MATHEMATICS

Month: <u>April</u>

<u>Rational numbers</u>

<u>SECTION –A</u>

1) Using properties, simplify the following:

      (a) $\dfrac{-5}{7} \times \dfrac{5}{3} + \dfrac{1}{3} \times \dfrac{-5}{7}$ (b) $\dfrac{-9}{13} \times \dfrac{6}{10} + \dfrac{6}{7} \times \dfrac{3}{5} + \dfrac{3}{5}$

2) Find the sum of additive inverse and multiplicative inverse of -9 .

3) Find the product of additive inverse and multiplicative inverse of $\dfrac{-1}{7}$

<u>SECTION –B</u>

4) What should be added to the product of the additive inverse of $\dfrac{-6}{11}$ and the multiplicative inverse of $\dfrac{-8}{13}$ to get the sum $\dfrac{5}{11}$?

5) Find 4 rational numbers between $\left| \dfrac{-2}{7} + \dfrac{-4}{18} \div \dfrac{6}{-14} \right|$ and $\dfrac{2}{21}$

6) Divide the additive inverse of $\left(\dfrac{-4}{3} \div \dfrac{5}{6} \right)$ by $\left(\dfrac{-2}{3} + \dfrac{5}{9} - \dfrac{-7}{6} \right)$

7) Subtract the multiplicative inverse of $\left(\dfrac{5}{3} + \dfrac{3}{-2} + 3 \right)$ from the multiplicative identity of rational numbers.

<u>SECTION- C</u>

(The following questions are optional and are for enrichment)

8) The sum of two natural numbers is 163 and their product is 6636. Without finding these numbers, find the sum of their reciprocals.

9) Simplify the following:

$$\dfrac{-9900}{60} \; X \; \dfrac{1}{5 \; X \; \dfrac{1}{33 \; X \; \dfrac{1}{11}}} \; 5 \; X \; \dfrac{1}{5 \; X \; \dfrac{1}{5 \; X \; \dfrac{1}{25}}}$$

<u>Squares and Square roots.</u>

<u>SECTION –A</u>

1) Find the square roots of the following.

i)   0.09+ 2 × 0.21 + 0.49 ii) 146.8944   iii) 15129   iv) [248+ {52 + (144)$^{1/2}$}$^{1/2}$]$^{1/2}$

2) Find the least square number which is exactly divisible by each of the number 6,9,15 and 20.

SECTION – B

3) The perimeter of two squares are 40 and 96 metres respectively. Find the perimeter of another square whose area is equal to the sum of the areas of first two squares.

4) Two numbers are in the ratio 2 : 3. If the sum of their squares is 2925, find these numbers.

5) Find the square root of 6241. Using this evaluate $\sqrt{62.41} + \sqrt{0.6241} \div \sqrt{0.006241}$

6) The area of a square field is 5184 m². A rectangular field whose length is twice its breadth has its perimeter equal to the perimeter of the square field. Find the area of the rectangular field.

7) Find the square root of (i) 7 (ii) $\frac{7}{9}$ (iii) 86.71 (iv) 10 ¼   correct up to two decimal places.

8) Find the value of the following by using a suitable property of square roots.

(a) $\sqrt{\dfrac{999^2}{12321}}$ (b)$\dfrac{11025}{1024}$ (c) $\sqrt{1250} \times \sqrt{128}$ (d) $\sqrt{162} \times \sqrt{242}$

SECTION –C

(The following questions are optional and are for enrichment)

9) Two buildings are 20m and 25m high. If the buildings are 12m apart, find the   distance between their tops.

10) Solve the equation $\sqrt{\dfrac{2x-1}{3}} = 5$

Month: May

Cubes and cube roots

SECTION –A

1) Find the side of a cube whose volume is equal to that of a cuboid of dimensions 75 m by 20 m by 18m.

2) Three numbers are in the ratio $1 : 2 : 3$. The sum of their cubes is 62208. Find the numbers.

 3) A cube of side 6cm is melted to form three different cubes, if the sides of the two cubes are 3cm & 5cm, what is the length of the side of third cube?

SECTION –B

4) Find the cube roots of the following:

   a) 46656   b) —226981   c) 250.047   d) 0.110592   e) $\dfrac{4913}{15625}$

5) The volume of a cubical box is 10. $648m^3$.Find the lateral surface area of the box.

6) Evaluate:

(i) $\sqrt[3]{27}$ $+ \sqrt[3]{0.008} + \sqrt[3]{0.064}$ (ii) $[\{5^2 + 12^2\}^{\frac{1}{2}}]^3$ (iii) $\sqrt[3]{\dfrac{54}{250}} \times \sqrt[3]{100} \times \sqrt[3]{80}$

7) Two natural numbers are in the ratio 3:2. The difference of their cubes is 9728.Find the numbers.

SECTION – C

  (The following questions are optional and are for enrichment)

8) Find y such that $a)$ $\sqrt[3]{16\frac{16}{27}} = \frac{4}{3} \times \sqrt[3]{y}$ $b)$ $99 \times 21 - \sqrt[3]{y} = 1968$

9) The volumes of two cubes is in the ratio 1331:3375. Find the ratio of their surface areas.

Exponents or Powers

SECTION –A

   Simplify   (I) $(512)^{\frac{2}{-9}}$ (2) $(1024)^{\frac{-4}{5}}$ (3) $\left\{ \sqrt[3]{\dfrac{1}{(27)^{-4}}} \right\}^{\frac{-3}{2}}$

SECTION –B

Simplify

(4) $\dfrac{4}{(216)^{\frac{-2}{3}}} + \dfrac{1}{(256)^{\frac{-3}{4}}} + \dfrac{2}{(243)^{\frac{-1}{5}}}$ (5) $16^{1/2}(16^{1/2} - 2)$ (6) $\dfrac{(25)^{\frac{3}{2}} \times (243)^{\frac{3}{5}}}{(16)^{\frac{5}{4}} \div (8)^{\frac{4}{3}}}$

(7) $(0.25)^{1/2} + (0.01)^{-1/2} - (27)^{2/3}$ (8) $(\frac{1}{4})^{-2} -- 3\times 5^0 - (\frac{1}{81})^{-1/2}$

(9) Express $\sqrt[3]{(\frac{81}{100})^5}$ into exponential form and $(\frac{200}{15})^{\frac{2}{3}}$ into radical form.

M3

Solve the following Exponential Equations for x:

(10) $[(125)]^{X-2} \times 5^3 \div (25)^{\frac{-3}{2}} = 125$

(11) $\left[\frac{7}{2}\right]^{-3x+2} \div \left(\frac{49}{4}\right)^{\frac{3}{2}} \times \left(\frac{2}{7}\right)^{-5x} = \frac{343}{8}$

(12) $\left(\frac{25}{144}\right)^{-5} \times \sqrt{\left(\frac{5}{12}\right)^X} \div \left(\frac{5}{12}\right)^{-3} = \frac{12}{5}$

(13) $8^{x-2} \times (\frac{1}{2})^{4-3x} = (0.0625)$

(14) Evaluate: $[(2\frac{10}{27})^{-2/3} \div (11\frac{1}{9})^{-0.5}] + [(6.25)^{0.5} \div (-4)^{-1}]$

SECTION – C

(The following questions are optional and are for enrichment)

(15) If $\sqrt[3]{2x-3} - 4 = 0$ then find the value of x.

(16) If $9^{x+2} = 240 + 9^x$ then find the value of x.

Month: July

Linear equations in one variable

SECTION- A

1) Solve the following equations:

(a) $\frac{3y-5}{5} - 2(y-5) = \frac{y-1}{2}$

(b) $\frac{2}{3}(4x-1) - \left(4x - \frac{1-3x}{2}\right) = \frac{x-7}{2}$

(c) $\frac{5}{2}(x+2) + 6 = \frac{9x-4}{2} + \frac{5x}{4}$

SECTION- B

2) On dividing Rs 200 between A and B, such that twice of A's share is less than 3 times B's share by 200, what is B's share?

3) Anima left one half of her property to her daughter, one third of the remaining to her son and donated the rest to an educational institute. If the donation was worth Rs 100000, how much money did Anima have?

4) A man was engaged as typist for the month of February in 2009. He was paid Rs 500 per day but Rs 100 per day were deducted for the days he remained absent. He received Rs 9100 as salary for the month. For how many days did he work?

5) The sum of the three sides of a triangle is 55 m. If two sides of it are each 4 m less than three times the third side, find the dimensions of the triangle.

6) A steamer goes downstream and covers the distance between two ports in 3 hours. It covers distance in 5 hours, when it goes upstream. If the stream flows at 3km/h, the find what is the speed of the steamer?

7) The digit at the ten's place of a two-digit number is four times the digit at one's place. If the sum of this number and the number formed by reversing the digits is 55, find the number.

SECTION – C

(The following questions are optional and are for enrichment)

8) Find x, if $\sqrt{\dfrac{4x}{3}} - 2 = 2$

9) A boy goes to his school at a speed of 10 km per hour but he reaches the school late by 6 minutes. If he cycles at a speed of 12 km per hour, he reaches there 6 minutes earlier. Find the distance of the school from his starting place.

Commercial Mathematics

SECTION- A

1) Waheeda bought an air cooler for Rs 3360 including GST of 12%. Find the price of the air cooler before GST was added.

2) The distance between two places is 200 Km. It was wrongly measured as 280 Km. Find the percentage error.

3) If $x \, \alpha \, \dfrac{1}{y}$ and x = 1.5 when y = 60. Find x when y = 4.5

4) If x = 5y, then x and y vary _____ with each other.

SECTION –B

5) Three bags contain 64.2 kg of sugar. The second bag contains 4/5 of the contents of the first and the third contains 45.5% of what there is in the second bag. How much sugar is there in each bag?

6) 120 men can finish a piece of work in 200 days. After 5 days, 30 men have left the work. In how many days will the same work can be completed by the remaining men?

7) Soham had money which was enough to buy 30 bags @ Rs 200 per bag. If the price of each bag is increased to 25%, how many bags can Soham buy with the same amount of money?

8) A train 225m in length, crosses a man standing on a platform in 10 seconds. Find the speed of the train. How long will it take to pass a platform 405m long?

9) A train 490m long is travelling at 120 km/hr. In how much time will it pass through a tunnel 100m long?

10) Ashima sold two coolers for Rs. 3,990 each. On one she made a gain of 5 % and

 on the other a loss of 10%. Find her overall gain or loss%.

11) The marked price of an article is Rs 500. The shopkeeper gives a discount of 5% and still makes a profit of 25%. Find the cost price of the article.

12) The marked price of a cooler is Rs.12,000. The shopkeeper offers a discount of 10%.Find the amount that a customer has to pay, if 8%GST is added.

13) Babita bought 160 kg of mangoes at Rs 48 per kg. She sold 70% of the mangoes at Rs70 per kg and the remaining mangoes at Rs 40 per kg. Find Babita's gain or loss % on the whole dealing.

14) A shopkeeper was selling all his items at 25% discount. During the off season, he offered 30% discount over and above the existing discount. If Pragya bought a skirt which was marked for Rs 1200, how much did she pay for it?

15) A quintal of wheat costs Rs 45500. Find (a) the cost of 60 kg of wheat and (b) the quantity of wheat that can be bought for Rs 18200.

SECTION –C

(The following questions are optional and are for enrichment)

16) A alone can do a piece of work in 8 days. A and B together can finish the same work in 6 days, If B alone is doing, how long will he take to complete the work?

17) A and B working alone, can finish a job in 10 days and 15 days respectively,

 If they work together, how much of the work can they finish in 1 day? How many days will they take to finish the entire job?

Month: August.

Simple interest and Compound interest

1) Find the amount to be paid at the end of 6 months on Rs 32000 at 25 % per annum compounded quarterly.

2) If the C.I on a certain sum for 2 years at 3% p.a is Rs 101.50, then what will be the simple interest on the same sum at the same rate and for the same time?

3) On what time Rs 2400 amount to Rs 2646 at 5% per annum C.I?

4) On what sum will the C.I. for 2 years at 5% p.a. be Rs1230?

5) A sum of money amounts to Rs 4840 in 2 years & Rs 5324 in 3 years at C.I compounded annually. What is the rate of interest per annum?

6) The present population of a town is 31250. If the annual increase in the population is 4%, what will be the population of the town after 3 years.

Quadrilaterals

SECTION - A

1) A playground in the town is in the form of a kite. The perimeter is 106m. If one of its sides is 23m, what are the lengths of other three sides?

2) In a rhombus ABCD , AB = (7x + 3) mm and BC = (2x + 38) mm. Find the side of the rhombus and also find the perimeter of the rhombus in cm. Mention the property of rhombus that is used.

3) MUST is a trapezium such that MU II TS, $\angle$M : $\angle$T = 2:1 , $\angle$ U : $\angle$S = 7:5. Find the angles of the trapezium.

SECTION – B

4.) ABCD is a rectangle. Find x.
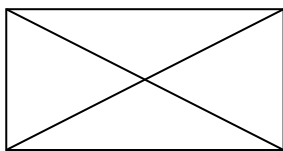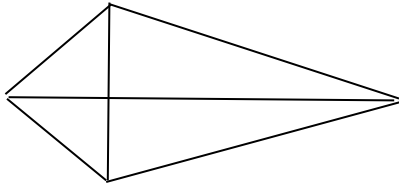

5) In parallelogram FIST, find x, y, z and w.
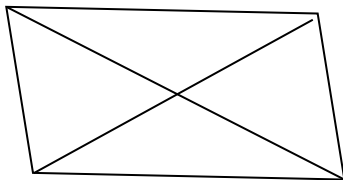
6) ABCD is a trapezium where

AB = AD, ∠ABE = 140°& ∠BCF = 120°.Find x and y.
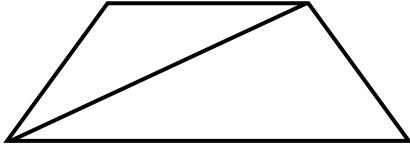
7) The diagonals of a square measure $\left(\frac{7}{4}x + 5\right) cm \; and \left(\frac{5}{3}x + 10\right) cm$ .Find their measures.

8) In the given Kite, Calculate x, y & z.

9) The angle between the two altitudes of a parallelogram through the vertex of an obtuse angle of a parallelogram is 45˚. Find all the angles of a parallelogram.

SECTION – C

(The following questions are optional and are for enrichment)

11) In the figure, ABCD is a parallelogram and∠DAB = 60°. If the bisectors AP and BP of the angles A and B respectively, meet at P on CD, prove that P is the mid-point of CD.
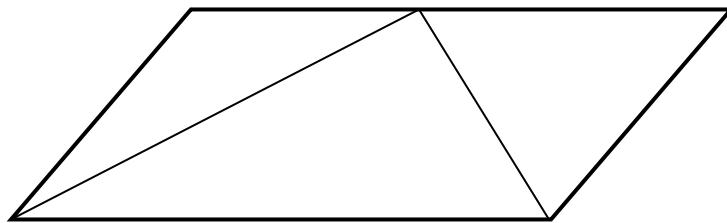
   12) In a quadrilateral ABCD, AO and BO are the bisectors of ∠A and ∠B respectively. Prove that∠AOB = ½ (∠ C +∠ D).

Month: October.

Area of Polygons

1) The area of a rectangular field is 48 m² and one of its side is 6m. How long will a lady take to cross the field diagonally @ 20m/minute?

2) The area of a trapezium with equal non parallel sides is 168 m². If the lengths of the parallel sides are 36m and 20m, find the length of the non-parallel sides.

3) A running track has 2 semicircular ends of radius 63m and two straight lengths. The perimeter of the track is 1000m. Find each straight length.

4) The parallel sides of a trapezium are 40 cm and 20 cm. If its non-parallel sides are both equal, each being 26 cm, find the area of trapezium.

5) In the given figure, the dimensions are given in metres. Find the area of this field.
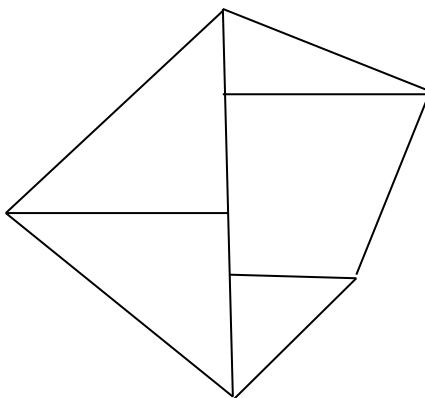
Volume and Surface Area

SECTION – A

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

2) The circumference of the base of a circular cylinder is 6π cm. The height of the cylinder equals to the diameter of the base. How many litres of water can it hold?

SECTION – B

3) If the rainfall on a certain day was 5 cm, how many litres of water fell on 1.5 hectare field on that day?

4) Four times the area of the curved surface of a cylinder is equal to 6 times the sum of the areas of its bases. If its height is 12cm, find its curved surface area.

5)The sum of radius of the base and height of the solid cylinder is 37 m. If the TSA of the solid cylinder is 1628 m², find the circumference of its base and the volume of the cylinder.

6) A well 20m in diameter is dug 14m deep and the mud taken out is spread all round it to

a width of 5m to form an embankment. Find the height of the embankment.

7) A square sheet of paper is converted into a cylinder by rolling it along its side. What is the ratio of the base radius to the side of the square?

8) A swimming pool is 200m by 50m and has an average depth of 2m. By the end of a summer day, the water level drops by 2cm. How many cubic meters of water is lost on the day?

9) External dimensions of a closed wooden box are in the ratio 5:4:3. If the cost of painting its outer surface at the rate of Rs 5 per dm² is Rs 11750, find the dimensions of the box.

ACTIVITY

 Take a rectangular sheet (say A4 sized sheet) and note its dimensions. Roll it along it's (a) length and (b) width. Paste the edges after bringing them together. Can you identify the figure formed?
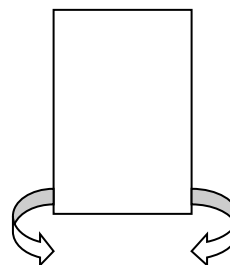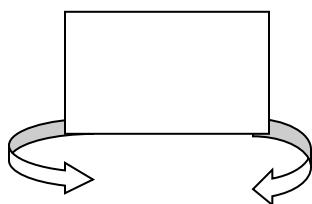
Now, calculate the following in both the cases (ignoring the overlapping portions)

- CSA

- RATIO OF THE VOLUMES (assuming that they are closed from both top and bottom)

SECTION – C

(The following questions are optional and are for enrichment)

10) If the radius of a right circular cylinder open at both the ends is decreased by 25% and the height of the cylinder is increased by 25%, then find the percentage increase or decrease in the surface area of the cylinder thus formed?

11) It is required to fix a pipe such that water flowing through it at a speed of 7 metres per minute fills a tank of capacity 440 cubic metres in 10 minutes. Find the inner radius of the pipe?

Practical Geometry

SECTION – A

1) Construct a parallelogram one of whose sides is 5.2 cm and whose diagonals are 6cm and 6.4cm.

2) Construct a Rectangle ABCD such that AB = 6cm, AC =10 cm. Measure the length of BC.

3) Construct a trapezium RISK in which RI II KS, RI = 7cm, IS = 5 cm, RK = 6.5cm and $\angle I = 60°$

SECTION – B

4) Construct a Rhombus PQRS such that PQ = 5cm and $\angle P = 75°$.

5) Construct a Quadrilateral ABCD such that BC = 6.5cm , CD = 4.8cm, $\angle A = 80°$, $\angle B = 100°$, $\angle D =75°$.

6) Construct a quadrilateral ABCD in which AB= AD = 5cm. BC = CD = 7cm and BD = 6cm. What type of quadrilateral is this?

7) Construct a parallelogram NAME in which the diagonals NM & AE are 4.5cm and 4.2cm and the angle between these diagonals is $30°$.

Month: November.

Algebraic Expressions &Factorisation

SECTION-A

1)Expand the following using identities:-

(a)$(0.4a + 1.1b)^2$ (b) $(5y -- 6z)^2$ (c) $(15 a -- 12b)(15 a + 1 2 b)$ (d) $(x -- 4yz) (x + 4yz)$

2) Find the following products:

a) $\left(\frac{1}{2}x-1\right)\left(\frac{1}{2}x-3\right)$ b) $\left(\frac{1}{3}yzx-3\right)\left(\frac{1}{3}yzx+9\right)$
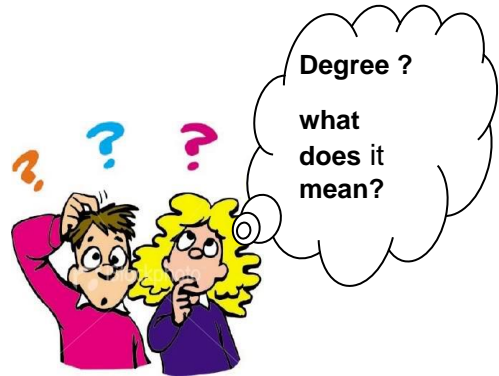
3) Find the quotient and remainder when f(x) is divided by g(x):

(i) $f(x) = 2x^4 - 3x^3 + x^2 + 1$, $g(x) = x - 2$

(ii) $f(x) = 5x^4 - 4x^3 + 9x - 10$, $g(x) = x^2 + 2x + 1$

4) Match the polynomial with its degree.

Polynomial	Degree
(1) $-4x^3 + 5x$	7
(2) $2x^5y + 3xy - 7y^2$	6
(3) $3x^6y + 12xyz - 3xy - 25$	0
(4) $y^8 + x^3 + 50xy$	3
(5) 2500	8

SECTION –B

5) If $x + \dfrac{1}{x} = \dfrac{5}{2}$, find the values of: (a) $x^2 + \dfrac{1}{x^2}$ (b) $x - x^{-1}$ (c) $x^4 + \dfrac{1}{x^4}$

6) Evaluate the following, using identities:-

(a) $(201)^2$ (b) $(99)^2$ (c) (3005 x 2991) (d) 99.9 X 100.1

7) Find the surface area of a cube whose each edge is of length (16x–15y) cm.

8) Find m, if 10.5m = (12.5)^2 -- 62.5 + (2.5)^2, (use suitable identity)

9) Factorise:

(a) $12y^3 + 120y^2 + 300y$ (b) $p^2 - 25p + 84$ (c) $5x^2 - 16xy - 16y^2$

(d) $225 - 25x^2 + 40xy - 16y^2$ (e) $(p+q)^2 - 20 (p+q) - 125$ (f) $a^2 + \dfrac{1}{a^2} + 2 -- 3a - \dfrac{3}{a}$

(g) $\dfrac{48p^2}{81} - \dfrac{3}{121q^2}$ (h) $1.44 + \dfrac{a^2}{0.09} - 8a$ (i) $(x+y)^4 - (x-y)^4$

10) Divide $15x^3 - 20x^2 + 13x - 12$ by $--6 + 3x$ and also write the degree of the quotient.

11) What should be added to $-4x^3 + 5x^2 - 13x + 15$ so that the resulting polynomial is exactly divisible by $1 - 4x$?

12).Simplify the following expressions:

a) $\dfrac{4x^2 - 11x + 7}{x - 1}$ b) $\dfrac{2x^2 - 15x + 22}{2x - 11}$

SECTION-C

(The following questions are optional and are for enrichment)

13) Divide $a^4 - b^4$ by $a - b$ and check the division by division algorithm.

M12

14). If $x^2 - y^2 = 28$ and $x - y = 8$, what is the average of x and y ?

15) Factorise:

(a) $x^2 + 3\sqrt{3}x + 6$ (b) $(x^2 - 4x)(x^2 - 4x - 1) - 20$

(c) $x^3 + 3x^2 + 3x - 7$ (d) $21x^2 - 2x + \dfrac{1}{21}$ (e) $2x^2 - \dfrac{5}{6}x + \dfrac{1}{12}$

Month: December.

Topics: Data Handling and Probability

SECTION – A

1) Prepare a grouped frequency distribution table from the given data and then draw a histogram from it. (take 0 – 10 as the first class interval)

     30 , 7 , 40, 15, 5, 14, 33, 29, 11, 38, 6, 35, 9, 26, 33, 8, 21, 26, 23, 44.

    (i)   What is the lower class limit of the second class interval?

    (ii)   Find the class mark of the third class interval.

    (iii)   Find the modal class.

    (iv)   Find the range of the data.

2) (i) Find the probability of getting a number (a) not greater than 5 (b) a factor of 36, when a dice is thrown.

   (ii) A pack of 52 cards is shuffled. Find the probability of getting (a) a red face card

     (b) 5 of spades (c) an ace (d) red club.

    (iii) Each morning I walk to work or take a taxi to work. The probability that I walk to work is $\dfrac{3}{5}$. What is the probability that I take a taxi?

    (iv) In a test, the marks obtained by 15 students are 34, 37, 44, 39, 45, 46, 35, 42, 48, 40,

      39, 33, 43, 47, 44.The probability that a pupil chosen at random passed the test,

     if the passing marks are 40.

SECTION – B

3) The following pie chart represents the distribution of proteins in parts of human body.

M13
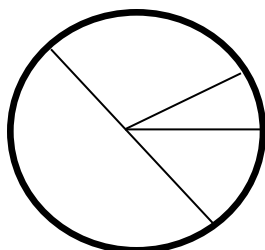
(i)   What is the central angle of the sector representing skin and bones together?

(ii)   What is the ratio of distribution of proteins in the muscles to that of proteins in the bones?

4) The following data represents the approximate percentage of water in various oceans. Prepare a   pie chart for the given data:

Pacific: 40%, Atlantic: 30%, Indian: 20% and Others: 10%.

## Month: January.

Introduction to graphs

SECTION–A

1) On a graph sheet draw the four quadrants and mark two points on each of them.

2) (i)What are the coordinates of the point whose vertical distance from the x-axis is 3 units and vertical distance from the y –axis is 4 units?
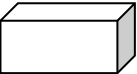
   (ii) What is the ordinate of all the points on x-axis?

SECTION- B

3)   In which quadrant/axis do these points lie in the coordinate plane?

   A (0 , 18) ;   B (-11 , -15) ;   C(5, 12) ;   D (19, --17) ;   E$\left(\frac{-5}{7},7\right)$

4) Draw a parallelogram ABCD on a graph paper with the coordinates as A(1,1),B(4,4),C(8,4) & D(5,1).

5) Locate the points A(1,2),B(4,2) & C(1,4) on a graph sheet taking suitable axes. Write the coordinates of the fourth point D to complete rectangle ABCD.

6) Draw a line graph to represent the growth chart of a child.

Height(in cm)	75	90	110	120	130
Age (in years)	2	4	6	8	10

FORMULAE USED IN MENSURATION

FIGURE	PERIMETER	AREA
SQUARE	4 X side	Side X side or ½ X product of the diagonals
RECTANGLE	2 (l + b)	Length X breadth
PARALLELOGRAM	2 (l + b)	Base X Height
RHOMBUS	4 X side	Base X Height or ½ x product of the diagonals
	Sum of the sides	(Base X Height) ÷ 2
TRAPEZIUM	Sum of the sides	½ X Height X sum of the parallel sides
QUADRILATERAL	Sum of the sides	½ X Height X sum of the offsets
CIRCLE	$2\pi r$	Πr^2

SOLID	LSA/ CSA	TSA	VOLUME
CUBE	4 (Side)^2	6(side)^2	(side)^3
CUBOID	Perimeter of the base X ht	2[lb+bh+lh]	Lbh
CYLINDER	2 πrh	2 πr(h+r)	Πr^2 h
CYLINDRICAL PIPE	INNER CSA = 2 llrh OUTER CSA =2 ll Rh	INNER CSA + OUTER CSA + 2 ll (R^2 -- r^2)	Volume of solid part = ll h (R^2 -- r^2) r=inner adius&R=outer radius