following products : $(3x + 4) (3x – 5)$
a. $x^2 + 14x+40$
b. $x^2 – 2x – 80$
c. $9x^2 – x – 20$
d. None of the above
Ans : (c) $9x^2 – x – 20$

Q26. Expand using suitable identity $(x+2y+ 4z)^2$
a. $4x^2 + y^2 + z^2 – 4xy – 2yz + 4zx$
b. $x^2 + 4y^2 + 16z^2 + 4xy + 16yz + 8 zx$
c. $4x^2 + 9y^2 + 4z^2 – 12xy + 12yz – 8zx$
d. None of the above
Ans : (b)

Q27. Factorise $2x^2 + y^2 + 8z^2 – 2\sqrt{2}xy + 4\sqrt{2}yz – 8xz$
a. $(2x + 3y + 4z) (2x + 3y – 4z)$
b. $(- \sqrt{2}x + y + 2 \sqrt{2}z) (- \sqrt{2}x + y + 2 \sqrt{2}z)$
c. $(3x + y + z)(9x^2 + y^2 + z^2 – 3xy – yz – 3zx)$
d. $4k \times (3y + 5) \times (y – 1)$
Ans : (b) $(- \sqrt{2}x + y + 2 \sqrt{2}z) (- \sqrt{2}x + y + 2 \sqrt{2}z)$

Q28. Without actually calculating the cubes, find the value $(28)^3 + (- 15)^3 + (- 13)^3$
a. -16830
b. -16380
c. -1620
d. -1260

Ans : (d) -1260

Q29. A binomial of degree 20 in the following is:
a. 20x + 1
b. x/20 + 1
c. x^{20} +1
d. x^2+20
Ans : (c) x^{20} +1

Q30. If $x + y = 12$ and $xy = 27$, find the value of $x^3 + y^3$
a.765
b.865
c.756
d.568
Ans : (c) 756

ASSERTION AND REASON DIRECTION :
In each of the following questions, a statement of Assertion is given followed by a corresponding statement of Reason just below it. Of the statements, mark the correct answer as
a. Both assertion and reason are true and reason is the correct explanation of assertion.
b. Both assertion and reason are true but reason is not the correct explanation of assertion.
c. Assertion is true but reason is false.
d. Assertion is false but reason is true.

1.Assertion : If $f(x) = 3x^7 – 4x^6 + x + 9$ is a polynomial, then its degree is 7.
Reason : Degree of a polynomial is the highest power of the variable in it.
Ans : (a)

2. Assertion : The degree of the polynomial (x-2)(x-3)(x+4) is 4.
Reason : The number of zeroes of a polynomial is the degree of that polynomial.
Ans : (d) A

3. Assertion : If (X+1) is a factor of $f(x) = x^2+ax+2$, then a =- 3.
Reason : If (x-a) is a factor of p (X), if p (a) = 0.
Ans : (d)

4. . Assertion : If $f(x) = x^4+x^3- 2x^2 + x+ 1$ is divided by (x-1) , then its remainder is 2.
Reason : If p (x) be a polynomial of degree greater than or equal to one, divided by the linear polynomial(x -a) , then the remainder is p (-a)
. Ans : (c)

5.Assertion : (x+2) is a factor of $x^3 + 3x^2 + 5x+ 6$ and of (2x+4) .
Reason : If p (x) be a polynomial of degree greater than or equal to one, then (x-a) is a factor of p (x), if p (a) = 0
Ans : (a)

QUADRILATERALS

Key Concepts

(1) Sum of the angles of a quadrilateral is 360°.
(2) A diagonals of a parallelogram divides it into two congruent triangles.
(3) In a parallelogram
   (a) diagonals bisects each other.
   (b) opposite angles are equal.
   (c) opposite sides are equal
(4)A quadrilateral is a parallelogram if a pair of opposite sides is equal and parallel.
(5) Diagonals of a square bisects each other at right angles and are equal, and vice-versa.
(6) The line-segment joining the mid-points of any two sides of a triangle is parallel to the third side and is half of it.
(7) A line through the mid-point of a side of a triangle parallel to another side bisects the third
side.

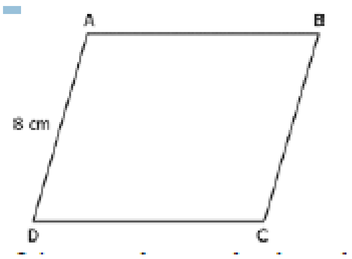
ONE MARK QUESTIONS

1. The angles of a quadrilateral are in the ratio 1: 2 : 3: 4. Find the largest angle.

2. If ABCD is a parallelogram, then what is the measure of ∠A – ∠C ?

3. Which of the following is NOT a property of a quadrilateral that is a parallelogram?
   a. Diagonals of a quadrilateral bisect each other
   b. A pair of adjacent sides of a quadrilateral is equal
   c. Each pair of opposite sides of a quadrilateral is equal
   d. Each pair of opposite angles of a quadrilateral is equal

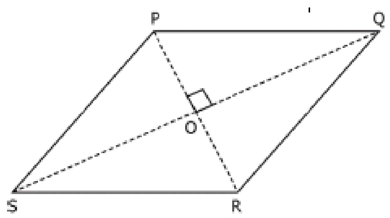
4. A parallelogram ABCD is shown below.



If the perimeter of the parallelogram is 36 cm, what is the length of AB?
a. 5 cm
b. 8 cm

c. 10 cm
d. 12 cm

5. In the parallelogram shown below, PR = 16 cm, PQ = 10 cm.



What is the length of the diagonal SQ?

a. 6 cm
b. 8 cm
c. 12 cm
d. 16 cm

6. The diagonals of a parallelogram ABCD ,intersect at O.If ∠BOC = 90° and ∠BDC = 50° , then ∠OAB is equal to

a. 40°
b. 50°
c. 10°
d. 90°

7. If the diagonals of a rhombus are 18 cm and 24 cm respectively, then its side is equal to

a. 16 cm
b. 15 cm
c. 20 cm
d. 17 cm

8. Name the quadrilateral formed by joining the mid-points of the sides of any quadrilateral ABCD.

9. PQRS is a square.PR and SQ intersect at O. State the measure of ∠POQ.

10. In ΔABC , E is the mid-point of median AD such that BE produced meets AC at F. If AC = 10.5 cm , then find the length of AF.

11. In a quadrilateral ABCD . ∠A + ∠C is 2 times ∠B + ∠D. If ∠A = 140° and ∠D= 60° , then find ∠B.

12. If the diagonals of a quadrilateral bisect each other at right angles, then name the quadrilateral.

13. Two consecutive angles of a parallelogram are $(x + 60)°$ and $(2x + 30)°$. What special name can you give to this parallelogram?

Directions: In the following questions , a statement of Assertion is given followed by a statement of Reason .Each of these questions also has four alternative choices,one of which is the correct answer. Select the correct option

14. Assertion: Two opposite angles of a parallelogram are $(3x -2)°$ and $(50 –x)°$.The measure of one of the angles is 37°.

Reason: Opposite angles of a parallelogram are equal.

(a) Assertion and reason are true and reason is the correct explanation of assertion.
(b) Both assertion and reason are true but reason is not the correct explanation of assertion.
(c) Assertion is true but reason is false
(d) Assertion is false but reason is true.

15. Assertion: In ΔABC , E and F are the mid points of AC and AB respectively. The altitude AP at BC intersects FE at Q. Then AQ=QP.

Reason: Q is the mid-point of AP.

(a) Assertion and reason are true and reason is the correct explanation of assertion.
(b) Both assertion and reason are true but reason is not the correct explanation of assertion.
(c) Assertion is true but reason is false
(d) Assertion is false but reason is true.

16. Assertion : If the angles of a quadrilateral are in the ratio 2:3 :7:6 ,then the measures of angles are 40°, 70° , 130°, 120°.

Reason:The sum of the angles of a quadrilateral is 360°.

(a) Assertion and reason are true and reason is the correct explanation of assertion.
(b) Both assertion and reason are true but reason is not the correct explanation of assertion.
(c)Assertion is true but reason is false
(d) Assertion is false but reason is true.

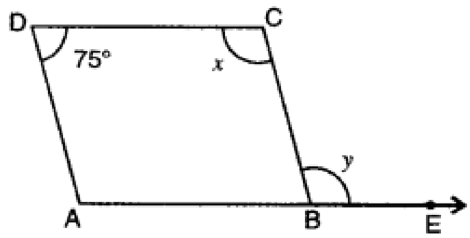
17. Assertion : A parallelogram consists of two congruent triangles.

Reason: Diagonal of a parallelogram divides it intotwo congruent triangles.

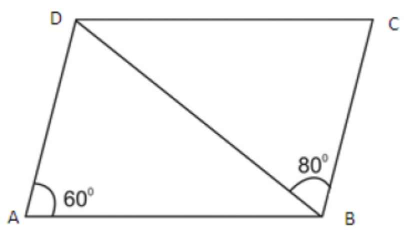
(a) Assertion and reason are true and reason is the correct explanation of assertion.
(b) Both assertion and reason are true but reason is not the correct explanation of assertion.
(c)Assertion is true but reason is false
(d) Assertion is false but reason is true

2 MARK QUESTIONS

1. ABCD is a parallelogram in which ∠ADC = 75° and side AB is produced to point E as shown in the figure. Find x + y.



2. In the adjoining figure, ABCD is a ||gm. If ∠DAB=60° and ∠DBC= 80° ,find ∠CDB



3. Prove that the diagonals of a parallelogram bisect each other.
4. ABCD is a rectangle in which diagonal AC bisects ∠A as well as ∠C . Show that ABCD is a square.

5. The angles of quadrilateral are in the ratio 2 : 4 : 5 : 7. Find the difference between the greatest and smallest angle of the quadrilateral.

6. Two adjacent angles of a parallelogram are in the ratio 4:5.Find all the angles of the parallelogram.

7. One of the diagonals of a rhombus is equal to the side of the rhombus. Find the angles of the rhombus.

8. Show that the diagonal divides a parallelogram into two congruent triangles.

9. In a rectangle, one diagonal is inclined to one of its sides at 25°. Measure the acute angle between the two diagonals.

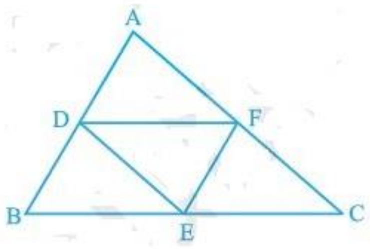
10. The perimeter of a parallelogram is 38 cm. If the longer side is 11 cm , find the length of shorter side.

11. In ΔABC , median AM is produced to D such that AM=MD. Prove that ABDC is a parallelogram.

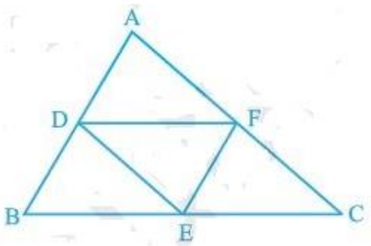
12. In a parallelogram ABCD, if AB =y+1, CD=2x+5 ,AD= y+5 and BC= 3x-4. Then find the ratio of AB:BC.

3 MARKS QUESTIONS

1. In a parallelogram , show that the angle bisectors of two adjacent angles intersect at right angles.
2. ABCD is a parallelogram and line segments AX , CY bisect the angles A and C respectively. Show that AX ∥ CY.
3. In ΔABC, D, E and F are respectively the mid-points of sides AB, BC and CA. Show that ΔABC is divided into four congruent triangles by joining D, E and F.

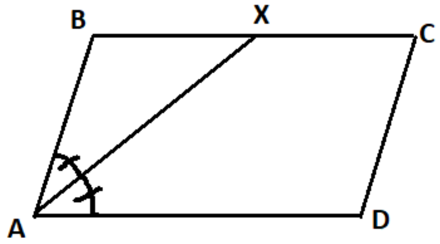


4. In the adjoining figure, D, E and F are mid-points of the sides BC, CA and AB of If AB = 6.2cm, BC = 5.6cm and AC = 4.6cm, find the perimeter of ΔDEF.



5. Prove that the bisector of any two consecutive angles of a parallelogram intersect at right angle.
6. Show that the figure obtained by joining the mid-points of the adjacent sides of a quadrilateral of a quadrilateral is a parallelogram.

7. In a parallelogram ABCD, the bisector of $\angle A$ also bisects BC at X. Prove that AD=2AB.



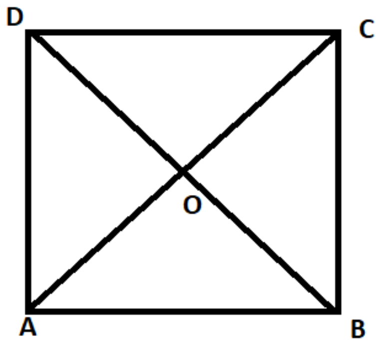
8. AD is a median of ΔABC and E is the mid-point of AD. BE produced to meet AC in F. Prove that AF= $\frac{1}{3}$ AC.
9. D, E and F are respectively the mid-points of sides BC, AC and AB respectively of an equilateral triangle ABC. Show that ΔDEF is also an equilateral triangle.
10. P is the mid point of side AB of a parallelogram ABCD. A line through B parallel to PD meets DC at Q and AD produced at R. Prove that (i) AR= 2BC (ii) BR= 2BQ

5 MARKS

1. The diagonals of a quadrilateral ABCD are perpendicular to each other. Show that the quadrilateral formed by joining the mid-points of its sides is a rectangle.
2. Prove that the bisectors of the angles of a parallelogram enclose a rectangle.

CASE BASED QUESTION

Rajan is studying in IX standard. His father purchased a plot which is in a square shape. After visiting the land, few questions came in his mind. Give answers to his questions by looking at the figure.



i) Measure of $\angle AOB$

a) 70° b) 80° c) 90° d) 100°

ii) If OA = 3 cm , then value of OC is

a) 6cm b) 3 cm c) 9cm d) 7cm

iii) Which is the correct congruence rule applicable to prove $\Delta ABO \cong \Delta ADO$

a) SSS b) SAS c) ASA d) AAS

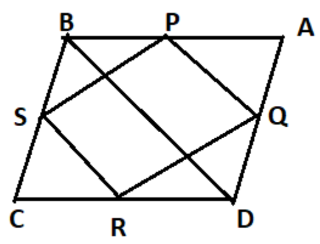
iv) If OB = 5cm ,then value of BD is

a) 10 cm b) 6 cm c)8cm d)12 cm

v) Which is the correct congruence rule applicable to prove $\Delta ABC \cong \Delta BAD$

a) SSS b) SSA c) ASA d) AAS

3. The class teacher of IX class gave students coloured papers made by recycling of waste products in shape of quadrilateral. She asked them to make a parallelogram from it using paper folding.



Then teacher ask them some questions .To answer these questions , choose the correct option.

i) How can a parallelogram be formed by using paper folding?

a) Joining the sides of quadrilateral
b) Joining the midpoints of sides of quadrilateral
c) Joining the vertices of quadrilateral
d) None of the above

ii) Which of the following is the correct condition?

a) PQ= BD
b) PQ= ½ BD
c) 3PQ=BD
d) PQ=2BD

iii) Which of the following is the correct condition?

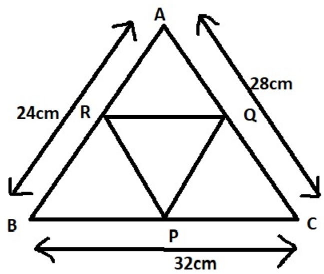
a) 2RS= BD
b) RS = 1/3BD

c) RS =BD
d) RS = 2BD

iv) Which of the following is correct condition.
a) PQ= 1/2 SR
b) PQ =SR
c) PQ= SR/3
d) 4PQ=SR

v) Write the formula to find the perimeter of quadrilateral PQRS
a) PQ +QR+RS+PS
b) PQ-QR-RS +PS
c) (PQ+QR+RS+PS)/2
d) (PQ+QR+RS+PS)/3

4. Practical knowledge is very useful for student to grow in his carrier. To improve the practical knowledge and awareness about social life directorate of education announces a visit in a Kendriya Vidyalaya. Girls are asked to prepare a rangoli in triangular shape as shown in figure.



Dimension of rangoli (ΔABC) are 24cm, 32cm and 28cm. Garland is to be placed along the side of ΔPQR, which is formed by joining the mid-points of sides of ΔABC. Some questions are arises about the above situation, answer the following questions

i) Find the length of RQ
a) 12cm b) 14cm c) 16cm d) 18cm

ii) Find the length of QP
b) 11cm b) 12cm c) 13cm d) 14cm

iii) Find the length of PR
c) 13cm b) 14cm c) 15cm d) 16cm

iv) Find the length of garland

d) 42cm b) 44cm c) 46cm d) 47cm

v) Write the formula to find the perimeter of ΔABC

a) (AB+BC+CA)/2 b) AB+BC+CA c) AB-BC+CA d) (AB+BC+CA)/3

ANSWER :

1. 144°
2. 0
3. option b
4. option c
5. option c
6. 40°
7. 15 cm
8. Parallelogram
9. 90°
10. 3.5cm
11. 60°
12. Rhombus
13. Rectangle
14. A
15. A
16. D
17. A

MULTIPLE CHOICE QUESTION

Q1. A rhombus can be a:

a. Parallelogram
b. Trapezium
c. Kite
d. Square
Ans : (d) Square

Q2. The diagonals of a parallelogram:

a. Equal
b. Unequal
c. Bisect each other
d. Have no relation
Ans : (c) Bisect each other

Q3. Perimeter of a parallelogram is 22 cm. If the longer side, measures 6.5 cm, the measure of the shorter side will be

a. 4.5 cm
b. 6.5 cm
c. 2.5 cm
d. 3.0 cm
Ans : (a) 4.5 cm

Q4. If ABCD is a Parallelogram with 2 Adjacent angles ∠A =∠B, then the parallelogram is a
a. Rhombus
b. Triangle
c. Rectangle
d. Square
Ans : (c) Rectangle

Q5. Which of the following is not a parallelogram?
a. Rectangle
b. Rhombus
c. Square
d. Trapezium
Ans : (d) Trapezium

Q6. Two angles of a quadrilateral are 50° and 80° and other two angles are in the ratio 8 : 15. Find the measure of the remaining two angles.
a. 100°, 130°
b. 140°, 90°
c. 80°, 150°
d. 70°, 160°
Ans : (c) 80°, 150°

Q7. If angles A, B, C and D of a quadrilateral ABCD, taken in order, are in the ratio 3 : 7 : 6 : 4, then ABCD is a
a. Rhombus
b. Parallelogram
c. Trapezium
d. Kite
Ans : (c) Trapezium

Q8. A diagonal of a rectangle is inclined to one side of the rectangle at 25°. The acute angle between the diagonals is
a. 55°
b. 50°
c. 40°
d. 25°
Ans : (b) 50°

Q9. ABCD is a rhombus such that ∠ABC = 40°, then ∠ADC is equal to
a. 40°
b. 45°
c. 50°
d. 20°

Ans : (a) 40°

Q10. The opposite angles of a parallelogram are (3x – 2)° and (50 – x)° the measure of these angles is _________.
a. 140°, 140°
b. 20°, 160°
c. 37°, 143°
d. 37°, 37°
Ans : (d) 37°, 37°

Q11. The sum of all the angles of a quadrilateral is equal to:
a. 180°
b. 270°
c. 360°
d. 90°
Ans : (c) 360°

Q12. The bisectors of any two adjacent angles of a || gm intersect at
a. 30°
b. 45°
c. 60°
d. 90°
Ans : (d) 90°

Q13. If one angle of a parallelogram is 24° less than twice the smallest angle, then the measure of the largest angle of a parallelogram is
a. 176°
b. 68°
c. 112°
d. 102°
Ans : (c) 112°

Q14. If the diagonal of a rhombus are 18 cm and 24 cm respectively, then its side is equal to
a. 16 cm
b. 15 cm
c. 20 cm
d. 17 cm
Ans : (b) 15 cm

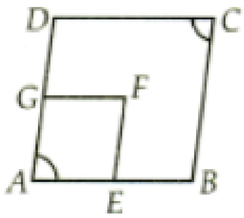
Q15. A diagonal of a parallelogram divides it into two congruent:
a. Square
b. Parallelogram
c. Triangles
d. Rectangle
Ans : (c) Triangles

Q16. ABCD is quadrilateral. If AC and BD are its diagonals then the
a. sum of the squares of the sides of the quadrilateral is equal to the sum of the squares of its diagonals.
b. perimeter of the quadrilateral is equal to the sum of the diagonals.
c. perimeter of the quadrilateral is less than the sum of the diagonals.
d. perimeter of the quadrilateral is greater than the sum of the diagonals.

Ans : (d) perimeter of the quadrilateral is greater than the sum of the diagonals.

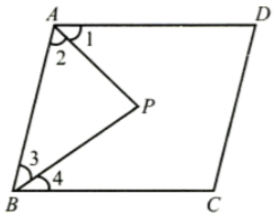
Q17. Two adjacent angles of a parallelogram are 2x+25 degree and 3x-5degree. The value of x is
a. 28degree
b. 32degree
c. 36degree
d. 42degree

Q18. In the following figure, ABCD and AEFG are two parallelograms. If∠ C = 55degree, find ∠F .



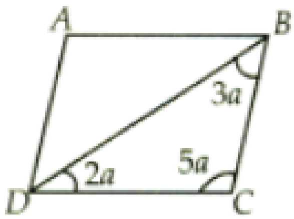
a. 65degree
b. 75degree
c. 85degree
d. 55degree

Q19. In the given figure, AP and BP are angle bisector of ∠A and ∠B which meets at P on the parallelogram ABCD. Then 2∠APB =



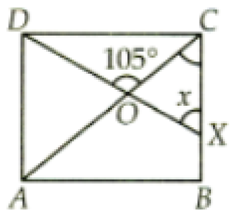
a. ∠ C+∠ D
b. ∠ A+∠ C
c. ∠ B+∠ D
d. 2 ∠ C

Q20. In the given figure, the measure of ∠ C is equal to



a. 90deg
b. 80deg
c. 75deg
d. 95deg
Ans : (a) 90deg

Q21. In the given figure, if ABCD is a square, the value of x is



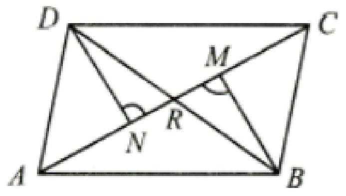
a. 45deg
b. 60deg
c. 70deg
d. 36deg
Ans : (b) 60deg

Q22. Which is not correct about rectangle EFGH ?
a. ∠ E=∠F=∠G=∠H = 90degree
b. EG= FH
c. EF= GH and HE= FG
d. EG and FH are perpendicular bisectors
Ans : (d) EG and FH are perpendicular bisectors

Q23. In a parallelogram ABCD, diagonals AC and BD intersect at O and AC = 12 8. cm and BD = 7 6. cm. The measure of OC and OD respectively are
a. 6.4 cm, 3.8 cm
b. 2.4 cm, 3.8 cm
c. 4.5 cm, 6.4 cm
d. 3.8 cm, 6.4 cm
Ans : (a) 6.4 cm, 3.8 cm

Q24. LMNO is a trapezium with LM NO z . If P and Q are the mid-points of LO and MN respectively and LM = 5 cm and ON = 10 cm then PQ =
a. 2.5 cm
b. 5 cm
c. 7.5 cm
d. 15 cm
Ans : (c) 7.5 cm

Q25. In quadrilateral ABCD, BM and DN are drawn perpendiculars to AC such that BM= DN . If BR = 8 cm, then BD is

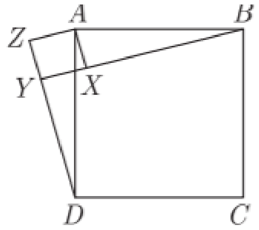


a. 4 cm
b. 2 cm
c. 12 cm
d. 16 cm
Ans : (d) 16 cm

Q26. A quadrilateral has three acute angles each measuring 70c. The measure of fourth angle is
a. 140deg
b. 150deg
c. 105deg
d. 120deg
Ans : (b) 150deg

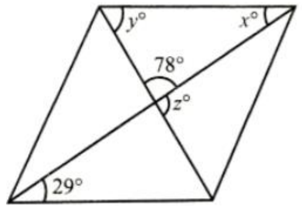
Q27. The length and breadth of a rectangle are in the ratio 4 : 3. If the diagonal measures 25 cm, then the perimeter of the rectangle is
a. 58 cm
b. 60 cm
c. 70 cm
d. 80 cm
Ans : (c) 70 cm

Q28. In figure X is a point in the interior of square ABCD. AXYZ is also a square. If DY = 3 cm and AZ = 2 cm, then BY =



a. 5 cm
b. 6 cm
c. 7 cm
d. 8 cm
Ans : (c) 7 cm

Q29. In the given figure is a parallelogram, find the values of x and y



a. 29deg 73 deg
b. 23deg 78 deg
c. 23deg 23 deg
d. 29 deg78 deg
Ans : (a) 29deg 73 deg

Q30. In a square ABCD, AB = (2x+3) cm and BC = (3x-5) cm. Then, the value of x is
a. 5
b. 7
c. 8
d. 10
Ans : (c) 8

ASSERTION AND REASON
DIRECTION :
In each of the following questions, a statement of Assertion is given followed by a corresponding statement of Reason just below it. Of the statements, mark the correct answer as
a. Assertion and reason are true and reason is the correct explanation of assertion.
b. Both assertion and reason are true but reason is not the correct explanation of assertion.
c. Assertion is true but reason is false.
d. Assertion is false but reason is true.

1. Assertion : Two opposite angles of a parallelogram are (3x-2)deg and (50-x)deg The measure of one of the angle is 37deg.
Reason : Opposite angles of a parallelogram are equal
Ans(a)

2. Assertion : The angles of a quadrilateral are x deg, (x-10) deg , (x+30)deg and (2x)deg , the smallest angle is equal to 58deg.
Reason : Sum of the angles of a quadrilateral is 360deg
Ans : (a)

3. Assertion : If the diagonals of a parallelogram ABCD are equal, then) ∠ ABC = 90deg.
Reason : If the diagonals of a parallelogram are equal, it becomes a rectangle.
Ans : (a)

4. Assertion : ABCD is a square. AC and BD intersect at O. The measure of) ∠ AOB = 90deg.
Reason : Diagonals of a square bisect each other at right angles.
Ans : (a)

5. Assertion : The consecutive sides of a quadrilateral have one common point.
Reason : The opposite sides of a quadrilateral have two common point.
Ans : (c)

6. Assertion : In TABC , median AD is produced to X such that AD= DX . Then ABXC is a parallelogram.
Reason : Diagonals AX and BC bisect each other at right angles.
Ans : (c)

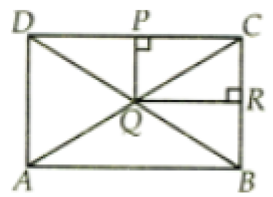
7. Assertion : If the angles of a quadrilateral are in the ratio 2 : 3 : 7 : 6, then the measure of angles are 40deg, 60deg, 140 deg,120 deg , respectively.
Reason : The sum of the angles of a quadrilateral is 360deg.

Ans : (a)

8. Assertion : A parallelogram consists of two congruent triangles.
Reason : Diagonal of a parallelogram divides it into two congruent triangles.

9. Assertion : In TABC , E and F are the midpoints of AC and AB respectively. The altitude AP at BC intersects FE at Q. Then, AQ= QP .
Reason : Q is the midpoint of AP.
Ans : (b)

10. Assertion : ABCD and PQRC are rectangles and Q is a midpoint of AC . Then DP= PC
Reason : The line segment joining the midpoint of any two sides of a triangle is parallel to the third side and equal to half of it.
Ans : (b)



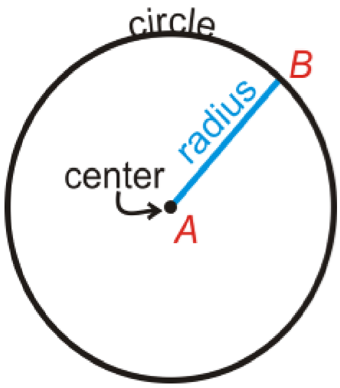
CIRCLES

Circles
Introduction to Circles

There are lot many objects in our life which are round in shape. Few examples are the clock, dart board, cartwheel, ring, Vehicle wheel, Coins, etc.

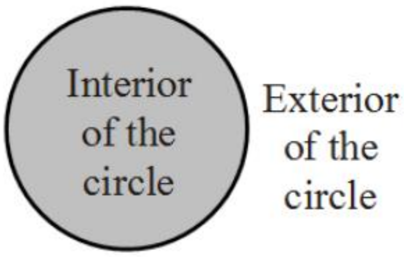
Circles

- Any closed shape with all points connected at equidistance from centre forms a **Circle**.
- Any point which is at equidistance from anywhere from its boundary is known as the **Centre of the Circle**.
- Radius is a Latin word which means 'ray' but in the circle it is the line segment from the centre of the Circle to its edge. So any line starting or ending at the centre of the circle and joining anywhere on the border on the circle is known as the **Radius of Circle**.



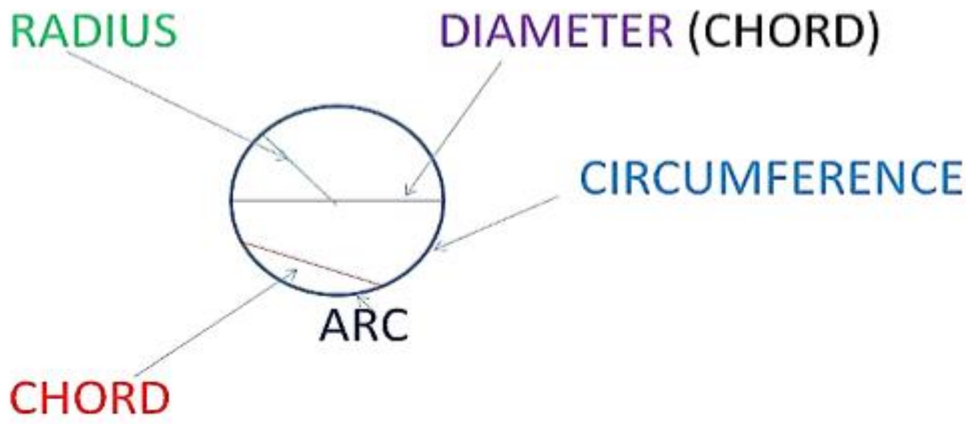
Interior and Exterior of a Circle

In a flat surface, the **interior of a circle** is the line whose distance from the centre is less than the radius.
The **exterior of a circle** is the line in the plane whose distance from the centre is larger than the radius.

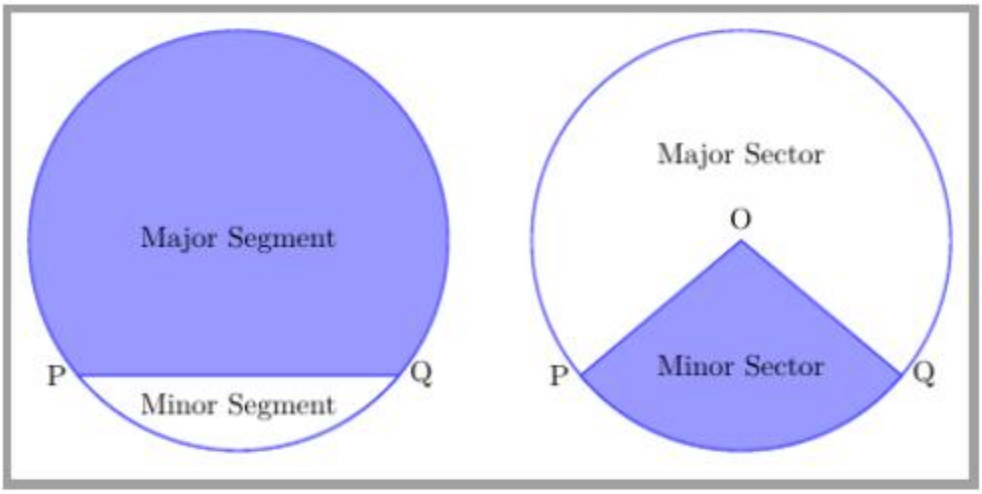


Terms related to circle

- **Chord:** Any straight-line segment that's both endpoints fall on the boundary of the circle is known as Chord. In Latin, it means 'bowstring'.
- **Diameter:** Any straight-line segment or Chord which passes through the centre of the Circle and its endpoints connects on the boundary of the Circle is known as the **Diameter of Circle**. So in a circle Diameter is the longest chord possible in a circle.
- **Arc:** Any smooth curve joining two points is known as **Arc**. So in Circle, we can have two possible Arcs, the bigger one is known as **Major Arc** and the smaller one is known as **Minor Arc**.
- **Circumference:** It is the length of the circle if we open and straightened out to make a line segment.

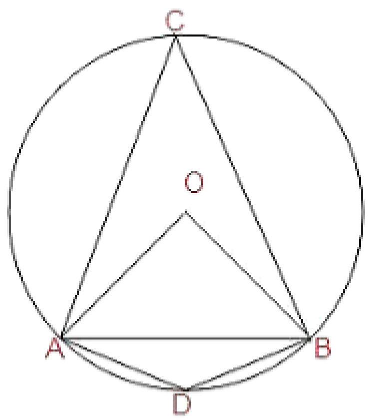


Segment and Sector of the Circle
A segment of the circle is the region between either of its arcs and a chord. It could be a major or minor segment.
Sector of the circle is the area covered by an arc and two radii joining the centre of the circle. It could be the major or minor sector.



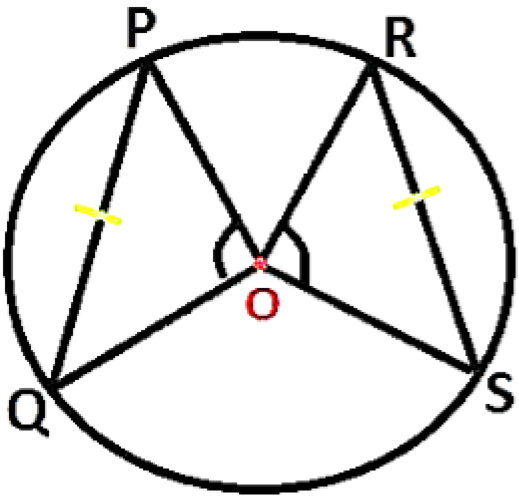
Angle Subtended by a Chord at a Point

If in a circle AB is the chord and is making ∠ACB at any point of the circle then this is the angle subtended by the chord AB at a point C.



Likewise, ∠AOB is the angle subtended by chord AB at point O i.e. at the centre and ∠ADB is also the angle subtended by AB at point D on the circle.

Theorem 1: Any two equal chords of a circle subtend equal angles at the centre.



Here in the circle, the two chords are given and PQ = RS with centre O.

So OP = OS = OQ = OR (all are radii of the circle)

$\Delta POQ \cong \Delta SOR$

$\angle POQ = \angle SOR$

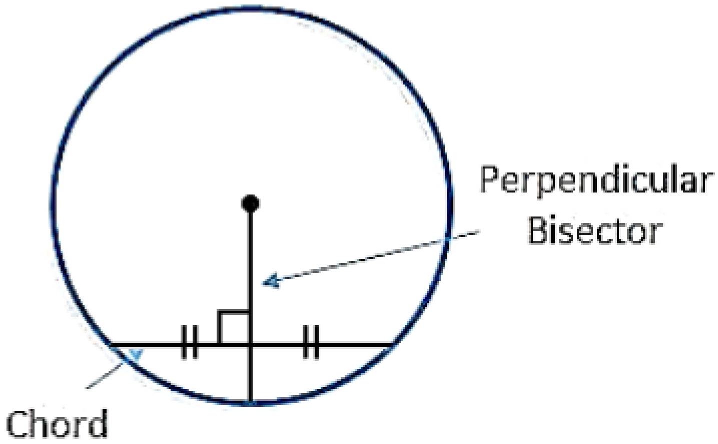
This shows that the angles subtended by equal chords to the centre are also equal.

Theorem 2: **If the angles made by the chords of a circle at the centre are equal, then the chords must be equal**.

This theorem is the reverse of the above Theorem 1.

Perpendicular from the Centre to a Chord

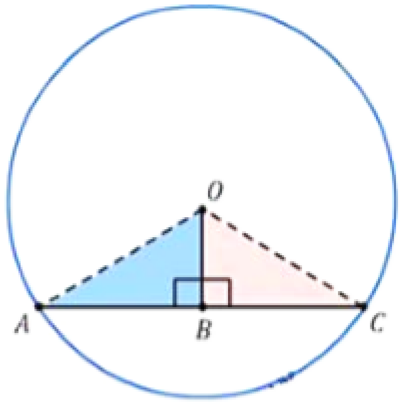
Theorem 3: If we draw a perpendicular from the centre of a circle to any chord then it bisects the chord.



If we draw a perpendicular from the centre to the chord of the circle then it will bisect the chord. And the bisector will make 90° angle to the chord.

Theorem 4: The line which is drawn from the centre of a circle to bisect a chord must be perpendicular to the chord.

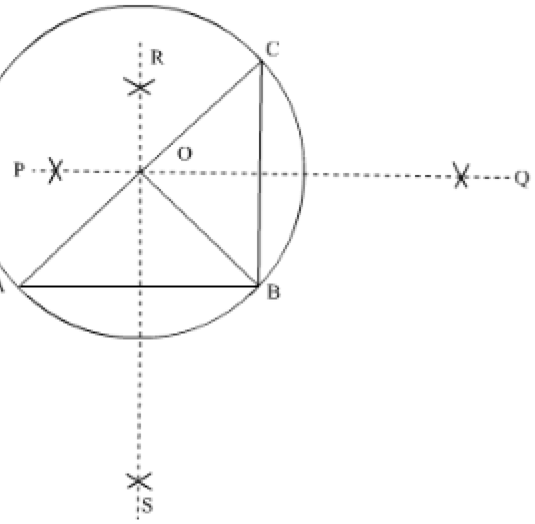
If we draw a line OB from the centre of the circle O to the midpoint of the chord AC i.e. B, then OB is the perpendicular to the chord AB.



If we join OA and OC, then
In ΔOBA and ΔOBC,
AB = BC (B is the midpoint of AC)
OA = OC (Both are the radii of the same circle)
OB = OB (same side)
Hence, ΔOBA ≅ ΔOBC (both are congruent by SSS congruence rule)
⇒ ∠OBA = ∠OBC (respective angles of congruent triangles)
∠OBA + ∠OBC = ∠ABC = 180° [Linear pair]
∠OBC + ∠OBC = 180° [Since ∠OBA = ∠OBC]
2 x ∠OBC = 180°
∠OBC = 90°
∠OBC = ∠OBA = 90°
∴ OB ⊥ AC

Circle through Three Points

Theorem 5: There is one and only one circle passing through three given non-collinear points.



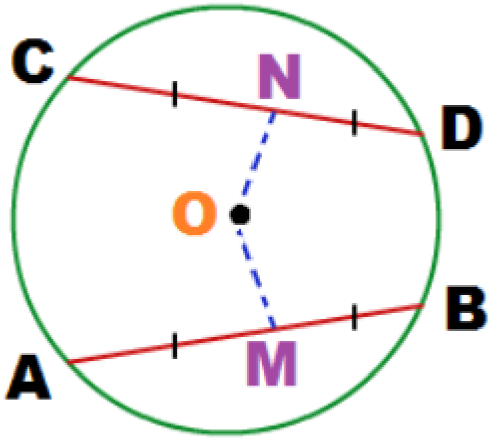
In this figure, we have three non-collinear points A, B and C. Let us join AB and BC and then make the perpendicular bisector of both so that RS and PQ the perpendicular bisector of AB and BC respectively meet each other at Point O.

Now take the O as centre and OA as the radius draw the circle which passes through the three points A, B and C.

This circle is known as **Circumcircle**. Its centre and radius are known as the **Circumcentre** and **Circumradius**.

Equal Chords and Their Distances from the Centre

Theorem 6: Two equal chords of a circle are at equal distance from the centre.

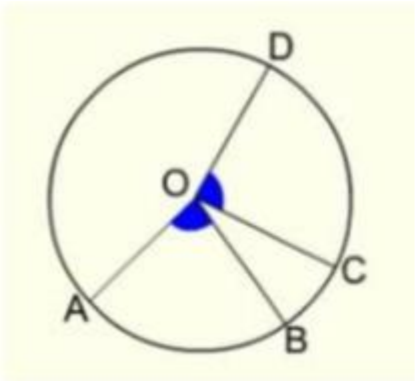


AB and CD are the two equal chords in the circle. If we draw the perpendicular bisector of these chords then the line segment from the centre to the chord is the distance of the chord from the centre.If the chords are of equal size then their distance from the centre will also be equal.

Theorem 7: Chords at equal distance from the centre of a circle are also equal in length.
This is the reverse of the above theorem which says that if the distance between the centre and the chords are equal then they must be of equal length.

Angle Subtended by an Arc of a Circle

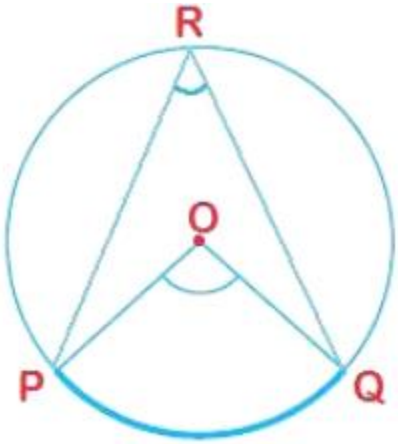
The angle made by two different equal arcs to the centre of the circle will also be equal.



There are two arcs in the circle AB and CD which are equal in length.

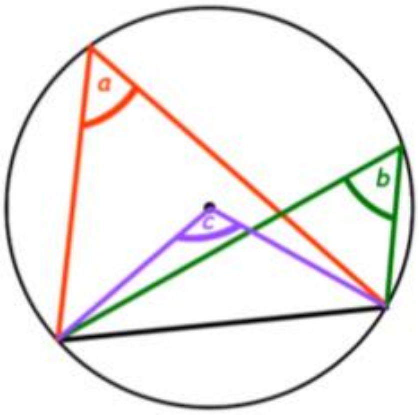
So ∠AOB = ∠COD.

Theorem 8: The angle subtended by an arc at the centre is twice the angle subtended by the same arc at some other point on the remaining part of the circle.



In the above figure ∠POQ = 2∠PRQ.

Theorem 9: Angles from a common chord which are on the same segment of a circle are always equal.



If there are two angles subtended from a chord to any point on the circle which are on the same segment of the circle then they will be equal.

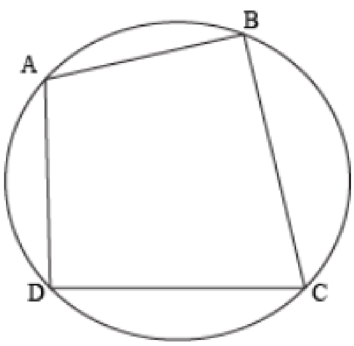
∠a = (1/2) ∠c

∠b = (1/2) ∠c

∠a = ∠b

Cyclic Quadrilaterals

If all the vertex of the quadrilateral comes on a circle then it is said to be a cyclic quadrilateral.



Theorem 10: Any pair of opposite angles of a cyclic quadrilateral has the sum of 180º.

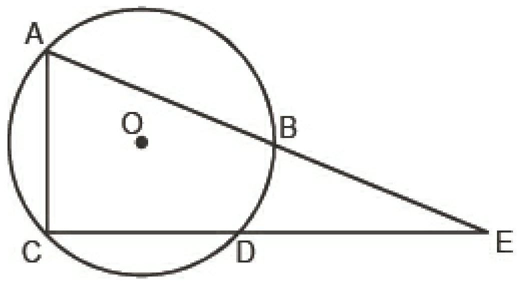
$\angle A + \angle B + \angle C + \angle D = 360^\circ$ (angle sum property of a quadrilateral)

$\angle A + \angle C = 180^\circ$

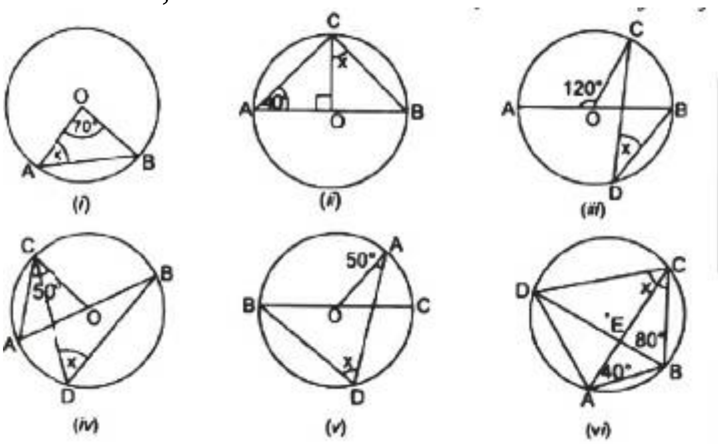
$\angle B + \angle D = 180^\circ$

Important Question

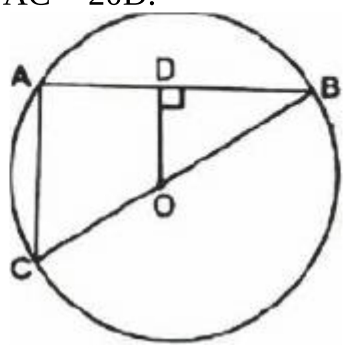
1. In the figure, OD is perpendicular to chord AB of a circle whose centre is O. If BC is a diameter; prove that CA = 2OD.
2. l is a line intersecting two concentric circles having common centre O, at A, B, C and D. Prove that AB = CD.
3. AB and CD are equal chords of a circle whose centre is O. When produced, these chords meet at E. Prove that EB = ED.



4. If O be the centre of the circle, find the value of x in each of the following figures.



5. Prove that equal chords of a circle subtend equal angles at the centre.
6. The line drawn through the centre of a circle to bisect a chord is perpendicular to the chord. Prove it.
7. Prove that equal chords of a circle (or congruent circles) are equidistant from the centre (or centres).
8. In the figure, OD is perpendicular to the chord AB of a circle with centre O. If BC is a diameter, show that AC || OD and AC = 20D.



Hint: ∴ OD ⊥ AB therefore; D is the mid-point of AB.
9. If two intersecting chords of a circle make equal angles with the diameter passing through their point of intersection, prove that the chords are equal.
10. Show that the angles in the same segment of a circle are equal.

CONSTRUCTIONS

INTRODUCTION

GEOMETRICAL CONSTRUCTIONS - Geometrical construction is the process of drawing a geometrical figure using only two instruments ,an ungraduated ruler also called a straight edge and a compass.In constructions where measurements are also required , graduated scale and protractor may be used.

KEY POINTS

1) **Basic Constructions** – In Basic consructions we will construct bisector of given angles,perpendicular bisector of a given line segment and angles of 30 °,45 °,60 °,90 ° also the angles which are multiples of 15 and 7.5 using compass and straight edge only with justification of all consructions.
2) **Some constructions of triangles** - In this section we will construct equilateral triangle . Also we learn how to construct a triangle when :-
   (i) Given it's base,a base angle and sum of other two sides
   (ii) Given it's base ,a base angle and difference of other two sides

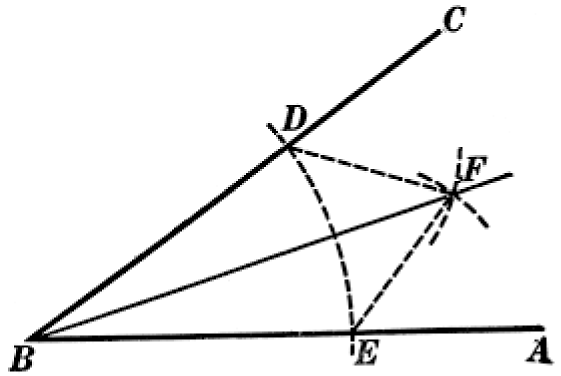
   In this chapter we will learn how to draw accurate and scaled drawing ,so we must have proper geometrical instruments like

   (i) A graduated scale (to draw or measure line segments)
   (ii) A protractor (to measure and draw angles which can not be drawn with the help of compass and straight edge only)
   (iii) A compass,a sharpen pencil and eraser

BASIC CONSRUCTIONS

1) To construct the bisector of a given angle :-

Given an angle ABC ,we want to construct it's bisector



Steps of construction:-

(i)Place compass point on the vertex of the angle (point B)

(ii)Taking B as centre draw an arc which cuts arms of angle ABC at point D and E.

(iii)Now taking D and E as centres draw arcs with same radius ,which intersect at point F.

(iv)Join BF .BF is the angle bisector of $\angle ABC$

Justification :-

Join DF and EF

In ΔBDF and ΔBEF

BD = BE (radii of same arc)

DF = EF (radii of same arc)

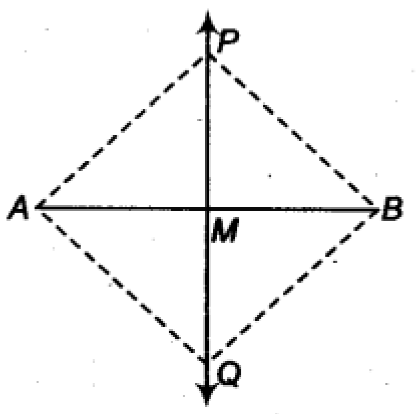
BF = BF (common)

Therefore, $\Delta BDF \cong \Delta BEF$ (SSS)

So , $\angle DBF = \angle EBF$(CPCT)

2) To construct the perpendicular bisector of a given line segment

Given line segment AB we want to construct it's perpendicular bisector.



Steps of constructions :-

(i)Taking A and B as centres draw arcs with radius more then 1/2 AB on both sides of line segment AB

(ii) Let these arcs intersect each other at point P and Q

(iii)Join PQ which intersect AB at point M.

(iv)Line PMQ is required perpendicular bisector.

Justification:-

Join AP,AQ,BP and BQ.

In ΔAPQ and ΔBPQ

AP = BP (radii of equal arcs)

AQ = BQ (radii of equal arcs)

PQ = PQ (common)

Therefore $\Delta APQ \cong \Delta BPQ$ (SSS)

So, $\angle APQ = \angle BPQ$ (CPCT)

Or $\angle APM = \angle BPM$ --- (1)

Now in Δ APM and Δ BPM

AP =BP (radii of equal arcs)

$\angle APM = \angle BPM$ by (1)

PM =PM (common)

So , $\Delta APM \cong \Delta BPM$ (SAS)

Therefore , AM = BM (CPCT)

Also $\angle AMP = \angle BMP$ (CPCT) ---- (2)

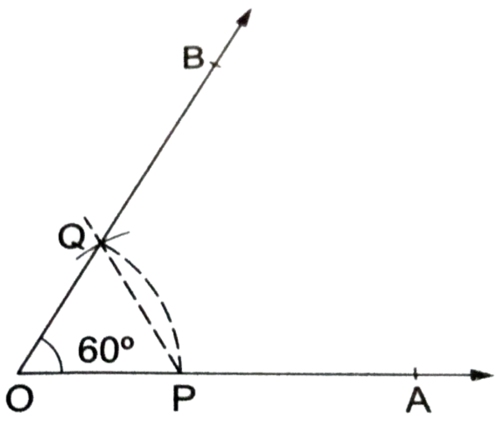
Now $\angle AMP + \angle BMP = 180°$ (Linear Pair) --- (3)

By (2) and (3) we get $\angle AMP = \angle BMP = 90°$

Therefore, PMQ is the perpendicular bisector of line segment AB.

3) To construct an angle of 60 °

Let OA is a ray with initial point O.We want to construct $\angle AOB = 60°$



Steps of construction :-

(i)Taking O as centre draw an arc of some radius which intersect OA at point P .

(ii)Taking P as centre draw an arc with same radius which intersect the initial arc at point Q (iii)Join OQ and extend the line OQ to point B

(iv)$\angle AOB$ is the required angle of 60 °

Justification ;-

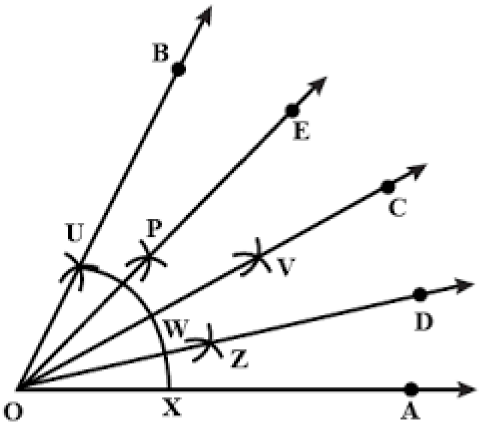
In Δ OPQ , OP = OQ = PQ

Therefore OPQ is an equilateral triangle with each of it's angle equal to 60 °

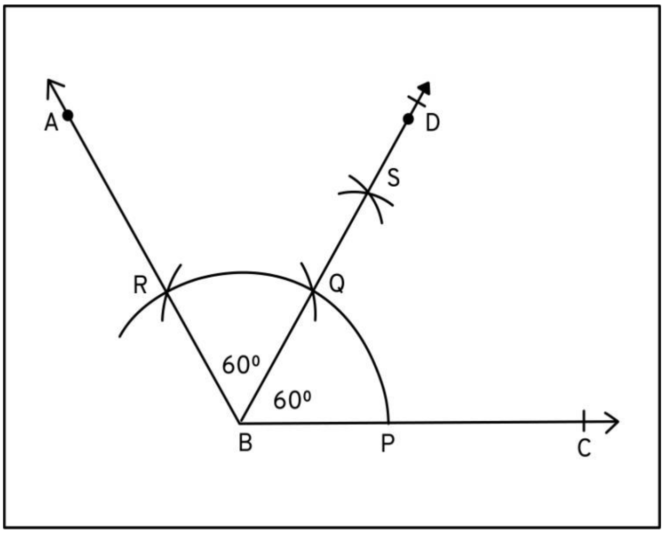
So , ∠ POQ = 60 ° or ∠ AOB = 60°

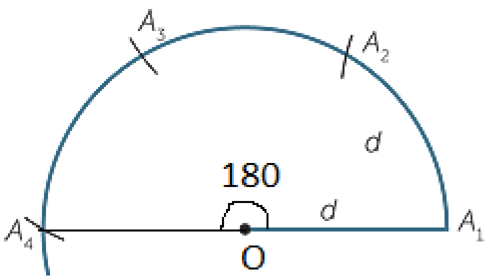
NOTE -

Now, if we bisect this angle of 60°, we will get angle of 30° and by bisecting 30° we will get angle of 15° ,By bisecting 15° we will get angle of 7.5°



(4)To construct angle of 120° and 180°





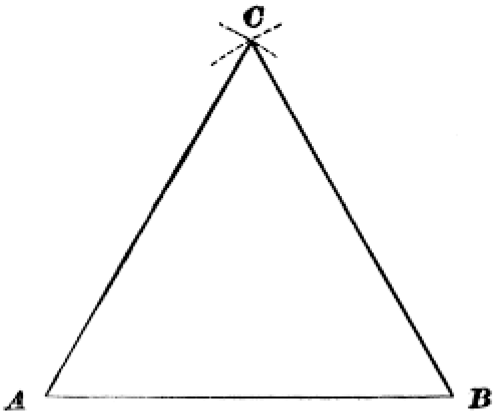
To construct angle of 120° ,we first construct angle of 60° like in above figure, ∠DBC= 60° ,then taking Q as centre if we cut another arc with same radius (BP),which cuts initial arc at R.Now we get ∠RBC = 120° (60°+60°)

Similarly ,If we draw another arc of same radius (BP) taking R as centre we will get angle of 180° (60°+ 60°+60°)

So ,if we know how to construct initial angles of 60° ,120° and 180° with construction of angle bisector ,then we can construct all angles which are multiples of 15° or 7.5° with the use of only compass and straight edge.

<u>SOME CONSTRUCTIONS OF TRIANGLES:-</u>

1) To construct an equilateral triangle when it's side is given



Steps of construction:-

(i)Draw a line segment AB of given length.AB = side of equilateral triangle

(ii)Taking A and B as centres draw arcs of radius equal to AB on same side of AB.

(iii)Let both arcs intersect at point C.Join AC and BC.

(iv) Δ ABC is required equilateral triangle.

Justification:-

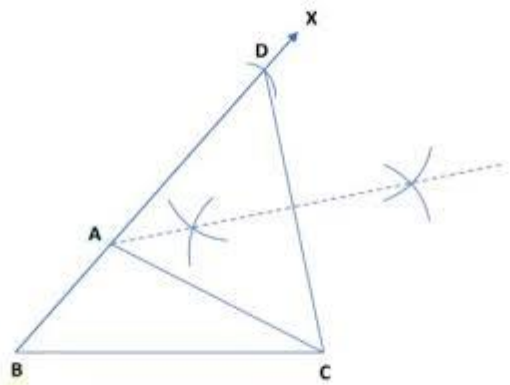
In Δ ABC

AB = BC = AC (radii of equal arcs)

So Δ ABC is an equilateral triangle.

2) To construct a triangle when given it's base, a base angle and sum of other two sides

Given the base BC,a base angle say∠ B and sum AB + AC,we have to construct Δ ABC



Steps of construction :-

(i)Draw line segment BC of given length.

(ii)Construct ∠XBC of given measure at vertex B.

(iii)Taking B as centre draw an arc of radius equal to sum of other two sidesAB + AC (say a) ,which intersect XB at point D.So BD = a (iv)Join DC and draw perpendicular bisector of line segment DC,which intersect XB at point A.Join AC.

(v)Δ ABC is required triangle.

Justification:-

Point A lies on perpendicular bisector of DC ,therefore

AD = AC -------- (1)

Now In Δ ABC ,BC and B are drawn as given ,

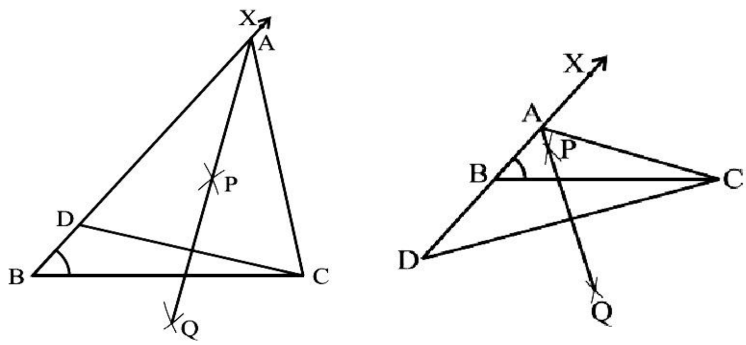
BD = a = AB + AD (in figure)

or a = AB + AC by (1)

3) To construct a triangle, given it's base ,a base angle and difference of other two sides

Case I :- Given base BC,B and AB – AC (AB > AC)

Case II :- Given base BC,B and AC – AB (AC > AB)



Case I Case II

Case I

Steps of construction :-

(i) Draw line segment BC of given length.

(ii) Construct ∠XBC of given measure at vertex B

(iii)Taking B as centre draw an arc of radius equal to difference of other two sides AB – AC (say a) ,which intersect XB at point D.So BD = a (iv)Join DC and draw perpendicular bisector of line segment DC,which intersect XB at point A.Join AC.

(v)Δ ABC is required triangle. Justification:-

Point A lies on perpendicular bisector of DC ,therefore

AD = AC -------- (1)

Now In Δ ABC ,BC and B are drawn as given ,

BD = a = AB – AD (in figure)

or a = AB – AC by (1)

Case II :-

Steps of construction :-

(i) Draw line segment BC of given length.

(ii) Construct ∠XBC of given measure at vertex B and produce XB .

(iii)Taking B as centre draw an arc of radius equal to difference of other two sides AC – AB (say a) ,which intersect XB produced at point D.So BD = a
(iv)Join DC and draw perpendicular bisector of line segment DC,which intersect XB at point A.Join AC. (v)Δ ABC is required triangle. Justification:-

Point A lies on perpendicular bisector of DC ,therefore

AD = AC -------- (1)

Now In Δ ABC ,BC and B are drawn as given ,

BD = a = AD – AB (in figure)

or a = AC – AB by (1)

PRACTICE QUESTIONS

1 MARKER QUESTIONS :

1) Is it possible to construct angle of 27° using ruler and compass only?
2) Can we construct angle of 52.5° using ruler and compass only?
3) Draw an angle of 67.5° using ruler and compass only.
4) Draw an angle of 100°with the help of protractor and bisect it.
5) Draw a line segment of length 6.9 cm and draw perpendicular bisector of it.
6) To construct a Δ PQR in which PQ + PR = 8cm and ∠ B = 30°, can you take QR = 4cm?
7) Construct a right angle using ruler and compass only.
8) A unique triangle can be constructed when it's three .... are known. .(sides /angles)
9) A triangle can be constructed when sum of any two sides is .... than third side.(less/greater)
10) An equilateral triangle has it's .... sides equal.(two/three)

2 MARKER QUESTIONS :

1)Draw an obtuse angle.Bisect it.

2)Draw a line segment of length 7.4 cm .Divide it into four equal parts.

3)Draw a line segment of length 10.4 cm .Bisect it and measure the length of each part.

4)Construct an equilateral triangle of side 4.5 cm.

5) Construct an angle of 45° and bisect it.

6)Draw an angle of 50° and divide it into four equal parts.

7)Using protractor draw an angle of 84°.With this angle as given draw an angle of 42°.

8)What do you mean by perpendicular bisector of given line segment.

9)What do you mean by angle bisector of a given angle.

10)Draw angle of 60° with rular and compass only and justify it.

3 MARKER QUESTIONS :

1) Draw a line segment of length 6.8 cm. Construct it's perpendicular bisector and justify your construction.

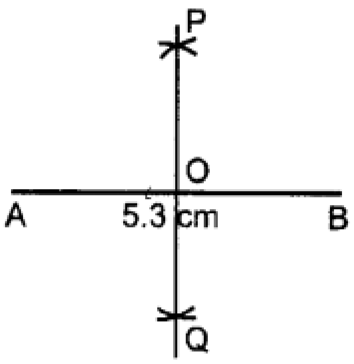
2)Draw ∠ ABC = 64°.Construct 1/4 ∠ ABC using compass.

3)Construct an equilateral triangle with side 6 cm and juatify the construction.

4)Construct a Δ PQR in which PQ = 5.8 cm, ∠Q = 60°and QR + PR = 8.4 cm.

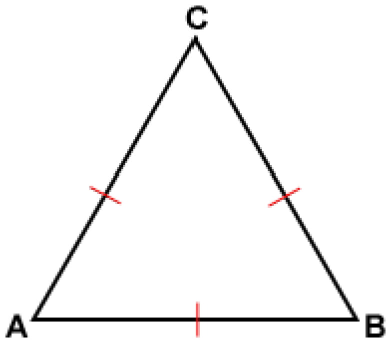
5)Construct a right angled Δ ABC right angled at C, in which AB = 5.6 cm , BC = 4.5cm and . ∠C = 90°.

*Directions :*In the following questions, a statement of assertion (A) is followed by a statement of reason (R). Mark these statements as (a),(b),(c) or (d):-
(a) Both assertion (A) and reason (R) are true and reason (R) is the correct explanation of assertion (A).
(b) Both assertion (A) and reason (R) are true but reason (R) is not the correct explanation of assertion (A).
(c) Assertion (A) is true but reason (R) is false.
(d) Assertion (A) is false but reason (R) is true.
6)



Assertion :-OA = OB = 5.3/2,where PQ is perpendicular bisector of AB.

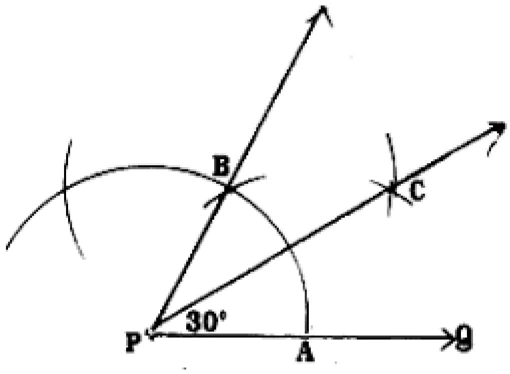
Reason :- Perpendicular bisectot of a line segment divides it into two equal parts.
7)



Assertion :- Δ ABC is an equilateral triangle.

Reason :- Each angle of an equilateral triangle is 60°.

8)



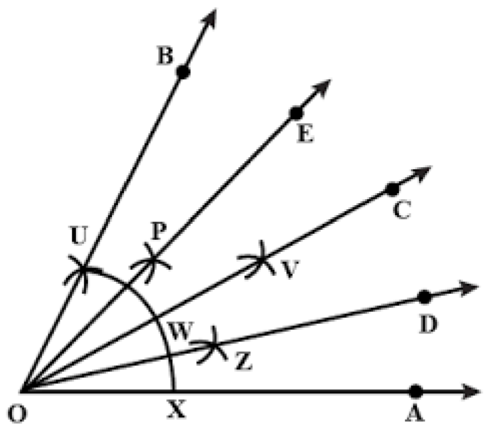
Assertion **:- If** ∠ APB = 60° and PC is bisector of ∠ APB then ∠ APC is 30°

Reason :- Bisector of an angle divides it into two equal parts.

9)Assertion :- Angle of 75°can be constructed by ruler and compass only.

Reason :- 75 is multiple of 15.

10)



Assertion :- In given figure AOD = 1/4 AOB.

Reason :- Perpandicular bisector of a line segment divides it into two equal parts.

5 MARKER QUESTIONS :

1)Construct a right triangle whose base is 6cm and the sum of hypotenuse and the other side is 10cm.Justify your construction.

2) Draw a linear pair of angles .Bisect each of the two angles.Verify that two bisecting rays are perpendicular to each other.

3) Draw a line segment AB of 4 cm in length. Draw a line perpendicular to AB through A and B, respectively. Are these lines parallel?

4) Construct a triangle PQR in which QR = 6cm, $\angle Q = 60°$ and PR – PQ = 2cm.Justify your construction.

5) Draw an angle of 80° with the help of a protractor. Then construct angles of (i) 40° (ii)160° (iii) 120°

6) Construct a triangle whose sides are 3.6 cm, 3.0 cm and 4.8 cm. Bisect the smallest angle and measure each part.

7) Construct an equilateral triangle ABC of side measures 5 cm. Bisect $\angle B$ and $\angle C$ of the triangle, Let these bisectors intersect at point O .Measure $\angle BOC$.

8) Construct a triangle ABC in which BC = 8cm, $\angle B = 45°$ and AB – AC = 3.5 cm.justify your construction.

9) Draw a line segment AB = 5.6 cm.At point A construct an angle of 120° using compass.Now construct it's supplement at point A.

10) Construct a triangle having sidesof length 6.2 cm, 7.3 cm and 6 cm.Measure all the three angles.Bisect the smallest and the largest angle.

MULTIPLE CHOICE QUESTIONS

1) Which of the following angles can be constructed using a ruler and compass?

a. 35°

b. 40°

c. 90°

d. 50°

Answer**:** c

2) With the help of ruler and compass only we can construct the angles which are multiples of

(a) 5

(b) 7.5

(c) 7

(d) 5.5

Answer b

3) Which of these angles we cannot construct using a ruler and compass?

a. 120°

b. 90°

c. 60°

d. All can be constructed

Answer: d

4) Bisector of an angle divides it into

(a) two equal parts

(b) three equal parts

(c) four equal parts

(d) five equal parts

Answer a

5) If a, b and c are the lengths of three sides of a triangle, then:

a. a+b>c

b. a-b>c

c. a+b=c

d. a-b=c

Answer a

6) Which of the following set of lengths can be the sides of a triangle?

a. 2 cm, 4 cm, 1.9 cm

b. 1.6 cm, 3.7 cm. 5.3 cm

c. 5.5 cm, 6.5 cm, 8.9 cm

d. None of the above

Answer: c

7) The side lengths 4cm, 4cm and 4cm can be sides of:

a. Scalene Triangle

b. Isosceles Triangle

c. Equilateral Triangle

d. None of the above

Answer c

8) To construct a bisector of a given angle, we need:

a. A ruler

b. A compass

c. A protractor

d. Both ruler and compass

Answer: d

9) To construct an angle of 60 degrees, we need to draw first:

a. A ray

b. An arc

c. Two rays

d. A straight line

Answer a

10) Two main geometrical insruments that are essential to do a geometrical construction are

(a) A graduated ruler , protractor

(b) An ungraduatated ruler , compass

(c) An ungraduated ruler , protractor

(d) A graduatated ruler , compass

Answer b

11) A straight edge is also known as

(a) A graduated ruler ,

(b) An ungraduatated ruler

(c) A protractor

(d) none of these

Answer b

12) The construction of a triangle ABC in which AB = 4 cm, ∠A = 60° is not possible when the difference of BC and AC is equal to

(a) 2.5 cm

(b) 3 cm

(c) 3.5 cm

(d) 4.5 cm

Answer d

13) A triangle ABC with AB = 4 cm and ∠A= 60° and ∠B= 40° is constructed. Then what is the measurement of ∠C?

(a) 40°

(b) 60°

(c) 80°

(d) 100°

Answer: c

14) The construction of a triangle ABC, given that BC = 6 cm, ∠B = 45° is not possible when the difference of AB and AC is equal to:

(a) 4 cm

(b) 5 cm

(c) 5.2 cm

(d) 6.9 cm

Answer d

15) The side length of 2 cm, 3 cm, and 4 cm can be the sides of

(a) Scalene triangle

(b) Isosceles triangle

(c) Equilateral triangle

(d) None of the above

Answer a

16) The side length of 5 cm, 3 cm, and 5 cm can be the sides of

(a) Scalene triangle

(b) Isosceles triangle

(c) Equilateral triangle

(d) None of the above

Answer:b

17) The internal and external bisectors of an angle forms

(a) Acute angle

(b) Right angle

(c) Obtuse angle

(d) Straight angle

Answer: b

18) The bisector of an angle lies in its

(a) Interior

(b) Exterior

(c) Anywhere in the plane

(d) On the arms of the angle

Answer: a

19) The point of occurrence of three angle bisectors of a triangle is called

(a) Incentre

(b) Circumcentre

(c) Orthocentre

(d) Centroid

Answer a
20) To construct a right triangle whose base is 12 cm and sum of its hypotenuse and other side is 18 cm. We draw line segment AB of 12 cm. Draw a ray AX making 90° with AB. The next step is:

(a) Cut a line segment AD of 18 cm on AX

(b) Cut a line segment BD of 18 cm

(c) Cut a line segment BD of 18 cm on AB

(d) Cut a line segment AD of 18 cm on AB

Answer a

21) Two radii of the same circle are always:

(a) equal

(b) parallel

(c) unequal

(d) none of these Answer a .
22) To construct a ΔABC in which BC = 10 cm and ∠B= 60 degrees and AB + AC = 14 cm, then the length of BD used for construction.

(a) 7 cm

(b) 14 cm

(c) 20 cm

(d) 10 cm

Anawer (b)

23) It is not possible to construct a triangle ABC with BC = 5cm,∠B = 75 ° and AB+AC equal to

(a) 8 cm

(b) 7.5 cm

(c) 9 cm

(d) 4.5 cm

Answer d
24) In Δ ABC, which of the following information is needed to construct it if it is known that measure of ∠B = 60 ° and BC = 6 cm :

(a) AB + BC

(b) CA + AB

(c) BC + CA

(d) All of the these

Answer b

25)An external bisector of an angle measuring 70 ° will divide the angle into two angles measuring

(a) 110°

(b) 55°

(c) 35°

(d) 70°

Answer (b)

26)) Bisector of an angle measuring 70 ° will divide the angle into two angles measuring

(a) 110°

(b) 55°

(c) 35°

(d) 70°

Answer c

27) Which of these triangles are possible to construct by knowing only its one side?

(a) Right angled triangle

(b) Equilateral triangle

(c) Isosceles triangle

(d) Any triangle

Answer b

28)Which of the following sets of angles can be the angles of a triangle? (a) 30°, 60°, 80°

(b) 40°, 60°, 70°

(c) 50°, 30°, 100°

(d) 50°, 40°, 100°

Answer c

(29) To construct a perpendicular bisector of a given angle, we need:

(a) A ruler

(b) A compass

(c) A protractor

(d) Both ruler and compass

Answer: d

30) Construction of triangle ABC is not possible when

(a) AB + BC = AC

(b) AB + BC < .AC

(c) Both (a) and (b)

(d) AB + BC > AC

Answer c

SURFACE AREAS AND VOLUMES

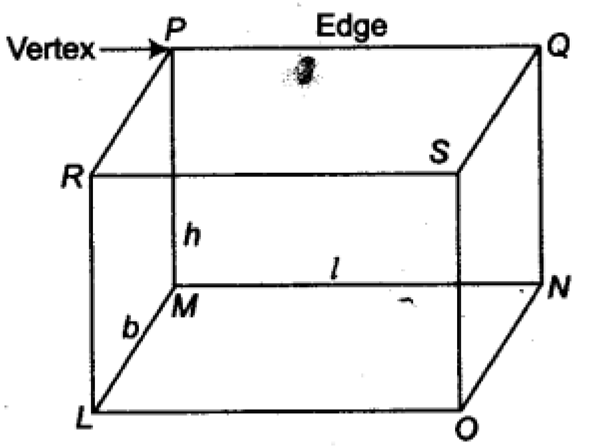
SOLIDS AND THEIR SURFACE AREAS

The bodies occupying space are called solids, such as a cuboid, a cube, a cylinder, a cone, a sphere, etc.

These solids have plane or curved surfaces.

1.**Cuboid:** A figure which is surrounded by six rectangular surfaces is called cuboid.
The opposite surface of a cuboid is equal and parallel.

A cuboid has 12 edges and 8 corners. Each corner of a cuboid is called the vertex of a cuboid. The line segment joining the opposite vertices is called the diagonal of a cuboid. There are four diagonals in a cuboid.



Volume of cuboid = Length × Breadth × Height = l × b × h

Lateral surface area = 2 (Length + Breadth) × Height = 2 (l + b) × h

Total surface area = 2 (Length × Breadth + Breadth × Height + Height × Length) = 2 (lb + bh + hl)

Total length of cuboid = 4 (l + b + h)

$$\textbf{Diagonal of cuboid} = \sqrt{(\text{Length})^2 + (\text{Breadth})^2 + (\text{Height})^2}$$
$$= \sqrt{l^2 + b^2 + h^2}$$

2. **Cube:** A cuboid, whose length, breadth and height are same is called a cube.

A cube has six surfaces, twelve edges, eight corners and four diagonals.

Volume of cube= $(\text{Side})^3 = l^3$

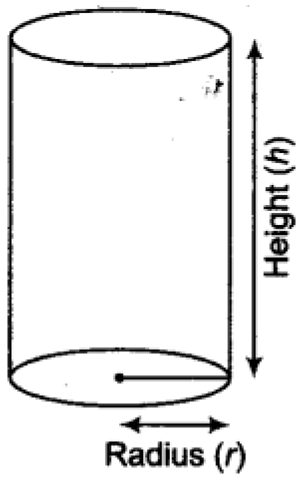
Lateral surface area = $4 \times (\text{Side})^2 = 4l^2$

Total surface area = $6 \times (\text{Side})^2 = 6l^2$

Total length of cube = 12l

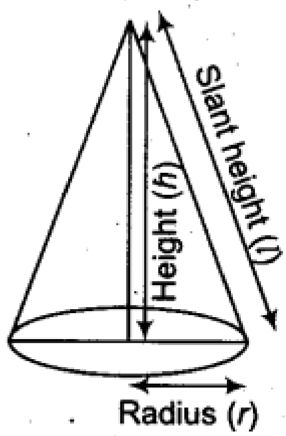
Diagonal of cube = $\sqrt{3}\ l$

3. **Right Circular Cylinder:** A right circular cylinder is considered as a solid generated by the revolution of a rectangle about one of its sides.



The volume of a cylinder = $\pi r^2 h$
Curved surface area or lateral surface area = $2\pi rh$
Total surface area = Curved surface + 2 × Base area = $2\pi rh + 2\pi r^2 = 2\pi r(h + r)$

4. **Cone:** A right circular cone is a solid generated by revolving of a triangle about one of its sides (other than hypotenuse).



Volume of cone = 13 $\pi r^2 h$
Curved surface area or lateral surface area = πrl
Total surface area = Curved surface area + Base area

$$= \pi rl + \pi r^2$$

$$= \pi r(l + r)$$

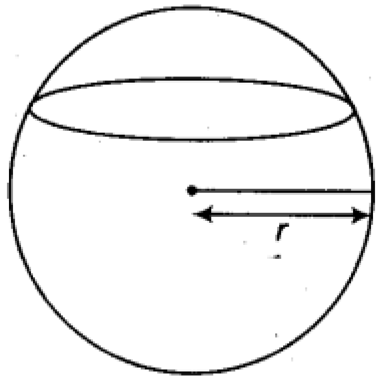
$$l = \sqrt{h^2 + r^2}$$

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

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

5. **Sphere:** A solid which is surrounded by a curved surface and each point of the surface is the same distance from a fixed point. The fixed point is called the centre of the sphere. The line segment

joining from the centre of the sphere to any point of the surface is called the radius of the sphere.



Volume of sphere $= \frac{4}{3}\pi r^3$

Surface area of sphere $= 4\pi r^2$

(1 MARKS QUESTIONS)

Question 1
A cuboid having surface areas of 3 adjacent faces as a, b and c has the volume:
(a) 3abc
(b) 2abc
(c) abc
(d) $(abc)^2$

Answer: (b) abc

Question 2.
The radius of a cylinder is doubled and the height remains the same. The ratio between the volumes of the new cylinder and the original cylinder is
(a) 1 : 2
(b) 3 : 1
(c) 4 : 1
(d) 1 : 8

Answer: (c) 4 : 1

Question 3.
Volume of hollow cylinder
(a) $\pi(R^2 - r^2)h$
(b) πR^2h
(c) πr^2h
(d) $\pi r^2(h_1 - h_1)$

Answer: (a) $\pi(R^2 - r^2)h$

Question 4.
In a cylinder, radius is doubled and height is halved, curved surface area will be
(a) halved
(b) doubled

(c) same
(d) four time

Answer: (c) same

Question 5.
The radius of a hemispherical balloon increases from 6 cm to 12 cm as air is being pumped into it. The ratios of the surface areas of the balloon in the two cases is
(a) 1 : 4
(b) 1 : 3
(c) 2 : 3
(d) 2 : 1

Answer: (a) 1 : 4

Question 6.
The length of the longest pole that can be put in a room of dimension (10 m × 10 m × 5 m) is
(a) 15 m
(b) 16 m
(c) 10 m
(d) 12 m

Answer: (a) 15 m

Question 7.
The lateral surface area of a cube is 256 m^3. The volume of the cube is
(a) 512 m^3
(b) 64 m^3
(c) 216 m^3
(d) 256 m^3

Answer: (a) 512 m^3

Question 8.
The radii of two cylinders are in the ratio of 2 : 3 and their heights are in the ratio of 5 : 3. The ratio of their volumes is
(a) 10 : 17
(b) 20 : 27
(c) 17 : 27
(d) 20 : 37

Answer: (b) 20 : 27

FILL IN THE BLANKS

(a) A cylinder radius is doubled and height is halved, the curved surface area of the cylinder will ___________________ (Increase/decrease/remain same)

(b) The radius of the sphere is 7 cm, the surface area of the sphere is__________________ (616 cm^2 / 700 cm^2/ 800 cm^2)

(c) Three cubes whose sides are 6 cm, 8 cm and 10 cm. They are melted and form a big cube. The volume of the big cube is _____________________ (1800cm^3/1728 cm^3)

(d) The total surface area of a hemisphere of radius 10 cm using value of π=3.14 is ___________________(956 cm^2/942 cm^2)

TRUE/FALSE

(a) A cylinder, hemisphere and cone stand on equal base and same height, the Volume ratio is 3:2:1

(b) The radius of a solid sphere is 24 cm. 8 spheres can be made from it of 12cm radius

(c)Rradius of the cone is doubled and height is halved, the volume will be halved

(d) A river 10m deep and 40m wide is flowing at the rate of 2m per min. 48000m^3 water will flow into the sea from river

(2 MARKS QUESTIONS)

1. If the total surface area of a sphere is 154 cm^2. Find its total volume.
2. If the total surface area of a cube is 216 cm^2, then find its volume.

3. If the radius of a sphere is doubled, then find the ratio of their volumes.

4. Two cubes of edge 6 cm are joined to form a cuboid. Find the total surface area of the cuboid.

5. In a cylinder, if radius is halved and height is doubled, then find the volume with respect to original volume.

6. Calculate the edge of the cube if its volume is 1331 cm^3.

7. A metallic sphere is of radius 4.9 cm. If the density of the metal is 7.8 g/cm^2, find the mass of the sphere (π = 227).

8. The curved surface area of a cone is 12320 sq. cm, if the radius of its base is 56 cm, find its height.

(3 MARKS QUESTIONS)

1. If the circumference of the base of a right circular cylinder is 110 cm, then find its base area.

2. The radius of a cylinder is 7 cm. If its volume is 2002 cm^3, then find its height and total surface area.

3. A conical tent of radius 7 m and height 24 m is to be made. Find the cost of the 5 m wide cloth required at the rate of Rs. 50 per metre.

4. The diameter of a road roller, 120 cm long is 84 cm. If it takes 500 complete revolutions to level a playground, find the cost of levelling it at Rs. 2 per square metre.

5. A rectangular piece of paper is 22 cm long and 10 cm wide. A cylinder is formed by rolling the paper along its length. Find the volume of the cylinder.

6. A right triangle ABC with sides 5 cm, 12 cm and 13 cm is revolved about the side 5 cm. Find the volume of the solid so obtained. If it is now revolved about the side 12 cm, then what would be the ratio of the volumes of the two solids obtained in two cases ?

7. A right triangle of hypotenuse 13 cm and one of its sides 12 cm is made to revolve taking side 12 cm as its axis. Find the volume and curved surface area of the solid so formed.

8. It costs ₹3300 to paint the inner curved surface of a 10 m deep well. If the rate cost of painting is of ₹30 per m^2, find :
(a) inner curved surface area
(b) diameter of the well
(c) capacity of the well.

PROBABILITY

FILL IN THE BLANKS (1 MARK QUESTION)

1. A coin is tossed 900 times with the following frequencies: Head : 400, Tail : 500
   Probability of getting a head will be ………………………………. .
2. The probability that a number selected from the numbers 1, 2, 3, …, 14 is a multiple of 6 is ……………………. .
3. A die is thrown, the probability of getting an odd number is ……………….. .
4. A bag has 15 cards having number 1, 2, 3 …., 15 respectively. One card is drawn at random. The probability that a number is divisible by 3 is ……………….. .
5. In a cricket match at Bengaluru stadium, 2 batsman were picked randomly out of 11 cricketers to start the innings. Probability of any cricketer getting chance to do the opening is …………………….
6. If the probability of any event happening is 0.6 then the probability of that event Not happening will be ……………………….
7. **The sum of all probabilities is equal to ………………..**
8. **If P(E) = 0.55, then P(not E) will be…………………**
9. The probability that a number selected from the group of numbers 1, 2, 3, …, 10 is a multiple of 4 is ……………………. .
10. **The probability of drawing a face card from a deck of cards is……………………**

MCQ TYPE PRACTICE QUESTIONS:

1. The probability of any event will lie between:

a. 1 & 2

b. 1 & 10

c. 0 & 1

d. 0 & 5

2. If **A dice is thrown. The probability of getting number 1 and 6 is:**

a. $\frac{1}{6}$

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

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

d. ½

3. If the probability of any event happening is 0.75 then the probability of that event Not happening is:

a. 0

b. 1

c. 0.50

d. 0.25

4. What is the probability of an impossible event?

a. 1

b. 0

c. More than 1

d. Less than 1

5. If a die is thrown twice what is the probability of getting same number both the times?

a. 2/6

b. 3/6

c. 4/6

d. 1/6

6. Probability of any sure event is

a. 0

b. 1

c. 0.5

d. 1.5

7. A card is drawn from a well-shuffled deck of 52 cards. What is the probability of getting a queen of the black cards?

a. 3/36

b. 1/26

c. 3/26

d. 1/16

8. Which out of the following cannot be the probability of any event?

a. 1 b. 0

c. 0.25 d. 1.6

9. A deck of cards is well shuffled. Find the probability of drawing a red number card ?

a. 9/26

b. 11/26

c. 13/26

d. 15/26

10. A box contains10 balls of 3 different colors. 5 balls of red color, 2 balls of purple color and 3 balls of blue color. Find the probability of drawing a purple ball without seeing inside the bag?

a. 5/10

b. 3/10

c. 2/10

d. 0

11. A box contains10 balls of 3 different colors. 5 balls of red color, 2 balls of purple color and 3 balls of blue color. Find the probability of drawing a white ball without seeing inside the bag?

a. 5/10

b. 3/10

c. 2/10

d. 0

12. A box contains 10 red balls. Find the probability of drawing a red ball randomly out of the box?

a. 0

b. 1

c. 2/5

d. 3/5

13. A die is thrown, find the probability of getting an even number?

a. 1/2

b. 1/3

c. 1/4

d. 1/6

14. If the probability of any event happening is 0.25 then the probability of that event Not happening is:

a. 0 b. 1

c. 0.75 d. 0.25

15. A card is drawn out of a well shuffled deck of cards, find the probability of getting an ace card?

a. 1/13

b. 2/13

c. 3/13

d. 1/26

STATE TRUE OR FALSE:

16. Value of probability of an event happening can be 2.

17. When 2 die are thrown simultaneously, then the total number of outcomes are 36.

17. Probability of a sure event is 0.

18. If the probability of an event is p, then the probability of its complementary event will be p-1.

19. In a family there 3 kids (all girls). A child is chosen at random , the probability that the chosen child is a girl is 1.

20. In a deck of well shuffled cards, the probability of getting a jack red colored card drawn at random is 1/26.

ASSERTION REASON QUESTIONS: (2 MARK QUESTION)

The following questions consists of 2 statements – Assertion (A) and Reason . Answer these questions selecting the appropriate option given below:

a) Both A and R are true. And R is the correct explanation for A.
b) Both A and R are true. And R is NOT the correct explanation for A.
c) A is true but R is false.
d) A is false but R is true.

21. ASSERTION: It is given that probability of a winning game is 0.6 so the probability of not winning the game will be 0.4.

REASON: P(E)+P(NOT E)= 1 where E is any event .

22. ASSERTION: If the possibility of an event to happen is very unlikely. Then its probability will be 0.000001

REASON: Range for the value of probability lies between 0 and 1.

23. ASSERTION (A): The probability of getting a prime number a die is thrown once is 2/3.

REASON: Prime numbers on a die are 2,3,5.

CASE STUDY: (4 MARK QUESTION)

Q1. Two Friends Naveen and Parveen went to a Trade fair and reached on a wooden handicrafts shop . On the shop they found a necklace with 22 beads of 6 different colors. The colors were: Red, Blue, Green, Yellow, Pink, Orange. Necklace consisted of 4 Red beads , 6 blue beads, 2 yellow beads, 3 pink beads, 3 green beads, 4 Orange beads. By accident the necklace wire was broken and beads fell on the ground. Both try to search the beads. They found all the beads and put them in jar. One by one beads were taken out of the jar and were put back in the necklace wire.

1. A bead is drawn at random from jar, what is the probabilty that the bead is of green color.

   a. 1/22 b. 2/22

   c. 3/22 d. 6/22

2. A bead is drawn at random from jar, what is the probability that the bead is of white color.

   a. 1/22 b. 1

   c. 0 d. 6/22

3. What is the probability of getting either a red or a blue colored bead?

   a. 10/22 b. 5/11

   c. Both of these d. none of these

4. What is the probability that the bead found is not pink?

   a. 3/22 b. 4/22

   c. 19/22 d. none of these

Q2. Seven cards – three numbered cards(8,9,10) a jack, a queen, a king and a ace of clubs, are well shuffled with their face downwards. A game is being played. If picked the king card you win. 3 Players come one after other and check their luck. The card once picked will be removed from the group and will be kept aside.

1. What is the probability that the first player wins the game?

a. 1/7 b. 2/7 c. 3/7 d. 4/7

2. If the first player loses. What is the probability that the second player wins the game?

a. 1/7 b. 2/7 c. 4/7 d. 1/6

3. What is the probability that none of them wins the game?

a. 1/7 b. 1/6 c. 3/5 d. 4/5

4. If the first two played picked the number card and lost. What is the probability that the third player will pick a face card and lose?

a. 3/5 b. 2/5 c. 1/5 d.4/5

SAMPLE QUESTION PAPERS WITH MARKING SCHEME

SAMPLE PAPER -01

TERM-2

CLASS-9(Mathematics)

Time Duration:1.30hrs. **M.M: 40**

General Instructions:
1. This question paper contains two parts A and B.
2. Both Part A and Part B have internal choices.

Part – A:
1. It consists two sections- I and II.
2. Section I has 8 questions of 1 mark each. Internal choice is provided in 3 questions.
3. Section II has 2 case study based questions.Each case study has 5 case-based sub-parts.An examine has to attempt any 4 out 5 sub parts.

Part – B:
1. Question No 11 to 14 are Very short answer Type questions of 2 mark each.
2. Question No 15 to 16 are Short Answer Type questions of 3 marks each
3. Question No 17 to 18 are Long Answer Type questions of 5 marks each.

Part-A

(Section - I)

Q1.Zero of the polynomial p(x) = 3x + 1 is

a)-1 b) -3 c) -1/3 d) 1/3

Q2.If the diagonals of a quadrilateral bisect each other at right angle , then it is a

a)Trapezium b) Rhombus c) Rectangle d) parallelogram

Q3.The sum of either pair of opposite angles of a cyclic quadrilateral is

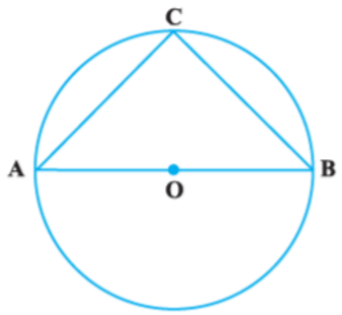
a)135 degree b) 180 degree c) 90 degree d) 45 degree

OR

The coefficient of x in the expansion of $(x + 3)^3$ is

a)18 b) 9 c) 1 d) 27

Q4. In the given figure If AOB is the diameter of the circle and AC = BC, then ∠CAB is equal to:



a) 90 degree b) 120 degree c) 35 degree d) 45 degree

Q5.The degree of a zero polynomial is
a)0 b)1 c)2 d) not defined

Q6.If the angles of a parallelogram are equal , then measure of each angle is
a)45 degree b) 75 degree c) 90 degree d) 120 degree

OR

Angles of a quadrilateral are in the ratio 5 : 7 : 11 : 13 , then value of x is
a)360 degree b) 10 degree c) 15 degree d) 5 degree

Q7. Value of $(999)^2 - (1)^2$
a)998000 b) 998998 c) 999 d)999989

OR

A polynomial of degree 3 is called
a)Linear polynomial b) Quadratic Polynomial c) Cubic polynomial d) Trinomial

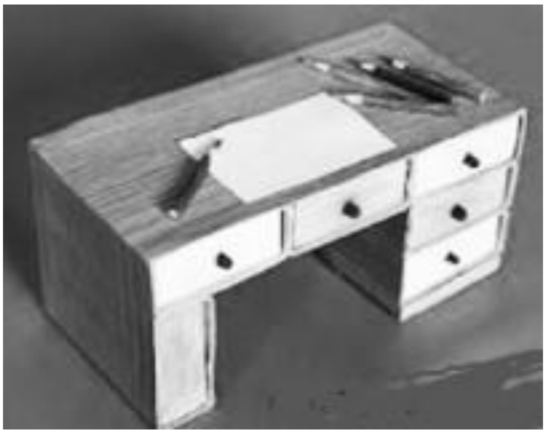
Q8. Equal chords of a circle subtend equal angles at the _____________.
a)diameter b)radius c)segment d)centre

(Section -II)

Case Study Based Questions

Case study 1

9. Rini, Suchandra and Rai made a table with empty match boxes. They coloured the boxes in such a way that the toy table looks like a table. They made drawers with handle. All the match boxes are identical. The length, breadth and height of the match box are 2.5 cm by 4 cm by 1.5 cm.



(a) How many match boxes are needed to make the table as shown in the figure?

(i) 7 (ii) 6 (iii) 8 (iv) 5

(b) What is the total volume of the match boxes?

(i) 90 cm^3 (ii) 105 cm^3 (iii) 75 cm^3 (iv) 15 cm^3

(c) How much area is covered by the floor?

(i) 20cm^2 (ii) 100 cm^2 (iii) 30 cm^2 (iv) 10 cm^2

(d) What is the surface area of the top of the table?

(i) 30 cm^2 (ii) 10 cm^2 (iii) 100 cm^2 (iv) 60 cm^2

(e) Is the table steady? Are the two sides (left & right) has same volume? What is the volume difference?

(i) no, 30 cm^3 (ii) no, 10 cm^3 (iii) no, 6 cm^3 (iv) yes, same volume

Case Study 2

10. A gumball machine contains 40 blue gumballs, 20 red gumballs, 15 orange gumballs, and 25 purple gumballs. The machine dispenser randomly selects any one gumball at a time when you press the dispenser button. By using the facts of probability answer the following:

i. What is the probability that a person gets a red gumball?

a. 0.2 b. 0.3 c. 1.0 d. -0.1

ii. What is the probability that a person gets no orange gumball?

a. 0.15 b. 0.85 c. 0.55 d. 0.75

iii. What is the probability that a person gets a/an Orange, Blue, and Purple gumball?

a)1/2 b) 3/4 c) 4/5 d) 3/6

iv. In the gumball machine, if x Pink gumballs are added and the machine dispenser randomly selects one gumball, what is the probability that it will be a pink ball?

a) $\frac{x}{100+x}$ b) $\frac{x}{100}$ c) $\frac{100+x}{x}$ d) $\frac{60+x}{x}$

v. What is the probability of getting a black ball

a.0 b. 1 c. 1/2 d. 1/4

Part - B

Q11.Factorise: $25x^2 - 36y^2$

Q12. Proof that equal chords of a circle subtend equal angles at the centre .

OR

Proof that the perpendicular from the centre to a chord bisects the chord .

Q13.Find the remainder when $x^3 + 3x^2 + 3x + 2$ is divided by x + 7

Q14.Factorise : $x^2 - 24x - 180$

Q15.Construct a triangle ABC in which base BC = 5 cm , AB + AC = 7 cm and < B = 75 degree .

OR

Construct a triangle LMN where MN = 5 cm , < M = 60 degree and LM - LN = 3.5 cm

Q16. Evaluate the following product using algebraic identities

a)95 × 96 b) $(- 12)^3 + 7^3 + 5^3$

Q17.Proof that the angle subtended by an arc at the centre is double the angle subtended it at any point on the remaining part of the circle .

Q18.A conical tent is 10 m high and the radius of its base is 24 m . Find:

i) Slant height of the tent

ii) Cost of the canvas required to make the tent, if the cost of $1m^2$ canvas is Rs 70.

OR

A village, having a population of 4000, requires 150 litres of water per head per day. It has a tank measuring 20 m × 15 m × 6 m . For how many days will the water of this tank last?

MARKING SCHEME

PART - A (SECTION I)

1.c) -1/3
2. b) Rhombus
3. b) 180 degree

OR

d) 27
4. d) 45 degree
5. d) Not defined
6. c) 90 degree

OR

b) 10 degree
7. a) 998000

OR

c) Cubic Polynomial
8. d) centre

SECTION II

CASE STUDY

9. a) ii) 6
b) i) 90 cm3
c) as shown in the figure
d) as shown in the figure
e) as shown in the figure

10. i) a) 0.2
ii) b) 0.85
iii) c) 4/5
iv) a) $\frac{x}{100+x}$
v) a) 0

PART - B

11. (5x - 6y) (5x + 6y)
12. Proof
13. -215
14. (x + 6) (x - 30)
15. Do construction
16. a) 9120
b) -1260
17. Proof
18. i) Slant height of tent = 26 m
ii) Total cost of canvas = Rs. 137280

OR

3 days

SAMPLE PAPER -02

TERM-2

CLASS-9 (Mathematics)

Time Duration:2:00rs. M.M: 40

General Instructions:

1. This question paper contains two parts A and B.
2. Both Part A and Part B have internal choices.

Part – A:

1. It consists two sections- I and II.
2. Section I has 8 questions of 1 mark each. Internal choice is provided in 3 questions.
3. Section II has 2 case study based questions. Each case study has 5 case-based sub-parts. An examine has to attempt any 4 out 5 sub parts.

Part – B:

1. Question No 11 to 14 are Very short answer Type questions of 2 mark each.
2. Question No 15 to 16 are Short Answer Type questions of 3 marks each
3. Question No 17 to 18 are Long Answer Type questions of 5 marks each.

Part-A

(Section - I)

Q1.Zero of the polynomial $3x^2 + 11x + 8$ is

a)-8/3 b)8/3 c)-3 d)-2

Q2.If the diagonals of a Rhombus are equal, then it will be a________.

a)Kite b)Rectangle c)Square d)Trapezium

Q3.Angles in the same__________ of a circle are equal.

a)part b) radius c)point. d)segment

OR

The degree of the zero polynomial is

a)0 b)1 c) not defined d)constant

Q4.ABCD is a Rhombus such that ∠ACB=40°.Then ∠ADB is

a)40° b)45° c)50° d)60°

Q5.The degree of a non constant polynomial is

a)0 b)1 c)2 d)3

Q6.The maximum number of obtuse angles a quadrilateral can have is/are

a)1 b)2 c)3 d)4

OR

If the diagonals of a quadrilateral bisect each other, then it is not a_________.

a)Kite b)Rhombus c)Rectangle d)Parallelogram

Q7.Equal chords of a circle subtend equal angles at the ____________.

a)diameter b)radius c)segment d)centre

OR

Number of circles that can pass through three non-collinear points _________.

a)0 b)1 c)2 d)3

Q8.The value of the polynomial 5x- 2/3 at x=2 is

a)-2/3 b)28/3 c)-28/3 d)1/3

(Section -II)

Case Study Based Questions

Topic: Watermelons

Q9.Cubic Watermelons are watermelons grown into the shape of a cube. This is generally intended for space efficiency in small refrigerators. The practice of growing cube watermelons is popular in Japan .The melons are grown in boxes and assume the shape of the container. Normal watermelons are round in nature.

Side of the cubic watermelon is 15cm and radius of round watermelon is 14cm.

I)Whose total surface area will be greater, cubic or round watermelon.

II)If the side of a cubical watermelon is equal to the diameter of a spherical watermelon and they are to be stacked in boxes, then which one would occupy more space than the other.

III)If 90% of the cubic watermelons are full of water, then how much water (juice) will you get from the cubic watermelon.

IV)Radha bring 1 cubic watermelon and 2 round watermelons, then she cut both watermelons of each type into 8 parts. She gave 2 parts of cubic watermelon to her son and 1 part of round watermelon to her daughter, then who will receive the greater part.

V)Find the minimum number of cubical watermelons required to occupy a room of dimensions 200x300x180cm .

Topic: Bluff Game

Q10.Bluff is a card game where the player’s aim to get rid of all of their cards. It is a game of deception, with cards being played face down and players being permitted to lie about the cards they have played.

Two friends are playing a game of bluff, each player has to draw a card, view it and place the card face down. Player calls out the name of the picked card which may be true or bluff. After each round card is placed back into the deck of cards.

If an opponent skips the call of the player, the player gets 1 point.

Based upon the given information answer the following questions:

1)A card is drawn by player 1 from a well shuffled deck of 52 playing cards. He said ,"It is a jack of heart". Find the probability of him bluffing.

2)A card is drawn by player 2 from a well shuffled deck of 52 cards. He said, "It is an ace". Find the probability of him telling the card's real name.

3)A card is drawn by player 1 from a well shuffled deck of 52 cards. He said, "It is a face". Find the probability of him telling the card's real name.

4)A card is drawn by player 2 from a well shuffled deck of 52 cards. He said, "It is a red queen". Find the probability of him bluffing.

5)A card is drawn by player 1 from a well shuffled deck of 52 cards. He said," t is a king of spade". Find the probability of him bluffing.

Part - B

Q11.Factorise: $6x^2 + 17x + 5$

Q12.Prove that the line drawn through the centre of a circle to bisect a chord is perpendicular to the chord.

Q13.Find the remainder when $4x^3 + 3x^2 - 4x - 3$ is divided by $x - 1$.

Q14.Factorise : $x^3 - 3x^2 - 9x - 5$

Q15.Construct a triangle PQR in which QR= 5cm, $\angle Q = 75°$ and PQ + PR= 11cm.

Q16.Evaluate each of the following using suitable identities:
(i) $(x+10)(x-8)$.   (ii) 107×103

Q17.Show that the quadrilateral formed by angle bisectors of a cyclic quadrilateral is also cyclic.

Q18.A river 3m deep and 40m wide is flowing at the rate of 2km per hour. How much water will fall into the sea in a minute.

Sample Question Paper -02

Class- IX Session- 2021-22 TERM 2 Subject- Mathematics

SOLUTION

1)a)-8/3 (1mark)
2)c)Square (1mark)
3)d)Segment OR c)not defined (1mark)
4)c)50° (1mark)
5)a)0 (1mark)
6)c)3 OR a)Kite (1mark)
7)d)Centre OR b)1 (1mark)
8)b)28/3 (1mark)
9)I)T.S.A of cubic watermelon =1350sq cm
T.S.A of round watermelon = 2464sq cm
II)Volume of cubic watermelon = 3375 cubic cm
Volume of round watermelon = 1767.86 approx.
III)Volume of the cubic watermelon =3375 cubic cm
Volume of water in cubic watermelon =3037.5 cubic cm
IV)Part of cubic watermelon received by her son=843.76 cubic cm
Part of round watermelon received by her daughter =1437.33 cubic cm
Therefore, her daughter received greater part.
V)Number of cubical watermelons required to occupy the room = volume of room/volume of watermelon
=200x300x180/15x15x15
=3200
10)1)51/52
2)4/52 or 1/3
3)12/52 or 3/13
4)50/52 or 25/26
5)51/52

(Section-II)

11)(3x+1) (2x+5) (2marks)
12)for correct Given and proof (2marks)
13)x-1=0
x=1
$p(1)=4x(1)^3+3x(1)^2-4x1-3=0$. (2 marks)
Therefore, remainder =0
14)(x-5) (x+1) (x+1). (2 marks)

15)for correct construction. (3 marks)

16)(i) (x+10) (x-8) = x^2+2x-80
(ii)(100+7) (100+3) = 10000+1000+21=11021 (3marks)

17) for correct figure, given and proof. (5marks)
18)Amount of water that falls into the sea= area of river x flow rate. (1mark)

SAMPLE PAPER -03

CLASS – IX Session: 2021-22
Term II
Subject – Mathematics

Time Allowed: 2 HRS Maximum Marks: 40

General Instructions:

1. This question paper contains two parts A and B.
2. Both Part A and Part B have internal choices.

Part – A:
1. It consists of two sections- I and II
2. Section I has 8 questions. Internal choice is provided in 3 questions.
3. Section II has two case study-based questions. Each case study has 5 case-based sub-parts. Student is to attempt any 4 out of 5 sub-parts.

Part – B:
1. Question No 11 to 14 are Very short answer Type questions of 2 mark each,
2. Question No 15 to 16 are Short Answer Type questions of 3 marks each
3. Question No 17 to 18 are Long Answer Type questions of 5 marks each.
4. Internal choice is provided in 1 question of 2 marks, 1 question of 3 marks and 1 question of 5 marks.

	PART – A	
	SECTION – I **Section - I consists of 8 questions.**	
Q.No.		**Marks**
1	Degree of the polynomial f(x) = $4x^4 + 0x^3 + 0x^5 + 5x + 7$ is (a) 4 (b) 5 (c) 3 (d) 7	1
2	The ratio of the side and diagonal of square is : (a) 1 : 1 (b) 1 : $\sqrt{2}$ (c) 1 : $\sqrt{3}$ (d) $\sqrt{3}$: 1	1

3	Angles in the same segment of a circle are : (a) complementary (b) supplementary (c) equal (d) unequal	1
4	If one angle of a parallelogram is 24° less than twice the smallest angle , then the measure of the largest angle of the parallelogram is (a) 176° (b) 68° (c) 112° (d) 102°	1
5	Zero of the polynomial $f(x) = 3x + 7$ is (a) 7 / 3 (b) 3 / 7 (c) -7 / 3 (d) – 7	1
6	A circle divides a plane on which it lies into : (a) 4 parts (b) 3 parts (c) 2 parts (d) none of these OR The region between a chord and either of it arcs is called : (a) sector of a circle (b) segment of a circle (c) quadrant of a circle (d) secant of a circle	1
7	Three angles of a quadrilateral are 70° , 85° and 90°. It's fourth angle is: (a) 90° (b) 115° (c) 100° (d) 85° OR The angles of a quadrilateral are in the ratio 1 : 2 : 3 : 4 . The greatest of these angle is: (a) 120° (b) 144° (c) 140° (d) 108°	1
8	Degree of the zero polynomial is (a) 0 (b) 1 (c) any natural number (d) not defined	1

	OR √2 is a polynomial of degree (a) 2 (b) 1 (c) 1/2 (d) 0	
	SECTION - II	
	Case study based questions	
9	**Case Study - 1 (Any 4 parts out of 5 parts are to be attempted)**	**4 X 1**

Rahul is a student of class IX. Some guests have come to his house. He went to the shop to get soft drinks for the guests ,where the shopkeeper told that he had two packs of soft drinks available,

(i) A tin can with a rectangular base of length 5 cm and width 4 cm , having a height of 15 cm and
(ii) A cylindrical can with circular base of diameter 7 cm and height 10 cm. (Take π = 22/7)

(i)	The formula to find the volume of a tin can with rectangular box is : (a) 2 (l + b + h) (b) lbh (c) 2 (lb + bh + hl) (d) 2 (l + b) h	
(ii)	The capacity of a tin can with rectangular box is (a) 385 cm^3	

	(b) 300 cm^3 (c) 385 cm^2 (d) 300 cm^2	
(iii)	The formula to find the volume of a cylindrical can with circular base is : (a) $2\pi r h$ (b) $2\pi r (h + r)$ (c) $2\pi r^2 h$ (d) $\pi r^2 h$	
(iv)	The capacity of a cylindrical can with circular base is : (a) 385 cm^3 (b) 300 cm^3 (c) 385 cm^2 (d) 300 cm^2	
(v)	By how much is the capacity of larger container greater than the capacity of smaller container? (a) 85 cm^2 (b) 85 cm (c) 85 cm^3 (d) none of these	
10	**Case Study - 2 (Any 4 parts out of 5 parts are to be attempted)**	**4 X 1**

Two students Seema and Lata of class IX are playing LUDO game and They take turns throwing die.

If the die is thrown 100 times and the outcomes were recorded as follows :

Outcomes	1	2	3	4	5	6
Frequency	18	15	16	17	15	19

Then,

(i)	The probability of an impossible event is (a) 1 (b) 0 (c) -1 (d) 2	
(ii)	The probability of a certain event is (a) 1 (b) 0 (c) -1 (d) 2	
(iii)	The probability of getting a number 2 is (a) 18/100 (b) 0 (c) 15/100 (d) 2	
(iv)	The probability of getting an even number is (a) 51 (b) 0 (c) 15/100 (d) 51/100	
(v)	The probability of getting a prime number is (a) 46/100 (b) 0 (c) 1 (d) 64/100	
	PART – B	
Q.No.		**Marks**
11	Find the value of the polynomial $5x - 4x^2 + 3$ at (i) $x = 0$ (ii) $x = -1$	2
12	If the length of a chord of a circle is 16 cm and is at a distance of 15 cm from the centre of the circle, then find the radius of the circle.	2
13	By using suitable identity , find the product of $(x + 8)(x - 10)$	2
14	Find the value of k, if $x - 1$ is a factor of $p(x) = x^2 + x + k$	2
15	Factorise : $4x^2 + 9y^2 + 16z^2 + 12xy - 24yz - 16xz$	3
16	If the diagonals of a parallelogram are equal, then show that it is a rectangle.	3
17	A river 3 m deep and 40 m wide is flowing at the rate of 2 km per hour. How much water will fall into the sea in a minute?	5
18	Construct a triangle ABC in which BC = 7cm, $\angle B = 75°$ and AB + AC = 13 cm. Write the steps of construction also. OR Construct a triangle ABC in which BC = 8cm, $\angle B = 45°$ and AB – AC = 3.5 cm. Write the steps of construction also.	5

Sample Question Paper -03

Class- IX Session- 2021-22 TERM 2 Subject- Mathematics

SOLUTION

1	(a) 4	9 (ii)	(b) 300 cm^3
2	(b) $1/\sqrt{2}$	9 (iii)	(d) $\pi r^2 h$
3	(c) equal	9 (iv)	(a) 385 cm^3
4	(c) 112°	9 (v)	(c) 85 cm^3
5	(c) -7/3	10 (i)	(b) 0
6	(b) 3 parts OR (b) SEGMENT OF A CIRCLE	10 (ii)	(a) 1
7	(b) 115° OR (b) 144°	10 (iii)	(c) 15/100
8	(d) not defined OR (d) 0	10 (iv)	(d) 51/100
9 (i)	(b) lbh	10 (v)	(a) 46/100

11	(i) 3 (ii) -6	1 1
12	$r^2 = 15^2 + 8^2$ r = 17 cm	1 1
13	$x^2 + (8 + (-10))x + 8 \times (-10)$ $x^2 - 2x - 80$	1 1
14	P(1)=0 K=-2	1 1
15	$(2x)^2 + (3y)^2 + (- 4z)^2 + 2 \times 2x \times 3y + 2 \times 3y \times (-4z) + 2 \times (-4z) \times 2x$ $(2x + 3y - 4z)^2$	2 1
16	Given,to prove,figure Correct proof	1 2
17	Speed of water = 2000/60 m/min Length = 100/3 m Volume = 4000 m^3	1 1 3
18	Correct constructions Steps of constructions OR Correct constructions Steps of constructions	4 1 4 1

SAMPLE PAPER -01
MCQ-BASED

SUBJECT - MATHEMATICS

Time Allowed: 90 minutes **Maximum Marks: 40**

General Instructions:

1. The question paper contains three parts A, B and C

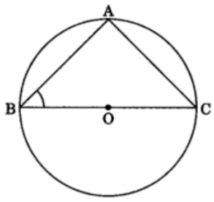
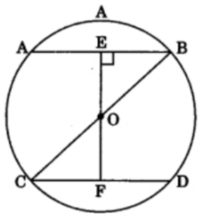
2. Section A consists of 20 questions of 1 mark each. Any 16 questions are to be attempted

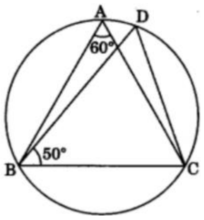
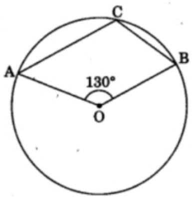
3. Section B consists of 20 questions of 1 mark each. Any 16 questions are to be attempted

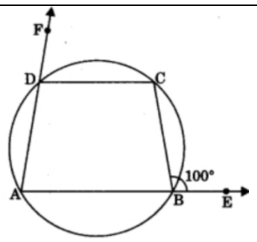
4. Section C consists of 10 questions based on two Case Studies. Attempt any 8 questions.

5. There is no negative marking.

	SECTION - A	
	Section A consists of 20 questions of 1 mark each. Any 16 questions are to be attempted.	
Q.NO.		MARKS
1	One of the factors of $(1 + 3y)^2 + (9y^2 - 1)$ is (a) $1 - 3y$ (b) $3 - y$ (c) $3y + 1$ (d) $y - 3$	1
2	Find the degree of polynomial $\sqrt{2}$. (a) 2 (b) 0 (c) 1 (d) 1/2	1
3	The length of the longest rod that can be fitted in a cubical vessel of edge 10 cm long is : (a) 10 cm (b)$10\sqrt{2}$cm (c)$10\sqrt{3}$cm (d)20 cm	1
4	The radius of a circle is 13 cm and the length of one of its chords is 10 cm. The distance of the chord from the centre is (a) 11.5 cm (b) 12 cm (c) $\sqrt{69}$cm (d) 23 cm	1
5	ABCD is a rhombus such that $\angle ACB = 40°$, then $\angle ADB$ is (a) 40° (b) 45° (c) 50° (d) 60°	1
6	If angles A, B, C and D of a quadrilateral ABCD, taken in order, are in the ratio 3 : 7 : 6 : 4, then ABCD is a (a) rhombus (b) parallelogram (c) trapezium (d) kite.	1
7	If $y^{97} + 97$ is divided by $y + 1$, the remainder is: (a) 0 (b) 1 (c) 95 (d) 96	1
8	In a cylinder , if radius is doubled and height is halved ,curved surface area will be : (a) halved (b)doubled (c)same (d)four times	1
9	Assertion: A cone is a solid figure. Reason: A cone is generated when rectangular sheet is rotated about its axis. (a)Both A and R are true and R is the correct explanation of A. (b) Both A and R are true and R is not the correct explanation of A. (c) A is true but R is false. (d) A is false but R is true.	1

10	In the given figure, BOC is a diameter of a circle and AB = AC. Then, ∠ABC =  (a) 30^0 (b) 45^0 (c) 60^0 (d) 90^0	1
11	If x – 2 is a factor of $5x^2 - kx - 18$, then find the value of k. (a) -1 (b) 1 (c) 0 (d) 5	1
12	The construction of the triangle ABC is not possible if it is given that AB = 4 cm, ∠A = 60° and the difference of BC and AC is (a) 3.5 cm (b) 4.5 cm (c) 3 cm (d) 2.5 cm	1
13	The diagonals AC and BD of a || gm ABCD intersect each other at the point O. If ∠DAC = 32° and ∠AOB = 70°, then ∠DBC is equal to (a) 24° (b) 86° (c) 38° (d) 32°	1
14	Assertion: The degree of the polynomial $4x^2 - 2x + 1$ is 3. Reason: The degree of the polynomial is the highest power of the variable. (a)Both A and R are true and R is the correct explanation of A. (b) Both A and R are true and R is not the correct explanation of A. (c) A is true but R is false. (d) A is false but R is true.	1
15	In the given figure, BOC is a diameter of a circle with centre O. If AB and CD are two chords such that AB || CD and AB = 10 cm, then CD =  (a) 5 cm (b) 12.5 cm (c) 15 cm (d) 10 cm	1
16	If x+p+y = x+y+z then which of the following must be true? (a) p = y (b)y = z (c)y = x (d) z = p	1
17	Which of these angles cannot be constructed using ruler and compasses? (a) 120 (b) 60 (c) 140 (d) 135	1
18	A diagonals of a parallelogram divides it into two congruent: (a)square (b) triangle (c)rectangles (d) none of these	1
19	Expansion of $(3a + 4b)^3$ is : (a)$27a^3 + 64b^3 - 108a^2b - 144ab^2$ (b) $27a^3 + 64b^3 + 108a^2b + 144ab^2$ (c) $27a^3 + 64b^3 + 144a^2b + 108ab^2$ (d) $27a^3 + 64b^3 - 144a^2b - 108ab^2$	1

20	An equilateral triangle of side 9 cm is inscribed a circle. The radius of the circle is (a) 3 cm (b) 3√2 cm (c) 3√3 cm (d) 6 cm	
SECTION - B		
Section B consists of 20 questions of 1 mark each. Any 16 questions are to be attempted		
Q.NO.		MARKS
21	Value of (x+8)(x-10) (a) $x^2 + 2x - 80$ (b) $x^2 - 2x + 80$ (c) $x^2 - 2x - 80$ (d) $x^2 + 2x + 80$	1
22	In the given figure, ΔABC and ΔDBC are inscribed in a circle such that ∠BAC = 60° and ∠DBC = 50°. then, ∠BCD =  (a) 50^0 (b) 60^0 (c) 70^0 (d) 80^0	1
23	Find: $(28)^3 + (-15)^3 + (-13)^3$ (a) -16380 (b)16380 (c)16280 (d)-16280	1
24	An arc is a _______ when its ends are the ends of a diameter. (a)Diameter (b)chord (c)Semicircle (d)Segment	1
25	If the volumes of two cones are in the ratio 1:4 and their diameters are in the ratio 4:5, then the ratio of their heights is (a) 1:5 (b)5:4 (c)5:16 (d)25:64	1
26	In figure, O is the centre of a circle and ∠AOB = 130°, then ∠ACB =  (a) 50^0 (b) 65^0 (c) 115^0 (d) 155^0	1
27	Which of the following is (are) the factors of $2x^3 + x^2 + x$? (a) x (b)$2x^2 + x + 1$ (c)Both a and b (d) 2x	1
28	What is the length of DE if DE || BC and D and E are midpoints of sides AB and AC of triangle ABC and BC is 18 cm? (a)18cm (b)15cm (c)9cm (d) 20cm	1
29	In figure, sides AB and AD of a quadrilateral ABCD are produced to E and F respectively. If ∠CBE = 100°, then find ∠CDF.	1

	 (a) 100^0 (b) 80^0 (c) 130^0 (d) 90^0	
30	Value of 103 × 97 is (a)9991 (b)9990 (c)9981 (d) 9864	1
31	Assertion: A square , rectangle and rhombus are all parallelograms. Reason: A parallelogram is a square. (a)Both A and R are true and R is the correct explanation of A. (b) Both A and R are true and R is not the correct explanation of A. (c) A is true but R is false. (d) A is false but R is true.	1
32	**A triangle ABC with AB = 4 cm and ∠A= 60° and ∠B= 40° is constructed. Then what is the measurement of ∠C?** (a) 40° (b) 60° (c) 80° (d) 100°	1
33	What is the value of $p(x) = 5x^2 - 3x + 7$ at x=1? (a) 9 (b)7 (c) 11 (d) 5	1
34	In a triangle ABC , median AD is produced to X such that AD = DX. Which of the following statement is correct? (a)ABXC is a rhombus. (b) ABXC is a parallelogram. (c) ABXC is a square. (d) ABXC is a rectangle.	1
35	Find the total surface area of a hemisphere of radius 10 cm . (a) $942cm^2$ (b) $986cm^2$ (c) $38.5cm^2$ (d) $906cm^2$	1
36	Assertion: If the lengths of two sides of an isosceles triangle are 4cm and 10cm , then the length of the third side is 4cm. Reason: An isosceles triangle has two of its sides equal. (a)Both A and R are true and R is the correct explanation of A. (b) Both A and R are true and R is not the correct explanation of A. (c) A is true but R is false. (d) A is false but R is true.	1
37	**Two diagonals of a rhombus ABCD are intersecting each other at point O. What is the value of ∠DOC?** (a) 30° (b) 60° (c) 90° (d) 45°	1
38	How many zeroes does a linear polynomial have ? (a) 0 (b)2 (c)1 (d) 3	1
39	**If the bisectors of all four angles of a parallelogram are made to intersect each other then the new quadrilateral thus formed will be a:** **(a) Rhombus (b) Rectangle (c) Square (d) Parallelogram**	1

40	The length ,breadth and height of a room are 5m , 4m and 3m respectively. Find the cost of white washing the walls of the room and the ceiling at the rate of Rs $7.50/m^2$. (a)505 (b)550 (c)544 (d) 555	1
	SECTION – C	
	Case study based questions: **Section C consists of 10 questions of 1 mark each. Any 8 questions are to be attempted.**	
	Q41-Q45 are based on Case Study -1	

Case Study – 1

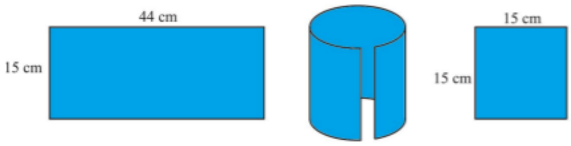
Mohan has a box of coloured pens. He takes a pen at random from the box. The probability that he takes a red pen is 0.4. If box contains total 50 pens of blue , green and red colour and there are 15 blue pens and 15 green pens , then answer the following questions:

41	Probability that he does not take red pen is : (a)3/5 (b) 4/5 (c)2/5 (d)1/2	1
42	The number of red pens in the box are : (a)15 (b) 20 (c) 25 (d) 30	1
43	Probability of taking blue pen is : (a) 0.6 (b) 0.5 (c)0.4 (d)0.3	1
44	Probability of taking green pen is : (a) 0.6 (b)0.5 (c)0.4 (d) 0.3	1
45	Probability of taking green or blue pen is : (a) 0.6 (b)0.3 (c)0.7 (d) 1	1

Q46-Q50 are based on Case Study -2

Case Study – 2

Mohan lives in Hyderabad in telangana.Those were very hot days of May. He thought that if we human beings need so much of water to drink , won't the birds also be thirsty.He decided to prepare a vessel to provide water for birds. He found a flexible blue coloured plastic rectangular sheet 44cm x 15cm . He rolled it along its length and joined the two opposite ends using a tape.He wanted to have a circular base for this cylinder and searched for another sheet. He found a square sheet 15cm x 15cm. He got a circular sheet just equal to the base of the cylinder cut from it.



46	The curved surface area of cylinder formed is : (a) 540cm^2 (b)560cm^2 (c)640 cm^2 (d) 660cm^2	1
47	The radius of the base of the cylinder is :	1

	(a)2cm (b) 7cm (c) 3.5cm (d)10cm	
48	The area of circular base required for the cylinder is : (a) 154cm^2 (b)216cm^2 (c)260 cm^2 (d) 308cm^2	1
49	How much will be the area of square sheet left unused after removing the circular base of cylinder from it ? (a) 69cm^2 (b)71cm^2 (c)83 cm^2 (d) 91cm^2	1
50	Find the volume of water that can be filled in the cylinder . (a) 1410ml (b)1730ml (c)2170ml (d) 2310ml	1

ANSWERS

Subject- Mathematics

Q.NO.	CORRECT OPTION	MARKS	**Q.NO.**	CORRECT OPTION	MARKS
1	(c)3y+1	1	31	(c)A is true but R is false	1
2	(b) 0	1	32	(c)80^0	1
3	(c)$10\sqrt{3}$cm	1	33	(a)9	1
4	(b) 12 cm	1	34	(b) parallelogram	1
5	(c)50^0	1	35	(a)942 cm^2	1
6	(c)trapezium	1	36	(d)A is false but R is true	1
7	(d)96	1	37	(c)90^0	1
8	(c)same	1	38	(c)1	1
9	(c)A is true but R is false	1	39	(b) rectangle	1
10	(b)45^0	1	40	(d)555	1
11	(b) 1	1	41	(a)3/5	1
12	(b) 4.5 cm	1	42	(b)20	1
13	(c)38^0	1	43	(d)0.3	1
14	(d)A is false but R is true	1	44	(d)0.3	1
15	(d) 10 cm	1	45	(a)0.6	1
16	(d) z = p	1	46	(d)660cm^2	1
17	(c)140	1	47	(b)7 cm	1
18	(b) triangle	1	48	(a)154 cm^2	1
19	(b)$27a^3 + 64b^3 + 108a^2b + 144ab^2$	1	49	(b) 71 cm^2	1
20	(c)$3\sqrt{3}$cm	1	50	(d) 2310ml	1
21	(c)$x^2 - 2x - 80$	1			
22	(c)70^0	1			
23	(b)16380	1			
24	(c)semicircle	1			
25	(d) 25:64	1			
26	(c)115^0	1			
27	(c)both a and b	1			
28	(c)9 cm	1			
29	(b)80^0	1			
30	(a)9991	1			

SAMPLE PAPER -02
MCQ-BASED

TERM II EXAMINATION 2021-22

SUBJECT – MATHEMATICS

CLASS - IX

TIME: $1\frac{1}{2}$ Hours **M.M: 40**

General Instructions:

1. **The question paper contains four parts A, B, C and D.**
2. **Section A consists of 20 questions of 1 mark each. Attempt any 16 questions.**
3. **Section B consists of 20 questions of 1 mark each. Attempt any 16 questions.**
4. **Section C consists of 5 questions of 1 mark each based on case studies. Attempt any 4 questions.**
5. **Section D consists of 5 questions of 1 mark each based on case studies. Attempt any 4 questions.**
6. **There is no negative marking.**

SECTION – A

Section A consists of 20 questions. Any 16 questions are to be attempted.

Q.1) Degree of the polynomial $f(x) = 5x^4 + 0x^3 + 0x^5 - 6x – 7$ is

(a) 5 (b) 3 (c) 4 (d) 7

Q.2) If $x = -1$ is a zero of the polynomial $ax^3 + x^2 - 2x + 4a – 12$, then $a =$

(a) 13/5 (b) 6 (c) 4 (d) 3

Q.3) With the help of a ruler and compass it is not possible to make an angle of

a) $37\frac{1}{2}^\circ$ (b) $22\frac{1}{2}^\circ$ (c) $67\frac{1}{2}^\circ$ (d) 40°

Q.4) The ratio of the interior angles of a quadrilateral is 3:5:9:13. Then the largest angle is

a) 150° (b) 156° (c) 132° (d) 130°

Q.5) **Equal _____ of the congruent circles subtend equal angles at the centers.**
(a)Segments (b) Radii (c) secants (d) chords

Q.6) To construct a triangle we need at least ______ no. of measurements.

(a) 2 (b) 3 (c) 1 (d) 4

Q.7) If the volume of a sphere is numerically equal to its surface area then its diameter is =

(a) 2 units (b) 1 unit (c) 3 units (d) 6 units

Q.8) Factors of $84 - 2r - 2r^2$ are

(a) 2(7+r) (6-r) (b) (14-r) (6-r)

(c) 2(7-r) (6-r) (d) (7-r) (12+2r)

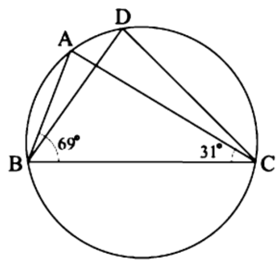
Q.9) $\sqrt{3}$ is a polynomial of degree

(a) not defined (b) 3 (c) 0 (d) ½

Q.10) The coefficient of x in the expansion of $(x + 3)^3$ is

(a) 1 (b) 9 (c) 18 (d)27

Q.11) In Fig., ∠ABC= 69°, ∠ACB= 31°, find ∠BDC.



a) 100° (b) 80° (c) 90° (d) 40°

Q.12) **The angle subtended by the diameter at a point on the semi-circle is:**
a) 90° (b) 45° (c) 180° (d) 60°

Q.13) A diagonal of a rectangle is inclined to one side of the rectangle at 25°. The acute angle between the diagonals is
(a) 55° (b) 50° (c) 40° (d) 25°

Q.14) $12x - 7x^2 + 4x - 2x^3$ is called a ___________ polynomial.

(a) linear (b) quadratic (c) cubic (d) biquadratic

Q.15) One of the zero of the polynomial $f(x) = 2x^2 + 7x - 4$ is

(a) 2 (b) 1/2 (c) -1/2 (d) -2

Q.16) x -2 is a factor of the polynomial

(a) $3x^2 + 6x - 24$ (b) $4x^2 + x - 2$ (c) $4x - 3x^2$ (d) $7x + x^2 - 28$

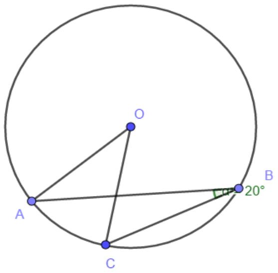
Q.17) The length of the chord which is at a distance of 12 cm from the centre of a circle of radius 13 cm is :

a) 5 cm (b) 12 cm (c) 13 cm (d) 10 cm

Q.18) The lateral surface area of cube is 256 m^2. The volume of the cube is:

a) 512 m^3 (b) $64m^3$ (c) 216 m^3 (d) 256 m^3

Q.19) In Fig. if ∠ABC = 20°, then find the value of ∠AOC.



a) 40° (b) 140° (c) 10° (d) 20°

Q.20) If the diagonal of a rhombus are 18 cm and 24 cm respectively, then its side is equal to
(a) 16 cm (b) 15 cm (c) 20 cm (d) 17 cm

SECTION – B

Section B consists of 20 questions of 1 mark each. Any 16 questions are to be attempted.

Q.21) The volumes of the two spheres are in the ratio 64:27. The ratio of their surface areas is

(a) 3:2 (b) 4:3 (c) 16:9 (d) 9:16

Q.22) 30 Circular plates each of radius 14 cm and thickness 3 cm are placed one above the another to form a cylindrical solid. Its total surface area is =

a) 9152 cm^2 (b) $1496cm^2$ (c) 8020 cm^2 (d) 264 cm^2

Q.23) (7A + ½) (7A – ½) =

(a) $49A^2 + 1/4$ (b) $49A^2 - 1/4$

(c) $49A^2 + 1/4 + 7A$ (d) $49A^2 + ¼ - 7A$

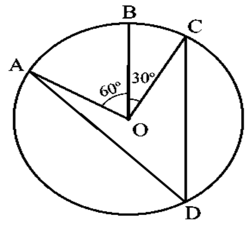
Q.24) The total surface area of a cone whose radius is r/2 and slant height is 2l is

a) $2\pi r(l + r)$ (b) $\pi r(l + r/4)$ (c) $\pi r(l + r)$ (d) $2\pi rl$

Q.25) The radius of a hemisphere is 3r. Its volume is

a) $2/3\pi r^3$ (b) $18 \pi r^3$ (c) $4/3\pi r^3$ (d) $9\pi r^3$

Q.26) In Fig. A,B and C are three points on a circle with centre O such that ∠ BOC = 30° and ∠ AOB = 60°. If D is a point on the circle other than the arc ABC, find ∠ADC.



a) 120° (b) 15° (c) 45° (d) 30°

Q.27) The construction of a triangle ABC , given that AB = 5 cm, angle A = 45° is possible when BC + CA =

a) 5 cm (b) 4.5 cm (c) 8 cm (d) 4 cm

Q.28) Factors of $1 + 64 x^3$ are :

(a) $(1 + 4x)^3$ (b) $(1+4x)(1+16x^2 – 4x)$

(c) $(1- 4x)(1 + 16x^2 – 4x)$ (d) $(1-4x)(1 + 16x^2 + 4x)$

Q.29) If $x + 1/x$ is 5 then $x^2 + 1/x^2$ =

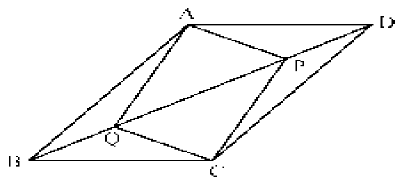
a) 25 (b) 10 (c) 23 (d) 27

Q.30) **ABC is a triangle right angled at C. A line through the mid-point M of hypotenuse AB and parallel to BC intersects AC at D. Then which of the following is not true?**

(a) **D is the mid-point of AC** (b) **MD ⊥ AC** (c) **CM = MA = 1/2 AB**
(d) **none of these**

Q.31) In parallelogram ABCD, two points P and Q are taken on diagonal BD such that DP = BQ (see Fig). Then which of the following is true ?

(a) Δ APD ≅ Δ CQB (b) AP = BQ (c) Δ APD ≅ Δ AQB (d) AQ = DP



Q.32) The radius of a circle is 17 cm and the length of one of its chords is 16 cm. The distance of the chord from the centre is
(a) 11.5 cm (b) 12 cm (C) √69 (d) 15 cm

Q.33) **ABCD is a rectangle and P, Q, R and S are mid-points of the sides AB, BC, CD and DA, respectively. Then the quadrilateral PQRS is a**

(a) rhombus (b) square (c) rectangle (d) trapezium

Q.34) If p(x) = x + 3 , then p(x) + p(-x) =

(a) 2x (b) 3 (c) 0 (d) 6

Q.35) ASSERTION: Diagonals of a rhombus bisect each other.

REASON: One angle between its diagonals is 60°.

(A) Both assertion (A) and reason (R) are correct and reason (R) is the correct explanation of assertion (A).
(B) Both assertion (A) and reason (R) are correct but reason (R) is not the correct explanation of assertion (A).
(C) assertion (A) is true but reason (R) is false.
(D) assertion (A) is false but reason (R) is true.

Q.36) ASSERTION: If all the angles of a quadrilateral is 90° then it is a rectangle

REASON: If adjacent sides of a rectangle are equal then it is a square.

(A) Both assertion (A) and reason (R) are correct and reason (R) is the correct explanation of assertion (A).
(B) Both assertion (A) and reason (R) are correct but reason (R) is not the correct explanation of assertion (A).
(C) assertion (A) is true but reason (R) is false.
(D) assertion (A) is false but reason (R) is true.

Q.37) ASSERTION: If $a^2 + b^2 + c^2 = 20$ and $a + b + c = 0$, then $ab + bc + ca = -10$

REASON: $(a + b + c)^2 = a^2 + b^2 + c^2 + 2ab + 2bc + 2ca$

(A) Both assertion (A) and reason (R) are correct and reason (R) is the correct explanation of assertion (A).
(B) Both assertion (A) and reason (R) are correct but reason (R) is not the correct explanation of assertion (A).
(C) assertion (A) is true but reason (R) is false.
(D) assertion (A) is false but reason (R) is true.

Q.38) ASSERTION: Factorization of polynomial $f(x) = 25x^2 – 10x + 1 – 36y^2$ is

$(5x – 1 + 6y)(5x – 1 – 6y)$

REASON: $(5x – 1 + 6y)(5x – 1 – 6y)$ on simplification gives $25x^2 – 10x + 1 – 36y^2$

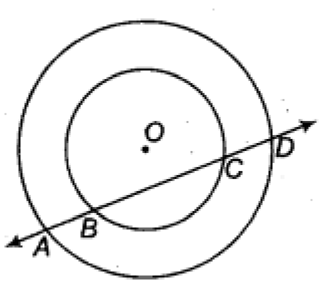
(A) Both assertion (A) and reason (R) are correct and reason (R) is the correct explanation of assertion (A).
(B) Both assertion (A) and reason (R) are correct but reason (R) is not the correct explanation of assertion (A).
(C) assertion (A) is true but reason (R) is false.
(D) assertion (A) is false but reason (R) is true.

Q.39) ASSERTION: Diameter is the longest chord of the circle.

REASON: There is only one diameter in a circle.

(A) Both assertion (A) and reason (R) are correct and reason (R) is the correct explanation of assertion (A).
(B) Both assertion (A) and reason (R) are correct but reason (R) is not the correct explanation of assertion (A).
(C) assertion (A) is true but reason (R) is false.
(D) assertion (A) is false but reason (R) is true.

Q.40) ASSERTION: In the given figure, l is a line intersecting concentric circles with centre O at points A, B, C and D. Then AB = CD.



REASON: The perpendicular drawn from the centre to a chord bisects the chord.

(A) Both assertion (A) and reason (R) are correct and reason (R) is the correct explanation of assertion (A).
(B) Both assertion (A) and reason (R) are correct but reason (R) is not the correct explanation of assertion (A).
(C) assertion (A) is true but reason (R) is false.
(D) assertion (A) is false but reason (R) is true.

SECTION – C

CASE STUDY BASED QUESTIONS

Section C consists of 5 questions of 1 mark each. Any 4 questions are to be attempted.

CASE STUDY – 1 VISIT TO THE RED FORT

Mathematics teacher of a school took her 9th standard students to show the Red fort. It was a part of their Educational trip. The teacher had interest in history as well. She narrated the facts of the Red fort to the students. Then the teacher said that in this monument one can find many solid figures. There are 2 pillars which are cylindrical in shape. Also 2 domes at the corners which are hemispherical. 7 smaller domes at the centre. Flag hoisting ceremony on Independence Day takes place near these domes.

Q.41) How much cloth material will be required to cover 2 big domes each of radius 3.5 metres? (Take π = 22/7)

(a) 175m^2 (b) 77 m^2
(c) 87.47m^2 (d) 154 m^2

Q.42) Write the formula to find the volume of a cylindrical pillar.

(a) $\pi r^2 h$ (b) πrl
(c) $\pi r(l + r)$ (d) $2\pi r$

Q.43) Find the lateral surface area of two pillars if height of the pillar is 7m and radius of the base is 1.4m.

(a) 112.3 m^2 (b) 123.2m^2
(c) 90m^2 (d) 145.2m^2

Q.44) How much is the volume of a hemisphere if the radius of the base is 7 m?

(a) 7 85.9 m^3 (b) 780 m^3
(c) 798 m^3 (d) 718.67 m^3

Q.45) Find the radius of the smaller dome if its curved surface area is 27.72 m^2

(a) 2.1 m (b) 3.5 m
(c) 2.8 m (d) 1.4 m

SECTION – D

CASE STUDY – II ORANGES

Section D consists of 5 questions of 1 mark each. Any 4 questions are to be attempted.

The following data gives the weight (in grams) of 30 oranges picked from a basket: 106, 107, 76, 109, 187, 95, 125, 92, 70, 139, 128, 100, 88, 84, 99, 113, 204, 141, 136, 123, 90, 115, 110, 97, 90, 107, 75, 80, 118, 82.

Grouped frequency distribution table

Class Interval	Frequency
60-80	3
80-100	10

100-120	9
120-140	5
140-160	1
160-180	0
180-200	1
200-220	1
Total	**30**

Q.46) If one orange is selected from the basket, find the probability that this orange has weight less than 100 grams.

(a) 9/30 (b) 1/10 (c) 11/15 (d) 13/30

Q.47) If one orange is selected from the basket, find the probability that this orange has weight less than 220 grams.

(a) 1/30 (b) 1/10 (c) 0 (d) 1

Q.48) If one orange is selected from the basket and this orange has weight less than 220 grams. This event is called

(a) not defined (b) impossible event (c) sure event (d) simple event

Q.49) If probability of selecting an orange having weight less than equal to 150 gm is 0.9, then probability of selecting an orange weighing more than 150 gm is

(a) not defined (b) 0.1 (c) 0 (d) can't say

Q.50) The probability of an impossible event is

(a) not defined (b) 1 (c) 0 (d) ½

MARKING SCHEME OF SAMPLE PAPER (MCQ BASED)

CLASS IX MATHEMATICS TERM II (2021-22)

NOTE: Each correct answer carries one mark.

SECTION A

Q.1) (c) 4 Q.2) (d) 3 Q.3) (d) 40°

Q.4) (b) 156° Q.5) (d) chords Q.6) (b) 3

Q.7) (d) 6 units Q.8) (a) 2(7 + r) (6 – r) Q.9) (c) 0

Q.10) (d) 27 Q.11) (b) 80° Q.12) (a)) 90°

Q.13) (b) 50° Q.14) (c) cubic Q.15) (b) 1/2

Q.16) (a) $3x^2 + 6x - 24$ Q.17) (d) 10 cm Q.18) (a) 512 m^3 Q.19) (a) 40° Q.20) (b) 15 cm

SECTION B

Q.21) (c) 16 : 9 cm Q.22) (a) 9152 Q.23) (b) 49 A^2 – ¼

Q.24) (b) $\pi r (l + r/4)$ Q.25) (b) $18\pi r^3$ Q.26) (c) 45°

Q.27) (c) 8 cm Q.28) (b)$(1+4x)(1+16x^2-4x)$ Q.29) (c) 23

Q.30) (d) none of these Q.31) (a) $\Delta APD \cong \Delta CQB$ Q.32) (d) 15 cm

Q.33) (a) rhombus Q.34) (d) 6 Q.35) (C)

Q.36) (B) Q.37) (A) Q.38) (A)

Q.39) (C) Q.40) (A)

SECTION C

Q.41) (d) 154 m^2 Q.42) (a) $\pi r^2 h$ Q. .43) (b) 123.2 m^3 Q. .44) (d) 718.67 m^3 Q. .45) (a) 2.1 m

SECTION D

Q.46) (d)13/30 Q.47) (d)1 Q. .48) (c) sure event Q. .49) (b) 0.1 Q. 50) (c) 0

SAMPLE PAPER -03 MCQ-BASED

Class- IX

Session- 2021-22 TERM II Subject- Mathematics

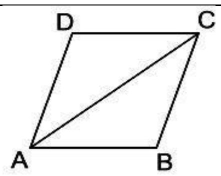
Time Allowed: 90 minutes Maximum Marks: 40

General Instructions:

1. The question paper contains three parts A, B and C.

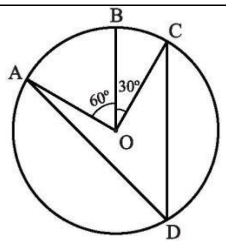
2. Section A consists of 20 questions of 1 mark each. Attempt any 16 questions.

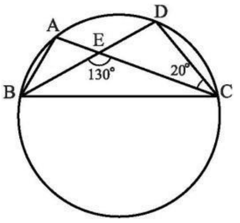
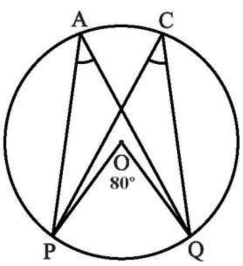
3. Section B consists of 20 questions of 1 mark each. Attempt any 16 questions.

	SECTION A	
	Section A consists of 20 questions of 1 marks each. Any 16 questions are to be attempted.	
Q.NO		MARKS
1	The value of $p(x) = 5x - 4x^2 + 3$ for $x = 0$ is: (a) 3 (b) 2 (c) – 3 (d) – 2	1
2	There is one and only one circle passing through ____________given non-collinear points. (a) two (b) three (c) four (d) five	1
3	If $x - 2$ is a factor of $x^3 - 3x + 5a$ then the value of a is: (a) 1 (b) –1 c)2 / 5 (d) -2/5	
4	The number of zeroes of the given polynomial, $(x+1)^2 = (x+2)(x-3)$is (a) 2 (b) 3 (c) 4 (d) 1	1
5	ABCD is a parallelogram, M is the midpoint of BD and BM bisects $\angle$ B, then $\angle$ AMB = (a) 450 (b) 750 (c) 900 (d) 600	1
6	 In the above right sided diagram of rhombus *ABCD*, $m\angle CAB = 35^0$.Find $m\angle CDA$. (a) 35° (b) 70° (c) 110° (d) 140°	1
7	The bisectors of the angles of parallelogram enclose a a)parallelogram (b) rhombus (c) rectangle (d) square	1

4. Section C consists of 10 questions based on two Case Studies. Attempt any 8 questions.

5. There is no negative marking.

8	The area of circular base of a right circular cone is 78.5 cm^2. If its height is 12 cm then its volume is a)31.4 cm^3 (b) 3.14 cm^3 (c) 314 cm^3 (d) none of these	1
9	For which of the following condition the construction of a triangle is not possible: **a.** If two sides and angle included between them is not given **b.** If two sides and angle included between them is given **c.** If its three sides are given **d.** If two angles and side included between them is given	1
10	The degree of 3 is: (a) 0 (b) 1 (c) 2 (d) 3	1
11	ABCD is a cyclic quadrilateral in which BC is parallel to AD, $\angle$ ADC = DAC $\angle$ (a) 80º (b) 60º (c) 90º (d) 170	1
12	If base radius and height of a cylinder are increased by 10% then its volume increased by: (a) 30% (b) 40% (c) 42% (d) 33.1%	1
13	 In above sided Fig, A,B and C are three points on a circle with centre O such that $\angle BOC = 30°$ and $\angle AOB = 60°$. If D is a point on the circle other than the arc ABC, find $\angle$ ADC. a)45º (b) 60º (c) 90º (d) none of these	1
14	The number in the form of 4p + 3, where p is a whole number, will always be: (a) even (b) odd (c) even or odd (d) multiple of 3	1
15	The sum of either pair of opposite angles of a cyclic quadrilateral is (a) 180º. (b) 360º (c) 90º (d) none of these	1

16	Assertion : A polynomial always has a degree as a positive integer Reason : $p(x) = x^4 - 2x^3 + 3x^2 - ax + 3a - 7$ is a polynomial. (a) Both assertion (A) and reason (R) are true and reason (R) is the correct explanation of assertion (A). (b) Both assertion (A) and reason (R) are true but reason (R) is not the correct explanation of assertion (A). (c) Assertion (A) is true but reason (R) is false. (d) Assertion (A) is false but reason (R) is true.	1
17	 In the above sided Fig., A, B, C and D are four points on a circle. AC and BD intersect at a point E such that ∠BEC = 130° and ∠ECD = 20°. Find ∠ BAC. a) 110° b) 150° (c) 90° (d) 100^0	1
18	If $2(a^2 + b^2) = (a + b)^2$, then (a) a + b = 0 (b) a = b (c) 2a = b (d) ab = 0	1
19	Construction of a triangle is not possible if: (a) AB + BC < AC (b) AB + BC = AC (c) both (a) and (b) (d) AB + BC > AC	1
20	A bag contains 5 red, 8 green and 7 white balls. One ball is drawn at random from the bag, find the probability of getting a white ball or a green ball a) 1/7 b)7/20 c)8/20 d) 3/4	1
	SECTION B	
	Section B consists of 20 questions of 1 marks each. Any 16 questions are to be attempted.	
21	 In the figure, ∠ POQ= 80^0, find ∠ PAQ a)80° (b) 40° (c) 100° (d) none of these	1

22	On dividing $x^3 + 3x^2 + 3x + 1$ by x 1,we get remainder: (a) 1 (b) 0 (c)– 1 (d) 2	1
23	If 2 and α are zeroes of $x^2 - 3x + 2$, then the value of α is : (a) 2 (b) 3 (c) 1 (d) 5	1
24	The curved surface area of a sphere is 616 cm^2. Its radius is a)7 cm (b) 5 cm (c) 6 cm (d) 8 cm	1
25	A cylindrical pillar is 50 cm in diameter and 3.5 m in height. The cost of painting its curved surface at the rate of Rs. 12.50 per m^2 is: (a) Rs. 68.75 (b) Rs. 58.75 (c) Rs. 48.75 (d) Rs. 38.75	1
26	If two consecutive sides of a rhombus are represented by 3*x* - 6 and *x* + 14, then the perimeter of the rhombus is (a) 10 (b) 24 (c) 70 (d) 96	1
27	The volume of a sphere is 524 cm^3. The diameter of sphere is…(Take π=3.14) a) 5cm (b) 10cm (c) 3cm (d) 7cm	1
28	In rectangle *DATE*, diagonals DT and AE intersect at *S*. If *AE* = 40 and *ST* = *x* + 5, find the value of *x*. (a) 10 (b) 18 (c) 15 (d) 20	1
29	The construction of a triangle ABC, given that BC = 6cm with angle = 45^0 is not possible when the difference of AB and AC is equal to (a) 6.9 cm (b) 5.2 cm (c) 5.0 cm (d) 4.0 cm.	1
30	If x + y + 2 = 0, then $x^3 + y^3 + 8$ equal (a) $(x + y + 2)^3$ (b) 0 (c) 6xy (d) –6xy	1
31	The area of rhombus is 120 cm^2 and one of its diagonals is 12 cm then the other diagonal is A. 5 cm B. 10 cm C. 20 cm D. 12 cm	1
32	A ticket is drawn at random from a bag containing tickets numbered from 1 to 40. The probability that the selected ticket has a number which is a multiple of 5 is: (a) 3 /5 (b) 1/ 5 (c) 1 /3 (d) 4 /5	1

33	Which statement is true about all parallelograms? (a) The diagonals are congruent. (b) The area is the product of two adjacent sides. (c) The opposite angles are congruent. (d) The diagonals are perpendicular to each other.	1
34	Factorisation of $x^3 + 1$ is (a) $(x + 1)(x^2 – x + 1)$ (b) $(x + 1)(x^2 + x + 1)$ (c) $(x + 1)(x^2 – x – 1)$ (d) $(x + 1)(x^2 + 1)$	1
35	The number of zeroes of the polynomial x^3 $+ x – 3 – 3x^2$ is (a) 1 (b) 2 (c) 0 (d) 3	1
36	The region between chord and either of arcs is .... a)Segment b) Diameter c)Sector d) Major arc	1
37	Zero of the polynomial $p(x) = a^2x$, a □0 is (a) x = 0 (b) x = 1 (c) x = –1 (d) a = 0	1
38	The length of the side of a square whose diagonal is 16cm, is: (a) 8√2cm (b) 2√8cm (c) 4√2 cm (d) 2√2 cm.	1
39	The probability of selecting a rotten apple randomly from a heap of 900 apples is 0.18. What is the number of rotten apples in the heap? (a) 18 (b) 81 (c) 738 (d) 162	1
40	The figure formed by joining the mid-points of the sides of a quadrilateral ABCD, taken in order, is a square only if, (A) ABCD is a rhombus (B) diagonals of ABCD are equal (C) diagonals of ABCD are equal and perpendicular (D) diagonals of ABCD are perpendicular.	1
	SECTION C CASE STUDY BASED QUESTIONS	
	Section C consists of 10 questions of 1 marks each. Any 8 questions are to be attempted.	
	CASE STUDY QUESTION 01 Mathematics teacher of a school took her 9th standard students to show Red fort. It was a part of their Educational trip. The teacher had interest in history as well. She narrated the facts of Red fort to students. Then the teacher said in this monument one can find combination of solid figures. There are 2 pillars which are cylindrical in shape. Also 2 domes at the corners which are hemispherical.7 smaller domes at the centre. Flag	

	hoisting ceremony on Independence Day takes place near these domes. 	
41	How much cloth will be required to cover 2 big domes each of radius 2.5 m?(π=22/7) a) 75m^2 b)78.57m^2 c)87.47 m^2 d)25.8 m^2	1
42	Write the formula to get the volume of cylindrical pillar a) πr^2 b)πr^2h c)2πr d)πrl	1
43	Find the lateral surface area of two pillars if the height of the pillar is 7m and radius is 1.4 m a) 112.3 cm^2 b)123.2 cm^2 c)90 cm^2 d) 345.2cm^2	1
44	The volume of hemisphere if the radius of base is 3.5m is... a)85.9 m^2 b)80m^2 c)98 m^2 d)89.83 m^2	1
45	What is the ratio of sum of volumes of two hemispheres of radius 1 cm each to the volume of a sphere of radius 2 cm? a) 1:1 b)1:8 c)8:1 d) 1:16	1
	CASE STUDY QUESTION 02  In the autumn break, Ravi and Aman started playing a game .They put some cards marked with numbers 1-25 in the box and mixed thoroughly. One card is drawn at random by each from the box.	
46	What is the probability of getting a number 5? (a) 1 (b) 0 c) 1/25 d)1/5	1
47	What is the probability of getting a number less than 11? (a) 1 (b) 0 c) 1/5 d) 2/5	1
48	What is the probability of getting a number greater than 25? (a) 1 (b) 0 c)1/5 d)2/5	1
49	What is the probability of getting an even number? (a) 1 (b) 0 c) 12/25 d)13/25	1
50	What is the probability of getting a number divisible by 3?	1
	a)8/25 b) 4/25 c)1/5 d) 3/5	

Sample Question Paper -01

Class- IX Session- 2021-22 TERM 2 Subject- Mathematics

SOLUTION

Q.NO	CORRECT OPTION	HINT/SOLUTION
		SECTION A
1	A	For x=0 ,p(x) =3
2	B	Three points
3	D	Put x=2 in polynomial a=-2/5
4	D	1
5	C	ABCD is a rhombus ,hence ∠AMB=90º
6	C	*m∠CDA=180º*
7	C	Rectangle
8	C	Area=1/3x area of base x height Put the values , Volume= 314
9	A	If two sides and angle included between them is not given
10	A	Degree is zero
11	B	∠DAC=60º
12	D	33.1%
13	A	∠AOC=90º Hence ∠ADC=1/2x∠AOC=1/2x90º= 45º
14	B	Odd number because even+odd= odd number
15	A	Sum=180º
16	A	Both assertion (A) and reason (R) are true and reason (R) is the correct explanation of assertion (A)
17	A	110º , because ∠DEC +∠BEC=180º
18	B	a=b ,
19	C	Both(a) and (b)
20	D	Probability=3/4 Total balls=20 P(of getting white or green ball)= 15/20 = ¾
21	B	∠PAQ=40º Angle subtended by an arc at center is twice of angle at the remaining part of circle
22	A	1
23	C	α=1 Factors are (x-2)(x-1) x=1 or 2
24	A	Radius =7cm C.S.A. =616 sq.cm $Area = 4\pi r^2$ hence radius =7cm
25	A	Cost=Rs.68.75 C.S.A of cylinder=2πrh= 5.5 sq.m. Cost=5.5x12.50= Rs. 68.75
26	D	96 3x-6= x+14 2x=20 ,x=10 Hence side =3(10)-6= 24 Perimeter= 4X Side= 4X24=96 m
27	C	10cm Volume of sphere= $4/3\pi r^3$ =524 cm cube

		Radius = 5cm Diameter=10cm
28	C	15 x=15 cm
29	A	6.9 cm
30	C	6xy a3+ b3+ c3− 3abc = (a + b + c) (a2+ b2+ c2− ab − bc − ac) If a+b+c=0 then a3+ b3+ c3= 3abc Hence $x^3 + y^3 + 8$= 6xy
31	C	20cm Area of rhombus =120 cm Area=1/2 X diagonal 1Xdiagonal2
32	B	P=1/5 Total tickets=40 P(multiple of 5)=8/40= 1/5
33	C	The opposite angles are congruent
34	A	$x^3 + 1= (x + 1)(x^2 – x + 1)$
35	D	Number of zeroes =3 $p(x)=x^3 + x – 3 – 3x^2$ Degree=3 Hence it has 3 zeroes
36	A	Segment
37	A	X=0 Zero of the polynomial $p(x) = a^2x, a \neq 0$ X=0
38	A	8√2cm Diagonal= √2a ,Hence side = 8√2cm
39	D	162 apples P(of selecting a rotten apple)=0.18=18/10 Total apples=900 Also P=Rotten/total apples Rotten apples=162
40	C	diagonals of ABCD are equal and perpendicular
41	B	$78.57m^2$ Cloth material=2X Surface area of hemisphere $=78.57m^2$
42	B	Volume of cylinder=πr^2h
43	B	C.S.A=$123.2m^2$ Lateral surface area =2X C.S.A=$123.2m^2$
44	D	89.83 m^3 volume of hemisphere=2/3πr^3 = 89.83 m^3
45	B	1:8
46	C	P(a number 5)= 1/25
47	D	P(a number less than 11)=10/25= 2/5
48	B	P(a number greater than 25)= 0
49	C	P(an even number)= 12/25
50	A	P(a multiple of 3)= 8/25