Bhaktapur Municipality

Basic Level Examination (Grade 8) - 2082

Subject: Compulsory Mathematics

Time: 2 Hours **Full Marks: 50**

Attempt all the questions.

1) यदि U = {4, 5, 6, 7, 8, 9} का उपसमूहहरू A = {4, 6, 8} र B = {5, 6, 7, 8} छन् ।
If A = {4, 6, 8} and B = {5, 6, 7, 8} are sub-sets of the universal set U = {4, 5, 6, 7, 8, 9}.

a) समूह A र B खप्टिएका वा अलगिएका कस्ता समूहहरू हुन् ?
What type of sets are A and B, Overlapping or disjoint sets? [1]

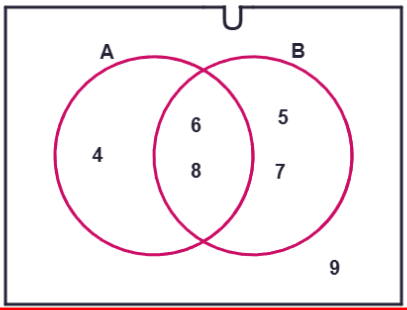
Solution:
Since elements {6, 8} are common to both sets, A and B are Overlapping sets.

b) उपसमूहको सङ्ख्यालाई सुत्रात्मक तरिकाबाट लेख्नुहोस् ।
Write the formula form of the number of sub-sets. **[1]**

Solution:
Number of subsets = 2^n
$\therefore$ Where n is the number of elements in the set

c) माथि समूहहरूलाई भेनचित्रमा देखाउनुहोस् ।
Show the above sets in a Venn diagram. **[1]**

Solution:
In Venn-diagram,



2) काठमाडौं-नारायणघाट राजमार्गको दुरी 1,40,000 मिटर छ ।

The highway distance between Kathmandu and Narayanghat is 1,40,000.

a) उक्त लम्बाईलाई वैज्ञानिक सङ्केतमा लेख्नुहोस् ।

Write the scientific notation of that distance. **[1]**

Solution:

$$\therefore\ 140000 = 1.4 \times 10^5$$

b) $0.\overline{6}$ लाई भिन्नमा रूपान्तरण गर्नुहोस् ।

Convert $0.\overline{6}$ into fraction. **[2]**

Solution:

Let $x = 0.666..$ (i)

Multiply by 10: $10x = 6.666..$ (ii)

Subtract (i) from (ii)

$or, \quad 10x = 6.666 - 0.666$

$or, \quad 9x = 6$

$or, \quad x = \frac{6}{9}$

$\therefore\ 0.\overline{6} = \frac{6}{9}$

c) P को मान कति हुँदा, द्विआधार सङ्ख्या $110P1_2$ ले 25 जनाउँछ?

For what value of P, the binary number $110P1_2$ represents 25? **[1]**

Solution:

$(1 \times 2^4) + (1 \times 2^3) + (0 \times 2^2) + (P \times 2^1) + (1 \times 2^0) = 25$

or, $(1 \times 16) + (1 \times 8) + (0 \times 4) + (P \times 2) + (1 \times 1) = 25$

or, $16 + 8 + 0 + 2P + 1 = 25$

or, $16 + 8 + 0 + 2P + 1 = 25$

or, $25 + 2P = 25$

or, $2P = 25\text{-}25$

$\therefore\ P = \frac{0}{2} = 0$

d) रामको परिवारको आम्दानी र खर्चको अनुपात 7:5 छ। यदि आम्दानी रू. 7000 भए खर्च कति होला?
In Ram's family, the ratio of income and expenditure is 7:5. If the income is Rs. 7000, what is the expenditure?) **[1]**

Solution:

Let income = $7x$ and expenditure = $5x$.

$$7x = 7000$$

$$or, \quad x = \frac{7000}{7}$$

$$or, \quad x = 1000$$

$$\therefore \text{Expenditure} = 5 \times 1000 = 5000$$

3) रमिता मोबाइल किन्न एउटा पसलमा गइन्। मोबाइलको क्रय मूल्य रू. 30000 छ। मोबाइलको अङ्कित मूल्य क्रय मूल्यको 30%ले बढी छ।
Ramita went to a shop to buy a mobile set. The cost price of the mobile is Rs. 30000. The marked price of the mobile is 30% more than the cost price.)

a) यदि नाफा प्रतिशत, क्रय मूल्य र विक्रय मूल्यलाई क्रमशः P%, CP र SP ले जनाउने हो भने क्रय मूल्य (CP) निकाल्ने सूत्र लेख्नुहोस्।
If profit percent, cost price and selling price are denoted by P%, CP and SP respectively, write the formula to find cost price (CP).) **[1]**

Solution:

$$\text{CP} = \frac{\text{SP} \times 100}{100 + \text{P\%}}$$

b) उक्त मोबाइलको अङ्कित मूल्य कति होला ?
Find the marked price of the mobile. **[1]**

Solution:

CP = 30000
Markup (MP) = 30% more than CP
MP = 30000 + (30% of 30000)
= 30000 + 9000
$\therefore$ MP = 39,000

c) रमिताले 20% छुट पाएर मोबाइल किन्दा पसलेलाई कति नाफा वा नोक्सान हुन्छ ?

If Ramita bought the mobile getting 20% discount, what is the profit or loss of the shopkeeper?) **[2]**

Solution:

Discount = D% of MP

$$= \frac{20}{100} \times 39000$$

$$= 7800$$

SP = MP-D

= 39000 - 7800

= 31200

Profit = SP - CP

= 31200 - 30000

∴ Profit= Rs. 1200

4) विशालले रू. 60000 प्रतिवर्ष 8% ब्याजदरमा बचत खातामा जम्मा गरेछ । 5 वर्षपछि साँवा रू. 40000 र 5 वर्षसम्मको ब्याज झिकेछ ।

Bishal deposited Rs. 60000 in a savings account at 8% interest per annum. After 5 years, he withdrew Rs. 40000 principal and the interest of 5 years.)

a) P, T, R र I को सम्बन्ध लेख्नुहोस्, जहाँ सङ्केतहरूको आफ्नै प्रचलित अर्थ छन् ।

Write the relation of P, T, R and I, where the symbols have their usual meanings.) **[1]**

Solution:

$$I = \frac{P \times R \times T}{100}$$

b) 5 वर्षसम्मको ब्याज पत्ता लगाउनुहोस् ।

Find the interest of 5 years. **[2]**

Given:

Principal (P)= 60000

Rate of interest (R) = 8%
Time (T) = 5
Interest (I) =?
We know that,

$$I = \frac{P \times R \times T}{100}$$

$$= \frac{60000 \times 5 \times 8}{100}$$

$$= Rs.24000$$

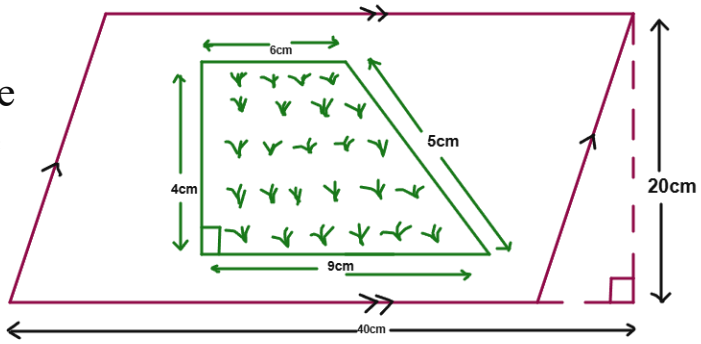
∴ Interest (I)=Rs. 24000

c) सुरूदेखिको जम्मा रू. 28800 ब्याज पाउन बाँकी रकम कति वर्ष बैङ्कमा राख्नुपर्ला?
How long should he keep the remaining amount in the bank to get total interest Rs. 28800 from the beginning?) **[2]**

Solution:
Remaining principal: 60000−40000 =20000
From (c)
Interest already earned = Rs. 24,000
Given, Total required interest = Rs. 28,800
By question,
Extra interest needed: 28800−24000 = 4800
Now,
P=20000
R=8%
I=4800
T= $\frac{I \times 100}{PR} = \frac{4800 \times 100}{2000 \times 8} = 3$
∴ He should keep the remaining money for 3 years.

5) एउटा समानान्तर चतुर्भुज आकारको जग्गाभित्र समलम्ब चतुर्भुज आकारमा फुलहरू रोपिएका छन् ।

Flowers are planted in a trapezium shape within a piece of land that is shaped like a parallelogram.



a) समानान्तर चतुर्भुजको क्षेत्रफल निकाल्ने सूत्र लेख्नुहोस् ।

Write the formula to calculate the area of a parallelogram. **[1]**

Solution:

Area of a parallelogram (A)= $b \times h$.

b) सो समानान्तर चतुर्भुजको क्षेत्रफल कति होला?

What is the area of the parallelogram? **[1]**

Given:

Base (b) = 40m

Height (h) = 20m

Now,

Area of a parallelogram (A)= $b \times h$

$= 40 \times 20$

$= 800$

∴ Area of a parallelogram is $800m^2$.

c) समलम्ब चतुर्भुज बाहेकको समानान्तर चतुर्भुजको क्षेत्रफल निकाल्नुहोस् ।

Calculate the area of the parallelogram excluding the trapezium. **[2]**

Solution:

Case -1 (In Trapezium)

Parallel side (a) = 6m

Parallel side (b) = 9m

Height(h) = 4m

Now,

Area of Trapezium = $\frac{1}{2} \times h \times (a + b)$

$$= \frac{1}{2} \times 4 \times (6 + 9)$$
$$= \frac{1}{2} \times 4 \times 15$$
$$= 2 \times 15$$
$$= 30$$

Area of Trapezium = $30m^2$

Again,

Case -2

Remaining Area = $800m^2 - 30m^2$

$= 770m^2$

∴ Remaining Area is $770m^2$.

d) सो फुलबारी घेर्न प्रति मिटर रू. 500 को दरमा कति खर्च लाग्ला?

What will be the cost of fencing the flower bed at the rate of Rs. 500 per meter?) **[1]**

Solution:

Perimeter of trapezium = sum of all sides

= 6+4+9+5

= 24m

Cost = Perimeter × Rate

= 24m ×Rs.500/m

= Rs. 12000

∴ Total Cost = Rs. 12,000

6)

a) सरल गर्नुहोस् (Simplify): $x^{a-b} \times x^{b-c} \times x^{c-a}$. **[1]**

Solution:

$= x^{a-b} \times x^{b-c} \times x^{c-a}$ $[\because\ a^m \times a^n]$

$= x^{a-b+b-c+c-a}$

$= x^0$

$= 1$

b) $\frac{2}{1+(a-b)^0}+(a+b)^0$ को मान निकाल्नुहोस् ।

Find the value of: $\frac{2}{1+(a-b)^0}+(a+b)^0$. **[1]**

Solution:

$$= \frac{2}{1+(a-b)^0}+(a+b)^0$$
$$= \frac{2}{1+1}+1 \quad [\because a^0 = 1]$$
$$= \frac{2}{2}+1$$
$$= 1+1$$
$$= 2$$

c) सरल गर्नुहोस् (Simplify): $\frac{1}{(x-3)(x-5)}+\frac{1}{(x-3)(x-1)}$ **[2]**

Solution:

$$= \frac{1}{(x-3)(x-5)}+\frac{1}{(x-3)(x-1)}$$
$$= \frac{1(x-1)+1(x-5)}{(x-1)\,(x-3)\,(x-5)}$$
$$= \frac{x-1+x-5}{(x-1)\,(x-3)\,(x-5)}$$
$$= \frac{2x-6}{(x-1)\,(x-3)\,(x-5)}$$
$$= \frac{2(x-3)}{(x-1)\,(x-3)\,(x-5)}$$
$$= \frac{2}{(x-1)\,(x-5)}$$

7)

a) दिइएका अभिव्यञ्जकहरूको ल.स. पत्ता लगाउनुहोस् ।

Find the lowest common multiples of given algebraic expression, $x^2 - 1$ and $x^2 + 2x - 3$ **[2]**

Solution

Frist Expression: $x^2 - 1$

$= x^2 - 1$

$= x^2 - 1^2$

$= (x + 1)(x - 1)$

Second Expression: $x^2 + 2x - 3$

$= x^2 + 2x - 3$

$= x^2 + (3 - 1)x - 3$

$= x^2 + 3x - 1x - 3$

$= x(x + 3) - 1(x + 3)$

$= (x + 3)(x - 1)$

H.C.F $= (x - 1)$

L.C.M $= (x - 1)(x + 3)(x - 3)$

b) खण्डीकरण गर्नुहोस् (Factorize): $9x^2 - 25y^2$ **[1]**

Solution:

$= 9x^2 - 25y^2$

$= (3x)^2 - (5y)^2$

$= (3x + 5y)(3x - 5y)$

8)

a) बीजीय अभिव्यञ्जक $x^2 - 6x + 9$ को डिग्री पत्ता लगाउनुहोस् ।

Find the degree of algebraic expression $x^2 - 6x + 9$. **[1]**

Solution:

Degree = 2 [∴ The degree of an algebraic expression is the highest power of the variable.]

b) लेखाचित्रको प्रयोग गरी दिइएका समीकरणहरू हल गर्नुहोस्।

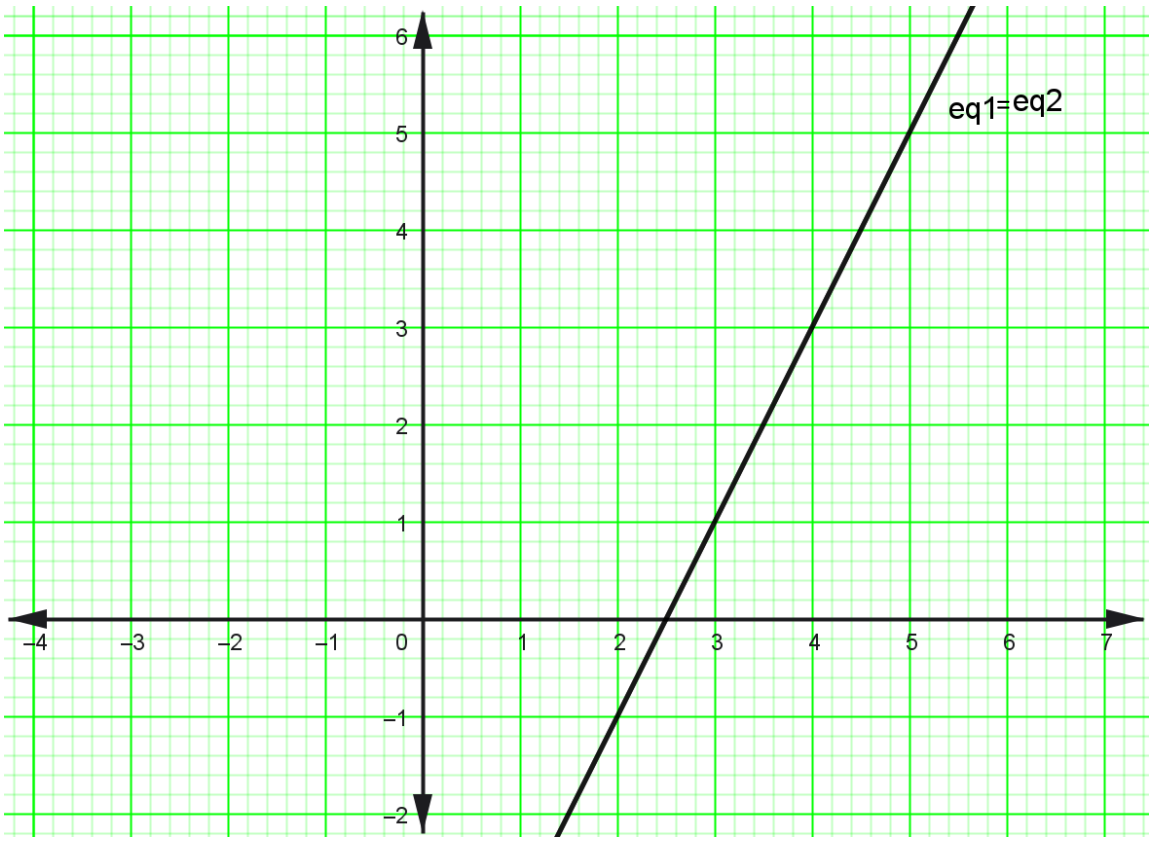
Solve the equations by using graph: 2x - y = 5 and 2x - y = 5 [2]

Solution:

The system has infinitely many solutions because the lines overlap.

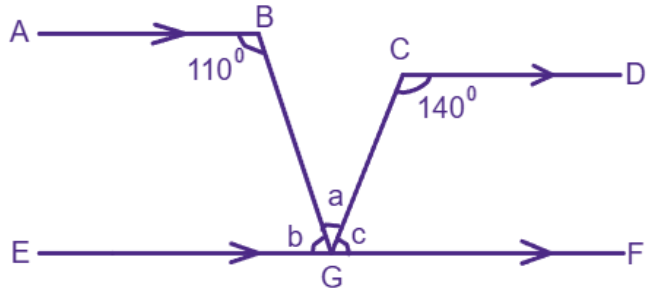
Where:

- The lines coincide (overlap)
- There are infinitely many solutions
- Every point on the line satisfies the equations



9) दिइएको चित्रमा **AB || EF || CD** छन् । यदि $\angle ABG = 110°$ र $\angle DCG = 140^0$, भए तलका प्रश्नहरूको उत्तर दिनुहोस् ।

In the given figure, **AB || EF || CD**. If $\angle ABG = 110°$ and $\angle DCG = 140^0$ then answer the following questions.



a) ∠ ABG को क्रमागत भित्रीकोण लेख्नुहोस् ।

Write the co-interior angle of ∠ABG. **[1]**

Solution:

Co-interior angle of ∠ABG is ∠EGB.

b) विन्दु G मा बनेका कोणहरू a, b र c का मानहरू पत्ता लगाउनुहोस् ।

Find the values of angles a, b and c formed at a point G.) **[3]**

Solution:

For b^0

$110^0 + b^0 = 180^0$ [∴ Co − interior angle]

or, $b^0 = 180^0 - 110^0$

$\therefore b^0 = 70^0$

For b^0

$140^0 + a^0 = 180^0$ [∴ Co − interior angle]

or, $a^0 = 180^0 - 140^0$

$\therefore a^0 = 40^0$

For a^0

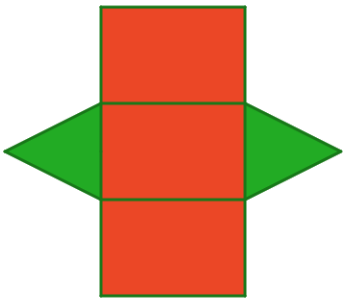
$40^0 + 70^0 + a^0 = 180^0$ [∴ Sum of straight angle]

or, $a^0 = 180^0 - 110^0$

$\therefore a^0 = 70^0$

c) एउटा त्रिभुजाकार प्रिज्मको जाली खिच्नुहोस् ।
Draw the net of triangular prism.**[1]**

Solution:
Net of Triangular prism

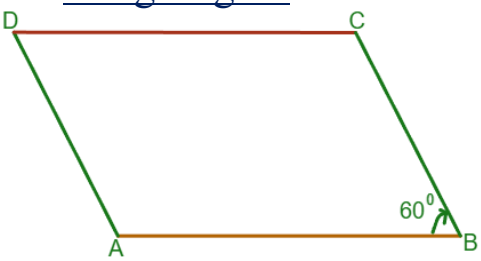


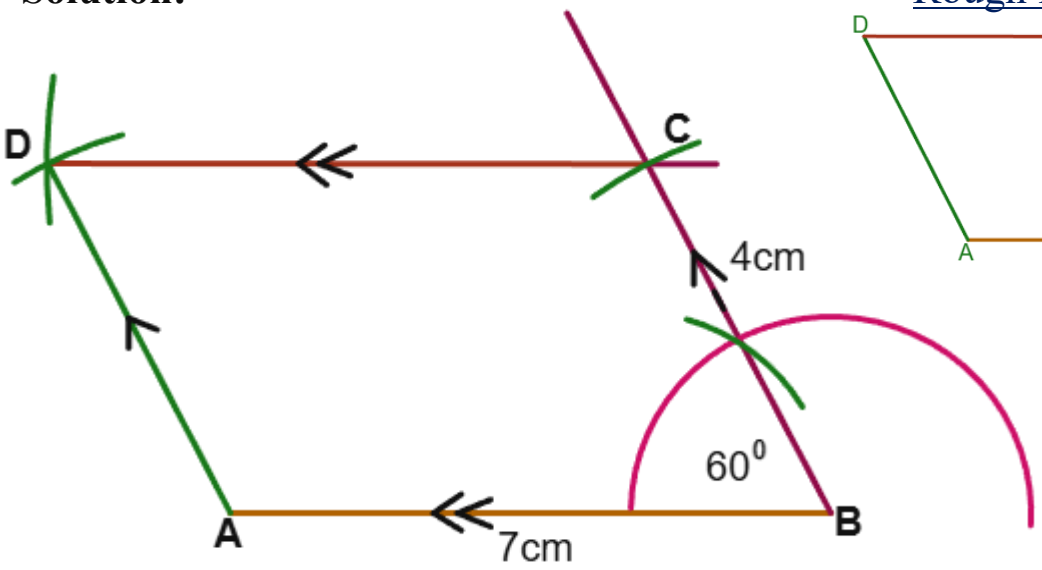
10)

a) AB = 6cm, BC = 4cm र ∠ ABC = 60^0 भएको समानान्तर चतुर्भुज ABCD को रचना गर्नुहोस् ।
Construct a parallelogram ABCD in which AB = 6cm, BC = 4cm and ∠ABC = 60^0. **[3]**

Solution:

Rough figure

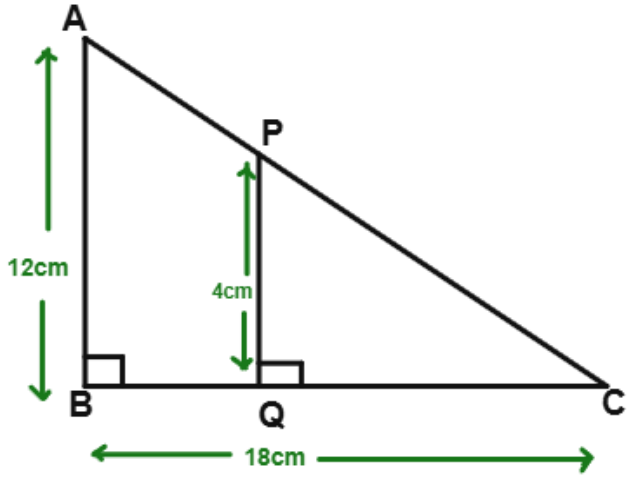




∴ ABCD is a required parallelogram

b) दिइएको चित्रमा $\Delta PQC \sim \Delta ABC$ भए QC को मान पत्ता लगाउनुहोस् ।

In the given figure if $\Delta PQC \sim \Delta ABC$, find the value of QC. **[2]**



Solution:

In $\Delta ABC \text{ and } \Delta PQC$,

$\frac{AB}{PQ} = \frac{AC}{PQ} = \frac{BC}{QC}$ [∴ Corresponding side of similar triangle are promotionally equal]

$\frac{12}{4} = \frac{AC}{PC} = \frac{18}{QC}$

Taking 1st and 3rd ratio,

$\frac{12}{4} = \frac{18}{QC}$

$or, 12QC = 18 \times 4$

$or, QC = \frac{18 \times 4}{12}$

$or, QC = \frac{72}{12}$

∴ QC = 6cm

11)

a) बिन्दुहरू A(3, 4) र O(0, 0) बीचको दुरी पत्ता लगाउनुहोस् ।

Find the distance between the points $A(3,4)$ and $O(0,0)$. **[1]**

Solution:

Given points:

$A(3,4) = (x_1, y_1)$,

$O(0,0) = (x_2, y_2)$

Now,

Using Distance formula:

$$d = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$$

$$= \sqrt{(0-3)^2 + (0-4)^2}$$

$$= \sqrt{(-3)^2 + (-4)^2}$$

$$= \sqrt{9+16}$$

$$= \sqrt{25}$$

$$\therefore AO = 5\ units$$

b) शीर्षबिन्दुहरू A(1, 3), B(4, 1) र C(3, 5) भएको ΔABC लाई उद्गमबिन्दुमा $+90^0$ मा परिक्रमा गराउँदा बन्ने प्रतिबिम्ब ΔA'B'C' का शीर्षबिन्दुहरू पत्ता लगाउनुहोस् । Δ ABC र Δ A'B'C' लाई एउटै लेखाचित्रमा प्रस्तुत गर्नुहोस् ।

Find the vertices of the image ΔA'B'C' of ΔABC with vertices $A(1,3), B(4,1)$ and $C(3,5)$ under the rotation through $+90°$ about the origin. Represent ΔABC and ΔA'B'C' on the same graph.) **[3]**

Solution:

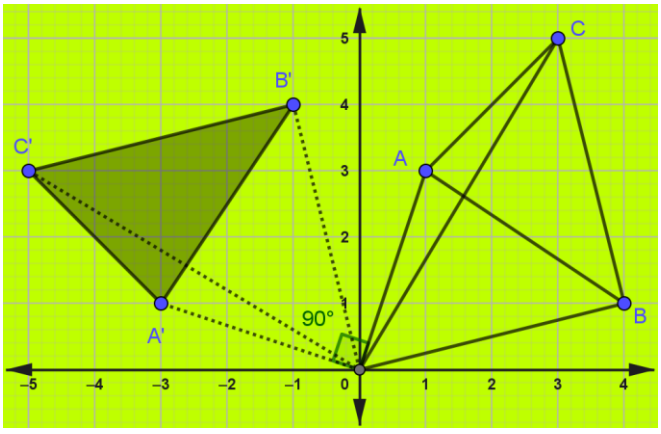
Object **Image**

$P(x,y)$ ——— **Rotation about +90** (Origin (0,0)) ———→ $P'(-y,x)$

$A(1,3)$ ———→ $A'(-3,1)$

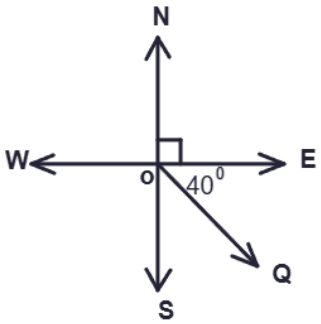
$B(4,1)$ ———→ $B'(-1,4)$

$C(3,5)$ ———→ $C'(-5,3)$



$\therefore$ Rotated coordinates: $A'(-3,1), B'(-1,4)$, and $C'(-5,3)$

c) बिन्दु O बाट बिन्दु Q को दिशास्थिति लेख्नुहोस् ।
Write down the bearing of point Q from point O. **[1]**



Solution:
Bearing = Angle from N to E +Angle from E to Q
$= 90^0 + 40^0$
$= 130^0$
∴ The bearing of point Q from point O is 130^0.

12) कक्षा आठका 7 जना विद्यार्थीले प्रथम त्रैमासिक परीक्षामा गणित विषयमा प्राप्त गरेका अङ्कहरू दिइएका छन् ।
The following are the marks obtained by 7 students of grade eight in the First Terminal Examination in mathematics: 23, 30, 26, 25, 23, 27, 28

a) माथिका तथ्याङ्कबाट रीत पत्ता लगाउनुहोस् ।
Find the mode from the above data. **[1]**

Given data:
Marks = 23, 30, 26, 25, 23, 27, 28
Mode = the value that occurs most frequently
23 appears 2 times, others appear once
∴ Mode = 23

b) 7 जना विद्यार्थीले प्रथम त्रैमासिक परीक्षामा पाएको औसत प्राप्ताङ्क कति हुन्छ? पत्ता लगाउनुहोस् ।

What is the average mark obtained by the 7 students in the first terminal examination? Find it. **[1]**

Solution:

$\sum x = 23+30+26+25+23+27+28 = 182$

$N = 7$

$\bar{X} = ?$

Now,

$$\bar{X} = \frac{\sum x}{N}$$

$$= \frac{182}{7}$$

$$= 26$$

$\therefore$ Mean = 26

c) मध्यक, मध्यिका र रीतमध्ये कुनले दिइएको तथ्याङ्कलाई बराबर दुई भागमा विभाजन गर्छ ?

Among mean, median and mode which divide the given data in two equal parts. **[1]**

Solution:

Median divides the data into two equal parts

*****Best of Luck*****