

Symbol No: Date: 2082-10-18 7:30am 1031'D'



PABSON
SEE PRE-BOARD EXAMINATION-2082

Subject: Compulsory Mathematics

Full Marks: 75
Time: 3 hrs.

Candidates are required to answer the questions in their own way words as far as practicable. Figures in the margin indicate the full marks.

Attempt all questions.

सबै प्रश्नहरू अनिवार्य छन्।

1. In a survey of a group of people, it was found that 55 of them enjoy watching videos from Tiktok, 60 enjoy by watching reels in facebook, and 35 liked both activities. It was found that 20 were totally against both of activities.

मानिसहरुको एउटा समूहमा गरिएको समेक्षणमा 55 जना टिकटकमा भिडियो हेरेर रमाउछन्, 60 जना फेसबुकमा रिल्स हेरेर रमाउछन्। 35 जना दुवै क्रियाकलापमा रमाउछन् भने 20 जना दुवै क्रियाकलापको विपक्षमा उभएका छन्।

- a) By letting set of people who like to watch Tiktok as T and set of people who like to watch reels in Facebook as F. Write the set of the people who liked both activities in cardinal notation.

Ans: $n(T \cap F) = 35$ [1]

टिकटकमा भिडियो हेर्न मन पराउने मानिसहरुको समूहलाई T र फेसबुकमा भिडियो हेर्न मन पराउने मानिसहरुको समूहलाई F मानि दुवै क्रियाकलाप मन पराउने मानिसहरुको समूहलाई गणनात्मक संकेतमा लेख्नुहोस्।

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

मार्थिको तथ्यलाई भेन चित्रमा देखाउनुहोस्।

- c) Find the total number of people who participated in the survey. [3]

समेक्षणमा सद्गारी जम्मा मानिसहरुयां संख्या पता लगाउनुहोस्।

- d) By what percentage are only the Tiktok user's only less or more than the only Facebook users? Ans: 20% less [1]

टिकटक मात्र प्रयोग कर्ता फेसबुक मात्र प्रयोग कर्ता भन्दा कति प्रतिशतले कर्मि वा वर्दि रहेछन्?

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2. The compound amount of a sum of money in 2 years and 3 years are Rs.6050 and Rs.6655 respectively at the interest of compounded annually.

वार्षिक चक्रीय व्याजदरमा कुनै रकमको मिश्रधन 2 वर्ष र 3 वर्षमा कमशः रु.6050 र रु.6655 हुन्छ ।

- a) Which formula is used to calculate annual the compound amount?

$$\text{Ans: } CA = P \left(1 + \frac{R}{100}\right)^t$$

[1]

वार्षिक चक्रीय मिश्रधन पत्ता लगाउन कुन सुन्न प्रयोग गर्नु पर्ना ?

- b) Find the sum and rate of interest. **Ans: Rs. 5000 and 10%**

[2]

मूलधन र व्याजदर पत्ता लगाउनुहोस् ।

- c) Calculate the quarterly compound interest of the same sum in one year at the same rate of interest. **Ans: Rs. 519**

[2]

सो मूलधनको उहि व्याजदरमा हुने 1 वर्षको त्रैमासिक चक्रीय व्याज गणना गर्नुहोस् ।

3. The present population of a rural municipality is 66,550. The annual population growth rate is 10%.

एउटा गाउँपालिकाको अहिलेको जनसंख्या 66550 छ । उक्त गाउँको वार्षिक जनसंख्या वृद्धिदर 10% छ भने,

- a) Write whether the given population growth rate is simple or compound. **Ans: Compound**

[1]

प्रश्नमा दिइएको जनसंख्या वृद्धिदर चक्रीय वा साधारण कुन हा? लेख्नुहोस् ।

- b) What was the population at the rural municipality before 3 years? FB - Tuition Class of Rajan Shrestha **Ans: 50,000**

[2]

३ वर्ष अघि गाउँपालिकाको जनसंख्या कति थियो ?

- c) Compare the population between before 3 years and after one year. **Ans: The population after one year is 23,205 more**

[1]

३ वर्ष अघिको र १ वर्ष पछिको जनसंख्या बीच तुलना गर्नुहोस् ।

4. According to the currency exchange rate of Nepal Rastra Bank on 12/17/2025, the buying rate and selling rate of an US dollar (\$1) were NRs.145.35 and 145.95 respectively.

नेपाल राष्ट्र बैंको मिति 12/17/2025 को मुदा विनियम दर अनुसार एक अमेरिकी डलर (\$1) को खरीद दर र बिक्की दर कमशः ने रु.145.35 र रु.145.95 थियो ।

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- a) If the Nepal Rastra Bank buys \$50000 and again sells the same amount on the same day, find the profit in NRs of the bank in this transaction. Ans: NRs 30,000 [2]

यदि नेपाल राष्ट्र बैंकले सोहिं दिन 50000 डलर किनार बेच्दछ भने साँ बैंकले उक्त कारोबार बाट कमाएको नापा पता लगाउनुहोस् ।

- b) Soniya needs \$15000 for the higher study in the US. How much Nepali Rs. does she require? Ans: NRs 2,189,250 [1]

अमेरिका उच्च शिक्षा अध्ययन गर्न जान सोनियालाई \$15000 चाहिएको छ भने उनलाई कति नेपाली रुपैया आवश्यक पर्दछ ?

- c) If the bank charges Soniya 1.5% commission of the exchanged money and pays Rs.2200000. How much amount does she get returned ? Ans: No return; NRs 22,088.75 more is needed [1]

यदि सोनियासंग बैंकले साटिएको रकमको 1.5% कमिसन लिन्छ भने रु.2200000 वुभाउदा कति रकम फिर्ता पाउँछन् ?

5. Inside the compound of Gaurishankar Secondary School lies a square based pyramid shape tank whose base length is 6m and slant height is 5m.

गौरीशंकर माध्यमिक विद्यालयको कम्पाउण्ड भित्र एउटा वर्गाकार आधार भएको पिरामिड आकारको द्याङ्की राखिएको छ । जसको आधारको लम्बाई 6m र छड्के उचाई 5m छ ।

- a) Write the formula to calculate the volume of squared based pyramid. FB - Tuition Class of Rajan Shrestha Ans: $V = \frac{1}{3} a^2 h$ [1]

वर्गाकार आधार भएको पिरामिडको आयतन निकाल्ने सुत्र लेख्नुहोस् ?

- b) Find the height of the tank. Ans: 4m [1]

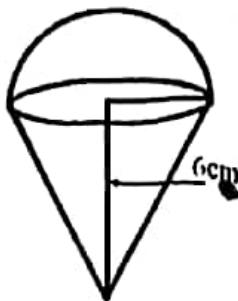
उक्त द्याङ्कीको उचाई पता निकाल्नुहाम् ।

- c) How many liters of water can be filled in the tank? [2]

उक्त द्याङ्कीमा कर्ति लिटर पारी भने गरिन्छ ? पता लगाउनुहोस Ans: 48000 lt

6. The metal toy is made up of hemisphere and cone. The height of cone is 6cm and the diameter of base is 16cm.

एउटा धातुको खेलौना अर्ध गोला र सोली मिलि बनेको छ । सोलीको उचाई 6 सेमी. र आधारको व्यास 16 सेमी. छ ।



- a) Find the slant height of the cone? [1]
सोलीको छाड्के लम्बाई पता लगाउनुहोस्।
- b) Calculate the total surface area of Ans: **10cm** [2]
उक्त खेलौनाको पुरा सतहको क्षेत्रफल निकाल्नुहोस्।
- c) Find the total cost for silver plating of the s Ans: **653.7cm²** at [1]
the rate of 50 paisa per square cm.
यदि उक्त खेलौनाको सतहमा प्रति वर्ग सेमी 50 पैसाका दरले चार्दी लेपन गर्न जम्मा खर्च पता लगाउनुहोस्।
7. The inner length, breadth and height Ans: **Rs. 326.85** :ank made for drinking water by two families are 6m, 3m and 2m respectively.
दुई परिवारका लागि बनाइएको पानी ट्याङ्कीको भित्री लम्बाई 6 मि. चौडाई 3 मि. र उचाई 2 मि. छ भने।
- a) What is total cost of coloring the inner four walls of the tank at the rate of Rs. 120 per 5 squares meters? Calculate. [3]
ट्याङ्कीको भित्री चार वटे पर्खालहरूमा प्रति 5 वर्ग मिटरको रु 120 का दरले रड लगाउदा कुल कति खर्च पर्छ ? गणना गर्नुहोस्।
- b) If two families pay equal amounts for consum Ans: **Rs. 864** 1 a full tank, how much will one family has to pay at the rate of [2]
50 paisa per liter? FB - Tuition Class of Rajan Shrestha
यदि भणिएको ट्याङ्कीको पानी दुई परिवारले उपयोग गद Ans: **Rs. 9,000** र त्रो भने प्रति लिटर 50 पैसामा दरले एक परिवारले कति रकम तिर्नुपर्छ ?
8. The monthly salary of Roshani is Rs.42000, her monthly salary increases by Rs.4000 in every year.
रोशनीको मासिक तलवर रु.42000 छ। प्रत्येक वर्ष उनको तलवमा रु.4000 को दरले वृद्धि हुन्छ।
- a) In which series is this problem related. Ans: **Arithmetic** [1]
यो समस्या कुन श्रेणीसँग सम्बन्धित छ ?
- b) After how many years, will her monthly salary be Rs.70000?

कति वर्ष पछि उनको मासिक तलब रु 70000 हुन्छ ? Ans: 7 years

- c) How much is her total income of the first 3 years? [2]

उनको पहिलो 3 वर्षको जग्गा आमदानी किए हुन्छ ? Ans: Rs. 16,56,000

9. If The length of a rectangular field is thrice the width and its area is 192 sq. meter.

एउटा आयतकार खेतको लाम्बाई चौडाईको 3 गुणा छ र त्यसको क्षेत्रफल 192 वर्ग मिटर छ भने।

- a) Write the roots of standard form quadratic equation. [1]

वर्ग समिकरणको स्तरीय रूपको मूलहरू लेख्नुहोस्। Ans:

- b) Find the perimeter of the field. [3]

उक्त जग्गाको परिमिति निकाल्नुहोस्। Ans: 64m

- c) How many plots of 8×6 sq. m can be prepared in a rectangular field? Calculate. FB - Tuition Class of Rajan Shrestha [1]

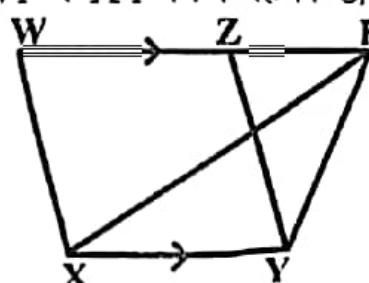
उक्त आयतकार खेतमा (8×6) वर्ग मिटर कति वटा प्लटहरू तयार गर्न सकिएला ? गणना गर्नुहोस्। Ans: 4

10. a) Simplify: (सरल गर्नुहोस्।) $\frac{1}{x^2-5x+6} + \frac{1}{(x-2)(x-1)}$ Ans: $\frac{2}{(x+1)(x-3)}$ [2]

- b) Solve: (हल गर्नुहोस्।) $4^{x+1} - 17 \cdot 2^x + 4 = 0$ Ans: ± 2 [3]

11. In given figure, ΔPXY and parallelogram $WXYZ$ are standing at same base XY and between the same parallel lines WP and XY .

दिइएको चित्रमा ΔPXY र समानान्तर चर्तुभुज $WXYZ$ एउटै आधार XY र उहि समानान्तर रेखाहरू WP र XY विच रहेका छन्।



- a) Write the relation between the areas of the parallelogram standing on the same base and between same parallel lines. [1]

एउटै आधार र उहि समानान्तर रेखाहरू विच रहेको समानान्तर चर्तुभुजहरूको क्षेत्रफलको सम्बन्ध कर्तो हुन्छ।) Ans: Equal

- b) Prove that the area of parallelogram $WXYZ$ is twice the area of triangle PXY . [2]

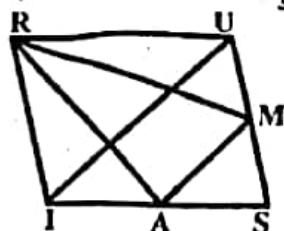
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समानान्तर चतुर्भुज $WXYZ$ को क्षेत्रफल त्रिभुज PXY को दुई गुणा हुन्छ भनि प्रमाणित गर्नुहोस् ।

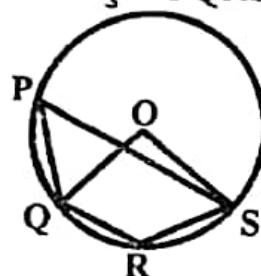
- c) In the given figure, $SIRU$ is a parallelogram A and M are the any points of IS and SU respectively. If $IU//AM$, then prove that Area of $\Delta RIA = \text{Area of } \Delta RMU$. [2]

दिइएको चित्रमा $SIRU$ एउटा समानान्तर चतुर्भुज हो । A र M कमशः IS र SU का कुनै विन्दुहरू छन् । यदि $IU//AM$ भए ΔRIA को क्षेत्रफल $= \Delta RMU$ को क्षेत्रफल हुन्छ भनि प्रमाणित गर्नुहोस् ।



12. In the given figure, O is the centre of the circle and $PQRS$ is a cyclic quadrilateral.

दिइएको चित्रमा O वृतको केन्द्रविन्दु र $PQRS$ चक्रीय चतुर्भुज हो ।



- a) Write the relation between opposite angles of a cyclic quadrilateral. FB - Tuition Class of Rajan Shrestha [1]
चक्रीय चतुर्भुजका सम्मुख कोणहरू विचको सम्बन्ध लेख्नहोस् ।
- b) In $\angle PQR = 120^\circ$, find the value of $\angle PSR$. Ans: 60° [1]
यदि $\angle PQR = 120^\circ$ भए $\angle PSR$ को मान पत्ता लगाउनुहोस् ।
- c) Verify experimentally the relationship between the centre angle and the circumference angle standing on the same arc of a circle. (Two circles having radii at least 3cm are necessary.) [2]

वृतको एउटे चापमा आधारित केन्द्रिय कोण र परिधी कोण विचको सम्बन्धलाई प्रयोग द्वारा सिद्ध गर्नुहोस् । कम्तिमा 3 से.मि. अर्धव्यास भएका दुई वटा वृतहरू आवश्यक छन् ।

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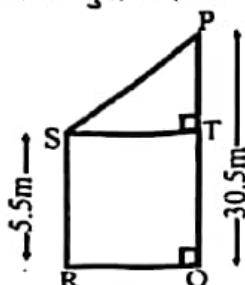
13. a) Construct a triangle MAN in which $MA=4\text{cm}$, $AN=3.2\text{cm}$ and $NM=3.5\text{cm}$. Also construct a parallelogram NICE equal in area to the MAN having $\angle CEN=60^\circ$. [3]

$MA=4$ से.मि., $AN=3.2$ से.मि. र $NM=3.5$ से.मि. भएको एउटा MAN को रचना गर्नुहोस्। उक्त त्रिभुज MAN क्षेत्रफलसँग वरावर क्षेत्रफल हुने भएको $\angle CEN=60^\circ$ एउटा समानान्तर चतुर्भुज NICE को रचना गर्नुहोस्।

- b) Find the area of parallelogram also. [1]
उक्त समानान्तर चतुर्भुजको क्षेत्रफल पनि पत्ता लगाउनुहोस्।

14. In the given figure, the height of tower PQ is 30.5m and the height of house SR is 5.5m . RQ denotes the distance between the house and the tower.

दिइएको चित्रमा स्तम्भ PQ को 30.5m उचाई र घर SR को 5.5m उचाई छ। RQ ले घर र स्तम्भको विचको दुरीलाई जनाउछ।



- a) Define the angle of depression. [1]

अवननी कोणलाई परिभासित गर्नुहोस्।

- b) Find the value of PT. [1]

PT को मान पत्ता लगाउनुहोस्। Ans: 25m

- c) If $\angle PST = 30^\circ$, find the distance between house and tower. [1]

यदि $\angle PST = 30^\circ$ भए घर र स्तम्भ विचको दुरी पत्ता लगाउनुहोस्। Ans: 43.3m

- d) By what degree is the angle of elevation less or more when PT and ST are equal? Compare it. Ans: 15° more [1]

PT र ST वरावर भएको बेलामा उन्ताशकोण कर्ति डिग्रिले बढी वा घटि

हुन्छ? तुलना गर्नुहोस्। FB - Tuition Class of Rajan Shrestha

15. Study the given table and answer the following questions.

तल दिइएको तालिका अध्ययन गरी निम्न प्रश्नहरूको उत्तर दिनुहोस्।

Obtained marks प्राप्ताङ्क	0-10	10-20	20-30	30-40	40-50
No. of student विद्यार्थी संख्या	6	13	17	10	2

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- a) What does A denote in the formula, $\bar{X} = A + \frac{\sum fd}{N}$? [1]

दिइएको सुत्र $\bar{X} = A + \frac{\sum fd}{N}$ गा A ले के लाई जनाउच्छ? Ans: Assumed mean

- b) Find the median from the given data. Ans: 22.94 mark [2]

दिइएको तथ्याइबाट मधियका पत्ता लगाउनुहोस्।

- c) Find the marks obtained by the highest number of students. [2]

सबै भन्दा धेरै विद्यार्थीहरुले प्राप्त गरेको अंक पत्ता लगाउनुहोस्। Ans: 23.64

- d) What percentage of student obtained marks above the modal class? Ans: 25% [1]

रीतश्रेणी भन्दा माथि अंक ल्याउने विद्यार्थीहरु कति प्रतिशत रहेछन्?

16. Hari lal planned to have two children at an interval of 5 years after getting married.

हरिलालले विवाह गरिसके पछि 5 वर्षको अन्तरालमा दुईवटा बच्चाहरु जन्माउने योजना बनाएछन्।

- a) If A and B are two mutually exclusive events then write the formula to find $P(A \cup B)$. Ans: $P(A \cup B) = P(A) + P(B)$ [1]

यदि A र B दुई वटा पारस्परिक निषेधक घटना भए $P(A \cup B)$. निकाल्ने सुत्र लेख्नुहोस्।

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

छोरा वा छोरी जन्मने सम्भावित परिणामहरूको सम्भाव्यताहरूलाई वृक्ष चित्रमा देखाउनुहोस्। FB - Tuition Class of Rajan Shrestha

- c) Find the probability having both children as sons. [1]

दुवै बच्चाहरू छोरा नै हुने सम्भाव्यता पत्ता लगाउनुहोस्। Ans: $\frac{1}{4}$

- d) Find the probability having at most one daughter. [1]

वर्द्धमा एक छोरी हुने सम्भाव्यता पत्ता लगाउनुहोस्। Ans: $\frac{3}{4}$





Symbol No: Date : 2082/10/18 Subject Code: 1031

PABSON SEE Preparatory Examination – 2082

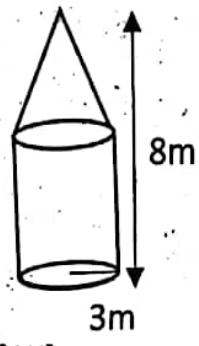
Time : 3 hours Subject : C. Mathematics Full Marks : 75

Attempt all the questions.

1. In a survey of 50 people visiting Pokhara were asked whether they like Fewa lake or Begnas lake. It was found that 3 people prefer both the lakes and 2 people choose neither of them. The number of people who like Fewa lake only is twice the number of people who like Begnas lake only. (पोखरा भ्रमण गर्ने ५० जना मानिसहरूलाई फेवाताल मन पर्छ कि बेगनासताल मन पर्छ भनेर सोध्दा, ३ जनाले दुवै ताल मन पराउँछन् र २ जनाले कुनै पनि रोज्जैनन् भन्ने पत्ता लाय्यो। फेवाताल मात्र मन पराउनेहरूको संख्या बेगनासताल मात्र मन पराउनेहरूको संख्याको दोब्बर छ।)
 - a. Write the set of people who choose both the lakes in cardinality notation by supposing the set of people who like Fewa lake by F and who like Begnas lake by B. (फेवाताल मन पराउनेहरूको समूहलाई F र बेगनासताल मन पराउनेहरूको समूहलाई B ले मानेर दुवै तालहरू रोज्जैहरूको समूहलाई गणनात्मकता संकेतमा लेख्नुहोस।) [1K]
 - b. If the number of people who like Benas lake only is x , what would be the number of people who like Fewa lake only? (यदि बेगनासताल मात्र मन पराउनेहरूको संख्या x छ भने, फेवाताल मात्र मन पराउनेहरूको संख्या कति होला?) [1U]
 - c. By drawing a Venn-diagram, find the number of people who like Fewa lake. (मेन-चित्र बनाएर, फेवाताल मन पराउनेहरूको संख्या पत्ता लगाउनुहोस।) [3A]
 - d. If 5 people who like Fewa lake only wanted to change their preference to choose only Begnas lake, what percentage of people are there who don't like Begnas lake now? (यदि फेवाताल मात्र मन पराउने ५ जनाले आफ्नो प्राथमिकता परिवर्तन गरेर बेगनासताल मात्र रोज्जै चाहे भने, अहिले कति प्रतिशत मानिसहरू बेगनासताल मन पराउँदैनन्?) [1HA]
2. Naina deposited Rs. 50,000 in 'woman saving account' in Pokhara Development Bank for 2 years. (नैनाले पोखरा विकास बैंकमा २ वर्षको लागि 'महिला बचत खाता' मा रु. ५०,००० जम्मा गरिन्।)
 - a. If P, N, K and CA_y represent principal, no. of years, rate of interest and annual compound amount respectively, then express their relation in mathematical formula form. (यदि P, N, K र CA_y ले क्रमशः मूलधन, वर्ष संख्या, ब्याज दर र वार्षिक चक्रीय मिश्रधनको प्रतिनिधित्व गर्छ भने, तिनीहरूको सम्बन्ध गणितीय सूत्रको रूपमा व्यक्त गर्नुहोस।) [1K]

- b. The bank provided 8% p.a. Compound interest annually in the first year and 6% p.a. compound interest semi-annually in the second year, find the interest she got at the end of the 2 years. (बैंकले पहिलो वर्षमा वार्षिक ८% चक्रीयब्याज र दोस्रो वर्षमा अर्धवार्षिक ६% चक्रीयब्याज प्रदान गर्न्यो भने, २ वर्षको अन्त्यमा उनले प्राप्त गरेको ब्याज पत्ता लगाउनुहोस।) [2A]
- c. Had the bank provided 6% p.a. compound interest semi-annually in the first year and 8% p.a. compound interest quarterly in the second year, how much would be the difference in the interests in these two years in comparison to previous 2 years? (यदि बैंकले पहिलो वर्षमा अर्धवार्षिक ६% चक्रीय ब्याज र दोस्रो वर्षमा त्रैमासिक ८% चक्रीय ब्याज प्रदान गरेको भए, अघिल्लोको दुइ वर्षको तुलनामा यो दुई वर्षको ब्याजमा कति भिन्नता हुन्यो?) [2HA]
3. John bought a new bike for Rs. 1,20,000 and sold it as second hand at Rs. 87,480 to Mohan after using it for 3 years. (जोनले रु. १,२०,००० मा नयाँ मोटरसाइकल किनेका थिए र ३ वर्ष प्रयोग गरेपछि मोहनलाई रु. ८७,४८० मा सेकेन्ड हान्डको रूपमा बेचेका थिए।)
- a. If $P_T = P \left(1 - \frac{R}{100}\right)^T$ represents the formula to calculate the price of the bike after T years, what does the value of $P - P_T$ represent? (यदि $P_T = P \left(1 - \frac{R}{100}\right)^T$ ले T वर्ष पछि मोटरसाइकलको मूल्य गणना गर्छ भने, $P - P_T$ ले कुन मूल्य जनाउँछ?) [1A]
- b. Find the rate of depreciation in the price of the bike. (मोटरसाइकलको मूल्यमा मूल्यहास दर पत्ता लगाउनुहोस।) [2U]
- c. The price of a house bought at a certain price becomes $\frac{1}{4}$ of its price in 2 years after a certain rate of depreciation. Find the rate of depreciation.? (निश्चित मूल्यमा किनेको घरको मूल्य २ वर्षमा मूल्यहास पछि यसको मूल्यको $\frac{1}{4}$ भाग बन्छ भने मूल्यहासको दर पत्ता लगाउनुहोस।) [1HA]
4. Chameli was going to USA to visit for few months. She exchanged Rs 7,06,000 to US dollars in a day when the rate of exchange was: Buying rate: 1 US \$ = Rs 140 and selling rate 1 US \$ = Rs 141.2 (चमेली केही महिनाको लागि अमेरिका भ्रमण गर्न जाँदै थिएन्। उनले एक दिन रु. ७,०६,००० अमेरिकी डलरमा साटिन् जुन दिन विनिमय दर खरिद दर: १ अमेरिकी डलर = १४० रुपैयाँ र बिक्री दर: १ अमेरिकी डलर = १४१.२ रुपैयाँ थियो।)
- a. Find how much dollars will she get while exchanging Rs. 7,06,000 to US \$. (७,०६,००० रुपैयाँ अमेरिकी डलरमा साटदा उनले कति डलर पाउनेछिन्? पत्ता लगाउनुहोस।) [1U]

- b. She spent half of the US dollars she had taken to USA while visiting, and came back to Nepal after 4 months. How much dollars she had now while coming back to Nepal? (उनले अमेरिका भ्रमण गर्दा लगेको अमेरिकी डलरको आधा हिस्सा खर्च गरिन् ८ महिनापछि नेपाल फर्किइन। नेपाल फंकिँदा उनीसँग कति डलर थियो?) [1K]
- c. During those 4 months, the Nepali currency has been devaluated by 2.5% in comparison to US dollars. How much Nepali Rupees will she have now if she exchanges the remaining dollars to Nepali rupees by the new devaluated rate? (ती ४ महिनामा, नेपाली मुद्राको अमेरिकी डलरको तुलनामा २.५% ले अवमूल्यन भएको छ। यदि उनले बाँकी डलरलाई नयाँ अवमूल्यन भएको दरले नेपाली रुपैयाँमा साटिन् भने उनीसँग अहिले कति नेपाली रुपैयाँ होला?) [2A]
5. A square-based pyramid has vertical height 24 cm and the length of the base is 20 cm. (वर्ग-आधारित पिरामिडको ठाडो उचाई २४ सेमी र आधारको लम्बाइ २० सेमी छ।)
- Write the relationship among edge (e), slant height (l) and length of base (a) of a square based pyramid in the form of formula. (वर्ग-आधारित पिरामिडको किनारा (e), छडके उचाई (l) र आधार को लम्बाइ(a) बीचको सम्बन्धलाई सूत्रको रूपमा लेख्नुहोस।) [1K]
 - Find the total surface area of the given square-based pyramid? (दिइएको वर्ग-आधारित पिरामिडको पुरा सतहको क्षेत्रफल पत्ता लगाउनुहोस।) [2A]
 - Is Rs. 500 sufficient for colouring it's all the surfaces when the cost of painting is 25 paisa per square centimeter? Calculate it. (प्रति वर्ग सेन्टिमिटर २५ पैसा लागत ले के सबै सतहहरू रंगाउन ५०० रुपैयाँ पर्याप्त हुन्छ? गणना गर्नुहोस।) [1U]
6. A metallic solid is made by combining a cylinder and a cone having same radius as shown in the diagram. The radius of the base is 3m and the total height of the solid is 8m. (रेखाचित्रमा देखाइए जस्तै बराबर अर्धव्यास भएको बेलना र सोलीलाई मिलाएर धातुको ठोस बनाइन्छ। आधारको अर्धव्यास ३ मिटर छ र ठोसको कुल उचाई ८ मिटर छ।)
- How many surfaces are there in the solid? (ठोसमा कतिवटा सतहहरू छन्?) [1K]
 - If the height of the cylinder and cone are equal, then find the volume of the solid. (यदि बेलना र सोलीको उचाई बराबर छ भने, ठोसको आयतन पत्ता लगाउनुहोस।) [2U]



- c. What would be the difference in the volume of cone and cylinder if the height of the conical part is tripled and the cylindrical part is as it is. (यदि सोलीको भागको उचाइ तीन गुणा गरियो र बेलनाकार भागको उचाइ जस्ताको तरै भए सोली र सिलिङ्डरको आयतनमा कति भिन्नता हुनेछ?) [1HA]
7. A contractor company took a contract to prepare a program hall at Rs. 30,00,000. The hall has length 12m, breadth 10m and height 8m. The cost of materials used in the hall are as follows: (एक ठेकेदार कम्पनीले ३०,००,००० रुपैयाँमा कार्यक्रम हल तयार गर्ने ठेक्का लिएको थियो। घरको लम्बाइ १२ मिटर, चौडाइ १० मिटर र उचाइ ८ मिटर छ। घरमा प्रयोग हुने सामग्रीको लागत यस प्रकार छः)

Cement: 2000 packets at Rs 400 per packet,
 Rods: 6000 kg at Rs 80 per kg,
 and the cost of other materials such as aluminum, sand, wood etc. : Rs 8,50,000.
 (सिमेन्ट: २००० प्याकेट प्रति प्याकेट ४०० रुपैयाँमा,
 रडहरू: ६००० किलोग्राम प्रति किलोग्राम ८० रुपैयाँमा,
 र आल्मुनियम, बालुवा, काठ आदि जस्ता अन्य सामग्रीको लागत: ८,५०,००० रुपैयाँ)

The worker for plastering, charged the cost of plastering its 4 walls and floor at the rate of Rs 300 per sq. meter and the total wages of construction for other than plastering works was Rs. 3,56,000. (प्लास्टर गर्ने कामदारले यसको ४ वटा भित्ता र भुइँ प्लास्टर गर्ने लागत प्रति वर्गमिटर ३०० रुपैयाँका दरले लिएको थियो र प्लास्टर गर्ने काम बाहेक अन्य निर्माणको कुल ज्याला रु. ३,५६,००० थियो।)

- a. Find the cost of construction of the hall including the cost of materials and labour charge. (सामग्रीको मूल्य र श्रम शुल्कसहित घर निर्माणको लागत पता लगाउनुहोस्) [3A]
- b. The company put Zipson on the ceiling which costs Rs. 400 per sq. meter as per the owner of the hall makes special request to do it as penalty for doing delay in completing the hall (Cost of Zipson was not included in initial contract). Calculate whether the company got profit or loss from the construction of the hall. (घरधनीले घर निर्माणमा ढिलाइ गरेकोमा जरिवाना स्वरूप प्रति वर्गमिटर ४०० रुपैयाँको दरले सिलिङ्डरमा जिपसन राखेको थियो (प्रारम्भिक सम्झौतामा जिपसनको लागत समावेश गरिएको थिएन)। घर निर्माण गर्दा कम्पनीले घाटा वा नाफा के कमाएको छ? गणना गर्नुहोस्।) [2HA]
8. Two stationary shops A and B at Palikhe Chok, Pokhara sell the books in the following pattern. (पोखराको पालिखेचोकमा रहेका दुई स्टेशनरी पसलहरू A र B ले निम्न ढाँचामा पुस्तकहरू बेच्छन्।)

Day Shops \	Baisakh-1	Baisakh-2	Baisakh-3	Baisakh-4	...
A	1000	1200	1400	1600	...
B	1	2	4	8	...

- a. How do you identify any sequence to be arithmetic or geometric? Write. (कुनै पनि अनुक्रम अंकगणितीय वा ज्यामितीय हो भनेर तपाईं कसरी पहिचान गर्नुहोस्।) [1K]
- b. Which shop sold more books in total in the first 15 days of Baisakh? Calculate it. (वैशाखको पहिलो १५ दिनमा कुन पसलले कुल धेरै पुस्तकहरू बेचेको थियो? गणना गर्नुहोस्।) [3A]
- c. Compare the total number of books sold by shop A in the first 15 days to the number of books sold by shop B in the 17th day only. (पहिलो १५ दिनमा पसल A ले बेचेको कुल पुस्तकहरूको संख्यालाई पसल B ले १७ औं दिनमा मात्र बिक्री गरेको पुस्तकहरूको संख्यासँग तुलना गर्नुहोस्।) [2U]
9. The length of a rectangular futsal ground is 5 more than its breadth. Its area is 500m^2 . (आयताकार फुटसल मैदानको लम्बाइ यसको चौडाइ भन्दा ५ बढी छ। यसको क्षेत्रफल 500 वर्ग मिटर छ।)
- a. What is the condition for the equation $ax^2 + bx + c = 0$ to be quadratic equation? (समीकरण $ax^2 + bx + c = 0$ लाई द्विघात समीकरण बनाउनको लागि आवश्यक शर्त के हो?) [1K]
- b. Find the length and breadth of the futsal ground. (फुटसल मैदानको लम्बाइ र चौडाइ पत्ता लगाउनुहोस्।) [2A]
- c. The owner of the ground wishes to fence all the sides of the ground by thin plastic net to make the height of the fence as 8m on each side around it. Find the area of net required and also the cost of it at the rate of Rs 10 per sq. meter. (जमिनको मालिकले जमिनको सबै छेउमा पातलो प्लास्टिकको जालीले बार लगाउन चाहन्छ ताकि बारको उचाइ यसको वरिपरि ८ मिटर होस्। प्रति वर्गमिटर १० रुपैयाँको दरले आवश्यक पर्ने जालीको क्षेत्रफल र यसको लागत पनि पत्ता लगाउनुहोस्।) [2HA]
10. a. Simplify the expression $\frac{1}{4(k-8)} - \frac{1}{4(k-4)}$ and prove it to be $\frac{1}{k^2-12k+32}$. (अभिव्यक्ति $\frac{1}{4(k-8)} - \frac{1}{4(k-4)}$ लाई सरल गर्नुहोस् र यो $\frac{1}{k^2-12k+32}$ हुन्छ भनी प्रमाणित गर्नुहोस्।) [2U]

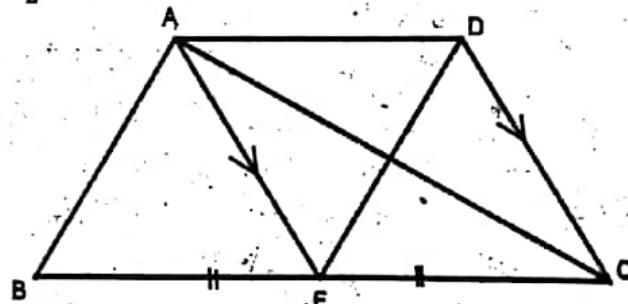
b. Find the value of x if $k = 2^x$ and $k^2 - 12k + 32 = 0$. (यदि $k = 2^x$ र $k^2 - 12k + 32 = 0$ छ भने x को मान पता लगाउनुहोस।) [2A]

11. A parallelogram $PQRS$ and a triangle PQT are standing on the same base PQ and lie between same parallel lines PQ and MN . (एक समानान्तर चतुर्भुज $PQRS$ र त्रिभुज PQT एउटै आधार PQ र एउटै समानान्तर रेखाहरू PQ र MN मा उभिएका छन् भने)

a. What is the relation between the area of two parallelograms standing on the same base and lying between same parallel lines? (एउटै आधारमा उभिएका र एउटै समानान्तर रेखाहरू बीच रहेका दुई समानान्तर चतुर्भुजको क्षेत्रफल बीच के सम्बन्ध छ?) [1K]

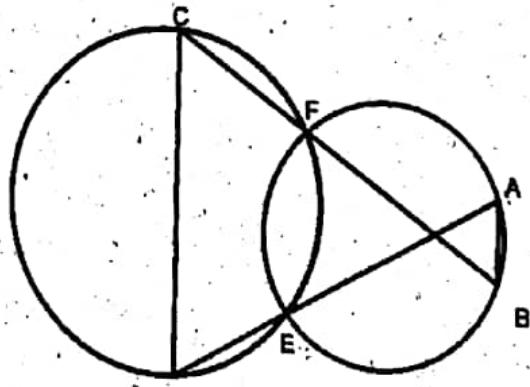
b. Prove that the area of triangle PQT = $\frac{1}{2}$ the area of parallelogram $PQRS$. (प्रमाणित गर्नुहोस् $\Delta PQT = \frac{1}{2} PQRS$ (क्षेत्रफलमा)) [2U]

c. In the figure alongside, E is the mid-point of BC , $AE \parallel DC$ and the area of triangle ABE is 5 cm^2 , find the area of the quadrilateral $ABED$. (चित्रमा BC को मध्य बिन्दु E हो, $AE \parallel DC$ र त्रिभुज ABE को क्षेत्रफल ५ बर्ग सेमी छ, चतुर्भुज $ABED$ को क्षेत्रफल पता लगाउनुहोस।) [1U]



12. In the figure, two circles intersect at two points E and F . AD and BC are two straight lines. (चित्रमा, दुई वृत्तहरू दुई बिन्दु E र F मा काटिएका छन्। AD र BC दुई सीधा रेखाहरू हुन्।)

a. Prove that $\angle CDE = \angle BAE$.
प्रमाणित गर्नुहोस् ($\angle CDE = \angle BAE$). [2HA]



b. If CD is the diameter of the circle shown alongside, and $\angle DCF = 40^\circ$, what would be the value of $\angle CDF$, after joining D and F ? (यदि CD सँगसँगै देखाइएको वृत्तको व्यास र $\angle DCF = 40^\circ$ हो भने, D र F जोडेपछि $\angle CDF$ को मान कर्ति हुनेछ?) [1HA]

- c. Experimentally verify that in a circle the central angle is double of inscribed angle standing on the same arc. (Two circles of radii at least 3 cm are necessary) (प्रयोगात्मक रूपमा प्रमाणित गर्नुहोस् कि वृत्तमा केन्द्रीय कोण एउटै चापमा उभिएको परिधी कोणको दोब्बर हुन्छ। (कम्तिमा 3 सेमी अर्धव्यास भएका दुई वृत्तहरू आवश्यक छन्) [2A]
13. Answer the following questions related to construction. (रचनासँग सम्बन्धित निम्न प्रश्नहरूको उत्तर दिनुहोस्।)
- Construct a triangle ABC with $AB = 8\text{cm}$, $\angle ABC = 60^\circ$ and $BC = 6.1\text{ cm}$. Also construct a rectangle BINU having equal area to the triangle ABC. ($AB = 8\text{cm}$, $\angle ABC = 60^\circ$ र $BC = 6.1$ सेमी भएको त्रिभुज ABC बनाउनुहोस्। त्रिभुज ABC को क्षेत्रफल बराबर भएको आयत BINU पनि बनाउनुहोस्।) [3A]
 - How are their areas equal? Give reason. (तिनीहरूको क्षेत्रफल कसरी बराबर छ? कारण दिनुहोस्।) [1K]
14. There is a circular pond having radius 7 m. In the middle of the pond, a pole is to be fixed so that while observing the top of the pole from any point on the circumference, the angle of elevation must be 60° . (7 मिटर अर्धव्यास भएको एउटा गोलाकार पोखरी छ। पोखरीको बीचमा एउटा खम्बा राख्नु पर्नेछ जसले गर्दा परिधिको कुनै पनि बिन्दुबाट खम्बाको माथिल्लो भाग अवलोकन गर्दा उन्नतान्स कोण 60° हुनुपर्छ।)
- Define angle of elevation. (उन्नतांश कोण परिभाषित गर्नुहोस्।) [1K]
 - Draw a figure to represent the above context assuming the height of pole above the water level to be $x\text{ m}$. (पानीको सतहभन्दा माथिको खम्बाको उचाइलाई $x\text{ m}$ मानेर माथिको सन्दर्भलाई प्रतिनिधित्व गर्ने चित्र कोर्नुहोस्।) [1U]
 - Find the height of the pole above the water level. (पानीको सतहभन्दा माथिको खम्बा को उचाइ पत्ता लगाउनुहोस्।) [1A]
 - If 30% of the total length of the pole is to be fixed below the water level, how long pole is required to fix there to make the same angle of elevation? (यदि खम्बाको कुल लम्बाइको 30% पानीको सतहभन्दा तल राख्ने हो भने, उत्तिकै उन्नतांश कोण बन्नलाई त्यहाँ कति लामो खम्बा राख्न आवश्यक छ?) [1HA]
15. The marks obtained by 80 students of a boarding school in Mathematics are given in the table below. (एउटा आवासीय स्कुलका 80 जना विद्यार्थीहरूले गणित विषयमा प्राप्त गरेको प्राप्ताङ्कलाई तलको तालिकामा देखाईएको छ।)

Marks obtained	0-10	10-20	20-30	30-40	40-50	50-60
No. of Student	8	12	16	10	14	20

- a. What does 'i' represent in the formula for finding the median (M_d) = $L + \frac{i}{f} (\frac{N}{2} - cf)$? (मधिका पत्ता लगाउने सुत्र (M_d) = $L + \frac{i}{f} (\frac{N}{2} - cf)$ मा 'i' ले के जनाउँछ ?) [1K]
- b. Find the median from the given data.
दिईएको तथ्याङ्कबाट मधिका पत्ता लगाउनुहोस्। [2U]
- c. Find the mode from the given data.
माथिको तथ्याङ्कबाट बहुलक पत्ता लगाउनुहोस्। [2A]
- d. What should be the number of students in the class internal (50-60) in order to make 30 as the average score of students? Calculate and write it. (विद्यार्थीको औसत प्राप्ताङ्क ३० बनाउन (५०-६०) वर्गान्तरको विद्यार्थी सङ्ख्या कति हुनुपर्छ? गणना गरी लेख्नुहोस्।) [1HA]
16. Two cards are drawn randomly one after another without replacement from a well shuffled deck of 52 playing cards. (राम्रोसँग फिटिएको ५२ पत्ती तासको गड्डीबाट नहेरीकन दुईवटा तासहरू एक पछि अर्को गरी पुनः नराखीकन झिकिएका छन्।)
- a. If M and N are two independent events, then write down the formula to find $P(M \cap N)$. (यदि M र N दुई ओटा अनाश्रित घटनाहरू हुन् भने $P(M \cap N)$ पत्ता लगाउने सुत्र के हुन्छ? लेख्नुहोस्।) [1K]
- b. Find the probability of getting both non-Faced cards. (दुवै तास अनुहार नभएको पर्ने सम्भाव्यता कति हुन्छ? पत्ता लगाउनुहोस्।) [1U]
- c. Show the probability of all possible outcomes of getting and not getting faced cards in a tree diagram. (अनुहार भएको तास पर्ने र नपर्ने सबै सम्भाव्यतालाई वृक्षचित्रमा देखाउनुहोस्।) [2A]
- d. If two cards are drawn randomly one after another with replacement, how many times more is the probability that both are non-faced cards than the probability that both cards are king? (यदि सम्भाव्यता दुवै तास बादशाह पर्ने सम्भाव्यता भन्दा कति गुणा बढी हुन्छ?) [1HA]

The End

SAINIK SCHOOL EXAMINATION BOARD (SSEB)
Pre SEE -2082

Class : 10**Time: 3:00 Hr****Full Marks : 75****Subject: Comp. Mathematics (1031)**

Students are encouraged to write answers in their own words as far as practicable. The figures in the margin indicate the full marks.

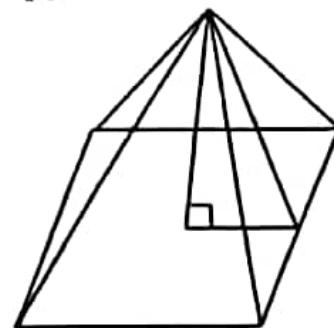
Attempt all the questions.

1. In a survey of a group of people interviewed in a community about social media, it was found that 65% of the people use Facebook, 57% use Instagram and 30% people use Facebook as well as Instagram. If 120 use none of them,
 - a. If F and I represents the Facebook and Instagram respectively then write the cardinality of $n(F \cup I)$. [1]
 - b. Show the given information in a Venn-diagram. [1]
 - c. Find the number of people who use at least one social media. [3]
 - d. Compare the number of people who use at most one social media and who use both social media. [1]
2. Samyak took a loan of Rs.4,00,000 for 2 years at the rate of 10% per annum from Machhapuchhre Bank Pokhara. To reduce the interest and loan partly, he paid Rs.2,40,000 at the end of first year.
 - a. How much amount should he has to pay to clear all his debts at the end of second year? [2]
 - b. Find the total interest paid by him in two years. [1]
 - c. If he had cleared all the loan only after two years, how much more or less interest should have been paid? [1]
3. The population of a Ghandruk village increases every year by 5%. At the end of two years, if 1025 people migrated to other places and the population of the village remained 10,000
 - a. Write the formula to find the population after T years (P_T) if initial population is P and rate of population growth R% for T years. [1]
 - b. What was the population of the village in the beginning? [2]
 - c. Ram purchased an i-phone for Rs. 1,50,000. If he used it for 3 years and sold to shyam for Rs. 76,800. Find the rate of compound depreciation? [2]
4. Mr. Devkota has a flight to China for the business purpose. He has US \$ 3650 and he wants to exchange in to Chinese Yuan. The exchange rate of US \$1 is NPR145 and 1 Chinese Yuan is NPR 20.

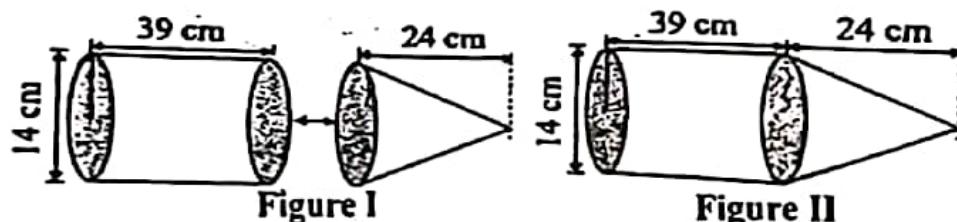
- a. How many Chinese Yuan can be exchanged with US \$ 3650? [1]
 b. If he exchanges the dollars on the day when the Nepali rupees are devaluated by 10% relative to US \$ and there is no change in the exchange rate of Chinese Yuan, how much Chinese Yuan can be exchanged with US \$ 3650? [2]
 c. If the bank charges 3% commission in the period of devaluation how much Chinese Yuan can be exchanged with US \$ 3650? [1]

5. The ratio of the slant height and vertical height of the adjoining square base pyramid is 13:5. If the lateral surface area of the pyramid is 624cm^2 . Then, Answer the following questions.

- a. Write the relation among length of base (a) slant height (l) and length of slanted edge(e) in square based pyramid? [1]
 b. Find the length of base of the pyramid? [2]
 c. If the pyramid is immersed in to a pot then, how many liters of water will it displace? [1]



6. There are a cylinder and a cone with same base in the first figure. The second figure is a solid of combination of solids of first figure.



- a. Write the formula to find the volume of cone? [1]
 b. Find the total surface area of solid objects of the first figure separately and find their sum. [3]
 c. Is the sum of volume of solids of the first figure equal to the volume of combined solid of the second figure? Justify with reasons. [2]

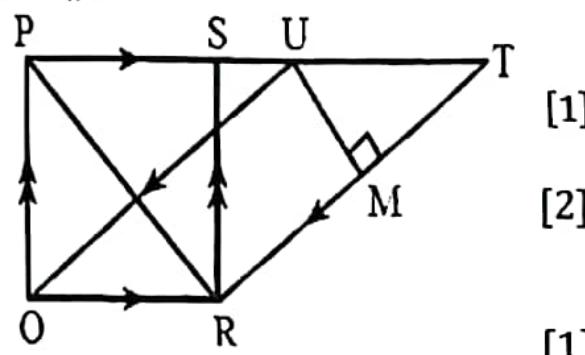
7. The inner length, breadth and height of a rectangular tank made for drinking water by four families are 4m, 3m and 2.5m respectively.

- a. Calculate the total cost of coloring the inner four walls and base of the tank at the rate of Rs250 per 3 square meters. [2]
 b. If all the families consumed 5 full tanks of water in a month and they paid equal amounts for consuming water, how much would each family have to pay at the rate of 50 paisa per liter in a month? [2]

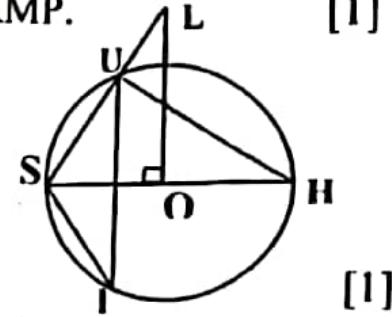
8. The commission of two employees of a pharmacy in five months are given below:

Name of Employee	Mangshir	Paush	Magh	Falgun	Chaitra
Ram	Rs 4000	Rs 5000	Rs 6000	Rs 7000	Rs 8000
Shyam	Rs 50	Rs 100	Rs 200	Rs 400	Rs 800

- a. Which employee received commission in geometric sequence? Write with reason. [1]
- b. What is the difference between the total amount received by Ram and Shyam at the end of 10 months? [2]
- c. Based on the above sequence, would 2 months after 10 months of received commission be enough to collect a total of Rs 2,00,000 by Shyam? Write with reason. [2]
9. Two cars left an intersection road at a same time. One heading due north and the other due east. Sometimes later the car travelling towards the north has travelled 24 km and the distance between the car is 4km more than 3 times the distance travelled by the car towards east. Answer the following questions.
- a. How many roots does quadratic equation $ax^2 + bx + c = 0$, $a \neq 0$ have? Write it. [1]
- b. Write the quadratic equation to represent the given context? [1]
- c. Find the actual distance between the two cars? [3]
10. a. Simplify: $\frac{x+3}{x^2+3x+9} + \frac{x-3}{x^2-3x+9} - \frac{54}{x^4+9x^2+81}$ [3]
- b. Solve: $3^{2y} - 4 \times 3^y + 3 = 0$ [2]
11. In the given figure $PT \parallel PO$, $PO \parallel SR$, $UO \parallel RT$ and $PO \perp OR$.
- a. State the relationship between the area of $\triangle POR$ and $\square TROU$. [1]
- b. Prove that:
 $\text{Ar. } \square PORS = \text{Ar. } \square TROU$ [2]
- c. In the given figure, $PO = 10 \text{ cm}$, $OR = 6 \text{ cm}$ and $RT = 15 \text{ cm}$, find the length of UM . [1]
12. a. Construct a triangle ABC in which $a = 5.6 \text{ cm}$, $b = 4.5 \text{ cm}$ and $c = 6.4 \text{ cm}$. Then, construct a parallelogram $SAMP$ having $SP = 6.8 \text{ cm}$ and is equal to the area of $\triangle ABC$. [3]



- b. Find the height and area of Parallelogram SAMP. [1]
13. In a circle with centre O, where S, I, H and U are the concyclic points and L is an external point where LO is perpendicular to SH.
- What is the measurement of angle $\angle SUH$? Write with reason. [1]
 - Verify experimentally the relation between the inscribed angles $\angle SIU$ and $\angle SHU$ standing on the same arc SU by drawing two circles with radii at least 3 cm. [2]
 - If $\angle USH = 50^\circ$, then what is the measurement of $\angle SIU$? [1]



14. The top of the tree broken by the wind makes an angle of 30° with the ground at a distance $4\sqrt{3}$ m from the foot of the tree.
- Which trigonometric ratio do you use to find length of broken part? [1]
 - Find the length of broken part. FB - Tuition Class of Rajan Shrestha [1]
 - At what height from the bottom of the tree was broken? [1]
 - Compare the height of the tree before and after broken. [1]
15. The table given below represents the height (in cm) of the plant of your School.
- | Height (in cm) | 5-15 | 15-25 | 25-35 | 35-45 | 45-55 |
|----------------|------|-------|-------|-------|-------|
| No. of plants | 7 | 10 | k | 9 | 5 |
- What does L stand for in the formula, $M_d = L + \frac{l}{f} \left(\frac{N}{2} - c.f \right)$? [1]
 - If the modal height is 29, find the value of k . [2]
 - Calculate the maximum height of lower 75% of plants. [2]
 - Are the modal class and median class of the given data same? Give reason. [1]
16. In a class of 32 students, 15 play football and 17 play volleyball.
- Write the addition laws on probability. [1]
 - Two students are chosen randomly one after another without sending the first students back to the class, show the probabilities of all the possible outcomes in a tree-diagram. FB - Tuition Class of Rajan Shrestha [2]
 - Find the probability of selecting first football player and second volleyball player. [1]
 - If two students are chosen randomly one after another with sending the first students back to the class, how much will increase the probability of chosen both football players? [1]

Best of Luck

काठमाडौं महानगरपालिका
द्वितीय त्रैमासिक परीक्षा-२०८२
अनिवार्य गणित (Compulsory Mathematics)

कक्षा : १०

पूर्णाङ्ग : ७५

समय : ३ घण्टा

सबै प्रश्न अनिवार्य छन्। (Attempt all the questions)

दिइएका निर्देशनका आधारमा जाफौं शैलीमा सिर्जनात्मक उत्तर दिनुहोस् :
 सबै प्रश्नहरू अनिवार्य छन्। (Answer all the questions.)

1. कक्षा दशमा अध्ययनरत 100 जना विद्यार्थीहरूको सर्वेक्षणमा 55 जनाले गणित र 60 जनाले विज्ञान मन पराउने रहेछन्। त्यसमध्ये 35 जनाले यीमध्ये कुनै पनि विषय मन नपराउने रहेछन्।

(In a survey conducted among 100 students studying in grade ten, 55 like Mathematics, 60 like Science, 35 didn't like any of these subjects.) FB - Tuition Class of Rajan Shrestha

- (a) 'M' र 'S' ले क्रमशः गणित र विज्ञान मन पराउने विद्यार्थीहरूको समूहलाई जनाउँछ भने दुवै विषयमध्ये कुनै पनि विषय मन नपराउने विद्यार्थीहरूको समूहलाई गणनात्मकता सङ्केतमा लेख्नुहोस्।

If 'M' and 'S' denote the set of students who like mathematics and science respectively. Write the set of students who don't like any of these two subjects in cardinality notation. (1)

- (b) माथिको जानकारीलाई भेनचित्रमा प्रस्तुत गर्नुहोस्।

Present the above information in a Venn diagram. (1)

- (c) एउटा मात्र विषय मन पराउने विद्यार्थीहरूको सङ्ख्या पता लगाउनुहोस्।

Find the number of students who like exactly one subject. (3)

- (d) यदि सर्वेक्षणमा कुनै पनि विषय मन नपराएका 35 जना विद्यार्थीहरूले गणित मन पराएको भए गणित मात्र मन पराउने र विज्ञान मात्र मन पराउने विद्यार्थीहरूको अनुपात कति हुने थियो ? पता लगाउनुहोस्।

If 35 students who don't like any of the two subjects in the survey, liked Mathematics, then what would be the ratio of students who like Mathematics only and Science only? Find it. (1)

2. प्रदीपले रु. 20,000 वार्षिक 10% चक्रीय व्याजदरले एउटा बैंकमा 2 वर्षको लागि जम्मा गरेछन्।
 Pradip deposited Rs.20,000 in a bank at the rate of 10% p.a. compound interest for 2 years.
- (a) चक्रीय व्याजलाई परिभासित गर्नुहोस्। Define compound interest. (1)
 (b) प्रदीपले 2 वर्षमा कति वार्षिक चक्रीय मिश्रधन पाएछन्? पता लगाउनुहोस्। How much annual compound amount did Pradip receive in 2 years? Find it. (2)
- (c) यदि बैंकले सोही व्याजदरमां 2 वर्षका लागि वार्षिक चक्रीय व्याजको सट्टामा अर्धवार्षिक चक्रीय व्याज दिएको भए प्रदीपले कति बढी व्याज पाउने थिए? पता लगाउनुहोस्।
 If the bank provides the semiannual compound interest instead of the annual compound interest at the same rate of interest for 2 years, how much more interest would be received by Pradip? Find it. FB - Tuition Class of Rajan Shrestha (2)
3. एउटा नगरपालिकाको हालको जनसङ्ख्या 2,00,000 छ र त्यहाँको वार्षिक जनसङ्ख्या वृद्धिदर 4% छ।
 The present population of a municipality is 2,00,000 and the annual population growth rate is 4%.
- (a) यदि सुरुको जनसङ्ख्या P र वार्षिक जनसङ्ख्या वृद्धिदर R भए T वर्षपछि हुने जनसङ्ख्या P_T पता लगाउने सुन लेख्नुहोस्।
 If the initial population is P and rate of annual population growth is R . Write the formula to find the population P_T after T years (1)
- (b) उक्त नगरपालिकामा 2 वर्षपछिको बढेको जनसङ्ख्या पता लगाउनुहोस्। Find the increased population of municipality after 2 years. (1)
 (c) उक्त नगरपालिकामा 1 वर्षमा बढेको जनसङ्ख्या र 2 वर्षमा बढेको जनसङ्ख्याविच तुलना गर्नुहोस्। Compare the increased population of municipality after 1 year and after 2 year. (1)
4. नेपाल राष्ट्र बैंकको मिति 12/17/2025 को मुद्रा विनियम दर अनुसार एक अमेरिकन डलर (S_1) को खरिद दर र विक्रिदर क्रमशः ने.रु.145.35 र 145.95 थियो।

According to the currency exchange rate of Nepal Rastra Bank on 12/17/2025, the buying rate and selling rate of one US dollar (\$1) were NRs. 145.35 and NRs. 145.95 respectively.

- (a) ने.रु.272080 सँग कति अमेरिकी डलर (\$) साटन सकिन्छ ? पत्ता लगाउनुहोस्।

How many American dollars (\$) can be exchanged with NRs. 272080? Find it. (1)

- (b) नेपाली मुद्रामा 2% ले अवमूल्यन हुँदा अमेरिकी डलर 750 सँग कति नेपाली रुपियाँ साटन सकिन्छ ? पत्ता लगाउनुहोस्।

How many Nepali rupees can be exchanged with American dollars 750 when Nepali currency is devaluated by 2%? Find it. (2)

- (c) यदि नेपाली मुद्रामा अवमूल्यनको सटटा 2% अधिमूल्यन भएको भए अमेरिकी डलर 750 साटदा कति कम वा बढी नेपाली रुपियाँ प्राप्त गर्न सकिन्न्यो ? पत्ता लगाउनुहोस्।

If the Nepali currency was revaluated up by 2% instead of devaluation, how much less or more Nepali rupees can be obtained while exchanging 750 American dollars? Find it. (2)

5. एउटा वर्गाकार आधार भएको पिरामिडको आयतन 384 घन सेमी. र आधारको भुजाको लम्बाई 12 सेमी. दिइएका छन्।

The volume of square based pyramid is 384 cubic cm and length of side of base is 12 cm are given.

- (a) वर्गाकार आधार भएको पिरामिडमा एउटा त्रिभुजाकार सतहको क्षेत्रफल पत्ता लगाउन कुन सूत्रको प्रयोग गरिन्छ ? लेख्नुहोस्।

In a square based pyramid, which formula can be used to find the area of a triangular surface? Write it. (1)

- (b) उक्त पिरामिडको ठाडो उचाइ पत्ता लगाउनुहोस्।

Find the vertical height of the pyramid. (1)

- (c) उक्त पिरामिडको त्रिभुजाकार सतहहरूको क्षेत्रफल पत्ता लगाउनुहोस्।

Find the area of the triangular surfaces of the pyramid. (2)

6. एउटा वेलना र अर्धगोला मिलि बनेको पानी द्याइकी छ। त्यसको पूरा उचाइ 3.5 मिटर र आधारको अर्धव्यास 1.05 मिटर छन्।

A water tank is made up of a cylinder and a hemisphere. The total height is 3.5 meter and radius of base is 1.05 meter.

(a) येलना र अर्धगोला मिलि बनेको संयुक्त ठोस वस्तुको आयतान पता लगाउने सूत्र लेख्नुहोस् ।

Write the formula to calculate the volume of the combined solid made of a cylinder and a hemisphere. (1)

(b) उक्त ट्याइकीमा बढीमा कति लिटर पानी अटाउँछ ? पता लगाउनुहोस् ।

How much maximum liters of water is contained in that tank? Find it. (3)

(c) उक्त ट्याइकीको आधारमा प्रति वर्गमिटर कतिका दरले रड लगाउँदा जम्मा खर्च रु. 3465 लाग्छ ? पता लगाउनुहोस् ।

At what rate per square meter on the base of the tank will the total cost of painting be Rs. 3465? Find it. (1)

7. एउटा आयताकार कोठाको लम्बाई, चौडाई र उचाई क्रमशः 20 फिट, 12 फिट र 10 फिट छन् । उक्त कोठामा 5 फिट किनारा भएका दुईओटा वर्गाकार भ्यालहरू र एउटा $6 \text{ ft} \times 2 \text{ ft}$ को ढोका छन् ।

The length, breadth and height of a rectangular room are 20 ft, 12 ft and 10 ft. respectively. There are two square windows of dimension 5 ft and one door of dimension $6 \text{ ft} \times 2 \text{ ft}$.

(a) उक्त कोठामा प्रतिवर्ग फिट रु.150 का दरले कार्पेट विछ्याउँदा कति खर्च लाग्छ ? पता लगाउनुहोस् ।

How much does it cost for carpeting the room at the rate of Rs.150 per sq. ft.? Find it. (2)

(b) भ्याल ढोका वाहेक उक्त कोठाको चारभित्ता र सिलिङ्गमा प्रति वर्गफिट रु. 250 का दरले रड लगाउँदा जम्मा कति खर्च लाग्छ ? पता लगाउनुहोस् ।

How much is the cost of coloring four walls and ceiling excluding door and windows of the room at the rate of Rs. 250 per square feet? Find it. FB - Tuition Class of Rajan Shrestha (2)

8. रविनले प्रत्येक दिन अधिल्लो दिनको भन्दा दोब्बर रकम जम्मा गर्ने गरी 15 औं दिनसम्म रकम जम्मा गरेछन् । उनले पहिलो दिन रु. 5, दोस्रो दिन रु.10, तेस्रो दिन रु. 20 जस्तै गरी 15 औं दिनसम्म जम्मा गरेछन् ।

Rabin deposits the amount for 15 days by increasing the amount every day double than the previous day. He deposited Rs. 5 on the first day, Rs. 10 on the second day, Rs. 20 on the third day and so on till the 15th day.

(a) माथिको सन्दर्भ अनुसार जम्मा गरेको रकमवाट बने श्रेणी कुन प्रकारको हुन्छ ? लेख्नुहोस्।

What type of series is formed from the deposited amount according to above context? Write it. (1)

(b) रविनले 15 दिनको अन्त्यसम्म तीव्रता रकम जम्मा गर्दछ ? पता लगाउनुहोस्। How much amount will Rabin deposit by the end of 15 days? Find it. (2)

(c) यदि उनले 10 दिनसम्म जम्मा भएको रकम पहिले नै निकालेको भए 15 दिनको अन्त्यमा कति रकम मात्र पाउँदछ ? पता लगाउनुहोस्। If he withdraws the amount deposited up to 10th day, how much will he receive at the end of the 15th day? Find it. (2)

9. एउटा आयताकार जमिनको लामो भुजा छोटो भुजाभन्दा 6 मि. बढी छ र त्यसको क्षेत्रफल 135 वर्ग मि. छ।

The longer side of a rectangular field is 6 m more than the shorter side and its area is 135 square meter.

(a) वर्ग समिकरणको स्तरीकृत रूप लेख्नुहोस्। Write the standard form of the quadratic equation. (1)

(b) आयताकार जमिनको छोटो भुजा र लामो भुजाको लम्बाइ पता लगाउनुहोस्। Find the length of the shorter side and longer side of the rectangular filed. (2)

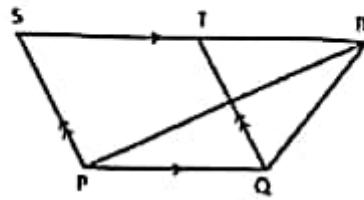
(c) उक्त आयताकार जमिनमा 4 मि. \times 4 मि. नापका अधिकतम कति ओटा जग्गाका टुक्राहरू तयार गर्न सकिन्दछ ? चित्रात्मक रूपमा समेत प्रस्तुत गर्नुहोस्। How many maximum numbers of plots having the size 4 m \times 4 m can be made from the rectangular field? Also represent it in diagram. (2)

10. (a) सरल गर्नुहोस् (Simplify): $\frac{x}{x-y} - \frac{y}{x+y}$ (2)

(b) हल गर्नुहोस् (Solve): $9^y + 9^{-y} = 9 \frac{1}{9}$ (3)

11. दिइएको चित्रमा $\triangle PQR$ र समानान्तर चतुर्भुज $PQTS$ एउटै आधार PQ र उही समानान्तर रेखाहरू PQ र SR बिच बनेका छन्।

In the given figure, $\triangle PQR$ and parallelogram $PQTS$ are standing on the same base PQ and between the same parallel lines PQ and SR .



- (a) एउटै आधार र उही समानान्तर रेखाहरू बिच रहेका समानान्तर चतुर्भुजहरूको क्षेत्रफल बिचको सम्बन्ध लेख्नुहोस्।

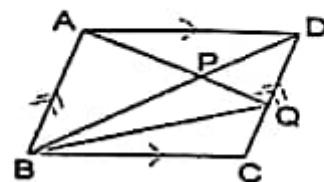
Write the relation between the areas of parallelograms standing on the same base and between same parallel lines. (1)

- (b) $\triangle PQR$ को क्षेत्रफल समानान्तर चतुर्भुज $PQTS$ को क्षेत्रफलको आधा हुन्छ भनि प्रमाणित गर्नुहोस्।

Prove that area of $\triangle PQR$ is half of the area of parallelogram $PQTS$. FB - Tuition Class of Rajan Shrestha (2)

- (c) के दिइएको चित्रमा $\triangle APD$ र $\triangle BPQ$ को क्षेत्रफल बराबर हुन्छन्? कारण सहित लेख्नुहोस्।

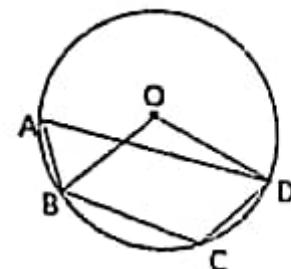
Are the areas of $\triangle APD$ and $\triangle BPQ$ equal in the given figure? Write with reason.



(2)

12. दिइएको चित्रमा O वृत्तको केन्द्रविन्दु र $ABCD$ एउटा चक्रिय चतुर्भुज हो।

In the given diagram, O is the centre of the circle and $ABCD$ is a cyclic quadrilateral.



- (a) चक्रिय चतुर्भुज $ABCD$ मा $\angle ABC$ को सम्मुख कोणको नाम लेख्नुहोस्।

In cyclic quadrilateral $ABCD$, write the name of the opposite angle of $\angle ABC$. (1)

- (b) यदि $\angle BCD = 100^\circ$ भए वृहत $\angle BOD$ को मान पत्ता लगाउनुहोस्।

If $\angle BCD = 100^\circ$, find the value of reflex $\angle BOD$. (1)

- (c) चक्रिय चतुर्भुज $ABCD$ का सम्मुख कोणहरू BAD र BCD परिपूरक हुन्छन् भनि प्रयोगात्मक विधिवाट प्रमाणित गर्नुहोस्। (कम्तीमा 3 से.मि. अर्धव्यास भएका दुईओटा वृत्तहरू आवश्यक छन्।)

Experimentally verify that the opposite angles BAD and BCD of cyclic quadrilateral $ABCD$ are supplementary. (Two circles with at least 3 cm radii are necessary.) (2)

13. त्रिभुज MNO मा $MN = 8$ से.मि., $NO = 7$ से.मि. र $\angle MNO = 60^\circ$

दिइएका छन्। In triangle MNO, $MN = 8 \text{ cm}$, $NO = 7 \text{ cm}$ and $\angle MNO = 60^\circ$ are given.

(a) कम्पासको प्रयोग गरी $\triangle MNO$ को रचना गर्नुहोस् र उक्त त्रिभुजको क्षेत्रफलसंग वरावर हुने एउटा आयत NPQR को पनि रचना गर्नुहोस्।

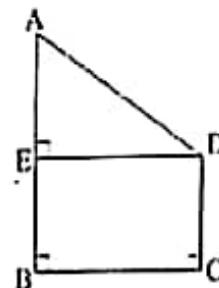
Construct a $\triangle MNO$ by using compass. Also construct a rectangle NPQR equal in area to $\triangle MNO$. (3)

(b) $\triangle MNO$ र आयत NPQR को क्षेत्रफल किन वरावर हुन्छन्? कारण दिनुहोस्।

Why the areas of $\triangle MNO$ and the rectangle NPQR are equal?
Give the reason. (1)

14. चित्रमा, $AB = 26.5$ मिटर स्तम्भको उचाई र $CD = 6.5$ मिटर घरको उचाई छन्। जहाँ, BC ले स्तम्भ र घर बिचको दूरीलाई जनाउँछ।

In the given figure, $AB = 26.5$ meter be the height of the tower and $CD = 6.5$ meter be the height of a house. Where, BC denotes the distance between tower and house.



(a) उन्नतांश कोणलाई परिभाषित गर्नुहोस्।

Define the angle of elevation. (1)

(b) AE को मान पता लगाउनुहोस्।

Find the value of AE. (1)

(c) यदि $\angle ADE = 60^\circ$ भए स्तम्भ र घरबिचको दुरी पता लगाउनुहोस्।

If $\angle ADE = 60^\circ$, find the distance between the tower and the house. (1)

(d) AE र ED वरावर भएको बेलामा उन्नतांश कोण कति डिग्रीले कम वा बढी हन्छ? तर्कपूर्ण जवाफ दिनुहोस्।

By how many degrees is the angle of elevation less or more when AE and ED are equal? Give the logic. (1)

15. एउटा परीक्षामा 20 जना विद्यार्थीहरूले प्राप्त गरेको प्राप्ताहारू तलको तालिकामा दिइएको छ।

The marks obtained by 20 students in an exam are given in the following table.

प्राप्ताइक (Obtained Marks)	0-10	0-20	0-30	0-40	0-50
विद्यार्थी संख्या (Number of students)	2	7	11	17	20

- (a) निरन्तर श्रेणीको मध्यिका निकाल्ने सुन्दर लेखनहोस्।
Write the formula to calculate the median of continuous series. (1)
- (b) माधिको तालिकाबाट मध्यिका पता लगाउनुहोस्।
Find the median from the above table. (2)
- (c) माधिको तालिकाबाट औसत प्राप्ताइक पता लगाउनुहोस्।
Find the average mark from the above table. (2)
- (d) औसत प्राप्ताइकमन्दा कम अंक ल्याउने अधिकतम विद्यार्थी संख्या कति जना हुन सक्छन्? पता लगाउनुहोस्।
How many maximum number of students could be there who obtained the marks less than the average mark? Find it. (1)
16. राम्ररी फिटिएको 52 पत्ति तासको गढीबाट नहेरी कुनै दुईओटा तासहरू एक पछि बर्को गरी पुनः नराखिकन भिकिएका छन्।
Two cards are drawn randomly one after another without replacement from a well shuffled deck of 52 cards.
- (a) यदि $P(A \cup B) = P(A) + P(B)$ हुँदा A र B कस्ता घटनाहरू हुन्छन्?
लेखनहोस्।
If $P(A \cup B) = P(A) + P(B)$, what type of events are A and B?
Write it. (1)
- (b) एका पर्ने र नपर्ने सबै परिणामहरूको सम्भाव्यतालाई वृक्षचित्रमा देखाउनुहोस्। FB - Tuition Class of Rajan Shrestha
Show the probabilities of all possible outcomes of getting and not getting ace cards in a tree diagram. (2)
- (c) दुवै तासहरू बादशाह पर्ने सम्भाव्यता पता लगाउनुहोस्।
Find the probability of getting both king cards. (1)
- (d) के दुवै तास इटाको एका पर्ने सम्भाव्यता सम्भव हुन्छ? कारण दिनुहोस्।
Is the probability of getting both ace of diamond possible? Give reason. (1)

धन्यवाद !



PABSON Kathmandu
PRE-QUALIFYING EXAMINATION-2082

Subject: C. Mathematics

Full Marks: 75

Class: 10

Time: 3 hrs.

Candidates are required to answer the questions in their own way words as far as practicable. Figures in the margin indicate the full marks.

Attempt all questions.

1. In a survey of 400 people, 180 people like Mobile Phone and 150 people like Computer. However, one-fourth of the people do not like either of the two items. **FB - Tuition Class of Rajan Shrestha**

४०० जनामा गरिएको एउटा सर्वेक्षणमा १८० जनालाई मोबाइल मन पर्दै, १५० जनालाई कम्प्युटर मन पर्दै। तर एक चौधाई मानिसहरूलाई दुवै मन पर्दैन।

- a) If M and C be the sets of people who like Mobile and Computer respectively, write the cardinality of $n(\overline{M \cup C})$. [1]

यदि M र C क्रमशः ट्याबलेट र ल्यापटप मन पराउने व्यक्तिहरूको समुह हो भने, $n(\overline{M \cup C})$ को गणनात्मकता लेख्नुहोस्।

- b) Represent above information in Venn diagram. [1]

माथिको जानकारीलाई भेन चित्रमा प्रस्तुत गर्नुहोस्।

- c) Find the number of people like only one item. [3]

एउटा मात्र वस्तु मन पराउने व्यक्तिहरूको संख्या पत्ता लगाउनुहोस्।

- d) Find the percentage of people who like at most one of these items. [1]

बढीमा एउटा वस्तु मन पराउने व्यक्तिहरूको प्रतिशत पत्ता लगाउनुहोस्।

2. Suman plans to deposit Rs 3,00,000 in a bank for 2 years. The bank offers interest at the rate of 10% p.a. with two alternatives: half-yearly compound interest or quarterly compound interest.

सुमनले २ वर्षको लागि बैंकमा रु. ३,००,००० जम्मा गर्ने भएको छ। बैंकले सुमनलाई प्रति वर्ष १०% व्याजदरमा दुई विकल्पहरू अर्धवार्षिक चक्रिय व्याज वा त्रैमासिक चक्रिय व्याज प्रस्ताव गरेको छ।

- a) Which option is more profitable for Suman? [1]

सुमनको लागि कुन विकल्प बढी फाइदाजनक छ?

- b) How much compound amount can he get at the end of 2 years at the rate of half yearly compound interest? [2]

दुई वर्षको अन्तरमा अर्धवार्षिक चक्रिय व्याजदरले उसले कति चक्रिय मिश्रपन पाउँछ?

- c) If the bank applies half-yearly compound interest for the first year and quarterly compound interest for the second year, calculate the total interest earned in two years. [2]

यदि बैंकले पहिलो वर्ष अर्धवार्षिक चक्रिय व्याजदर र दोस्रो वर्ष त्रैमासिक चक्रिय व्याजदर लगाउँछ भने उसले दुई वर्षमा पाउने कुल पत्ता लुगाउनुहोस्।

3. The present population of a rural municipality of Koshi Province is 57245. The annual population growth rate is 7%.
 कोशी प्रदेशको एउटा गाउँपालिकाको हालको जनसंख्या ५७२४५ छ। वार्षिक जनसंख्या वृद्धि दर ७%, रहको छ।
- Write the formula for calculating population after T years? [1]
 T वर्ष पछि जनसंख्या पत्ता लगाउने सूत्र लेख्नुहोस्।
 - What was the population of the rural municipality 2 years ago? [2]
 दुई वर्ष अगाडि गाउँपालिकाको जनसंख्या कति थिए ?
 - If the population growth rate was 9% in the previous year, what would be the present population? [2]
 यदि अधिल्लो वर्ष जनसंख्या वृद्धिदर ९%, थिए भने, गाउँपालिकाको हालको जनसंख्या कति हुनेछ ?
4. A trader exchanged Nepali currency of Rs 12,78,000 into US Dollars at the rate of US \$1 = Rs 142. After a few days, Nepali currency was devalued by 2% in comparison to the US Dollar. On that day, he exchanged all the US Dollars back into Nepali currency.
 एक व्यापारीले रु १२,७८,००० यु.यस.डलर (\$) $= 142$ रुपैयाङ्को दरले साटो केही दिनपछि, नेपाली मुद्रा यु.यस.डलरको तुलनामा २% ले अवमूल्यन भयो र त्यस दिन उनले यु.यस.डलरलाई फेरि नेपाली मुद्रामा साटे ।
- How many US Dollars did the trader exchange? Find it. [1]
 व्यापारीले कति यु.यस.डलरसाटे ? पत्ता लगाउनुहोस्।
 - How many Nepali rupees did the trader receive after devaluation? [1]
 अवमूल्यन पछि नेपाली रुपैयामां परिवर्तन गर्दा व्यवसायीले कति नेपाली रुपैयां प्राप्त गरे ? FB - Tuition Class of Rajan Shrestha
 - What profit or loss percent did the trader make in that transaction?
 Find it. [1]
 उक्त कारोबारबाट व्यापारीलाई कति प्रतिशत नाफा वा घाटा भयो ? पत्ता लगाउनुहोस्।
5. The volume of a metallic square-based pyramid is 675 cm^3 and the length of the side of its base is 15 cm.
 वर्गाकार धातुको पिरामिडको आयतन 675 घन सेमी र आधारको लम्बाई 15 सेमी छ।
- What is the formula to find the lateral surface area of a square based pyramid? [1]
 वर्गाकार पिरामिडको छड्के सतहको क्षेत्रफल पत्ता लगाउने सूत्र कुन हो ?
 - Find the cost of coloring the surfaces of the pyramid at the rate of Rs. 3 per cm^2 . [3]
 ग्राति वर्ग सेमी को ३ रुपैयाङ्को दरले पिरामिडको सतहहरूमा रड लगाउदा लाग्ने लागत पत्ता लगाउनुहोस्।
 - If the pyramid is melted and recast into another square based pyramid of height 20 cm, what would be its length of base? [2]
 यदि उक्त पिरामिडलाई पगालेर 20 सेमी उचाइ भएको अर्को वर्गाकार पिरामिड पूऱ बनाइन्छ भने, यसको आधारको लम्बाई कति हुनेछ ?

6. A solid object is made up of a hemisphere and a cylinder. The height of the cylinder is 70 cm and the total height of the solid is 91 cm.
 एउटा ठोस वस्तु अर्धगोलार्ध र सिलिन्डर मिलेर बनेको छ। सिलिन्डरको उचाइ ७० सेमी र ठोस वस्तुको उचाइ ९१ सेन्टिमिटर छ।
- Which formula is used to calculate volume of hemisphere? [1]
 अर्धगोलाको आयतन गणना गर्न कुन सूत्र प्रयोग गरिन्छ?
 - Find the total surface area of the solid. [2]
 दिइएको ठोस वस्तुको पुरा सतहको क्षेत्रफल पता लगाउनुहोस्।
7. The length of a wall is 15 m, width is 40 cm and height is 4 m. Bricks of size $25 \text{ cm} \times 12.5 \text{ cm} \times 7.5 \text{ cm}$ are used to construct the wall.
 एउटा पर्खालिको लम्बाइ १५ मिटर, चौडा ४० सेन्टिमिटर र उचाइ ४ मिटर छ। पर्खाल बनाउन २५ सेन्टिमिटर \times १२.५ सेन्टिमिटर \times ७.५ सेन्टिमिटर आकारका इंटाहरू प्रयोग गरिन्छ।
- Find the volume of wall. [1]
 पर्खालको आयतन पता लगाउनुहोस्।
 - How many bricks are used to construct the wall? [2]
 पर्खाल बनाउन कति इंटा प्रयोग हुन्छ?
 - Estimate the cost of bricks used in the wall at the rate of Rs 14,000 per 1000 brick. [1]
 प्रति १००० इंटाको रु १४,००० को दरले पर्खाल बनाउन प्रयोग हुने इंटाको लागत अनुमान गर्नुहोस्। FB - Tuition Class of Rajan Shrestha
8. The 3rd term and the 9th term of a geometric sequence are 16 and 1024 respectively.
 ज्यामितिय अनुक्रमको पाँचौं र बाईं पदहरू कम्शः ३४ र ८३ छन्।
- What is geometric mean between two numbers a and b? [1]
 दुई संख्याहरू a र b बीचको ज्यामितिय माध्यक कति हुन्छ?
 - Find common difference and first term. [2]
 समान भिन्नता र पहिलो पद पता लगाउनुहोस्।
 - Find sum of first five terms of the sequence. [2]
 अनुक्रमको पहिलो पाँच पदहरूको योगफल पता लगाउनुहोस्।
9. The sum of the present ages of Sita and Gita is 21 years. After 2 years, the product of their ages will be 144.
 सिता र गिताको हालको उमेरको योगफल २१ वर्ष छ। २ वर्ष पछाडी उनीहरूको उमेरको गुणनफल १४४ हुनेछ।
- What are the roots of x in quadratic equation $ax^2 + bx + c = 0$, $a \neq 0$? [1]
 वर्ग समीकरण $ax^2 + bx + c = 0$, $a \neq 0$ मा x का मूलहरू के हुन्?
 - Find the present ages of Sita and Gita. [3]
 सिता र गिताको वर्तमान उमेर पता लगाउनुहोस्।
 - After how many years, sum of their ages will be 31? [1]
 कति वर्ष पछि, उनीहरूको उमेरको योगफल ३१ हुनेछ?

10. a) Simplify (मरल गर्नुहोस्) : $\frac{1}{(x-1)^2} + \frac{1}{(x-2)^2} - \frac{1}{(x-1)^2(x-2)^2}$ [3]

b) Solve (हल गर्नुहोस्) : $2^x + \frac{1}{2^x} = 2\frac{1}{2}$ [2]

11. A parallelogram ABCD and a triangle ABN stand on the same base AB and lie between the same parallel lines.

एउटै आधार र उही समानान्तर रेखा बीच समानान्तर चतुर्भुज ABCD र त्रिभुज ABN बनेका छन्।

a) If the area of parallelogram ABCD is $p \text{ cm}^2$ and area of ΔABN is $y \text{ cm}^2$ then write the relation between p and y . [1]

यदि समानान्तर चतुर्भुज ABCD को क्षेत्रफल $p \text{ cm}^2$ छ र ΔABN को क्षेत्रफल $q \text{ cm}^2$ छ भने p र q बीचको सम्बन्ध लेख्नुहोस्।

b) Prove theoretically the relation between areas of parallelogram ABCD and ΔABN . [2]

समानान्तर चतुर्भुज ABCD र ΔABN को क्षेत्रफल बीचको सम्बन्ध सैद्धान्तिक रूपमा प्रमाणित गर्नुहोस्।

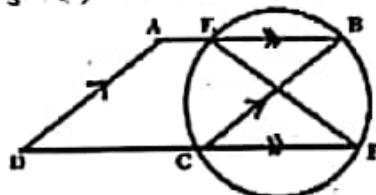
c) Construct a quadrilateral WXYZ in which $WX = 4 \text{ cm}$, $XY = 6 \text{ cm}$, $YZ = 5.2 \text{ cm}$, $ZW = 4.5 \text{ cm}$ and diagonal $XZ = 6.8 \text{ cm}$. Also construct a triangle WXQ which is equal in area to the quadrilateral WXYZ. [3]

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 $WX = 4 \text{ cm}$, $XY = 6 \text{ cm}$, $YZ = 5.2 \text{ cm}$, $ZW = 4.5 \text{ cm}$ and diagonal $XZ = 6.8 \text{ cm}$ भएको चतुर्भुज WXYZ बनाउनुहोस्। साथै चतुर्भुजको क्षेत्रफल बरावर भएको ΔWXQ पनि बनाउनुहोस्।

12. In the given figure, ABCD is a parallelogram, E, B, F and C are the points on circumference of a circle.

दिइएको चित्रमा ABCD एउटा समानान्तर चतुर्भुज हो। E, B, F र C वृत्तको परिधिका विन्दूहरू भए

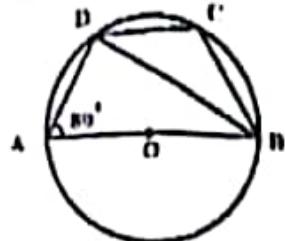
a) Prove that (प्रमाणित गर्नुहोस्) : $\angle FEB = \angle ADC$ [2]



b) Is ADFE a cyclic quadrilateral? Give reason. [1]

के ADFE एउटा चक्रिय चतुर्भुज हो ? कारण दिनुहोस्।

13. In the given figure, O is the center of circle and $\angle BAD = 80^\circ$
दिएको चित्रमा, O केन्द्र हो र $\angle BAD = 80^\circ$, त्तू ?



a) What is the relation of $\angle A$ and $\angle C$? [1]

$\angle A$ र $\angle C$ को सम्बन्ध के हो ?

b) Find the value of $\angle ABD$. [1]

$\angle ABD$ को मान पता लगाउनुहोस्।

c) Verify experimentally that central angle of circle is twice the circumference angle standing on same arc. (At least two circles with radii more than 3 cm are necessary) [2]

एउटै चापमा रहेका वृत्तको केन्द्रीय कोण परिधि कोणको दोधार छ भनी प्रयोगात्मक ।

स्पष्टप्रयोगात्मक गर्नुहोस्। (तीन वटी भन्दा बढी अर्दचारास भएका कमितमा दुई वृत्तहरू आवश्यक छन्) FB - Tuition Class of Rajan Shrestha

14. A man standing on the top of a tower observes the top of a statue and finds the angle of depression to be 45° . The height of the statue is 8 m and the horizontal distance between the tower and the statue is 10 m.
एउटा टावरको टुप्पोमा रहेको मानिसले मुर्तिको दुप्पो हेर्दै र 45° को अवनती कोण बनाउँदै। मुर्तिको उचाइ ८ मिटर छ र टावर र मुर्तियीचको दूरी १० मिटर छ ।

a) Define angle of depression. [1]

अवनती कोणको परिभाषा दिनुहोस् ।

b) Draw a figure according to context. [1]

सन्दर्भ अनुसार चित्र बनाउनुहोस् ।

c) Find the height of the tower. [1]

टावरको उचाइ पता लगाउनुहोस् ।

d) Find the shortest distance between the foot of the statue and the top of the tower. [1]

मुर्तिको फेंद र टावरको टुप्पो बीचको सबैभन्दा छोटो दूरी पता लगाउनुहोस् ।

15. The following table shows the marks obtained by students in the Science mid-term examination.

निम्न तालिकाले विज्ञान विषयको मध्य त्रैमासिक परीक्षामा विद्यार्थीले प्राप्त गरेको ग्रन्थालयको छ ।

Marks	0-10	10-20	20-30	30-40	40-50
Number of students	4	$y+2$	10	9	5

a) Find the median class. [1]

मध्यका वर्गालार पता लगाउनुहोस् ।

b) The median mark of students is 24, find the value of y . [2]

यदि विद्यार्थीहरूको प्राप्ति अंक २४ छ, त्तू, y को मान पता लगाउनुहोस् ।

- c) Find the average marks of the students. [2]
 विद्यार्थीहरूको औसत अंक पता लगाउनुहोस्।
- d) If marks less than 30 are considered as failing marks, find the percentage of failed students. [1]
 यदि ३० भन्दा कम अंक प्राप्त गर्ने विद्यार्थीहरूलाई असफल मानिन्दू भने, असफल विद्यार्थीहरूको प्रतिशत निकाल्नुहोस्। FB - Tuition Class of Rajan Shrestha
16. A bag contains 6 white and 4 black balls of same size and sizes. Two balls are drawn randomly one after another without replacement; एउटा भोलामा एउटै आकार र उस्तै ६ वटा सेता र ४ वटा काला बलहरू छन्। दुईवटा बलहरू एक पछि अर्को नहेरीकन(पुन नराखीकन) निकालिएका छन्।
- If $P(A \cap B) = 0$ what type of event are A and B? [1]
 यदि $P(A \cap B) = 0$ छ भने A र B कस्तो प्रकारको घटना हुन्?
 - Show the probabilities in tree diagram. [2]
 परिणामहरूको सम्भाव्यतालाई वृक्ष चित्रमा देखाउनुहोस्।
 - Find the probability of getting both are black balls. [1]
 दुवै काला बलहरू प्राप्त गर्ने सम्भाव्यता पता लगाउनुहोस्।
 - Find the ratio of the probability of getting balls of the same color to the probability of getting balls of different colors. [1]
 एउटै रंगका बलहरू प्राप्त गर्ने सम्भाव्यता र फरक रंगका बलहरू प्राप्त गर्ने सम्भाव्यताको अनुपात पता लगाउनुहोस्।

कृपा



National PABSAN Kathmandu

Pre-Qualifying Exam-2082

Class-X

Sub- C. Mathematics

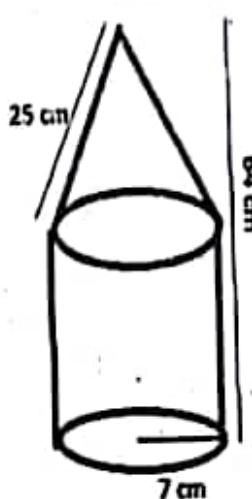
All the questions are compulsory

MM-75

Time- 3hrs

1. A survey was conducted among 500 students regarding what career banking , hospitality or IT they would pursue after school education . 10% showed no interest towards these careers and 20% showed interest towards all of them. The number of students who showed interest in each of the careers are equal. The number of students showing interest in IT only and in banking and hospitality only are equal and the number of students showing interest in banking and IT only and in hospitality only are equal .
- a) How do you write the number of students in set notation who showed no interest towards those careers if the students pursuing career in Banking , Hospitality and IT are denoted by B,H and I respectively? [1]
- b) Find the number of students who want to pursue all the three careers.[1]
- c) How many students pursue a career in hospitality? Calculate it. [3]
- d) Prove that the number of students pursuing career only in banking is equal to the number of students pursuing career only in IT and hospitality are equal.[1]
2. Raunak Gautam took the loan Rs. 20,00,000 to buy an electric vehicle from Kohinoor Bank for two years @ 8.50 % per year interest payable at the interval of six months. At the end of 1st year , he paid Rs. 11,73.612.50.
- a) Which system of interest is applied by the bank. [1]
- b) How much amount should he pay off at the end of the 2nd year to clear the loan ?[2]
- c) If he had paid all the money at the end of the 2nd year , how much more money would he have to pay ? [2]
3. A local body instructed its community schools for the students enrollment campaign. The community schools imposed a rule that a group of five students should bring one new students for enrollment. The total number of students this year is 2,000 .

- a) Find the annual growth rate of the students in the community schools if new rule is applied. [1]
- b) What will be the number of students after 2 years if the students increases in the same rate? [1]
- c) If the rule became effective and number of students at the end of 2 years was 3125, what more percentage of students were enrolled than the targeted percentage . [1]
4. A person exchanged some Nepali currency with US dollar when the exchange rate was 1 US dollar = Rs.128 .After some time, Nepali currency was devaluated by 10% in comparison to US dollar and he gained Rs.7,680 on exchanging the dollar into Nepali currency .
- a) What is the new rate after the devaluation? [1]
- b) How much Nepali currency was exchanged with US dollar? [2]
- c) If Nepali money was revaluated by 10% would he gain or lose in this transactions. [1]
5. The ratio of slant height and a side of a square based pyramid is 5:6 and the diagonal of the base of the pyramid is $24\sqrt{2}$ cm.
- a) What is the relation among the area of base(A) ,height(h) and volume (V) of the pyramid? [1]
- b) Determine the height of the pyramid. [1]
- c) Find the volume of the pyramid. [2]
6. A metallic solid is made up of a cone and a cylinder as given in the figure. The radii of the base of the cone and cylinder are equal. The total height of the solid is 64 cm , the slant height of the cone is 25 cm. radius of the base of the cone is 7 cm.



- a) Write down the formula to calculate total surface area of the solid.[1]
- b) Find the total surface area of the solid. [2]

c) Find the ratio of volume of the cylindrical part and the conical part.

[1]

7. A wall is 30m long , 3m high and 50cm wide. If it contains three square windows of length 1.5 m each and three gates of dimension 2m. \times 1.5m. a) How many bricks of size 20cm \times 10 cm \times 5cm are required to build the wall? [3]

b) Find the cost of bricks at the rate of Rs. 16.000 per 1000 bricks . [2]

8. A person began to deposit amount every day twice the previous day for 10 days. He deposited Rs.200 on the first day , Rs. 400 on the second day ,Rs.800 on the third day and so on.

a) What sequence does it form? [1]

b) How much money was saved at the end of 7th day? [2]

c). If he wants to get Rs. 25,600 more than that of 7th day , how many more days does he have to deposit ? [2]

9. The difference of the ages of two brothers is 7 years and the product of their ages is 120 .

a. If the present age of elder brother is x years then write the present age of younger brother in terms of x. [1]

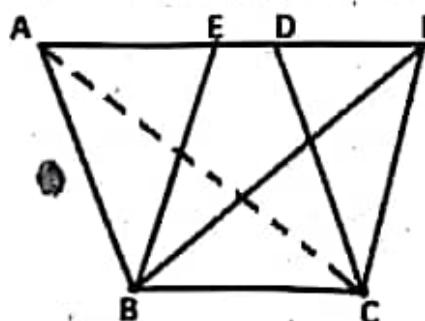
b. Find the present ages of the two brothers. [3]

c. How many years later , the sum of their ages will be 33 years ?[1]

10. a) If $x^2=3^{\frac{2}{3}} + 3^{\frac{-2}{3}}$ -2 then prove that : $3x^3+9x=8$. [2]

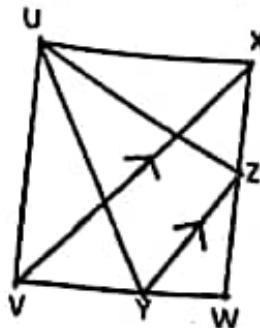
b) Simplify:
$$\frac{2(a-3)}{(a-4)(a-5)} + \frac{a-1}{(3-a)(a-4)} + \frac{a-2}{(5-a)(a-3)}$$
 [3].

11. In the figure parallelograms, ABCD and EBCF are standing on the same base BC and between the same parallels AF and BC.

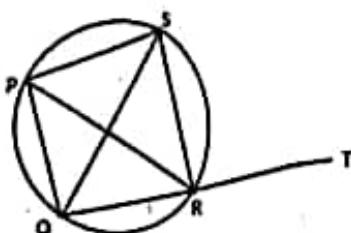


a) Write the relation between the areas of ΔABC and ΔADC . [1]

- b) Prove that the area of parallelogram ABCD is equal to the area of parallelogram EBCT. [2]
- c) In the figure, UVWX is a parallelogram , prove that area of ΔUVY
 $=\Delta UZX$ [2]



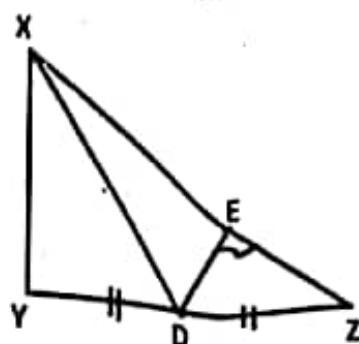
12. In the given figure, PQRS is a cyclic quadrilateral .The side QR is produced to T.



- a) What is the relation between the inscribed angles $\angle PSQ$ and $\angle PRQ$? [1]
- b) If the measurement of $\angle PSQ$ is $(x+20)^\circ$, the measurement of $\angle PQS$ is 35° and $\angle SRT = (2x+5)^\circ$ find the value of $\angle QPS$. [1]
- c) Verify experimentally that opposite angles of a cyclic quadrilateral are supplementary. (Two circles having radii more than 3 cm are necessary.) [2]

- 13 a) Construct a quadrilateral ABCD in which AB=4cm , BC=5cm , CD=4.4cm , AD=3.6 cm and diagonal BD =6.4 cm ,Then construct a triangle ABE equal in area to the quadrilateral ABCD . [3]

- b. In the given figure , D is the mid-point of YZ and $DE \perp XZ$. If $XZ=12\text{cm}$ and $DE=7\text{cm}$,find the area of ΔXYZ . [1]



14. A cat of height 0.50 m observes a bird which is sitting on the top of a pole 3.97 m high from the ground .The distance between the cat and the pole is 6m .

- a) What is the name of the angle formed with the horizontal line when the bird looks at the cat? [1]
- b) By how much is the height of the pole more than the height of the cat ?[1]
- c) Through what angle should the cat jump from his place in order to catch the bird ? [1]
- d) In order to increase the angle between them, should the cat move towards the pole or away from the pole ? Write with reason . [1]

15. The median marks obtained by students is 27.

Marks	0 -10	10-20	20-30	30-40	40-50	50- 60
No of Students	5	3	p	6	4	2

- a) Write the median class. [1]
- b) Find the value of p. [2]
- c) If the modal class and the median class are same , find the value of mode ? [2]
- d) Can it be concluded that half of the students obtained marks above the median marks ? Support or oppose this statement. [1]

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16. The probability of solving a mathematical problem by two students A and B are

$\frac{1}{3}$ and $\frac{1}{4}$ respectively.

- a) Write the formula to find $P(A \cup B)$. [1]
- b) If the problem is given to the both students, find the probability of solving the problem if they try solving together. [2]
- c) If the problem is given to both students , find the probability of solving it by one student. [2]
- d) If the probability of solving a problem by A is $\frac{1}{2}$, what will be the change in solving solving the problem.
[1]

Best of Luck

Symbol No:



PABSON Lalitpur

SEE PRE-QUALIFYAING EXAMINATION-2082

Subject: Compulsory Mathematics

Full Marks: 75

Class: 10

Time: 3 hrs.

Give creative answers in your own style based on the given instructions.

Attempt all questions.

1. Among the 80 students of a school, 50 of them like to play football, 40 of them like to play cricket and 20 of them like to play both games.

- Write the cardinality notation of the number of students who don't like none of the games football and cricket. [1]
- Represent the required information in a Venn diagram. [1]
- How many students don't like both type of games? Find it. [3]
- Compare the number of students who like football only to cricket only. [1]

2. Binaya borrowed Rs 80,000 from Ramesh for 2 years at the rate of 10% p.a. simple interest. At the same rate, he invested the same sum for the same time at the compound interest compounded annually. (1)

- Define compound interest.
- Find the compound interest received by Binaya after 2 years. (2)
- What is the remaining amount with Binaya after paying principal and interest to Ramesh? Find it. (2)

2082-09-13

3. The initial population of Chuha was 3,20,000 and that of Bauniya was 3,30,000. The population of Chuha increases by 4% per year and the population of Bauniya decreases by 5% per year.

- a) Write the formula to find the population after T years. [1]
b) After 2 years, which place has more population and by how much? Find it. [2]
c) By what percentage should the population of Bauniya increase in 2 years to reach the same population as the initial population of Chuha? Find it. [1]

4. A man bought American dollars for Rs 68250 at the rate of 1 dollar = Rs 140. After some days, Nepali currency is devaluated by 10% with comparison to American dollars.

- a) How many dollars did he exchange? Find it. [1]
b) Calculate the new exchange rate between dollars and Nepali currency after devaluation. [1]
c) Calculate his gain or loss amount. [2]

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5. In the square base pyramid, the edge of the lateral face is 26 cm and side length of square base is 20 cm.

- a) How many surfaces are there in a square base pyramid? Write it. [1]
b) Find the volume of the pyramid. [2]
c) Compare the base area to the area of triangular surfaces of the pyramid. [1]

6. The length, breadth and height of a rectangular room are 12 m, 7 m and 4 m respectively. There are three square windows with edges 3 m and a doors of size 2 m x 1 m.

10:00 am

- a) How much does it cost to paint the four walls excluding the windows and doors at the rate of Rs. 100 per square meter? Find it. [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 fourth of what it was before due to the increase in the market price? Find it. [3]
7. A solid made of a cone of height 10cm and hemisphere has the diameter of 6cm. [2]
- a) What is the relation among radius, slant height and height of a cone? FB - Tuition Class of Rajan Shrestha [1]
- b) Find the volume of the solid [2]
- c) If that solid is melted and converted into a cylinder of radius 3cm, find the height of cylinder. [1]
8. The profit of a farmer from a cow farm is given below for the different years. [1]

Years	First	Second	Third	Fourth
Profit	Rs 80000	Rs 95000	Rs 110000	Rs 125000

- a) What type of sequence has been formed? [1]
- b) Estimate the farmer's total profit in the first ten years. [2]
- c) After the 10th year, how many more years are required to make a total profit of Rs 24,85,000? [2]

9. The sum of the present age of mother and daughter is 40 years and after 5 years, the product of their ages will be 400.
- a) In which condition of a quadratic equation: $ax^2 + bx + c = 0, a \neq 0$ will have equal roots. [1]
- b) Find the present ages of the mother and daughter. [3]
- c) If both of them live till the daughter becomes as old as her mother is now, what will be the sum of their ages? [1]

Symbol No:

10. a) If $a^{\frac{1}{x}} = b^{\frac{1}{y}} = c^{\frac{1}{z}}$ and $abc=1$, prove that: $x+y+z=0$.

[3]

b) Simplify: $\frac{x-y}{x+y} - \frac{x+y}{x-y}$

[2]

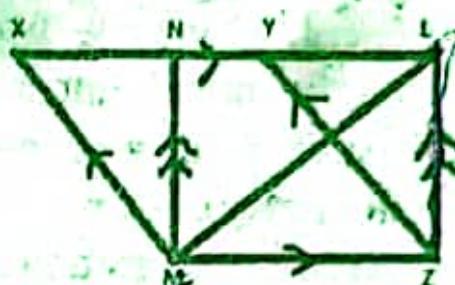
11. a) In the adjoining diagram write the relation between parallelogram NLZM and XYZM.

[1]

b) Prove that:

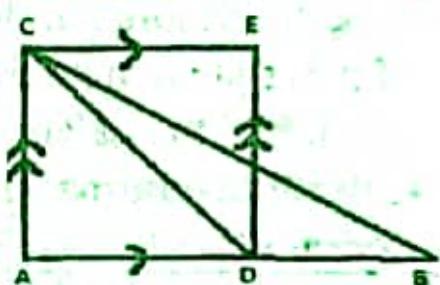
$\Delta M L Z$ is half of parallelogram NLZM.

[2]



- c) In the adjoining figure, $AB \parallel CE$ and $AC \parallel DE$. If D is the midpoint of AB then prove that area of $\Delta DBC = \Delta CDE$.

[2]



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12. A circle with centre "O" consists of two inscribed angles $\angle ABC$ and $\angle ADC$ both formed on an Arc AC.
- a) Write relation between $\angle ABC$ and $\angle ADC$. [1]
- b) In a circle if central and inscribed angles standing on same base are $6x^\circ$ and 30° respectively find value of x° . [1]
- c) Experimentally verify two inscribed angles formed on same arc of a circle are equal. (At least 2 circles of radii more than 3cm are necessary). [2]

13. a) Construct a triangle PQR having sides $PQ=7\text{cm}$, $QR=5\text{cm}$ and $\angle PQR=75^\circ$. Construct another triangle SQR equal in area with triangle PQR. [3]

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- b) At what condition will a triangle and parallelogram lying between a common parallel line have equal area? [1]

4. The circumference of a circular pond is 88 m and a pillar is fixed at its center. A man finds the angle of elevation of the top of the pillar from a point on the bank of the pond to 60° .
- Find the distance between the man and the pillar. [1]
 - Represent the given statement in a figure. [1]
 - Find the height of the pillar above the water level. [1]
 - If the angle of elevation was 45° , what would be the relation between the height of the pillar and the radius of the pond? FB - Tuition Class of Rajan Shrestha [1]

5. The marks obtained by the students in an examination are given below in table.

Marks	0-10	10-20	20-30	30-40	40-50
No of std	9	21	T	15	10

- What does 'c.f' represent in the formula $M_d = L + \frac{1}{f} \left(\frac{N}{2} - c.f. \right)$ for the calculation of median in the continuous series? Write it. [1]
- Construct the cumulative frequency table from the given data. [2]
- If the median of the given data is 24, calculate the value of 'T'. [2]
- Find the average marks of the students whose marks are above the median class marks. [1]

10:00am

6. A bag contains 8 black and 10 red balls of same shape and size. Two balls are drawn randomly one after another with replacement.

- If A and B be two independent events then write the formula of $P(A \cap B)$. [1]
- Show the probabilities all the possible outcomes in a tree diagram. FB - Tuition Class of Rajan Shrestha [1]
- Find the probability of getting both black balls. [2]
- By how much the probability of getting both red balls is more or less than the probability of getting both black balls? Find it. [1]

Best of Luck

Symbol No:

2082-09-13 130pm



PABSON Kathmandu
PRE-QUALIFYING EXAMINATION-2082

Subject: C.Mathematics

Full Marks: 75

Class: 10

Time: 3 hrs.

Candidates are required to answer the questions in their own way words as far as practicable. Figures in the margin indicate the full marks.

Attempt all questions.

1. In a survey of 300 people, 120 people like Tablet, 100 people like Laptop. But one-third of the people do not like both.
३०० जनामा गरिएको एउटा सर्वेक्षणमा १२० जनालाई ट्रायाबलेट मन पाइ, १०० जनालाई ल्यापटप मन पाइ तर एक विहाइ मानिसहरूलाई एवे मन पाइन।
 - a) If T and L be the sets of people who like Tablet and Laptop respectively, write the cardinality of $n(\overline{L \cup T})$. [1]
यदि T र L कमश: ट्रायाबलेट र ल्यापटप मन पराउने व्यक्तिहरूको गम्भीर भने, $n(\overline{L \cup T})$ को गणनात्मकता लेख्नुहोस्।
 - b) Represent above information in Venn diagram. [1]
माथिको जानकारीलाई भेन चित्रमा प्रस्तुत गर्नुहोस्।
 - c) Find the number of people who like only one item. [3]
एउटा मात्र वस्तु मन पराउने व्यक्तिहरूको संख्या पता लगाउनुहोस्।
 - d) Find the percentage of people who like at most one of these items.
FB - Tuition Class of Rajan Shrestha [1]
बढीमा एउटा वस्तु मन पराउने व्यक्तिहरूको प्रतिशत पता लगाउनुहोस्।
2. Harka is going to deposit Rs 2,00,000 in a bank for 2 years. The bank has offered Harka two options half-yearly compound interest or quarterly compound interest at the rate of 8% p.a.
हर्काले २ वर्षको लागि बैंकमा रु. २,००,००० जम्मा गर्ने भएको छ। बैंकले इफलाई प्रति वर्ष ८%, व्याजदरमा दुई विकल्पहरू अर्धवार्षिक चक्रिय व्याज वा त्रैमासिक चक्रिय व्याज प्रस्ताव गरेको छ।
 - a) Which option is more profitable for Harka? [1]
हर्काको लागि कुन विकल्प बढी फाइदाजनक छ?
 - b) How much compound amount can he get at the end of 2 years at the rate of half yearly compound interest? [2]
दुई वर्षको अन्त्यमा अर्धवार्षिक चक्रिय व्याजदरले उसले कति चक्रिय मिश्रधन पाउँछ?
 - c) If bank changes its policy to pay interest compounded quarterly from interest compounded half yearly after one year how much total interest will he get in two years? [2]

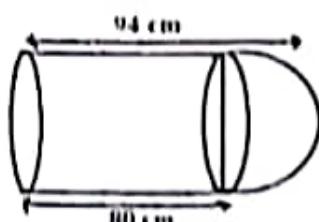
2082-09-13

गरि यैकमे एक वर्ष पछि अधिकारीक चाकिय व्याजदरबाट बैमागिक चाकिय
व्याजदरबाटो भीति परिवर्तन गर्दै भने उगले दई वर्षमा कुल कर्ति व्याज पाउनेछ ?

3. The present population of a municipality of Madesh province is 59895.
The annual population growth rate is 10%.
भूपेश प्रदेशको एउटा नगरपालिकाको हालको जनसंख्या ५९,८९५ छ । वार्षिक जनसंख्या वृद्धि दर १०% रहेको छ ।
- a) Write the formula for finding population after T years? [1]
T वर्ष पछि जनसंख्या पता लगाउने सूत्र लेख्नुहोस् ।
- b) What was the population of the municipality before 3 years? [2]
तीन वर्ष अगाडि नगरपालिकाको जनसंख्या कति थियो ?
- c) If the population growth were 8% before one year, what would be the present population of the municipality? [2]
यदि एक वर्ष अगाडि जनसंख्या वृद्धि ८% थियो भने, नगरपालिकाको हालको जनसंख्या कति हुनेछ ?
4. A businessman exchanged Chinese Yuan with Rs. 9,56,000 at the rate of Chinese Yuan (¥)1 = Rs. 19.12. After some days, Nepali currency was devaluated by 1% in comparison to Chinese Yuan and on that day he exchanged Chinese Yuan into Nepali currency again.
एक व्यापारीले रु ९,५६,००० चिनियाँ युआन (¥)१ = १९.१२ रुपैयाँको दरले साटे । केही दिनपछि, नेपाली मुद्रा चिनियाँ युआनको तुलनामा १% ले अवमूल्यन भयो र त्यस दिन उनले चिनियाँ युआनलाई फेरि नेपाली मुद्रामा साटे ।
- a) How many Chinese Yuan did the businessman exchange? Find it. [1]
व्यापारीले कति चिनियाँ युआन साटे ? पता लगाउनुहोस् ।
- b) How many Nepali rupees did the businessman receive when he exchanged after devaluation? [1]
अवमूल्यन पछि नेपाली रुपैयाँमार्फ व्यवसायीले कति नेपाली रुपैयाँ प्राप्त गरे ?
- c) What profit or loss percent did the businessman make in that transaction? Find it. [1]
उक्त कारोबारबाट व्यापारीलाई कति प्रतिशत नाफा वा घाटा भयो ? पता लगाउनुहोस् । FB - Tuition Class of Rajan Shrestha
5. The volume of a metallic square based pyramid is 384 cm^3 and the length of the side of base is 12 cm.
एउटा वर्गाकार धातुको पिरामिडको आयतन 384 cm^3 र आधारको लम्बाई १२ सेमी छ ।
- a) What is the formula to find the lateral surface area of a square based pyramid? [1]
वर्गाकार पिरामिडको छड्के सतहको क्षेत्रफल पता लगाउने सूत्र कुन हो ?
- b) Find the cost of coloring the surfaces of the pyramid at the rate of Rs. 2 per cm^2 . [3]

प्रिय बच्चे गेमी को २ शिखावा द्वारा लिखितका वर्तमानम् १५ वर्षात्मा नाम
नामत पता लगाउनुहोस् ।

- c) If the pyramid is melted and recast into another square based pyramid of height 18 cm, what would be its length of base? [2]
यदि उक्त पिण्डाङ्काको पाण्डेव पद गेमी उभाइ गणको बाटो वर्णित भएको
पूर्ण बनाउन्न अने, त्यसको उभाइ किमि हुन्न ?
6. Given solid object is made up of a hemisphere and a cylinder. The height of a cylinder is 80 cm and the height of the solid object is 94 cm.
विद्युएको छोय वस्तु अधिकारी र सिरिएन्डर भित्रेर केवलो छ । अधिकारीको उभाइ ८०
गेमी २ छोय वस्तुको उभाइ ९४ गेन्टिमिटर छ ।



- a) Which formula is used to calculate volume of hemisphere? [1]
अधिकारीको आयतन गणना गर्ने कृति गृह प्रयोग गरिन्न ?
- b) Find the total surface area of the solid. [2]
विद्युएको छोय वस्तुको पूरा सतहाको क्षेत्रफल पता लगाउनुहोस् ।
7. The length of a wall is 20 m, width is 50 cm and height is 3 m. Bricks sizes 20cm × 10cm × 8cm are used to build the wall.
एउटा पर्वालको लम्बाई २० मिटर, चौडा ५० गेन्टिमिटर र उभाइ ३ मिटर छ ।
पर्वाल बनाउन २० गेन्टिमिटर × १० गेन्टिमिटर × ८ गेन्टिमिटर आकारका इटाल
प्रयोग गरिन्न ।
- a) Find the volume of wall. पर्वालको आयतन पता लगाउनुहोस् । [1]
b) How many bricks are used to construct the wall? [2]
पर्वाल बनाउन किनि इटा प्रयोग हुन्न ?
- c) Estimate the cost of bricks used in the wall at the rate of Rs 13500
per 1000 brick. [1]
पुर्ति १००० इटाको रु १३५०० को दरले पर्वाल बनाउन प्रयोग हुने इटालको लागत
अनुमान गर्नुहोस् ।
8. The fifth and the twelfth term of an arithmetic sequence is 34 and 83
respectively. FB - Tuition Class of Rajan Shrestha
अकारणिकीय अनुक्रमको पाँची र बाढी पदहरू काण्डा ३४ र ८३ छन् ।
- a) What is arithmetic mean between two numbers a and b? [1]
दुई संख्याहरू a र b बीचको अकारणिकीय मध्यक किमि हुन्न ?
- b) Find common difference and first term. [2]
गणान भिन्नता र पहिलो पद पता लगाउनुहोस् ।
- c) Find sum of first five terms of the sequence. [2]
अनुक्रमको पहिलो पाँच पदहरूको गोणफल पता लगाउनुहोस् ।



9. The sum of present age of Ramu and Jinu is 19 years. After 1 year, the product of their ages will be 104.

रामु र जिनुको हालको उमेरको योगफल १९ वर्ष छ । एक वर्ष पछाडी उनीहरूको उमेरको गुणनफल १०४ हुनेछ ।

- a) What are the roots of x in quadratic equation

$$ax^2 + bx + c = 0, a \neq 0?$$

वर्ग समीकरण $ax^2 + bx + c = 0, a \neq 0$ मा x का मूलहरू के हुन् ?

- b) Find the present ages of Ramu and Jinu.

रामु र जिनुको वर्तमान उमेर पता लगाउनुहोस् ।

- c) After how many years, sum of their ages will be 25?

कति वर्ष पछि, उनीहरूको उमेरको योगफल २५ हुनेछ ?

10. a) Simplify (सरल गर्नुहोस् ।) : $\frac{1}{(x+1)^2} + \frac{1}{(x+2)^2} - \frac{1}{(x+1)^2(x+2)^2}$

$$\text{b) Solve (हल गर्नुहोस् ।)}: 9^{x-2} + 2 \times 3^{2x-3} = 63$$

11. A parallelogram PQRS and a triangle PQM are standing on the same base and between same parallel lines.

एउटै आधार र उही समानान्तर रेखा बीच समानान्तर चतुर्भुज PQRS र त्रिभुज PQM बनेका छन् । FB - Tuition Class of Rajan Shrestha

- a) If the area of parallelogram PQRS is $x \text{ cm}^2$ and area of ΔPQM is $y \text{ cm}^2$ then write the relation between x and y .

यदि समानान्तर चतुर्भुज PQRS को क्षेत्रफल $x \text{ cm}^2$ छ र ΔPQM को क्षेत्रफल $y \text{ cm}^2$ छ भने x र y बीचको सम्बन्ध लेख्नुहोस् ।

- b) Prove theoretically the relation between areas of parallelogram PQRS and ΔPQM .

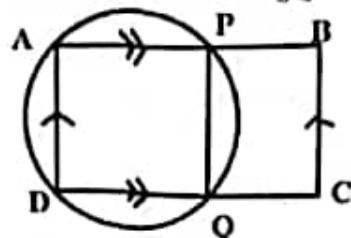
समानान्तर चतुर्भुज PQRS र ΔPQM को क्षेत्रफल बीचको सम्बन्ध सेद्वान्तिक रूपमा प्रमाणित गर्नुहोस् ।

- c) Construct a quadrilateral ABCD, in which $AB=4.2 \text{ cm}$, $BC=5.6 \text{ cm}$, $CD=5 \text{ cm}$, $AD=4.8 \text{ cm}$ and $BD=6.5 \text{ cm}$. Also construct ΔADP which is equal to the area of the quadrilateral.

$AB = 4.2 \text{ cm}$, $BC = 5.6 \text{ cm}$, $CD = 5 \text{ cm}$, $AD = 4.8 \text{ cm}$ र $BD = 6.5 \text{ cm}$ भएको चतुर्भुज ABCD बनाउनुहोस् । साथै चतुर्भुजको क्षेत्रफल बराबर भएको ΔADP पनि बनाउनुहोस् ।

12. In the given figure, ABCD is a parallelogram

दिएको चित्रमा ABCD एउटा समानान्तर चतुर्भुज हो ।



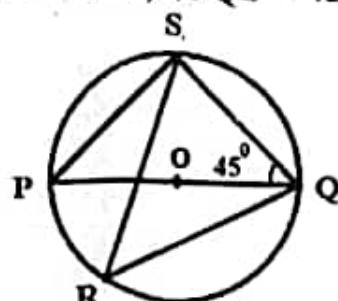
a) Prove that (प्रमाणित गर्नुहोस्) : $\angle PQD = \angle ABC$ [2]

b) Is PBCQ a cyclic quadrilateral? Give reason. [1]

के PBCQ चक्रिय चतुर्भुज हो ? कारण दिनुहोस् ।

13. In the given figure, O is the center of circle, $\angle PQS = 45^\circ$.

दिएको चित्रमा, O वृत्तको केन्द्र हो, $\angle PQS = 45^\circ$ रहेको छ ।



a) What is the value of $\angle PSQ$? [1]

$\angle PSQ$ को मान करि हो ?

b) Find the value of $\angle QRS$. [1]

$\angle QRS$ को मान पता लगाउनुहोस् ।

c) Verify experimentally that central angle of circle is twice the circumference angle standing on same arc. (At least two circles with radii more than 3 cm are necessary) [2]

एउटै चापमा रहेका वृत्तको केन्द्रीय कोण परिधि कोणको दोब्बर छ भनी प्रयोगात्मक रूपमा प्रमाणित गर्नुहोस् । (तीन सेमी भन्दा बढी अर्धव्यास भएका कमितमा दुई वृत्तहरू आवश्यक छन्)

14. A monkey on the top of tree observes a top of temple and finds the angle of depression of 30° . The height of temple is 10 m and distance between tree and temple is 12 m.

रुखको टुप्पोमा रहेको बाँदरले मन्दिरको टुप्पो हेच्छं र 30° को अवनती कोण बनाउच्छ । मन्दिरको उचाइ १० मिटर छ र रुख र मन्दिर बीचको दूरी १२ मिटर छ ।

a) Define angle of depression. अवनती कोणको परिभाषा दिनुहोस् । [1]

b) Draw a figure according to context. सन्दर्भ अनुसार चित्र बनाउनुहोस् । [1]

c) Find the height of the tree. रुखको उचाइ पता लगाउनुहोस् । [1]

d) Find the shortest distance between the foot of temple and top of the tree. FB - Tuition Class of Rajan Shrestha [1]

मन्दिरको फेद र रुखको टुप्पो बीचको मध्यभन्दा छोटो दूरी पता लगाउनुहोस् ।

15. The following table shows the marks obtained by students in the Mathematics mid-term examination.

विज्ञ तात्त्विकामे प्रश्नमा गणित विषयको मध्य वैज्ञानिक परीक्षामा विद्यार्थीले प्राप्त प्राप्ति को अनु विवरणमा देखा।

Marks	0-10	10-20	20-30	30-40	40-50	50-60
Number of students	12	18	27	x	17	6

- a) Write the formula to find the arithmetic mean of continuous data by direct method. [1]
प्रत्यक्ष विधिले अखण्डित तथाको अकार्णीय मध्यम पता लगाउने सूत्र लेखनुहोस्। FB - Tuition Class of Rajan Shrestha
- b) If the average mark of students is 28, find the value of x. [2]
यदि विद्यार्थीहरूको औसत अंक २८ हो भने, x को मान पता लगाउनुहोस्।
- c) Find the median marks of the students. [2]
विद्यार्थीहरूको मध्यिका अंक पता लगाउनुहोस्।
- d) If marks less than 30 are considered as failing marks, find the percentage of failed students. [1]
यदि ३० भन्दा कम अंक प्राप्त गर्ने विद्यार्थीहरूलाई असफल मानिन्दू भने, असफल विद्यार्थीहरूको प्रतिशत निकाल्नुहोस्।

16. A bag contains 4 red and 5 blue balls of same size and sizes.

एउटा भोलामा एउटे आकार, र उस्तै ४ बटा राता र ५ बटा नीला बलहरू छन्।

- a) If $P(A \cap B) = P(A) \times P(B)$ what type of event are A and B? [1]
यदि $P(A \cap B) = P(A) \times P(B)$ छ भने A र B कस्तो प्रकारको घटना हुन्?
- b) Two balls are drawn randomly one after another without replacement; show the probabilities in tree diagram. [2]
दुईबटा बलहरू एक पछि अको नहेरीकन (पुन नराखीकन) निकालिएका छन् भने परिणामहरूको सम्भाव्यतालाई वृक्ष चित्रमा देखाउनुहोस्।
- c) Find the probability of getting both blue balls. [1]
दुवै नीलो बलहरू प्राप्त गर्ने सम्भाव्यता पता लगाउनुहोस्।
- d) Compare the probability of getting balls of same color and probability of different color. [1]
एउटे रंगका बलहरू प्राप्त गर्ने सम्भाव्यता र फरक रंगका बलहरू प्राप्त गर्ने सम्भाव्यताको तुलना गर्नुहोस्।

कृष्ण



भक्तपुर नगरपालिका

एसईई तयारी परीक्षा-२०८२

SEE Preparation Examination-2082

कक्षा: १०

पूर्णाङ्गक: ७५

विषय: अनिवार्य गणित

समय: ३ घण्टा

सबै प्रश्नहरू अनिवार्य छन्। (Attempt all the questions)

1. 145 जना विद्यार्थीहरूको एउटा समूहमा गणित मन पराउने र विज्ञान मन पराउने विद्यार्थीहरूको अनुपात $6:7$ छ। यदि 10 जनालाई दुवै विषयहरू मनपर्छ र 25 जनालाई कुनै पनि विषय मन पर्दैन भने, (In a group of 145 students, the ratio of the number of students who like Math and who like Science is $6:7$. If 10 of them like both the subjects and 25 of them like none of these subjects, then) [1+3+1+1]
 - a) यदि M र S ले क्रमशः गणित मन पराउने र विज्ञान मन पराउने विद्यार्थीहरूको समूह जनाउँदछ भने $n(\overline{M \cup S})$ को मान पत्ता लगाउनुहोस्। (If M and S denote the set of students who like Math and Science respectively then write the value of $n(\overline{M \cup S})$.)
 - b) विज्ञान मात्र मन पराउने विद्यार्थी सङ्ख्या पत्ता लगाउनुहोस्। (Find the number of students who like only Science.)
 - c) माथिको तथ्याइकलाई भेन चित्रमा प्रस्तुत गर्नुहोस्। (Represent the above data in a Venn-diagram.)
 - d) पछि जाँचवाट थाहा भयो कि दुवै विषय मन पराउने भनी गणना गरिएका ५ जना विद्यार्थीले वास्तवमा विज्ञान विषय मन पराउँदैन। यस सच्याइसँगै गणित विषय मात्र मन पराउने विद्यार्थी कर्ति हुन्छ पत्ता लगाउनुहोस्। Later, a recheck found that 5 students who were counted as liking both subjects actually do not like Science. After correcting the data, find the number of students who like only Math.)
2. एक जना व्यक्तिले प्रतिवर्ष 12% वार्षिक चक्रीय व्याजको हिसाबले 2 वर्षको लागि रु. 3,00,000 ऋण लियो। व्याज र सावालाई आंशिकरूपमा घटाउनको लागि उसले पहिलो वर्षको अन्त्यमा रु. 1,50,000 फिर्ता गय्यो। (A person took a loan of Rs. 3,00,000 for 2 years at the rate of 12% annual compound interest. To reduce interest and the loan partly, he paid Rs. 1,50,000 at the end of the first year.) [1+2+1]

- a) अधूरार्पिक चक्रीय व्याज पत्ता लगाउने सूत्र लेख्नुहोस् । (Write the formula to calculate the compound interest compounded semi-annually.)
- b) दोश्रो वर्षको अन्त्यमा सो ऋण चुक्ता गर्नको लागि कति रुपियाँ तिर्नुपर्नां ? (How many rupees does he have to pay at the end of the second year to clear his debt?)
- c) उसले दुई वर्षमा तिरेको जम्मा व्याज गणना गर्नुहोस् । (Calculate the total interest paid by him in 2 years.)
3. सुदिपसंग रु.3,00,00,000 छ । सुदिपले रु.1,00,00,000 मा एउटा कार र रु.2,00,00,000 मा एउटा जग्गा खरिद गरे । 2 वर्षसम्म कारको मूल्य वार्षिक 10% का दरले चक्रीय ह्रास हुँदै गएछ, भने जग्गाको मूल्य निश्चित प्रतिशतले चक्रीय वृद्धि हुँदै गएको छ । (Sudip has Rs. 3,00,00,000 with him. Sudip purchased a car for 1,00,00,000 and a piece of land for Rs. 2,00,00,000. For 2 years, the price of the car has been decreasing at a compound rate of 10% per annum, while the price of the land has been increasing at a certain compound growth rate.) [1+2+2]
- a) चक्रीय मिश्रह्रास पत्ता लगाउने सूत्र लेख्नुहोस् । (Write the formula to find the amount of compound depreciation.)
- b) 2 वर्ष पछि उक्त कारको मूल्य कति हुन्छ ? गणना गर्नुहोस् । (What will be the price of the car after two years? Calculate.)
- c) 2 वर्षपछि कार र जग्गाको जम्मा मूल्य रु. 3,23,00,000 हुन्छ भने जग्गाको मूल्यमा कति प्रतिशतले वृद्धि भएको रहेछ ? हिसाब गर्नुहोस् । (After 2 years the total price of car and land is Rs. 3,23,00,000, then what is the rate of compound growth in the price of land?)
4. नेपाल राष्ट्र बैंकले जुलाई 8, 2025 का लागि निधारण गरेको क्यानेडियन डलरको विनियम दर निम्नानुसार छ । (Nepal Rastra Bank has published the exchange rate of Canadian dollars for 8 July 2025 as follows:)

मुद्रा (Money)	खरिद दर (Buying Rate)	विक्री दर (Selling Rate)
CAD \$1	Rs. 98.90	Rs. 99.25

बिरेन्द्रले केही क्यानेडियन डलर किनेर नेपाली रुपैयाँ 10% अवमूल्यन भएपछि बेच्दा रु. 56,580 नाफा बनायो । (Birendra bought some Canadian dollar and sold them after the devaluation of Nepali money by 10% and made a profit of Rs. 56,580.) [1+1+2]

- a) कुन दरमा विरेन्द्रले भुरुमा क्यानेडियन डलर किनेको थियो ? (At what rate Birendra had bought Canadian dollar in the beginning.)
- b) नेपाली मूद्रा अबमूल्यनपछि विनियम दर पत्ता लगाउनुहोस् । (Find the money exchange rate after devaluation of Nepali money.)
- c) रु.56,580 नापा बनाउन विरेन्द्रले कति क्यानेडियन डलर किनेर बेच्नुपर्ला ? (How much Canadian dollar should Birendra buy and sell to make a profit of Rs. 56,580?)
5. रामले घरको छानो जस्तापाताले छाउने विचार गन्यो । घरको छानो वर्ग आधार भएको पिरामिड आकारमा छ । छानोको उचाइ 12 फिट र छड्के उचाइ 13 फिट छ । (Ram thought of covering the roof of the house with zinc sheets. The roof of the house is in the shape of a pyramid with a square base. The height of the roof is 12 feet and the height of the rafters is 13 feet.) [1 + 1 + 2]
- a) छानाको वर्गाकार आधारको एक छेउको लम्बाइ कति हुन्छ ? (Find the length of one side of the square base of the roof.)
- b) छाना छोप्न आवश्यक जस्ता पाताको कुल क्षेत्रफल कति हुन्छ ? (Calculate the total area of zinc sheet required to cover the roof.)
- c) जस्ता पाता लगाइसकेपछि रामले छानाको भित्री सतह रंग लगाउने निर्णय गर्दछन् । यदि रंग लगाउने खर्च प्रति वर्ग फिट रु. 60 छ र काठका संरचनाका कारण 15% क्षेत्रफलमा रंग लगाउन नमिल्ने भएमा, छानामा रंग लगाउनुपर्ने कुल खर्च कति हुन्छ? (After covering the roof with zinc sheets, Ram decides to paint the inner surface of the roof. If the cost of painting is Rs 60 per square foot and 15% of the surface area is not paintable due to wooden supports, calculate the total cost of painting the roof.)
6. एउटा पानी ट्याइकी बेलनाकार र अर्धगोलाकार भाग मिलेर बनेको छ । सो ट्याइकीको पूरा उचाइ 24 m छ र आधारको क्षेत्रफल 616 m^2 भए, (A water tank is formed with the combination of cylinder and hemisphere. The height of the tank is 24 m and the base area is 616 m^2 .) [1 + 2 + 2]
- a) आधारको व्यास पत्ता लगाउनुहोस् । (Find the diameter of the base.)
- b) सो ट्याइकीको आयतन पत्ता लगाउनुहोस् । (Find the volume of the tank.)

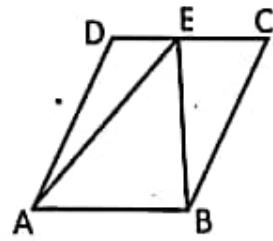


- c) प्लास्टर गर्न आवश्यक वाहिरी सतहको क्षेत्रफल निकाल्नुहोस् । (Calculate the total outer surface area of the tank that needs plastering.)
7. एउटा हलको वर्गाकार आधार छ, जसको प्रत्येक छेउ 14 मि छ र हलको उचाइ 6 मि छ । उक्त हलमा (The base of a hall is square-shaped with each side 14 m and the height of the hall is 6 m. The hall has)[1 + 1 + 2]
- 2 वटा ढोका छन्, प्रत्येकको आकार $2 \text{ m} \times 3 \text{ m}$ र (two doors, each of size $2 \text{ m} \times 3 \text{ m}$, and)
 - 8 वटा भ्याल छन्, प्रत्येकको आकार $2.5 \text{ m} \times 1.5 \text{ m}$ छ । (Eight windows, each of size $2.5 \text{ m} \times 1.5 \text{ m}$.)
- माथि दिइएको जानकारीको आधारमा निम्न प्रश्नहरूको उत्तर दिनुहोस् । (On the basis of the given information, answer the following questions:)
- a) हलको आधार क्षेत्रफल पत्ता लगाउनुहोस् । (Find the area of the base of the hall.)
- b) हलका चारवटा भित्ताहरूको कुल क्षेत्रफल पत्ता लगाउनुहोस् । (Find the total area of the four walls.)
- c) यदि ढोका र भ्यालको क्षेत्रफल घटाएपछि वार्की भित्ताको 90% मात्र रंगिनु पर्ने हो भने, प्रति वर्ग मिटर रु. 120 का दरले भित्तामा पेन्टीड गर्न लाग्ने जम्मा खर्च पत्ता लगाउनुहोस् । If only 90% of the wall area (excluding doors and windows) is to be painted, find the total cost of painting the walls at the rate of Rs. 120 per square meter.
8. एक विद्यार्थी हरेक महिनामा दुई फरक तरिकाले पैसा बचत गर्दछ । (A student saves money every month in two different ways.) [1 + 2 + 2]
- योजना A: पहिलो महिनामा रु. 500 बचत गर्दछ र प्रत्येक महिनामा रु. 100 ले बचत बढाउँछ । (In Plan A, he saves Rs. 500 in the first month and increases his saving by Rs. 100 every month.)
 - योजना B : पहिलो महिनामा रु. 500 बचत गर्दछ र प्रत्येक महिना अघिल्लो महिनाको बचतको दुई गुणा बचत गर्दछ । (In Plan B, he saves Rs. 500 in the first month and each month his saving becomes twice the previous month's saving.)

उपरोक्त जानकारीको आधारमा निम्न प्रश्नहरूको उत्तर दिनुहोस् । (On the basis of the above information, answer the following questions:)

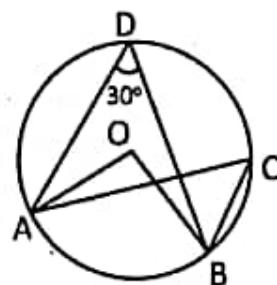
- a) कुन योजना अंकगणितीय अनुक्रम हो र कुन ज्यामितीय अनुक्रम हो लेख्नुहोस् ।
 (State which plan represents an Arithmetic Sequence and which represents a Geometric Sequence.)
- b) योजना A मा, छैठौ महिनामा बचत परिणामको रकम पता लगाउनुहोस् । (Find the amount saved in the 6th month in Plan A.)
- c) योजना B मा, कति महिनामा कूल बचत रकम रु. 1,27,500 हुनेछ ? पता लगाउनुहोस् । (In how many months, will the total saving amount be Rs. 1.27.500.)
9. रामको हालको उमेर 50 वर्ष र सीताको हालको उमेर 45 वर्ष छ । (The present age of Ram is 50 years and the present age of Sita is 45 years.)
- [1 + 2 + 2]
- a) राम र सीताको x वर्ष अघिको उमेर कति थियो ? (What was the age of Ram and Sita before x years ?)
- b) यदि x वर्षअघि उनीहरुको उमेरको गुणनफल 750 थियो भने x को मान कति हुन्छ ? (If the product of their ages before x years was 750, what is the value of x .)
- c) उनीहरुको उमेरको अनुपात 13:12 हुँदा राम र सीता कति कति वर्षका हुनेछन् ? गणना गर्नुहोस् । (How old will they be when the ratio of their ages is 13:12? Calculate it.)
10. a) सरल गर्नुहोस् । (Simplify): $\frac{x+y}{x-y} - \frac{x-y}{x+y} - \frac{2xy}{x^2-y^2}$ [3]
- b) हल गर्नुहोस् । (Solve): $3^{2x} - 4 \times 3^x + 3 = 0$ [2]
11. एउटै आधार RI र उही समानान्तर रेखाहरु RI र KS बीच समानान्तर चतुर्भुज KRIS र त्रिभुज RHI रहेका छन् । (A parallelogram KRIS and a triangle RHI are standing on the same base RI and between the same parallel lines RI and KS.)
- [1 + 2 + 1]
- a) एउटै आधार र उही समानान्तर रेखाहरुबिच बनेका समानान्तर चतुर्भुजहरुको क्षेत्रफल विचको सम्बन्ध लेख्नुहोस् । (Write the relation between the area of parallelograms standing on the same base and between the same parallel lines.)
- b) समानान्तर चतुर्भुज KRIS को क्षेत्रफल त्रिभुज RHI को दोब्बर हुन्छ भनी प्रमाणित गर्नुहोस् । (Prove that the area of parallelogram KRIS is double of the area of the triangle RHI.)

- c) दिइएको चित्रमा ABCD एउटा समानान्तर चतुर्भुज हो र DC को मध्यविन्दु E हो । यदि ABCD को क्षेत्रफल 24 वर्ग से.मि. भए त्रिभुज ECB को क्षेत्रफल निकाल्नुहोस् । (In the given figure, ABCD is a parallelogram and E is the midpoint of DC. If the area of the parallelogram ABCD is 24 cm^2 , then find the area of triangle ECB.)



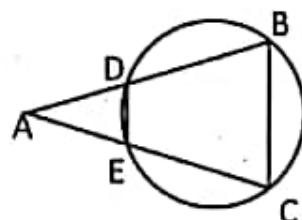
12. दिइएको चित्रमा वृत्तको केन्द्रविन्दु O र $\angle ADB = 30^\circ$ छ । (In the figure, O is the center of the circle with angle $\angle ADB = 30^\circ$.) [1 + 1 + 2]

- a) AB चापमा बनेका परिधिकोणहरु लेख्नुहोस् । (Write the name of an inscribed angles subtended by arc AB.)
 b) $\angle AOB$ को मान पत्ता लगाउनुहोस् । (Find the value of $\angle AOB$.)
 c) कम्तिमा 3 से.मि. अर्धव्यास भएका दुईवटा वृत्तहरु बनाई एउटै चापमा आधारित परिधिकोणको मान बराबर हुन्छ भनी प्रयोगात्मक विधिवाट परीक्षण गर्नुहोस् । (Verify experimentally that the inscribed angles standing on the same arc are equal by making two circles of radii not less than 3 cm.)



13. a) चतुर्भुज ABCD को रचना गर्नुहोस् । जहाँ, $AB = 5.1$ से.मि., $BC = 4.9$ से.मि., $CD = 5.5$ से.मि., $DA = 6.1$ से.मि. र $BD = 5.3$ से.मि. छन् । उक्त चतुर्भुजको क्षेत्रफलसँग बराबर हुने गरी एउटा पनि रचना गर्नुहोस् । (Construct a quadrilateral ABCD with $AB = 5.1 \text{ cm}$, $BC = 4.9 \text{ cm}$, $CD = 5.5 \text{ cm}$, $DA = 6.1 \text{ cm}$, and $BD = 5.3 \text{ cm}$. Also, construct a triangle whose area is equal to the area of the quadrilateral.) [3]

- b) दिइएको चित्रमा $AD = AE$ भए $DE//BC$ हुन्छ भनी प्रमाणित गर्नुहोस् । (In the given figure, if $AD = AE$, prove that $DE//BC$.) [2]



14. एउटा 1.5 मि. अग्लो केटाले 9 मि. अग्लो घरको छतबाट चड्हा उडारहेको छ । चड्हाको धागाले जमिनसँग समानान्तर हुने रेखासँग 30° को कोण बनाउँछ । चड्हा जमिनदेखि 58 मि. उचाइमा पुगेको छ । (A 1.5 m tall boy is flying a kite

from the roof of a 9 m high house. When the string of the kite makes an angle of 30° with the line parallel to the ground, the height of the kite from the ground is 58 m.) [1 + 1 + 1 + 1]

- a) माथिको जानकारीलाई चित्रमा प्रस्तुत गर्नुहोस् । (Present the above information in the figure.)
 - b) धागोको वास्तविक लम्बाइ पत्ता लगाउनुहोस् । (Find the length of the string.)
 - c) केटो र चड्गाविचको तेस्रो दुरी पत्ता लगाउनुहोस् । (Find the horizontal distance between the boy and the kite.)
 - d) यदि धागोले बनाएको कोण 30° नभई 60° भएको भए तेस्रो दुरीमा कस्तो परिवर्तन हुन्छ ? कारण दिनुहोस् । If the angle made by the string is 60° instead of 30° what changes will there be in the horizontal distance? Give reason.)
15. तल दिइएका तथ्याङ्कको रीत 36 छ । (In the following data, the mode is 36.) [1 + 2 + 2 + 1]
- | Class | 10 – 20 | 20 – 30 | 30 – 40 | 40 – 50 | 50 – 60 |
|-----------|---------|---------|---------|---------|---------|
| frequency | 4 | 7 | a | 8 | 1 |
- a) रीत पर्ने श्रेणी कति हुन्छ ? (Find the modal class.)
 - b) a को मान पत्ता लगाउनुहोस् । (Find the value a.)
 - c) औसत मान रीत भन्दा कतिले बढी वा घटी हुन्छ ? (By how much is the mean of the data more or less than the mode?)
 - d) के औसत पर्ने श्रेणी, मध्यिका पर्ने श्रेणी र रीत पर्ने श्रेणी एउटै हुन्छ ? पत्ता लगाउनुहोस् । (Does the mean, median and mode lie in the same class? Determine it.) FB - Tuition Class of Rajan Shrestha
16. एउटा झोलामा 5 ओटा सेता र 7 ओटा काला उही आकारका बलहरु छन् । (A bag contains 5 white and 7 black balls of the same size.) [1 + 2 + 1 + 1]

- a) यदि A र B अनाश्रित घटनाहरु हुन् भने $P(A \text{ र } B)$ पत्ता लगाउने सुन्न लेख्नुहोस् । (Write the formula to find $P(A \text{ and } B)$ if A and B are independent events.)
- b) दुईओटा बलहरु एकपछि अर्को पुनः नराखी फिकदा आउन सक्ने सबै सम्भाव्यतालाई वृक्षचित्रमा देखाउनुहोस् । (Two balls are drawn

randomly one after another from the box without replacement.
Show the probability of all possible outcomes in a tree diagram.

- c) दुवै बल कालो आउने सम्भाव्यता निकाल्नुहोस् । (Find the probability of getting both the balls are black.)
- d) के पहिलो बल सेतो र दोस्रो बल कालो आउने सम्भाव्यता पहिलो बल कालो र दोस्रो बल सेतो आउनेसँग वरावर हुन्छ ? कारण सहित उपयुक्त जवाफ दिनुहोस् । (Is the probability of getting the first ball white and the second ball black, equal to getting the first ball black and the second ball white? Give suitable answer with reason.)

The End

SEE Pre – Preparatory Examination 2025 – 2026

Jawalakhel, Lalitpur

Subject: Mathematics

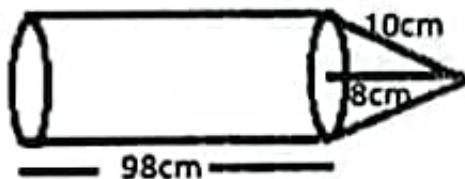
F.M.: 75

Time: 3 hrs

P.M.: 30

1. In a survey of 50 people of a community, it was found that the ratio of the people who like tea only and coffee only is 2:3. Out of which 30% of the total people liked both and 10% of the people did not like both.
 - a) Write the above information in the cardinal form by assuming tea by T and coffee by C. [1]
 - b) Draw a Venn diagram to illustrate the above information. [1]
 - c) Find the number of people who like exactly one item. [3]
 - d) Compare the number of people who like both items and number of people who like tea only. [2]
2. Sagar deposited RS 50,000 at 8% per annum compound interest compounded semiannually in a bank for two years.
 - a) Write the formula to find compound amount quarterly. [1]
 - b) How much semiannual compound amount received by him. Find it. [2]
 - c) Find the difference between half yearly compound amount if the rate of interest is increased from 8% to 10% per annum. [2]
3. A man bought a computer for Rs.40, 000, then he sold it to for Rs. 32,400 after using it for 2 years.
 - a) Define compound depreciation. [1]
 - b) Find the rate of compound depreciation of the computer. [2]
 - c) What is the decreased price of the computer after 3 years at the same rate. Find it. FB - Tuition Class of Rajan Shrestha [1]
4. According to the money exchange rate 1 US dollar is equal to NRs 103.72 and 1 pound is equal to NRs. 170.
 - a) How much US dollar can be exchanged with NRs.51860? [1]
 - b) How much pound can be exchanged by 1000 dollar? [1]

- c) Nepali currency is devaluated to the comparison of US dollars by 10%. How many Nepali rupees are required to get US dollar 1000? [2]
5. In the square base pyramid, the slant height is 13cm and the length of base side is 10cm.
- Write the formula for finding volume of a square base pyramid. [1]
 - Find the height of the pyramid. [1]
 - Find the area of triangular surfaces of the pyramid. [1]
6. Given solid object is formed by combining cylinder and a cone with equal radius. The slant height of cone is 10 cm, vertical height is 8cm and the height of the cylinder is 98cm.



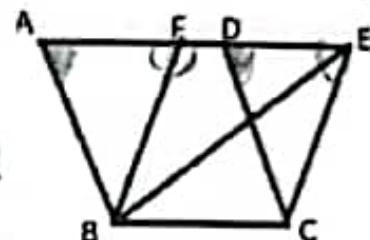
- What is the radius of the base of cylinder? Find it. [1]
 - Find the cost of coloring the surface of the solid object at the rate of 10 paisa per square cm. [2]
 - How many times more the volume of cylinder is than the volume of cone? Write the answer in whole number. [1]
7. A water tank is formed with a cylinder in the lower part and hemisphere above it. The total height of the tank is 20m and the base area is 154 m^2 . FB - Tuition Class of Rajan Shrestha
- Find the cost of coloring the surface of water tank except bottom of the tank at the rate of 50 paisa per sq.meter. [3]
 - The capacity of the tank is 2002 cubic meter. Is Rs. 1,00,000 sufficient to fulfill the water tank at the rate of Rs.50 per cubic meter? Write by calculating. [2]
8. The first three terms of arithmetic series are given below
 $24 + 20 + 16 + \dots$
- Write the formula for finding sum of arithmetic series. [1]
 - Find the sum of the first 10 terms. [2]
 - For how many numbers, the sum of the series is 72? Find it. [2]

9. Sila was 25 years old when her son was born. Now the product of their ages is 150 years.
- Express the above statement in mathematical form supposing the present age of son as x years. [1]
 - Find their present ages. [3] \checkmark
 - After how many years, the product of their ages will be 350. [2]

10.

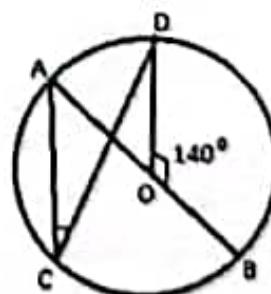
- If $x-1 = 2^{\frac{1}{3}} + 2^{\frac{2}{3}}$, prove that: $x(x^2 - 3x - 3) = 1$ [3]
- $$\frac{a+b}{a-b} + \frac{a-b}{a+b} + \frac{a^2+b^2}{a^2-b^2}$$
 [2]

11. In the figure, parallelograms ABCD and BCEF and $\triangle EBC$ are on the same base BC and between the same parallel lines BC and AE. [1+2+2]



- Write the formula to find area of parallelogram.
- Prove that the area of parallelograms standing on the same base and lying between same parallel lines are equal in area.
- If the length of base of parallelogram ABCD is 12cm and height is 10cm find the area of $\triangle EBC$.

12. In the figure, O is the center of the circle. AOB is a diameter and $\angle BOD = 140^\circ$.



- Write the relationship between inscribed angle and central angle standing on the same arc. [1]
- Find the value of $\angle ACD$. [2]
- Experimentally verify that Opposite angles of cyclic quadrilateral are supplementary. FB - Tuition Class of Rajan Shrestha [3] \checkmark

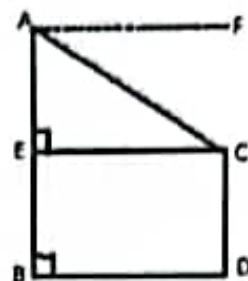
13.

- AC and BD are diagonals of rhombus ABCD. Write the relation between AC and BD . [1]

- b) Construct a quadrilateral ABCD in which AB=BC= 5.5 cm, CD=DA=4.5cm and $\angle DAB=60^\circ$. Also construct a triangle equal to the area of quad. ABCD. [3]

14. In the given figure, height of the tower AB is 21.5m and the height of a house CD is 1.5m. BD denotes the distance between tower and house.

- a) Define the angle of depression. [1]
 b) Find the value of AE. [1]
 c) If $\angle FAC$ is 30° , find the distance between tower and house [1]
 d) By how many degree is the angle of depression less or more when AE and EC are equal? Compare it. [1]



15. The given data is marks obtained by 20 students in an exam of mathematics.

Marks obtained	0-10	10-20	20-30	30-40	40-50
No. of students	2	3	6	5	4

- a) What does i denote in the formula. [1]

$$Q_1 = L + \left(\frac{\frac{N}{f} - c.f.}{f} \right) \times i$$

- b) Find the mean. [2]

- c) By what percentage the mean (\bar{x}) is less than the median(m_d).
 Find it by calculation. [2]

16. A fair die is thrown once.

- a) Identify whether the occurrence of 1 and 6 are mutually exclusive events or non-mutually exclusive events. [1]
 b) Find the probability of getting 1 or 6. [1]
 c) Find the probability of getting an even number or a multiple of 3. [1]
 d) Shyam said that the probability of getting an odd number or a composite number is equal to the probability of getting a prime number or factor of 4. Justify the statement. [2]

Best of Luck



Symbol No: Date : 2082/10/18 Subject Code: 1031

PABSON SEE Preparatory Examination – 2082

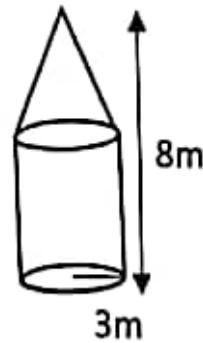
Time : 3 hours Subject : C. Mathematics Full Marks : 75

Attempt all the questions.

1. In a survey of 50 people visiting Pokhara were asked whether they like Fewa lake or Begnas lake. It was found that 3 people prefer both the lakes and 2 people choose neither of them. The number of people who like Fewa lake only is twice the number of people who like Begnas lake only. (पोखरा भ्रमण गर्ने ५० जना मानिसहरूलाई फेवाताल मन पर्छ कि बेगनासताल मन पर्छ भनेर सोधा, ३ जनाले दुवै ताल मन पराउँछन् र २ जनाले कुनै पनि रोजदैनन् भन्ने पत्ता लायो। फेवाताल मात्र मन पराउनेहरूको संख्या बेगनासताल मात्र मन पराउनेहरूको संख्याको दोब्बर छ।)
 - a. Write the set of people who choose both the lakes in cardinality notation by supposing the set of people who like Fewa lake by F and who like Begnas lake by B. (फेवाताल मन पराउनेहरूको समूहलाई F र बेगनासताल मन पराउनेहरूको समूहलाई B ले मानेर दुवै तालहरू रोजेहरूको समूहलाई गणनात्मकता संकेतमा लेख्नुहोस।) [1K]
 - b. If the number of people who like Benas lake only is x , what would be the number of people who like Fewa lake only? (यदि बेगनासताल मात्र मन पराउनेहरूको संख्या x छ भने, फेवाताल मात्र मन पराउनेहरूको संख्या कति होला?) [1U]
 - c. By drawing a Venn-diagram, find the number of people who like Fewa lake. (मेन-चित्र बनाएर, फेवाताल मन पराउनेहरूको संख्या पत्ता लागाउनुहोस।) [3A]
 - d. If 5 people who like Fewa lake only wanted to change their preference to choose only Begnas lake, what percentage of people are there who don't like Begnas lake now? (यदि फेवाताल मात्र मन पराउने ५ जनाले आफ्नो प्राथमिकता परिवर्तन गरेर बेगनासताल मात्र रोज चाहे भने, अहिले कति प्रतिशत मानिसहरू बेगनासताल मन पराउँदैनन्?) [1HA]
2. Naina deposited Rs. 50,000 in 'woman saving account' in Pokhara Development Bank for 2 years. (नैनाले पोखरा विकास बैंकमा २ वर्षको लागि भिला बचत खाता' मा रु. ५०,००० जम्मा गरिन्।) FB - Tuition Class of Rajan Shrestha
 - a. If P , N , K and CA_y represent principal, no. of years, rate of interest and annual compound amount respectively, then express their relation in mathematical formula form. (यदि P , N , K र CA_y ले क्रमशः मूलधन, वर्ष संख्या, ब्याज दर र वार्षिक चक्रीय मिश्रधनको प्रतिनिधित्व गर्छ भने, तिनीहरूको सम्बन्ध गणितीय सूत्रको रूपमा व्यक्त गर्नुहोस।) [1K]

- b. The bank provided 8% p.a. Compound interest annually in the first year and 6% p.a. compound interest semi-annually in the second year, find the interest she got at the end of the 2 years. (बैंकले पहिलो वर्षमा वार्षिक ८% चक्रीय ब्याज र दोस्रो वर्षमा अर्धवार्षिक ६% चक्रीय ब्याज प्रदान गर्न्यो भने, २ वर्षको अन्त्यमा उनले प्राप्त गरेको ब्याज पत्ता लगाउनुहोस्।) [2A]
- c. Had the bank provided 6% p.a. compound interest semi-annually in the first year and 8% p.a. compound interest quarterly in the second year, how much would be the difference in the interests in these two years in comparison to previous 2 years? (यदि बैंकले पहिलो वर्षमा अर्धवार्षिक ६% चक्रीय ब्याज र दोस्रो वर्षमा त्रैमासिक ८% चक्रीय ब्याज प्रदान गरेको भए, अधिल्लोको दुइ वर्षको तुलनामा यो दुई वर्षको ब्याजमा कति भिन्नता हुन्यो?) [2HA]
3. John bought a new bike for Rs. 1,20,000 and sold it as second hand at Rs. 87,480 to Mohan after using it for 3 years. (जोनले रु. १,२०,००० मा नयाँ मोटरसाइकल किनेका थिए र ३ वर्ष प्रयोग गरेपछि मोहनलाई रु. ८७,४८० मा सेकेन्ड ह्यान्डको रूपमा बेचेका थिए।)
- If $P_T = P \left(1 - \frac{R}{100}\right)^T$ represents the formula to calculate the price of the bike after T years, what does the value of $P - P_T$ represent? (यदि $P_T = P \left(1 - \frac{R}{100}\right)^T$ ले T वर्ष पछि मोटरसाइकलको मूल्य गणना गर्छ भने, $P - P_T$ ले कुन मूल्य जनाउँछ?) [1A]
 - Find the rate of depreciation in the price of the bike. (मोटरसाइकलको मूल्यमा मूल्यहास दर पत्ता लगाउनुहोस्।) [2U]
 - The price of a house bought at a certain price becomes $\frac{1}{4}$ of its price in 2 years after a certain rate of depreciation. Find the rate of depreciation.? (निश्चित मूल्यमा किनेको घरको मूल्य २ वर्षमा मूल्यहास पछि यसको मूल्यको $\frac{1}{4}$ भाग बन्छ भने मूल्यहासको दर पत्ता लगाउनुहोस्।) [1HA]
4. Chameli was going to USA to visit for few months. She exchanged Rs 7,06,000 to US dollars in a day when the rate of exchange was: Buying rate: 1 US \$ = Rs 140 and selling rate 1 US \$ = Rs 141.2 (चमेली केही महिनाको लागि अमेरिका भ्रमण गर्न जाँदै पिइन। उनले एक दिन रु. ७,०६,००० अमेरिकी डलरमा साटिन् जुन दिन विनिमय दर, खरिद दर: १ अमेरिकी डलर = १४० रुपैयाँ र बिक्री दर: १ अमेरिकी डलर = १४१.२ रुपैयाँ पियो।)
- Find how much dollars will she get while exchanging Rs. 7,06,000 to US \$. (७,०६,००० रुपैयाँ अमेरिकी डलरमा साट्दा उनले कति डलर पाउनेछिन्? पत्ता लगाउनुहोस्।) [1U]

- b. She spent half of the US dollars she had taken to USA while visiting, and came back to Nepal after 4 months. How much dollars she had now while coming back to Nepal? (उनले अमेरिका भ्रमण गर्दा लगेको अमेरिकी डलरको आधा हिस्सा खर्च गरिन् ४ महिनापछि नेपाल फर्किँदै। नेपाल फर्किँदा उनीसँग कति डलर थियो?) [1K]
- c. During those 4 months, the Nepali currency has been devaluated by 2.5% in comparison to US dollars. How much Nepali Rupees will she have now if she exchanges the remaining dollars to Nepali rupees by the new devaluated rate? (ती ४ महिनामा, नेपाली मुद्राको अमेरिकी डलरको तुलनामा २.५% ले अवमूल्यन भएको छ। यदि उनले बाँकी डलरलाई नयाँ अवमूल्यन भएको दरले नेपाली रुपैयाँमा साटिन् भने उनीसँग अहिले कति नेपाली रुपैयाँ होला?) [2A]
5. A square-based pyramid has vertical height 24 cm and the length of the base is 20 cm. (वर्ग-आधारित पिरामिडको ठाडो उचाइ २४ सेमी र आधारको लम्बाइ २० सेमी छ।)
- Write the relationship among edge (e), slant height (l) and length of base (a) of a square based pyramid in the form of formula. (वर्ग-आधारित पिरामिडको किनारा (e), छडके उचाई (l) र आधार को लम्बाइ(a) बीचको सम्बन्धलाई सूत्रको रूपमा लेखुहोस्।) [1K]
 - Find the total surface area of the given square-based pyramid? (दिइएको वर्ग-आधारित पिरामिडको पुरा सतहको क्षेत्रफल पत्ता लगाउनुहोस्।) [2A]
 - Is Rs. 500 sufficient for colouring it's all the surfaces when the cost of painting is 25 paisa per square centimeter? Calculate it. (प्रति वर्ग सेन्टिमिटर २५ पैसा लागत ले के सबै सतहहरू रंगाउन ५०० रुपैयाँ पर्याप्त हुन्छ? गणना गर्नुहोस्।) FB - Tuition Class of Rajan Shrestha [1U]
6. A metallic solid is made by combining a cylinder and a cone having same radius as shown in the diagram. The radius of the base is 3m and the total height of the solid is 8m. (रेखाचित्रमा देखाइए जस्तै बराबर अर्धव्यास भएको बेलना र सोलीलाई मिलाएर धातुको ठोस बनाइन्छ। आधारको अर्धव्यास ३ मिटर छ र ठोसको कुल उचाइ ८ मिटर छ।)
- How many surfaces are there in the solid? (ठोसमा कतिवटा सतहहरू छन्?) [1K]
 - If the height of the cylinder and cone are equal, then find the volume of the solid. (यदि बेलना र सोलीको उचाइ बराबर छ भने, ठोसको आयतन पत्ता लगाउनुहोस्।) [2U]



- c. What would be the difference in the volume of cone and cylinder if the height of the conical part is tripled and the cylindrical part is as it is. (यदि सोलीको भागको उचाइ तीन गुणा गरियो र बेलनाकार भागको उचाइ जस्ताको तस्तै भए सोली र सिलिन्डरको आयतनमा कति भिन्नता हुनेछ?) [1HA]
7. A contractor company took a contract to prepare a program hall at Rs. 30,00,000. The hall has length 12m, breadth 10m and height 8m. The cost of materials used in the hall are as follows: (एक ठेकेदार कम्पनीले ३०,००,००० रुपैयाँमा कार्यक्रम हल तयार गर्ने ठेकका लिएको थियो। घरको लम्बाइ १२ मिटर, चौडाइ १० मिटर र उचाइ ८ मिटर छ। घरमा प्रयोग हुने सामग्रीको लागत यस प्रकार छः)

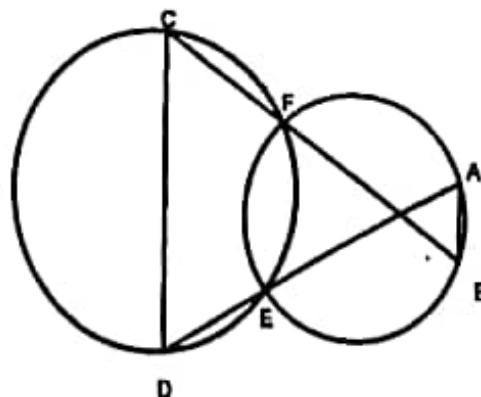
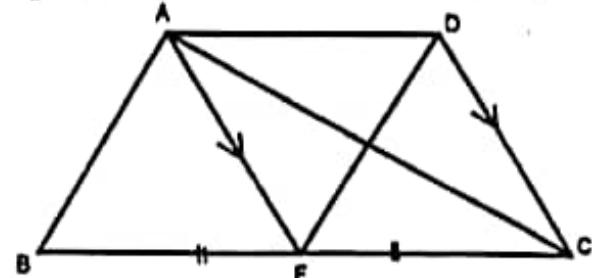
Cement: 2000 packets at Rs 400 per packet,
 Rods: 6000 kg at Rs 80 per kg,
 and the cost of other materials such as aluminum, sand, wood etc. : Rs 8,50,000.
 (सिमेन्ट: २००० प्याकेट प्रति प्याकेट ४०० रुपैयाँमा,
 रडहरू: ६००० किलोग्राम प्रति किलोग्राम ८० रुपैयाँमा,
 र आल्मुनियम, बालुवा, काठ आदि जस्ता अन्य सामग्रीको लागत: ८,५०,००० रुपैयाँ)

- The worker for plastering, charged the cost of plastering its 4 walls and floor at the rate of Rs 300 per sq. meter and the total wages of construction for other than plastering works was Rs. 3,56,000. (प्लास्टर गर्ने कामदारले यसको ४ वटा भित्ता र भुइँ प्लास्टर गर्ने लागत प्रति वर्गमिटर ३०० रुपैयाँका दरले लिएको थियो र प्लास्टर गर्ने काम बाहेक अन्य निर्माणको कुल ज्याता रु. ३,५६,००० थियो।)
- a. Find the cost of construction of the hall including the cost of materials and labour charge. (सामग्रीको मूल्य र श्रम शुल्कसहित घर निर्माणको लागत पत्ता लगाउनुहोस।) [3A]
- b. The company put Zipson on the ceiling which costs Rs. 400 per sq. meter as per the owner of the hall makes special request to do it as penalty for doing delay in completing the hall (Cost of Zipson was not included in initial contract). Calculate whether the company got profit or loss from the construction of the hall. (घरधनीले घर निर्माणमा ढिलाइ गरेकोमा जरिवाना स्वरूप प्रति वर्गमिटर ४०० रुपैयाँको दरले सिलिङ्गमा जिपसन राख्न विशेष अनुरोध गरेको कारण कम्पनीले जिपसन राखेको थियो (प्रारम्भिक सम्झौतामा जिपसनको लागत समावेश गरिएको थिएन)। घर निर्माण गर्दा कम्पनीले घाटा वा नाफा के कमाएको छ? गणना गर्नुहोस।) FB - Tuition Class of Rajan Shrestha [2HA]
8. Two stationary shops A and B at Palikhe Chok, Pokhara sell the books in the following pattern. (पोखराको पालिखे चोकमा रहेका दुई स्टेशनरी पसलहरू A र B ले निम्न ढाँचामा पुस्तकहरू बेच्छन।)

Day Shops	Baisakh-1	Baisakh-2	Baisakh-3	Baisakh-4	...
A	1000	1200	1400	1600	...
B	1	2	4	8	...

- a. How do you identify any sequence to be arithmetic or geometric? Write. (कुनै पनि अनुक्रम अंकगणितीय वा ज्यामितीय हो भनेर तपाईं कसरी पहिचान गर्नुहोस्।) [1K]
- b. Which shop sold more books in total in the first 15 days of Baisakh? Calculate it. (वैशाखको पहिलो १५ दिनमा कुन पसलले कुल धेरै पुस्तकहरू बेचेको थिए? गणना गर्नुहोस्।) FB - Tuition Class of Rajan Shrestha [3A]
- c. Compare the total number of books sold by shop A in the first 15 days to the number of books sold by shop B in the 17th day only. (पहिलो १५ दिनमा पसल A ले बेचेको कुल पुस्तकहरूको संख्यालाई पसल B ले १७ औं दिनमा मात्र बिक्री गरेको पुस्तकहरूको संख्यासँग तुलना गर्नुहोस्।) [2U]
9. The length of a rectangular futsal ground is 5 more than its breadth. Its area is 500m^2 . (आयताकार फुटसल मैदानको लम्बाइ यसको चौडाइ भन्दा ५ बढी छ। यसको क्षेत्रफल 500 वर्ग मिटर छ।)
- a. What is the condition for the equation $ax^2 + bx + c = 0$ to be quadratic equation? (समीकरण $ax^2 + bx + c = 0$ लाई द्विघात समीकरण बनाउनको लागि आवश्यक शर्त के हो?) [1K]
- b. Find the length and breadth of the futsal ground. (फुटसल मैदानको लम्बाइ र चौडाइ पत्ता लगाउनुहोस्।) [2A]
- c. The owner of the ground wishes to fence all the sides of the ground by thin plastic net to make the height of the fence as 8m on each side around it. Find the area of net required and also the cost of it at the rate of Rs 10 per sq. meter. (जमिनको मालिकले जमिनको सबै छेउमा पातलो प्लास्टिकको जालीले बार लगाउन चाहन्छ ताकि बारको ऊचाइ यसको वरिपरि ८ मिटर होस्। प्रति वर्गमिटर १० रुपैयाँको दरले आवश्यक पर्ने जालीको क्षेत्रफल र यसको लागत पनि पत्ता लगाउनुहोस्।) [2HA]
10. a. Simplify the expression $\frac{1}{4(k-8)} - \frac{1}{4(k-4)}$ and prove it to be $\frac{1}{k^2-12k+32}$. (अभिव्यक्ति $\frac{1}{4(k-8)} - \frac{1}{4(k-4)}$ लाई सरल गर्नुहोस् र यो $\frac{1}{k^2-12k+32}$ हुन्छ भनी प्रमाणित गर्नुहोस्।) [2U]

- b. Find the value of x if $k = 2^x$ and $k^2 - 12k + 32 = 0$. (यदि $k = 2^x$ र $k^2 - 12k + 32 = 0$ छ भने x को मान पता लगाउनुहोस।) [2A]
11. A parallelogram $PQRS$ and a triangle PQT are standing on the same base PQ and lie between same parallel lines PQ and MN . (एक समानान्तर चतुर्भुज $PQRS$ र त्रिभुज PQT एउटै आधार PQ र एउटै समानान्तर रेखाहरू PQ र MN मा उभिएका छन् भने)
- What is the relation between the area of two parallelograms standing on the same base and lying between same parallel lines? (एउटै आधारमा उभिएका र एउटै समानान्तर रेखाहरू बीच रहेका दुई समानान्तर चतुर्भुजको क्षेत्रफल बीच के सम्बन्ध छ?) [1K]
 - Prove that the area of triangle $PQT = \frac{1}{2}$ the area of parallelogram $PQRS$. (प्रमाणित गर्नुहोस। $\Delta PQT = \frac{1}{2} PQRS$ (क्षेत्रफलमा)) [2U]
 - In the figure alongside, E is the mid-point of BC , $AE \parallel DC$ and the area of triangle ABE is 5 cm^2 , find the area of the quadrilateral $ABED$. (चित्रमा BC को मध्य बिन्दु E हो, $AE \parallel DC$ र त्रिभुज ABE को क्षेत्रफल ५ वर्ग सेमी छ, चतुर्भुज $ABED$ को क्षेत्रफल पता लगाउनुहोस।) [1U]
12. In the figure, two circles intersect at two points E and F . AD and BC are two straight lines. (चित्रमा, दुई वृतहरू दुई बिन्दु E र F मा काटिएका छन्। AD र BC दुई सीधारेखाहरू हुन्।)
- Prove that $\angle CDE = \angle BAE$.
प्रमाणित गर्नुहोसः ($\angle CDE = \angle BAE$). [2HA] FB - Tuition Class of Rajan Shrestha
 - If CD is the diameter of the circle shown alongside, and $\angle DCF = 40^\circ$, what would be the value of $\angle CDF$, after joining D and F ? (यदि CD सँगसँगै देखाइएको वृतको व्यास र $\angle DCF = 40^\circ$ हो भने, D र F जोडेपछि $\angle CDF$ को मान कर्ति हुनेछ?) [1HA]



- c. Experimentally verify that in a circle the central angle is double of inscribed angle standing on the same arc. (Two circles of radii at least 3 cm are necessary) (प्रयोगात्मक रूपमा प्रमाणित गर्नुहोस् कि वृत्तमा केन्द्रीय कोण एउटै चापमा उभिएको परिधी कोणको दोब्बर हुन्छ। (कम्तिमा 3 सेमी अर्धव्यास भएका दुई वृत्तहरू आवश्यक छन्) [2A]
13. Answer the following questions related to construction. (रचनासँग सम्बन्धित निम्न प्रश्नहरूको उत्तर दिनुहोस्।)
- Construct a triangle ABC with $AB = 8\text{cm}$, $\angle ABC = 60^\circ$ and $BC = 6.1\text{ cm}$. Also construct a rectangle BINU having equal area to the triangle ABC. ($AB = 8\text{cm}$, $\angle ABC = 60^\circ$ र $BC = 6.1$ सेमी भएको त्रिभुज ABC बनाउनुहोस्। त्रिभुज ABC को क्षेत्रफल बराबर भएको आयत BINU पनि बनाउनुहोस्।) [3A]
 - How are their areas equal? Give reason. (तिनीहरूको क्षेत्रफल कसरी बराबर छ? कारण दिनुहोस्।) [1K]
14. There is a circular pond having radius 7 m. In the middle of the pond, a pole is to be fixed so that while observing the top of the pole from any point on the circumference, the angle of elevation must be 60° . (७ मिटर अर्धव्यास भएको एउटा गोलाकार पोखरी छ। पोखरीको बीचमा एउटा खम्बा राख्नु पर्नेछ जसले गर्दा परिधिको कुनै पनि बिन्दुबाट खम्बाको माथिल्लो भाग अवलोकन गर्दा उत्त्रातान्स कोण 60° हुनुपर्छ।) FB - Tuition Class of Rajan Shrestha
- Define angle of elevation. (उन्नतांश कोण परिभाषित गर्नुहोस्।) [1K]
 - Draw a figure to represent the above context assuming the height of pole above the water level to be x m. (पानीको सतहभन्दा माथिको खम्बाको उचाइलाई x m मानेर माथिको सन्दर्भलाई प्रतिनिधित्व गर्ने चित्र कोर्नुहोस्।) [1U]
 - Find the height of the pole above the water level. (पानीको सतहभन्दा माथिको खम्बा को उचाइ पत्ता लगाउनुहोस्।) [1A]
 - If 30% of the total length of the pole is to be fixed below the water level, how long pole is required to fix there to make the same angle of elevation? (यदि खम्बाको कुल लम्बाइको 30% पानीको सतहभन्दा तल राख्ने भने, उत्तिकै उन्नतांश कोण बन्नलाई त्यहाँ कति लामो खम्बा राख्न आवश्यक छ?) [1HA]
15. The marks obtained by 80 students of a boarding school in Mathematics are given in the table below. (एउटा आवासीय स्कुलका ८० जना विद्यार्थीहरूले गणित विषयमा प्राप्त गरेको प्राप्ताङ्कालाई तलको तालिकामा देखाईएको छ।)

Marks obtained	0-10	10-20	20-30	30-40	40-50	50-60
No. of Student	8	12	16	10	14	20

- a. What does 'i' represent in the formula for finding the median (M_d) = $L + \frac{i}{f} (\frac{N}{2} - cf)$? (मधिका पत्ता लगाउने सुत्र (M_d) = $L + \frac{i}{f} (\frac{N}{2} - cf)$ 'मा 'i' से के जनाउँछ ?) [1K]
- b. Find the median from the given data.
दिईएको तथ्याङ्कबाट मधिका पत्ता लगाउनुहोस्। [2U]
- c. Find the mode from the given data.
माधिको तथ्याङ्कबाट बहुलक पत्ता लगाउनुहोस्। [2A]
- d. What should be the number of students in the class Internal (50-60) in order to make 30 as the average score of students? Calculate and write it. (विद्यार्थीको औसत प्राप्ताङ्क ३० बनाउन (५०-६०) वर्गान्तरको विद्यार्थी सङ्ख्या कति हुनुपर्छ? गणना गरी लेख्नुहोस्।) [1HA]

16. Two cards are drawn randomly one after another without replacement from a well shuffled deck of 52 playing cards. (राप्तोसँग फिटिएको ५२ पत्ती तासको गङ्गीबाट नहेरीकन दुईवटा तासहरू ऐक पछि अर्को गरी पुनः नराखीकन झिकिएका छन् ।) FB - Tuition Class of Rajan Shrestha

- a. If M and N are two independent events, then write down the formula to find $P(M \cap N)$. (यदि M र N दुई ओटा अनाक्रित घटनाहरू हुन् भने $P(M \cap N)$ पत्ता लगाउने सुत्र के हुन्छ? लेख्नुहोस्।) [1K]
- b. Find the probability of getting both non- Faced cards. (दुवै तास अनुहार नभएको पर्ने सम्भाव्यता कति हुन्छ? पत्ता लगाउनुहोस्।) [1U]
- c. Show the probability of all possible outcomes of getting and not getting faced cards in a tree diagram. (अनुहार भएको तास पर्ने र नपर्ने सबै सम्भाव्यतालाई वृक्षचित्रमा देखाउनुहोस्।) [2A]
- d. If two cards are drawn randomly one after another with replacement, how many times more is the probability that both are non-faced cards than the probability that both cards are king? (यदि दुई ओटा तासहरू एक पछि अर्को गरी पुनः राख्दा दुवै तास अनुहार नभएको पर्ने सम्भाव्यता दुवै तास बादशाह पर्ने सम्भाव्यता भन्दा कति गुणा बढी हुन्छ?) [1HA]

The End

GEMS SCHOOL

SEE QUALIFYING EXAMINATION 2082

CLASS: X

Time: 3 hrs

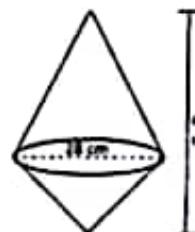
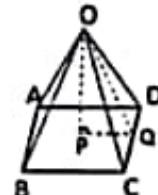
COMPULSORY MATHEMATICS SET B

F.M.: 75

1. In a survey of some people in a youth club, 14 people like Archery, 12 like Basketball, and 16 like Cricket. Similarly, 5 people like both Archery and Basketball, 7 people like both Archery and Cricket and 6 people like both Basketball and Cricket. If 3 people like all three sports and 3 did not like any of the above sports, then:
 - a. Write the cardinality of set of people who like Archery as well as Basketball as well as Cricket in a set notation. [1]
 - b. Represent the above information in a Venn-diagram. [1]
 - c. Find the total number of people surveyed. [3]
 - d. Compare the number of people who like exactly one sport and exactly two sports in ratio. [1]
2. A sum of money yields compound interest of Rs 21,000 and Rs 43,260 for time intervals of 1 year and 2 years respectively.
 - a. Assuming Principal as 'P' and rate of interest as 'R%' per annum, express the above interest values in the form of equations. [1]
 - b. Calculate the sum and rate of interest. [2]
 - c. If the same sum was invested for simple interest at the same rate, how much less interest would be received? [1]
3. According to the Census of 2025 A.D., the population of a town was 10,20,000. The population growth rate was 2%.

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 - a. What do P_0 and P_T mean in the formula, $P_T = P_0(1 + \frac{R}{100})^T$? [1]
 - b. Find the population of the town in 2024 A.D. [1]
 - c. In which year will the population be exactly 10,61,208? [2]
4. On a certain day, the exchange rate of U.S. dollar to NPR was \$1 = Rs 140. Sujeeb bought some dollars worth Rs 5,60,000 for his trip to U.S. Unfortunately his trip was cancelled, and after a month he exchanged his dollars back to NPR. During this time interval, the Nepali rupees has been devaluated by 0.5%.
 - a. How many U.S. dollar did he buy initially? [1]
 - b. Find his profit or loss in this transaction. [2]
 - c. If his trip had been successful and he returned to Nepal after 2 months, spending only half of the dollars he had, how much NPR would he receive on exchanging the remaining half dollar back into Nepali Rupees? Consider that, in this case Nepali rupees was revaluated by 0.5%. [2]
5. A solid square based pyramid is placed on the surface as shown in the figure which has vertical height (OP) = 12 cm. If the Pyramid occupies the space of 1296 cm^3 ,
 - a. How many edges does the pyramid have? [1]
 - b. Find the area of one triangular face of Pyramid? [2]
 - c. By how much is the length of slanted edge more or less than the length of its horizontal edge? [2]
6. A solid is made up of combining two cones of same diameter but different heights as shown in the figure.
 If the common diameter is 28 cm and the total height of solid is 42 cm, then:
 - a. Write the formula for the total surface area of the solid. [1]
 - b. Find the volume of the solid. [2]
 - c. If the volume of the lower cone is one third of the total volume, find the ratio of height of lower cone to the height of upper cone. [1]
7. A rectangular tank of $10\text{m} \times 1\text{m} \times 4\text{m}$ is completely filled with water. The water is filled at the rate of 50 paisa per litre.
 - a. Calculate the cost of painting the outer four walls of the tank at the rate of Rs 1,000 per square meter. [2]
 - b. The water in the full tank is consumed by 40 families in one month. How much does each family pay? [2]



8. Number of words learnt by two children follows the pattern shown below.

Day	1 st	2 nd	3 rd	4 th
Child A	3	6	12	24
Child B	10	15	20	25

- a. In which sequence is child A learning the words? [1]
- b. In how many days will child B learn a total of 385 words? Find it. [2]
- c. Which child learns more words in a week and by how many? [2]

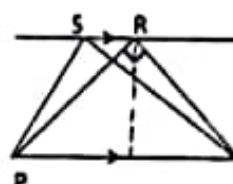
9. Solve the following problems related to quadratic equation:

- a. Solve using completing square method: $3x^2 + 5x - 2 = 0$. [2]
- b. The present ages of a father and a son are 40 years and 15 years respectively. How many years hence will the product of their ages be 900? Find it. [2]

10. Perform the following operations:

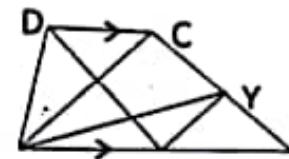
- a. If $10^{3x-1} = 1$, find the value of 'x'. [1]
- b. Simplify: $\frac{1}{x-y} + \frac{2y}{y^2-x^2}$. [2]
- c. Solve for x : $3^{x+2} + 3^{2-x} = 82$. [2]

11. In the given figure, $PQ \parallel SR$ and $PR \perp RQ$. If $PR = 4\text{cm}$ and $RQ = 3\text{cm}$,



- a. Prove theoretically that area of $\Delta PSQ = \text{area of } \Delta PRQ$. [2]
- b. Find the area of ΔPSQ . [2]
- c. If PQ would be equal to SR , write the relation between area of ΔSPR and ΔPQR . [1]

12. a. In a quadrilateral ABCD, $AB = BC = 4.8\text{ cm}$, $CD = AD = 5.8\text{ cm}$ and $\angle BAD = 60^\circ$. Construct the quadrilateral ABCD and then construct a triangle CDE whose area is equal to the area of quadrilateral ABCD.



- b. In the given figure, $AB \parallel DC$ and area of $\Delta AXD = \text{area of } \Delta ACY$, prove that $\overline{AC} \parallel \overline{XY}$. [2]

13. In a circle, $\angle AOB$ is a central angle, $\angle ADB$ and $\angle ACB$ are two inscribed angles.

- a. Write the relation between $\angle AOB$ and $\angle ADB$. [1]
- b. Verify experimentally the relation between inscribed angles $\angle ADB$ and $\angle ACB$. (Two circles with radius at least 3 cm is required). [2]
- c. If $\angle AOB = 5x^\circ$ and $\angle ADB = 2x+10^\circ$, find the value of 'x'. [1]

14. The median of given continuous data is 30:

Marks	0-10	10-20	20-30	30-40	40-50
No. of stu	6	4	a	4	11

- a. Write the formula to find the actual mode of a continuous data with the meaning of the symbol used. [1]
- b. Find the value of missing frequency 'a'. [2]
- c. What is the average marks of students who scored less than 20 marks? [1]
- d. Samyav said that the class interval of mode and upper quartile is same in this data. Justify his statement. [1]

15. Two cards are drawn randomly one after the other without replacing the first one from a well shuffled deck of playing cards. FB - Tuition Class of Rajan Shrestha

- a. State addition law of probability. [1]
- b. Find the probability of getting a club or a non-face card in the first draw. [2]
- c. Show the probabilities of all possible outcomes of getting and not getting a king in a tree diagram. [2]
- d. By how much is the probability of getting both King card more or less than probability of getting only one King card in two draws? [1]

16. A house has been built up to the height of 20m so far. It is observed from a point on the ground 20m away from the house. The angle of elevation is θ .

- a. Define the angle of elevation. [1]
- b. Draw a figure based on the above context. [1]
- c. Find the value of θ . [1]
- d. How high should the house be raised from 20m, so that the elevation angle is increased by 15° ? [1]

The End