GREENLAWNS SCHOOL, WORLI

Terminal Examination 2025-26

Mathematics

STD: IX **Marks: 80**

Date:15/09/2025 **Time: 3 hrs**

Section A [40 marks]

(Answer all questions from this Section.)

Question 1 Choose the correct answers to the questions from the given options.
(Do not copy the question, write the correct answers only.) **[15]**

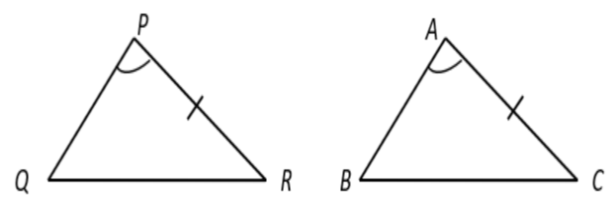
i. $(-2 - \sqrt{3})(-2 + \sqrt{3})$ when simplified is
(a) positive and irrational **(b)** positive and rational
(c) negative and irrational **(d)** negative and rational

ii. The coefficient of x^2 in $(3x + x^3)(x + 1)$ is
(a) 3 **(b)** 1 **(c)** 4 **(d)** 2

iii. One of the factors of $(x - 1) - (x^2 - 1)$ is
(a) $x^2 - 1$ **(b)** $x + 1$ **(c)** $x - 1$ **(d)** $x + 4$

iv. What is the median of the values 11, 7, 6, 9, 12, 15, 19
(a) 9 **(b)** 11 **(c)** 12 **(d)** 15

v. Given that $\angle A = \angle P$ and AC = PR. Then, which of the following conditions are true for Δ PQR and Δ ABC to be congruent.



a) BC = QR by ASS criteria
b) BC = QR by SSA criteria
c) AB = PQ by SAS criteria **d)** AB = PQ by SSA criteria

vi. How many real numbers are there between 3 and 8 (Including 3 and 8)?
a) Six **b)** Four **c)** Infinite **d)** Five

vii. What do we get after factorizing $x^2+6x-27$?
a) (x+9)(x-3) **b)** (x-9)(x+3) **c)** (x-9)(x-3) **d)** (x+9)(x+3)

viii. $10^{-3} = 0.001$ can be written in the form of logarithm as
a) $\log 1 = -3$ **b)** $\log 0.001 = 3$ **c)** $\log 3 = -0.001$ **d)** $\log 0.001 = -3$

ix. From the table given below, how many students weigh equal to or more than 55kg?

Weight(kg)	40-45	45-50	50 - 55	55 - 60	60 - 65	65 - 70
Students	4	12	3	2	3	1

a) 2 **b)** 3 **c)** 20 **d)** 6

x. If a point is in 2^{nd} quadrant, then it is in __________ form.

a) (+, +) **b)** (+, -) **c)** (-, +) **d)** (-, -)

xi. Which of the following option is correct according to the below statements?

i) Every rational number is real number.

ii) Every real number is rational number.

a) Both statements are correct

b) Statement (i) is correct and statement (ii) is incorrect

c) Statement (i) is incorrect and statement (ii) is correct

d) Both statements are incorrect

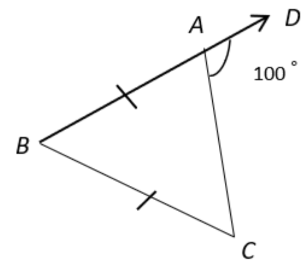
xii. Point P(0, 4) lies along __________ axis.

a) OX **b)** OX’ **c)** OY **d)** OY’

xiii. Find the value of angle ABC if AB = BC.

a) 80° **b)** 100°

c) 120° **d)** 20°



xiv. Which of the following is not a criterion for congruency of triangles?

(a) SAS **(b)** ASA **(c)** SSA **(d)** SSS

xv. Which of the following is (are) equivalent to 16^{-12}?

(a) – 8 **(b)** 14 **(c)** – 4 **(d)** 4^{-1}

Question 2

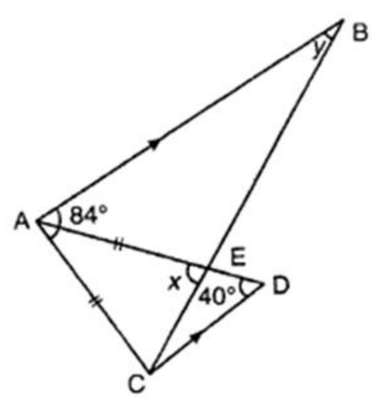
(a) Rationalize the denominator and simplify: $\frac{3}{5-\sqrt{3}} + \frac{2}{5+\sqrt{3}}$ **[3]**

(b) Mr. Kumar borrowed ₹ 15,000 for two years. The rate of interest for the two successive years are 8% and 10% respectively. If he repays ₹ 6,200 at the end of the first year, find the outstanding amount at the end of the second year. **[3]**

(c) **i.** Expand: $(3x - 2y)^3$

ii. Factorize: 8x + 16y **[3]**

d) In the figure alongside AB // CD and AE = AC, Find the x and y from the information Given **[4]**



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Question 3

(a) In a two-digit number, the sum of digits is 13. If the number is subtracted from the one obtained by interchanging the digits, the result is 45. What is the number? **[4]**

(b) A (-2, 4), C (4, 10) and D (-2, 10) are the vertices of a square ABCD. Use graphical method to find the coordinates of the fourth vertex B. Also, find
(i) the coordinates of the mid-point of BC,
(ii) the coordinates of the mid-point of CD and
(iii) the coordinates of the point of intersection of the diagonals of the square ABCD. **[4]**

(c) **i.** Factorize: $8x^3 - 127y^3$
ii. If $a - b = 7$ and $a^3 - b^3 = 133$, find: ab **[4]**

Section – B [40 Marks]

(Attempt any four questions)

Question 4

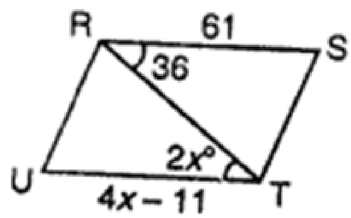
(a) Solve: $y + 2x = 5$; $3y - 5x = 4$ **[3]**

(b) Simplify: $\dfrac{6.(8)^{n+1} + 16.2^{3n-2}}{10.2^{3n+1} - 7.(8)^n}$ **[3]**

(c) Express $\dfrac{3-5\sqrt{5}}{3+2\sqrt{5}}$ in the form $(a\sqrt{5} - b)$ where a and b are simple fractions. **[4]**

Question 5

(a) Prove that $\Delta RST \cong \Delta TUR$ when x = 18. **[3]**



(b) Construct a frequency table for the following set of data of weights (in gms) of 30 oranges using equal class intervals one of them being 50-60 (60 not included).
45, 55, 30, 85, 75, 85, 40, 60, 65, 40, 60, 75, 70, 60, 70, 85, 85, 80, 35, 45, 40, 40, 50, 60, 65, 55, 45, 30, 80, 85, 75. **[3]**

(c) **i.** Find $p^2 + q^2$ if $p - q = 6$ and $p + q = 14$
ii. If $x + \frac{1}{x} = 3$, find $x^2 + \frac{1}{x^2}$ **[4]**

Question 6

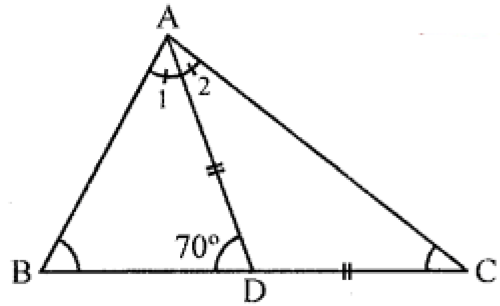
(a) Simplify: $\left(\frac{1}{4}\right)^{-2} - 3(8)^{2/3} \times 4^0 + \left(\frac{9}{16}\right)^{-1/2}$ **[3]**

(b) Find x : If $\log_{10} 5 + \log_{10}(5x + 1) = \log_{10}(x + 5) + 1$. **[3]**

(c) **i.** Factorize: $a^3 + ab(1 - 2a) - 2b^2$ **ii.**
Factorize: $4x^2 - 4x + 1$ **[4]**

Question 7

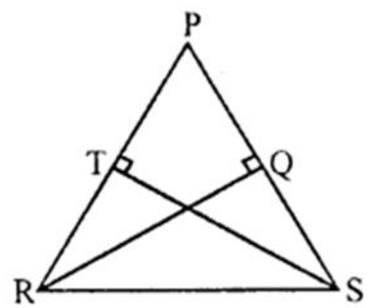
(a) In a $\triangle ABC$, AD bisects $\angle BAC$ and AD = DC.
If $\angle BDA = 70°$,
calculate $\angle ACD$ and $\angle ABD$.



[3]

(b) I Find, $a^2 + b^2 + c^2$ if $a + b + c = 17$ and $ab + bc + ca = 30$.
ii Find the products: $(x + y)(x - y)(x^2 + y^2)$ **[4]**

(c) In the given figure, if PR = PS, PT = PQ,
$\angle PTS = \angle PQR = 90°$,
prove that RQ = ST and RT = SQ. **[3]**



Question 8

(a) ABC is an isosceles triangle with AB = AC. Draw AP ⊥ BC to show that $\angle B = \angle C$. **[2]**

(b) Prove the following:
(i) $\log_{10} 4 \div \log_{10} 2 = \log_3 9$
(ii) $\log_{10} 25 + \log_{10} 4 = \log_5 25$ **[4]**

(c) Draw the graph of equation $y = 3x - 4$. Find graphically
(i) the values of y, when x = -1.
(ii) the value of x when y = 5. **[4]**

Question 9

(a) If the mean of x, x + 2, x + 4, x + 6, x + 8 is 24, find x. **[3]**

(b) The sum of two numbers is 2. If their difference is 20, find the numbers. **[3]**

(c) In what period will ₹ 12,000 yield ₹ 3,972 as compound interest at 10% per annum, if compounded on yearly basis? **[4]**

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ANSWER KEY (grade 9 math)

Question 1 Choose the correct answers to the questions from the given options. (Do not copy the question, write the correct answers only.) **[15]**

i. **(b)** positive and rational
ii. **(a)** 3
iii. **(c)** x – 1
iv. **(b)** 11
v. **c)** AB = PQ by SAS criteria
vi. **c)** Infinite
vii. **a)** (x+9)(x-3)
viii. **d)** log 0.001 = −3
ix. **d)** 6
x. **c)** (-, +)
xi. **b)** Statement (i) is correct and statement (ii) is incorrect
xii. **a)** OX
xiii. **d)** 20°
xiv. **(c)** SSA
xv. **(d)** 4^{-1}

Question 2

(a) Rationalize the denominator and simplify: $\frac{3}{5-\sqrt{3}}+\frac{2}{5+\sqrt{3}}$ **[3]**

Solution:

$$=\frac{3(5+\sqrt{3})}{(5-\sqrt{3})(5+\sqrt{3})}+\frac{2(5-\sqrt{3})}{(5+\sqrt{3})(5-\sqrt{3})}$$

(Rationalising the denominator)

$$=\frac{15+3\sqrt{3}}{25-3}+\frac{10-2\sqrt{3}}{25-3}$$

$$=\frac{15+3\sqrt{3}}{22}+\frac{10-2\sqrt{3}}{22}$$

$$=\frac{15+3\sqrt{3}+10-2\sqrt{3}}{22}=\frac{25+\sqrt{3}}{22}$$

(b) Mr. Kumar borrowed ₹ 15,000 for two years. The rate of interest for the two successive years are 8% and 10% respectively. If he repays ₹ 6,200 at the end of the first year, find the outstanding amount at the end of the second year. **[3]**

Solution:

For 1st year :

S.I = 15000×8×1100 = ₹ 1200

Amount = ₹ (15000 + 1200) = ₹ 16200
Remaining amount after repayment
= ₹ (16200 – 6200) = ₹ 10000
For 2nd year :
P = ₹ 10000
S.I.= 10000×10×1100 = ₹ 1000
Amount at the end of 2nd year = ₹ 10000 + ₹ 1000 = ₹ 11000

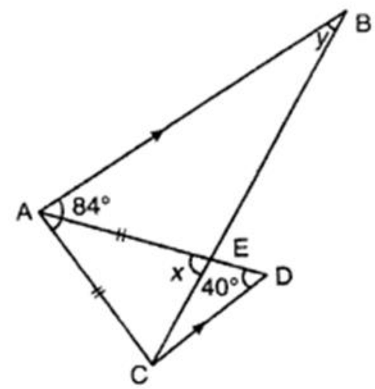
(c) **i.** Expand: $(3x - 2y)^3$
ii. Factorize: $8x + 16y$ **[3]**

Sol: i $(3x - 2y)^3$

$= (3x)^3 - 3(3x)^2 (2y) + 3(3x)(2y)^2 - (2y)^3$
$= 27x^3 - 3 \times 9x^2 \times 2y + 3 \times 3x \times 4y^2 - 8y^3$
$= 27x^3 - 54x^2y + 36xy^2 - 8y^3$

ii. Solution:
$8x + 16y = 8(x + 2y)$

d) In the figure alongside AB // CD and AE = AC,
Find the x and y from the information Given **[4]**



Sol: ∵ AB || CD and BC is its transversal
∴ ∠y = ∠1 (alternate angle)
In ∆ECD,
Ext. ∠x = ∠C + ∠D = ∠1 + 40°
In ∆ACE,
AE = AC (given)
∴ ∠ACE = ∠AEC = x
∵ AB || CD
∴ ∠BAC + ∠ACB = 180° (colinear angles)
84° + x + ∠1 = 180°
⇒ x + ∠L = 180° – 84° = 96°
⇒ ∠1 + 40° + ∠L = 96° (∵ x = ∠1 + 40°)
⇒ 2 ∠1 = 96 – 40 = 56
⇒ ∠1 = 56°2 = 28°
⇒ ∠y = 28° (∵ ∠1 = ∠y)
But x = ∠1 + 40° = 28° + 40° = 68°
Hence x = 68°, y = 28°

Question 3

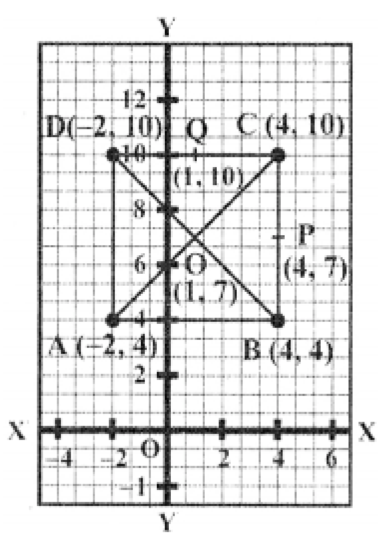
(a) In a two-digit number, the sum of digits is 13. If the number is subtracted from the one obtained by interchanging the digits, the result is 45. What is the number? **[4]**

Solution:
Sum of two digit of a two digit number = 13

Let units digit = x
and tens digit = y
∴ Number = x + 10y
and number by reversing the digit = y + 10x
According to the conditions,
x + y = 13 … (i)
and (y + 10x) – (x + 10y) = 45
⇒ y + 10x – x – 10y = 45
⇒ 9x – 9y = 45
⇒ x – y = 5 … (ii)
(Dividing by 9)
Adding (i) and (ii)
2x = 18 ⇒ x = 182 = 9
and subtracting (ii) from (i).
2y = 8 ⇒ y = 82 = 4
Number = x + 10y = 9 + 10 x 4
= 9 + 40 = 49

(b) A (-2, 4), C (4, 10) and D (-2, 10) are the vertices of a square ABCD. Use graphical method to find the coordinates of the fourth vertex B. Also, find
(i) the coordinates of the mid-point of BC,
(ii) the coordinates of the mid-point of CD and
(iii) the coordinates of the point of intersection of the diagonals of the square ABCD. **[4]**

Sol:
Plot the points A (-2, 4), C (4, 10) and D (-2, 10) on the graph and join them and complete the square
(i) The fourth point is B whose vertices are (4, 4).
(ii) The mid-point of BC will be P whose cocordinates will be (4, 7).
(iii) The mid-point of CD will be Q whose cocordinates will be (1, 10).
(iv) Its diagonals AC and BD intersect each other at O whose co-ordinates will be (1, 7).



(c) i. Factorize: $8x^3 - 127y^3$

ii. If $a - b = 7$ and $a^3 - b^3 = 133$, find: ab **[4]**

Solution: i.

$$8x^3 - \frac{1}{27}y^3 = (2x)^3 - \left(\frac{1}{3}y\right)^3$$

$$= \left(2x - \frac{1}{3}y\right)\left[(2x)^2 + 2x \times \frac{1}{3}y + \left(\frac{1}{3}y\right)^2\right]$$

$$= \left(2x - \frac{1}{3}y\right)\left(4x^2 + \frac{2}{3}xy + \frac{1}{9}y^2\right)$$

ii. **$a - b = 7$**

Cubing both sides,

(i) $(a - b)^3 = (7)^3$

$\Rightarrow a^3 + b^3 - 3ab(a - b) = 343$

$\Rightarrow 133 - 3ab \times 7 = 343$

$\Rightarrow 133 - 21ab = 343$

$\Rightarrow -21ab = 343 - 133$ $21ab = 210$

$\Rightarrow ab = 210-21 = -10$

Section – B [40 Marks]

(Attempt any four questions)

Question 4

(a) Solve: $y + 2x = 5$; $3y - 5x = 4$ **[3]**

Solution:

$y + 2x = 5 \Rightarrow y = 5 - 2x$

$3y - 5x = 4$

$\Rightarrow 3(5 - 2x) - 5x = 4$

$\Rightarrow 15 - 6x - 5x = 4$

$\Rightarrow -11x = 4 - 15$

$\Rightarrow -11x = -11$

and $y = 5 - 2x = 5 - 2 \times 1 = 5 - 2 = 3$

$\therefore x = 1, y = 3$

(b) Simplify: $\dfrac{6.(8)^{n+1}+16.2^{3n-2}}{10.2^{3n+1}-7.(8)^{n}}$ **[3]**

Sol:

$$\frac{6.(8)^{n+1}+16.2^{3n-2}}{10.2^{3n+1}-7.(8)^{n}}$$

$$=\frac{6.(2^3)^{n+1}+16.2^{3n-2}}{10.2^{3n+1}-7.(2^3)^{n}}=\frac{6.2^{3n+3}+16.2^{3n-2}}{10.2^{3n+1}-7.2^{3n}}$$

$$=\frac{6.2^{3n}.2^{3}+16.2^{3n}.2^{-2}}{10.2^{3n}.2-7.2^{3n}}$$

$$=\frac{2^{3n}(6\times 2^{3}+16\times 2^{-2})}{2^{3n}(10\times 2-7)}=\frac{6\times 8+16\times\frac{1}{4}}{20-7}$$

$$=\frac{48+4}{13}=\frac{52}{13}=4$$

(c) Express $\dfrac{3-5\sqrt{5}}{3+2\sqrt{5}}$ in the form (a√5 – b) where a and b are simple fractions. **[4]**

Solution:

$$\frac{3-5\sqrt{5}}{3+2\sqrt{5}} = \frac{(3-5\sqrt{5})(3-2\sqrt{5})}{(3+2\sqrt{5})(3-2\sqrt{5})} \qquad \text{(Rationalising the denominator)}$$

$$= \frac{9-6\sqrt{5}-15\sqrt{5}+10\times 5}{(3)^2-(2\sqrt{5})^2}$$

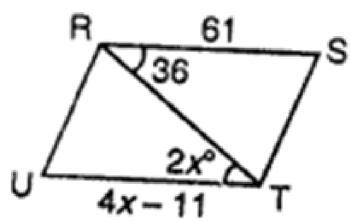
$$= \frac{9-21\sqrt{5}+20}{9-20} = \frac{59-21\sqrt{5}}{-11}$$

$$= \frac{-59}{11} + \frac{21}{11}\sqrt{5}$$

$$= \frac{21}{11}\sqrt{5} - \frac{59}{11}$$

Which is in the form of $a\sqrt{5} - b$

Question 5



(a) Prove that ΔRST ≅ ΔTUR when x = 18. **[3]**

Solution:
When x = 18, then
UT = 4x – 11 = 4 x 18 – 11 = 72 – 11
= 61 ⇒ RS = UT = 61
and 2x = 2 x 18 = 36°
⇒ ∠SRT = ∠RTU = 36°
RT = RT (common)
Hence ΔRST ≅ ΔTUR (SAS criterion)

(b) Construct a frequency table for the following set of data of weights (in gms) of 30 oranges using equal class intervals one of them being 50-60 (60 not included).
45, 55, 30, 85, 75, 85, 40, 60, 65, 40, 60, 75, 70, 60, 70, 85, 85, 80, 35, 45, 40, 40, 50, 60, 65, 55, 45, 30, 80, 85, 75. **[3]**

Solution:

Greatest weight = 85

Lowest weight = 30

Range = 85 – 30 = 55
Taking class intervals such as 50 – 60, (60 not included)

Class interval (weight in gms)	Tally marks	Frequency
30 – 40	III	3
40 – 50	~~IIII~~ I	6
50 – 60	III	3
60 – 70	~~IIII~~ I	6
70 – 80	~~IIII~~	5
80 – 90	~~IIII~~ II	7
Total		30

(c) **i.** Find $p^2 + q^2$ if $p - q = 6$ and $p + q = 14$

ii. If $x + \frac{1}{x} = 3$, find $x^2 + \frac{1}{x^2}$ **[4]**

Sol **i.** $p - q = 6$, $p + q = 14$

$$2(p^2 + q^2) = (p + q)^2 + (p - q)^2$$
$$= (14)^2 + (6)^2$$
$$= 196 + 36 = 232$$
$$\therefore p^2 + q^2 = 232/2 = 116$$

ii.

$$\left(x + \frac{1}{x}\right)^2 = (3)^2$$

$$(x)^2 + 2 \times x \times \frac{1}{x} + \left(\frac{1}{x}\right)^2 = 9$$

$$x^2 + 2 + \frac{1}{x^2} = 9 \Rightarrow x^2 + \frac{1}{x^2} = 9 - 2 = 7$$

Hence $x^2 + \frac{1}{x^2} = 7$

Question 6

(a) $$\left(\frac{1}{4}\right)^{-2} - 3(8)^{2/3} \times 4^0 + \left(\frac{9}{16}\right)^{-1/2}$$ **[3]**

Sol:

$$\left(\frac{1}{4}\right)^{-2} - 3(8)^{2/3} \times 4^0 + \left(\frac{9}{16}\right)^{-1/2}$$

$$= \left(\frac{1}{2^2}\right)^{-2} - 3\ (2^3)^{2/3} \times 1 + \left[\frac{(3)^2}{(4)^2}\right]^{-1/2}$$

$$= \frac{1}{(2)^{2\times(-2)}} - 3\ (2^{3\times 2/3}) \times 1 + \left(\frac{3}{4}\right)^{2\times(-1/2)}$$

$$= \frac{1}{2^{-4}} - 3 \times 2^2 \times 1 + \left(\frac{3}{4}\right)^{-1}$$

$$= 2^4 - 3 \times 4 + \frac{4}{3} = 16 - 12 + \frac{4}{3}$$

$$= 4 + 1\frac{1}{3} = 5\frac{1}{3}$$

(b) Find x : If $\log_{10} 5 + \log_{10} (5x + 1) = \log_{10} (x + 5) + 1$. **[3]**

Sol:

$\log_{10}5 + \log_{10}(5x + 1) = \log_{10}(x + 5) + 1$
$\log_{10}5\ (5x + 1) = \log_{10}\ (x + 5) + \log_{10}10$
$\log_{10}(5x + 1) = \log_{10}10\ (x + 5)$
Comparing, we get
$\Rightarrow 5(5x + 1) = 10(x + 5)$
$\Rightarrow 25x + 5 = 10x + 50$
$\Rightarrow 25x – 10x = 50 – 5$
$\Rightarrow 15x = 45 \Rightarrow x = 4515 = 3$
$x = 3$

(c) **i.** Factorize: $a^3 + ab(1 - 2a) - 2b^2$
ii. Factorize: $4x^2 - 4x + 1$ **[4]**

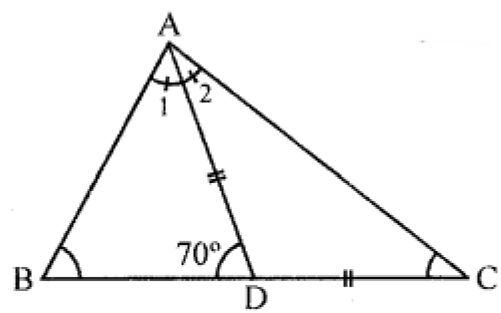
Solution:

i. $a^3 + ab(1 - 2d) - 2b^2$
$= a^3 + ab - 2a^2b - 2b^2$
$= a(a^2 + b) - 2b(a^2 + b)$
$= (a^2 + b)(a - 2b)$

ii. $4x^2 - 4x + 1$
$= (2x)^2 - 2 \times 2x \times 1 + (1)^2$
$= (2x - 1)^2$

Question 7

(a) In a ΔABC, AD bisects $\angle BAC$ and AD = DC.
If $\angle BDA = 70°$,
calculate $\angle ACD$ and $\angle ABD$. **[3]**



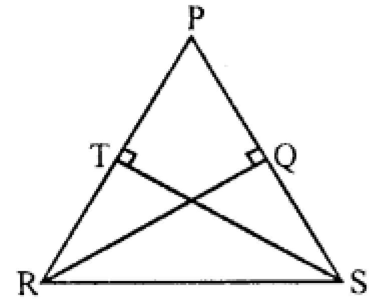
Sol:

In ΔABC, AD is the bisector of $\angle BAC$ which meets BC at AD, AD = DC and $\angle BDA = 70°$
$\because$ AD is the bisector of $\angle BAC$

$\therefore \angle 1 = \angle 2$
In ΔADC,
$\because$ AD = DC (given)
$\therefore \angle 2 = \angle C$
But Ext. $\angle ADB = \angle 2 + \angle C$
$\Rightarrow 70° = \angle 2 + \angle C = \angle C + \angle C = 2\angle C$
$\therefore \angle C = 70°2 = 35°$
In ΔABD,
$\angle 1 + \angle B + \angle ADB = 180°$
(sum of angles of a triangle)
$\Rightarrow \angle 2 + \angle B + 70° = 180°$ ($\because \angle 1 = \angle 2 = \angle C$)
$\Rightarrow \angle C + \angle B + 70° = 180°$
$\Rightarrow 35° + \angle B + 70° = 180°$
$\Rightarrow \angle B + 105° = 180°$

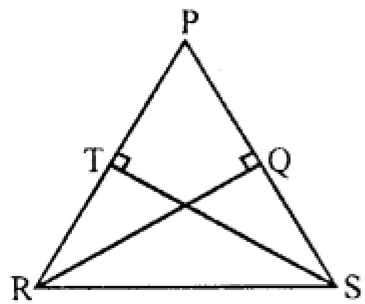
$\Rightarrow B = 180° - 105° = 75°$
Hence $\angle ACD = 35°$ and $\angle ABD = 75°$

(b) In the given figure, if PR = PS, PT = PQ, $\angle PTS = \angle PQR = 90°$, prove that RQ = ST and RT = SQ. **[3]**



Solution:

Given : In the figure, PR = PS, PT = PQ, $\angle PQR = 90°$ and $\angle PTS = 90°$



To prove :
(i) RQ = ST
(ii) RT = SQ
Proof:
(i) In right ΔPQR and ΔPTS

(c) I Find, $a^2 + b^2 + c^2$ if $a + b + c = 17$ and $ab + bc + ca = 30$.
ii Find the products: $(x + y)(x - y)(x^2 + y^2)$ **[4]**

Solution:
(i) $a + b + c = 17$
Squaring both sides,
$(a + b + c)^2 = (17)^2$
$\Rightarrow a^2 + b^2 + c^2 + 2(ab + bc + ca) = 289$
$\Rightarrow a^2 + b^2 + c^2 + 2 \times 30 = 289$
$\Rightarrow a^2 + b^2 + c^2 + 60 = 289$
$\Rightarrow a^2 + b^2 + c^2 = 289 - 60 = 229$
$\therefore a^2 + b^2 + c^2 = 229$

ii. $(x + y)(x - y)(x^2 + y^2)$
$= [(x)^2 - (y)^2](x^2 + y^2)$
$= (x^2 - y^2)(x^2 + y^2)$

$= (x^2)^2 - (y^2)^2$
$= x^4 - y^4$

Question 8

(c) ABC is an isosceles triangle with AB=AC. Draw AP ⊥ BC to show that ∠B = ∠C. **[2]**

Sol:

Given : ΔABC is an isosceles triangle with

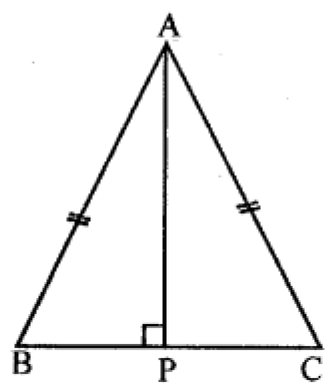
AB = AC

AP ⊥ BC

To prove : ∠B = ∠C

Proof : In right ΔAPB and ΔAPC

Side AP = AP (Common)



Hyp. AB = AC (Given)

∴ ΔAPB ≅ ΔAPC (RHS axiom)

∴ ∠B = ∠C (c.p.c.t.)

(d) Prove the following:

(i) $\log_{10} 4 \div \log_{10} 2 = l0g_3 9$

(ii) $\log_{10} 25 + \log_{10} 4 = \log_5 25$ **[4]**

Solution:

(i) $\text{L.H. S} = \log_{10} 4 \div \log_{10} 2$

$= \log_{10} (2)^2 \div \log_{10} 2 = 2 \log_{10} 2 \div \log_{10} 2$

$= \dfrac{2\log_{10} 2}{\log_{10} 2} = 2\,(1) = 2$

$\text{R.H.S.} = \log_3 9 = \log_3 (3)^2 = 2 \log_3 3 = 2\,(1) = 2$

Hence, Proved. L.H.S. = R.H.S.

(ii) $\text{L.H.S.} = \log_{10} 25 + \log_{10} 4 = \log_{10} 25 \times 4$

$= \log_{10} 100 = \log_{10} 10^2$

$= 2 \log_{10} 10 = 2 \times 1$

$= 2 \qquad (\because \log_a a = 1)$

$\text{R.H.S.} = \log_5 25 = \log_5 (5)^2$

$= 2 \log_5 5 = 2 \times 1 = 2$

$(\because \log_a a = 1)$

Hence L.H.S. = R.H.S.

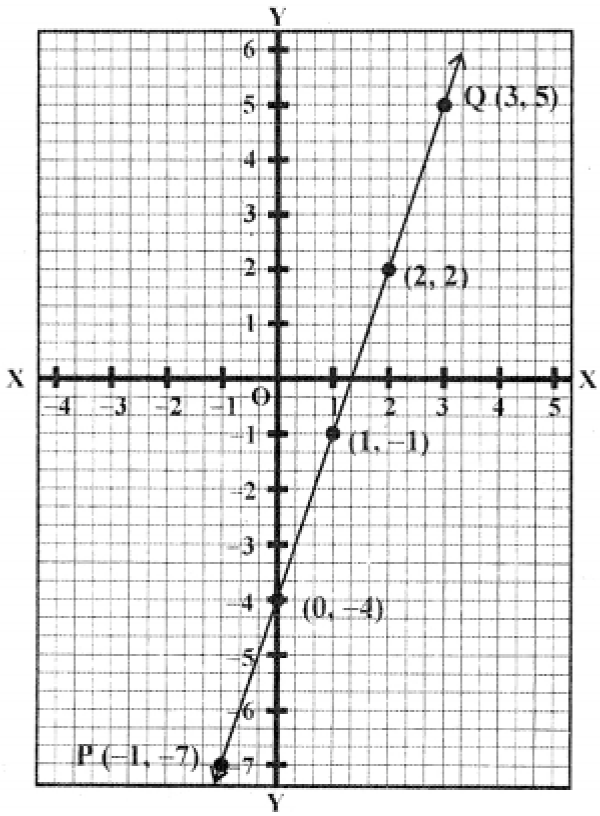
(c) Draw the graph of equation y = 3x – 4. Find graphically
(i) the values of y, when x = -1.
(ii) the value of x when y = 5. **[4]**

Sol: y = 3x – 4

Giving some suitable value to x, we get the corresponding values of y as shown below:

X	0	1	2
y	-4	-1	2

Now plot the points (0, -4),(1, -1) and (2, 2) on the graph and join than to get the required line



(i) From $x = -1$, draw a perpendicular which meet the line at P. From P draw a line || to x- axis meeting y-axis at -7

$\therefore$ If $x = -1$, then $y = -7$

(ii) Similarly from $x = 5$, draw a perpendicular on y-axis which meets the line at Q From Q, draw perpendicular on x-axis meeting at 3

$\therefore x = 3, y = 5$

Question 9

(a) If the mean of x, $x + 2$, $x + 4$, $x + 6$, $x + 8$ is 24, find x. **[3]**

Solution:

Mean of 5 terms = 24

$\therefore$ Their total = $24 \times 5 = 120$

Now sum of mean = $x + x + 2 + x + 4 + x + 6 + x + 8$

$= 5x + 20$

$\therefore 5x + 20 = 120 \Rightarrow 5.x = 120 – 20$

$\Rightarrow 5x = 100 \Rightarrow x = 1005 = 20$

$\therefore x = 20$

(b) The sum of two numbers is 2. If their difference is 20, find the numbers. **[3]**

Solution:

from equation (1) and equation (2), we get,

$$x + y = 2$$
$$x - y = 20$$

Adding, $\overline{2x \quad = 22}$

$\Rightarrow \quad x = \frac{22}{2} = 11$

Substituting the value of x in equation (1), we get

$11 + y = 2 \quad \Rightarrow \quad y = 2 - 11 \quad \Rightarrow \quad y = -9$

Hence, the numbers are 11 and –9

(c) In what period will ₹ 12,000 yield ₹ 3,972 as compound interest at 10% per annum, if compounded on yearly basis? **[4]**

Solution:

P = ₹ 12000

A = ₹ 12000 + ₹ 3972 = ₹ 15972

R = 10% p.a., n = ?

$$A = P\left(1 + \frac{R}{100}\right)^n$$

$$\Rightarrow 15972 = 12000\left(1 + \frac{10}{100}\right)^n$$

$$\Rightarrow \frac{15972}{12000} = \left(\frac{11}{10}\right)^n$$

$$\frac{1331}{1000} = \left(\frac{11}{10}\right)^n$$

$$\Rightarrow \left(\frac{11}{10}\right)^3 = \left(\frac{11}{10}\right)^n$$

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