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Vedanta's

SEE GURU-MANTRA-2081

(Compulsory Mathematics)

SEE Q. No. 1

1. In a survey among 60 students, 10 play football only and 20 play volleyball only but 12 play neither of the games.

(a) If F and V represent the sets of students who play football and volleyball respectively, write the number of students who like football only in cardinality notation. (1)

(b) Show the above information in the Venn-diagram. (1)

(c) Find the number of students who play volleyball. (3)

(d) By what percent is the number of students who play both the games more or less than the number of students who play none of these games? (1)

Ans: (a) $n_o(F) = 10$ (c) 38 (d) 50% more

2. In a survey among people of a community, 65% ride motorcycle (M), 35% ride scooter (S) but 20% don't ride both whereas 100 people ride both motorcycle and scooter.

(a) Write the cardinality notation for number 100 given in the context. (1)

(b) Represent the above information in the Venn-diagram. (1)

(c) Find the total number of people who participated in the survey. (3)

(d) Compare the number of people who ride only one of these vehicles and those who ride none of these vehicles. (1)

Ans: (a) $n(M \cap S) = 100$ (c) 500 (d) 3:1

3. In a survey of 48 students of a class, the ratio of number of students who like milk and curd is 2:1 where 15 students like both the drinks and 3 students don't drink both.

(a) If M and C denote the sets of students who like milk and curd respectively, write the number of students who don't drink both in cardinality notation. (1)

(b) Show the above information in the Venn-diagram. (1)

(c) Find the number of students who like milk only. (3)

(d) If those students, who don't drink both, used to drink both, find the change in the number of students drinking at most one drink. (1)

Ans: (a) $n(\overline{M \cup C}) = 3$ (c) 25 (d) 3

4. In a survey of 65 women each woman is involving in at least one of the occupation: sewing (S) or teaching (T). The number of women involving in sewing is 4 times the number of women involving in teaching and 10 women are involving in both the occupations.

(a) What is the value of $n(S \cup T)$? (1)

(b) Draw a Venn-diagram to illustrate the above information. (1)

(c) Find the number of women who are involving in teaching profession. (3)

(d) If each woman involving in teaching were also involving in sewing, how many women wouldn't involve in any of these occupations? (1)

Ans: (a) 65 (c) 15 (d) 5

5. Among the 180 students who participated in SEE examination in 2081 from a school, 86 students secured A-grade in Science, 80 students secured A-grade in Mathematics and 76 students secured A-grade in Nepali. Out of them, 26 students secured A-grade in Science and Mathematics, 36 students secured A-grade in Mathematics and Nepali, 32 students secured A-grade in Science and Nepali but 20 students did not secure A-grade in all the subjects.

(a) If S, M and N denote the sets of students who secured A-grade in Science, Mathematics and Nepali respectively, write the cardinality of $n(\overline{S \cup M \cup N})$. (1)

(b) Find the number of students secured A-grade in all three subjects and show the data in a Venn-diagram. (3)

(c) How many students secured A-grade in Science and Mathematics only? (1)

(d) Find the ratio of number of students who secured A-grade in Science only to the number of students who secured A-grade in Mathematics only to number of students who secured A-grade in Nepali only. (1)

Ans: (a) 20 (b) 12 (c) 14 (d) 4: 3: 2

SEE Q. No. 2

1. A man borrowed Rs. 62,500 from his friend at the rate of simple interest of 8% per annum for 2 years. He lent the whole sum to a shopkeeper at the same rate of annual compound interest.

(a) Write the formula to calculate the annual compound amount. (1)

(b) How much more money will he get after 2 years? (2)

(c) How much more or less amount would he get if the interest was compound semi-annually rather than compounded annually at the same rate? Find it. (2)

Ans: (b) Rs. 500 (c) Rs 216.16 more

2. Suppose, your father plans to invest Rs. 2,00,000 for a year. There are three options.

- Yearly compound interest @ 5.5% p.a.
- Half-yearly compound interest @ 5% p.a.
- Terminal compound interest @ 4% p.a.

(a) How many times is the half-yearly compound interest calculated in 2 years? (1)

(b) How much yearly compound interest will father get at the end of 2 years? (2)

(c) Which alternative would you suggest your father to choose for deposit? Give reason with calculation. (2)

Ans: (a) 4 times (b) Rs. 10,000 (c) Terminal

3. Chameli is a student of class 12. Her mother deposited Rs. 40,000 for 2 years in fixed deposit at a bank at the rate of annual compound interest. The compound amount at the end of one year is Rs. 43,200.

(a) For principal Rs. 'P', time T years and rate of interest R% per year, write the formula to find yearly compound amount 'CA'. (1)

(b) Find the annual rate of compound interest offered by the bank. (2)

(c) What will be the compound amount that Chameli get after 2 years? Find it. (2)

Ans: (b) 8% p.a. (c) Rs.46,656

4. Khemlal borrowed a certain sum in a bank. The loan becomes Rs. 70,560 in 2 years and Rs. 74,088 in 3 years at a certain rate of annual compound interest.

(a) Define compound interest. (1)
(b) Find the rate of compound interest and the principal. (2)
(c) If the rate of interest in the 1st year and second year were 4% and 10% respectively, how much more or less amount would he get in 2 years? (2)

Ans: (b) 5% p.a., Rs. 64,000 (c) Rs. 1245.75

5. A person deposited Rs. 2,00,000 in a development bank for 2 years to get the yearly compound interest at the rate of 10% per annum after deducting the 5% tax on the interest. But after a year, bank changed the policy and decided to compute the interest half-yearly at the same rate of interest.

(a) Writ the formula to find the half-yearly compound interest. (1)
(b) Find the interest of the first year by deducting the tax. (2)
(c) After deducting the tax, by what percentage the interest of the first year differ from the interest of the second year? (2)

Ans: (b) Rs. 19,000 (c) 12.24%

SEE Q. No. 3

Population Growth

1. The population of a city in 2080 B.S. was 50,000. The annual population growth rate of the city was 4%.

(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. (1)
(b) What will be the population of the city in 2082 B.S.? (1)
(c) If 420 people migrate in the city from different places and 200 people migrate to other places from the city in 2082 B.S.; what will be the population of the city in 2083 B.S. at the same rate of growth? (2)

Ans: (b) 54,080 (c) 56,472

2. In 2077 B.S., 50,000 students appeared SEE from a district. It increased by 4%, 5% and 6% respectively in upcoming 3 years.

(a) How many students appeared SEE in 2080 B.S. from the district? (2)
(b) Monika said that if the number of SEE appeared students increased by 10% p.a., the increased number of students would be differed by 8,674 in 3 years. Analyze her statement. (2)

Ans: (a) 57,876 (b) Her statement is correct

3. The price of a photocopy machine increases from Rs. 40,000 to Rs. 48,400 in 2 years.

(a) Find the rate of yearly increment. (2)
(b) What will be the price of the machine in 3 years at the same rate? (2)

Ans: (a) 10% p.a. (b) Rs. 53,240

4. There are 1000 students in a school. The number of students increases by 20% every year in the school.

(a) In how many years will the number of students be 1440? (2)
(b) What would be the annual growth rate of the students if only 121 students increased during the same time period? (2)

Ans: (a) 2 years (b) 10%

5. The population of a metropolitan city in 2079 B.S. was 1,00,000. In 2080 B.S., 7500 people migrated there from other places and 500 died due to epidemics. The population increase rate is 3% p.a. every year.

(a) State whether the population growth simple or compound. (1)
(b) What was the population of the city in 2080 B.S.? (1)
(c) What will be the population in 2082 B.S.? (2)

Ans: (a) Compound (b) 1,10,000 (c) 116699

Compound Depreciation

1. 2 years ago, Nishant bought a motorbike for Rs. 3,00,000. This year he sold his bike at a compound depreciated rate of 10% per annum.

(a) What do you mean by compound depreciation? (1)
(b) At what price did he sell the bike? Find it. (2)
(c) If the rate of depreciation were 9% and 11% p.a. in last two successive years, how much more or less amount would he receive? (2)

Ans: (b) Rs. 2,43,000 (c) Rs. 30 less

2. Anita admitted in BBS. She purchased a computer for Rs. 40,000 for her study. After using it for 2 years, the price of the computer depreciates by Rs. 7,600.

(a) Write the formula for calculating the amount of depreciation. (1)
(b) Find the rate of depreciation. (2)
(c) If she purchased a mobile set for Rs. 18,000; what would the depreciated amount in 2 years at the same rate of depreciation? (2)

Ans: (b) 10% p.a. (c) Rs. 3,420

3. Bimal 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_o, 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_o, R% and T. (1)
(b) Find the selling price of the bus after three years. (1)
(c) If Bimal's wife Bimala 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? (2)

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

4. When the price of a share of a finance company depreciates continuously for 2 years by 10% p.a.; Hemanta sold his share of the company for Rs. 64,800. then how many shares of Rs. 100 were sold? Find it.

(a) Find the cost price of his shares of Rs. 100 each. (2)
(b) How many shares of Rs. 100 each were sold? (1)
(c) If he purchased the shares by borrowing money from a bank at the rate of 10% p.a., how much would be insufficient to clear the loan after selling the shares? (2)

Ans: (a) Rs. 80,000 (b) 800 (c) Rs. 32,000 insufficient

5. Ojaswee 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, $D_v = P\left(1 - \frac{R}{100}\right)^T$? (1)

(b) What will be the price of the electric car after two years? (1)

(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? (2)

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

SEE Q. No. 4

1. Rajesh 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. (2)

(b) How much Nepali rupees did his friend receive while exchanging US $3500 in the same day? Find it. (1)

(c) After 2 weeks, the selling rate for US dollar became Rs. 126.35, by what percent the Nepali currency was revaluated? Find it. (1)

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

2. A business woman 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. (1)

(b) Find the exchange rate of CAD $ 1 after devaluation in Nepali currency. (1)

(c) Calculate her gain or loss amount. (2)

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

3. Ram Prasad, 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. (1)

(b) What is the total amount to be paid after 1 year? (1)

(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? (2)

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? (2)

(b) Determine the exchange rate between NRs. and US dollars. (1)

(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. (1)

(d) According to the new exchange rate, how much profit or loss does Hari make when he exchanges his American dollars with Nepalese rupees? (1)

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

5. Sunil 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? (1)

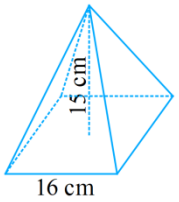
(b) How much Nepali rupees did he exchange to get US dollars initially? Find it. (2)

(c) How much profit or loss would be there for him if the Nepali currency was revaluated by 10% instead of devaluation of 10%? (1)

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

SEE Q. No. 5

1. The height of a metallic square based pyramid is 15 cm and the length of base is 16 cm.



(a) How many triangular surfaces are there in a square based pyramid? (1)
(b) Find the volume of the pyramid. (1)
(c) Calculate the the cost of painting the total surfaces of the pyramid at the rate of Rs. 65 per 100 cm^2. (2)

Ans: (a) 4 (b) 1280 cm^3 (c) Rs. 520

2. The total surface area of the given aquarium with the shape of square based pyramid is 4200 cm^2 and its slant height is 29 cm.

(a) Write the formula to find the area of triangular faces of the aquarium having length of base 'a' and slant height 'l'. (1)
(b) Find the length of base of the aquarium. (2)
(c) Raj said that the aquarium cannot hold 12 litres of water. Evaluate his statement. (2)

Ans: (a) $2al$ (b) 42 cm (c) He is right

3. Annapura hotel is planning to manage a tent with a shape of a square based pyramid for a group of tourists from or foreign country in which, the length of side of base is 24 m and height is 16 m.

(a) Write the relation among base area (A), height (h) and volume (V) of the pyramid. (1)
(b) How much clothes in square meter is required to construct the tent? (2)
(c) If each person requires 48 cubic metre of air to breathe, how many tourists can be accommodated easily in the tent? (2)

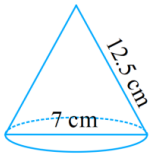
Ans: (b) 960 m^2 (c) 64

4. The radius of a cone is 14 cm and its volume is 9856 cm^3.

(a) Write the formula to find the volume of a cone having radius 'r' and height 'h'. (1)
(b) Find the height of the cone. (1)
(c) Is Rs. 500 enough to paint the curved surface area of the cone at 25 paisa per cm^2? (2)

Ans: (b) 48 cm (c) No, insufficient by Rs. 50

5. For a project-work, a student made up a cone with colourful clay.

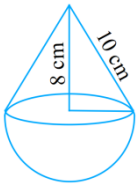


(a) Write the formula for calculating the curved surface area of a cone. (1)
(b) Calculate the surface area of the cone. (2)
(c) If s/he transformed the cone into another cone with height 5.88 cm, what would be the base radius of the new cone? (1)

Ans: (a) πrl (b) 176 cm^2 (c) 5 cm

SEE Q. No. 6

1. A toy is formed combining a hemispher and a cone of same base radius. The vertical height and slant height of the conical part are 8 cm and 10 cm respectively.



(a) Write the relation among the height (h), radius (r) and slant height (l) of the cone. (1)

(b) Find the volume of combined solid. (3)

(c) If the height of the hemispherical part and the height of conical part are exchanged to form a new toy, which one costs more to paint at the same rate? (2)

Ans: (a) $h^2 + r^2 = l^2$ (b) 754.28 cm^3 (c) New solid costs more as its surface area is more by 238.85 cm^2

2. For project work, Ramesh made a cylinder and a cone with the same base radius as shown in the figure-I. Likewise, Sagun made a solid as shown in the figure-II by combining a cylinder and a cone.

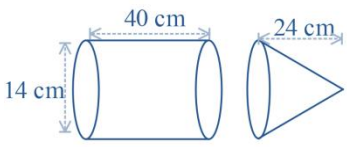


Figure-I

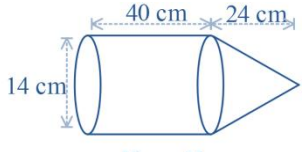


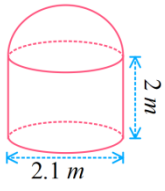
Figure-II

(a) What is the formula for finding the total surface area of figure-II? (1)

(b) Find the separate total surface area of solid objects of the both the figures and calculate their sum. (2)

(c) If Ramesh and Sagun paint their own solids at the same rate, who require more cost? Give your logical answer. (1)

3. A cylindrical tank with hemispherical top is built in a community as shown in the figure. The internal measurements of the tank are given.



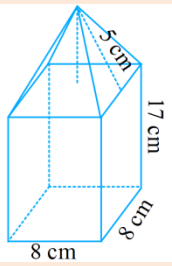
(a) Which shapes are combined to form the tank? (1)

(b) How much water is required to fill the tank at one time? Find it. (3)

(c) Compare the curved surface area of hemispherical part and curved surface of cylindrical part of internal part inside the tank. (1)

Ans: (a) Cylinder and hemisphere (b) 9,355.5 litres (c) 21:40

4. A solid composed up of a square based cuboid and a pyramid of same base is made of metal.



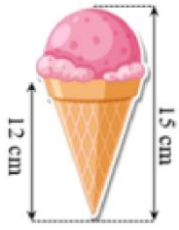
(a) Write the formula to find the lateral surface area of the solid. (1)

(b) Find the total surface area of the solid. (2)

(c) If the solid were melted and transformed into a square based pyramid of height 8 cm, what would be the side length of base of the pyramid?

Ans: (b) 688 cm^2 (c) 12 cm

5. Dawa organized a party on the occasion of his daughter Palmu's first birthday in his family. After meal, each of 100 people, including the family members, took 1/1 cone filled with ice-cream as shown in the picture.



(a) Write the formula to find the volume of cone having base radius 'r' units and height '*h*' units? (1)

(b) Find the volume of the ice-cream eaten by each person. (3)

(c) How many cylindrical ice-cream containers of internal base diameter 12 cm and height 15 cm were enough? Find it. (2)

Ans: (b) 169.71 cm^3 (c) 10

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 × 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? (3)

(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? (2)

Ans: (a) Rs. 34,200 (b) Rs. 11,400

2. 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. (3)

(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? (2)

Ans: (a) Rs. 480 (b) Rs. 1800

3. 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.

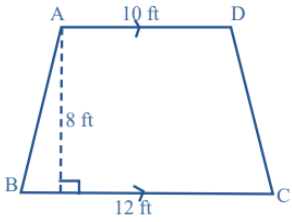
(a) Write the formula to find the lateral surface area of a pyramid. (1)

(b) Find the surface area of both the pillars with pyramidal top for the painting. (2)

(c) Would Rs. 5,550 be sufficient to paint the pillars at the rate of Rs. 110 per square feet? Give reason. (1)

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

4. 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 ft² and the cost of brick per piece is Rs. 16.



(a) Find the area of the parking land. (2)

(b) How many bricks are needed to pave the whole parking area? (1)

(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? (1)

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

3. A pyramid shaped tent is formed using 20 equal triangular shaped pieces of clothes and the lengths of sides of each triangular piece of clothes are 6.1 m, 6.15 m and 0.25 m.

(a) Find the area of a piece of cloth. (2)

(b) The cost of canvas per square meter is Rs. 600, find the total cost of canvas required for the construction of the tent. (2)

(c) If 10% of the canvas were used in cutting, pasting and sewing, how much more money would be required to make the tent at the same rate?

Ans: (a) 0.75 m² (b) Rs. 9000 (c) Rs. 1000 more

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 (1)

(b) How much money will be deposited by tenth day? Find using formula. (2)

(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. (2)

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

2. Roshana collected following sum of money in first five months of 2081 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. (1)

(b) How much money will be deposited by the eighth month? Find using formula. (1)

(c) Based on the above sequence, how many extra months enough after 8 months to collect the total amount Rs 1,02,300? (2)

Ans: (b) Rs. 25,500 (c) 2 months more

3. Ashish started a tea-corner in his locality. The following table shows the sales of tea in the first 5 days in his tea-corner.

Day	First	Second	Third	Fourth	Fifth
Number of cups of tea	14	25	36	47	58

(a) Identify the name of sequence of daily sales of tea. (1)

(b) How many cups of tea did he sell in 10 days based on the same trend of his daily sales? Find it. (2)

(c) If 5 cups of tea were sold on the 1st day, 10 cups of tea on the 2nd day, 20 cups of tea on the 3rd day and so on, determine how many days would be sufficient to sell as much tea as sold in 10 days based on the above table. (2)

Ans: (b) 635 cups (c) 7 days

4. 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. (1)

(b) Find the total number of terms in the series. (2)

(c) What should be added to the third term of the series so that the first three terms form a geometric series? Find it. (2)

Ans: (b) 25 (c) 3

5. 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. (1)

(b) What is the third mean of the given series? Find it. (2)

(c) In arithmetic mean and geometric mean between 20 and 45, which one is greater and by how much? Compare it. (1)

Ans: (b) 35 (c) A.M. more by 2.5

SEE Q. No. 9

1. Given quadratic equation is $x^2 - 4x - 12 = 0$.

(a) Write the roots quadratic equation $ax^2 + bx + c = 0$ (1)

(b) Solve the quadratic equation by completing square method. (2)

(c) Form a quadratic equation having roots 2 and 3. (2)

Ans: (b) 6, – 2 (c) $x^2 - 5x + 6 = 0$

2. Ramhari Lamsal scored a total of 30 marks in two subjects English and Mathematics in the first terminal exam of grade 10. If he scored 2 more marks in Mathematics and 3 fewer marks in English, then the product of his marks would be 210.

(a) Write the standard form of quadratic equation. (1)

(b) Find the marks obtained by him in both the subjects. (3)

(c) Find the product of his marks obtained in both the subjects. (1)

Ans: (b) 6, – 2 (c) 216 or 221

3. Chetan sir teaches mathematics to Osika in class 10. The present age of Chetan sir is 35 years and the present age of Osika is 15 years.

(a) How old were Chetan sir and Osika before x years? (1)

(b) If the product of their ages before x years was 300, find the value of x. (2)

(c) By how many times will the age of Chetan sir more than Osika after x years? (1)

Ans: (a) 35 – x, 15 – x (b) 5 (c) 800

4. 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

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: $\frac{x+y}{x-y} + \frac{x-y}{x+y}$ (2) ***Ans:*** $\frac{2(x^2+y^2)}{x^2-y^2}$ (b) Solve: $2^x + \frac{1}{2^x} = 8\frac{1}{8}$ (3) ***Ans:*** ± 3

2. (a) Simplify: $\frac{1}{2a-3b} - \frac{6b}{4a^2-9b^2}$ (2) ***Ans:*** $\frac{1}{2a+3b}$ (b) Solve: $5 \times 4^{x+1} - 16^x = 64$ (3) ***Ans:*** 1, 2

3. (a) Simplify: $\frac{4x^2+y^2}{4x^2-y^2} - \frac{2x-y}{2x+y}$ (2) ***Ans:*** $\frac{4xy}{4x^2-y^2}$

(b) If $x^2 - 2 = 3^{\frac{2}{3}} + 3^{-\frac{2}{3}}$, then prove that $3x(x^2 - 3) = 10$ (3)

4. (a) Solve: $3^{x-1} + 3^{x-2} + 3^{x-3} = 13$ (2) ***Ans:*** 3

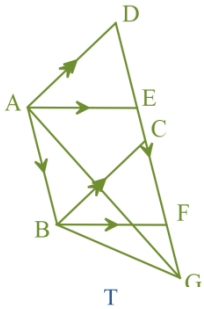
(b) Simplify: $\frac{1}{a^2 - 5a + 6} + \frac{2}{4a - 3 - a^2}$ (3) ***Ans:*** $\frac{1}{(1-a)(a-2)}$

5. (a) Solve: $2^x + 2^{x+1} + 2^{x+2} = 7$ (2) ***Ans:*** 0

(b) Simplify: $\frac{p+1}{p^2+p+1} + \frac{p-1}{p^2-p+1} - \frac{2}{p^4+p^2+1}$ (2) ***Ans:*** $\frac{2(p-1)}{p^2-p+1}$

SEE Q. No. 11

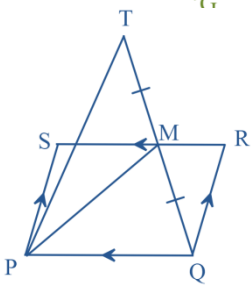
1. In the figure, AB||DG, AE||BF and BC||AD.



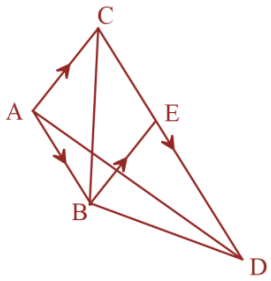
(a) Which parallelogram is equal in area to the parallelogram ABCD? (1)

(b) Prove that: Area of $\Delta ABG = \frac{1}{2}$ Area of $\square ABCD$. (2)

(c) In the figure, PQRS is a parallelogram, PQT is a triangle and M is the mid-point of QT. Prove that area of triangle PQT is equal to the area of parallelogram PQRS. (2)



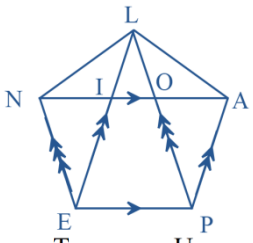
2. In the figure, AB||CD and AC||BE.



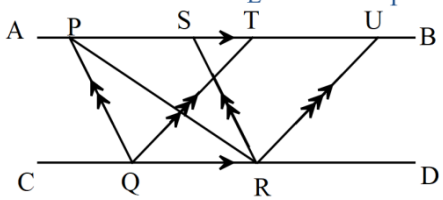
(a) Write the relation between the area of ΔABD and $\square ABEC$. (1)

(b) Prove that: Area of ΔABD = Area of ΔABC (2)

(c) In the given pentagon NEPAL, NA||EP, EL||PA and EN||PL. Prove that area of ΔNEL is equal to the area of ΔPAL. (2)



3. In the given figure, AB||CD, PQ||SR and QT||RU.

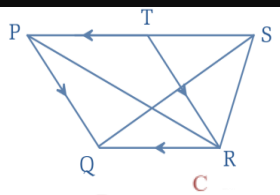


(a) State the relationship between the area of ΔPQR and ΔPRS. (1)

(b) Prove that area of $\square PQRS$ = area of $\square URQT$. (2)

(c) Construct a parallelogram PQRS in which PQ = 5 cm, diagonal PR = 6 cm and diagonal QS = 8 cm. Construct a ΔPSA whose area is equal to the area of parallelogram PQRS. (3)

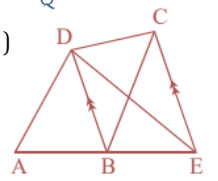
4. In the given figure, ΔPQR, ΔQRS and □PQRT are on the same base QR and between the same parallel lines PS and QR.



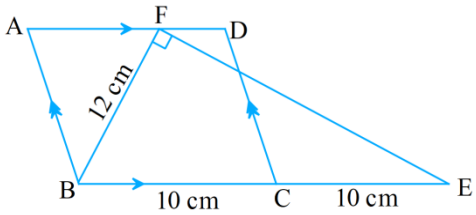
(a) Write the relation between the areas of ΔQRS and □PQRT.(1)

(b) If the area of triangle PTR is 40 cm^2, find the area of triangle QRS. (2)

(c) In the figure given alongside, BD // EC.
Prove that: areas of quad. ABCD and ΔDE are equal. (2)



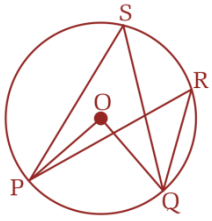
5. In the given figure, ABCD is a parallelogram and BEF is a triangle ABC where ∠BFE = 90°, BF = 12 cm and BC = CE = 10 cm.



(a) What is the measurement of EF? (1)
(b) What is the area of parallelogram ABCD? Find. (2)
(c) Construct a parallelogram ABCD having AB = 7 cm, BC = 5 cm and ∠ABC = 120°.
(d) Construct a triangle equivalent to the area of that parallelogram ABCD. (3)

SEE Q. No. 12

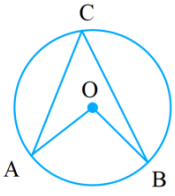
1. In a circle with centre O, central angle POQ and circumference angles PRQ and PSQ are drawn on the arc PQ.



(a) Write the relation between ∠POQ and ∠PRQ. (1)
(b) If ∠POQ = $5x^o$ and ∠PSQ = $(x + 27)^o$, find the measure of ∠PSQ. (1)
(c) Experimentally verify the relation between ∠PSQ and ∠PRQ. (At least two circles with radii 3 cm are necessary). (2)

Ans: (a) ∠POQ = 2∠PRQ (b) 18^o

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



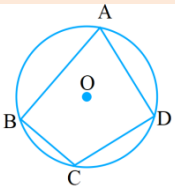
(a) Write the relationship between ∠AOB and ∠ACB. (1)

(b) Experimentally verify that the relationship between ∠AOB and ∠ACB. (Two circles of radii at least 3 cm are necessary) (2)

(c) If D is any point on arc AB such that ∠ADB is twice the ∠AOB, find the measure of ∠AOB. (1)

Ans: (a) ∠AOB = 2∠ACB (b) 10^o (c) 72^o

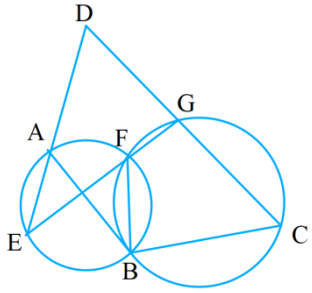
3. In a circle with center O, ABCD is a cyclic quadrilateral.



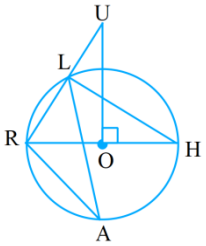
(a) Write the relation between ∠ABC and ∠ADC. (1)

(b) 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 ∠ABC and∠ADC. (2)

(c) In the given figure, EAD, DGC and EFG are straight lines. Prove that ABCD is a cyclic quadrilateral. (2)



4. In the given figure, O is the centre of the circle and RH is a diameter. R, A, H and L are the circumference points and U is an external point such that UO is perpendicular to RH.

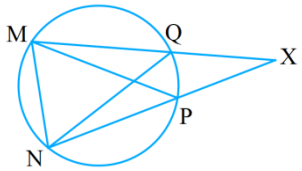


(a) What is the measurement of angle ∠RLH? Write with reason. (1)

(b) Prove that: ∠RAL = ∠OUR.

(c) If ∠OUR = 50°, then what is the measurement of ∠LAR? Find. (1)

5. O is the centre of the given circle and M, N, P and Q are the circumference points on it. X is an external point such that MX and NX are equal.



(a) Which inscribed angles are standing on the arc MN? (1)

(b) If ∠QMP = 20° then what is the measurement of ∠PNQ? (1)

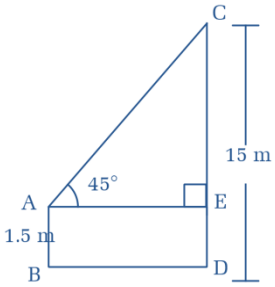
(c) Prove that: MP = NQ. (2)

SEE Q. No. 13

1. (a) Construct a parallelogram ABCD having AB = 4 cm, BC = 5.5 cm and ∠ABC = 60°. Also, construct another parallelogram ABQP whose area is equal to the area of parallelogram ABCD and having one side 6 cm. (3)
   (b) Why is the area of parallelogram ABCD equal to the area of parallelogram ABQP? Give reason. (1)
2. (a) Construct a triangle ABC having AB = 4.4 cm, BC = 5.5 cm and ∠ABC = 75°. Also, construct another triangle BCD whose area is equal to the area of triangle ABC having ∠BCD = 120°. (3)
   (b) How is AD // BC? Give reason. (1)
3. (a) Construct a triangle ABC having BC = 6 cm, ∠B = 90° and AC = 10 cm. Construct a parallelogram CDEF having ∠CDE = 60° and equal in area to the triangle ABC. (3)
   (b) Find the area of parallelogram CDEF. (1)
4. (a) Construct a parallelogram ABCD in which AB = 5 cm, BC = 4 cm and ∠ABC = 60°. Also, construct a ΔBEF with a side PB = 6cm and equal in area to the □ABCD. (3)
   (b) Write the reason for being the area of triangle BEF equal to the area of parallelogram ABCD. (1)
5. (a) Construct a quadrilateral PQRS in which PQ = QR = 5.5 cm, RS = SP = 4.5 cm and ∠SPQ = 75°. Construct a triangle PST equal in area to the quadrilateral PQRS. (3)
   (b) In the construction 5. (a), which two triangles are equal in area? Write with reason. (1)

SEE Q. No. 14

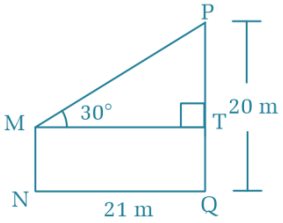
1. In the given figure, the height of a man (AB) = 1.5 m, the height of a tree (CD) = 15 m and the angle of elvation of the top of the tree as obseved by the man, ∠EAC = 45°.



(a) Define angle of elevation. (1)
(b) By how much is the height of the man less than the height of the tree? (1)
(c) Find the distance between the man and the tree. (1)
(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°? (1)

Ans: ((b) 13. 5 m (c) 13. 5 m (b) 9.88 m backward

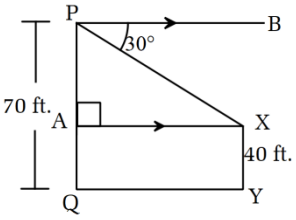
2. In the given figure, MN is the height of a pole, PQ is the height of a temple, NQ is the distance between the pole and the temple.



(a) Write the name the angle of elevation. (1)
(b) By how much is the temple taller than the pole? (1)
(c) Find the height of the pole? (1)
(d) If the height of the temple were raised by 1 m, what would be angle angle elevation o the top of the temple from the foot of the pole?

Ans: (a) ∠TMP (b) $7\sqrt{3}$ m (c) 7.88 m (d) 45°

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



(a) Define angle of depression. (1)
(b) What is the measure of angle of elevation of the top of the tower as observed from the top of the building? (1)
(c) Calculate the distance between the building and the tower. (1)
(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° (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° 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°, 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. The height of two buildings are 40 m and 52 m. The distance between them is 12 m.

(a) What type of angle is formed when observed from the roof of taller building to the roof of the shorter building? (1)

(b) Explain with reason the relation between the angle that forms when you observe the top of the taller building from the top of the shorter building and the top of the shorter building from the top of the taller building. (1)

(c) Calculate the angle in degree, when an observer observes from the roof of the shorter building to the roof of taller building. (1)

(d) If the ladder is fixed to join the roofs of the buildings, what should be the length of the ladder? Calculate it. (1)

Ans: (a) angle of elevation (b) equal as the alternate angles equal (c) 45^{o} (d) 16.97 m

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	20-30	30-40	40-50	50-60	60-70
No. of students	3	4	10	8	5

(a) What does '*c.f.*' stand for in the formula, $M_d = L + \left(\frac{N/2 - c.f.}{f}\right) \times i$? (1)

(b) Calculate the median mark. (2)

(c) Find the mark obtained by maximum number of students. (2)

(d) Compare the number of students of the class just preceding to the median class and the number of students of the class just succeeding to the modal class. (1)

Ans: (a) The cumulative frequency of pre-median class (b) 48 (c) 47.5 (d) 1: 2

2. The given table represents the age distribution of teacher of a secondary school. The median age of the teachers is 44 years.

Age (in years)	24-30	30-36	36-42	42-48	48-54	54-60
No. of teachers	2	4	10	*p*	9	3

(a) Write the formula for calculating the median of a continuous data. (1)

(b) Find the value of *p*. (2)

(c) Calculate the average age of the students. (2)

(d) Compare the mean, median and modal age of the teachers. (1)

Ans: (b) 12 (c) 43.65 (d) mean < median < mode

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

Income (Rs.)	0-100	100-200	200-300	300-400	400-500	500-600
No. of people	4	6	8	10	7	5

(a) Find the modal class. (1)

(b) Calculate the average income per hour. (2)

(c) Find the upper quartile (Q_3). (2)

(d) Compare the number of people lying below or above Q_3 class. (1)

Ans: (a) 300-400 (b) Rs. 312.50 (c) Rs. 320 (d) 3: 2

4. The height of students of class IX and X of Shanti Secondary School is given in the table.

Height (in cm)	110-115	115-120	120-125	125-130	130-135	135-140
Number of students	8	10	x	11	6	5

(a) Write the formula to calculate the mean of continuous data. (1)
(b) If the average height is 123.5 cm, find the value of x. (2)
(c) Calculate the height of maximum number of students. (2)
(d) What percent of students are there whose heights are below the modal class? (1)

Ans:(b) 20 (c) 122.63 cm (d) 30%

5. The ages (years) of people entering the Central Zoo from 7 am to 8 am are given below.
7, 22, 32, 47, 59, 16, 36, 17, 23, 39, 49, 31, 21, 24, 41, 12, 49, 21, 9, 8, 51, 36, 35, 18

(a) Write the formula for finding the mode of the continuous series. (1)
(b) Make the frequency distribution table with class size 10 then calculate the average age of people entering the zoo in the given time. (2)
(c) Calculate the median age. (2)
(d) How many people of age group 20-30 years should have entered the zoo from 7 am to 8 am so that the average age was equal to the median age of the given data? (1)

Ans: (b) 29.17 years (c) 30 years (d) 13

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)? (1)
(b) Find the probability of getting an ace or a king in the first draw. (1)
(c) When both cards are drawn, show the probabilities of all the possible outcomes of getting and not getting the cards of hearts in a tree diagram. (2)
(d) Find the ratio of probabilities of getting both cards of heart when the cards drawn at first is replaced and not replaced in the pack. (1)

Ans: (a) P (A or B) = P (A) + P (B) (b) $\frac{2}{13}$ (d) 17: 16

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

(a) What is the probability scale of any event 'E'? Write it. (1)
(b) Find the probability of having both children are daughter. (1)
(c) Show the probabilities of possible outcomes in a tree-diagram. (2)
(d) Compare the probability of having no son to the probability of having at least one daughter. (1)

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

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. (1)
(b) Show the probabilities of possible outcomes of selecting boys and girls in a tree diagram. (2)
(c) Find the probability of selecting both girls. (1)
(d) By how much the probability of getting at least one boy is less than the total probability? Calculate it. (1)

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

PRACTICE QUESTION SETS…

Set-1

SEE PREPARATION-2081 (2025)

Compulsory Mathematics

Time: 3 Hours Full Marks: 75

Answer all the questions.

1. Out of the students who participated in an examination, 70% passed English, 60% passed Mathematics but 20% failed both the subjects and 550 students passed both the subjects.

(a) Write the cardinality notation to represent the number of students passed in both subjects. (1)

(b) Show the above information in a Venn-diagram. (1)

(c) Find the number of students who passed in English. (3)

(d) If one student is randomly selected, what is the probability of getting the student who passed in only one subject? (1)

2. Sunil borrowed some money for 2 years at the rate of compound interest of 10% p.a. and immediately he lent the money at the same rate of half yearly compound interest for the same period of time. In this transaction, he gained Rs. 8,810.

(a) If C.A. is the amount compounded half yearly on a sum P for Q years at the rate of R% p.a., state the relation among C.A., P, Q and R. (1)

(b) Find, how much money did he borrowed? (2)

(c) If he had lent the money at the rate of 12% half yearly compound interest for the 1st year and 8% quarterly compound interest rate for next year, how much profit or loss would he make? Find it. (2)

3. Anita has bought a car. In a certain rate of yearly compound depreciation, the price of a car will be Rs. 32,40,000 and Rs. 29,16,000 in 2 and 3 years respectively.

(a) Define compound depreciation. (1)

(b) At what price did she buy the car? Find it. (2)

(c) Instead of buying car, if she bought the plot of land with the money, in how many years would its value be Rs. 46,65,600 at the annual increase rate of 8%? (1)

4. Ram exchanged some Nepali rupees with American dollars at the exchange rate of $1=Rs. 120. After 15 days, Nepali currency devaluated against American dollars by 10% and he made a profit of Rs. 1,11,000 by exchanging the same dollars into Nepali currency again.

(a) How much Nepalese rupees are equal to one American dollar ($1) after devaluation of the Nepali currency? (1)

(b) How much rupees did Ram exchange with American dollars in the beginning? (2)

(c) How much profit or loss would be there for him, if the Nepali rupees had revalued by 8% instead of devaluation of 10%? (1)

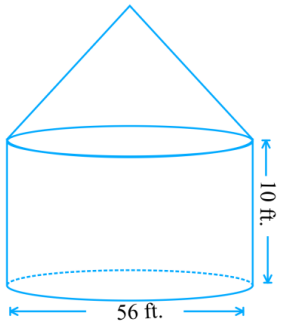
5. The total surface area of the given aquarium with the shape of square based pyramid is 4200 cm^2 and its slant height is 29 cm.

(a) Write the formula to find the area of triangular faces of the aquarium having length of base 'a' and slant height 'l'. (1)

(b) Find the length of base of the aquarium. (2)

(c) Raj said that the aquarium cannot hold 12 litres of water. Evaluate his statement. (2)

6. Shashwat has managed a tent for accommodation to the guests attending in his brother Swarnim's weaning ceremony (see the figure). The tent is in the form of a cylinder with a height of 10 ft. and a conical shape with the same radius above it. The diameter of base of tent is 56 ft. and the tent contains 41,888 cubic ft. of air.

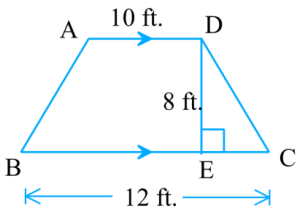


(a) Write the formula to find out the curved surface area of the cylinder having radius 'r' and height 'h'. (1)

(b) How much canvas is required to make the tent? Find it. (3)

(c) If all the canvas is used to make a hemispherical tent, what would be the diameter of the hemispherical tent? (1)

7. The parking area outside the Bir Hospital 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 ft² and the cost of brick per piece is Rs. 18.



(a) How many bricks are needed to pave the parking area? (2)

(b) If 2 workers can complete the work of paving bricks in 3 days and the wage of a worker per day is Rs. 1500, how much does it cost to pave the bricks including the cost of bricks? (1)

8. Dhruba has been joined in a bank as a branch manager. His monthly salary Rs. 45,000 and he receives an increment of Rs 1,500 in his monthly salary as a grade every year.

(a) In which sequence is the sequence of annual incomes related to? (1)

(b) What will be his total income in 6 years? (2)

(c) After working for a few years in the bank, he leaves the job there and goes to USA. If he earns a total of Rs 62,10,00,000 during his job, how long will he have been working altogether in the bank? (2)

9. In a rectangular plot, the longer side is 10 m more than the shorter side and the diagonal is 10 m more than its longer side.

(a) What are the roots of the quadratic equation $ax^2 + bx + c = 0$, $a \neq 0$? (1)

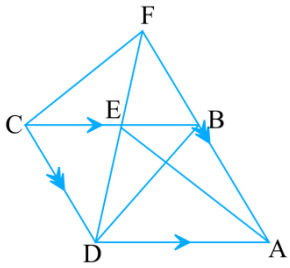
(b) Find the length of the shorter side, longer side and diagonal of the field. (3)

(c) How many pieces such of plots can be made on a field of size 200 m × 150 m can be made on that rectangular field? (1)

10. (a) Simplify: $\frac{4x^2 + 9y^2}{4x^2 - 9y^2} - \frac{2x - 3y}{2x + 3y}$ (2)

(b) If $x^2 + 2 = 3^{\frac{2}{3}} + 3^{-\frac{2}{3}}$, then prove that $3x(x^2 + 3) = 8$. (3)

11. In the adjoining figure, ABCD is a parallelogram where E is any point on BC. DE and AB are produced to meet at F.



(a) Write the relation between the area of ΔBCD and ΔFCD. (1)

(b) Prove that area of ΔEDA $= \frac{1}{2}$ area of □DABC. (2)

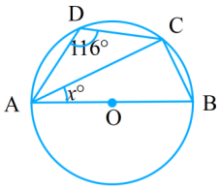
(c) Prove that the area of ΔABE and ΔCEF are equal. (2)

12. A ΔLMN has MN = 5.2 cm and ∠MLM = ∠LMN = 75°.

(a) Construct triangle LMN, then construct a parallelogram BEAN having a diagonal AB = 6.5 cm and equal in area to the ΔLMN. (3)

(b) Write with reason why the area of the given triangle LMN and the required parallelogram BEAN are equal. (1)

13. In the given figure, AOB is a diameter of the circle, ABCD is a cyclic quadrilateral and ∠ADC= 116°.



(a) What is the value of ∠ACB? (1)

(b) Find the value of x. (1)

(c) Draw two circles of radii at least 3 cm and experimentally verify the relation between measurements of ∠ABC and ∠ADC. (2)

14. The angle of depression of the roof of a house as observed from the top of the tower to is 30°. The height of the tower is 60 m and the house is 15 m shorter than the tower.

(a) How is the angle of depression formed? (1)

(b) Draw a suitable figure based on the given context. (1)

(c) Find the distance between the top of the tower and the roof of the house. (1)

(d) Compare the angles of depression and elevation of the roof of the house as observed from the top and foot of the tower respectively. (1)

15. The given data represents the monthly expenditure (in Rs. thousands) of the families of a community in ward no. 15 of Kathmandu metropolitan city.

Expenditure	30-40	40-50	50-60	60-70	70-80
No. of families	30	20	60	50	40

(a) Write the name central tendency which divides the number of the patients into two equal parts? (1)

(b) From the above data, what is the expenditure of the maximum family? (2)

(c) Calculate the average expenditure of the families. (2)

(d) Dawa said that the first quartile of the data is the upper limit of the Q_1 class. Justify it. (1)

16. A bag contains a dozen of TT balls of same size among then 7 are yellow and the rest are white. Ronika is going to draw TT balls from the bag one after another without replacement.

(a) Define mutually exclusive events. (1)

(b) Find the probability of getting both yellow balls. (1)

(c) Draw a tree-diagram to show the probabilities of possible outcomes. (2)

(d) Compare the probability of getting the same colored balls and the probability of getting the different colored balls. (1)

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PRACTICE QUESTION SETS...

Set-2

SEE PREPARATION-2081 (2025)

Compulsory Mathematics

Time: 3 Hours | Full Marks: 75

Answer all the questions.

1. In a survey of 75 students visiting to Chitwan, it was found that the ratio of the number of students who enjoyed the Jungle Safari (J) in National Park and Hiking (H) in Maulakalika Temple was 3:2. Among them, 45 enjoyed Jungle safari as well as Hiking and each enjoyed at least one of these activities.

(a) What is the value of $n(\overline{J \cup H})$? (1)

(b) Show the above information in a Venn-diagram. (1)

(c) Determine the number of students who enjoyed only one activity. (3)

(d) If those students who enjoyed ***Hiking*** only was found that they did not enjoy both the activities, what would be the ratio of number of students who enjoyed both and who enjoyed none of the activities. (1)

2. Rahul deposited Rs. 2,50,000 in a development bank for 2 years to get the yearly compound interest at the rate of 4% per annum after deducting the 5% tax on the interest. But right after a year, the bank changed the policy and decided to provide semi-annual compound interest at the same rate.

(a) Write the the formula to find the amount compounded quarterly. (1)
(b) Calculate the interest of the first year by deducting the tax. (2)
(c) After deducting the tax, by what percentage the interest of the first year differ from the interest of the second year? (2)

3. If the cost is depreciated at the rate of 12% per annum, the cost of a photocopy machine becomes Rs 61,952 after 2 years.

(a) If V = initial price, T= time, R = rate of depreciation and V_T = price after T years, write the relationship among V, T, R and V_T. (1)
(b) Find the original price of the machine. (1)
(c) If the rate of compound depreciation of the first and second years were 10% and 15% respectively, by how much the price of the photocopy machine would be more or less after 2 years? (2)

4. Deependra exchanged some Euros according to the following exchange rates from a bank in order to visit Germany.

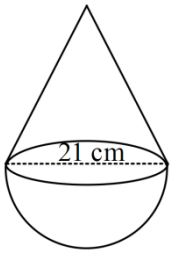
Buying rate: 1 Euro (€) = NRs 142.05 Selling rate: 1 Euro (€) = NRs 142.60

(a) How many Euros did he exchange with Rs 3,56,500? (1)
(b) If he could not go to Germany due to his health problem, how many Nepali rupees did he get back by exchanging Euros when the Nepali currency was devaluated by 4% in comparison to Euro? (2)
(c) How much profit or loss did he have from this transaction? Write with reason. (1)

5. Annapura hotel is planning to manage a tent with a shape of a square based pyramid for a group of tourists from or foreign country in which, the length of each side of base is 24 m and height is 16 m.

(a) How many triangular faces are there in the tent? (1)
(b) How much clothes in square meter is required to construct the tent? (2)
(c) If each person requires 9 square meter space on the ground, how many tourists can be accommodated easily in the tent? (2)

6. Pushpa bought a metallic toy which is in the form of cone mounted on a hemisphere of diameter 21 cm. The total volume of the toy is 3696 cm^3.



(a) Write the formula to calculate the surface area of the toy. (1)
(b) Find the total height of the toy. (2)
(c) If the toy was melted and recast the cylinder of radius 7 cm what would be the height of the cylindrical shape? (1)

7. A shopkeeper sells the water tanks made up of plastic materials and formed with the combination of a cylinder and a hemisphere. For the use of own house, Rupesh bought two water tanks of the same size, each having the base radius 1.05 m and total height 3.5 m from the shop.

(a) What is the height of the cylindrical part of each tank? (1)

(b) If Rupesh filled both the tanks with water at the rate of 40 paisa per litre, estimate the total cost of water. (3)

8. The commission of two employees of a hospital in five months is given below.

	Months				
Name	Baishakh	Jestha	Ashadh	Shrawan	Bhadra
Bimal	Rs. 10000	Rs. 12000	Rs. 14000	Rs. 16000	Rs. 18000
Bimala	Rs 4000	Rs. 6000	Rs. 9000	Rs. 13500	Rs. 20250

(a) Who received the commission in arithmetic sequence? (1)

(b) By using formula, find the total amount received by Bimala in 5 months. (2)

(c) If they received the commission in the same ways by the month of Kartik, who would receive more commission and by how? (2)

9. A bus and a rickshaw leave a cross road at the same time. The bus is travelling towards the North and the rickshaw is travelling towards the West. When the bus travelling towards the North covers a distance of 24 km, the shortest distance between the bus and the rickshaw was 6 km more than twice the distance of the rickshaw travelling to the West.

(a) Write the equation based on above context. (1)

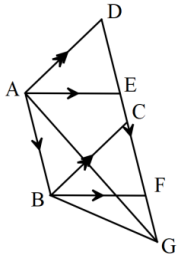
(b) Find the distance covered by the rickshaw travelling to the West. (2)

(c) If the speed of the bus is 48 km/hr, determine the speed of the rickshaw. (1)

10. (a) Simplify: $\frac{1}{x+a}+\frac{2x}{x^2+a^2}+\frac{4x^3}{a^4-x^4}$ (3)

(b) Solve the equation $9^x - 82 \times 3^{x-2} + 1 = 0$. (3)

11. In the figure, AB||DG, AE||BF and BC||AD.

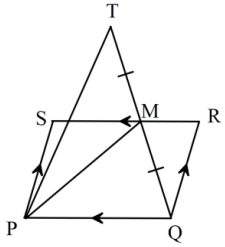


(a) Name the parallelogram which is equal in area to the parallelogram ABCD. (1)

(b) Prove that:

Area of $\Delta ABG = \frac{1}{2}$ Area of $\square ABCD$. (2)

(c) In the figure, PQRS is a parallelogram, PQT is a triangle and M is the mid-point of QT. Prove that area of ΔPQT is equal to the area of parallelogram PQRS. (2)

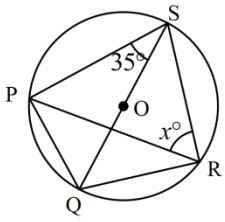


12. In a □ABCD; AB = 7 cm, BC = 6 cm and ∠ABC = 30°.

(a) Construct the parallelogram ABCD then construct the rectangle ABFE equal in area to the parallelogram. (3)

(b) Measure the length of side BF of the rectangle ABFE and find the area of the parallelogram ABCD. (1)

13. In a circle with centre O; PQRS is a cyclic quadrilateral.



(a) Write the relation between ∠PQR and ∠PSR. (1)

(b) Draw two circles with centre O and radii not less than 3 cm. Explore experimentally the relationship between ∠QPR and ∠QSR. (2)

(c) If ∠PSQ = 35°, find the value of x. (1)

14. The distance between a tower and a house is 20 m. The height of the tower is 60 m and the angle of depression of the roof of the house from the top of the tower is 45°.

(a) Define angle of depression. (1)

(b) Show the given information in diagrammatical form. (1)

(c) Find the height of the house. (1)

(d) How many metre should the observer come down from the top of the tower to observe the roof of the house such that the angle of depression of 30°? (1)

15. The following table shows the weight (in kg) of students of class X in a school.

Weight (in kg)	30-36	36-42	42-48	48-54	54-60
No. of students	6	10	12	9	3

(a) What does f_1 represent in the formula, $M_o = L + \frac{f_1 - f_0}{2f_1 - f_0 - f_2} \times i$? (1)

(b) Calculate the average weight of the students. (2)

(c) Calculate the median weight of the students. (2)

(d) Compare the number of students lying below and above the median class by finding the ratio. (1)

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

(a) What is the type of the events A and B if P(A ∩ B) = P(A) × P(B)? (1)

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

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

(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? (1)

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