

# SEE GURU-MANTRA

## (Compulsory Mathematics)

### SEE Q. No. 1

1. In a survey of 500 people of a community, it was found that 275 like cricket and 250 like football but 25 like neither of them.

- (a) If C and F represent the sets of people who like cricket and football respectively, write the cardinality notation of set of people who do not like both the games. [1K]  
 (b) Represent the above information in the Venn-diagram. [1U]  
 (c) Find the number of people who like football only. [3A]  
 (d) Compare the number of people who like both the games and who don't like both the games. [1HA]

Ans: (a)  $n(\overline{C \cup F}) = 25$  (c) 200 (d) 2: 1 or 25 more

2. The information on preference of two subjects Mathematics and Nepali among 80 students of grade 10 of a school are given below.

- 25 prefer only Mathematics
- 35 prefer only Nepali
- 10 prefer neither Mathematics nor Nepali

Based on this information, answer the following questions:

- (a) If M and N represent the sets of students who prefer Mathematics and Nepali respectively, write the cardinality of  $n_o(N)$ . [1K]  
 (b) Represent the above information in the Venn-diagram. [1U]  
 (c) Find the number of students who prefer Mathematics. [3A]  
 (d) How many times, the number of students who prefer only one subject is more than the number of students who prefer both the subjects? [1HA]

Ans: (a)  $n_o(N) = 35$  (c) 35 (d) 6 times

3. In a survey of 1000 foreign tourists visiting to Nepal, it was found that the ratio of the number of tourists who visited Pokhara and Lumbini was 3: 2. Among them, 20% visited both the places and 100 visited neither Pokhara nor Lumbini.

- (a) If P and L denote the sets of tourists who visited Pokhara and Lumbini respectively, write the cardinality of  $n(P \cap L)$ . [1K]  
 (b) Show the above information in the Venn-diagram. [1U]  
 (c) Find the number of tourists who visited only one place. [3A]  
 (d) What percent of tourists visited at least one of the places? [1HA]

Ans: (a)  $n(P \cap L) = 200$  (c) 700 (d) 90%

4. In a survey conducted among in a group of women regarding the celebration of Teej and Tihar festivals, it was found that 70% celebrated Teej, 60% celebrated Tihar but 10% didn't celebrate both the festivals while 20 celebrated Teej as well as Tihar.

- (a) If  $n(U) = x$ , write the given sets in terms of x. [1K]  
 (b) Draw a Venn-diagram to illustrate the above information. [1U]  
 (c) Find the number of women who celebrated Teej only. [3A]  
 (d) Find the ratio of number of women who celebrated both the festivals and who celebrated none of the festivals. [1HA]

Ans: (a)

$n(A) = 0.7x$ ,  $n(B) = 0.6x$ ,  $n(\overline{A \cup B}) = 0.1x$  and  $n(A \cap B) = 20$  (c) 15 (d) 4: 1

5. In a survey of a group of people, 120 like tea, 90 like coffee, 60 like milk, 50 like coffee and tea, 40 like milk and tea, 30 like coffee and milk and 20 like all three drinks.
- (a) If T, C and M denote the sets of people who like tea, coffee and milk respectively, write the cardinality of  $n(T \cap C \cap M)$ . [1K]
- (b) Draw a Venn-diagram to show the above information. [1U]
- (c) How many people are participated in the survey? [3A]
- (d) Compare number of people who like all three drinks and the number of people who like only one type of drinks. [1HA]

**Ans:** (a)  $n(T \cap C \cap M) = 20$  (c) 170 (d) 2: 9 or 70 less

**SEE Q. No. 2**

1. Suppose, your uncle has planned to invest Rs. 2,00,000 for 2 year at the rate of 10% compound interest per annum.

Options	Yearly interest	Half- yearly interest	Terminal interest
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- (a) How many times is the terminal compound interest calculated in 2 years? [1K]
- (b) How much yearly compound interest will uncle get at the end of 2 years? [2A]
- (c) Which alternative would you suggest him to choose for deposit? Give reason with calculation. [2HA]

**Ans:** (a) 8 times (b) Rs. 42,000 (c) Terminal

2. Teriya deposited Rs. 10,00,000 in a development bank for 2 years to get the half yearly compound interest at the rate of 8% per annum. But just after 1 year, bank has changed the policy and decided to give the interest compounded quarterly at the same rate of interest.

- (a) Write the formula to calculate the interest compounded half-yearly. [1K]
- (b) Calculate the principal for the second year. [2A]
- (c) If the bank policy was not changed, how much more or fewer amounts would she get at the end of two years? Calculate it. [2HA]

**Ans:** (b) Rs. 10,81,600 (c) Rs. 900.06 less

3. Ritesh is a student studying in class 10. His mother deposited Rs. 75,000 for 2 years in fixed deposit of a bank at compound interest compounded annually for his study expenses and the compound amount at the end of one year is Rs. 81,000.

- (a) For principal Rs. 'P', time T years and rate of interest R% per year, write the formula to find yearly compound amount 'CA'. [1K]
- (b) Find the annual rate of compound interest offered by the bank. [2U]
- (c) What will be the compound amount that Ritesh get at the end of 2 years? Find it. [2A]

**Ans:** (b) 8% p.a. (c) Rs. 87,480

4. Kumar has deposited a certain sum in a bank. The sum will amount to Rs. 14,520 in 2 years and Rs. 15,972 in 3 years at a certain rate of annual compound interest.

- (a) Define compound interest. [1K]
- (b) Find the rate of compound interest. [2U]
- (c) Find the interest of the the same sum at the same rate for 1 year interest being compounded quarterly. [2A]

**Ans:** (b) 10% p.a. (c) Rs. 1245.75

5. The management committee of Nepal Bank Limited in its regular meeting has decided to change its annual policy slightly. According to the decision, the rate of interest for fixed deposit compounded semi annually is given below.

Depositing period	Rate of interest	Minimum deposit amount
Up to 6 months	7%	Rs. 50,000
From 6 months to 1 year	8%	Rs. 50,000
From 1 year to 5 years	10%	Rs. 75,000

**Mr. Khan borrowed Rs. 2,00,000 from a cooperative with a condition of paying it back in 2 years at the rate of simple interest of 5%. Immediately after borrowing it, he deposited the same sum in a fixed deposit account of Nepal Bank Limited for the same duration.**

- (a) Which rate of interest should Mr. Khan deposit the money in the fixed deposit? [1K]  
(b) Find the compound amount that Mr. Khan could receive in 2 years. [2U]  
(c) Find the total amount to be paid to cooperative in 2 years. [1A]  
(d) How much profit did Mr. Khan earn in 2 years? [1HA]

**Ans:** (a) 10% p.a. (b) Rs. 2,43,101.25 (c) Rs. 2,20,000 (d) Rs. 23,101.25

**SEE Q. No. 3**

**1. In the beginning of 2078 B.S., the population of a municipality was 25,000. If the population of the municipality increases by 2% every year, answer the following questions.**

- (a) Write the formula for calculating the population of a place after T years if its present population is P and annual growth rate is R% p.a. [1K]  
(b) What was the population of the municipality in the beginning of 2080 B.S.? [1U]  
(c) If 90 people increased in the beginning of 2080 B.S. due to migration in the municipality; what will be the population of the municipality in the beginning of 2081 B.S. at the same rate of growth? Calculate it. [2A]

**Ans:** (b) 26,010 (c) 26622

**2. The population of a sub-metropolitan city before 2 years was 1,00,000. The population growth of the sub-metropolitan city is 5% per annum.**

- (a) State whether the population growth of the city is simple or compound. [1K]  
(b) Find the present population of sub-metropolitan city. [2A]  
(c) If 10000 migrated there from other places and 250 died in the beginning of this year, in how many years, will the population of the city become 1,38,915? [2HA]

**Ans:** (a) compound (b) 1,10,250 (c) 3 years

**3. Mr. Himal purchased a microbus for Rs. 25,00,000. After using the microbus for three years, he earned Rs. 15,00,000. The value of the microbus depreciated by the rate of 10% per annum and the he sold it after three years.**

- (a) If the purchasing price of the microbus is Rs.  $V_0$ , the rate of compound depreciation is R% per annum and price of the microbus after T years is Rs.  $V_T$ , then express  $V_T$  in terms of  $V_0$ , R% and T. [1K]  
(b) Find the selling price of the bus after three years. [1U]  
(c) If Himal's sister Himani deposited Rs. 25,00,000 in a bank at the compound interest rate of 10% per annum, who will earn more after 3 years and by how much? [2HA]

**Ans:** (b) Rs. 18,22,500 (c) Himani, by Rs. 5,000

**4. Kamana has Rs. 90,00,000 with her. She has purchased an electric car for Rs. 40,00,000 and a plot of land for Rs. 50,00,000. For 2 years, the price of the electric car has been decreasing at a compound rate of 5% per annum, while the price of land has been increasing at a certain compound growth rate.**

- (a) What does R indicate in the formula,  $D_v = P\left(1 - \frac{R}{100}\right)^T$ ? [1K]  
(b) What will be the price of the electric car after two years? [1U]  
(c) After 2 years the total price of the electric car with the land becomes Rs. 92,28,000, find the the rate of compound growth in the price of land? [2HA]

**Ans:** (a) Rate of depreciation (b) Rs. 36,10,000 (c) 6% p.a.

**5. Salina bought a land at Rs. 40,00,000 on 10<sup>th</sup> Baisakh of 2078 BS and started construction of a house on the same day. The construction of the house completed with an investment of Rs. 1,35,00,000. The price of land increased at the rate of 20% per year and the price of house decreased at the rate of 20% per year.**

- (a) What will be the price of the land after 2 years? [2U]

- (b) What will be the price of the house after 2 years? [2A]  
(c) Will the prices of the land and house be the same after 2 years? If not, in how many years will the prices of the land and house be equal? [2HA]

**Ans:** (a) Rs. 57,60,000 (b) Rs. 86,40,000 (c) 3 years

**SEE Q. No. 4**

1. **Rohit went to a bank to exchange US dollars to visit abroad. In that day, according to the money exchange rate, the buying rate of US \$ was Rs.132 and selling rate was Rs.133.**

- (a) How many dollars did he receive with Rs. 5,32,000? Find it. [2U]  
(b) How much Nepali rupees did his friend receive while exchanging US \$3500 in the same day? Find it. [1A]  
(c) After 2 weeks, the selling rate for US dollar became Rs. 126.35, by what percent the Nepali currency was revaluated? Find it. [1HA]

**Ans:** (a) \$4000 (b) Rs. 4,62,000 (c) 5%

2. **A business man exchanged some Canadian dollars with NRs. 5,39,000 at the exchange rate of Canadian dollar 1=NRs. 98. After 5 days, Nepali currency was devaluated by 2% in comparison to Canadian dollar and on that day he exchanged the dollars into Nepali currency again.**

- (a) How many Canadian dollars did he exchange with NRS 5,39,000? Find it. [1K]  
(b) Find the exchange rate of CAD \$ 1 after devaluation in Nepali currency. [1U]  
(c) Calculate his gain or loss amount. [2HA]

**Ans:** (a) CAD \$5500 (b) Rs. 99.96 (c) Rs. 10,780

3. **Ram Bahadur, a retired security person, decided to go in UAE for the employment as a security guard. He borrowed Rs. 2,50,000 for 2 years at the rate of 10% semi-annual compound interest from a bank. But, after 1 year, he remitted 5,000 UAE Dirham to his home to reduce the loan. (1 AED = Rs. 36)**

- (a) Write the formula to find the semi-annual compound amount. [1K]  
(b) What is the total amount to be paid after 1 year? [1U]  
(c) Was 3250 Dirhams sufficient to clear his remaining loan at the end of 2 years if the Nepali currency was revaluated by 5% in comparison to AED? [2HA]

**Ans:** (b) Rs. 2,75,625 (c) Yes

4. **It is given that 120 dollars=96 pounds and NRs.168=1 pound.**

- (a) Hari bought some US dollars for Rs.2,68,800. How much US dollars did he get? [2U]  
(b) Determine the exchange rate between NRs. and US dollars. [1A]  
(c) After few days, the Nepalese currency was devaluated in the comparison of US dollar by 10%. Find the exchange rates between NRs. and US dollar after devaluation. [1A]  
(d) According to the new exchange rate, how much profit or loss does Hari make when he exchanges his American dollars with Nepalese rupees? [1HA]

**Ans:** (a) \$2000 (b) \$1 = Rs. 134.40 (c) Rs. 147.84 (d) Rs. 26,880 profit

5. **Dawa Lama exchanged some Nepali rupees with American dollars at the exchange rate \$1= Rs.130. After 5 days, Nepali currency devaluated against American dollars by 10% and he made a profit of Rs. 39,000 by exchanging the same dollars into Nepali currency again.**

- (a) How many Nepalese rupees is equal to one US dollar after devaluation on the Nepali currency? [1K]  
(b) How much Nepali rupees did he exchange to get US dollars initially? Find it. [2A]  
(c) How much profit or loss would be there for him if the Nepali currency was revaluated by 10% instead of devaluation of 10%? [1HA]

**Ans:** (a) \$1 = Rs. 143 (b) Rs. 3,90,000 (c) Rs. 39,000 loss

SEE Q. No. 5

- The height of a metallic square based pyramid is 15 cm and the length of base is 16 cm.**
  - How many triangular surfaces are there in a square based pyramid? [1K]
  - Find the height of the triangular faces. [1U]
  - Calculate the the cost of painting the total surfaces of the pyramid at the rate of Rs. 65 per 100 cm<sup>2</sup>. [2A]

**Ans:** (a) 4 (b) 17 cm (c) Rs. 520
- The ratio of slant height and a side of base of square based pyramid is 5:6 and its total surface area is 1536 sq. cm.**
  - Write the relation among base area (A), height (h) and volume (v) of the pyramid. [1K]
  - Find the volume of the pyramid. [2U]
  - Compare the base area and the area of triangular surfaces. [2HA]


**Ans:** (a)  $V = \frac{1}{3} A \times h$  (b) 3072 cm<sup>3</sup> (c) 3: 5
- The volume of a metallic square based pyramid is 384 cubic centimeters and the length of the side of base is 12 centimeters.**
  - What is the formula to find the lateral surface area of a square based pyramid? [1K]
  - Find the cost of colouring the surfaces of the pyramid at the rate of Rs. 5 per 8 cm<sup>2</sup>. [3A]
  - If the pyramid is melted and recast into another square based pyramid of height 18 cm, what would be its length of base? [1HA]

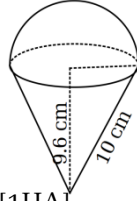
**Ans:** (a)  $2al$  (b) Rs. 240 (c) 8 cm
- The total surface area of a square based pyramid, with the length of base 6 cm, is 96 cm<sup>2</sup>.**
  - What is the formula to find the total surface area of a square based pyramid? [1K]
  - Find the volume of the pyramid. [3A]
  - By what percent is the total surface area of the pyramid more than its lateral surface area? [2HA]

**Ans:** (a)  $a^2 + 2al$  (b) 48 cm<sup>2</sup> (c) 60%
- The height and slant height of a cone are in the ratio of 24: 25. The curved surface area of the cone is 2200 cm<sup>2</sup>.**
  - Write the formula for calculating the curved surface area of a cone. [1K]
  - Find the volume of the cone. [3A]
  - Compare the circumference and height of the cone. [1HA]

**Ans:** (a)  $\pi r l$  (b) 9856 cm<sup>3</sup> (c) 11: 6

SEE Q. No. 6

- A well sharpened pencil composed up of a cylinder and a cone is given alongside. The radius of circular base is 0.7 cm, the cylindrical part is 4.8 cm long and the pencil is 7.2 cm long.** 
  - Write the formula for calculating the curved surface area of a cone. [1K]
  - Find the total surface area of the pencil. [3A]
  - By how many times is the volume of cylindrical part of the pencil more than the volume of conical part? [2HA]

**Ans:** (a)  $\pi r l$  (b) 28.16 cm<sup>2</sup> (c) 6 times
- In the figure, a cone is filled with ice-cream making hemispherical top. The vertical and slant heights of the conical part are 9.6 cm and 10 cm respectively.** 
  - Write the relation among the height (h), radius (r) and slant height (l) of the cone. [1K]
  - Find the volume of ice-cream in conical and hemi-spherical parts. [2A]
  - Compare the quantities of ice-cream in the conical and hemi-spherical parts. [1HA]

**Ans:** (a)  $h^2 + r^2 = l^2$  (b) 124.84 cm<sup>3</sup> (c) 32.9 cm<sup>3</sup>

3. **In a tank, the lowermost part is cylindrical and the uppermost part is hemispherical. The radius of both parts is the same. The total internal height of the tank is 4 m and the internal height of the cylindrical part is 2.95 m.**
- (a) Write the formula to find the curved surface area of a cylinder. [1K]  
 (b) Find the total cost of filling the tank at the rate of Rs. 20 per 15 litres. [3A]  
 (c) If the tank completely filled with water is poured into a cylindrical tank of internal radius 2 m, what would the height of the water level in the second tank? [1HA]
- Ans:** (a)  $2\pi rh$  (b) Rs. 16,863 (c) 1.006 m
4. **A solid cone is surmounted by a hemisphere of same radius. The common radius is 7 cm. The total cost to color the object is Rs. 1716 at the rate of Rs. 2 per square cm.**
- (a) Write the relation among the surface areas to be colored (A), rate of colouring (R) and the total cost of colouring (T). [1K]  
 (b) Find the total surface area of the combined solid. [1U]  
 (c) Calculate the volume of the conical part. [3A]  
 (d) Compare the the volume of conical part and hemispherical part. [1HA]
- Ans:** (a)  $T = A \times R$  (b)  $858 \text{ cm}^2$  (c)  $1232 \text{ cm}^3$  (d)  $513.33 \text{ cm}^3$  or 12: 7
5. **A cylindrical bucket, 32 cm high and with radius of base 18 cm, is filled with sand. When the bucket is emptied on the ground and a conical heap of sand is formed with height 24 cm.**
- (a) Write the relation between the volume of cement in the cylindrical bucket and the volume of the cement in the conical pile. [1K]  
 (b) Find the radius of the conical shaped heap of cement. [2U]  
 (c) Find the cost of plastic required to cover the conical pile of the cement at the rate of Rs 500 per sq. meter. [2HA]
- Ans:** (b) 36 cm (c) Rs. 244.77

**SEE Q. No. 7**

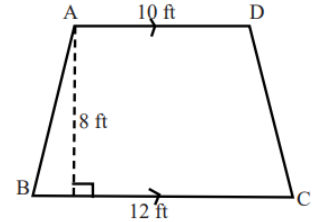
1. **The length, breadth and height of a rectangular room are 15 feet, 12 feet, and 10 feet respectively. There are 2 square windows of edge 3 feet and a door of size 6 feet  $\times$  3 feet in the room.**
- (a) Find the cost of painting the four walls and ceiling of the room excluding doors and windows at the rate of Rs. 50 per square feet? [3A]  
 (b) How much the total cost will increase to paint on same part if the cost of painting per square meter is increased by one third of what it was before due to the increase in the market price? [2HA]
- Ans:** (a) Rs. 34,200 (b) Rs. 11,400
2. **The volume and height of a square based room are  $294 \text{ m}^3$  and 3.5 m. respectively. The area occupied by a door and two windows in the room is 6 sq. m.**
- (a) Find the total cost of plastering the four walls at the rate of Rs. 150 per sq. meter. [3A]  
 (b) If the rate of plastering per square meter is increased by one-third, then what will be the increment in the total cost of plastering the walls? [2HA]
- Ans:** (a) Rs. 15,900 (b) Rs. 5,300
3. **The inner length, breadth and height of a rectangular tank made for drinking water by two families are 3 m, 1.5 m and 1.6 m respectively.**
- (a) Calculate the total cost of coloring the inner four walls of the tank at the rate of Rs. 100 per 3 square meters. [3A]  
 (b) If 2 families pay equal amounts for consuming water from a full tank, how much will one family have to pay at the rate of Rs 50 per 100 liters? [2HA]
- Ans:** (a) Rs. 480 (b) Rs. 1800



4. There are two pillars with the base 6 ft × 6 ft and height 8 ft of each in a stadium. A pyramid of height 4 ft is placed on the top of each pillar.
- (a) Write the formula to find the lateral surface area of a pyramid. [1K]  
 (b) Find the surface area of both the pillars with pyramidal top for the painting purpose. [2A]  
 (c) Would Rs. 5,550 be sufficient to paint the pillars at the rate of Rs. 110 per square feet? Give reason. [1HA]

Ans: (a)  $2al$  (b) Yes

5. The parking area outside the National Insurance Company Limited Nepal is in geometric shape as shown in the figure. It is planning to pave the area with bricks. A brick occupies the area of  $0.22 \text{ ft}^2$  and the cost of brick per piece is Rs. 16.



- (a) Find the area of the parking land.  
 (b) How many bricks are needed to pave the whole parking area?  
 (c) If 2 workers can complete the work of paving bricks in 3 days and the wage of a worker per day is Rs. 1200, how much does it cost to pave the bricks including the cost of bricks?

Ans: (a) 88 sq. ft. (b) 400 (c) Rs. 13,600

SEE Q. No. 8

1. Roshan collected following sum of money in first five days of month Baisakh.

Baisakh-1	Baisakh-2	Baisakh-3	Baisakh-4	Baisakh-5
Rs. 500	Rs. 700	Rs. 900	Rs. 1100	Rs. 1300

- (a) Whether the above sequence is arithmetic or Geometric on the basis of the deposited money in each day? Write with reason [1K]  
 (b) How much money will be deposited by tenth day? Find using formula. [2U]  
 (c) Based on the above sequence, is extra 2 days enough after 10 days to collect the total amount Rs 20,000? Write it with reason. [2HA]

Ans: (a) Arithmetic (b) Rs. 14,000 (c) No

2. Roshana collected following sum of money in first five months of 2080 BS.

Baisakh	Jesth	Asar	Shrawan	Bhadra
Rs. 100	Rs. 200	Rs. 400	Rs. 800	Rs. 1600

- (a) Write the formula to find the sum of first n terms of a geometric series. [1K]  
 (b) How much money will be deposited by the eighth month? Find using formula. [1U]  
 (c) Based on the above sequence, how many extra months enough after 8 months to collect the total amount Rs 1,02,300? [2HA]

Ans: (a)  $S_n = \frac{a(r^n - 1)}{r - 1}$  (b) Rs. 25,500 (c) 2 months more

3. The first and last term of arithmetic series having some terms are 3 and 51 respectively. The sum of all terms is 975.

- (a) Write the formula to calculate sum of the first n terms of the series  
 (b) Find the total number of terms in the series.  
 (c) What should be added to the third term of the series so that the first three terms form a geometric series? Find it

Ans: (a)  $S_n = \frac{n}{2} [2a + (n - 1)d]$  (b) 25 (c) 3

4. There are 4 arithmetic means between 20 and 45.

- (a) First term 'a', last term 'b' and number of arithmetic means 'n' are given. Write the formula for the calculation of common difference in the given condition. [1K]  
 (b) What is the third mean of the given series? Find it. [2U]  
 (c) In arithmetic mean and geometric mean between 20 and 45, which one is greater and by how much? Compare it. [1HA]

**Ans:** (a)  $d = \frac{b - a}{n + 1}$  (b) 40 (c) A.M. is 2.5 more than G.M.

- 5. Bishal lends Rs. 45,000 to Ram. Ram repays the loan (without interest) in 6 installments and pays 1000 more in each installment than the previous one. Similarly, Bishal lends Rs. 63,000 to Sita. Sita repays the loan (without interest) in 6 installments and she pays double in each installment than the previous installment.**

- (a) Make a sequence of money that Ram will repay in each installment. [1U]  
 (b) Find the money that will Ram and Sita pay in the first installment. [3A]  
 (c) In which installment do Ram and Sita pay same amount of money? [1HA]

**Ans:** (a) a, a + 1000, a + 2000, ... (b) Rs. 5,000; Rs. 1,000 (c) 4<sup>th</sup> installment

**SEE Q. No. 9**

- 1. The perimeter and area of a rectangular ground are 100 m and 600 m<sup>2</sup> respectively.**

- (a) Write the roots of x in the quadratic equation  $ax^2 + bx + c = 0$  [1K]  
 (b) Find the length and breadth of the given ground. [3A]  
 (c) How many such grounds can be made on the field with dimension (120 × 80) square meter? Calculate it. [1HA]

**Ans:** (a)  $x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$  (b) 30 m, 20 m (c) 16

- 2. The width of a rectangular plot is half of its length. The area of the plot is 450 sq. m.**

- (a) How many roots does quadratic equation  $ax^2 + bx + c = 0$  have? [1K]  
 (b) Find the length and breadth of the plot? [2U]  
 (c) How long the plot should be decreased from its length to form it is a square plot? Calculate it. [1HA]

**Ans:** (a) 2 roots (b) 30 m, 15 m (c) 15 m

- 3. The product of the digits of a two digit number is 18. If 27 is added to the number, the places of digits are reversed.**

- (a) Write the two digit number by supposing x as the digit at tens place and y as the digit at ones place. [1K]  
 (b) Find the number. [3A]  
 (c) Compare the original number and the number obtained by reversing the digits. [1HA]

**Ans:** (a) 10x + y (b) 36 (c) 4: 7

- 4. The age difference between the mother and her daughter is 25 years. Now, the product of their ages is 600.**

- (a) If the present age of mother is x years, write the present age of daughter in terms of x. [1K]  
 (b) Find their actual present age. [2U]  
 (c) After how many years hence, the mother will be twice as old as her daughter? [1HA]

**Ans:** (a) x - 25 (b) 40 years, 15 years (c) 10 years

- 5. In a rectangular field, the longer side is 20 m more than the shorter side but the diagonal of the field is 20 m more than its longer side.**

- (a) Write the standard form of quadratic equation. [1K]  
 (b) Find the length and breadth of the field. [3A]  
 (c) How many plots of land of dimension (12 m × 16 m) can be made on that field? [1A]

**Ans:** (a)  $ax^2 + bx + c = 0$  (b) 80 m, 60 m (c) 25

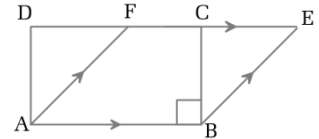


SEE Q. No. 10

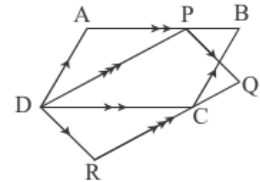
1. (a) Simplify:  $\frac{x+y}{x-y} + \frac{x-y}{x+y}$  [2U] **Ans:**  $\frac{2(x^2+y^2)}{x^2-y^2}$
- (b) Solve:  $2^x + \frac{1}{2^x} = 8\frac{1}{8}$  [3A] **Ans:**  $\pm 3$
2. (a) Simplify:  $\frac{1}{2a-3b} - \frac{6b}{4a^2-9b^2}$  [2U] **Ans:**  $\frac{1}{2a+3b}$
- (b) Solve:  $5 \times 4^{x+1} - 16^x = 64$  [3A] **Ans:** 1, 2
3. (a) Simplify:  $\frac{4x^2+y^2}{4x^2-y^2} - \frac{2x-y}{2x+y}$  [2U] **Ans:**  $\frac{4xy}{4x^2-y^2}$
- (b) If  $x^2 - 2 = 3 + \frac{2}{3}$ , then prove that  $3x(x^2 - 3) = 10$  [3A]
4. (a) Solve:  $3^{x-1} + 3^{x-2} + 3^{x-3} = 13$  [2U] **Ans:** 3
- (b) Simplify:  $\frac{1}{a^2-5a+6} + \frac{2}{4a-3-a^2}$  [3A] **Ans:**  $\frac{1}{(1-a)(a-2)}$
5. (a) Solve:  $2^x + 2^{x+1} + 2^{x+2} = 7$  [2U] **Ans:** 0
- (b) Simplify:  $\frac{p+1}{p^2+p+1} + \frac{p-1}{p^2-p+1} - \frac{2}{p^4+p^2+1}$  [3A] **Ans:**  $\frac{2(p-1)}{p^2-p+1}$

SEE Q. No. 11

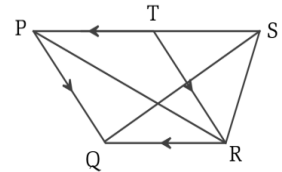
1. In the given figure, rectangle ABCD and parallelogram ABEF are on the same base AB and between the same parallels DE and AB.



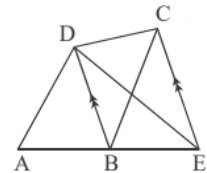
- (a) Write a property which is common to a rectangle and a parallelogram. [1K]
- (b) Prove that area of rectangle ABCD = area of parallelogram ABEF. [2U]
- (c) In the given diagram, ABCD and PQRD are two parallelograms.  
Prove that: area of  $\square$  ABCD = area of  $\square$  PQRD. [2HA]



2. In the given figure,  $\triangle$  PQR,  $\triangle$  QRS and  $\square$  PQRT are on the same base QR and between the same parallel lines PS and QR.



- (a) What is the relationship between the areas of  $\triangle$  QRS and  $\square$  PQRT? [1K]
- (b) Prove that Area of  $\triangle$  PQR = Area of  $\triangle$  QRS. [2U]
- (c) In the figure given alongside,  $BD \parallel EC$ .  
Prove that: areas of quad. ABCD and  $\triangle$  ADE are equal. [2HA]

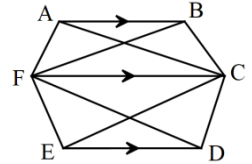
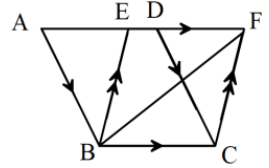


3. In the given figure,  $\square ABCD$ ,  $\square EBCF$  and  $\triangle FBC$  are on the same base BC and between the same parallel lines AF and BC.

- (a) Write the relationship between  $\square ABCD$  and  $\square EBCF$ . [1K]  
 (b) Prove that: Area of  $\triangle FBC = \frac{1}{2}$  area of  $\square ABCD$ . [2U]  
 (c) In the figure,  $AB \parallel FC \parallel ED$ .

Prove that: area of quadrilateral AFEC = Area of quadrilateral BCDF

[2HA]

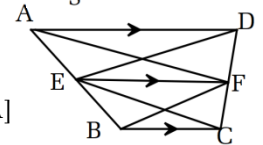
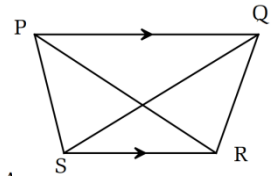


4. In the given figure, there are two triangles PSR and QSR on the same base SR and between same parallel lines PQ and SR.

- (a) Name the triangle which is equal in area to the  $\triangle PQS$ . [1K]  
 (b) Prove that: Area of  $\triangle PSR =$  Area of  $\triangle QSR$ . [2U]  
 (c) In the given figure,  $AD \parallel BC \parallel EF$ .

Prove that: area of  $\triangle ABF =$  area of  $\triangle CDE$ .

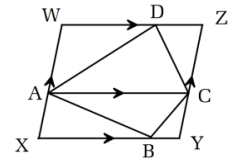
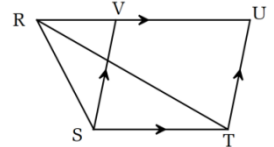
[2HA]



5. In the given figure,  $RU \parallel ST$  and  $SV \parallel TU$ .

- (a) Write the relation between the area of triangle RST and area of parallelogram STUV. [1K]  
 (b) Prove that:  $\square STUV = 2 \times \triangle QSR$ . [2U]  
 (c) In parallelogram WXYZ, points A, B, C and D are on the sides WX, XY, YZ and WZ respectively such that  $AC \parallel XY$ .

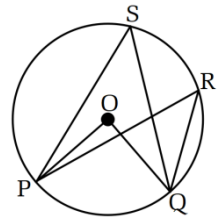
Prove that area of quadrilateral ABCD is half of the area of parallelogram WXYZ. [2HA]



**SEE Q. No. 12**

1. In a circle with centre O, central angle POQ and circumference angles PRQ and PSQ are drawn on the arc PQ.

- (a) Write the relation between  $\angle POQ$  and  $\angle PRQ$ . [1K]  
 (b) If  $\angle POQ = 5x^\circ$  and  $\angle PSQ = (x + 27)^\circ$ , find the measure of  $\angle PSQ$ . [1U]  
 (c) Experimentally verify the relation between  $\angle PSQ$  and  $\angle PRQ$ .  
 (At least two circles with radii 3 cm are necessary). [2A]



**Ans:** (a)  $\angle POQ = 2\angle PRQ$  (b)  $18^\circ$

2. In a circle; O is the centre. The angle at the centre  $\angle AOB$  and the angle at the circumference  $\angle ACB$  are standing on the same arc AB.

- (a) Write the relationship between  $\angle AOB$  and  $\angle ACB$ . [1K]  
 (b) If  $\angle AOB = (13x)^\circ$  and  $\angle ACB = (8x - 15)^\circ$ , what is the value of x? [1U]

(c) Experimentally verify that the relationship between  $\angle AOB$  and  $\angle ACB$ .

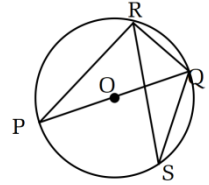
(Two circles of radii at least 3 cm are necessary).

[2A]

**Ans:** (a)  $\angle AOB = 2\angle ACB$

(b)  $10^\circ$

3. In the figure, O is the centre of circle and PQ is a diameter.



(a) What is the measure of  $\angle PRQ$ ?

[1K]

(b) If  $\angle PQR : \angle QPR = 3 : 2$ , find the value of  $\angle QSR$ .

[1U]

(c) Explore experimentally the measure of  $\angle PRQ$ .

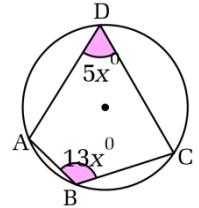
(Two circles of radii at least 3 cm are necessary).

[2A]

**Ans:** (a)  $90^\circ$

(b)  $36^\circ$

4. In the given cyclic quadrilateral ABCD;  $\angle B = 13x^\circ$  and  $\angle D = 5x^\circ$ .



(a) Write the relation between  $\angle ABC$  and  $\angle ADC$ .

[1K]

(b) Find the measure of  $\angle ABC$ .

[1U]

(c) Draw two circles of radii at least 3 cm and draw a cyclic quadrilateral of different shapes in each circle then experimentally verify the relation between  $\angle ABC$  and  $\angle ADC$ .

[2A]

**Ans:** (a)  $\angle ABC + \angle ADC = 180^\circ$

(b)  $130^\circ$

5. WXYZ is a cyclic quadrilateral.

(a) Write the relation between  $\angle WXY$  and  $\angle WZY$ .

[1K]

(b) Verify experimentally that the relationship between  $\angle XYZ$  and  $\angle XWZ$ . (Two circles having radii at least 3 cm are necessary.)

[2U]

(c) If the cyclic quadrilateral WXYZ is a parallelogram, find the value of  $\angle XYZ$ .

[1A]

**SEE Q. No. 13**

1. (a) Construct a parallelogram ABCD having  $AB = 4$  cm,  $BC = 5.5$  cm and  $\angle ABC = 60^\circ$ . Also, construct another parallelogram ABQP whose area is equal to the area of parallelogram ABCD and having one side 6 cm.

[3A]

(b) Why is the area of parallelogram ABCD is equal to the area of parallelogram ABQP? Give reason.

[1HA]

2. (a) Construct a triangle ABC having  $AB = 4.4$  cm,  $BC = 5.5$  cm and  $\angle ABC = 75^\circ$ . Also, construct another triangle BCD whose area is equal to the area of triangle ABC having  $\angle BCD = 120^\circ$ .

[3A]

(b) How is  $AD \parallel BC$ ? Give reason.

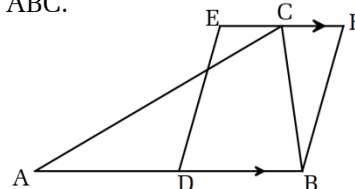
[1HA]

3. (a) Construct a triangle ABC having  $AB = 6$  cm,  $BC = 7$  cm and  $AC = 6.5$  cm. Construct a parallelogram CDEF equal in area to the triangle ABC.

[3A]

(b) In the figure, D is the mid-point of AB. Are the areas of triangle ABC and parallelogram ABCD equal? Write with reason.

[1HA]



4. (a) Construct a parallelogram ABCD in which  $AB = 5$  cm,  $BC = 4$  cm and  $\angle ABC = 60^\circ$ . Also, construct a  $\triangle BEF$  with a side  $PB = 6$  cm and equal in area to the  $\square ABCD$ .

[3A]

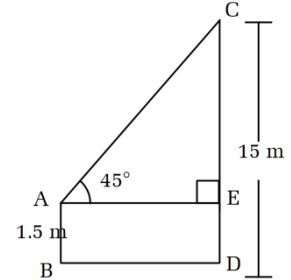
(b) Write the reason for being the area of triangle BEF equal to the area of parallelogram ABCD.

[1HA]

5. (a) Construct a quadrilateral PQRS in which  $PQ = QR = 5.5$  cm,  $RS = SP = 4.5$  cm and  $\angle SPQ = 75^\circ$ . Then, construct a triangle PST equal in area to the quadrilateral PQRS. [3A]
- (b) In the construction 5. (a), which two triangles are equal in area? Write with reason. [1HA]

**SEE Q. No. 14**

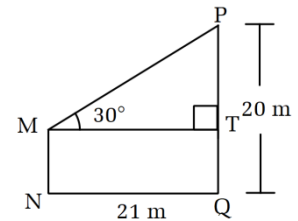
1. In the given figure, the height of a man (AB) = 1.5 m and the height of a tree (CD) = 15 m.



- (a) Write the name of the angle formed by the line of sight AC with the horizontal line AE. [1K]
- (b) By how much is the height of the man less than the height of the tree? [1U]
- (c) If  $\angle EAC = 45^\circ$ , what is the distance between the man and the tree? [1A]
- (d) When the man looks at the top of the tree, how far should he move forward or backward from the current position so that the angle of elevation may be  $30^\circ$ ? [1HA]

**Ans:** (a) Angle of elevation (b) 13.5 m (c) 13.5 m (d) 9.88 m backward

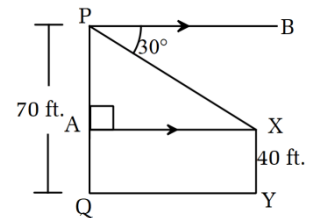
2. In the given figure, MN is the height of a pole, PQ is the height of a temple, NQ is the distance between the pole and the temple, and  $\angle TMP$  is the angle of elevation of the top of the temple from the top of the pole.



- (a) Define angle of elevation. [1K]
- (b) Find the length of PT part of the temple. [1U]
- (c) Find the height of the pole? [1A]
- (d) Compare the lengths of MP and NP. [1HA]

**Ans:** (b)  $7\sqrt{3}$  m (c) 7.88 m (d) MP is 4.75 m shorter than NP

3. In the figure given alongside, PQ is the height of telephone tower, XY is the height of the a building of supermarket and  $\angle BPX$  is the angle of depression of the top of the building from the top of the tower.



- (a) Define angle of depression. [1K]
- (b) What is the measure of angle of elevation of the top of the tower as observed from the top of the building? [1U]
- (c) Calculate the distance between the building and the tower. [1A]
- (d) Compare the height of the tower and the distance of the top of the tower from the top of the building. [1HA]

**Ans:** (b)  $30^\circ$  (c)  $30\sqrt{3}$  m (d) 7: 6

4. **A pine tree of height 21 m is broken by the wind so that its top touches the ground and makes an angle of  $30^\circ$  with the ground.**
- (a) If the length of broken part of the tree is  $x$  m, express the length of the remaining part of the tree in terms of  $x$ . [1K]
- (b) Sketch a figure according to the given context. [1U]
- (c) Find the length of broken part of the tree. [1A]
- (d) If the sun's altitude of the remaining part of the tree is  $45^\circ$ , find the length of the shadow of the remaining part of the tree on the ground. [1HA]
- Ans:** (c) 14 m (d) 7 m

5. **Ram, a 5 ft. tall boy, is flying a kite. The length of string of the kite is  $100\sqrt{3}$  m and the height of the kite from the ground is 155 ft.**
- (a) Sketch a figure according to the given context. [1U]
- (b) By how many feet is the height of the kite more than the height of the Ram? [1K]
- (c) Find the angle made by the string of the kite with the horizon. [1A]
- (d) If the angle made by the string of the kite with horizon is  $45^\circ$ , by how much more or less string is required to have the same height of the kite from the ground? [1HA]
- Ans:** (b) 150 ft. (c)  $60^\circ$  (d) 38.93 ft. more

**SEE Q. No. 15**

1. **The given table represents the marks obtained by the students of class 10 of a school in an examination in mathematics.**

Marks obtained	0-15	15-30	30-45	45-60	60-75
No. of students	3	4	10	8	5

**Answer the following questions based on the given data.**

- (a) What does 'c.f.' stand for in the formula for calculating the median of continuous data,  

$$M_d = L + \left( \frac{N/2 - c.f.}{f} \right) \times i?$$
 [1K]
- (b) Calculate the median mark. [2U]
- (c) Find the average mark. [2A]
- (d) Compare the number of students whose scores lie in the modal class and the median quartile class. [1HA]

**Ans:** (a) The cumulative frequency of pre-median class (b) 42 (c) 41.5 (d) Equal

2. **The per hour earning (in Rs) of 30 people in a community are given in the following table.**

Income (In Rs)	0-50	50-100	100-150	150-200	200-250
No. of People	6	4	7	5	8

- (a) Find the modal class. [1K]
- (b) Calculate the average income per hour. [2U]
- (c) Find the maximum amount received by below 75% people. [2A]

- (d) State whether the measures of central tendency (mean, median and mode) lie in the same class interval or not. Write with reason. [1HA]

**Ans:** (a) 200-250 (b) Rs. 133.33 (c) Rs. 203.13 (d) No

3. **The marks obtained by the students in an examination are as follows.**

Age (in years)	0 - 10	10 - 20	20 - 30	30 - 40	40 - 50
No. of people	4	12	x	9	5

- (a) If the median of this data is 24, identify the median class. [1K]  
 (b) Calculate the value of x. [2A]  
 (c) Find the mean. [2U]  
 (d) Compare the number of people falling in median and modal classes. [1HA]

**Ans:** (a) 20-30 (b) 10 (c) 24.75 (d) 6:5

4. **The wight of the a group of people are given in the table below.**

Weight in kg	30-40	40-50	50-60	60-70	70-80
Number of people	3	6	7	11	3

- (a) What does  $f_i$  represent in the formula  $M_o = L + \frac{f_1 - f_0}{2f_1 - f_0 - f_2} \times i$  for the calculation of mode of the grouped data? [1K]  
 (b) Find the modal age. [2U]  
 (c) Calculate the average shoes size. [2A]  
 (d) What percent of people are there whose weights are below the median class? [1HA]

**Ans:** (a) Frequency of modal class (b) 68 kg (c) 56.67 kg (d) 30%

5. **The marks obtained by 40 students of Janasewa Secondary School in Mathematics are given in the table below.**

Obtained marks	0-10	10-20	20-30	30-40	40-50	50-60
Number of students	4	6	8	5	7	10

- (a) Write the formula for finding the first quartile of the continuous series. [1K]  
 (b) Find the first quartile. [2U]  
 (c) Calculate the average marks. [2A]  
 (d) What should be the number of students in the class with 50-60 in order to make 30 as the average marks of students? Calculate and write it. [1HA]

**Ans:** (a)  $Q_1 = L + \left(\frac{N/4 - c.f.}{f}\right) \times i$  (b) 20 (c) 33.75 (d) 4

**SEE Q. No. 15**

1. **From well-shuffled pack of 52 playing cards, two cards are drawn one after another at random without replacement.**

- (a) If A and B are any two mutually exclusive events, what is the formula for finding the probability, P (A or B)? [1K]  
 (b) Find the probability of getting an ace or a king in the first draw. [1U]  
 (c) When both cards are drawn, show the probabilities of all the possible outcomes of king and not king in a tree diagram. [2A]



(d) Find the ratio of probabilities of getting both kings when the cards drawn at first is replaced and not replaced in the pack. [1HA]

**Ans:** (a)  $P(A \text{ or } B) = P(A) + P(B)$  (b)  $\frac{2}{13}$  (d) 17: 13

**2. Roshani planned to have two children at an interval of 4 years after married.**

(a) What is the probability scale of any event 'E'? Write it. [1K]

(b) Find the probability of having both children are daughter. [1A]

(c) Show the probabilities of possible outcomes of getting son and daughter in a tree-diagram. [2U]

(d) Find the probability of having at least one son. [1HA]

**Ans:** (a)  $0 \leq P(E) \leq 1$  (b)  $\frac{1}{4}$  (d)  $\frac{3}{4}$

**3. From a class having 24 boys and 16 girls, two students are selected randomly for class captain and vice-captain without sending the first student back to the class.**

(a) Define mutually exclusive events. [1K]

(b) Show the probabilities of possible outcomes of selecting boys and girls in a tree diagram. [2U]

(c) Find the probability of selecting both girls. [1A]

(d) By how much the probability of getting at least one boy is less than the total probability? Calculate it. [1HA]

**Ans:** (a) Two or more events which cannot happen at the same time (c)  $\frac{2}{13}$  (d)  $\frac{2}{13}$

**4. Two cards are drawn randomly one after another without replacement from a well shuffled deck of 52 cards.**

(a) If two events A and B are independent events, what is the formula for finding  $P(A \cap B)$ ? Write it. [1K]

(b) Find the probability of getting both are faced card. [1U]

(c) Show the probability of all the possible outcomes of getting or not-getting faced card in a tree diagram. [2A]

(d) If two cards are drawn randomly one after another with replacement, how many times more is the probability that both are faced cards than the probability that both cards are ace? [1HA]

**Ans:** (a)  $P(A \cap B) = P(A) \times P(B)$  (b)  $\frac{11}{221}$  (d) 9 times

**5. A bag contains 4 red and 8 green balls of the same shape and size.**

(a) Define independent events. [1K]

(b) If the balls are drawn one after another (without replacement), find the probability of getting both balls are red. [1U]

(c) If two balls are drawn one after another (with replacement), show the probability of all the possible outcomes in a tree diagram. [2A]

(d) Ramila said that both of the above conditions are independent. Is she correct? Write with reason. [1HA]

**Ans:** (b)  $\frac{1}{11}$  (d) No, only events in second condition are independent

**THE END**