CONTENTS

Term I - April-May

1. Coordinate Geometry

The Cartesian plane, coordinates of a point, names and terms associated with the coordinate plane, notation, plotting points in the plane, graph of linear equations as examples; focus on linear equations of the type ax+by+c = 0 by writing it as y = mx+c and linking with the chapter on linear equations in two variables.

2. Linear Equations in Two Variables

Recall of linear equations in one variable. Introduction to the equation in two variables. Prove that a linear equation in two variables has infinitely many solutions, and justify their being written as ordered pairs of real numbers, plotting them and showing that they seem to lie on a line. Examples, problems from real life, including problems on Ratio and Proportion and with algebraic and graphical solutions being done simultaneously.

3. Surface Areas and Volumes

Surface areas and Volumes of cubes, cuboids, spheres (including hemisphere) and right circu**lar** cylinders/cones.

July- August

1. Number System

Review of representation of natural numbers, integers, rational numbers on the number line. Representation of terminating/non-terminating recurring decimals, on the number line through successive magnification. Rational numbers as recurring/terminating decimals.

Examples of nonrecurring/non-terminating decimals such as $\sqrt{2}.\sqrt{3},\sqrt{5}$etc. Existence of non-rational numbers (irrational numbers) such as $\sqrt{2}.\sqrt{3}$, and their representation on the number line. Explaining that every real number is represented by a unique point on the number line, and conversely, every point on the number line represents a unique real number.

Existence of $\sqrt{x}$ for a given positive real number x (visual proof to be emphasized). Definition of nth root of a real number.

Recall of laws of exponents with integral powers. Rational exponents with positive real bases (to be done by particular cases, allowing learner to arrive at the general laws). Rationalization (with precise meaning) of real numbers of the type (and their combination)

$\frac{1}{a+b\sqrt{x}}$ *and* $\frac{1}{\sqrt{x}+\sqrt{y}}$where x and y are natural numbers and a ,b are integers.

2. **Heron's Formula.**

Area of triangle using Heron's formula (without proof) and its application in finding the area of a quadrilateral

2. POLYNOMIALS

Recall of algebraic expressions, terms, factorization, etc. Definition of a polynomial, its coefficients, with examples and counter examples. Zero polynomial. Degree of a polynomial with examples. Constant, linear, quadratic, cubic polynomials. Monomials, binomials, trinomials. Factors and multiples. Recall algebraic identities. Further identities of the type

$$(x+y+z)^2 = x^2+y^2+z^2+2xy+2yz+2zx,\ (x \pm y)^3 = x^3 \pm y^3 \pm 3xy(x \pm y),$$
$$x^3+y^3+z^3-3xyz = (x+y+z)(x^2+y^2+z^2-xy-yz-zx)$$

and their use in factorization of polynomials. Simple expressions reducible to these polynomials. Polynomials in one variable: zero/roots of a polynomial/ equation. State and motivate the Remainder Theorem with examples and analogy to integers. Statement and proof of the Factor Theorem. Factorization of $ax^2+bx+c, a \neq 0$ where a, b, c are real numbers, and of cubic polynomials using the Factor Theorem.$a^3+b^3+c^3-3abc$may be included.

3. **Introduction to Euclid's Geometry**

History- Euclid and geometry in India. Euclid's method of formalizing observed phenomenon into rigorous mathematics with definitions, common/obvious notation, axioms/postulates, and theorems. The five postulates of Euclid. Equivalent versions of the fifth postulate, showing the relationship between axiom and theorem.

1. Given two distinct points, there exists one and only line through them.
2. (Prove) Two distinct lines cannot have more than one point in common.

4.. Lines and Angles

1. If a ray stands on a line, then the sum of the two adjacent angles so formed is 180° and its converse.
2. **(**Prove**)** If two lines intersect, the vertically opposite angles are equal.
3. (Motivate) Results on corresponding angles, alternate angles, interior angles when a transversal intersects two parallel lines.
4. (Motivate) Lines, which are parallel to a given line, are parallel.
5. (Prove) The sum of the angles of a triangle is 180°
6. (Motivate) If a side of triangle is produced, the exterior angle so formed is equal to the sum of two interior opposite angles.

Term 2

September-October

1.Triangles

1. (Motivate) Two triangles are congruent if any two sides and the included angle of the one triangle are equal to any two sides and the included angle of the other triangle (SAS Congruence)
2. (Prove) Two triangles are congruent if any two angles and the included side of one triangle are equal to any two angles and the included side of the other triangle (ASA Congruence)
3. (Motivate) Two triangles are congruent if the three sides of one triangle are equal to the three sides of the other triangle.
4. (Motivate) Two right triangles are congruent if the hypotenuse and a side of one triangle are respectively equal to the hypotenuse and a side of the other triangle.
5. (Prove) The angles opposite to equal sides of a triangle are equal.
6. (Motivate) The sides opposite to equal angles of a triangle are equal.
7. (Motivate) Triangle inequalities and relation between 'angle and facing side' inequalities in triangles.

November- December

Quadrilaterals

1. (Prove) The diagonal divides a parallelogram into two congruent triangles.
2. (Motivate) In a parallelogram opposite side 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, diagonals bisect each other and conversely.
6. (Motivate) In a triangle, the line segment joining the midpoints of any two sides is parallel to the third side and (Motivate) its converse.

1. Area of Parallelograms and Triangles

1. (Prove) Parallelograms on the same base and between the same parallels have the same area.
2. (Motivate) Triangles on the same base and between the same parallels are equal in area and its converse.

<u>January</u>

1.Circles

Through examples, arrive at definitions of circle related concepts, radius, circumference, diameter, chord, arc, 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)There is one and only one circle passing through three given non-collinear points.

4. (Motivate) Equal chords of a circle (or of congruent circles) are equidistant from the centre(s) and conversely.
5. (Prove) 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.
6. (Motivate) Angles in the same segment of a circle are equal.
7. (Motivate) If a line segment joining two points subtends equal angle at two other points lying on the same side of the line containing the segment, the four points lie on a circle.
8. (Motivate) The sum of the either pair of the opposite angles of a cyclic quadrilateral is 180 and its converse.

2. Constructions

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

February

1. Statistics:

Introduction to statistics: Collection of data, presentation of data- tabular form, ungrouped/grouped, bar graphs, histograms (with varying base lengths), frequency polygons, qualitative analysis of data to choose the correct form of presentation for the collected data. Mean, median, mode of ungrouped data.

2. Probability

History of Probability. Repeated experiments and observed frequency approach to probability. Revision for the final term

Assignment 1(A)- Number Systems

1. $0.6666\ldots\ldots$ in $\frac{p}{q}$ form is :

   a) $\frac{3333}{5000}$ b) $\frac{2}{3}$ c) $\frac{2}{33}$ d) $\frac{3}{2}$

2. If the radius of a circle is a rational number, its area is given by a number which is:

   a) Always rational b) sometimes rational and sometimes irrational c) Always irrational

3. The decimal representation of an irrational number is :

   a) always terminating b) either terminating or repeating

   c) either terminating or non-repeating d) neither terminating nor repeating

4. A rational number between $\sqrt{2}$ and $\sqrt{3}$ is:

   (a) $\frac{\sqrt{2}+\sqrt{3}}{2}$ (b) $\frac{\sqrt{2}\times\sqrt{3}}{2}$ (c) 1.5 (d) 1.8

5. Classify the following as rational and irrational numbers:

   $(i)\ 2.\overline{613}$ (ii) 0.121523..... (iii) $4 + \sqrt{2}$ (iv) 7π $(v)\ \sqrt{9}+6$ (vi) 3.141141141......

6. Find a rational and an irrational number between $\sqrt{3}$ and $\sqrt{5}$.

7. Express the following in p/q form: (i) $0.\overline{001}$ (ii) $3.\overline{14}$ (iii) $0.1\overline{2}$

8. Multiply: (i) $\sqrt{162}$ by $\sqrt{2}$ (ii) $5\sqrt{2}$ by $\sqrt{17}$ (iii) $4\sqrt{12}$ by $7\sqrt{6}$

9. Divide: (i)$21\sqrt{384}$ by $8\sqrt{96}$ (ii) $3\sqrt{12}$ by $6\sqrt{27}$ (iii) $4\sqrt{28}$ by $3\sqrt{7}$

10. Simplify: (i) $2\sqrt{50}\times 3\sqrt{32}\times 4\sqrt{18}$ (ii) $8\sqrt{45}-8\sqrt{20}+\sqrt{245}-3\sqrt{125}$

11. Find the product: (i) $(3\sqrt{18}+2\sqrt{12})\times(\sqrt{50}-\sqrt{27})$ (ii)$(4\sqrt{3}+3\sqrt{2})\times(2\sqrt{5}-5\sqrt{3})$

12. Evaluate : (i) $\sqrt{5+2\sqrt{6}}$ (ii) $\sqrt{8-2\sqrt{15}}$

Additional Information:

http://tinyurl.com/irrationalnos

Fun with Math -Palindrome Numbers

Numbers that read the same whether read forwards or backwards are 'Palindrome numbers'. The numbers 1441, 121, 67076, 145787541 are palindromes.

- Find out all palindrome numbers less than 100. Are these all multiples of any one particular number?
- Find any five palindrome numbers which, when divided by 11 , yield a quotient that is also a palindrome.(e.g. when 24662 is divided by 11 the quotient is 22422, which is a palindrome)
- Are the squares of 33, 333, 3333 etc. palindromes?

Interesting facts about 'Palindrome'

- Palindrome is a Greek word meaning 'running back again'
- Some interesting palindromic words are ' Top Spot' , ' Malayalam' and ' Never odd or Even'
- The largest non-hyphenated palindrome word is saippuakauppias, a Finnish word for a soap dealer.
- An interesting word- palindrome by J. A. Lindon is: " You can cage a swallow , can't you, but, you can't swallow a cage, can you"

A Speedy Palindrome

Sarah checks out the odometer on her car. It reads 14,941 miles. She notices that it reads the same backward as forward.

"I wonder how long it will be before that happens again?" Sarah thought to herself. To her surprise, in 2 hours the odometer showed a new palindrome number. What was the number, and what was the average speed of the car in those 2 hours?

Assignment 1(B) -Number Systems

1. If $\sqrt{2} = 1.41$ then $\frac{1}{\sqrt{2}}$ is :

   a) 0.075 b) 0.75 c) 0.705 d) 7.05

2. $\sqrt[3]{2} \times \sqrt[4]{2} \times \sqrt[12]{32}$ is :

   a) 2 b) $\sqrt{2}$ c) $2\sqrt{2}$ d) $4\sqrt{2}$

3. If $\left(\frac{3}{5}\right)^x \left(\frac{5}{3}\right)^{2x} = \frac{125}{27}$ then x is :

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

4. If x = $\frac{\sqrt[3]{(343)^{-2}}}{\sqrt[4]{81}}$ then the value of x is :

   a) $\frac{1}{140}$ b) $\frac{49}{143}$ c) $\frac{3}{49}$ d) $\frac{1}{147}$

5. Simplify the following by rationalizing the denominator.

   (i) $\frac{2\sqrt{6}+\sqrt{5}}{3\sqrt{5}-2\sqrt{6}}$ (ii) $\frac{\sqrt{5}-2}{\sqrt{5}+2} - \frac{\sqrt{5}+2}{\sqrt{5}-2}$

6. If $x = 3 + 2\sqrt{2}$, find the value of $\sqrt{x} - \frac{1}{\sqrt{x}}$

7. If $x = 2 + \sqrt{3}$, find the value of $x^2 + \frac{1}{x^2}$

8. If $x = 1 - \sqrt{2}$, find the value of $\left(x - \frac{1}{x}\right)^3$

9. If a= $\frac{2-\sqrt{5}}{2+\sqrt{5}}$ and b= $\frac{2+\sqrt{5}}{2-\sqrt{5}}$, find $a^2 - b^2$

10. If x= $\frac{\sqrt{3}+\sqrt{2}}{\sqrt{3}-\sqrt{2}}$ and y= $\frac{\sqrt{3}-\sqrt{2}}{\sqrt{3}+\sqrt{2}}$, find $x^2 + y^2$

11. Evaluate: $\frac{40}{2\sqrt{10}+\sqrt{20}+\sqrt{40}-2\sqrt{5}-\sqrt{80}}$ when it is given that $\sqrt{5} = 2.236$ and $\sqrt{10} = 3.162$

12. If x and y are positive real numbers, simplify the following:

    (i) $\left(\sqrt{x^{-3}}\right)^5$ (ii) $\sqrt[4]{\sqrt[3]{x^2}}$ (iii) $\sqrt[3]{xy^2} \div x^2y$

13. Prove that: $\sqrt{\frac{1}{4}} + (0.01)^{\frac{-1}{2}} - (27)^{\frac{2}{3}} = \frac{3}{2}$

14. Simplify : (i) $\frac{(25)^{\frac{5}{2}} \times (729)^{\frac{1}{2}}}{(125)^{\frac{2}{3}} \times (27)^{\frac{2}{3}} \times (8)^{\frac{4}{3}}}$ (ii) $\left(\frac{81}{16}\right)^{\frac{-3}{4}} \times \left\{\left(\frac{25}{9}\right)^{\frac{-3}{2}} \div \left(\frac{5}{2}\right)^{-3}\right\}$

15. Show that : $\frac{x^{a(b-c)}}{x^{b(a-c)}} \div \left(\frac{x^b}{x^a}\right)^c = 1$

16. Evaluate: $\left(x^{a-b}\right)^{\frac{1}{ab}} \times \left(x^{b-c}\right)^{\frac{1}{bc}} \times \left(x^{c-a}\right)^{\frac{1}{ca}}$

17. Evaluate: $\dfrac{(0.6)^0-(0.1)^{-1}}{\left(\frac{3}{8}\right)^{-1}\left(\frac{3}{2}\right)^3-\left(\frac{1}{3}\right)^{-1}}$

18. Find the values of x in each of the following:

    (i) $2^{x-5} \times 5^{x-4} = 5$ (ii) $2^{x-7} \times 5^{x-4} = 1250$

Optional Enrichment

1. If $x = \frac{\sqrt{3}-\sqrt{2}}{\sqrt{3}+\sqrt{2}}$ and y $= \frac{\sqrt{3}+\sqrt{2}}{\sqrt{3}-\sqrt{2}}$, find $x^3 + y^3$.

2. If $\dfrac{9^{n+1}\times\left(3^{\frac{-n}{2}}\right)^{-2} -(27)^n}{(3^m\times 2)^3} = \frac{1}{729}$, prove that m-n = 2.

3. If abc = 1, show that $\left(1+a+\frac{1}{b}\right)^{-1} + \left(1+b+\frac{1}{c}\right)^{-1} + \left(1+c+\frac{1}{a}\right)^{-1} = 1$

Fun with Math

A **mnemonic** is an aid to memory. The approximate values of $\sqrt{2}, \sqrt{3}, \sqrt{5}, \sqrt{6}$ and $\sqrt{7}$ are often required in calculation work that one hates to calculate. You may learn the following mnemonics to recall their values up to three decimal places.

$\sqrt{2} \approx$ I have a mind(1.414)

$\sqrt{3} \approx$ I believe you so (1.732)

$\sqrt{5} \approx$ Go to the market (2.236)

$\sqrt{6} \approx$ Go Puja play badminton (2.449)

$\sqrt{7} \approx$ Go sister meet mother (2.646)

Can you guess and appreciate how the above mnemonics work? How about the following verse for recalling the value of πup to 13 places of decimal?

"How I wish I could recollect

Of circle round

The exact relation

Archimedes' surround"!

Assignment 2(A) –Polynomials

1. The polynomials $ax^3 + 3x^2 - 3$ and $2x^3 - 5x + a$ when divided by (x-4) leave remainders R_1 and R_2 respectively. Find the value of a in each of the following cases:
   (i) $R_1 = R_2$ (ii) $2R_1 - 3R_2 = 0$
2. Without actual division, prove that $2x^4 - 5x^3 + 2x^2 - x + 2$ is exactly divisible by $x^2 - 3x + 2$.
3. Find the value of a when $ay^2 - 9y + 4a$ divided by $2y - 1$ gives a remainder $\frac{5}{6}$.
4. If the polynomials $ax^3 + 4x^2 + 3x - 4$ and $x^3 - 4x + a$ leave the same remainder when divided by $x - 3$, find the value of a.
5. Find the values of p and q so that $x^4 + px^3 + 2x^2 - 3x + q$ is exactly divisible by $(x^2 - 1)$.
6. If both (x-2) and (x-$\frac{1}{2}$) are factors of $ax^2 + 5x + b$, then show that a = b.
7. If $ax^3 + bx^2 + x - 6$ has (x+2) as a factor and leaves a remainder 4 when divided by (x-2), find the values of a and b.
8. If f(x) = $x^4 - 2x^3 + 3x^2 - ax + b$ is a polynomial which when divided by x-1 and x+1 leaves remainders 5 and 19 respectively, find the remainder when f(x) is divided by x-2.
9. Factorize using factor theorem: (i) $x^3 - 8x^2 + 17x - 10$ (ii) $u^4 - 5u^2 + 4$.
10. Show that (x-2) is a factor of the polynomial f(x)= $2x^3 - 3x^2 - 17x + 30$. Hence, factorize f(x).

<u>Optional Enrichment</u>

1. Using factor theorem, prove that $x + p$is a factor of $x^n + p^n$ for all odd positive values of n.
2. Prove that $(x^2 + x - 2)(x^2 - 4x + 3)(x^2 - x - 6)$ is a perfect square.
3. If $x = 2y + 6$, prove that the value of $x^3 - 8y^3 - 36xy - 212$ is equal to 4.
4. Find the value of :
   $(x - a)^3 + (x - b)^3 + (x - c)^3 - 3(x - a)(x - b)(x - c)$ when $a + b + c = 3x$.
5. Factorize: $a^3 - \frac{1}{a^3} + 4$

Fun with Math

$$(\boldsymbol{x}+\boldsymbol{y})^{\mathbf{0}}=\mathbf{1}$$

$$(\boldsymbol{x}+\boldsymbol{y})^{\mathbf{1}}=\mathbf{1}.\boldsymbol{x}+\mathbf{1}.\boldsymbol{y}$$

$$(\boldsymbol{x}+\boldsymbol{y})^{\mathbf{2}}=\mathbf{1}.\boldsymbol{x}^{\mathbf{2}}+\mathbf{2}\boldsymbol{x}\boldsymbol{y}+\mathbf{1}.\boldsymbol{y}^{\mathbf{2}}$$

$$(\boldsymbol{x}+\boldsymbol{y})^{\mathbf{3}}=\mathbf{1}.\boldsymbol{x}^{\mathbf{3}}+\mathbf{3}\boldsymbol{x}^{\mathbf{2}}\boldsymbol{y}+\mathbf{3}\boldsymbol{x}\boldsymbol{y}^{\mathbf{2}}+\mathbf{1}.\boldsymbol{y}^{\mathbf{3}}.$$

Can you complete the following?

$$(x+y)^4 = -------------------$$

$$(x+y)^5 = ---------------------$$

Note that the numerical coefficients in the expression of $(x+y)^n$ for n $=$ 0,1,2,3....... are given by the Pascal's Triangle shown below:

1

1 1

1 2 1

1 3 3 1

1 4 6 4 1

1 5 10 10 5 1

- ✓ Do you also note that for any whole number n, the sum of the numerical coefficients of $(x+y)^n$ is 2^n ?
- ✓ Find more patterns in Pascal's Triangle

Assignment 2(B) – Polynomials

1. If $a^2 + b^2 + c^2 = 250$ and ab + bc + ca = 3, then the value of a + b + c is :

a) 16 b) -16 c) ± 4 d) ± 16

2. Using a suitable identity, the value of $285 \times 285 + 2\times 285 \times 15 + 15 \times 15$ is :

a) 9000 b) 900 c) 90000 d) 9995

3. If a-b =4 and ab = 45, then the value of $a^3 - b^3$ is:

a) 614 b) 604 c) 640 d) 641

4. If $3x - 2y = 8$ and $xy = 8$, then the value of $27x^3 - 8y^3$ is :

a) 1664 b) 1644 c) 1466 d) 488

5. The value of $\left(\frac{3}{4}\right)^3 + \left(\frac{2}{5}\right)^3 - \left(\frac{17}{20}\right)^3$ is :

a) $\frac{150}{200}$ b) $\frac{153}{200}$ c) $\frac{163}{200}$ d) $\frac{153}{100}$

6. Simplify using suitable identity: $(4x + 2y)^3 - (4x - 2y)^3$

7. Factorize the following quadratic polynomials:

a) $16x^4 - y^4$

b) $5\sqrt{5}x^2 + 30x + 8\sqrt{5}$

c) $40 + 3x - x^2$

d) $3p^3 - p^2 - 10p$

e) $5x^6 - 7x^3 - 6$

8. Factorize: (i) $8x^4y + \frac{1}{125}xy^4$ (ii) $x^3 - 8y^3 - 1 - 6xy$ (iii) $8(x + y)^3 - 27(x - y)^3$

9. Factorize:

(i) $(x + 2)^3 + (x - 2)^3$

(ii) $x^3 + 3x^2 + 3x - 7$

(iii) $2\sqrt{2}x^3 + 3\sqrt{3}y^3 + 5\sqrt{5} - 3\sqrt{5} \times \sqrt{6}xy$

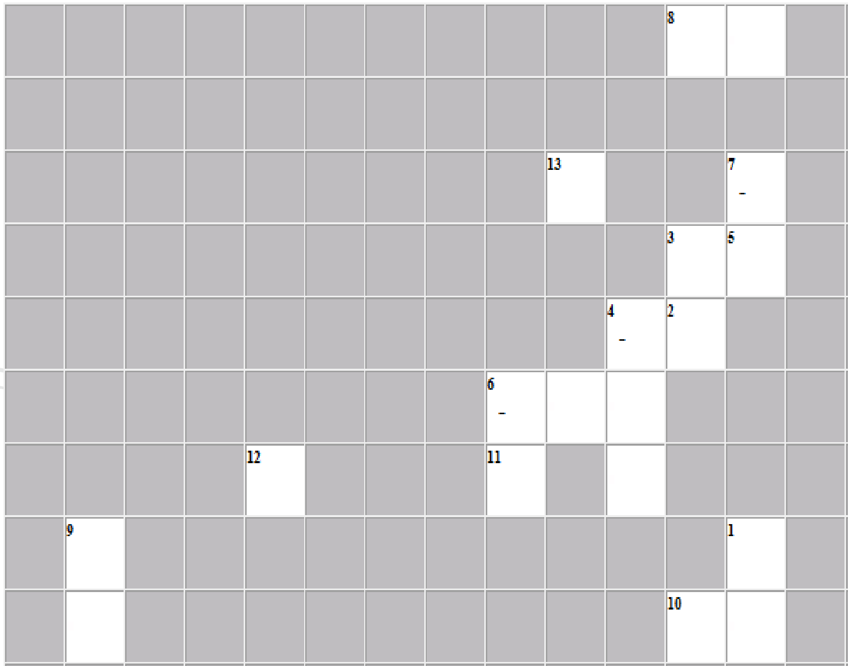
(iv) $a^3 + 3a^2b + 3ab^2 + b^3 - 8$

10. If $a^2 + b^2 + c^2 = 40$ and $ab + bc + ca = 12$, then find the value of $a^3 + b^3 + c^3 - 3abc$

Optional Enrichment

1. Factorize: $a^4 + 2a^3b + 3a^2b^2 + 2ab^2 + b^4$
2. Express $(7x + 3a)(7x + 5a)(7x + 9a)(7x + 11a) + 61a^4$ as the sum of two squares.
3. If $x^4 + \frac{1}{x^4} = 527$, find $x^3 + \frac{1}{x^3}$.
4. If $x = a^2 - bc, y = b^2 - ca, z = c^2 - ab$, prove that $x^3 + y^3 + z^3 - 3xyz = (a^3 + b^3 + c^3 - 3abc)^2$
5. If a+b+ c = 0, prove that: $(bc + ca + ab)^2 = b^2c^2 + c^2a^2 + a^2b^2 = \frac{1}{4}(a^2 + b^2 + c^2)^2$

Solve by Factorizing



Down		Across	
1.	$49x^2 - 4 = 0$	**3**	$x^2 - 144 = 0$
2.	$25x^2 - 36 = 0$	**4**	$81x^2 + 180x + 100 = 0$
3.	$x^2 - 6x - 55 = 0$	**6**	$x^2 - 121 = 0$
4.	$x^2 + 10x - 24 = 0$	**8**	$64x^2 + 16x + 1 = 0$
5.	$9x^2 - 42x + 49 = 0$	**10**	$81x^2 - 100 = 0$
6.	$x^2 + 11x + 30 = 0$	**11**	$x^2 + 12x + 36 = 0$
7.	$25x^2 - 144 = 0$	**12**	$x^2 + 8x + 16 = 0$
8.	$x^2 - 9x + 8 = 0$	**13**	$x^2 - 6x + 9 = 0$
9.	$x^2 - 12x + 20 = 0$		

Assignment 3 - Coordinate Geometry

1. Which of the following points lies on the y axis:

   (a) (0, -6) (b) (-6,0) (c) (8,0) (d) (-1,3)

2. In which quadrant will all points (a, b) lie when $a<0, b>0$

   (a) 1st quadrant (b) 2nd quadrant (c) 3rd quadrant (d) 4th quadrant

3. Where can we find all points with ordinate 0

   (a) x axis (b) y axis (c) origin only (d) fourth quadrant

4. How far is the point (5, -8) from the x axis

   (a) 5 units (b) 8 units (c) 3 units (d) cannot say

5. The point which lies on y-axis at 5 units from the origin in the negative direction of y-axis is

   (a) (0,5) (b) (5,0) (c) (0,-5) (d) (-5,0)

6. Fill in the blanks:

   (i) If the ordinate of a point is 3 and its abscissa is -5, then its coordinates are _______

   (ii) The distance of a point from the x-axis is called its ________ and the distance of the point from the y-axis is called its _______________

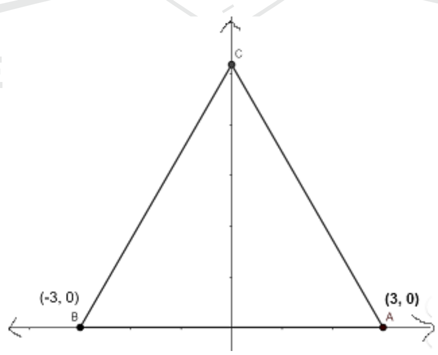
7. Plot the points A (1,2), B (-4,2) , C(-4,-1) and D(1,-1). What kind of a quadrilateral is formed?

8. Write the coordinates of the vertices of a rectangle which is 6 units long and 4 unit wide. The rectangle is in the first quadrant, its longer side lies on the x-axis and on vertex is at the origin.

9. Three vertices of a rectangle ABCD are A (1,3), B (1, -1) and C (7, -1). Plot these points on graph paper and hence find the coordinates of the fourth vertex, D. Also, find the area of this rectangle.

10. In which quadrant or axis do these points lie? P (5,0), Q(O,5), R (-4, -6), S (-6, -4) . Do R and S represent the same point? Why or why not? Give reasons.

11. In the given figure, ABC is an equilateral triangle. Find: (i) Measure of AO (ii) Area of Δ ABC.



Assignment 4 -Introduction to Euclid's Geometry

1. Through four distinct points of which three points are collinear, the number of lines that can be drawn is

   (a) 6 (b) 4 (c) 1 (d) 3

2. A statement whose truth can be easily derived from a theorem is called

   (a) axiom (b) corollary (c) postulate (d) none of these

3. A pair of lines drawn in the a plane which have no common point are called

   (a) coincident lines (b) parallel line

   (c) perpendicular lines (d) concurrent lines

4. The number of lines passing through three distinct collinear points is

   (a) 0 bi) 1 (c) 3 (d) infinitely many

5. Fill in the blanks:

   (a). The statements which are "obvious universal truths" are called____________ or ----------.

   (b). Things that are halves of the same thing are _____________ to each other.

   (c). The number of lines that can pass through two distinct points is_____________________.

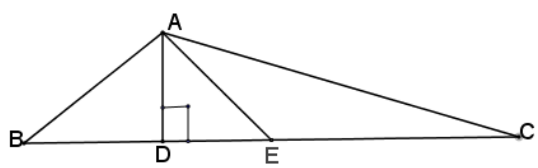
   (d). If A, B, C and D are points where AB = CD and CD=EF, then AB________EF.

   (e). Two distinct intersecting lines cannot be ________________ to the same line.

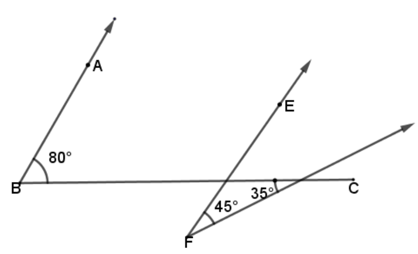
Watch the video to revise: http://tinyurl.com/euclidspostulates

Assignment 5 - Lines and Angles

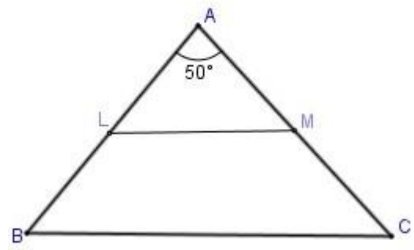
1. What is the measure of the angle between the hour and minute hands of a clock at 3'o clock?
2. If two interior angles on the same side of a transversal intersecting two parallel lines are in the same ratio 2 : 3 , then find the measure of the larger angle.
3. An angle is 10° more than one- thirds of its complement. Find the angle.
4. The measures of angles of a triangle are in the ratio 4 : 5: 9. Name the type of triangle formed.
5. Sum of two angles of a triangle is 90° and their difference is 50°. Find all the angles of the triangle.
6. A, B C are the three angles of a triangle. If $A - B = 15^\circ$ and $B - C = 30^\circ$ Find angles A, B, C
7. If the bisectors of angle B and C , of a triangle ABC meet at O, prove that
$\angle BOC = 90^\circ + \frac{1}{2}\angle A$
8. In the given figure $\angle ABC = 50^\circ, \angle ACB = 30^\circ$ and $\angle DAE = x$, then find the value of x, if AE is bisector of angle A in the triangle ABC.



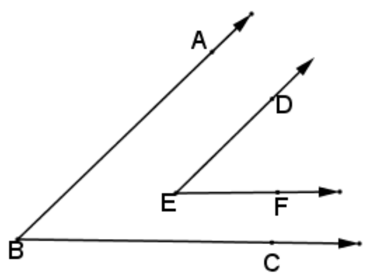
9. In the given figure, $\angle ABC = 30^\circ$, $\angle EDF = (40-x)^\circ$ and $\angle ADE = (13x + 20)^\circ$. Show that BC ∥ DE.
10. In the given figure, show AB ∥ EF.



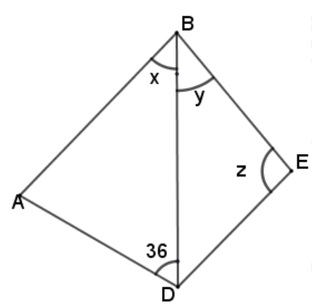
11.ABC is an isosceles triangle in which AB = AC and LM ∥ BC. If $\angle A = 50°$, find ∠LMC.



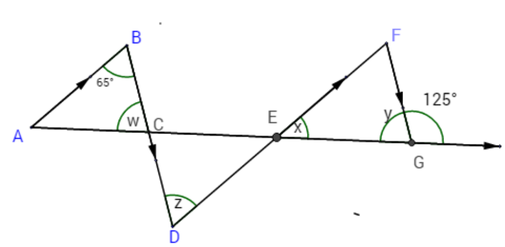
12. In the figure, BA ∥ ED and BC ∥ EF. Show that $\angle ABC = \angle DEF$.



13. In the figure, AB∥ DE. If $x = \frac{4y}{3}$ $and\ y = \frac{3z}{8}$, find: $\angle BED,\ \angle ABE,\ \angle BA$



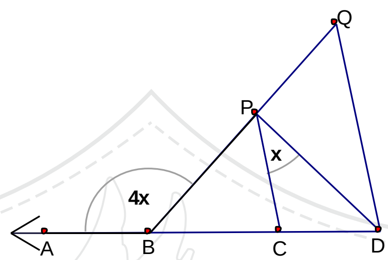
14. Given AB ∥DE and BD∥FG, $\angle G = 125°$and $\angle B = 65°$, find the values of x, y z and w



Optional Enrichment

1. In the given figure, ABCD and BPQ are lines. BP = BC and DQ II CP. Prove that:

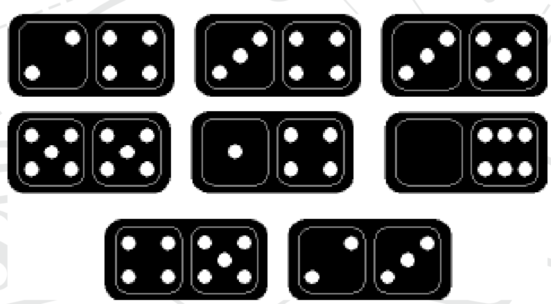
   (i) CP = CD (ii) DP bisects $\angle CDQ$



2. Three friends walk away from a point in three different directions such that the path of each is equally inclined to those of the other two. Find the angles their path make with another.
3. ABCD is a square and ABE is an equilateral triangle outside the square.

   Prove that $\angle ACE = \frac{1}{2}\angle ABE$

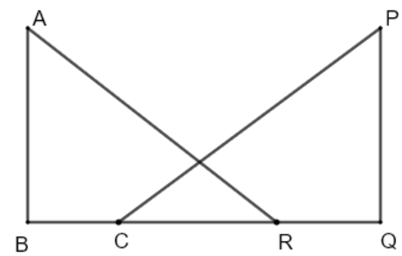
Fun with Math



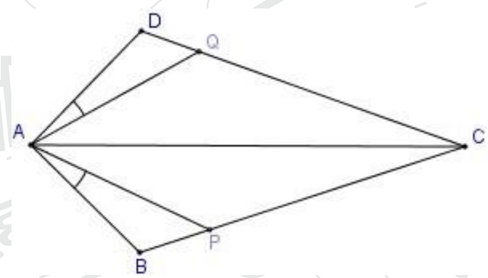
Arrange the eight-dominoes shown above to form a four-by-four square in which the number of dots in each row and column is the same.

Assignment 6 – Triangles

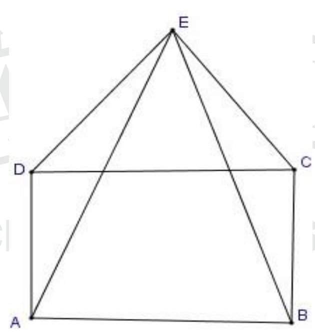
1. In the given figure, AB = PQ, BC = RQ, AB ⊥ BQ and PQ ⊥ BQ. Prove that: $\Delta ABR \cong \Delta PQC$



2. In the given figure AB = AD, $\angle BAP = \angle QAD$ and $\angle PAC = \angle CAQ$. Prove AP = AQ.

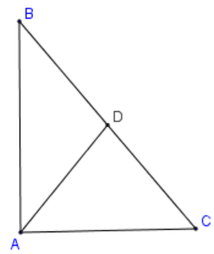


3. In the given figure ABCD is a square and ΔDEC is an equilateral triangle. Prove that:
(i) $\Delta ADE \cong \Delta BCE$ (ii) AE = BE (iii) $\angle DAE = 15°$

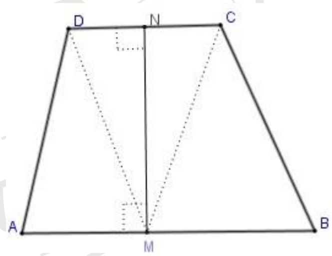


4. Show that the sum of the three altitudes of a triangle is less than the sum of the three sides of the triangle.

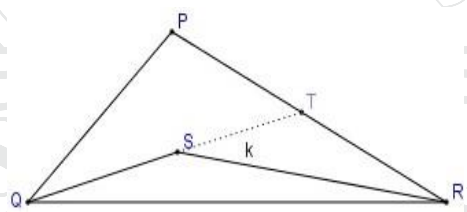
5. In the given figure, ABC is a right triangle with AB = AC. Bisector of $\angle A$ meets BC at D. Prove that: BC = 2AD



6. M and N are the midpoints of AB and DC respectively of a trapezium ABCD. MN is perpendicular to both the sides AB and DC. Prove that AD = BC.



7. S is any point in the interior of Δ PQR. Show that: SQ + SR < PQ + PR.



Optional Enrichment

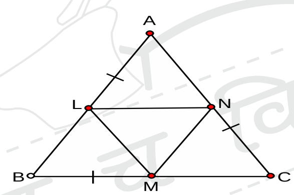
1. ABCD is a square and EF is parallel to BD. R is midpoint of EF. Prove that:
   (i) BE = DF (ii) AR bisects $\angle BAD$

2. If P is a point in the interior of ΔABC. Prove: (PA + PB + PC) $> \frac{1}{2}$ (AB +BC + CA)

3. ABCD is a quadrilateral in which diagonals AC and BD intersect at O. Prove that:

   (AB +BC + CD + DA) > (AC +BD)

4. In the given figure ΔABC is an equilateral triangle. Points L, M, N are taken on the sides AB, BC and CA respectively such that AL = BM = CN. Prove that ΔLMN is an equilateral triangle.



Fun with Math

A Fallacy

The following is the proof of the theorem that every triangle is isosceles.

Given: ΔABC

To Prove: AB = AC.

Proof: Let D be the midpoint of BC such that DB = DC and AD ⊥ BC.

Now DB = DC, AD = AD and $\angle ADB = \angle ADC$

Hence $\Delta ADB \cong \Delta ACD$ (SAS)

Therefore, AB = AC (c.p.c.t) *Can you find the fallacy?*

Assignment 7 - Heron's Formula

1. The area of an isosceles right triangle is 8 sq.cm. Then the length of its hypotenuse is:

   a) $\sqrt{32}\ cm$ b) $\sqrt{48}\ cm$ c) $\sqrt{24}\ cm$ d) $\sqrt{16}\ cm$

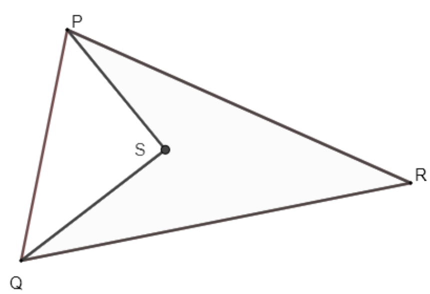
2. If a side of an equilateral triangle is 8cm, then its area is :

   a) $6\sqrt{3}\ sq.cm$ b) $16\sqrt{3}\ sq.cm$ c) $64\sqrt{3}\ sq.cm$ d) $2\sqrt{3}\ sq.cm$

3. The area of an equilateral triangle is $25\sqrt{3}m^2$. Then the perimeter of the triangle is :

   a)10cm b) 100 cm c) 30 cm d) 25cm

4. How much is the increase in the area of a triangle if each of its sides is doubled?
5. A square and an equilateral triangle have equal perimeters. If a diagonal of the square is $24\sqrt{2}$cm, then find the area of the triangle.
6. Find the area of trapezium PQRS with height PQ. Given that PS= 12cm, RQ=7cm, SR= 13cm.
7. The sides of a triangle are 11cm, 15cm, 16cm. Find the altitude to the largest side.
8. The height of an equilateral triangle is 6 cm .Find the area of the tirangle.
9. Calculate the area of the shaded portion of the given triangle, given that PR = 52cm, RQ= 48cm, PS=12cm, QS= 16cm, PS⊥QS.



10. The sides of a triangular plate are 8cm, 15cm, and 17cm.If its weight is 96gm, find the weight of the plate square cm.
11. Find the area of the quadrilateral ABCD in which AD =24cm, $\angle BAD = 90°$. ΔBCD forms an equilateral triangle whose each side is 26 cm.

Additional Information: http://tinyurl.com/heronformula

Optional Enrichment

1. The perimeter of the right triangle is 12 cm and its hypotenuse is of length 5cm. Find the other two sides and calculate its area. Verify the result using Heron's formula.
2. A trapezium with parallel sides in the ratio 7: 3 is cut from a rectangle (30 cm by 40 cm) so as to have an area equal to one third of the later. Find the lengths of the parallel sides if the distance between them is equal to the shorter side of the rectangle.
3. The area of a trapezium shaped field is 1400 sq.m. Its altitude is 50 m. Find the two bases, if the number of meters in each base is an integer divisible by 8. Give all possible dimensions.

<u>Fun Corner - Do you know your birthday?</u>

You could hardly be expected to remember the day itself, although you know your date of birth. Here is an easy method for you to calculate.

1. Let **Y** be the year in which you were born
2. Let **D** be the day of the year you were born
3. Calculate **X = (Y-1) /4** and ignore the remainder
4. Find **S = Y + D + X**
5. Divide **S** by **7** and note the remainder

The day on which you were born can now be deduced by using the table below to see which day corresponds to the remainder:

Remainder	0	1	2	3	4	5	6
Birthday	Fri	Sat	Sun	Mon	Tue	Wed	Thur

For example: Suppose the date of birth is 2[nd] March 2008

1. **Y** = 2008
2. January = 31 days, February = 29 days (2008 is a leap year), March = 2days, so **D**= 62
3. X = (2008 -1)/4 = 501 ignoring the remainder
4. S = 2008 + 62 + 501 = 2571
5. 2571 ÷ 7 gives the remainder 2. Using the table, a remainder 2 indicates the birth day is Sunday.

Assignment 8 - Linear Equations in Two Variables

1. If a linear equation has solutions (-2,2), (0,0), (2, -2), then what is its equation?
2. What is the equation of x-axis and y-axis?
3. Find the points where the graph of the equation 5x+4y=12 cuts the x-axis and the y-axis.
4. Find the equation of the line parallel to x-axis at 5 units from negative direction of y-axis.
5. What line does the equation x=2y represent?
6. Give the equations of two lines which will have a point (2,14) lying on it. How many more such lines are there? Why?
7. Find the value of k so that the given values of x and y is a solution of the given equation.
   (i) 5x+2ky=3k x=1, y=1
   (ii) 9kx+7ky=48 (1,1)
8. Draw the graph of $\frac{x}{2}+\frac{y}{3}=1$. Also, find the points where the line meets the two axes.
9. Draw the graph of the equation 3x+ 2y = 12. From the graph find:
   a. If x = -4, y = -2 is a solution of the equation
   b. If (-2, 9) lies on the graph of the equation
   c. The value of y when x = 8.
   d. The value of x when y = 12.
   e. The point where the line intersects the x and y axes.
10. Write the linear equation in two variables to represent the following statement:
    Cost of five trousers exceeds the cost of eight shirts by Rs 150. If the cost of one shirt is Rs 240, find the cost of one trouser.
11. Draw the graphs of the equations $x - y = 1$ and $2x + y = 8$ on the same graph sheet. Shade the area bounded by the two lines and y-axis. Also, determine this area.
12. On the same graph sheet draw graph of lines x - 3y + 1 = 0 and 2x - 3y - 4=0. Also find the point of intersection of the two lines on the graph.

Fun with Math - A Few Facts About Prime Numbers

1. Prime numbers of the form n – 1 and n +1 i.e. with difference 2 are called twin primes e.g. 3 and 5; 11 and 13; 17 and 19; 101 and 103.The world's largest known pair of twin primes is: $190116 \times 3003 \times 10^{5120} - 1$ and $190116 \times 3003 \times 10^{5120} + 1$

2. It has been proved that the number of prime numbers is limitless. The search for finding greater and still greater prime number continues. It is hard as trying to break the 100-m world. At present the highest prime is a number$2^{756839} - 1$, a number with 227832 digits. It was found in Feb. 1992 with the help of a supercomputer.

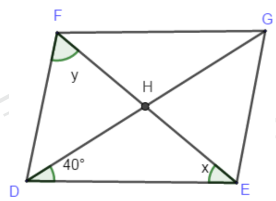
Assignment 9 – Quadrilaterals

1. In parallelogram ABCD, bisectors of angles A and B intersect at O. The value $\angle AOB$ is :

   a) 90°   b) 45°   c) 180°   d) 60°

2. Given DEGF is a rhombus . The values of x and y is :

   a) 40°, 40°   b) 50° , 40°   c) 50° , 50°   d) 40°, 50°



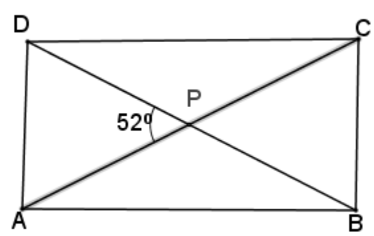
3. The parallel sides of a trapezium are a and b respectively. The line segment joining the midpoints of its non-parallel sides will be :

   a) $\frac{1}{2}(a-b)$ b) $\frac{1}{2}(b+a)$ c) $\frac{2ab}{a+b}$ d) $\frac{1}{2}(b-a)$

4. The length of each side of a rhombus is 10 cm and one of its diagonals is of length 16 cm. The length of the other diagonal is :

   a) 13 cm   b) 6 cm   c) $2\sqrt{39}$ cm   d) 12 cm

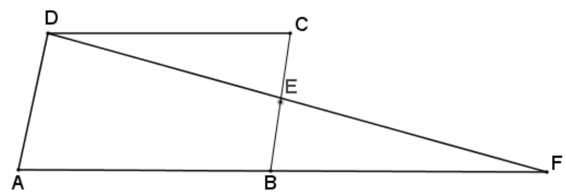
5. In the given figure, ABCD is a rectangle. Diagonals AC and BD intersect each other at P. If $\angle APD = 52°$, find ∠ACB and ∠ABD.



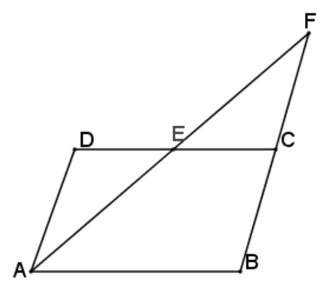
6. D and E are the mid points of AB and AC of a triangle ABC. O is any point on BC. Join O to A. If P is the midpoint of OB and Q is the midpoint of OC then DEQP is a :

   a) square   b) rhombus   c) rectangle   d) parallelogram

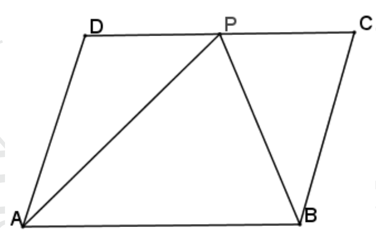
7. ABCD is a parallelogram and E is the midpoint of side BC. If DE and AB when produced meet at F, prove that AF = 2 AB



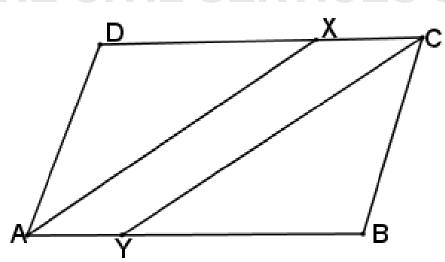
8. In parallelogram ABCD, AB=10 cm and AD= 6 cm. The bisector of $\angle A$ meets DC in E. AE and BC produced meet at F. Find the length of CF.



9. ABCD is a parallelogram and $\angle DAB = 60°$. If the bisectors AP and BP of angles A and B respectively meet at P on CD, prove that P is the midpoint of CD.



10. ABCD is a parallelogram. Line segments AX and CY bisect angles A and C respectively. Show that AX∥ CY.



http://goo.gl/0Ne1la

Let us Revise Properties: Complete the grid given below:

Properties	**Square**	**Rhombus**	**Rectangle**	**Trapezium**	**Parallelogram**
Opposite sides are equal	Yes	Yes	Yes	No	No
Opposite sides are parallel					
Adjacent sides are equal					
All angles are 90					
Diagonals bisect each other					
Diagonals bisect at 90					
Opposite angles are equal					
Diagonals divide it into two congruent triangles					
Diagonals are equal in length					

Assignment 10 - Areas of Parallelograms and Triangles

1. ar (ΔABC) $= 32 sq.cm$. AD is median of ΔABC and BE is median of ΔABD If BO is the median of ΔABE, then ar (ΔBOE)

   a. 8 sq.cm b. 4 sq.cm c. 16 sq.cm d. 2 sq.cm

2. AD is the median of a triangle ABC. Area of triangle ADC = 15 sq.cm, then ar (ΔABC).

   a. 30 sq .cm b. 7.5 sq.cm c 15 sq.cm d. 225 sq.cm

3. In trapezium PQRS, PQ ∥ RS and $SP \perp PQ$, PQ = 18 cm, RS= 8 cm RQ = 17 cm. Then the area of trapezium PQRS is

   a. 118 sq.cm b. 108 sq.cm c. 144sq.cm d. 180 sq.cm

4. The figure formed by joining the midpoints of adjacent sides of a rectangle of sides 8 cm and 6 cm is

   a. rectangle of area 24 sq.cm b. rhombus of area 24 sq.cm

   c. square of area 24 sq.cm d. a trapezium of area 24 sq.cm

5. ABCD is a parallelogram in which diagonals AC and BD intersect at O.

   If ar(ABCD) 52 sq.cm then the ar(AOB) is :

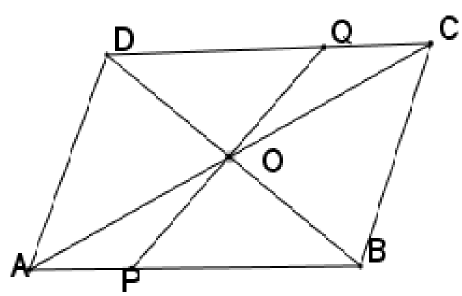
   a. 26 sqcm b. 18.5 sq.cm c. 39 sq.cm d. 13 sq.cm

6. In the given figure parallelogram ABCD and rectangle ABEF are of equal area. Then :

   a. perimeter of ABCD = perimeter of ABEF b. perimeter of ABCD < perimeter of ABEF

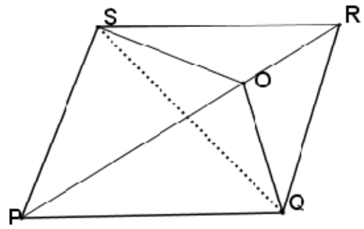
   c. perimeter of ABCD > perimeter of ABEF d. perimeter of ABCD = $\frac{1}{2}$ (perimeter of ABEF)

7. In a parallelogram ABCD, diagonals AC and BD intersect each other at O. Through O a line is drawn to intersect AB at P and CD at Q. Prove that: area (quad APQD) =$\frac{1}{2}$ area (∥ABCD).



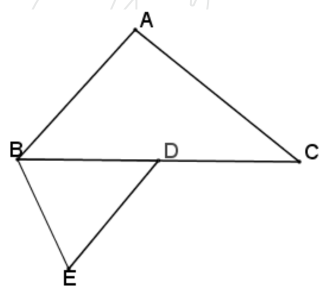
8. In the given figure, O is any point on the diagonal PR of parallelogram PQRS.

Prove that: ar(ΔPSO) = ar(ΔPQO).



9. In the given figure, Δ ABC and Δ BDE are equilateral triangles and D is midpoint of BC.

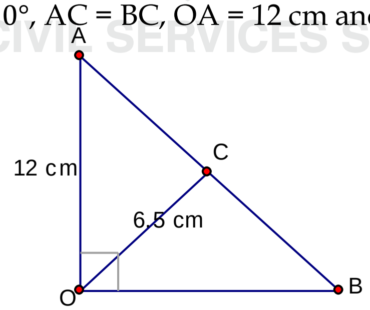
Prove that area (ΔBDE) = $\frac{1}{2}$ area (ΔABD).



Optional Enrichment

1. Prove that the parallelogram formed by joining the midpoints of the adjacent sides of a quadrilateral is half of the latter.
2. In triangle ABC, AD divides BC in the ratio m: n. Show that $\frac{Area(\Delta ABD)}{Area(\Delta ADC)} = \frac{m}{n}$
3. If P, Q, R and S are respectively the mid points of the sides AB, BC, CD and DA of parallelogram ABCD, prove that:

   $(i) area(ABCD) = 2 \times area(PQRS)$ $(ii) area(\Delta PQR) = \frac{1}{4} area(ABCD)$
4. In the given figure $\angle AOB = 90°$, AC = BC, OA = 12 cm and OC = 6.5 cm. Find the area of triangle AOB.



Fun With Math - Tower Of Brahma

Tower of Brahma in a temple in the Indian city of Bananas. This tower, the description reads, consists of 64 disks of gold, now in the process of being transferred by the temple priests. Before they complete their task, it was said, the temple will crumble into dust and the world will vanish in a clap of thunder. The disappearance of the world may be questioned, but there is little doubt about the crumbling of the temple. The formula $2^{64} - 1$, yields the 20-digit number 18,446,744,073,709,551,615. Assuming that the priests worked night and day, moving one disk every second, it would take them many thousands of millions of years to finish the job.

If we consider a tower of three disks only, then the number of moves will be $2^3 - 1 = 7$. So, it can be solved by moving the disks in the following order:

ABACABA

If we consider a tower of four disks, then the number of moves will be $2^4 - 1 = 15$

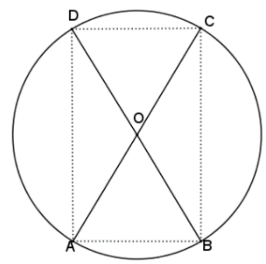
i.e. ABACABADABACABA

Assignment 11 – Circles

1. AC and BD are the chords of a circle that bisect each other. Prove that:

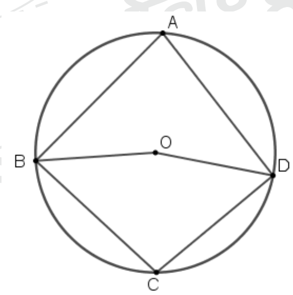
   (1) AC and BD are the diameters

   (2) ABCD is a rectangle.



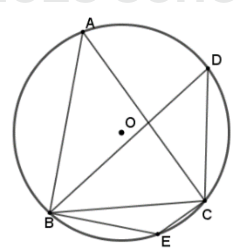
2. ABC is a triangle inscribed in a circle with centre O. If ∠AOC = 130°and ∠BOC = 150°, find ∠ACB.

3. O is the centre of a circle. Points A, B and C lie on the circle. If $\angle BAD = 75°$ and chord BC is equal to chord CD, find: (i) $\angle BOD$. (ii) $\angle BCD$ (iii) $\angle BOC$ (iv) $\angle OBD$

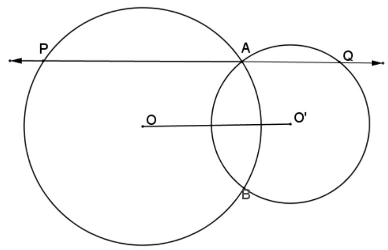


4. Equal chords AB and CD of a circle with centre O, cut at right angles at E. If M and N are the mid points of AB and CD respectively, prove that OMEN is a square.

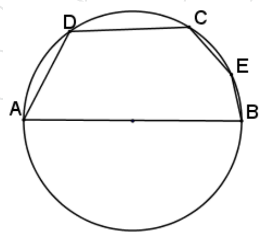
5. In the given figure,ΔABC is an isosceles triangle with AB = AC and $\angle ABC = 50°$. Find $\angle BDC$ and $\angle BEC$



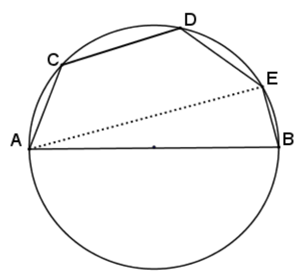
6. Two circles with centres O and O′ intersect at two points A and B.A line PQ is drawn parallel to OO′ through A, intersecting the circles at P and Q. Prove that PQ= 2 OO′.



7. In the given figure, AB is the diameter of a circle. If $\angle ADC = 120°$, find $\angle CAB$.



8.AB is the diameter of the circle. C, D, E are any points on the semicircle. Find the value of $\angle ACD + \angle BED$.



Optional Enrichment

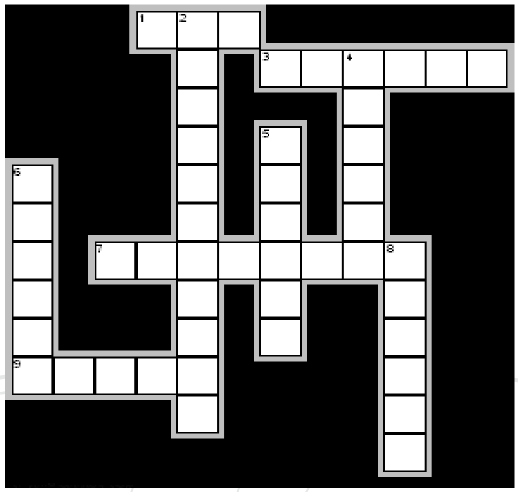
1. Two circles intersect at C and D. AB is their line of centres and M is the middle point of AB. Through C a straight line PCQ is drawn perpendicular MC, to meet the circles at P and Q. Prove that CP = CQ.
2. $\boldsymbol{\Delta ABC}$and$\boldsymbol{\Delta ADC}$ are two right triangles with common hypotenuse AC. Prove that $\angle CAD = \angle CBD$
3. Prove that if the bisector of any angle of a triangle and perpendicular bisector of its opposite side intersect, they will intersect on the circumcircle of the triangle.
4. ABCDE is regular pentagon. Prove that the points A, B, C and E are concyclic.
5. Prove that the altitudes of a triangle are concurrent.

http://goo.gl/c0R0mc

http://goo.gl/2N5tCt

http://goo.gl/uaAs9J

Crossword Puzzle Sheet



Across

1. Part of a circle

3. Sum of pair of opposite angles of -----quadrilateral is 180 degrees

7. Longest chord

9. Equal chords subtend -------angles at the center

Down

2. Angle in semi-circle

4. Collection of points in a plane equidistant from a fixed point

5. Perpendicular from centre of a circle to a chord -------- the chord

6. Angle subtended by an arc at centre of a circle is -----the angle subtended by it in remaining part of circle

8. Half of the diameter

Assignment 12 - Constructions

1. Construct a perpendicular bisector of a given line segment of length 7.1
2. Construct an angle of $60°$ and bisect it. Justify your construction
3. Construct an angle of 105°at the end point A of the line segment AB.
4. Take a straight-line AB = 3.6 cm long. At A construct an angle of 150°. Then construct its supplement at B.
5. Construct an equilateral triangle of side 5.2 cm. Give justification for the construction.
6. Construct a right triangle when one side is 4 cm and the sum of other side and the hypotenuse is 8 cm.
7. Construct a triangle PQR in which QR = 5.6 cm, $\angle Q = 30°$and PQ –PR = 2.8 cm.
8. Construct a triangle ABC with perimeter 10 cm and each base angle is 45°.
9. Construct a triangle whose perimeter is 10 cm and base angles are 60°,30°
10. Construct a triangle in which one side is 3.5 cm, a base angle is 45° and sum of the other side and hypotenuse is 5.5 cm

Visit the following pages to learn step by step basic constructions

http://goo.gl/IfQYib

http://goo.gl/14dLlF

Fun with Math - The Three Jesters

Among the prime numbers the three consecutive prime numbers 7,11,13 seem to possess some quite amusing properties. Hence, they are named as The three jesters. Addition of these numbers gives primes and they can bring back to your original number.

Take any three-digit number, say 123. Now let us write the same number to its right side to have a six-digit number. Then this case we will have 123123. Now any such six-digit number when divided by 7,11 and 13 will give you back your original three-digit number.

Relation with clock and calendar:

a. 11+13 = 24 = Number of hours which make a day
b. 7 = no. of days which make a week
c. 7 +11+13 = 31 no. of days which make a month
d. Average of 11 and 13 = 12 = no. of months which make a year.

Assignment 13 - Surfaces and Volumes

1. The ratio between the curved surface area and the total surface area of a right circular cylinder is 1:2. The ratio between the height and the radius of the cylinder is

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

2. The diameter of a sphere of surface area 346.5 sq.cm is :

   a) 33.2 cm b) 33 cm c) 30 cm d) 32.3 cm

3. A sphere, a cylinder and a cone have same diameter. The height of the cylinder as well as that of the cone is equal to the diameter of the sphere. Find the ratio of their volumes.

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

4. A hemispherical bowl of internal diameter 36cm contains some liquid. This, liquid is to be filled in a cylindrical bottle of radius 3cm and height 6 cm. How many bottles are required to empty the bowl?

   a) 36 b) 108 c) 72 d) 18

5. The volume of two spheres is in the ratio 64 : 27. Then the ratio of their surface areas is

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

6. In a rain shower, 5 cm of rain falls. Find the volume of the water that falls on2 hectares of the land.
7. The lateral surface area of a cube is 324 sq.cm. Find its volume and its total surface area.
8. A cubical tank whose side is 2m is completely filled with water. The water from this tank is shifted to the cuboidal tank whose length, breadth and height are 250 cm, 200 cm and 2m respectively. Find the depth of the tank which will remain empty.
9. Find the volume of the largest right circular cone that can fit into a cube of edge 14 cm.
10. The slant height of a cone is increased by 10%. If the radius remains the same, find the percent increase in its curved surface area.
11. A metallic sphere of radius 10.5 cm is melted and recast into smaller cones , each of radius 3 .5 cm and height 3 cm. How many cones are obtained.?

12. The internal and external diameter of a hollow hemispherical vessel are 20 cm and 28cm respectively . What is the total area to be painted if the vessel is painted all over?

Optional Enrichment

1. The barrel of a fountain pen, cylindrical in shape, is 7 cm long and 5mm in diameter. A full barrel of ink in the pen will be used up when writing 310 words on an average. How many words would use up a bottle of ink containing one fifth of a litre? Answer correct to the nearest 100 words.

2. A rectangular tank measuring 5m X 4.5 m X 2.1 m is dug in the centre of the field measuring 13.5 m X 2.5 m. The earth dug out is spread evenly over the remaining portion of the field. How much is the level of the field raised?

3. A solid cylinder has total surface area of 462 sq.cm. Its curved surface area is one third of its total surface area. Find the volume of the cylinder.

Fun Corner - Which is for Real?

Suppose you have 5 stacks with 20 supposedly gold coins in each stack. Each authentic gold coin weighs 10 grams, but two of the stacks are composed of only counterfeit coins weighing 11 grams each. You are given a scale that weighs in grams. Figure out a way to determine the counterfeit stacks in one weighing using this scale.

Assignment 14(A) – Statistics

1. The range of the data 14, 27, 29, 61, 45, 15, 9 , 18 is

   (a) 61 (b) 52 (c) 47 (d) 53

2. The class mark of a class is 10 and its class width is 6. The lower limit of the class is

   (a) 5 (b) 7 (c) 8 (d) 10

3. The mean for first five prime numbers is

   (a) 5 (b) 4.5 (c) 5.6 (d) 6.5

4. The mean of x+3, x-2, x+5, x+7 and x +2 is

   (a) x+5 (b) x+2 (c) x+3 (d) x+7

5. If the mode of 12, 16, 19, 16, x , 12 , 16 , 19 , 12 is 16 then the value of x is

   (a) 12 (b) 16 (c) 19 (d) 18

6. The mean of 10 numbers is 20. If 5 is subtracted from every number, what will be the new mean?

7. The mean of 8 numbers is 15. If each number is multiplied by 2, what will be the new mean?

8. Determine the median of 24, 23, a, a-1, 12, 16 where a is the mean of 12, 16, 23, 24, 28, 29.

9. The mean mark is for 100 students were found to be 40. Later, it was discovered that a score of 53 was misread as 83. Find the correct mean.

10. The mean of 25 observations is 27. If one observation is included, the mean remains 27. Find the included observation.

11. The mean of first 10 numbers is 16 and the average of first 25 numbers is 22. Find the average of the remaining 15 numbers.

12. A class consists of 50 students out of which 30 are girls. The mean marks scored by girls in a test are 73 and that of boys is 71. Determine the mean score of the whole class.

13. If $x_1, x_2, x_3, \ldots\ldots x_{10}$ are 10 observations , then show that:

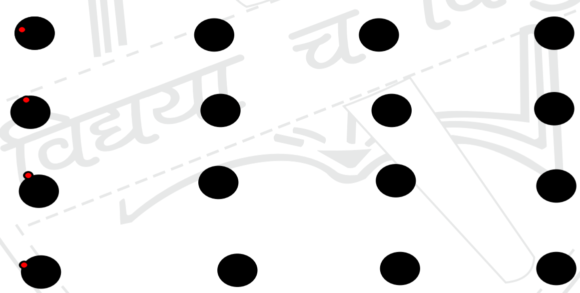
    $(x_1 + x_2 + \ldots\ldots + x_{10}) - (\bar{x} + \bar{x} + \bar{x} + \cdots \ldots 10 \text{ times}) = 0$

Optional Enrichment

1. The average marks of boys in an examination of a school are 60 and that of the girls is 75. The average score of the school in that examination is 66. Find the ratio of the number of boys to the number of girls appeared in the examination.
2. The mean of 25 observations is 36. If mean of first 13 observations is 32 and that of last 13 observations is 40, then find the 13^{th} observation.
3. The sum of deviations of set of values $x_1, x_2, x_3, \ldots, x_n$ measured from 50 is -10 and the sum of deviations of the values measured from 46 is 70. Find the value of n and the mean.

Puzzle corner

Connect the dots: Without lifting your pencil, connect 16 dots using 6 straight line segments



Answer: Which is for real? Base two to the rescue.

Place on the scale 1 coin from the 1^{st} stack 2 from the 2^{nd} stack, 4 from the 3^{rd} stack, 8 from the 4^{th} stack and 16 from the 5th stack. We know if all stacks are real the weight should be 31 grams. So, suppose the weight is 49 grams, for example. Writing the amount over 31, that is 18 grams, in base two we get 10010. So, this means the counterfeit coins came from the stacks from which you took 16 coins and 2 coin

Assignment 14(B) – Statistics

1. For the following data of monthly wages (in Rupees) received by 30 workers in a factory, construct a grouped frequency distribution taking class-intervals of equal width 20 in such a way that mid-value of the first class interval is 220;

   236, 258, 215, 307, 307, 316, 280, 240, 210, 220, 268, 258, 242, 210, 268, 272, 242, 210, 268, 272, 242, 311, 290, 300 ,320, 319, 304, 250, 254, 274

2. Draw a histogram for the following frequency distribution:

Class interval	1-10	11 – 20	21 – 30	31 –40	41- 50	51 -60
Frequency	3	7	10	5	2	6

3. Draw a histogram to represent the following data:

Marks	0 – 30	30 – 50	50 – 60	60 – 100
Number of students	3	6	5	16

4. Construct a histogram from the following frequency distribution of total marks obtained by 65 students:

Marks(midpoints)	150	160	170	180	190	200
No. of students	8	10	25	12	7	3

5. The mean of the following distribution is 50:

X	10	30	50	70	90
F	17	5a+3	32	7a-11	19

Find the value of a and hence the frequencies of 30 and 70.

6. If the mean of the following frequency distribution is 53, find the missing frequencies.

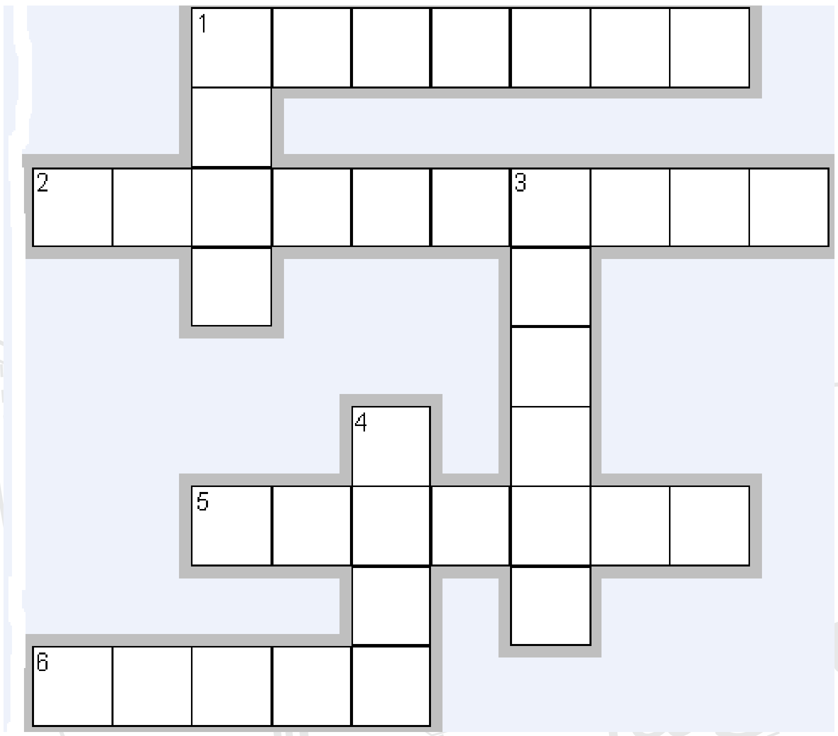
X	10	30	50	70	90	Total
F	15	f_1	21	f_2	17	100

7. The following are the scores of two groups of students in a test of reading ability.

Scores	Group A	Group B
50 – 53	4	2
46 – 49	10	3
42 – 45	15	4
38 – 41	18	8
34 – 37	20	12
30 -- 33	12	17
26 – 29	13	22
Total	92	68

Construct a frequency polygon of each of these groups on the same axes.

Crossword



Across

1. The mode of a group of observations is that value of the variable which has ------- frequency
2. The midpoint of a class is called---------
5. Data collected by the experimenter himself is called -------data
6. The difference between maximum and minimum observations in the data is called--------

Down

1. The sum total of all the observations divided by their number is called --------of the data
3. The -------- is the middle most observation in the data, when they are arranged in increasing or decreasing order.
4. The median of first 9 natural numbers is ------

Assignment 15 – Probability

1. In a bag, there are 100 bulbs out of which 30 are bad ones. A bulb is taken out of the bag at random. The probability of the selected bulb to be good is

   (a) 0.50 (b) 0.70 (c) 0.30 (d) none of these.

2. An experiment is conducted. Probabilities of an event are calculated by some students. Which of the following could be a correct answer?

   (a) $\frac{5}{4}$ (b) $\frac{1}{3}$ (c) $\frac{-2}{3}$ (d) 1.3

3. A coin is tossed 1000 times and 560 times head occurs. The empirical probability of occurrence of head in this case is:

   (a) 0.50 (b) 0.56 (c) 0.44 (d) 0.056

4. The probabilities of a student getting grade A, B, C and D are 0.2, 0.3, 0.15 and 0.35 respectively. Then the probability that a student gets at least C grade is:

   (a) 0.65 (b) 0.25 (c) 0.50 (d) 0.35

5. The probability of selecting a boy in a class is 0.6 and there are 45 students in a class, then the number of girls in the class are:

   (a) 36 (b) 27 (c) 20 (d) 18

6. In a survey of 364 children aged 19-36 months, it was found that 91 liked to eat potato chips. If a child is selected at random, the probability that he/she does not like to eat potato chips is:

   (a) 0.25 (b) 0.50 (c) 0.75 (d) 0.80

7. A die was rolled 100 times and the number of times 5 came up was noted. If the experimental probability calculated is $\frac{2}{5}$, then how many times a 5 came up?

8. The distance (in km) of 20 students from their residence to their school were found as follows: 5 , 3, 7, 12, 25, 10, 2, 7, 8, 10, 7, 2, 3.5, 10, 34, 20, 22, 11, 12.5, 15

   What is the empirical probability that a student lives:

   a) Less than 3 km radius from his school?

   b) More than or equal to 7 km from his school?

   c) Within 1 km from his school?

9. Over the past 184 working days, the number of defective parts produced by a machine is given in the following table:

No of defective parts	0	1	2	3	4	5	6	7	8	9
Days	50	32	22	18	12	12	10	10	10	8

Determine the probability that tomorrow's output will have:

(i) no defective part (ii) at least one defective part
(iii) at most five defective parts (iv) more than nine defective parts

10. Two dice are thrown simultaneously times . Each time the sum of two numbers appearing on the tops is noted and recorded in the following table.

Sum	2	3	4	6	5	67	8	9	10
Frequency	14	29	30	42	55	72	75	70	53

If the dice are thrown once more , what is the probability of getting a sum :

(i) 6 (ii) more than 10 (iii) between 6 and 10 (iv) less than 5 (v) greater than or equal to 8.

11. A die is thrown 400 times, the frequency of the outcomes of the events 1,2, 3, 4, 5 and 6 are noted in the frequency distribution table given below:

Outcome	1	2	3	4	5	6
frequency	75	60	65	70	68	62

Find the probability of occurrence of (i) an odd number (ii) a prime number

(iii) a composite number (iv) a square number

12. Frequency distribution of marks obtained by 34 students is given below:

Marks obtained	0 – 10	10 – 20	20 – 30	30 – 40	40 – 50	50 - 60	60- 70	70 - 80
No. of students	2	3	4	0	8	7	4	6

Find the probability that the mark obtained by a student is:

(i) less than 30 (ii) more than or equal to 50 and less than 60 (iii) less than 80.

FOR ONLINE QUIZ:

http://goo.gl/TknqHc

http://goo.gl/Txf3wl

http://goo.gl/l7FFLF

Math Magic Trick

Here's a really cool **Math Magic Trick** that kids can use to impress family and friends and build basic math skills too! You'll find lots of other math tricks here as well so have fun and learn some math along the way.

Materials: 5 dice

Performing the Trick:

1. Tell the spectator that you can*see through the dice* all the way to the bottom numbers.
2. Roll all 5 dice on table.
3. Pretend that you are looking through the dice to see the bottom numbers. (What you are actually doing is adding up the top numbers of all 5 dice.)
4. Then you will announce the sum of the bottom numbers. (All you have to do is subtract the sum of the numbers you added in your mind from the top from 35.)
5. Then turn over the 5 dice and have the spectator add the numbers of top numbers. They will be amazed at how you did it!

Can you Figure out the trick?

Revision Assignment - I

1. Represent $\sqrt{8.6}$ on the number line.

2. Rationalize $\frac{1}{\sqrt{3}+\sqrt{2}}$ and subtract it from $\sqrt{3}-2$

3. If $x=3-2\sqrt{2}$, find $x^2+\frac{1}{x^2}$

4. If x = $7+4\sqrt{3}$, find the value of $\sqrt{x}+\frac{1}{\sqrt{x}}$

5. Write $0.2\overline{35}$ in the form p/q.

6. Write two rational and two irrational numbers between $2\sqrt{2}$ and 3.

7. If $\frac{4+3\sqrt{5}}{4-3\sqrt{5}} = a + b\sqrt{5}$, find a and b.

8. Factorize:

(a) $18a^3b-33a^2b^2-30ab^3$

(b) $6(x+y)^2-5(x+y)-6$

(c) a^4-13a^2+36

(d) $9a^2-4ab-13b^2$

9. If $(x-a)$ is a factor of $x^6-ax^5+x^4-ax^3+3x-a+2$, find the remainder when $2x^4-6x^3+2x^2+ax+2$ is divided by $(x+2)$.

10. Using Factor theorem, factorize completely: $x^3-10x^2-53x-42$.

11. The polynomial ax^3+bx^2+x-6 has (x + 2) as a factor and leaves a remainder 4 when divided by (x – 2). Find a and b.

12. If two parallel lines are intersected by a transversal, then prove that the bisectors of the interior angles form a rectangle.

13. Without actual division show that $x^3-3x^2-10x+24$ is exactly divisible by x^2-x-12.

14. Let R1 and R2 be the remainders when the polynomials $x^3+2x^2-5ax-7$ and $x^3+ax^2-12x+6$ are divided by x+1 and x-2 respectively. If 2R1 + R2 = 6 find a.

15. Factorize:

(i) $8(x+y)^3$ -27 $(x-y)^3$

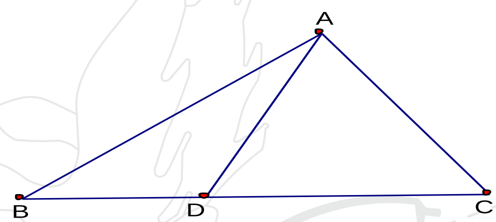
(ii) $a^2b^2 - a^2 - b^2 + 1$

(iii) $3\sqrt{3}\,a^3 - b^3 - 5\sqrt{5}\,c^3 - 3\sqrt{15}\ abc$

16. Factorise : $\dfrac{(x^2 - y^2)^3 + (y^2 - z^2)^3 + (z^2 - x^2)^3}{(x-y)^3 + (y-z)^3 + (z-x)^3}$

17. The bisector of $\angle$ ABC and $\angle$ BCA of triangle ABC intersect each other at O. Prove that $\angle$ BOC = 90 + $\frac{1}{2}\angle$ A.

18. D is a point on side BC of triangle ABC such that AD = AC. Show that AB > AD.

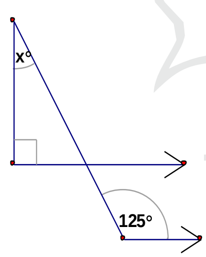


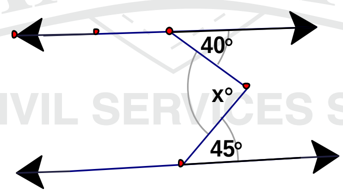
19. Factorize: $(i)\ \ 3x^2 + 2y^2 + z^2 + 2\sqrt{6}xy - 2\sqrt{2}yz - 2\sqrt{3}xz$ $\quad (ii)\ \ 32a^4b - 108ab^4$

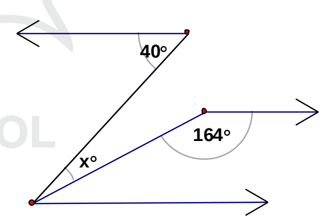
20. Ray OS stands on a line POQ. Ray OR and ray OT are angle bisectors of $\angle POS$ and $\angle SOQ$ respectively. If $\angle POS = x$, find $\angle ROT$.

21. Triangle ABC is an isosceles triangle in which AB = AC. D, E and F are the mid points of the sides BC, AC and AB respectively. Prove that DE = DF.

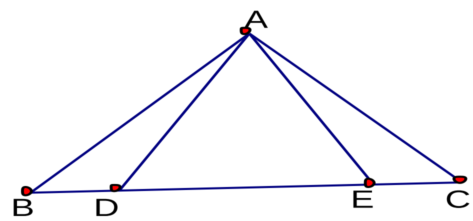
22. In the following figures, find the value of x.



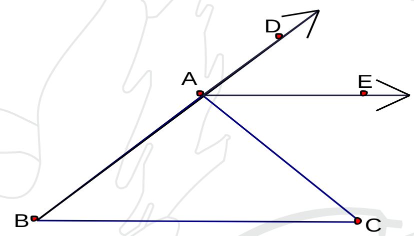




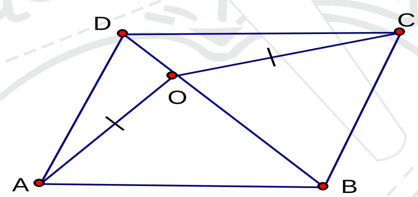
23. In the given figure D and E are points on the base BC of triangle ABC such that BD = CE and AD = AE. Prove that $\Delta ABE \cong \Delta ACD$



24. In the given figure, AE bisects $\angle CAD$ and $\angle B = \angle C$. Prove that AE II BC.



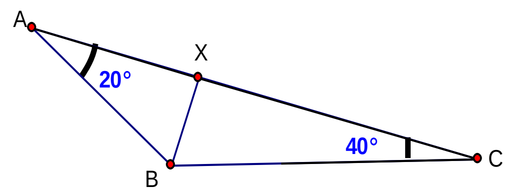
25. In the given figure, ABCD is a rhombus in which O is a point interior to it such that OA = OC. Prove that DOB is a straight line.



26. From the vertices B and C of ΔABC. Perpendiculars BE and CF are drawn to the opposite sides AC and AB respectively. If BE = CF. Prove that ΔABC is isosceles.

27. In $\Delta ABC, \angle A = 20°, \angle C = 40°$. The bisector of the angle B meets AC at X.

Prove that (i) AX >BX (ii) CX > BX (iii) BC > XC



28. AP and DP are the bisectors of two adjacent angles A and D of a quadrilateral ABCD. Prove that $2\angle APD = \angle B + \angle C$

Revision Assignment - II

1. In a parallelogram ABCD, bisectors of angles A and B intersect each other at O. what is the measurement of $\angle AOB$.
2. The numbers 2, 3,4, 4, 2x+1, 5,5,6,7 are written in ascending order. If their median is 5, find the value of x. Hence find mode
3. Find the length of a chord which is at a distance of 4cm from the centre of a circle whose radius is 5 cm.
4. In a cricket match, a batsman hits a boundary 6 times out of 24 balls he plays. Find the probability that he did not hit the boundary.
5. A rectangular sheet of paper 44cm X 18 cm is rolled along its length and a cylinder is formed. Find the volume of the cylinder.
6. In the given figure (a), O is the centre of the circle. Find ∠CBD

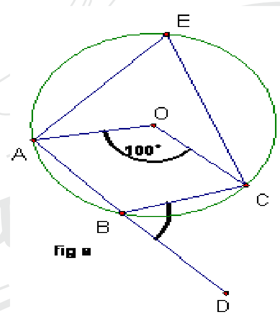


fig a

7. ABCD is a quadrilateral in which P, Q, R and S are midpoints of sides AB, BC, CD and DA. Prove that PQRS is a parallelogram.
8. ABCD is a trapezium in which AB II CD. E is the midpoint of AD. A line through E parallel to AB intersects BC at F. Prove that F is the midpoint of BC.
9. A rhombus sheet, whose perimeter is 32 m and whose one diagonal is 10 m long, is painted on both sides at the rate of Rs. 5 per square metre. Find the cost of painting.
10. There are two cones. The curved surface area of one is twice that of the other. The slant height of the latter is twice that of the former. Find the ratio of their radii.
11. Construct a triangle whose perimeter is 12 cm and base angles are of 45°and60°.
12. Total surface area of a solid sphere is 1386 sq.m then what will be the total surface area of the solid hemisphere of same radius.

13. Determine the median of 24, 23, a, a-1, 12, 16 where a is the mean of 10,20, 30, 40, 50

14. The class marks of distribution are 6, 10, 14, 18, 22, 26, 30 Find the class size and the class intervals

15. A triangle and a parallelogram have the same base and the same area. If the sides of the triangle are 26 cm, 28 cm and 30 cm, and the parallelogram stands on the base 28 cm, find the height of the parallelogram.

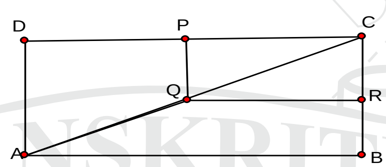
16. A metal pipe is 77 cm long. The inner diameter of a cross section is 4 cm the outer diameter being 4.4 cm Find: (a) inner surface area (b) outer surface area (c) total surface area.

17. Construct the frequency polygon for the following data.

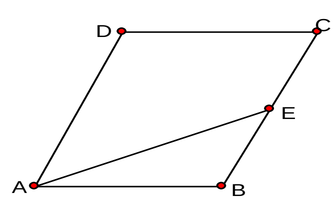
Age in Years	0 – 5	5 – 10	10 – 15	15 - 20	20 – 25	25 - 30	30 – 35
Frequency	7	10	14	20	16	8	2

18. A chord of a circle is equal to the radius of the circle. Find the angle subtended by the chord at a point on the major arc.

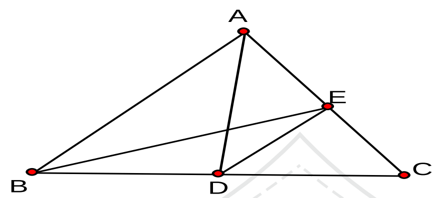
19. In the given figure ABCD and PQRC are rectangles where Q is the midpoint of AC.
Prove that: (i) DP = PC (ii) QR = $\frac{1}{2}AB$



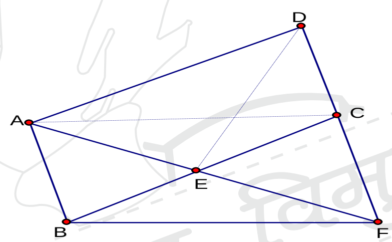
20. In the given figure, ABCD is a parallelogram. If E is mid-point of BC and AE be bisector of angle A, prove that $AB = \frac{1}{2}AD$.



21.In the given figure, ABC is a triangle with AD as median and DE II AB. Prove that BE is a median.



22. A point E is taken on the side of a parallelogram ABCD; AE and DC are produced to meet at F. Prove that:
(i) $ar(\Delta DEC) = ar(\Delta BEF)$ (ii) $ar(\Delta ADF) = ar(quadABFC)$



24. S is mid-point of the side QR of the triangle PQR, and T is the mid-point of QS. If O is the mid-point of PT, prove that the area of triangle QOT is one-eighth of the area of triangle PQR.

24. A quadrilateral ABCD is inscribed in a circle so that AB is the diameter of the circle. If $\angle ADC = 115°$, find $\angle BAC$.

25. Two congruent circles intersect each other at the points P and Q. A line through P meets the circles in A and B. Prove that QA = QB.

26. Diameters of a circle intersect each other at right angles. Prove that the quadrilateral formed by joining their end points is a square.

Sample Paper 1

Time: 3 hours **MM- 80**

General Instructions

- **Section A** consists of 20 questions of 1 mark each.
- **Section B** consists of 6 questions of 2 marks each.
- **Section C** consists of 8 questions of 3 marks each.
- **Section D** consists of 6 questions of 4 marks each.
- There are 40 questions in all.
- All questions are compulsory, however there is internal choice given in some questions. You must attempt only one of them.
- There are 6 printed pages in the question paper.

Section-A

In questions 1- 12 choose the correct option

1) The rationalizing factor of $\frac{1}{5+2\sqrt{6}}$ is:

a) $5+\ 2\sqrt{6}$ b) $-5+\ 2\sqrt{6}$ c) $5-\ 2\sqrt{6}$ d) $-5-\ 2\sqrt{6}$

2) Which of the following is equal to x?

a) $x^{\frac{12}{7}} - x^{\frac{5}{7}}$ b) $x^{\frac{12}{7}} \times x^{\frac{5}{7}}$ c) $\left(\sqrt{x^3}\right)^{\frac{2}{3}}$ d) $\left(\sqrt{x^2}\right)^{\frac{2}{3}}$

3) In ΔABC and ΔDEF, AB = FD and ∠A = ∠D. The two triangles will be congruent by SAS axiom if :

a)BC = EF b) AC = DE c) AC = EF d) BC = DE

4) On plotting the points O (0,0), A(3,0), B(3,4), C(0,4) and joining OA, AB, BC and CO, which of the following figures is obtained?

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

5) Which of the following equations represents a line parallel to the $x-axis$?

a) $3x+2=0$ b) $3y+2=0$ c) 3x+2y=0 d) $3x-2y=0$

6) The number $\left(2-\sqrt{3}\right)^2$ is:

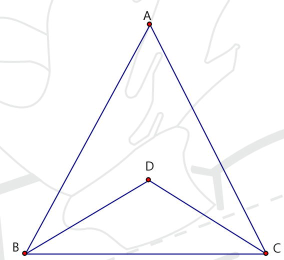
a) a natural number b) an integer c) a rational number d) an irrational number

7) If $p(x)=x^2-2\sqrt{2}x+1$ then $p(2\sqrt{2})$is:

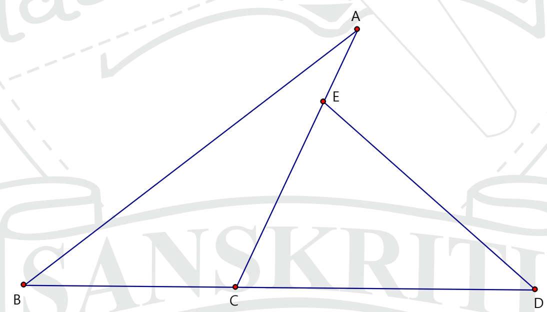
a) 0 b) 1 c) $4\sqrt{2}$ d) $8\sqrt{2}+1$

8) In the following figure AB=AC and BD=CD. The ratio ∠ABD : ∠ACD is:

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



9) In the following figure, ∠BAC=25°, ∠ABC=45°and ∠CDE=60°. The value of ∠AED is:



a) 110° b) 120° c) 130° d) 140°

10) The value of $\sqrt[4]{(81)^{-2}}$ is:

a) $\frac{1}{9}$ b) $\frac{1}{3}$ c) 9 d) $\frac{1}{81}$

11) Which of the following is a factor of $(x+y)^3-(x^3+y^3)$?

a) $x^2 + xy + 2xy$ b) $x^2 + y^2 - xy$ c) xy^2 d) $3xy$

12) In ΔPQR if ∠R>∠Q, then

a) QR>PR b) PQ>PR c) PQ<PR d) QR<PR

In questions 13- 16 fill in the blanks to make the statements true.

13) The degree of a non-zero constant polynomial is ______________.

14) Between two distinct irrational numbers, there lie _______________rational numbers.

15) If the non common- arms of adjacent angles form a line, then the adjacent angles are said to form a _____________.

16) T he abscissa of any point on the y-axis is ________________.

In questions 17-20 state whether the statements are <u>True or False.</u>

17) Zero of a polynomial is always zero.

18) A binomial may have degree 5.

19) The graph of the linear equation $x + 2y = 7$ passes through the point (0,7).

20) For every point in the coordinate plane , there is a unique ordered pair of real numbers.

<u>Section-B</u>

21) Simplify: $8\sqrt{45} - 8\sqrt{20} + \sqrt{245} - 3\sqrt{125}$

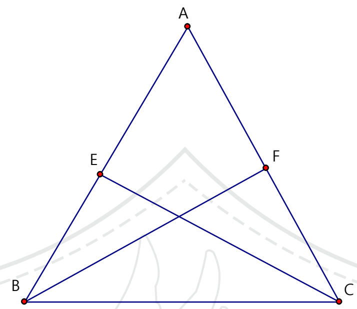
OR

Evaluate: $\left[\left((625)^{\frac{-1}{2}}\right)^{\frac{-1}{4}}\right]^2$

22) Check whether the polynomial $p(x) = 4x^3 + 4x^2 - x - 1$ is a multiple of $2x + 1$.

23) It is given that ∠XYZ=64° and XY is produced to a point P. Draw a figure from the given information. If ray YQ bisects ∠ZYP, find ∠XYQ and reflex∠QYP.

24) E and F are respectively the midpoints of equal sides AB and AC of ΔABC as shown in the figure. Show that BF=CE.



OR

Show that of all line segments drawn from a given point not on it, the perpendicular line segment is the shortest.

25) Give the geometric representation of $3x + 15 = 0$ as an equation (on the answer sheet)

(i) in one variable (ii) in two variables.

26) Write the coordinates of the vertices of a rectangle which is 7 units long and 5 units wide. The rectangle is in the first quadrant, its longer side is on the x-axis and one vertex is at the origin.

Section-C

27) If a and b are rational numbers and $\frac{\sqrt{2}+2\sqrt{3}}{2\sqrt{2}+4\sqrt{3}} = a - b\sqrt{6}$, find the values of a and b

OR

If $x = (2 - \sqrt{3})$, find the value of $\left(x - \frac{1}{x}\right)^3$.

28) If the polynomials $f(x) = ax^3 + 3x^2 - 13$ and $g(x) = 5x^3 - 8x + a$ leave the same remainder when divided by $x + 1$, then find the value of a.

29) Prove **any one** of the following statement:

"Angles opposite to equal sides of an isosceles triangle are equal."

OR

"If two lines intersect each other, then the vertically opposite angles are equal."

30) In which quadrant or on which axis do each of the following points lie?

a) (-3,5) b) (0,-3) c) (-3,-6)

31) Give the equations of two lines which will have a point (3,21)lying on it. How many more such lines are there? Explain why.

OR

Determine the point on the graph of the equation $2x + 5y = 20$ whose abscissa is $\frac{5}{2}$ times its ordinate.

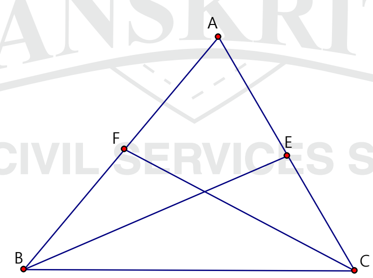
32) Represent $\sqrt{4.7}$ on the number line.

33) Without actually calculating the cubes evaluate the following:

a) $48^3 - 30^3 - 18^3$

b) 97^3

34) ABC is a triangle in which the altitudes BE and CF to the sides AC and AB are equal. Show that: (i) ΔABE ≅ ΔACF (ii) AB=AC , ie ΔABC is isosceles.



Section-D

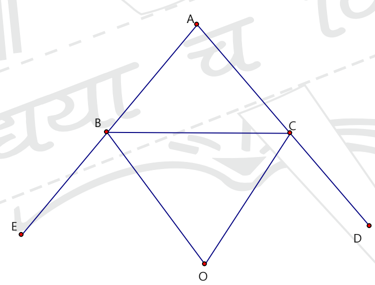
35) Factorize using Factor theorem: $2x^3 - 5x^2 - 19x + 42$

OR

Factorise: $\frac{(a^2-b^2)^3+(b^2-c^2)^3+(c^2-a^2)^3}{(a-b)^3+(b-c)^3+(c-a)^3}$

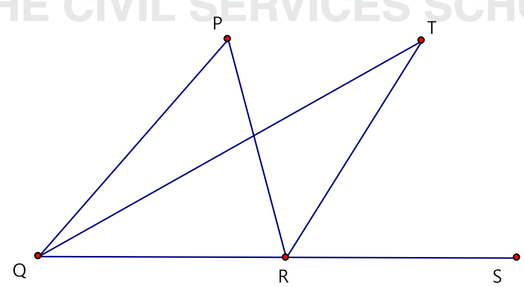
36) Draw the graphs of $x - 3y + 2 = 0$ and $2x - 3y - 4 = 0$ on the same graph sheet. Shade the region bounded by these two lines and the y-axis.

37) If AB and AC of a ΔABC are produced to points E and D respectively. If bisectors BO and CO of ∠CBE and ∠BCD respectively meet at point O, then prove that: $\angle BOC = 90° - \frac{1}{2}\angle BAC$.

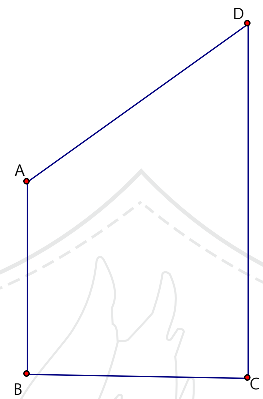


OR

The side QR of ΔPQR is produced to a point S. If the bisectors of ∠PQR and ∠PRS meet at point T, then prove that ∠QTR= $\frac{1}{2}$ ∠QPR.



38) AB and CD are respectively the smallest and longest sides of a quadrilateral ABCD. Show that $\angle A > \angle C$ and $\angle B > \angle D$.



39) Without actual division prove that $f(x) = 2x^4 - 5x^3 + 2x^2 - x + 2$ is divisible by $x^2 - 3x + 2$.

OR

Using proper identity factorize: $(2x - 5y)^3 - (2x + 5y)^3$

40) Factorize **<u>any two</u>** of the following:

(i) $a^3 - 2\sqrt{2}b^3$

(ii) $x^2 + 9\sqrt{3}x + 42$

(iii) $27p^3 - \frac{1}{216} - \frac{9}{2}p^2 + \frac{1}{4}p$

Sample Paper 2

Time: 3 hours **MM – 80**

General Instructions:

- ***All questions are compulsory.***
- ***There are 6 printed sides in the question paper.***
- ***The question paper consists of 40 questions divided into four sections A, B, C and D.***
- ***Section A contains 20 questions of 1 mark each. Section B contains 6 questions of 2 marks each. Section C contains 8 questions of 3 marks each and Section D contains 6 questions of 4 marks each.***
- ***There is no overall choice. However internal choice has been provided in some questions.***

Section A

1. A frequency polygon is constructed by plotting frequency of the class interval and the

(a) upper limit of the class

(b) lower limit of the class

(c) mid value of the class

(d) size of the class

2. In a football match, Ronaldo makes 4 goals from 10 penalty kicks. The probability of converting a penalty kick into a goal by Ronaldo is

(a) $\frac{2}{3}$ (b) $\frac{2}{5}$ (c) $\frac{3}{5}$ (d) $\frac{3}{2}$

3. A die is thrown 200 times. If the probability of getting an even number is $\frac{2}{5}$, then the number of times an odd number is obtained is

(a) 80 (b) 100 (c) 120 (d) 60

4. The graph of which equation is parallel to y-axis?

(a) $y = x + 1$ (b) $y = 2$ (c) $x = 3$ (d) $x = 2y$

5. To construct a triangle, at least how many parts should be known?

(a) 2 (b) 6 (c) 4 (d) 3

6. Two sides of a triangle are of lengths 4.5cm and 2 cm. The length of the third side of the triangle can be

(a) 6.8cm (b) 6.6cm (c) 6.5cm (d) 6.4cm

7. How many linear equations in x and y can be satisfied by $x = -1$ and $y = 2$?

(a) Only one (b) Two (c) Three (d) Infinitely many

8. The curved surface area of a cone whose radius is $\frac{r}{2}$ and slant height is $2l$ is

(a) πrl (b) $2\pi rl$ (c) $2\pi r(l + r)$ (d) $\frac{\pi rl}{2}$

9. The value of $248^2 - 249^2$ is

(a) $(-1)^2$ (b) 497 (c) –497 (d) None of these

10. Which of the following is not a criterion for congruency of triangles?

(a) AAA (b) SSA (c) SAS (d) Both (a) and (b)

11. What is the total surface area of an open hemisphere of radius r?

12. ___________ is the region between a chord and its corresponding arc.

OR

If a circle is divided into three equal arcs, each is a major arc. (True/False)

13. In the class intervals 10-20, 20-30, the number 20 is included in

(a) 10-20 (b) 20-30 (c) both the intervals (d) none of the intervals

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

(a) 40° (b) 72° (c) 144° (d) 180°

OR

In quadrilateral ABCD, AB||CD and AD = BC. What additional information is required to make it a parallelogram?

(a) AC = BD (b) ∠A = ∠B (c) AB = CD (d) ∠A + ∠D = 180°

15. A median of a triangle divides it into two congruent triangles. (True/False)

16. If diagonals of a parallelogram are equal, then it is always a square. (True/False)

17. Angle formed in minor segment of a circle is __________. (acute/right/obtuse)

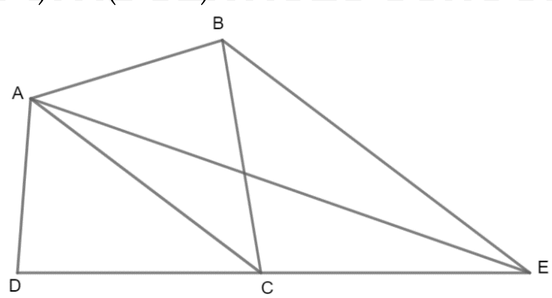
18. Write the equation of a line passing through the point (–3, 1).

19. If $x = 1, y = -3$ is a solution of the equation $2x + 5y = k$, then find the value of k.

20. Find the area of an equilateral triangle of side 12 cm.

Section B

21. In the given figure, ABCD is a quadrilateral. A line through B parallel to AC meets DC produced at E. Show that ar(AED) = ar(ABCD).



22. The following observations have been arranged in ascending order. If the median of the data is 61, find the value of x:

29, 32, 48, 50, x, x+4, 72, 78, 84, 95

23. If $a - b = 3$ and $ab = 4$, find the value of $a^3 - b^3$.

OR

Without actually calculating cubes, find the value of $26^3 + (-15)^3 + (-11)^3$.

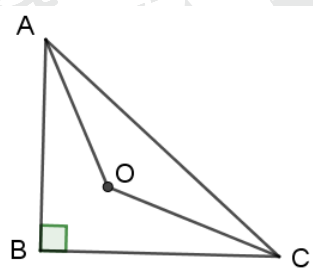
24. The volumes of two spheres are in the ratio 27 : 125. Find the ratio of their surface areas.

OR

Curved surface area of a right circular cylinder is $4.4m^2$. If the radius of the base of the cylinder is $0.7m$, find its height. (Use $\pi = 22 / 7$)

25. A hemispherical bowl has a radius of 3.5 cm. What would be the volume of water it would contain? (Use $\pi = 22 / 7$)

26. In the given figure, AO and CO are angle bisectors. Find the measure of ∠AOC.

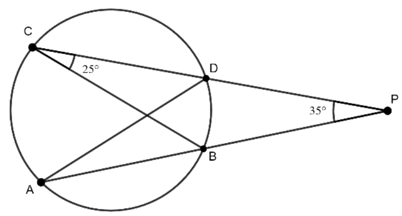


Section C

27. If the diagonals of a parallelogram are equal, then prove that it is a rectangle.

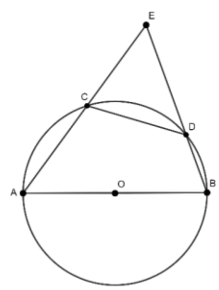
28. Find the point of intersection of $x + y = 6$ and $2x = y$ graphically.

29. In the given figure, chords AB and CD of a circle when produced meet at P. If $\angle APD = 35^0$ and $\angle BCD = 25^0$, then find $\angle ADC$ *and* $\angle BAD$.



OR

In the given figure, AB is a diameter of the circle and CD is a chord equal to the radius of the circle. AC and BD when extended intersect at the point E. Prove that $\angle AEB = 60^0$.

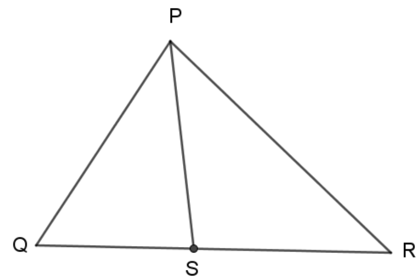


30. On a page of a telephone directory, there were 200 telephone numbers. The frequency distribution of their unit place digit is given in the following table:

Digit	0	1	2	3	4	5	6	7	8	9
Frequency	22	26	22	22	20	10	14	28	16	20

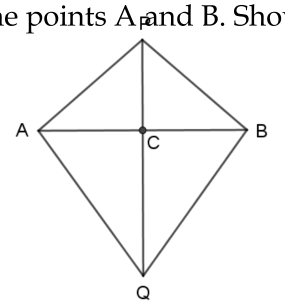
Find the probability of a telephone number, chosen at random, having unit place digit as (i) 8 (ii) a prime number (iii) a factor of 6

31. In the given figure, $PR > PQ$ and PS bisects $\angle QPR$. Prove that $\angle PSR > \angle PSQ$.



OR

In the given figure, AB is a line segment. P and Q are points on opposite sides of A such that each of them is equidistant from the points A and B. Show that the line PQ is the perpendicular bisector of AB.



32. Using factor theorem, factorize $2x^3 + 5x^2 - x - 6$.

OR

Using appropriate identities, factorize the following:

(i) $a^3 - b^3 + 1 + 3ab$ (ii) $\frac{a^3}{125} + 8b^3$

33. Sides of a triangle are in the ratio 12 : 17 : 25 and its perimeter is 540 cm. Find its area.

34. Find the value of 'a' if the mean of the following distribution is 50.

x	10	30	50	70	90
f	17	5a+3	32	7a -11	19

Section D

35. Construct a triangle ABC in which $BC = 3.2\ cm$, $\angle B = 45^0$ and $BA - CA = 1.4\ cm$.

OR

Construct a triangle XYZ in which $\angle Y = 30^0$, $\angle Z = 90^0$ and $XY + YZ + ZX = 11\ cm$.

36. In parallelogram ABCD, AC bisects ∠A. Show that

(a) AC bisects ∠C (b) ABCD is a rhombus

37. The volume of a conical tent is 1232 m^3 and the area of the base floor is 154 m^2. Calculate (i) radius of the floor (ii) height of the tent (iii) the area of the canvas required to cover this conical tent. (Use $\pi = 22 / 7$)

38. 100 students in a school have heights as tabulated below:

Height (in cm)	121-130	131-140	141-150	151-160	161-170
No. of students	12	18	30	24	16

Draw a frequency polygon of the above data.

OR

The monthly pocket money of 550 children are given as follows:

Pocket Money (in Rs.)	100-150	150-200	200-300	300-500	500-750
No. of children	64	86	120	120	160

Draw a histogram for the above data.

39. Prove that the parallelograms on the same base and between the same parallels are equal in area.

OR

If E, F, G and H are the mid-points of the sides AB, BC, CD and DA respectively of a parallelogram ABCD, show that ar(EFGH) = $\frac{1}{2}$ ar(ABCD).

40. 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.