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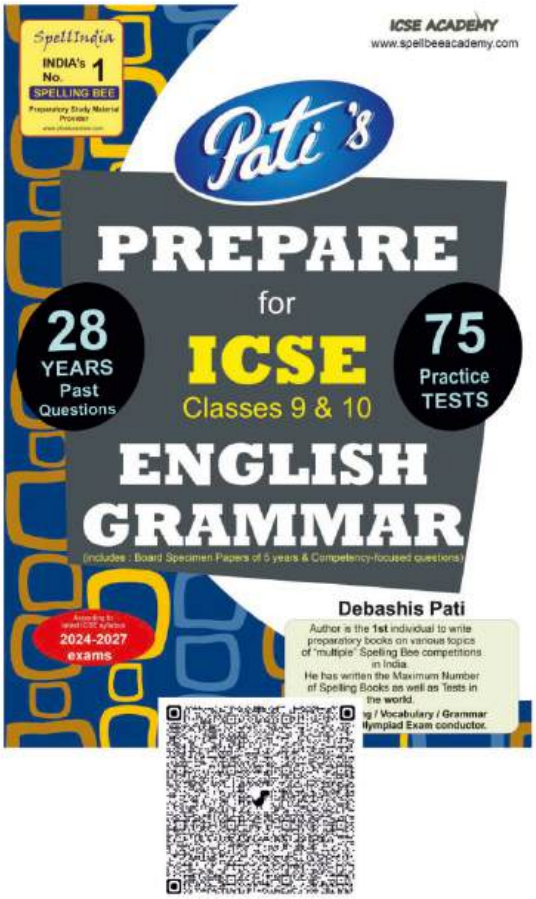

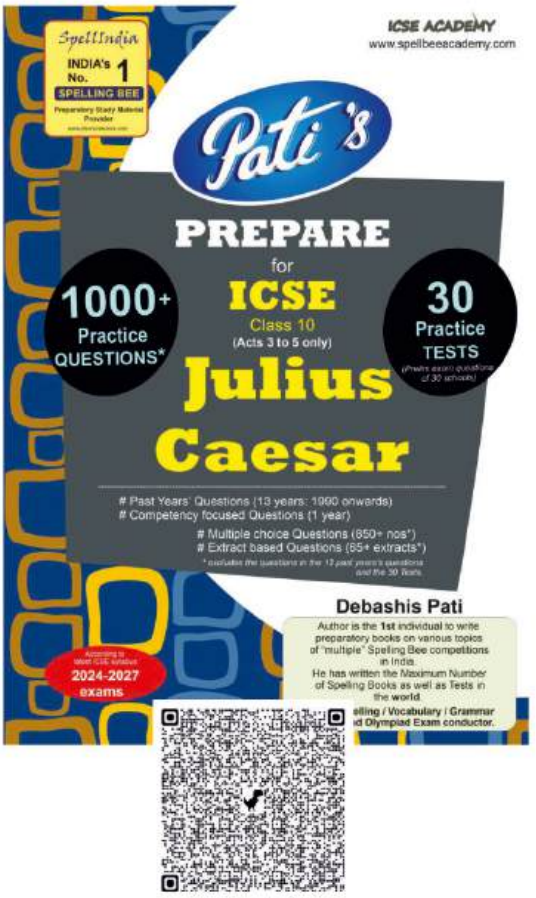

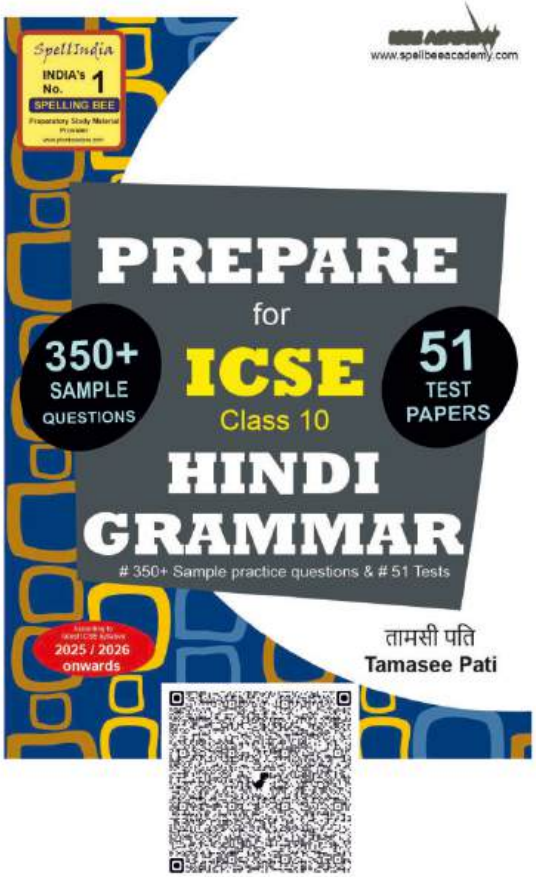

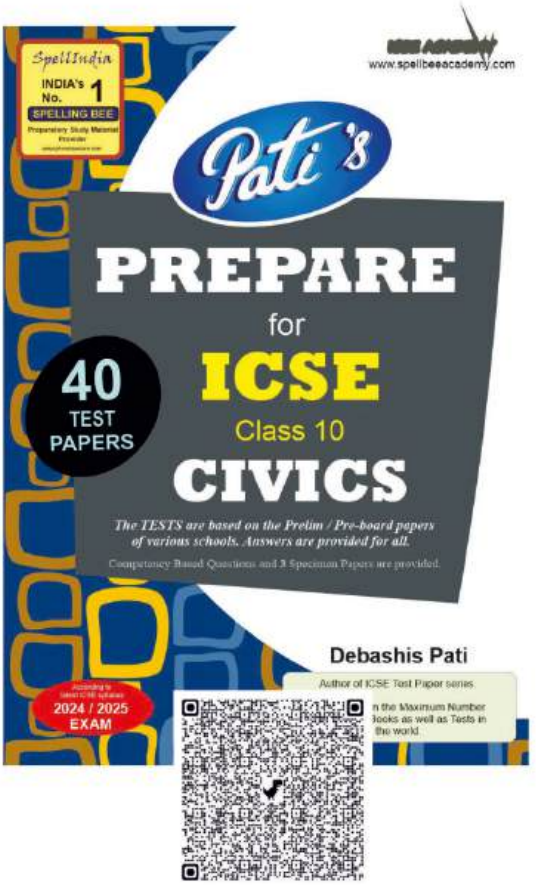

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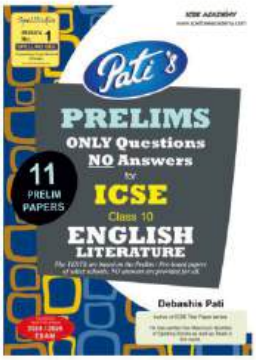

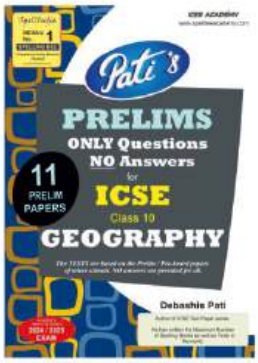

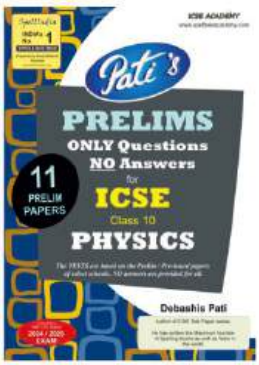

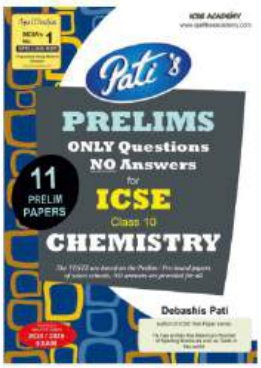

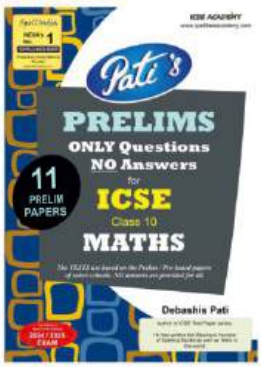

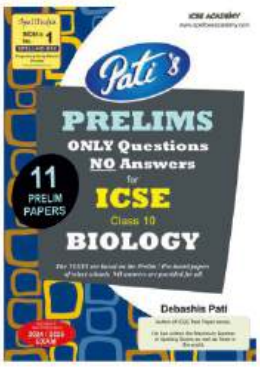

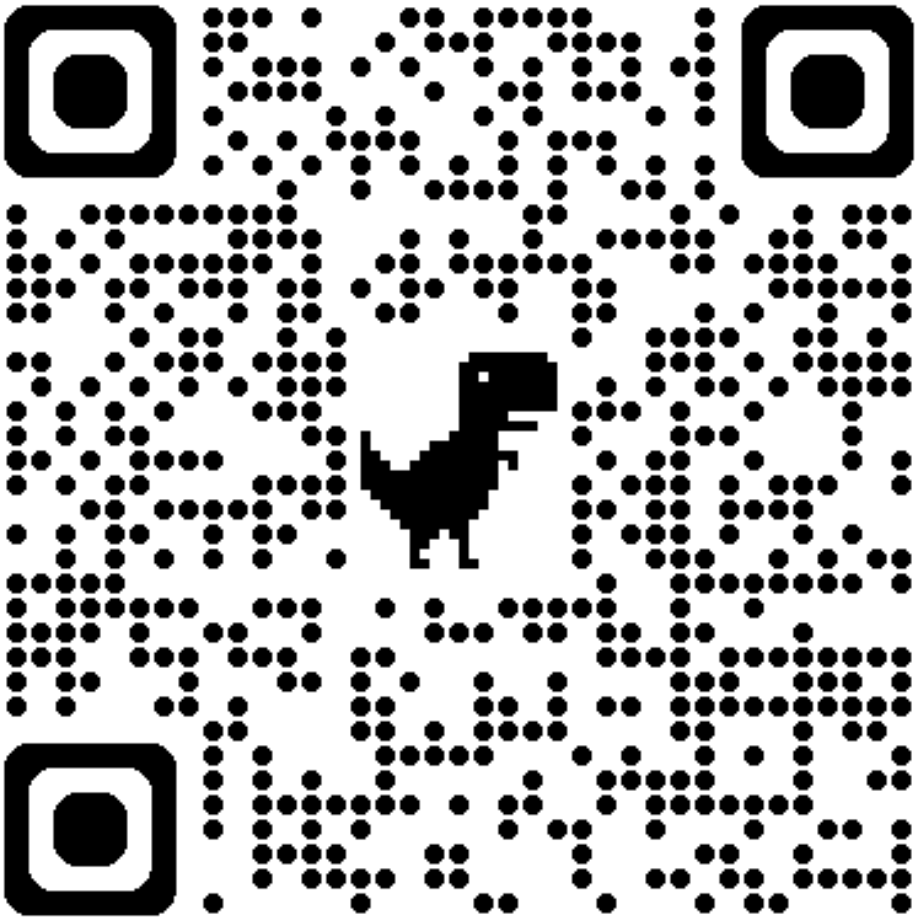

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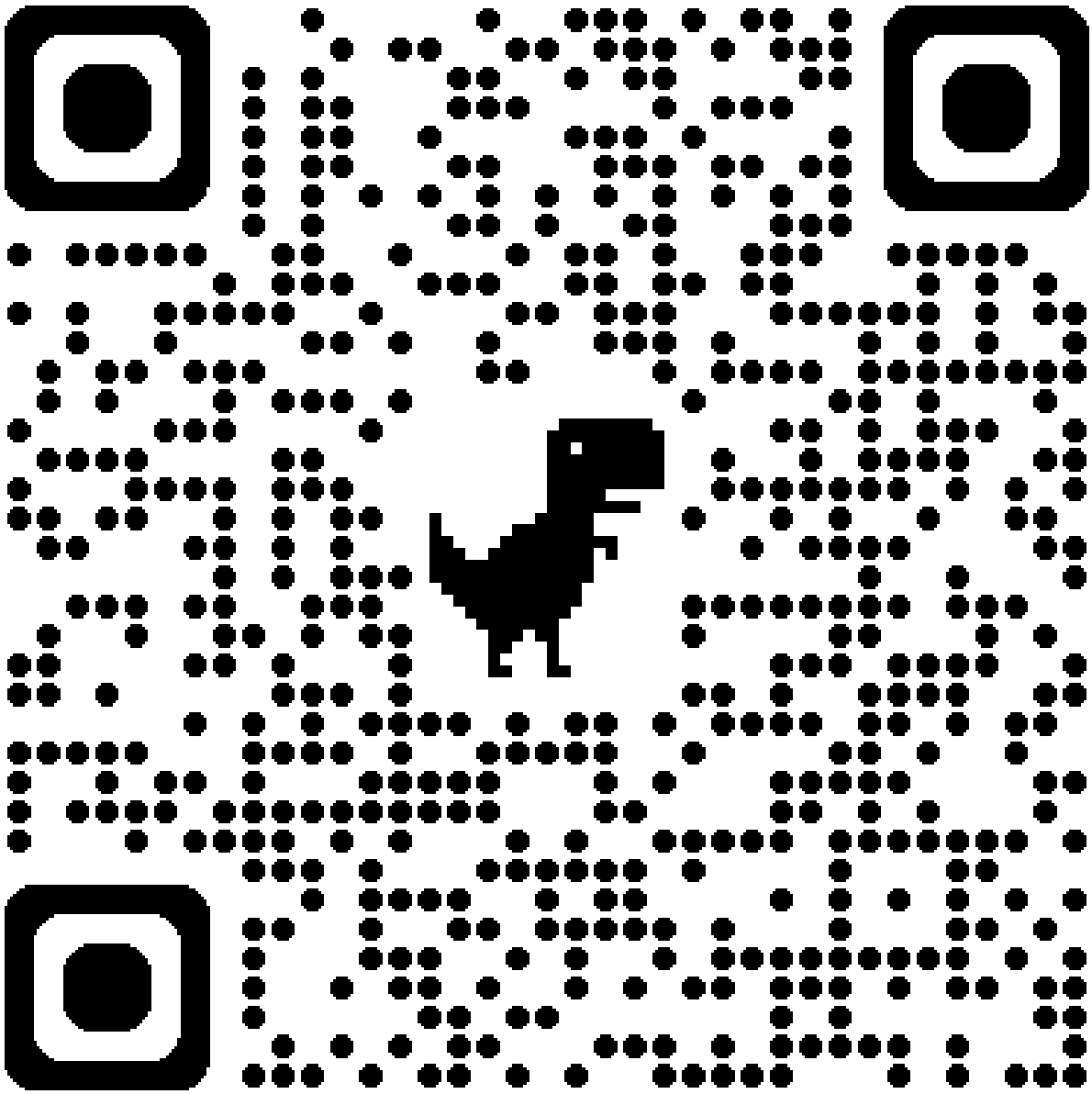

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CLASS	**Mathematics**
X	**Must Know Questions 2025 – 26**

GOODS AND SERVICES TAX

(1) A retailer purchased an air conditioner (A.C.) for ₹30,000. He marked up its price by 20% and then allows a discount of 10% on the marked price to a customer.
If the sale is intra-state and the rate of GST is 28%,
find the: (a) marked price of A.C.
(b) total amount paid by the customer including GST.
(c) tax collected by the central and the state governments respectively.

(2) The following bill shows the GST rate and the marked price of articles:
Find the total amount to be paid (including GST) for the above bill.

S.No.	Item	Marked price	discount	Rate of GST
(a)	Dry fruits (1Kg)	₹ 1200	₹ 100	12%
(b)	Packed Wheat flour (5kg)	₹ 286	Nil	5%
(c)	Bakery products	₹ 500	10%	12%

BANKING

(l) Rajesh deposits ₹300 per month in a Recurring Deposit Account for 2 years.
If the rate of interest is 10% per year; calculate the amount that Rajesh will receive at the end of 2 years.

(2) Mr. RK. Nair gets ₹6,455 at the end of one year at the rate of 14% per annum in a Recurring Deposit Account. Find the monthly instalment.

(3) Ahmed has a recurring deposit account in a bank. He deposits ₹2,500 per month for 2 years.
If he gets ₹66,250 at the time of maturity, find: the interest paid by the bank and the rate of interest.

(4) Monica has a C.D. Account in the Union Bank of India and deposited ₹600 per month.
If the maturity value of this account is ₹24,930 and the rate of interest is 10% per annum;
find the time (in years) for which the account was held.

SHARES AND DIVIDENDS

(1) A man invests ₹8,800 on buying shares of face value of rupees hundred each at a premium of 10%.
If he earns ₹1,200 at the end of year as dividend,
find: (i) the number of shares.
(ii) the dividend % per share.

(2) Amrita buys 52 shares of nominal value ₹100 available at ₹132.
(i) What is her investment?
(ii) If the dividend is 12%, what will be her annual income?
(iii) If she wants to increase her annual income by ₹240, how many extra shares should she buy?

(3) Mr. Sharma has 60 shares of nominal value ₹100 and he decides to sell them when they are at a premium of 60%. He invests the proceeds in shares of nominal value ₹50, quoted at 4% discount, paying 18% dividend annually.
Calculate (i) the sale proceeds
(ii) the no of shares he buys
(iii) his annually dividend from these shares.

(4) A man invests ₹22,500 in ₹50 shares available at 10% discount.
If the dividend paid by the company is 12%,
calculate: (i) the number of shares purchased.
(ii) the annual dividend.
(iii) the rate of return he gets on his investment. Give your answer correct to the whole number.

(5) Salman invests a sum of money in ₹50 shares, paying 15% dividend quoted at 20% premium.
If his annual dividend is ₹600,
calculate: (i) the number of shares he bought.
(ii) his total investment.
(iii) the rate of return on his investment.

LINEAR INEQUATIONS

(1) Solve the following inequation, write the solution set, and represent it on the real number line.

$$5x - 21 < \frac{5x}{7} - 6 \leq -3\frac{3}{7} + x; x \in R$$

(2) Solve the following inequation, write the solution set, and represent it on the real number line.

$$-8\frac{1}{2} < -\frac{1}{2} - 4x \leq 7\frac{1}{2}, x \in I$$

QUADRATIC EQUATIONS

(1) Solve the following quadratic equation: $3x^2 + 6x - 4 = 0$
Give your answer correct to two places of decimals.

(2) Solve the following quadratic equation and give answer correct to 3 significant figures:

$$x - \frac{18}{x} = 6$$

(3) Without solving the following equations,
find the value of 'm' for which the given equation has real roots.
(i) $3x^2 - mx + 27 = 0$
(ii) $mx^2 - 5x + 3 = 0$

(4) If the roots of the equation $(b - c)x^2 + (c - a)x + (a - b) = 0$ are equal, then prove that $2b = a + c$.

(5) The difference of 2 natural numbers is 7 and their product is 450. Find the numbers.

(6) The total expenses of a trip for certain number of people is ₹18,000. If three more people join them, then the share of each reduces by ₹3,000. Take x to be the original number of people, form a quadratic equation in x and solve it to find the value of x.

(7) A two-digit number is such that the product of its digits is 12. When 36 is added to this number; the digits interchange their places. Find the number.

RATIO AND PROPORTION

(1) What should be added to each of the numbers 13, 17 and 22 so that the resulting numbers are in continued proportion.

(2) 6 is the mean proportion between two numbers x and y and 48 is third proportion of x and y. Find the numbers.

(3) Use componendo and dividendo to find the value of x, when: $\frac{x^3+3x}{3x^2+1} = \frac{14}{13}$

FACTORISATION OF POLYNOMIALS

(1) $(x-3)$ is a factor of $x^3 + ax^2 + bx - 9$ and when it is divided by $(x-2)$, the remainder is 1. Find a and b.

(2) What number must be subtracted from $4x^3 + 6x^2 - 5x$ so that the resulting polynomial has a factor $x - 1$?

(3) While factorizing a given polynomial, using remainder & factor theorem, a student finds that $(2x + 1)$ is a factor of $2x^3 + 7x^2 + 2x - 3$.
(a) Is the student's solution correct stating that $(2x + 1)$ is a factor of the given polynomial?
(b) Give a valid reason for your answer.
(c) Also factorize the given polynomial completely.

MATRICES

(1) If $A = \begin{bmatrix} 4 & -4 \\ -4 & 4 \end{bmatrix}$ find A^2. If $A^2 = pA$, then find the value of p.

(2) Given matrix, $X = \begin{bmatrix} 1 & 1 \\ 8 & 3 \end{bmatrix}$ and $I = \begin{bmatrix} 1 & 0 \\ 0 & 1 \end{bmatrix}$. Prove that $X^2 = 4X + 5I$.

(3) Given $A = \begin{bmatrix} 1 & -2 \\ -3 & 4 \end{bmatrix}$

(i) Find the matrix B so that A + B is a zero matrix.
(ii) Find the matrix C so that A + C = A
(iii) Find the matrix D so that A + D = Identity matrix.

ARITHEMATIC PROGRESSION

(1) Find the common difference of an AP whose first term is $\frac{1}{2}$ and the 8^{th} term is $\frac{17}{6}$.

Also, write its 4^{th} term.

(2) The 31^{st}, 16^{th} and the last terms of an AP are 1, 4, $\frac{-4}{5}$ respectively.

Find the first term and the number of terms in the AP.

(3) Which term of the AP: 45, 41, 37, 33,..... is the first negative term?

(4) Find the value of k, if $k^2 + 4k + 8$, $2k^2 + 3k + 4$ and $3k^2 + 4k + 4$ are 3 consecutive terms of an AP.

(5) An arithmetic Progression has 3 as its first term. The sum of the first 8 terms is twice the sum of the first 5 terms. Find the common difference of the A.P.

(6) 164, 160, 156, 152, ... are in Arithmetic Progression (A.P.).
Find: (a) which term is equal to 0.
(b) the sum of its first 20 terms.

(7) -11, -7, -3, ... ,49, 53 are the terms of a progression.
Answer the following: (a) What is the type of progression?
(b) How many terms are there in all?
(c) Calculate the value of middle most term.

GEOMETRIC PROGRESSION

(1) The 4^{th}, 6^{th} and the last term of a geometric progression are 10, 40 and 640 respectively. If the common ratio is positive, find the first term, common ratio and the number of terms of the series.

(2) The sum of first three terms of a G.P. is 16 and the sum of next three terms is 128. Determine the sum of n terms of the G.P.

(3) Determine the G.P. whose 3rd term is 8 and 7^{th} term is $\frac{128}{625}$

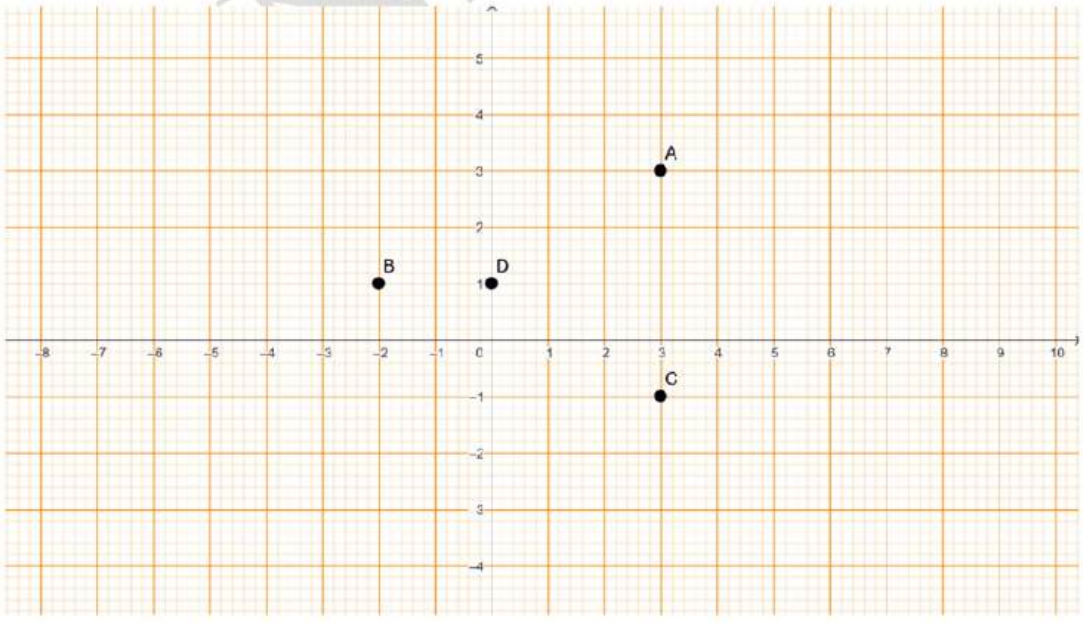
(4) The first term of a G.P. is 81 and the square of the third term is equal to its 1^{st} term. Find the 6^{th} term of the G.P.

(5) In a Geometric Progression (G.P.) the first term is 24 and the fifth term is 8. Find the ninth term of the G.P.

REFLECTION

(1) Use graph paper for this question. Take 1 cm = 1 unit on both X and Y axes.
(a) Plot the following points on your graph sheets: A(–4, 0), B(–3, 2), C(0, 4), D(4, 1) and E(7, 3)
(b) Reflect the points B, C, D and E on the X-axis and name them as B', C', D' and E' respectively.
(c) Join the points A, B, C, D, E, E', D', C', B' and A in order.
(d) Name the closed figure formed.

(2) Study the graph and answer each of the following:
(a) Write the coordinates of points A, B, C and D.
(b) Given that, point C is the image of point A. Name and write the equation of the line of reflection.
(c) Write the coordinates of the image of the point D under reflection in y-axis.
(d) What is the name given to a point whose image is the point itself?
(e) On joining the points A, B, C, D and A in order, a figure is formed. Name the closed figure.



(3) Use a graph sheet for this question. Take 1 cm = 1 unit along both the x and y axis.
Plot ABCDE, where A(4, 0), B(4, 2), C(2, 2), D(2, 4) and E(0, 4).
(a) Reflect the points A, B, C and D on the y-axis and name them as F, G, H and I respectively.
(b) Join the points A, B, C, D, E, I, H, G and F in order.
Reflect the figure ABCDEIHGF on the x-axis and name it as AMNPQRSTF.
(c) Give the geometrical name of the closed figure AEFQ.

SECTION FORMULA

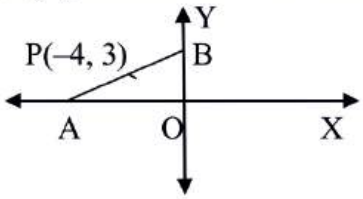
(1) If the line joining the points A(4, –5) and B(4, 5) is divided by the point P such that $\frac{AP}{AB} = \frac{2}{5}$.
Find the co-ordinates of P.

(2) In what ratio does the point P(2, –5) divide the line segment joining the points A(–3, 5) and B(4, –9)?

(3) Given a line segment AB joining the points A(–4, 6) and B(8, –3).
Find: (i) the ratio in which AB is divided by the y-axis.
(ii) the co-ordinates of the point of intersection.
(iii) the length of AB

(4) Calculate the ratio in which the line joining A(–4, 2) and B(3, 6) is divided by point P(x, 3). Also find x

(5) In the figure, P(–4, 3) divides AB in the ratio 3 : 2. Find the coordinates of A and B.

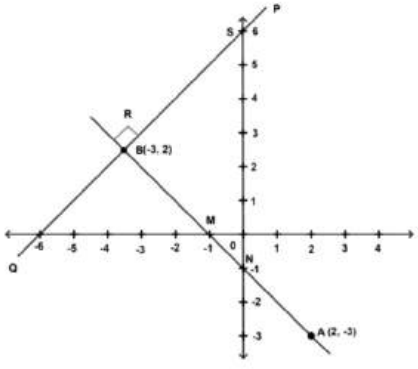


EQUATION OF A STRAIGHT LINE

(1) P is a point on the x-axis which divides the line joining A(-6, 2) and B (9, -4). Find:
(a) the ratio in which P divides the line segment AB.
(b) the coordinates of the point P.
(c) equation of a line parallel to AB and passing through (-3, -2).

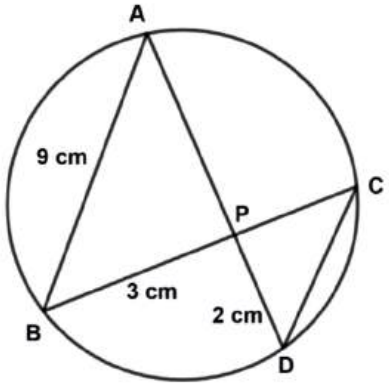
(2) Find the coordinates of the centroid P of the ΔABC, whose vertices are A(–1, 3), B(3, –1) and C(0, 0). Hence, find the equation of a line passing through P and parallel to AB.

(3) The line segment joining A(2, -3) and B(-3, 2) is intercepted by the x-axis at the point M and the y-axis at the point N. PQ is perpendicular to AB at R and meets the y-axis at a distance of 6 units form the origin O, as shown in the diagram, at S.
Find the: (a) coordinates of M and N.
(b) coordinates of S
(c) slope of AB.
(d) equation of line PQ.



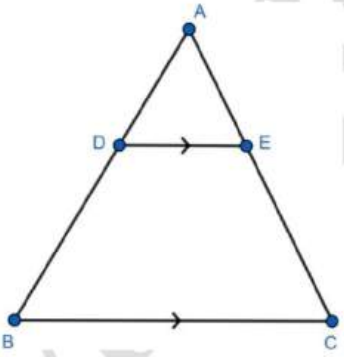
SIMILARITY

(1) In the given figure (not drawn to scale) chords AD and BC intersect at P, where AB = 9 cm, PB = 3 cm and PD = 2 cm.



(a) Prove that ΔAPB ~ ΔCPD.
(b) Find the length of CD.
(c) Find area ΔAPB : area ΔCPD.

(2) In the given figure DE // BC.
(i) Prove that ΔADE and ΔABC are similar.
(ii) Given that AD = ½ BD. Calculate DE, if BC = 4.5 cm. Also find: $\frac{A(\Delta ADE)}{A(\Delta ABC)}$ and $\frac{A(\Delta ADE)}{A(trap\ BCED)}$



(3) A model of a ship is made to a scale 1 : 300.
(i) The length of the model of the ship is 2 m. Calculate the length of the ship.
(ii) The area of the deck of the ship is 180000 m^2. Calculate the area of the deck of the model.
(iii) The volume of the model is 6.5 m^3. Calculate the volume of the ship.

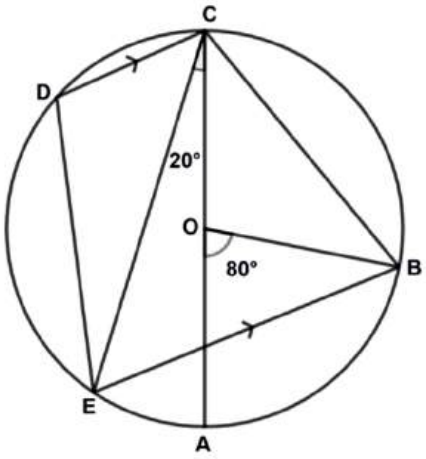
LOCUS

(1) Use a ruler and compass to answer this question.
(a) Construct a circle of radius 4.5 cm and draw a chord AB of length 6.5 cm.
(b) At A, construct ∠CAB = 75°, where C lies on the circumference of the circle.
(c) Construct the locus of all points equidistant from A and B.
(d) Construct the locus of all points equidistant from CA and BA.
(e) Mark the point of intersection of the two loci as P. Measure and write down the length of CP.

(2) Use ruler and compasses for the following question taking a scale of 10 m = 1 cm.
A park in the city is bounded by straight fences AB, BC, CD and DA.
Given that AB = 50 m, BC = 63 m, ∠ABC = 75°. D is a point equidistant from the fences AB and BC.
If ∠BAD = 90°, construct the outline of the park ABCD.
Also locate a point P on the line BD for the flag post which is equidistant from the corners of the park A and B

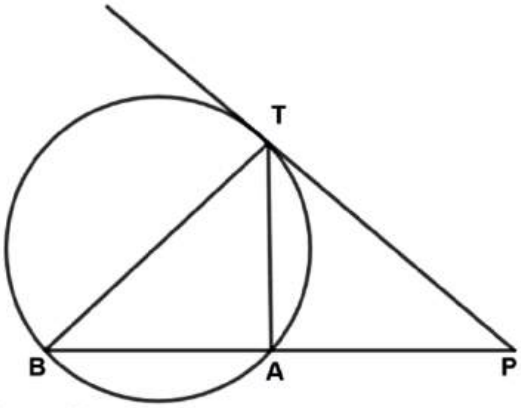
CIRCLES

(1) In the given figure, AC is the diameter of the circle with centre O.
CD is parallel to BE. $\angle AOB = 80^0$ and $\angle ACE = 20^0$.

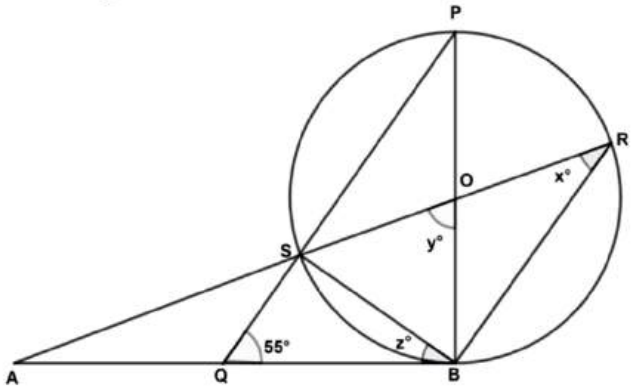


Calculate: (a) $\angle BEC$, (b) $\angle BCD$, (c) $\angle CED$

(2) In the given figure PT is a tangent to the circle. Chord BA produced meets the tangent PT at P.
Given PT = 20 cm and PA = 16 cm.
(a) Prove $\triangle PTB \sim \triangle PAT$
(b) Find the length of AB.



(3) In the given figure, O is the centre of the circle and AB is a tangent to the circle at B. If $\angle PQB = 55°$.
(a) find the value of the angles x, y and z.
(b) prove that RB is parallel to PQ.



CONSTRUCTIONS

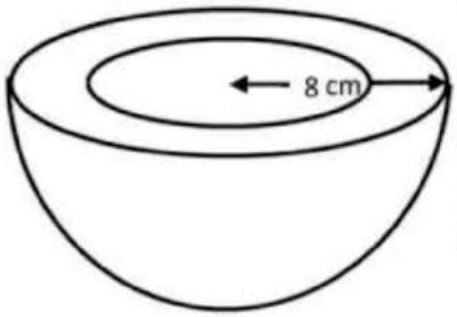
(1) Construct a regular hexagon of side 4.5 cm. Hence, construct a circle circumscribing the regular hexagon. Use ruler and compass for the construction. Measure and write down the radius of the circle.

(2) Use ruler and compass only for answering this question. Draw a circle of radius 4 cm.
Mark the centre as O. Mark a point P outside the circle at a distance of 7 cm from the centre.
Construct two tangents to the circle from the external point P.
Measure and write down the length of any one tangent.

AREA AND VOLUME OF SOLIDS

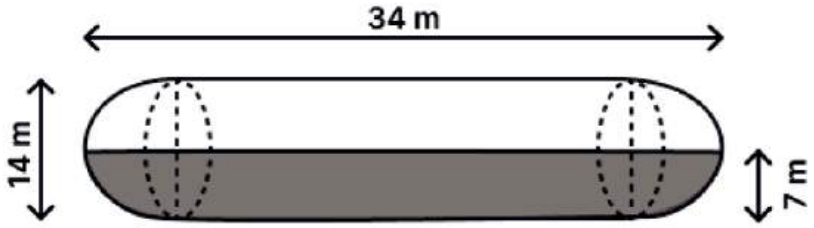
(1) A right circular cone of radius 20 cm has its volume 8800 cm^3.
Find its: (a) height
(b) curved surface area.
Give your answer to the nearest whole number.

(2) The inner circumference of the rim of a circular metal tub is 44 cm.
Find: (a) The inner radius of the tub.
(b) The volume of the material of the tub if it's outer radius is 8 cm.
Give your answer correct to three significant figures.



(3) An ice cream cone has a diameter of 7 cm and its height is 9 cm.
It is filled with a scoop of spherical shaped ice cream of radius 3.5 cm.
Find: (a) on melting, is the ice cream sufficient to fill the cone completely without any wastage?
(b) the volume of ice cream, if any, is in excess or less.
(Give all answers correct to the nearest whole number)

(4) Shown below a horizontal water tank composed of a cylinder and two hemispheres.
The tank is filled up to a height of 7 m. Find the surface area of the tank in contact with water.



TRIGONOMETRY

(1) Find: (a) $(\sin\theta + \operatorname{cosec}\theta)^2$
(b) $(\cos\theta + \sec\theta)^2$

Using the above results prove the following trigonometry identity:
$(\sin\theta + \operatorname{cosec}\theta)^2 + (\cos\theta + \sec\theta)^2 = 7 + \tan^2\theta + \cot^2\theta$

(2) Prove the following identity:
$(sin^2\theta - 1)(tan^2\theta + 1) + 1 = 0$

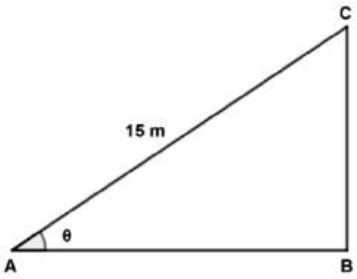
(3) Prove that:
$\frac{1}{1+sin\theta} + \frac{1}{1-sin\theta} = 2sec^2\theta$

(4) Prove the following trigonometry identity:
$(\sin\theta + \cos\theta)(\operatorname{cosec}\theta - \sec\theta) = \operatorname{cosec}\theta.\sec\theta - 2\tan\theta$

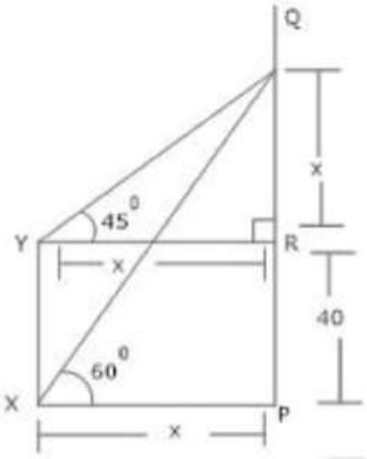
(5) Prove that:
$\tan^2\theta + \cos^2\theta - 1 = \tan^2\theta.\sin^2\theta$

HEIGHTS AND DISTANCES

(1) An inclined plane AC is prepared with its base AB which is $\sqrt{3}$ times its vertical height BC.
The length of the inclined plane is 15 m.
Find: (a) value of θ.
(b) length of its base AB, in nearest metre.



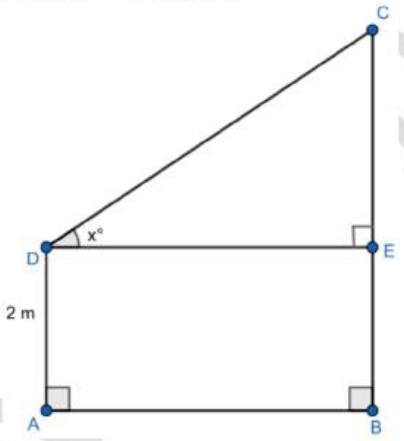
(2) The angle of elevation of the top Q of a vertical tower PQ from a point X on the ground is 60^0.
At a point Y, 40 m vertically above X, the angle of elevation is 45^0,
find the height of the tower PQ and the distance XQ.



(3) With reference to the given figure, a man stands on the ground at point A, which is on the same horizontal plane as B, the foot of the vertical pole BC. The height of the pole is 10 m.
The man's eye is 2 m above the ground. He observes the angle of elevation of C, the top of the pole, as x°, where $\tan x° = \frac{2}{5}$.

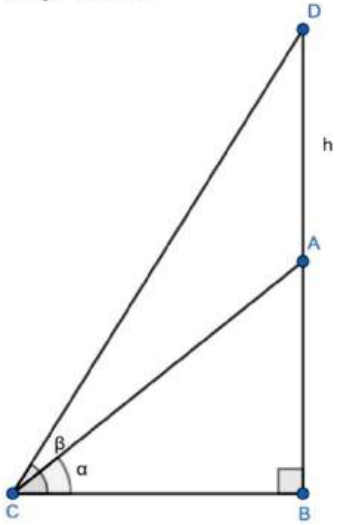
Calculate: (a) the distance AB in metres;

(b) angle of elevation of the top of the pole when he is standing 15 metres from the pole. Give your answer to the nearest degree.



(4) A vertical tower stands on a horizontal plane and is surmounted by a vertical flagstaff of height h meter. At a point on the plane, the angle of elevation of the bottom of the flagstaff is α and at the top of the flagstaff is β.

Prove that the height of the tower is: $\frac{h \tan \alpha}{\tan \beta - \tan \alpha}$



(5) Draw the necessary diagram for this question.
A man on the top of a lighthouse observes the angle of depression of two ships on the opposite sides of the lighthouse as 30° and 50° respectively.
If the height of the lighthouse is 80 m, find the distance between the two ships.
Give your answer correct to the nearest meter.

MEASURES OF CENTRAL TENDENCY AND GRAPHICAL REPRESENTATION

(1) The mean of following numbers is 68. Find the value of 'x'. 45, 52, 60, x, 69, 70, 26, 81 and 94.
Hence estimate the median.

(2) If the mean of the following distribution is 24, find the value of '*a* '.

Marks	0 – 10	10 – 20	20 – 30	30 – 40	40 – 50
Number of students	7	*a*	8	10	5

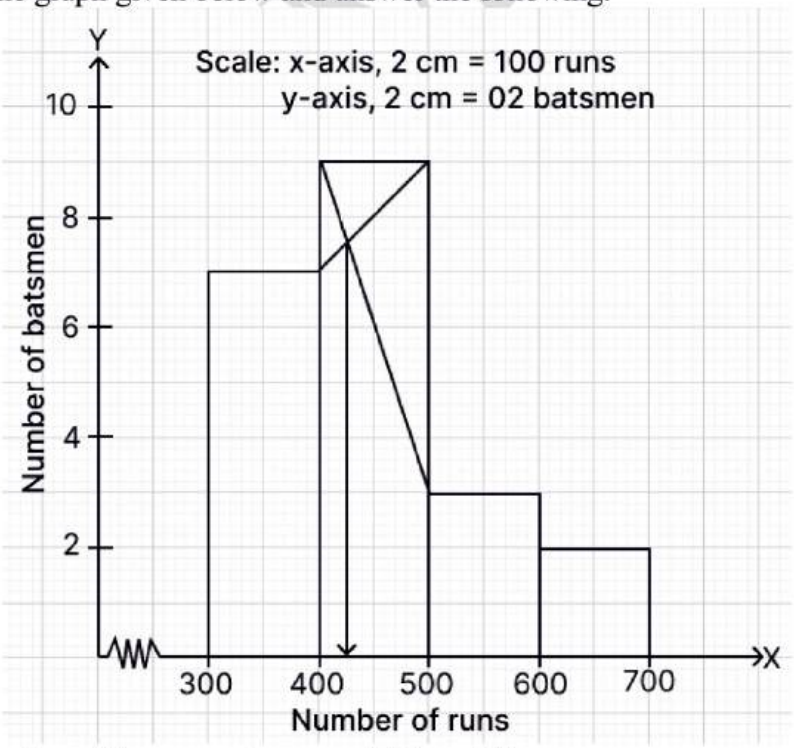
(3) Using short cut method, find mean for the following frequency distribution:

Height of plant (in cm)	120 – 140	140 – 160	160 – 180	180 – 200	200 – 220	220 – 240
Number of plants	4	10	20	12	6	8

(4) Using step-deviation method, find mean for the following frequency distribution:

Class	0 – 15	15 – 30	30 – 45	45 – 60	60 – 75	75 – 90
Frequency	3	4	7	6	8	2

(10) Study the graph given below and answer the following:



(a) Number of batsmen who scored 500 to 700 runs
(b) Modal class interval
(c) The value of mode

(11) The table given below shows a record of the weight in kilogram of 200 students of a school.
Draw a histogram and find the modal weight.
[Take 2 cm = 5 kg along one axis and 2 cm = 5 students along the other axis]

Weight (kg)	40 – 45	45 – 50	50 – 55	55 – 60	60 – 65	65 – 70	70 – 75
Number of students	8	19	24	45	51	31	22

(12) The marks of 200 students in a test were recorded as follows:

Marks %	No. of students
0 - 10	5
10 - 20	7
20 - 30	11
30 - 40	20
40 - 50	40
50 - 60	52
60 - 70	36
70 - 80	15
80 - 90	9
90 - 100	5

Using a graph sheet draw ogive for the given data and use it to find the:
(a) median.
(b) number of students who obtained more than 65% marks.
(c) number of students who did not pass, if the pass percentage was 35.

PROBABILITY

(1) A box containing cards numbered between 0 and 100 are shuffled and a card is picked at random.
Find the probability of getting a card which is:
(a) divisible by 6.
(b) not divisible by 6.

(2) The following letters A, D, M, N, O, S, U, Y of the English alphabet are written on separate cards and put in a box. The cards are well shuffled and one card is drawn at random.
What is the probability that the card drawn is a letter of the word?
(a) MONDAY?
(b) which does not appear in MONDAY?
(c) which appears both in SUNDAY and MONDAY?

(3) Each of the letter of the word "HOUSEWARMING" is written on cards and put in a bag.
If a card is drawn at random from the bag after shuffling,
what is the probability that the letter on the card is?
(a) a vowel.
(b) one of the letters of the word SEWING.
(c) not a letter from the word WEAR.

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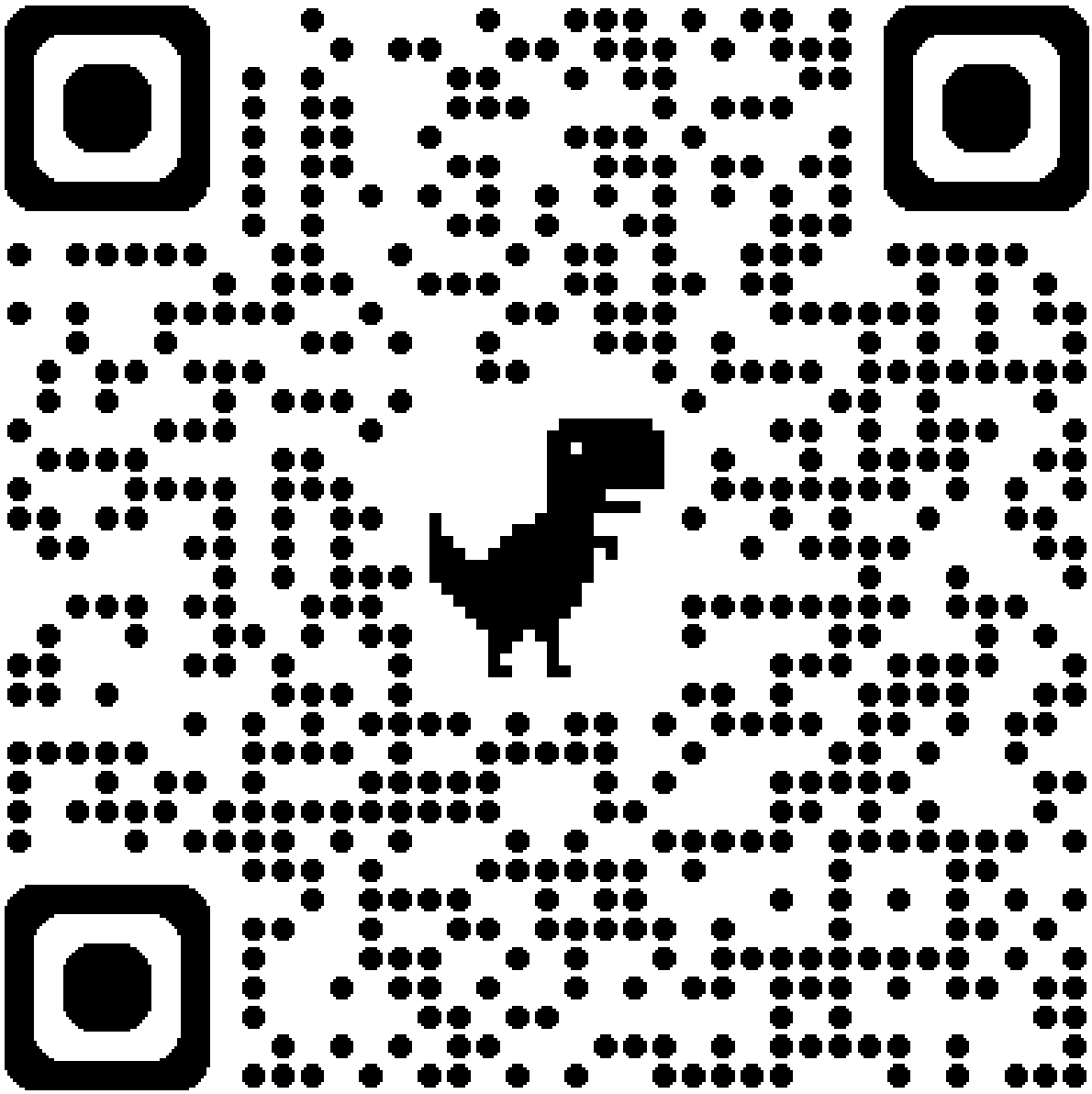

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