Class: IX — DASHAIN VACATION HOMEWORK

Project work-1

Write the mobile numbers of any two of your family members (grandfather / grandmother / father / mother / brother / sister).
Represent the set of digits used in mobile number of one of the members by A and other by B.

For example: A = {digits of the mobile number 9861342559} = {9, 8, 6, 1, 3, 4, 5}

B = {digits of the mobile number 9818315993} = {9, 8, 1, 3, 5}

Find the followings:

(a) List the elements of sets A and B.

(b) Consider the universal set U = {0, 1, …, 9} and show the relation of sets U, A and B in a Venn-diagram.

(c) Verify that:

(i) $A \cup (A \cap B) = A \cap (A \cup B)$

(ii) $A - (A \cap B) = (A \cup B) - B$

(iii) $A \cup (B - A) = B \cup (A - B)$

(iv) $(A \cup B) - (A \cap B) = (A - B) \cup (B - A)$

(v) $\overline{A \cup B} = \overline{A} \cap \overline{B}$

(vi) $\overline{A \cap B} = \overline{A} \cup \overline{B}$

(d) Find:

(i) The cardinal number of set A – B.

(ii) The cardinal number of set A Δ B.

(iii) The cardinal number of set $\overline{A \cap B}$.

(iv) The cardinal number of set $\overline{A \cup B}$.

(e) Write with reason:

(i) Is A ∩ B a proper subset of A ∪ B?

(ii) Is the set B – A equal to the set $\overline{A} - \overline{B}$?

Project work-2

Ask to one of your parents (if not ask any one of your relatives) regarding the following details.

- ✪ Monthly basic salary: _____
- ✪ Festival expense: _____
- ✪ Dearness allowance: _____
- ✪ Clothing allowance: _____
- ✪ Provident fund: _____
- ✪ Citizen investment trust: _____
- ✪ Life insurance: _____

Find the followings:

(a) Total annual income: *Annual basic salary + Festival expense + Dearness allowance + Clothing allowance*

(b) Tax rebate income: *10% of annual basic salary as PF + CIT + Insurance*

(c) Taxable income: *Total annual income – Tax rebate income*

(d) Annual tax amount:

Measure the length, breadth and height of any one room your home. Also, measure the dimensions of the door and windows of the rooms.

Room	Dimension of room			Dimension of door		Dimension of windows	
	Length	Breadth	Height	Length	Height	Length	Height
Room	....	....	....	....	....	....	....

Calculate:
(a) The area of floor of the room.
(b) The area of ceiling of the room.
(c) The area of four walls of the room.
(d) The area of four walls and ceiling of the room.
(e) Estimate the cost of plastering the walls and ceiling of each room at the rate of locality.

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Ask and list out the age of your relatives and guests who come to your home to take Tika in Dashain.

a) **Construct a frequency table of class size 10.**
b) **Calculate:**
(i) The average age. (ii) The median age.

PRACTICE QUESTIONS SET

Attempt all the questions:

1. **U = {0, 1, 2, …, 10} is a universal set. A = {2, 3, 5, 7} and B = {1, 3, 9} are the subsets of U.**

(a) Write $A \cup B$ in listing method. [1K]

(b) Show the relationship of U, A and B in a Venn-diagram. [1U]

(c) Verify that: $A - (A \cap B) = (A \cup B) - B$ [3A]

(d) Is $n(\overline{A}) = n(U) - n(A)$ equal? Answer with calculation. [1HA]

2. **In Bhat-Bhateni Super Market and Departmental Store, the catalogue price of the refrigerator shown alongside is Rs 30,000. The supermarket sells it with VAT after allowing discount.**

10% off

(a) What is the current rate of VAT in Nepal? [1K]

(b) How much should a customer pay for the refrigerator with VAT? [2A]

(c) By what percent is the VAT more than discount amount? [1HA]

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3. The tax rates implemented by Inland Revenue Department for the fiscal year 2080/81 are given below.

For unmarried people	For married people	Tax rates
Annual income	Annual income	
Up to Rs 5,00,000	Up to Rs 6,00,000	1%
Rs 5,00,001- Rs 7,00,000	Rs 6,00,001- Rs 8,00,000	10%

Anuj is an unmarried Science teacher. His details are given below.
- Monthly basic salary: Rs 43,600
- Monthly dearness allowance: Rs 2000
- Festival allowance: one month's basic salary
- Premium of life insurance: Rs 30,000
- Provident fund: 10% of basic salary

Answer the following questions.

(a) What do you mean by income tax? [1K]

(b) Find his total income a year including festival allowance. [1U]

(c) Calculate the total income tax paid by him. [2A]

4. **A cement factory made a net profit of Rs 2,40,00,000 in the last year. The management of the factory decided to distribute 10% bonus from the profit to its 120 employees equally.**

(a) Define bonus. [1K]

(b) Calculate the bonus amount received by each employee. [2U]

(c) The cement factory sold a total of 2000 kitta shares. Mr. Manandhar has 150 shares of the cement factory. The factory distributed 10% of the net profit as the cash dividend. Calculate the cash dividend received by him. [2A]

5. **An umbrella has been made by stitching 10 triangular pieces of cloth of two different, each piece measuring 104 cm, 100 cm, and 12 cm.**

(a) What is the area of triangle having sides 'a', 'b' and 'c' units? [1K]

(b) How much cloth is used for the umbrella? [3A]

(c) If the cost of 1 cm² cloth is Rs 0.15, by how much is the cost of the cloth required to make the umbrella less or more than Rs 1000? [1HA]

6. In Saraswoti Secondary School, the room of class IX is rectangular in shape. It is 15 m long, 10 m broad and 5 m high. Also, it contains two windows of size 2 m × 1.5 m each and a door of size 1 m × 4 m.

(a) Write down the formula to calculate the area of four walls. [1K]

(b) Find the area the floor of the room? [1U]

(c) Calculate the cost of painting its four walls excluding the windows and door at Rs 300 per sq. metre. [2A]

7. **The following figure shows a closed victory stand made up of wood.**
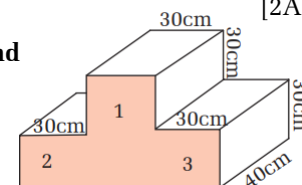
(a) Calculate the lateral surface area of the victory stand. [2U]

(b) How much air in space is occupied by the victory stand? [2HA]

8. (a) What is the formula of $a^3 + b^3$? [1K]

(b) Factorize: $8a^3 + b^3$ [1A]

(c) Resolve into factors: $x^4 + 4x^2 + 16$ [2U]

9. (a) What is the value of $(9x)^0$, $x \neq 0$? [1K]
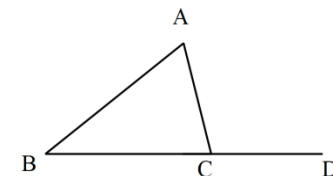
(a) Evaluate: $\dfrac{x^{9n+2} \times x^{-4n}}{x^{2n+10} \times x^{3n-7}}$ [2U]

(b) Junu said that the value of $(1 - x^{m-n})^{-1} + (1 - x^{n-m})^{-1}$ is equal to 1. Justify her statement. [2HA]

10. (a) Find the H.C.F. of $x^3 - 9x$ and $x^4 - 27x$ [3A]

(b) Simplify: $\dfrac{1}{1+9^{p-e}+9^{n-e}} + \dfrac{1}{1+9^{e-n}+9^{p-n}} + \dfrac{1}{1+9^{n-p}+9^{e-p}}$ [3A]

**11.** In the figure, the side BC of Δ ABC is produced to an exterior point D.

(a) Write the relation between ∠ACD and ∠ABC + ∠ABC. [1K]

(b) Draw two triangles of different shape and size then verify the experimentally the relationship between the exterior angle and the sum of two opposite interior angles. [2A]

12. **In the figure alongside, ∆ABC ~ APQ.**

(a) Write a condition under which two triangles are similar to each other. [1K]

(b) If AB = 15 cm, BP = 5 cm and BC = 10 cm, find the length of PQ. [2A]
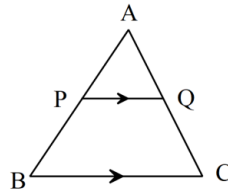
13. **In the figure alongside, X and Y are the centres of two intersecting circles and XY intersects AB perpendicularly at M.**
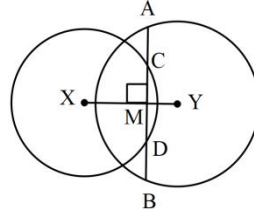
(a) Write down the relation between CM and DM. [1K]

(b) If CD = 6 cm and XM = 4 cm, find the length of radius XD. [2A]

(c) Prove that: AC = BD [2HA]

14. **An unbiased dice is rolled.**

(a) Define sample space. [1K]

(b) What is the probability of getting an odd number? [2U]

(c) Find the probability of not getting a number '6'. [2A]

(d) In what condition, the the probability of an event is 0? [1HA]

15. **The following table shows the marks obtained by the students of class IX in first terminal exam in Mathematics.**

Marks obtained	20	40	60	80	100
No. of students	2	8	15	10	5

(a) Write the formula to find the mean of discrete series? [1K]

(b) Calculate the mean marks. [2U]

(c) Calculate the median mark. [2A]

(d) By how much is the median mark less than the mean mark? [1HA]

16. **The table given below shows the weight of teahers of a school.**

Weight (in kg)	50	55	60	66	70	75
Number of teachers	3	4	8	10	2	1

(a) Name the quartile that divides the weights below 25% teachers. [1K]

(b) What is the modal weight of the teachers? [1U]

(c) Calculate the first quartile weight of the teachers. [2A]

(d) Heera said that the modal weight is 10% more than the first quartile. Evaluate her statement. [1HA]

Happy Learning!