



Education Department, UT Chandigarh

Critical and Creative Thinking

Mathematics Practice Booklet
Class:10



राज्य शैक्षिक अनुसंधान और प्रशिक्षण परिषद्
STATE COUNCIL OF EDUCATIONAL RESEARCH AND TRAINING
SECTOR-32 UT CHANDIGARH



Websites/links to download CCT Resource Material

CCT Tracker:

- URL: <https://pisa.diksha.gov.in>
- User Id: utcschools
- Password: Utcschools@01

SE Shagun Portal:

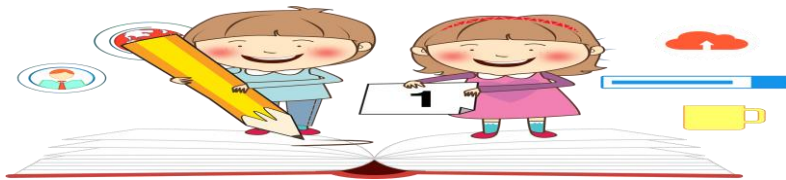
- <http://pisa.seshagun.gov.in/codes.html>
- <http://pisa.seshagun.gov.in/?AspxAutoDetectCookieSupport=1>
- <http://pisa.seshagun.gov.in/cct/>

DIKSHA:

- <http://diksha.gov.in>
- QR code and link for CCT Weekly- R5Z7P5
- <https://diksha.gov.in/get/dial/R5Z7P5>

OECD – PISA:

- <https://www.oecd.org/pisa/>
- <https://www.oecd.org/pisa/publications/>

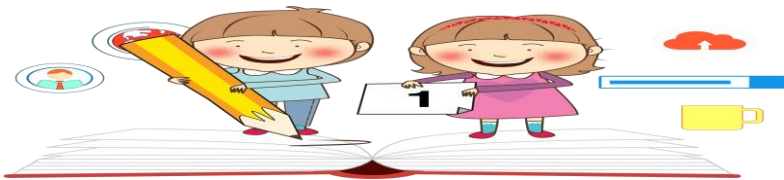


Challenge
yourself...



NCERT:CLASS10 CURRICULUM

Chapter No. & Name	Experiential Learning *	CCT Literacy Area	Learning Outcomes	Integration with other subjects
1. Real Numbers	<p>To calculate maximum and minimum weight, quantity and time.</p> <p>Visit to a race course to find minimum time taken by a runner. *</p>	Quantity	<p>The learner generalizes properties of numbers and relations among them studied earlier to evolve results, such as, Euclid's Division Algorithm, Fundamental Theorem of Arithmetic, and applies them to solve problems related to real life contexts.</p>	English – Letter writing to a friend describing your visit to a race course and how you rightly predicted the probability of winning of the weakest horse.



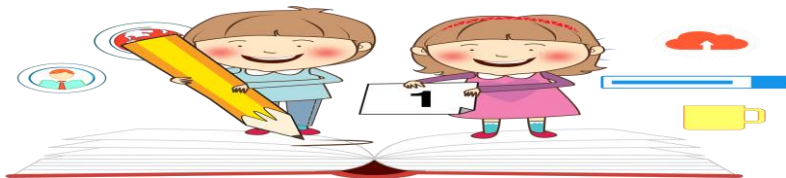
2. Polynomials	Speedometer, odometer, curves of rollercoaster rides. Visit to an amusement park*	Change & Relationship	The learner develops a relationship between algebraic and graphical methods of finding the zeroes of a polynomial.	Science- To study speed, distance and time of moving vehicles.
3. Pair of Linear Equations in Two Variables	Cost of articles, banking, shopping, budgeting etc. Visit to a market/shopping mall. *	Change & Relationship	The learner finds solutions of pairs of linear equations in two variables using graphical and different algebraic methods.	English- To express a situation and change it in the mathematical form.
4. Quadratic Equations	Profit and loss, Speed and distance, Ride in a car/bus to study	Change & Relationship	The learner demonstrates strategies of finding roots and determining the nature of	Social Studies- To study market rise and relating it with economics.



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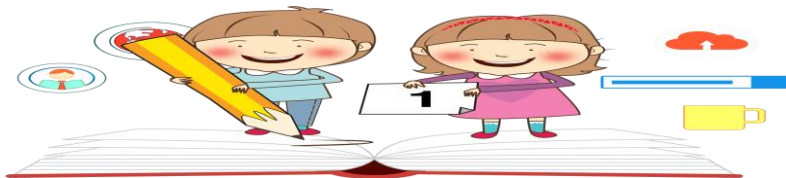
	speed time and distance.*		roots of a quadratic equation.	
5. Arithmetic Progressions	<p>Patterns and trends in daily life i.e increase in body temperature of a patient cost of construction, penalty charges.</p> <p>Visit to a builder for penalty charges of construction beyond completion date.*</p>	Quantity	<p>The learner develops strategies to apply the concept of A.P to daily life situations.</p>	<p>Science-Trends in growth of cells in biology.</p> <p>Social Studies- Study of population increase and factors responsible for it.</p> <p>Hindi/Punjabi- Designing an advertisement for sale of plots/flats by a local builder.</p>
6. Triangles	<p>Construction of buildings and bridges</p> <p>Visit to a</p>	Shape & Space	<p>The learner works out ways to differentiate between congruence</p>	<p>Art and craft,</p> <p>Social studies- Design of a bridge using art and craft skills</p>



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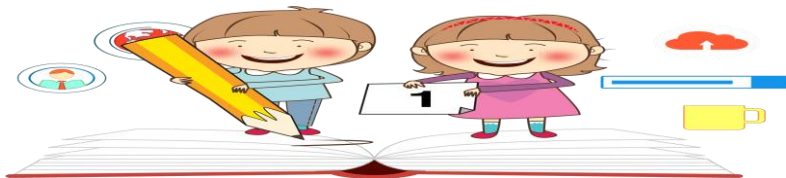
	constructi on site, traffic park to study traffic signs, bridges, lakes to observe sail boats etc.*		uent and similar figures. The learner establishes properties for similarity of two triangles logically using different geometrical criteria established earlier such as Basic Proportionalit y Theorem etc.	which can further be connected to social studies.
7. Coordinate Geometry	Location of points and places on world map Visit to any tourist place and studying	Shape & Space	The learner derives formulae to establish relations for geometrical shapes in the context of a	Geography - Study of different points/ locations on maps.



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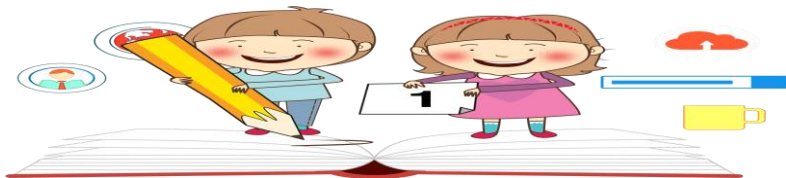
	the map of the place and coordinate s of different points. *		coordinate plane, such as finding the distance between two given points, to determine coordinates of a point between any two given points, to find area of a triangle etc.	
8. Introduction to Trigonometry	Calculation of heights of buildings, space crafts, tides and light house. Visit to a lighthouse, hills, monument ,buildings etc.*	Change & Relationship	The learner determines all trigonometric ratios with respect to a given acute angle (of a right triangle)	Space sciences/ Astronomy- To calculate distance of celestial objects and elevation of aircrafts. Art- Drawing a landscape with hills, oceans, light house etc.
9. Some	Calculation		The learner	Science-Study



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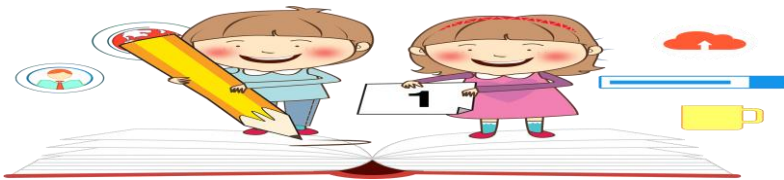
Applications of Trigonometry	of heights of buildings, space crafts, tides and light house. Visit to a lighthouse, hills, monument , buildings etc.*	Change & Relationship	uses trigonometric ratios in solving problems in daily life contexts like finding heights of different structures or distances between them.	of space crafts, satellites, high tide/low tide etc.
10. Circles	Fields, school buildings, monument s Study of planets, moon and sun Visit to science city, sports stadium,	Shape & Space	The learner understands different concepts of tangents, secants and circles.	Science -Shapes of cells and atomic structures in biology and chemistry.



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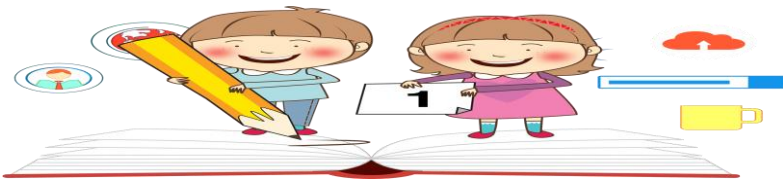
	lakes etc.*			
12. Areas Related to Circles	Bakery shop for sizes of cakes and pizza, Circumference of wheels and alloys. Visit to an auto wheel factory, Restaurants, roundabouts etc.*	Shape & Space	The learner determines areas of various 2D objects, designs around them. For e.g. design on a handkerchief, design of tiles on the floor, geometry box etc.	Social studies/ Science- Study of the crop pattern, growing conditions for crops, soil quality etc. in an agricultural field and calculating area of different parts of the field.
13. Surface Areas and Volumes	Oil tankers, space objects like rocket launcher, airplanes, ships etc. Visit to oil companies	Shape & Space	The learner finds surface areas and volumes of 3D objects in the surroundings by visualizing them as a combination of different	Space sciences- Study of fuel consumption in a rocket launcher. Social studies— Study of packing and storage of goods, oil producing countries, industrial



Challenge
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	, Industries, toy shops/factories etc.*		solids like cylinder and a cone, cylinder and a hemisphere, combination of different cubes etc.	production of goods, import, export etc.
14. Statistics	Medical study, scores of players, population study and weather pattern Visit to a hospital, cricket or football match etc.*	Uncertainty & Data	The learner calculates mean, median and mode for different sets of data related with real life contexts and observe graphical data to find mode, median etc.	Geography -To study weather forecast for an area Science -Study of different medical facilities provided in hospitals of rural and urban areas and the medical trends in terms of birth and death rate.
15. Probability	Weather forecast	Uncertainty & Data	The learner determines	Geography/Science -Study of

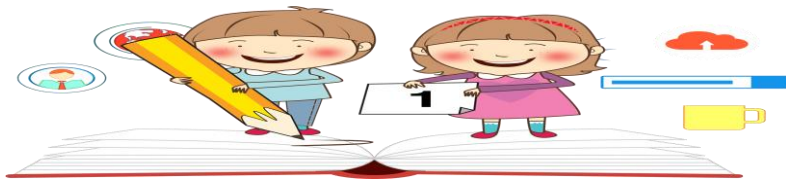


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	department to study rainfall, snowfall		the probability of an event.	rainfall trend in an area.
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*These are only suggestive activities other activities can also be further conducted as per need of the topic

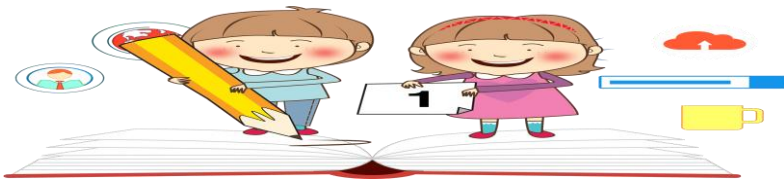


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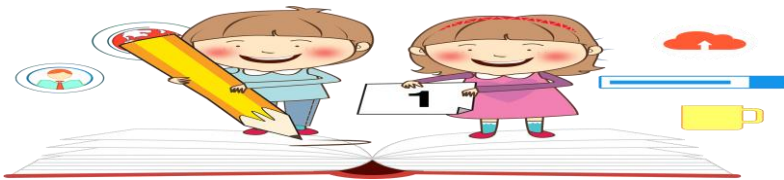
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Challenge
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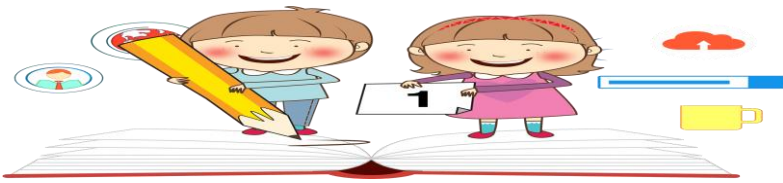
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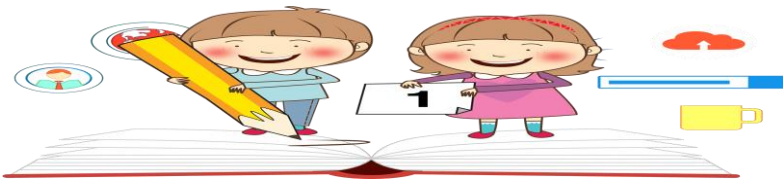


ROCKING LISTENERS

Radio Lemon is a nationwide network of private FM radio stations in India, very popular among youngsters. To attract more listeners, Radio Lemon along with sponsors is organizing an event ‘ROCKING LISTENERS’ for two days. During this time, they will be giving a free dinner voucher to every 100th caller and a free movie ticket to every 30th caller.



How many callers must get through before one of them receives both a dinner voucher and a movie ticket?



Challenge
yourself...



DANCING LIGHTS

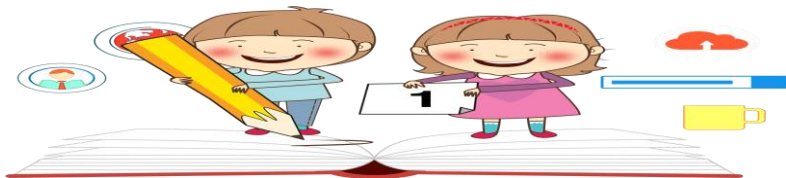
Mohit is a student of class 9th. Last week he attended the marriage ceremony of his neighbour. He was getting bored there. He sat on a chair and started to observe the arrangements around. The lightening bulbs were attracting him. 4 different colored lights were flickering.



One of the lights flickers every 6 second, 2nd light flickers every 8 second, 3rd light flickers every 9 second and 4th light flickers every 10 second.

- i. After how many seconds all lights will flicker together again?

- ii. How many times each light flicker in 6 minutes?



**Challenge
Yourself...**



MATH SCIENCE COCKTAIL

Sangeeta a Science teacher wants to conduct a practical activity on topic acids and bases with the students of class VII. She takes them to the Science lab. Before performing the practical activity, she wants to divide the class of 52 students into four groups in a random order. She instructs the students as:

Group I: If counted in fours, zero will remain.

Group II: If counted in fours, 1 will remain.

Group III: If counted in fours, 2 will remain.

Group IV: If counted in fours, 3 will remain.



- i. Help Sangeeta to write the groups mathematically using Euclid's Division Lemma?

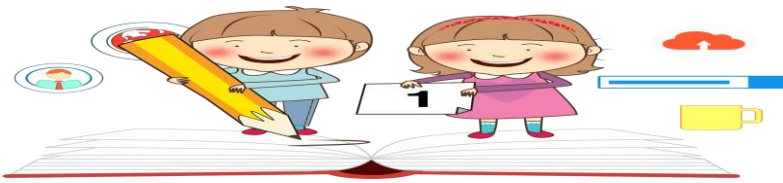
- ii. List the entries of Group I, Group II, Group III and Group IV.

Group I _____

Group II _____

Group III _____

Group IV _____

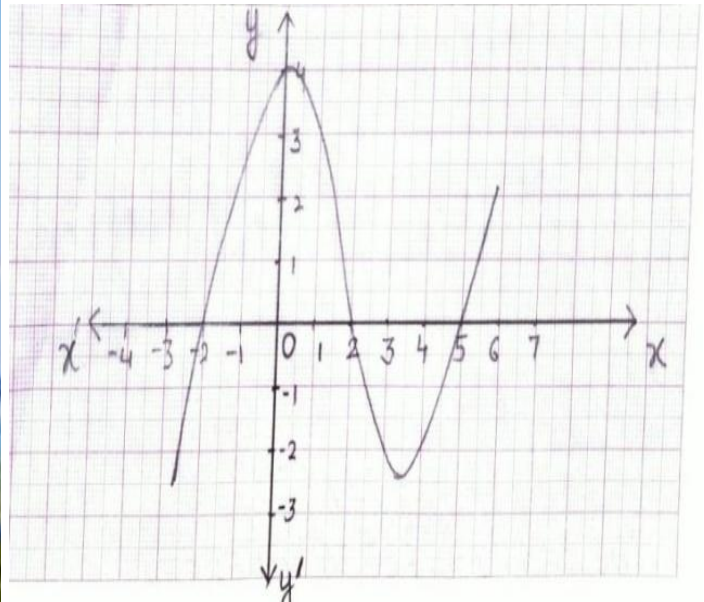


**Challenge
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ROLLER COASTER RIDE

Wow! All kids love the roller coaster ride, isn't it! Let's observe a section of roller coaster in the below given figure.



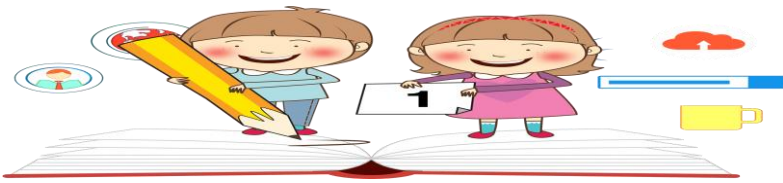
i. Which equation does the above section represent the following: -

- a. $y = ax^2 + bx + c$, $a \neq 0$
- b. $y = ax^3 + bx^2 + cx + d$, $a \neq 0$
- c. $y = ax + b$, $a \neq 0$

ii. How many zeroes does the polynomial have? (See figure)

iii. Write the zeroes of polynomial.

iv. Form the polynomial using the zeroes obtained in part (iii).



**Challenge
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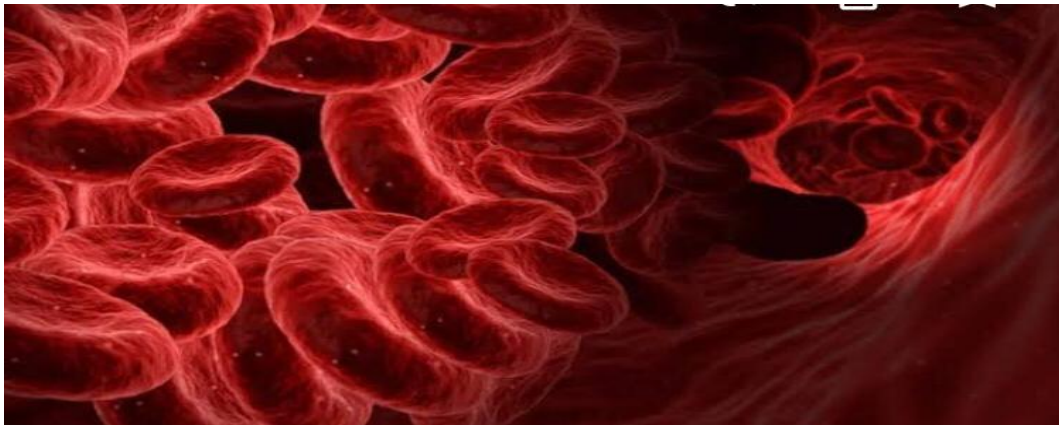
MEDICINE CONCOCTION

A drug is any substance (with the exception of food and water) which, when taken into the body, alters the body's function either physically and/or psychologically.

Measurement of concentration of drug is a very important factor to know the suitability of the medicine for a patient by a doctor to see the effect of drug in victim's body.

Let 'C' denotes the concentration of drug in blood after 't' hours given by

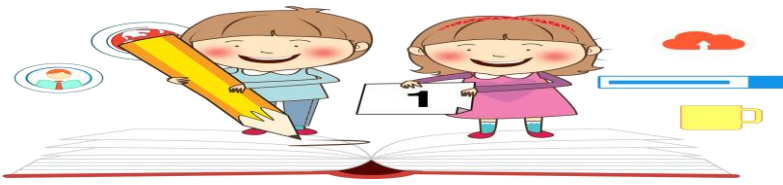
$$C = -2t^3 + 6t^2 - 8t + 8 \text{ mg/deciliter.}$$



- i. Find out what will be concentration after 4 hours?

- ii. What is the degree of the polynomial given above?

- iii. The polynomial $C = -2t^3 + 6t^2 - 8t + 8$ represents a straight line on the graph. State true or false. Support your answer:



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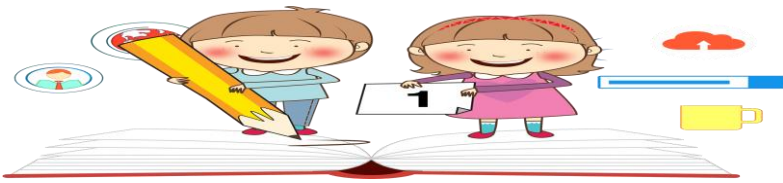
HOME ALONE

Laira is locked in her house and the only open window is on the second floor. She made a phone call to her neighbour for the ladder. There is bush along the edge of the house. The length of the ladder is supposed to be x meter, height of window is 2 meters less than the ladder and bush is 4 meters less than the ladder.



- i. Write an algebraic expression for the same situation.

- ii. Find the length of the ladder used.



Challenge
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BAKING IS FUN

Yummy Pan Cake Recipe

Ingredients

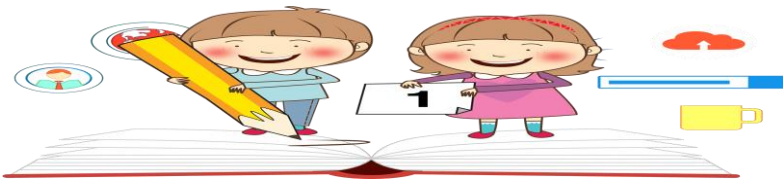
- (A)Flour
- (B)Sugar
- (C)Milk
- (D)Egg
- (E)Vanilla Essenceteaspoon



To make a pan cake we need one cup of flour, one fourth cup of sugar, one third cup of milk, 2 eggs & half teaspoons of vanilla essence.

- i. Sara wants to make a pan cake. Help her to make an algebraic expression for preparing 1pan cake.

- ii. The cake was so yummy that she wants to make 5 pan cakes for her friends. Write down the algebraic expression for 5 pan cakes.



Challenge
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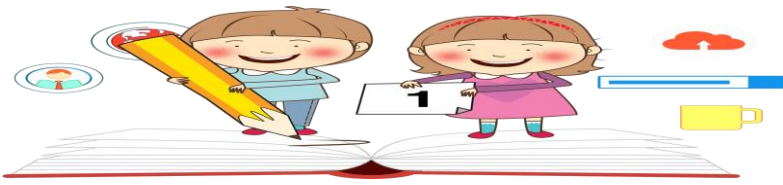
SANTA CLAUS ON HIS WAY!

Jingle bells jingle bells,

Jingle all the way,

Santa Claus with the gifts is on his way!





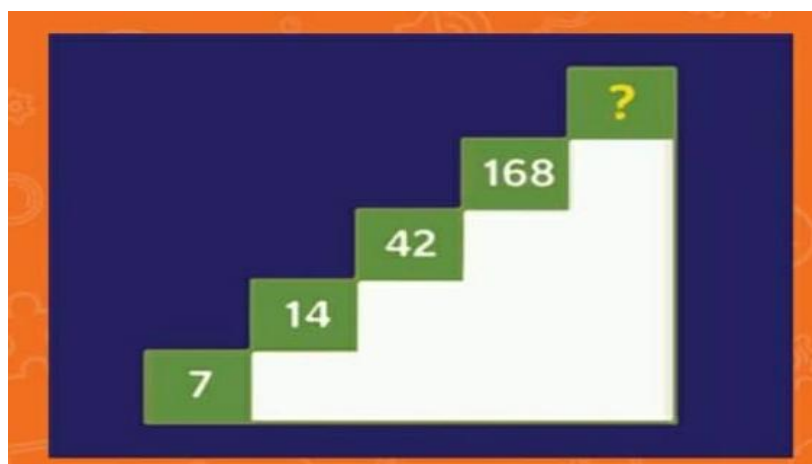
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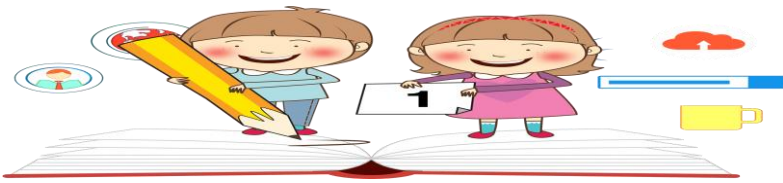


Complete the entries in the Christmas tree with the following pattern, on the bottom of the row multiply the polynomials in the adjacent triangles and write the answer in the triangle directly above the two triangles.

Calculate multiplying in this way until you reach the top of the tree to win exciting gifts.

A	
B	
C	
D	
E	
F	
G	





Challenge
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THE GUITAR CLASS

A music teacher runs a guitar class for 20 weeks. The class meets each week in a rented music studio.



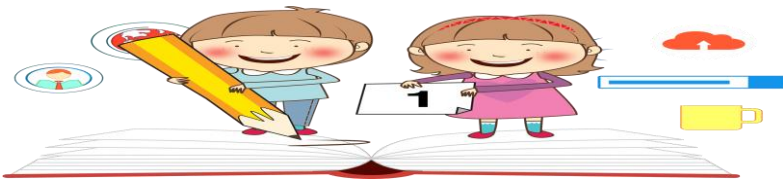
Suppose that

It costs the teacher c dollars to run the studio for 20 weeks

❖ The class contains n students.

❖ Each student pays the teacher a single fee of f dollars for the course.

❖ The teacher makes a profit of p dollars at the end of the 20 weeks.



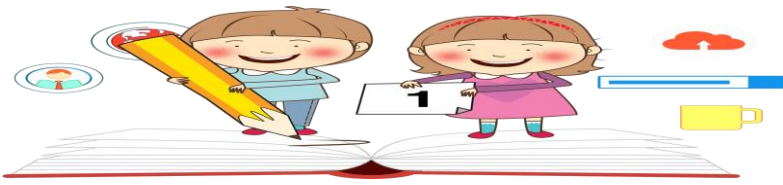
Challenge
yourself...



- i. If c is 400 and f is 70, write an equation to show how the profit p , depends on n , the number of students attending.

- ii. Is it possible that for any number of students, music teacher works with zero profit?

- iii. If the teacher makes a profit of 300 dollars, then how many are attending the guitar class?



Challenge
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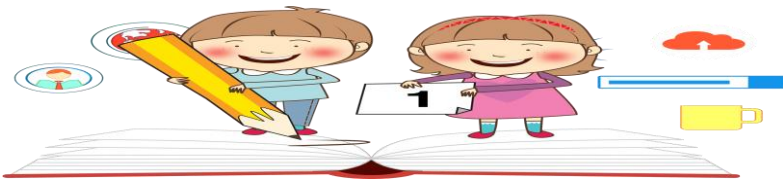
AQUARIUM

Zian and his Dad are filling an aquarium with water from the kitchen sink. The aquarium starts with 3 gallons of water. The sink adds water at a rate of 2.5 gallons per minute.

*An aquarium is a water filled tank
in which fish swim about*



- i. Write a linear equation to represent how much water is in the tank after a certain amount of time (t).



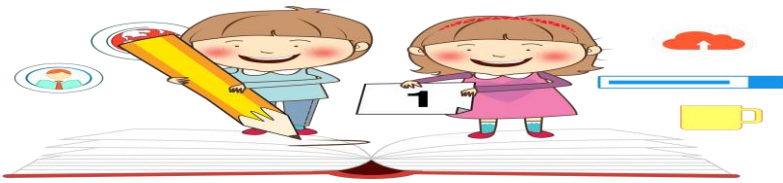
Challenge
yourself...



- ii. How much gallons of water is collected after 2 minutes?

- iii. Capacity of aquarium is 30 gallons, but due to stones & artificial plants etc., it can contain only 28 gallons water up to the brim. How much time will it take to fill the aquarium completely?

- iv. Dad noticed that the fish tank was dirty; he took out 5 mugs of dirty water. The capacity of 1 mug is 0.5 gallons. He added 2 mugs of clean water into the aquarium, what is the final amount of water left in the aquarium?



Challenge
yourself...



ON YOUR OWN

You have been waiting for your whole life to finally be out on your own. You just rented a new apartment that you now must furnish. Fortunately many of your relatives have given you much of what you will need. Unfortunately you still don't have a TV, a fridge, a laptop and a car.



32 Inch LCD (\$ 540)
\$300 down payment
Balance in 3 months
Interest free instalment

(a)



42 inch LCD (\$950)
\$50 down payment
Balance in 12 months
Interest free instalment

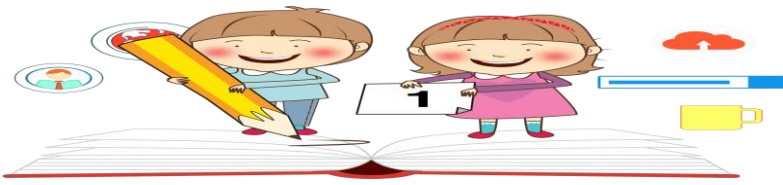
(b)



46 Inch LCD (\$1118)
\$150 down payment
Balance in 12 months
Interest free instalment

(c)

You are the type that always wants the best of everything but now that you are on your own, can you afford the best? Based on the information in the given advertisement, choose the biggest/best item that you can afford. You figured out that you can afford only \$75 per month as installment. There are three best deals of TV displayed in the shop. You made up your mind to purchase a flat screen TV.



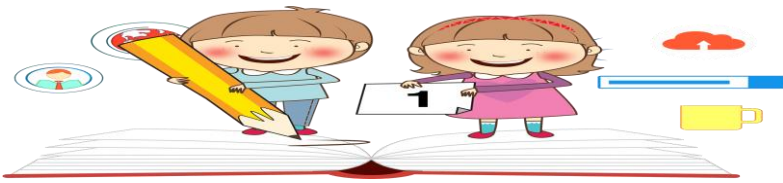
Challenge
yourself...



GOOD NEWS!!! Your grandmother just told you that she will pay the down payment for your T.V .So which TV is the biggest/best that you can afford without paying any extra money (interest)?



ANSWER



**Challenge
Yourself...**



ANXIOUS MOTHER

Radha was very anxious, as her son Pranshu's annual result of class 8th has to be declared today. Pranshu is good in studies but last month he suffered with COVID-19 due to which Radha is nervous about his performance.

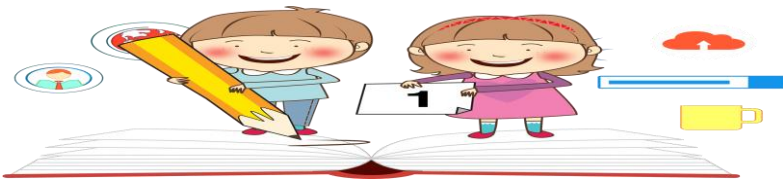
The teacher welcomes them and gave Pranshu's result to Radha.

She was relaxed to see his marks.



- i. The teacher told her that Pranshu got 6 marks more in Hindi than he got in Maths. The product of both marks is 112. Can you help Radha find his marks in Hindi and Maths?

- ii. When Radha entered the classroom, she observed that the length of the room is 2m more than the breadth. On the notice board in a corner it was mentioned that the area of the floor of the room is 80m^2 . To test Pranshu's knowledge, his mother asked him to find the dimensions of the floor.



Challenge
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A NATURAL GEYSER

Old faithful is a natural geyser is a popular attraction at Yellow Stone National Park in the United States. It produces long eruptions that are easily predictable and surprisingly no one controls it. The time between eruptions is based on the



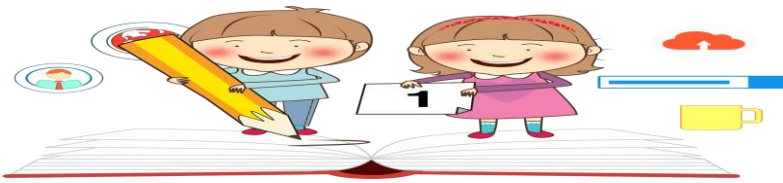
length of the previous eruption.

If the eruption lasts 1 minute, then the next eruption will occur in 46 minutes. If the eruption lasts 2 minutes, then the next eruption will occur in 58 minutes.

If the eruption lasts for 3 minutes then the next eruption will occur in 70 minutes and so on. The maximum duration of the eruption is 5 minutes.

- i. Suppose the eruption continues further after 5 minutes and it lasts for n - minutes, then when will the next eruption occur?

- ii. What will be the duration of the eruption, if the next eruption has to occur in 214 minutes?




**Challenge
Yourself...**



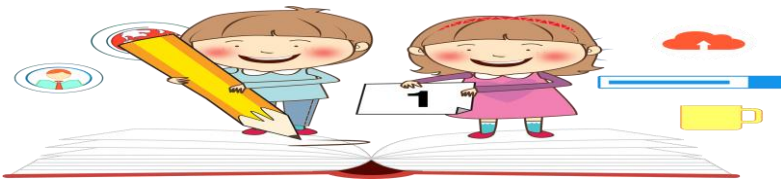
ELANTE SHOPPING MALL PARKINGCHARGES

The following table shows the parking charges of the vehicles at Elante Mall, Industrial area, Chandigarh.

Who pays what				
The hike came into force on Sunday				
New rates			Old rates	
Four-wheelers			Four-wheelers	
	Weekday	Weekend	0-1 hr	₹20
0-1 hr	₹30	₹30	1-3 hr	₹40
1-10 hr	₹30 + ₹10/hr	₹30 + ₹20/hr	3-5 hr	₹50
10-24 hr	₹180	₹230	5-8 hr	₹60
Two-wheelers			8-12 hr	₹80
Two-wheelers will be charged ₹20 for first two hours and additional ₹10 every hour till 10 hours. Thereafter, flat ₹120 will be collected. The rates are same throughout the week.			12-24 h	₹100
			Two-wheelers	
			0-6 hr	₹10
			6-12 hr	₹20
			12-24 hr	₹30
Outside Elante (MC parking)				
	Old	From April 1	MC House to meet today to take call on rolling back the hike in its parking lots	
Two-wheeler	₹10	₹20		
Four-wheeler	₹20	₹40		

- i. Write an expression to find out the parking charges if the car is parked for n hours where $1 < n \leq 10$ on weekdays.

- ii. If the flat rate is abolished and the same parking charges continue for 10-24 hours as it is for 1-10 hours. What will be the charges paid if the car is parked for 21 hours on a weekend?

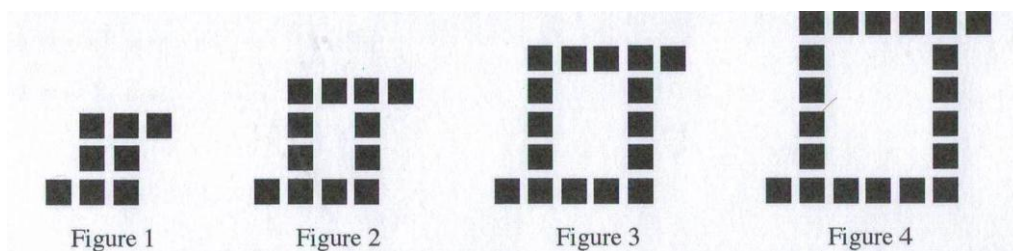


Challenge
yourself...



TILES DESIGN

Meera and her husband signed a contract for construction of their new house. Doing new construction is a different process than buying pre built house. For help they went to an architect. For flooring the architect shows them a series of designs formed by a number of square tiles are shown in the figure below



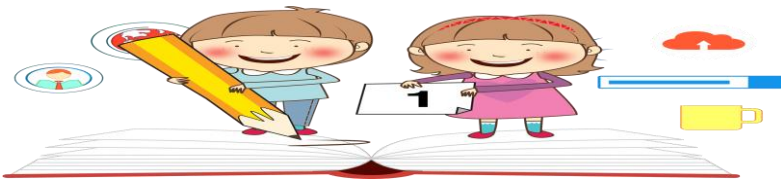
- i. Complete the table below.

Figure	1	2	3	4	5	6	7
Number of square tiles	8						

- ii. Write an expression in term of n , for the number of square tiles in figure n .

- iii. Find the number of square tiles required in 38th figure.

- iv. Find the value of k such that figure k has 288 square tiles.



Challenge
yourself...



ARRAY OF NUMBERS

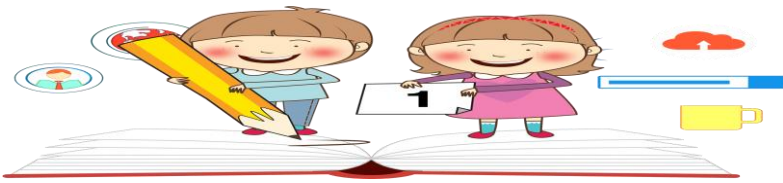
The diagram below shows an array of 45 consecutive numbers. A 3 x 3 square is placed in various positions to choose 9 numbers. Two such possible squares are shown.

1	2	3	4	5	6	7	8	9
10	11	12	13	14	15	16	17	18
19	20	21	22	23	24	25	26	27
28	29	30	31	32	33	34	35	36
37	38	39	40	41	42	43	44	45

- i. In one of the above shown placement, if the middle number of the square is 15, find the sum of all 9 numbers in that positioned square.

- ii. If at one particular position number in the middle of a chosen square is x , find the sum of the 9 numbers, in terms of x .

- iii. If the sum of the 9 numbers in a square is 297, find the value of the smallest number within the chosen square.



Challenge
yourself...



BAISAKHI

Baisakhi is celebrated on 13th and 14th April every year as a spring harvest festival, a solar New Year festival.

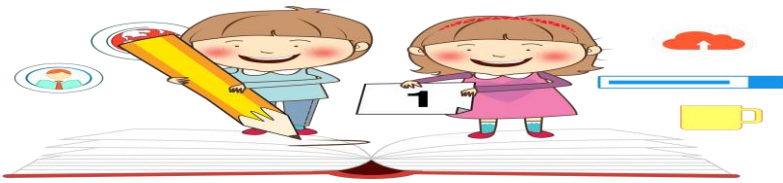
On Baisakhi Hargunpreet visits her field. From one corner of the wheat field taking O as origin Hargunpreet moves 6 units towards north and then 8 units towards east and reaches at point B



- i. What are the coordinates of point B?

- ii. If she decides to come back to the point O diagonally, then find the distance travelled by her.

- iii. If the yield of wheat per sq. units is 16 quintals, then how much wheat will she get from the triangular area covered by her?



Challenge
yourself...



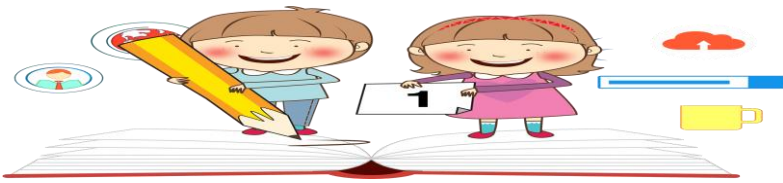
CAMPAIGNING

Students of class 9th started a campaign to raise a social awareness about the hazards of deforestation. They decided to make a banner with a slogan “GO GREEN, BREATHE CLEAN” in the shape of the square ABCD whose vertices are A(1,3) B(1,-1) and C (5,-1) .



FIND:

Fourth vertex D	
Area of the cloth used to make the banner	
Length of diagonal	

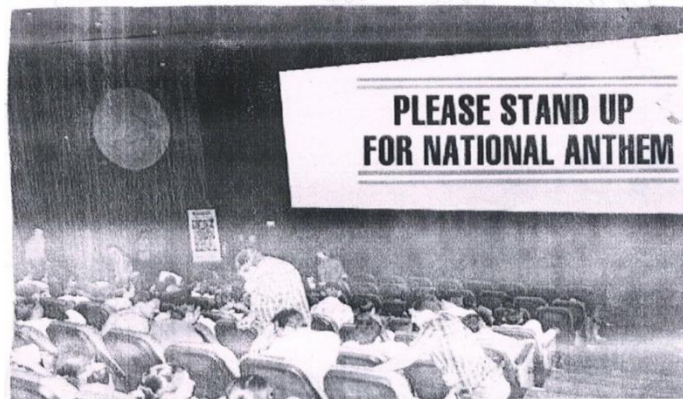


Challenge
yourself...



WATCHING MOVIE

After completion of Board Exams three students, Ramya, Rohit and Sachin of Class X decided to watch a movie at PVR Cinema. But they did not book the tickets in advance. They bought it on the spot and could not get the seats together.



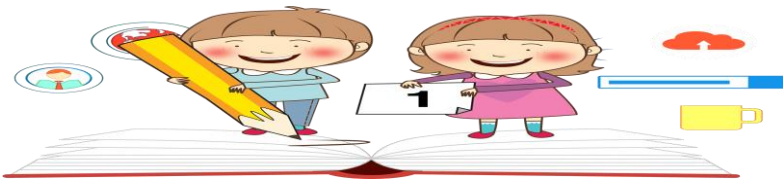
In Cinema hall Ramya, Rohit and Sachin were seated at $(1, -1)$, $(5, 2)$ and $(x, 5)$ coordinates respectively. In the interval they found that they are sitting in a straight line.

i. The location of Sachin is:

- a) $(5, 9)$
- b) $(9, 5)$
- c) $(0, 5)$
- d) $(0, 9)$

ii. What is the distance between Ramya and Sachin ?

iii. Is the distance between Ramya and Rohit the same, as the distance between Rohit and Sachin?



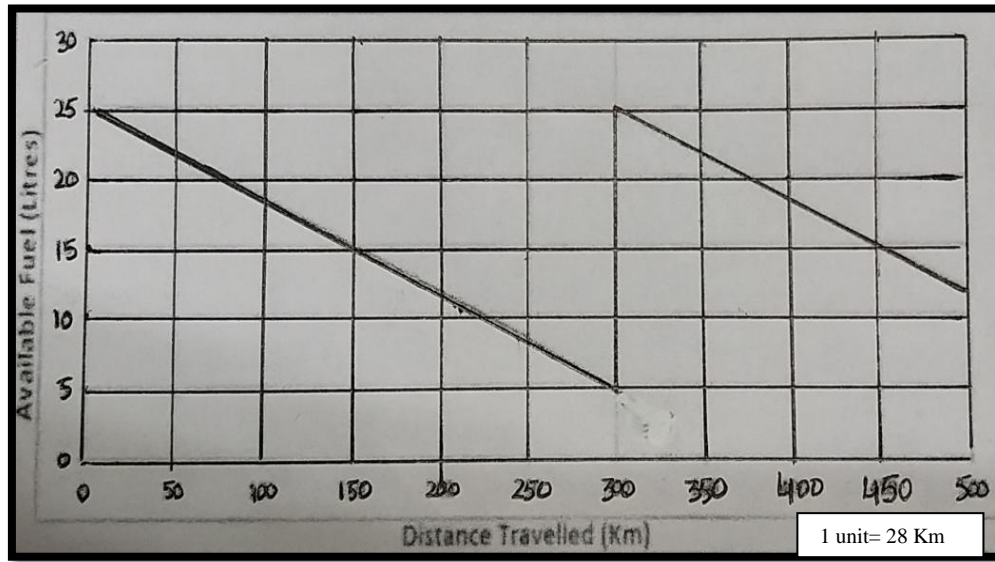
**Challenge
Yourself...**



A RIDE ON MG HECTOR SUV CAR

Rohan bought a new MG Hector SUV car. He went for a long drive in mountains.

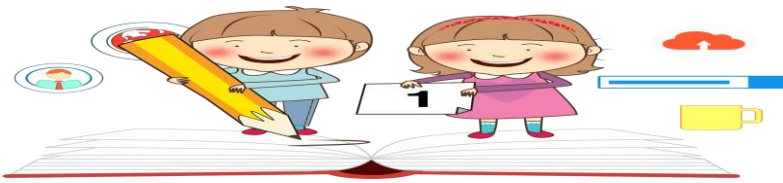
The graph below shows the distance Rohan travelled using his vehicle against the fuel left in the tank.



- i. How much fuel was left in the car after covering a distance of 450km?

- ii. Did Rohan refill fuel on the way? If yes, how much fuel did he refill?

- iii. What is the mileage of the vehicle?

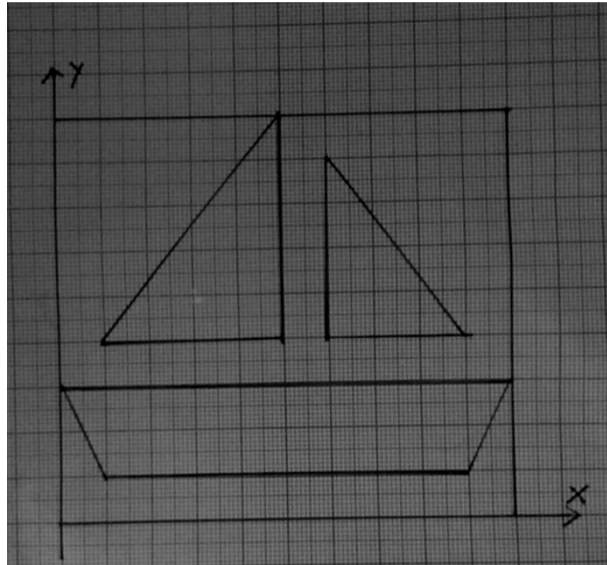


**Challenge
Yourself...**



FARMING

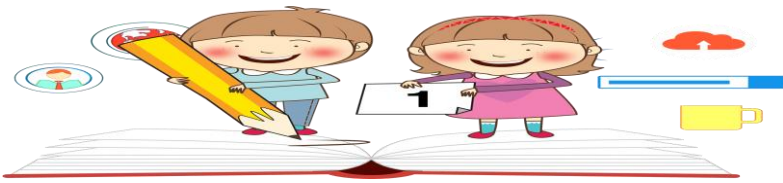
A farmer had rectangular plot of dimensions 10m x 9m. He wanted to grow fruits and vegetables in the same plot. He made three sections for separate cultivation of fruits and vegetables but he wanted to grow vegetables in larger area.



i. Complete the table

Figure	Area
ΔABC	
ΔDEF	
Trapezium PQRS	

ii. According to you, which region of the plot he should choose to grow vegetables? Three sections or the remaining area. Justify your answer.

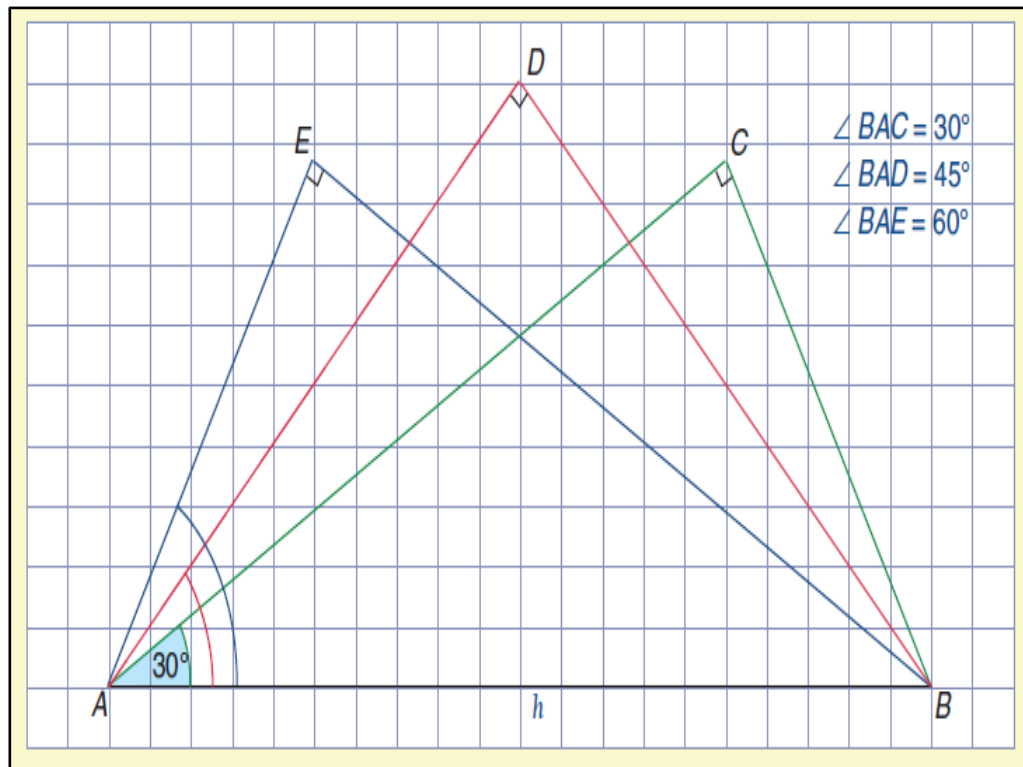


Challenge
yourself...



TEMPLE GATE

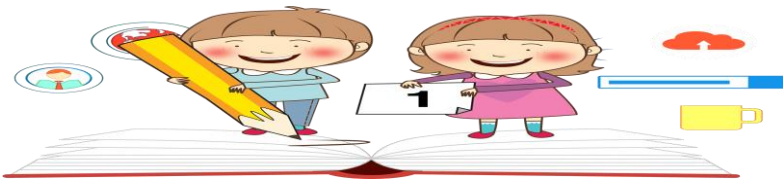
The following picture shows the drawing of the top of a temple gate in which three triangles are inscribed on each other. The top of gate is to be made of steel bars. The Architect forgets to put the exact measurement



of different sides of triangles but he shows that $\angle BAC = 30^\circ$, $\angle BAD = 45^\circ$ and $\angle BAE = 60^\circ$ and $AB = h$. Now the welder wants to make the top of the temple gate using the given information.

He goes to the temple site and measures the width of the gate, $h = 12$ units. Now help him in solving the given problems.

- Using trigonometric ratios find the sides CA and BC.



**Challenge
Yourself...**



- ii. Using trigonometric ratios find the sides DA and DB.

- iii. Using trigonometric ratios find the sides EA and EB.

- iv. He wants to fit fibre sheet of different colours in different triangles, red in $\triangle ABC$, yellow in $\triangle ADB$ and green in $\triangle AEB$. Find the area of each colour of fibre sheet.

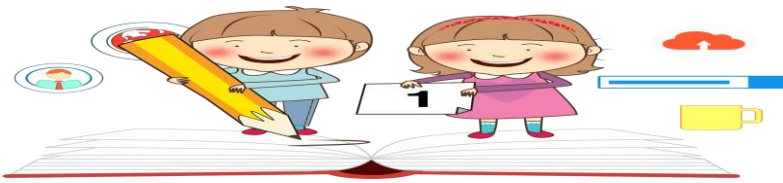
So,

area of $\triangle ABC$ =square units

area of $\triangle ADB$ =square units

area of $\triangle AEB$ =square units

- v. If fibre sheet costs Rs. 120 per square unit, find the cost of total fibre sheet required.

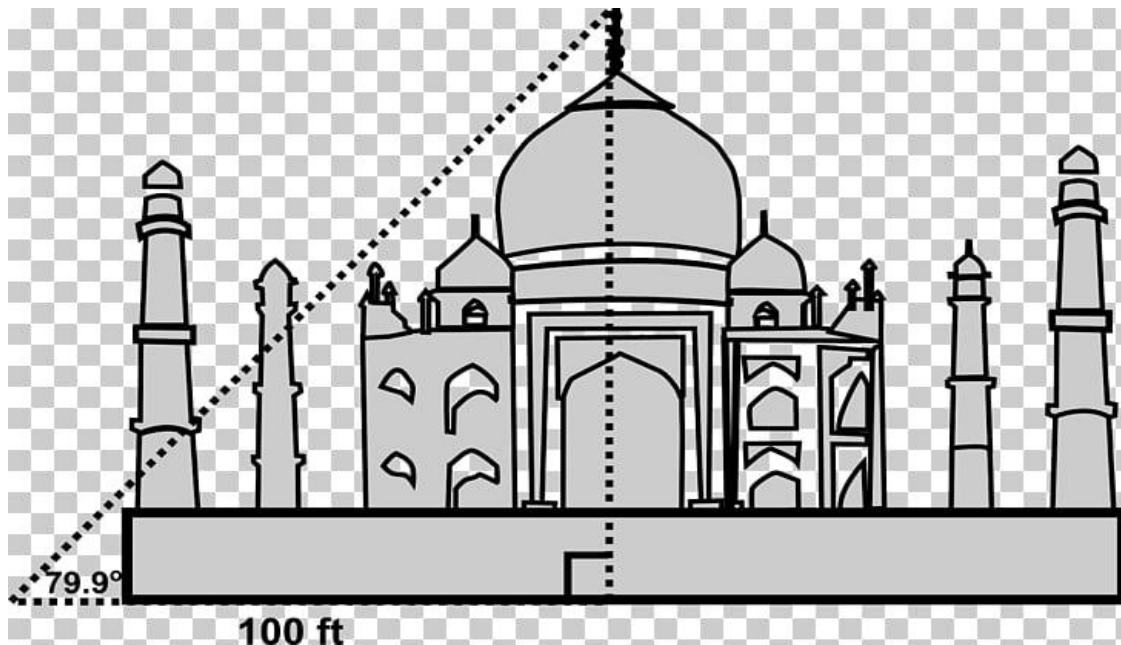


Challenge
yourself...

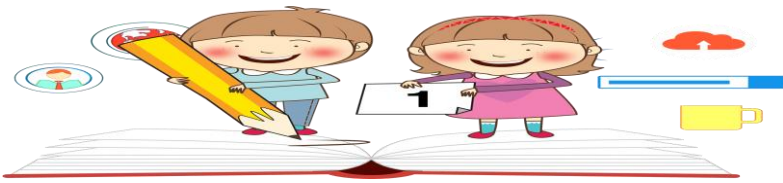


SYMMETRICAL WONDER

The TajMahal was commissioned by Shah Jahan in 1631, to be built in the memory of his wife MumtazMahal, who died on 17, June the same year, giving birth to their 14th child, Gauhara Begum. Construction started in 1632, and the mausoleum was completed in 1643, while the surrounding buildings and garden were finished five years later. The imperial court documenting Shah Jahan's grief after the death of MumtazMahal illustrates the love story held as the inspiration for the TajMahal.



- i. Find the height of the topmost part of the dome of TajMahal from the following figure. (Given $\tan 79.9^\circ = 5.6$).



**Challenge
Yourself...**

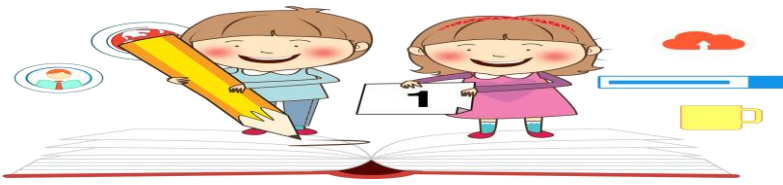


- ii. At some time of the day the length of shadow of the building is equal to its height. Then the sun's altitude at that time is

- iii. If the ratio of height of the building and length of the shadow is $\sqrt{3} : 1$, find the angle of elevation of sun.

- iv. Match the column:

(i) When an observer sees an object situated in upward direction, the angle formed by line of sight with horizontal line	(a) Line of Sight
(ii) When an observer sees an object situated in downward direction the angle formed by line of sight with horizontal line	(b) Angle of elevation
(iii) Line segment joining the object to the eye of the observer	(c) Angle of Depression

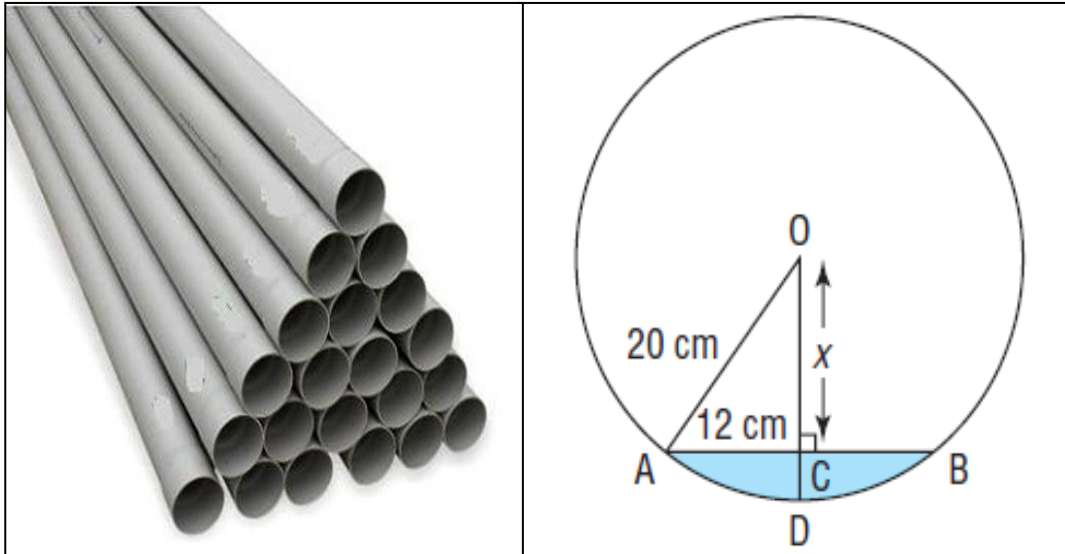


Challenge
yourself...



IRRIGATION

Ajit is a farmer. There is a canal flowing along his farm. To irrigate his farm he has put a pipe from canal into his farm. The horizontal pipe has a circular cross section, with centre O. Its radius is 20 cm. Water fills less than one-half of the pipe. The surface of the water AB is 24 cm wide as shown in figure

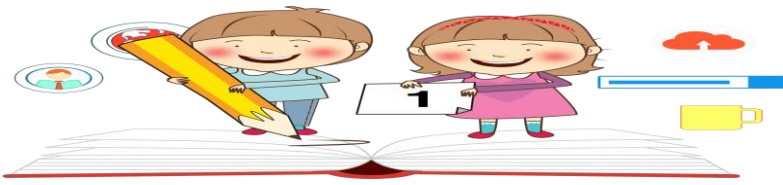


- i. Find the distance of water level from the centre of the pipe.

- ii. Determine the maximum depth of water in the pipe.

- iii. Find the circumference of the pipe.

- iv. Find the area of $\triangle ACO$.

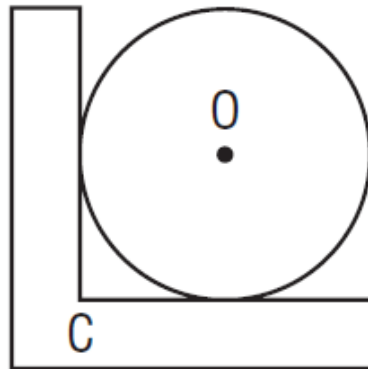


Challenge
yourself...



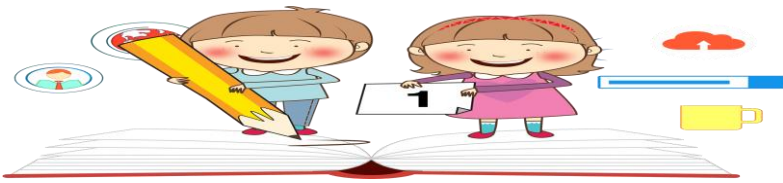
CIRCULAR PLATE

A circular plate is supported so it touches two sides of a shelf. The diameter of the plate is 20 cm. Where O is centre of circular plate and C is corner of the shelf as shown in figure.



- i. How far is the centre O of the plate from the inside corner C of the shelf?

- ii. Which property of circle helped you in finding the required distance?

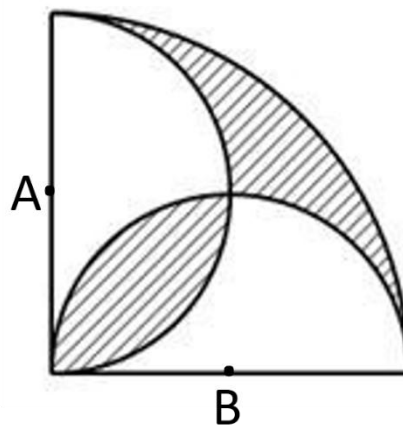


Challenge
yourself...



HORSE STABLE

Vikram supplies horses for weddings. During the day, his horses are kept in his stable, which is in the shape of quadrant. One fine day he tied two of his horses at points A and B respectively as shown in figure. Assuming the radius of quadrant of circles is 14m,



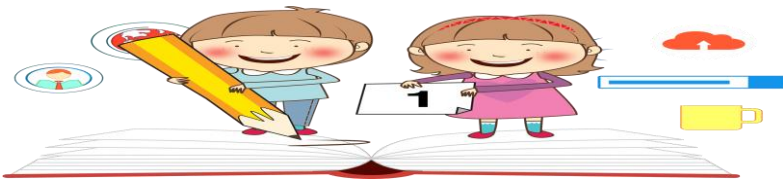
Find, the following

- i. Area that horse can graze which is tied at point A.

- ii. Area that is common for grazing to both horses.

- iii. Total area both horses can graze.

- iv. Left out area of stable, where horses cannot graze.

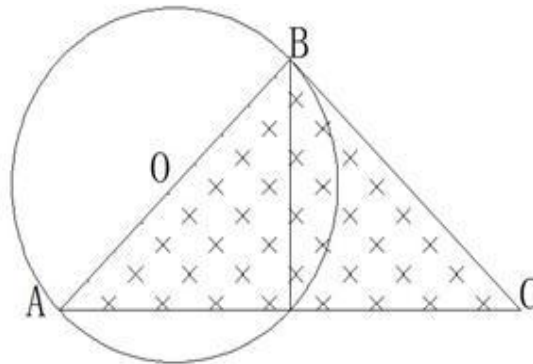


**Challenge
Yourself...**

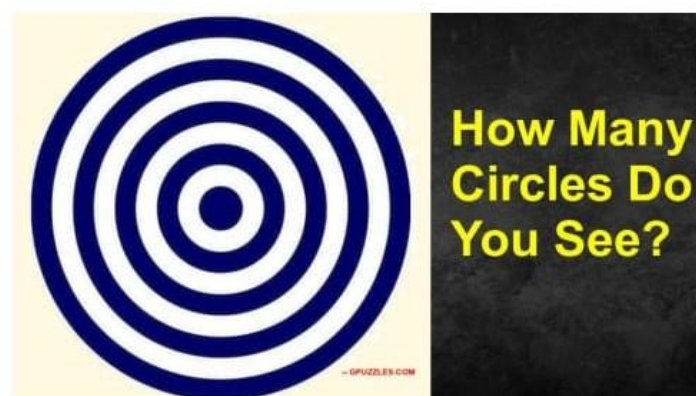


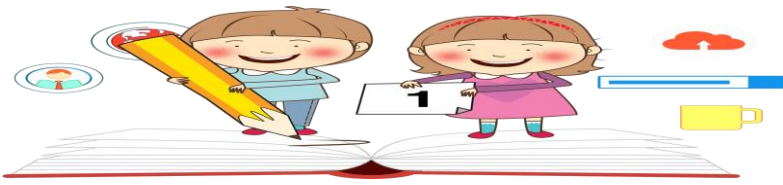
FARMERS'S FIELD

A farmer had a field, as shown in figure, which is made up of a circle and a triangle ABC and O is the centre of the circle. The diameter of the circle, AB is 10 m. He grew some wheat in the triangular area.



If the area of the circle is 1.5 times the area of the triangle then in how much area he was able to grow wheat (Use $\pi = 3.14$)



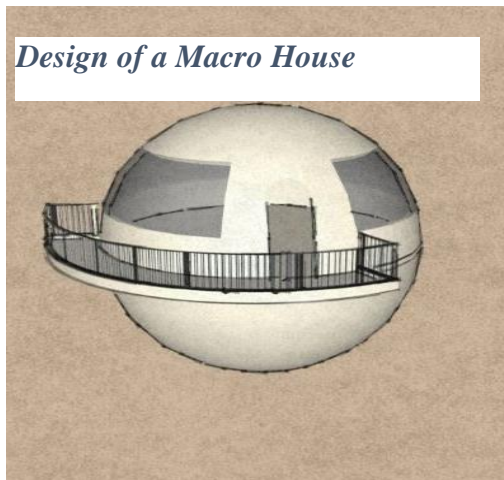


Challenge
yourself...



MATHEMATICS AND ARCHITECTURE

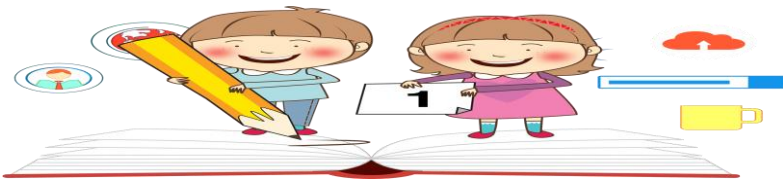
Today across the globe, we are experiencing a rise in densely populated urban areas, along with a lack of land resources to provide sufficient housing for the masses. This phenomenon has given rise to a new movement of Micro- housing; one that commands the idea of simple but innovative living in today's urban areas.



The concept of these revolutionary homes focuses primarily on the innovation of maximum functional area in a minimum footprint, thus redefining the perception of sustainability in urban dwellings.

With the idea of micro housing, designers are now coming up with various inventive solutions to solve the persistent issue of space crunch in cities to provide the imperative requirement of ideal housing to as many people as possible.

- i. Find the total surface area of spherical micro house having radius 3.2 m.



**Challenge
Yourself...**



- ii. Following the principle of maximum functional area in the given housing plan, calculate how much airspace would be there in each spherical shaped micro house, if its radius is 3.2 m?

- iii. Aman decided to paint the hemispherical dome of his Compartment in green colour. Will one bucket full of paint of radii 12 cm, 8 cm with height 21 cm be sufficient to paint the dome of radius 3.2 m, if 1 litre of paint can cover 12 square meter.

- iv. Quotes were invited for supplying water during a function in the society. The choice was to be made from three types of tankers of inner diameter 1m and total length 6 m as shown in the figure ($h = r$ for the conical part in the first figure). Which tank will contain maximum water out of the three?

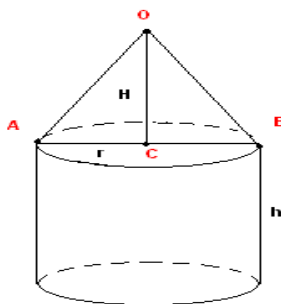


Figure 1

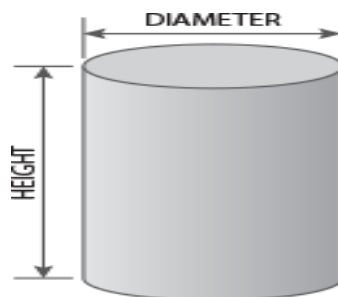


Figure 2

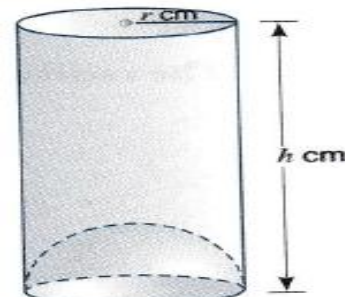
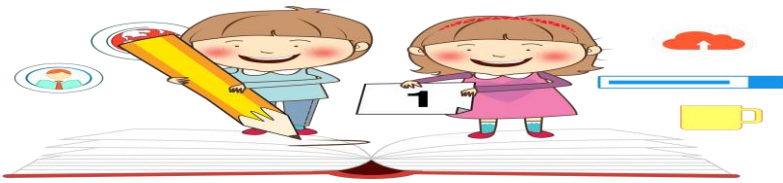


Figure 3



Challenge
yourself...



ROAD ROLLER

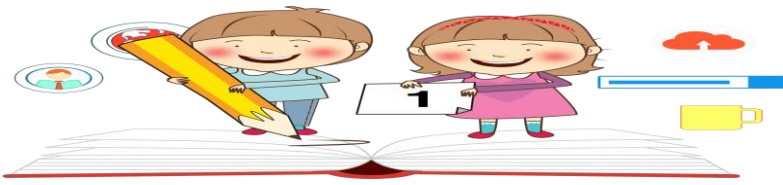
Road rollers are used in road, railroad, industrial mining and airfield construction. Road rollers can be either self-propelled or drawn. The workingparts of a road roller are rigid steel drums.The surfaces of the drums canbe flat or with a grid or cams (lugs).

Tractordrawn rollers with flat drums (static and vibration action),cams and balloon-tired rollers are used to compact earth and road foundations. The self-propelled rollers with flat drums (two drum or three drum, static or vibration action)and with balloon tires are used chiefly for compacting road surfaces.

The weightof a road roller is from 5 to 50 tons, and it operates at a speed of 2-8 km/hr.



The students of a school went for a visit to a road construction site. They wanted to know about the specifications and working of the road roller. The teacher gave them few tasks:



**Challenge
Yourself...**



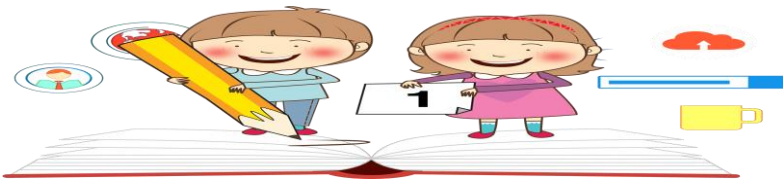
- i. Considering the area covered by the drum of the roller in one revolution as 10 sq. m and width as 2.1 m, figure out the diameter of the drum.

- ii. Assuming the drum as solid iron cylinder if we melt it to form of small solid cylinders of radius same as per radius of drum and height as 0.3 cm. Figure out how many cylinders can be formed?

- iii. In order to paint the road roller all over, how many paint buckets we need if the bucket is 35 cm high and the radii of its end are 12 cm and 20 cm and our total requirement of paint is 86.240 liters.

- iv. How many rounds the road roller has to make if the road is 5 km long and 8m wide?

- v. How much time will it take to level the ground for the given dimensions of road if its speed is 5km/hr?



Challenge
yourself...

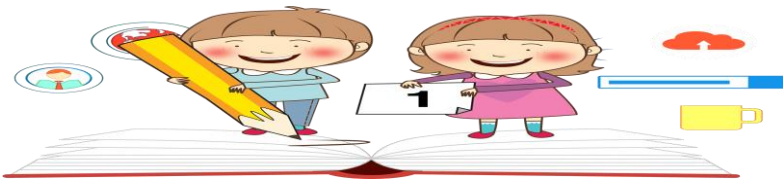


FACTORY VISIT

Mohit went to visit his friend Rana in Vapi during the summer vacations. Rana's father took them for a visit to his factory. Both the children were very excited about their visit, they saw how various parts were manufactured and assembled to get the final product. They also asked many questions from the workers. The head of the accounts department gave them the data of monthly wages of 1000 workers with two missing frequencies.

Wages (in thousand Rs.)	20-30	30-40	40-50	50-60	60-70	70-80
No. of workers	60	60	x	200	y	285

- i. If the median of the series is 56, find the missing frequencies.



**Challenge
Yourself...**



FUN WITH MATHS

Avni learnt a new number game, wherein she was asking the children to think of number less than 40. She played the game with 20 children and noted the data for number of children thinking a number between 0-10,10-20,.....She also found that the arithmetic mean of the data is 16 .To make it challenging she omitted the frequencies of two class intervals

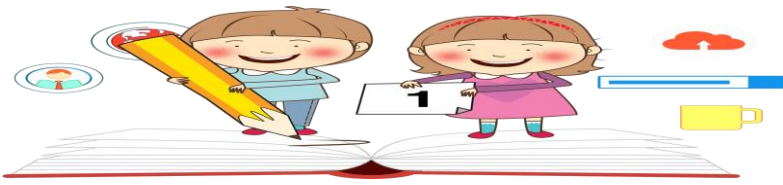
Number Thought	0-10	10-20	20-30	30-40
Number of Children	x	4	y	2

i. Find the missing frequencies.

ii. How many students thought of a number less than 20?

iii. The upper limit of the median class is _____

iv. The sum of lower limit of modal class and upper limit of median class is



Challenge
yourself...



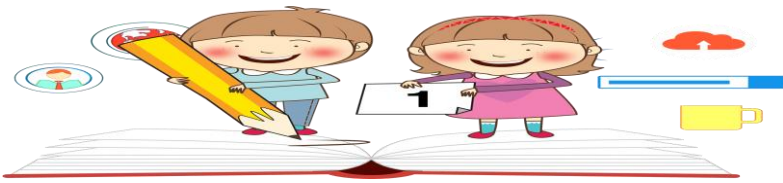
DATA ENTRY

Ruby was entering marks obtained by students in the test on an excel sheet. She pressed one button by mistake but she was happy to see the mean marks obtained by 110 students are estimated to be 80.



Later on, while rechecking the marks entered, she realized that one value was wrongly entered as 73 instead of 3. She corrected the entry and wants to know the mean mark.

- i. What is the new mean?

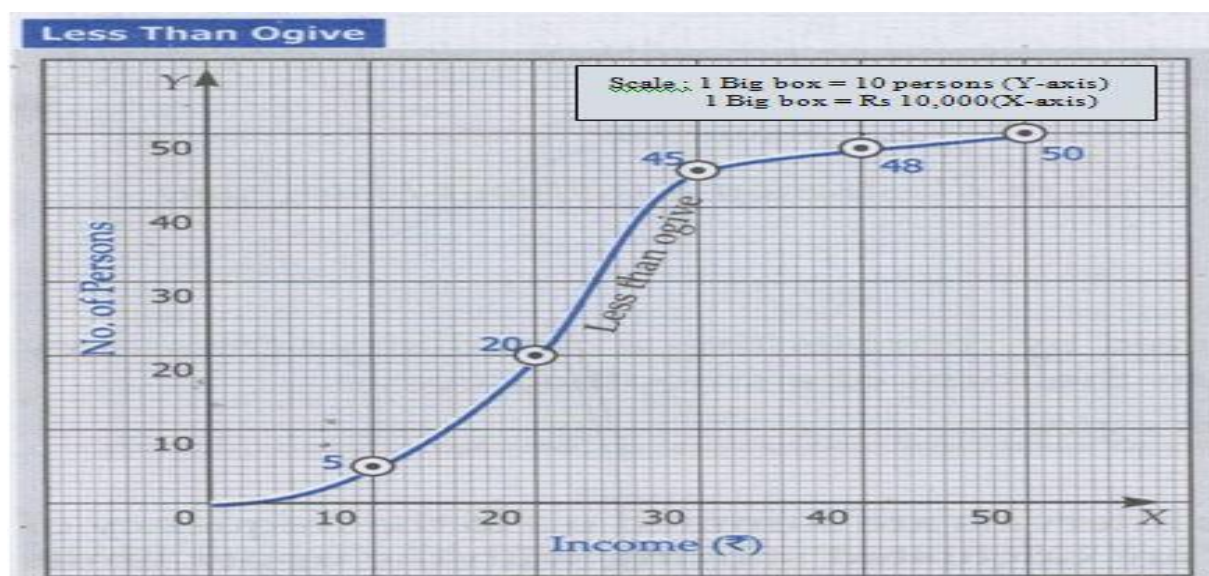


Challenge
yourself...



LEARNING WITH GRAPH

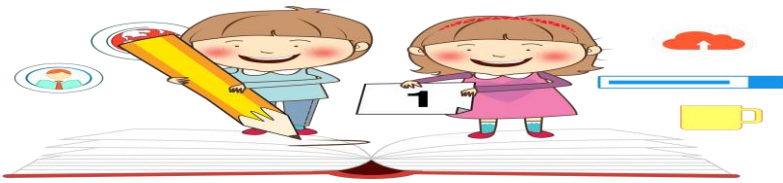
Class 10th students were given a project of doing survey in locality about the number of persons in their family and annual income. They represent the collected data in the form of graph and prepared a report to be presented. Using this report, teacher draw less than type ogive and asked few questions from them.



- i. Find the median of the data from the given graph.

- ii. Prepare a frequency distribution table from the given graph.

- iii. Write the median class.

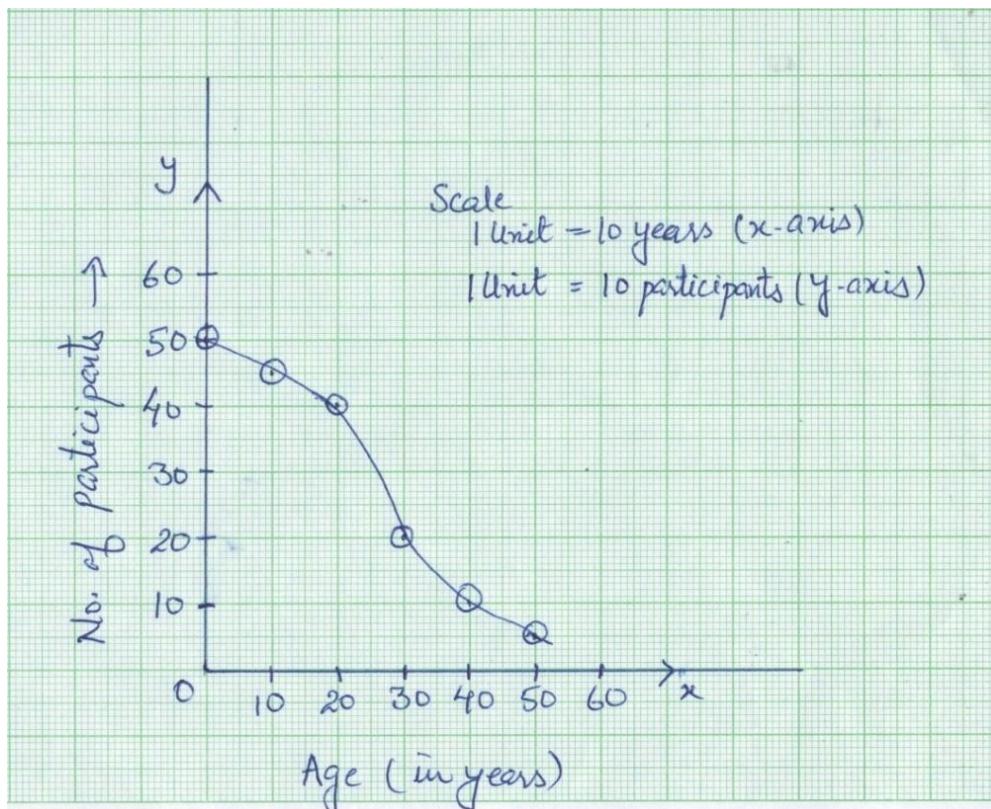


Challenge
yourself...



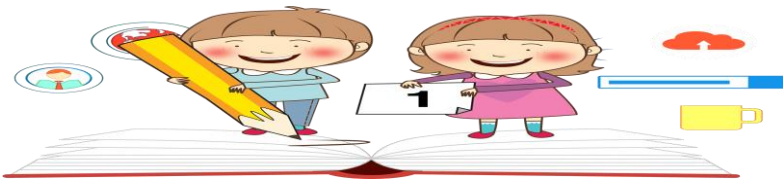
SWACHH BHARAT ABHIYAN.

On 2nd October some residents of a colony took part in Swachh Bharat Abhiyan. A boy of the colony collected the data of number of residents with respect to their ages who actively participated. After collecting the data he analyzed the data and prepared a report. Using his report, he drew the graph....



- i. How many persons participated in the Abhiyan?

- ii. If 5 more persons in the age group of 50-60 years had participated, then what is the new modal age?



Challenge
Yourself...



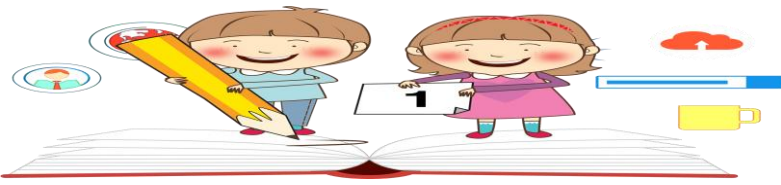
JIGSAW PUZZLE

To make a 750 piece jigsaw puzzle more challenging, a puzzle company includes 5 extra pieces in the box along with the 750 pieces and those 5 extra pieces do not fit anywhere in the puzzle.



- i. If you buy such a puzzle box, break the seal on the box and immediately. Select 1 piece at random, what is the probability that it will be one of those extra pieces:

- a. $\frac{1}{5}$
- b. $\frac{1}{150}$
- c. $\frac{1}{151}$
- d. $\frac{5}{151}$



**Challenge
Yourself...**

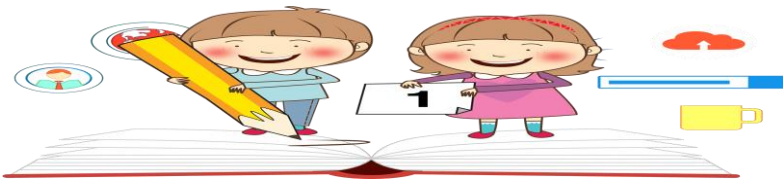


- ii. If the piece taken out is one of those extra pieces and is not kept back in the lot, then another piece is picked randomly again, what is the Probability that this piece is also one of those extra pieces:

- a. $\frac{2}{377}$
- b. $\frac{4}{750}$
- c. $\frac{5}{755}$
- d. $\frac{1}{150}$

- iii. If two such boxes were bought by a family for their two children and children mixed both the sets together. If a piece is chosen now, what is the probability that the one piece picked is one of those extra pieces:

- a. $\frac{10}{750}$
- b. $\frac{1}{150}$
- c. $\frac{1}{151}$
- d. $\frac{10}{1500}$



**Challenge
Yourself...**



BULL'S EYE

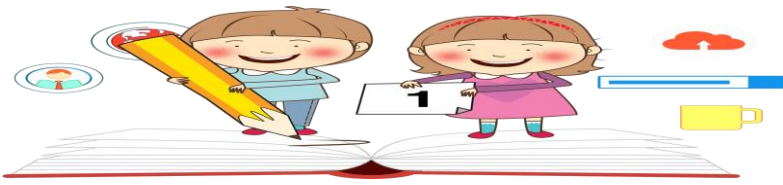
Rohit bought a set of dart board and 5 arrows. He fixed it on the wall in his room and marked a point from where aim will be taken. He wants to master the skill of bull's eye and he is all determined for it. So he started practicing it every day. The dart board has alternative black and white rings as seen in the picture. The width of each ring is 10cm. The diameter of the centre black circle is 20cm.



- i. Which colour has more probability to be hit- black or white? Give reasons.

- ii. What is the probability that an arrow thrown hits the Bull's Eye?
Show the calculation.

- iii. After practicing for a week, Rohit is becoming pro to hit the Bull's Eye. He does not hit the last three rings anymore. Now if Rohit aims and throws an arrow, what is the probability that his arrow hits the Bull's Eye.



**Challenge
Yourself...**



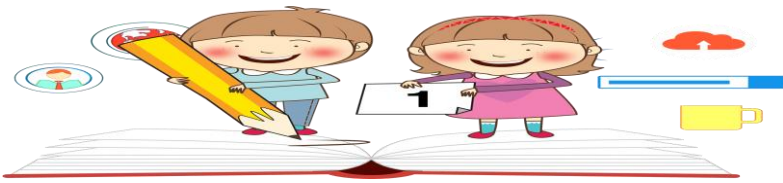
AN APPLE A DAY KEEPS THE DOCTOR AWAY

Apples come in a variety of shapes, colours, and flavours and provide a range of nutrients that can benefit many different aspects of a person's health. For example, they may help to reduce the risk of cancer, obesity, heart disease, diabetes and several other conditions.

Bag contains 18 Apples (Golden & Red) out of which x apples are Red and y apples are golden.

- i. If one apple is drawn at random from the bag, what is the Probability that it is Red ?
 - a. $x / 18$
 - b. $y / 18$
 - c. $x+y / 18$
 - d. $x-y / 18$

- ii. If 2 more Red apples are put in the bag the probability of drawing a Red apple will be $9/8$ times the probability of Red apples in Part (i) Find x ?
 - a. 10
 - b. 11
 - c. 8
 - d. 16



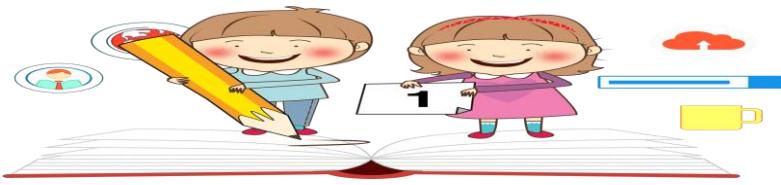
Challenge
yourself...



iii. If one apple drawn at random from the box. What is the probability that it is a golden apple?

- a. $\frac{4}{9}$
- b. $\frac{5}{9}$
- c. $\frac{1}{2}$
- d. $\frac{3}{5}$





Challenge
yourself...



PICNIC

A picnic is a short trip for pleasure to a beautiful place. It provides the much sought after relief from our routine life. After enjoying a picnic, we feel fresh and take up our work with renewed vigor.



On a School picnic there are 50 boys and 42 girls, the students are allowed to choose one drink and one snack from the menu:

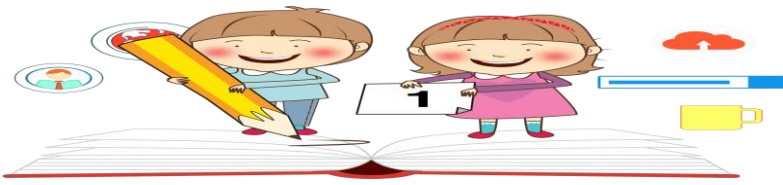
Drinks: Cola, fruit juice, water.

Snacks: Biscuits, cake, muffin.

- i. How many different combinations in which a student can make a choice?

- ii. What is the probability a student will choose cola as a drink?

- iii. What is probability the drink chosen is not water.

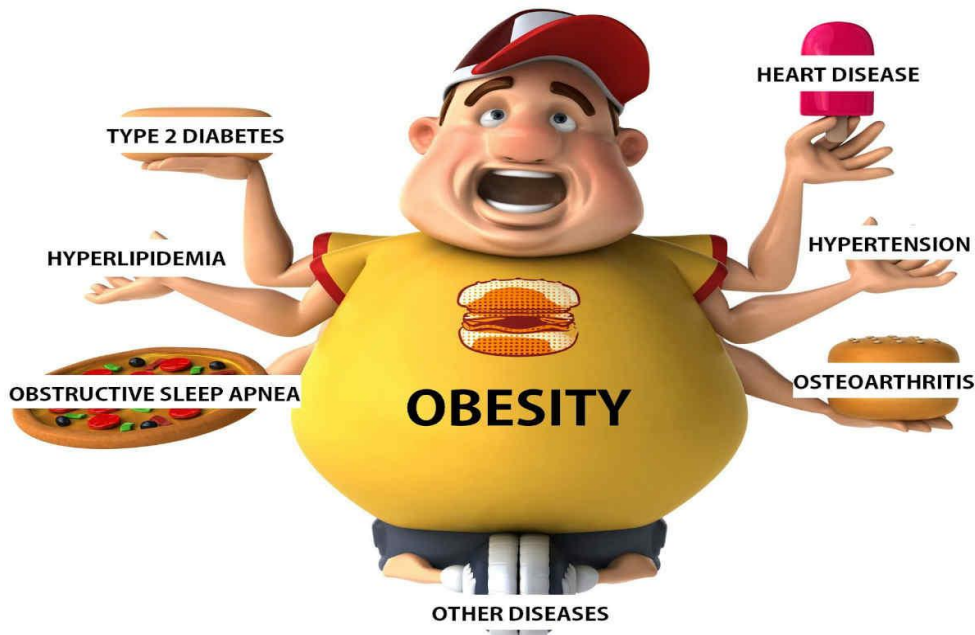


**Challenge
Yourself...**



OBESITY

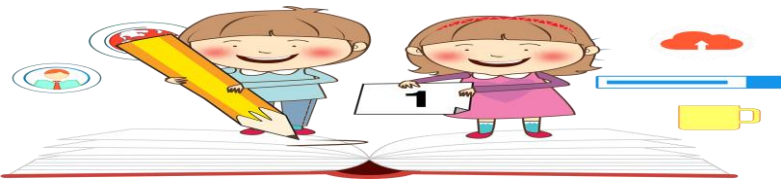
Obesity is a complex disease involving excessive amount of body fat. Obesity isn't just a cosmetic concern but also a medical problem that increases the risk of other diseases.



A survey is conducted related to problem of obesity in India, A sample Of 1020 people is collected. Out of which 660 are women and 360 are Men, Out of all the people surveyed 360 are between 20-30 years, 211 are 31 -40 years old, 447 are Above 40. In 20 -30 age group 60 % are found to be obese .Only 20 % of total people surveyed knew Obesity can trigger diabetes.

- i. If one person is chosen at random from the total people surveyed what are the chances that the person falls under 20-30 age group and are obese.

- ii. If one person is chosen at random what is the probability that the person knows the relation between obesity and diabetes.

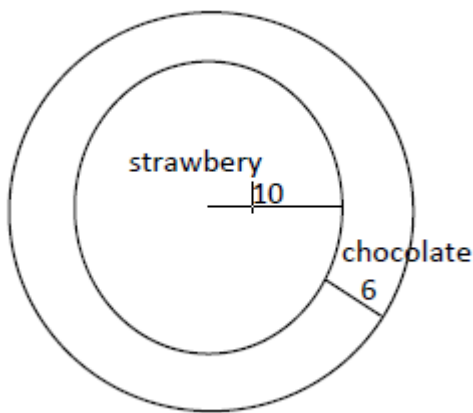


Challenge
yourself...



BIRTHDAY CAKE

Arjun baked a chocolate strawberry cake for his friend's birthday. The cake was divided into 2 parts. The inner portion was of strawberry which is surrounded by the chocolate portion. The radius of inner portion is 10 cm and width of the chocolate portion is 6 cm. Chocolate cake boundary and the top layer is covered with flavored cream.

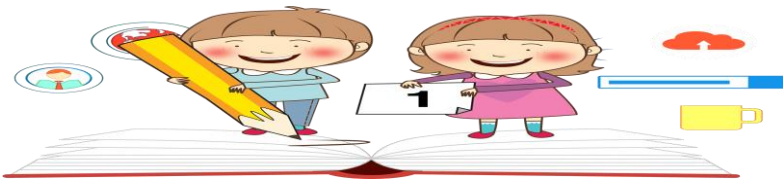


Answer the following questions:

- i. If 10cm^2 of cake used 3gm of cream and cake is divided into 5 slice of equal area. How much cream does each slice have?

- ii. How many cherries can be placed in the chocolate part if 1 cherry requires 2cm^2 area?

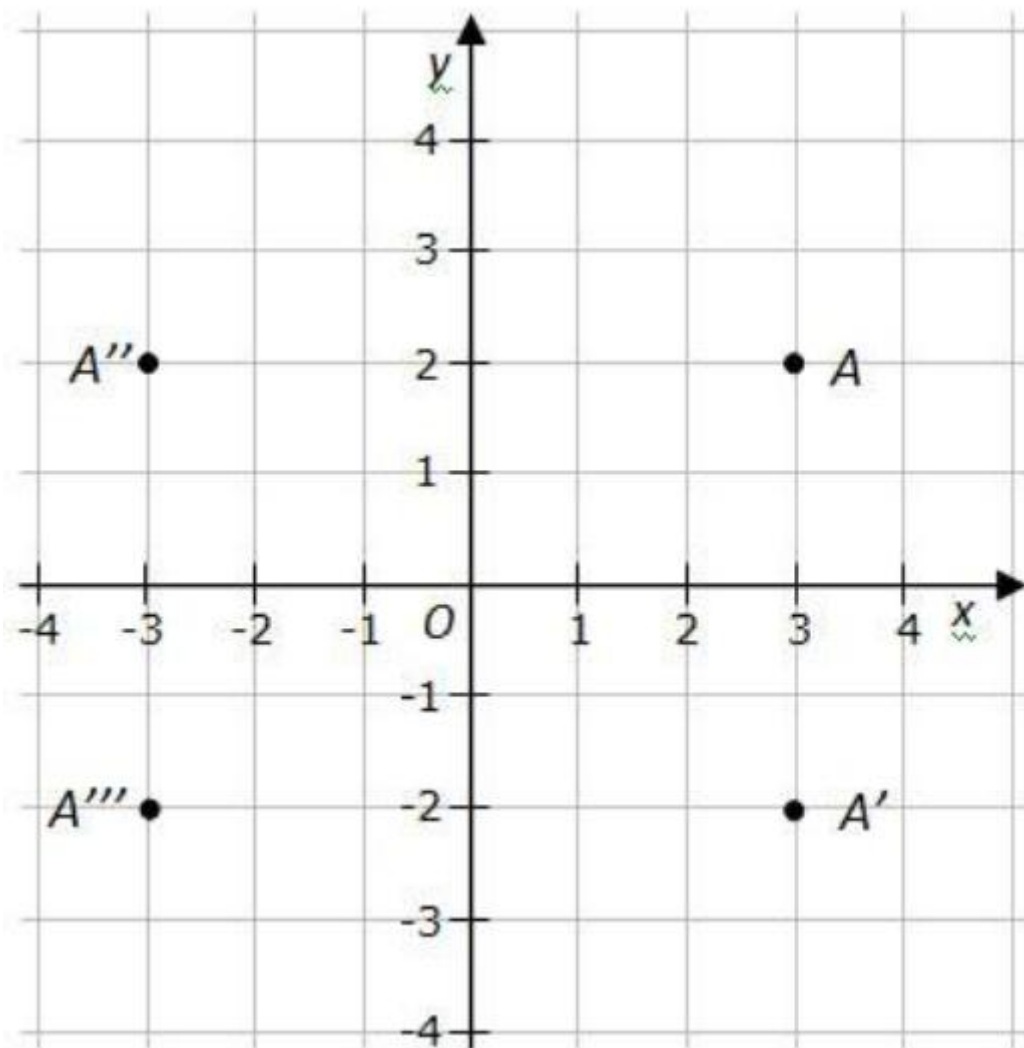
- iii. If 12gm of cream has 3gm fat. How much fat does each slice have?



Challenge
yourself...

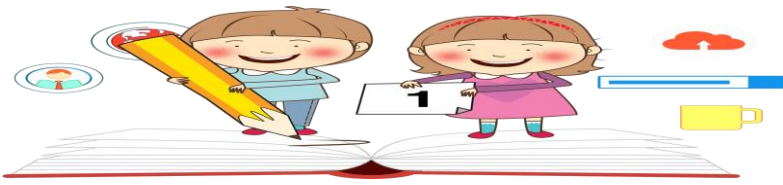


TOY TELEPHONE



Ram, Shyam, Mohan and Kabir are four friends. They want to play with toy telephone. Their positions are respectively A, A', A'', A''' as shown in the figure. They have their toy telephones connected to each other, telephones are connected with the string. With help of above conditions, answer the following questions:-

- What are the coordinates of A, A', A'', A'''?



Challenge
yourself...

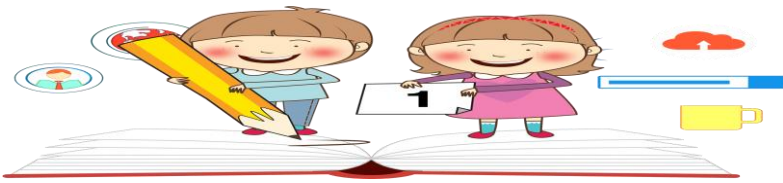


- ii. Find the distance between Ram and Shyam, Ram and Mohan.

- iii. What are the coordinates of, the mid-point of the string which is connected to Ram and Kabir?

- iv. What are the coordinates of, the mid-point of the string which is connected to Mohan and Shyam?

- v. What is the area of AA'A"A"?"

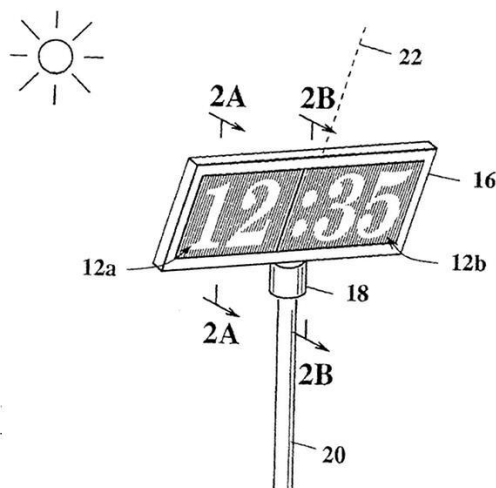


Challenge
yourself...

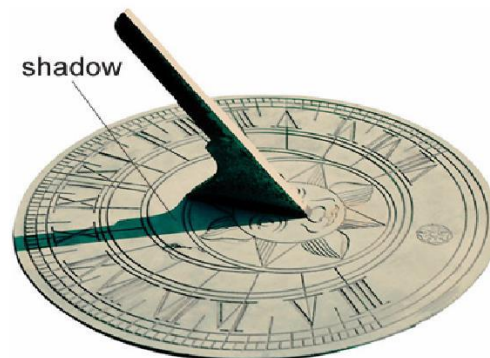


SUNDIAL

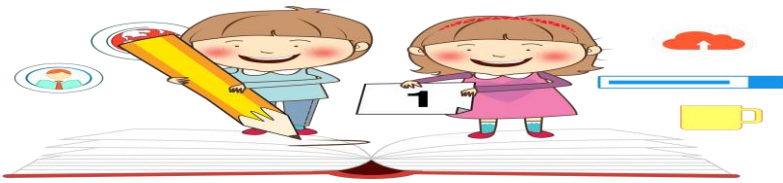
There is no Sunrise or Sunset at the polar regions as we experience at lower latitudes. The Sun appears above the horizon in Summer and makes a 360° circle in the sky - over a period of 187 days at the North Pole 90° North latitude. And in winter, the Sun is below the horizon for 163 days of darkness. It's not exactly six months of darkness/sunlight at the poles. A sundial is a device that tells the time of day when there is sunlight by the apparent position of the Sun in the sky. It consists of a flat plate and a gnomon (vertical stick) which casts a shadow onto the dial. To setup a sundial at any place on the earth, inclination of it's gnomon is decided by respective latitude but on the pole a simple vertical stick serves the purpose. At poles in summer sun makes a 360° circle in the sky in every 24 hours so gnomon's shadow makes one complete circle on its dial. Now days digital sundials are also available which shows time in digits using sunlight. Pictures of classical sundial and digital sundial are given below.



Digital sundial



Classical sundial

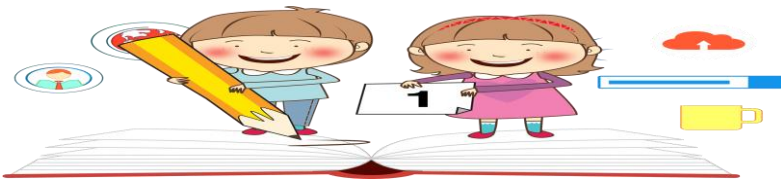


**Challenge
Yourself...**



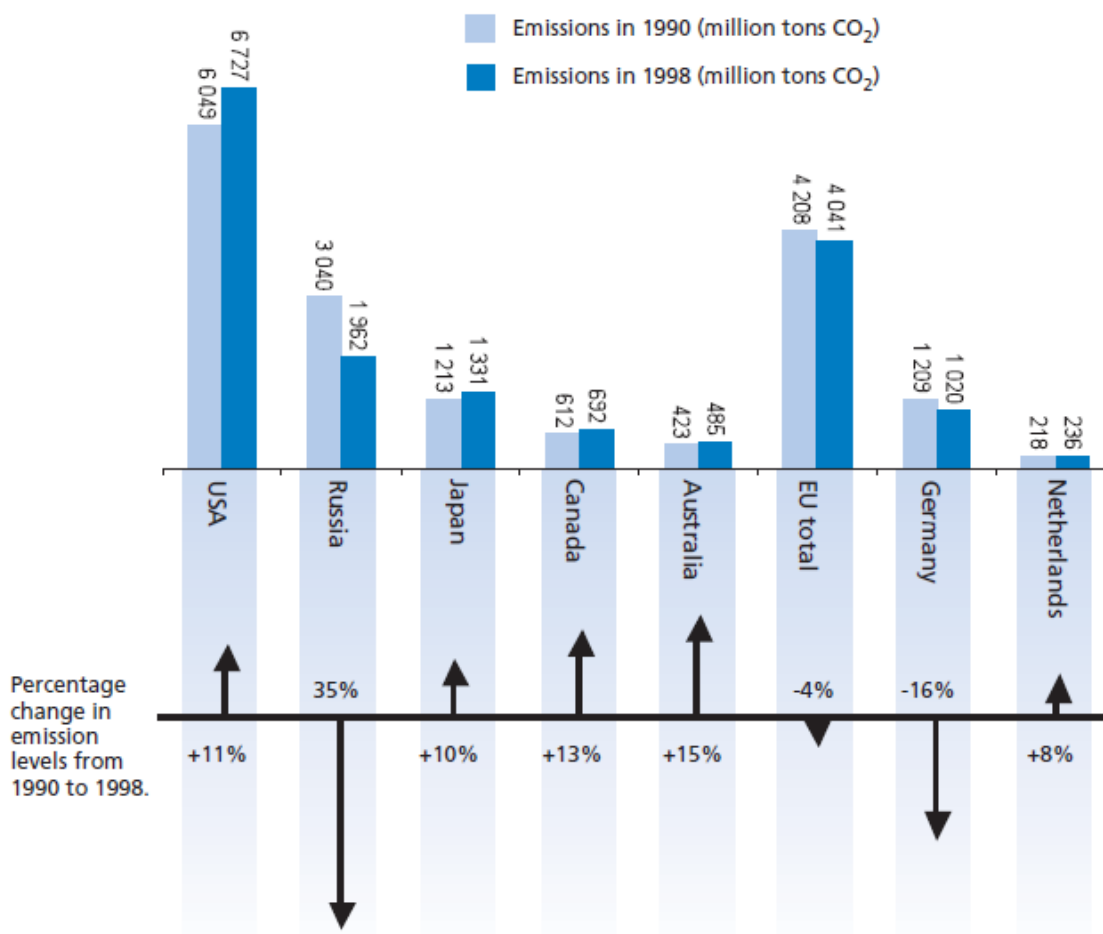
- i. A sundial is placed at the north pole during summer, what shape will gnomon's shadow complete in 24 hours?
- a. Ellipse
 - b. Circle
 - c. Straight line
 - d. There is no change in its direction
- ii. At north pole , what will be the angle of rotation of shadow in one hour ?
- ---

- iii. A research scholar is working at north pole. He started his work at 10:00 am. When he finished his work, he noted that his shadow has turned an angle x° such that $\sin x^\circ = 1$. At what time did he finish his work ?
- ---

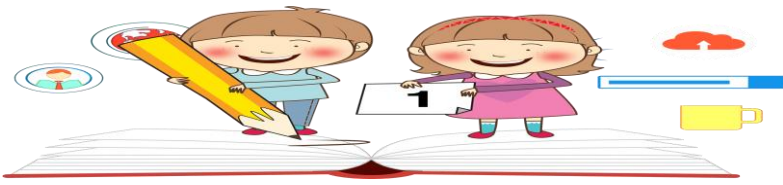


DECREASING CO₂ LEVELS

Many scientists fear that the increasing level of CO₂ gas in our atmosphere is causing climate change. The diagram below shows the CO₂ emission levels in 1990 (the light bars) for several countries (or regions), the emission levels in 1998 (the dark bars), and the percentage change in emission levels between 1990 and 1998 (the arrows with percentages).



- i. In the diagram you can read that in the USA, the increase in CO₂ emission level from 1990 to 1998 was 11%. Show the calculation to demonstrate how the 11% is obtained.



Challenge
yourself...

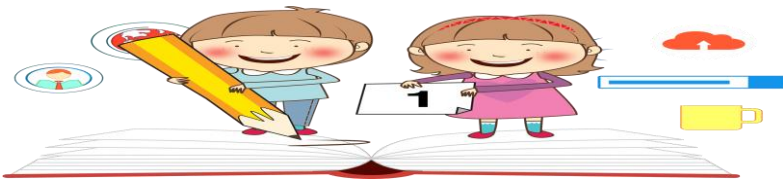


- ii. Mandy analysed the diagram and claimed she discovered a mistake in the percentage change in emission levels: “The percentage decrease in Germany (16%) is bigger than the percentage decrease in the whole European Union (EU total, 4%). This is not possible, since Germany is part of the EU.”

Do you agree with Mandy when she says this is not possible? Give an explanation to support your answer.

- iii. Mandy and Niels discussed which country (or region) had the largest increase in CO_2 emissions. Each came up with a different conclusion based on the diagram.

Give two possible ‘correct’ answers to this question, and explain how you can obtain each of these answers.

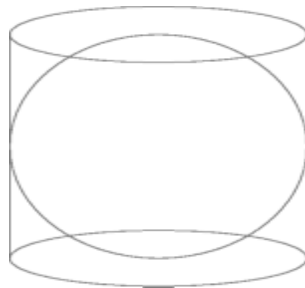


SPHERE AND CYLINDER

On the Sphere and Cylinder is a work that was published by Archimedes in two volumes c. 225 BCE. It most notably details how to find the surface area of a sphere and the volume of the contained ball and the analogous values for a cylinder, and was the first to do so.

He also observed that if a sphere is sliced into equal parts, then the total surface area of each part will same.

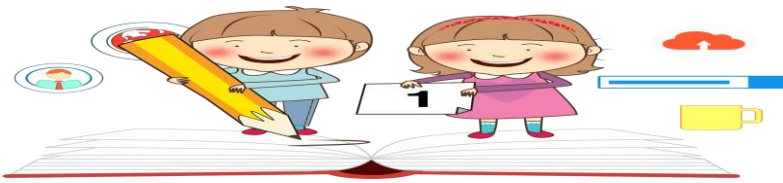
Archimedes was particularly proud of this latter result, and so he asked for a sketch of a sphere inscribed in a cylinder to be inscribed on his grave. Marcellus saw to it that Archimedes was given a burial in accordance with his wishes, including a monument featuring a stone sphere and cylinder.



Observe the above figure: A sphere of radius " r " is enclosed by a cylinder.

- i. What is the Volume of the sphere as compared to the volume of the cylinder?

- ii. Find the ratio of the Total Surface Area of the sphere to that of the cylinder.

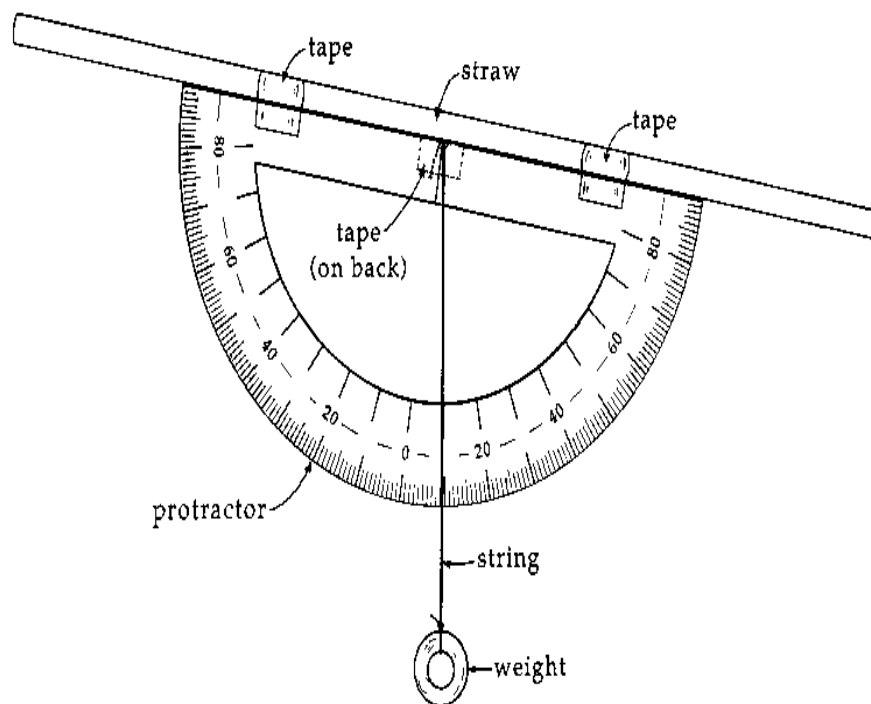


Challenge
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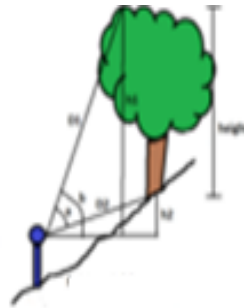
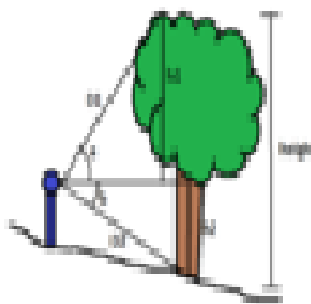
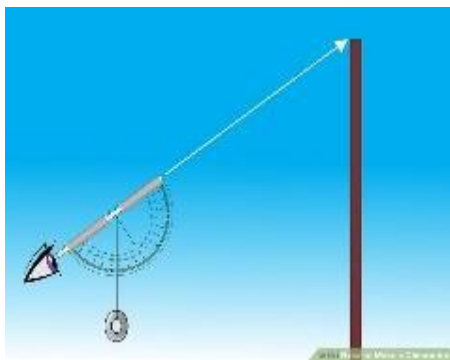
CLINOMETER

Clinometer is an instrument used for measuring angles of slope (or tilt), elevation, or depression of an object with respect to gravity's direction. It is also known as a *tilt indicator*, *tilt sensor*, *tilt meter*, *slope alert*, *slope gauge*, *gradient meter*, *gradiometer*, *level gauge*, *level meter*, *declinometer*, and *pitch & roll indicator*. Clinometers measure both inclines (positive slopes, as seen by an observer looking upwards) and declines (negative slopes, as seen by an observer looking downward) using three different units of measure: degrees, percent, and topo.





Challenge
yourself...

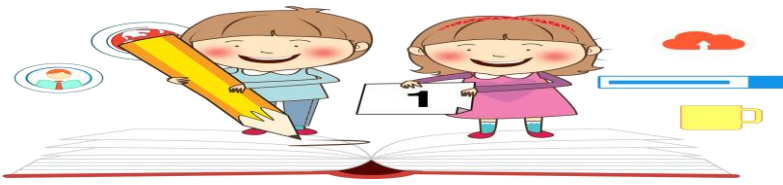


Clinometer can be used to measure the height of tall things that you can't possibly reach to the top of like flag poles, buildings, trees etc.

The clinometer is used to measure the angle Θ from the eye to the top of the tree, and then the horizontal distance to the tree at eye level is measured using a tape.

The height above eye level is then calculated by using the tangent function. Raju is a young boy always comparing measurements of objects around him. He was specially fascinated by height of objects around him and always thinking ways of measuring their height. Knowing his interest, Raju was gifted one clinometer on his birthday by his uncle. The first object that Raju was interested in measuring the height was flag staff in his school.

- i. The bottom of Flag staff was fixed on assembly platform used for morning assembly in the school which was exactly at eye level of Raju. Using clinometer Raju measured an angle of 60° to top of the flag staff from a distance of 30 m from it. Using calculations, Raju measured the height of flag staff as $10\sqrt{3}$ m. Is Raju correct? If Not, calculate the correct height of flagstaff.

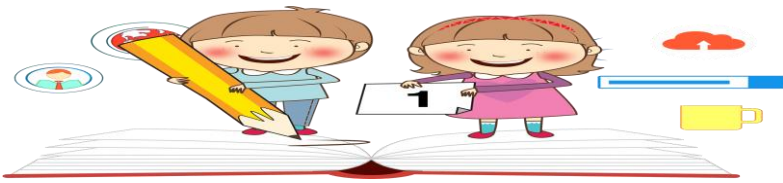


Challenge
yourself...



- ii. If Raju's height is 1.2m, find the height of flagstaff from the prayer ground.

- iii. In school ground, Raju finds one old tree whose upper part has been broken over by the wind making an angle of 30° with the ground and the distance from the bottom of the tree to the point where the top of tree touches the ground is 10m. Calculate the height of the tree for Raju.



Challenge
yourself...

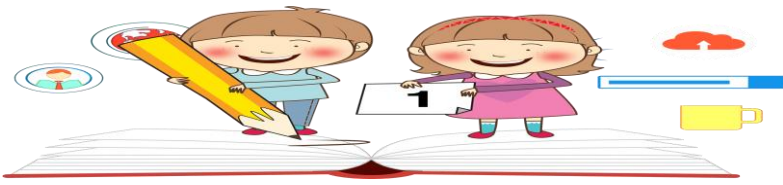


THE STATUE OF UNITY



The *Statue of Unity* is a colossal statue of Indian statesman and independence activist Sardar Vallabhbhai Patel (1875–1950), who was the first Deputy Prime Minister and Home minister of independent India and the chief adherent of Mahatma Gandhi during the non-violent Indian Independence movement. Patel was highly respected for his leadership in uniting the 562 princely states of India to form the single Union of India. It is located in the state of Gujarat, India. It is the world's tallest statue with a height of (597 ft) 182 metres. It is located on a river facing the Sardar Sarovar Dam on river Narmada in Kevadiya colony, 100 kilometers (62 mi) southeast of the city of Vadodara and 150 kilometers (93 mi) from Surat.

- i. Circle 'Yes' or 'No'.
Can we find the height of the statue from the distance of 182m without any other information?
YES / NO

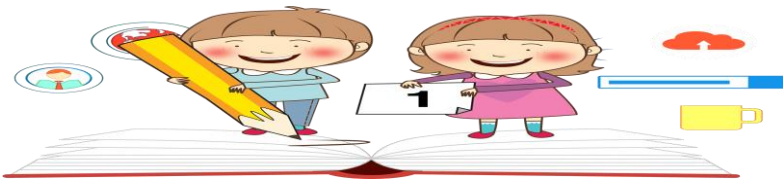


Challenge
yourself...



- ii. What information is required to find the height of statue if not given in the passage?
- a. Angle of elevation from a point on ground
 - b. Distance of point of angle of elevation from the bottom of the statue
 - c. Both A & B
 - d. Data insufficient
- iii. Find the angle of elevation of top of the statue from a point on ground at 182 m from the bottom of the statue .

- iv. A person of height of 2 m observes an angle of 60^0 from the top of statue, then the distance of that person from the bottom of statue is:
- a. More than the height of statue
 - b. Less than the height of statue
 - c. Equal to the height of statue
 - d. Can't say

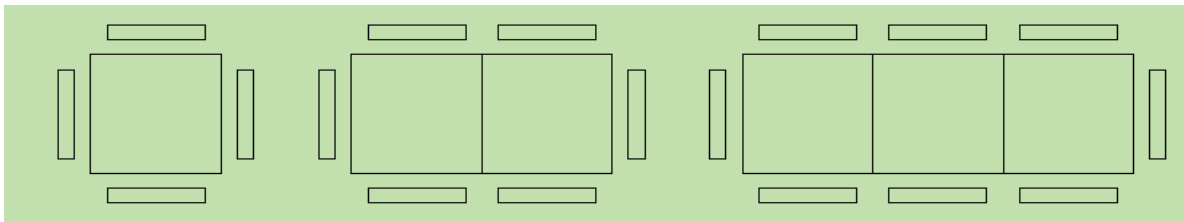


Challenge
yourself...



SITTING AROUND TABLES

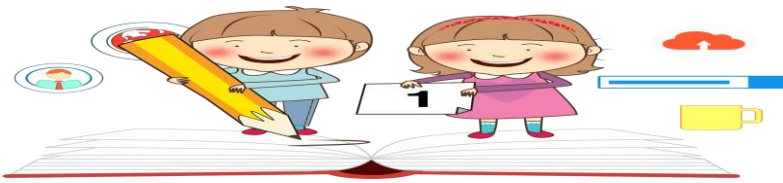
You and 3 friends are studying for Maths and are sitting together at a square table. A few minutes later 2 other friends arrive so you move another table next to yours. Now 6 people can sit at the table. Another 2 friends also join your group, so you take a third table and add it to the existing tables. Now 8 people can sit together as shown below.



- i. Write an expression for the number of people seated at n tables.

- ii. Use the general formula to determine how many people can sit around 12 tables.

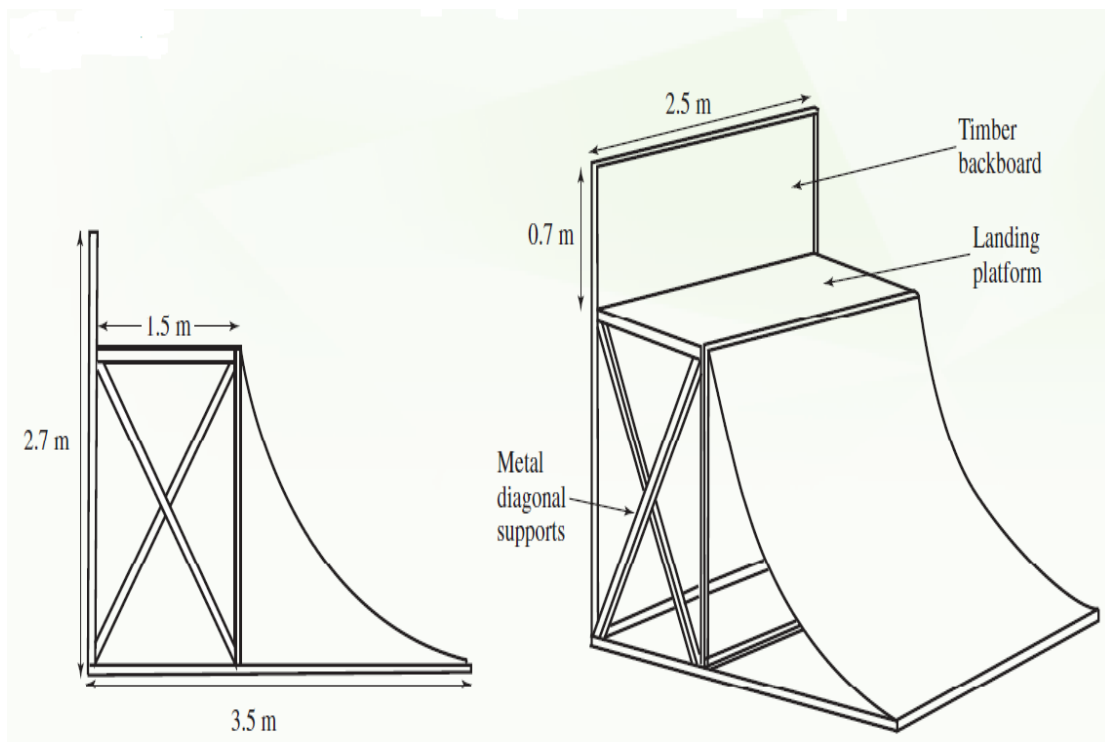
- iii. How many tables are needed for sitting of 20 people?



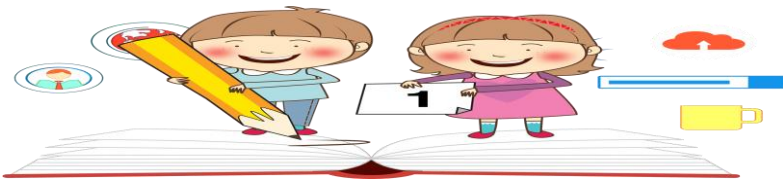
QUARTER-PIPE

Quarter-pipe is a smooth-surfaced wall with a curved base for performing stunts in sports such as skateboarding and snowboarding. In sports events quarter-pipe seems as the area of competition.

Two different views of the quarter-pipe design are shown below with measurements. The ramp section is made from metal and its length is equivalent to the arc length of a quarter circle with a radius of 2 m.



- i. What is the length of the curved part of the ramp?



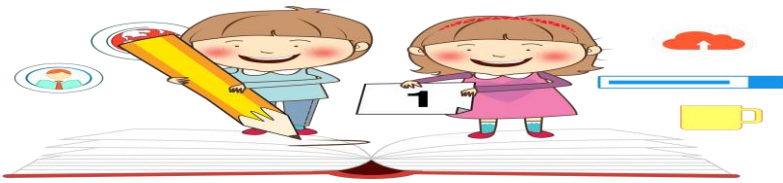
**Challenge
Yourself...**



- ii. Calculate the combined area of the timber backboard, landing platform and the curved section of the ramp.

- iii. The frame is made from strong square metal piping. If there are 10 horizontal supports in the frame, what is the total length of metal piping used in the construction?

- iv. How many times will a wheel of a skateboard turn on the curved section of the ramp, given that the diameter of the skateboard wheel is 55 mm?

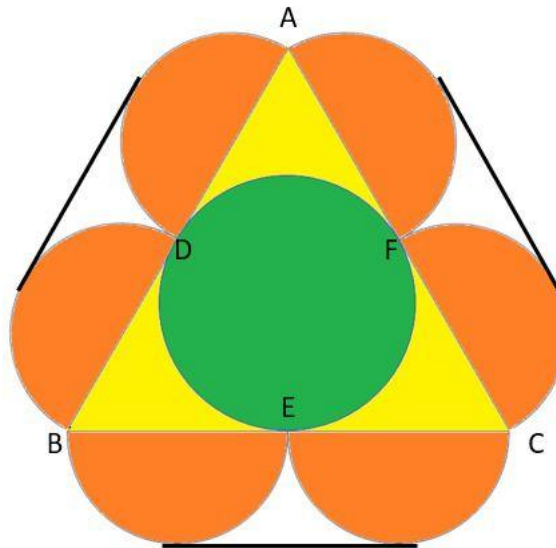


**Challenge
Yourself...**



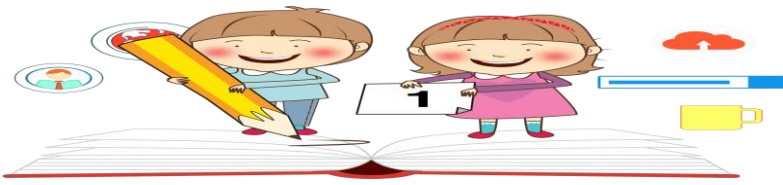
FUN ON NO BAG DAY

Students of class X were asked to make Mathematical Rangoli on a No Bag Day. The best adjudged Rangoli is shown in the figure below.



The Rangoli looked like a circle inscribed in an equilateral $\triangle ABC$ with sides AB, BC and CA which are tangents to the circles at points D, E and F respectively. Semicircles of equal radii were made on sides of $\triangle ABC$ as shown in figure. Length of common tangents to the semicircles with diameter (BE, CE), (CF, AF) and (AD, BD) is $\sqrt{12}$ cm respectively.

- What is the radius of each semicircle?



Challenge
yourself...

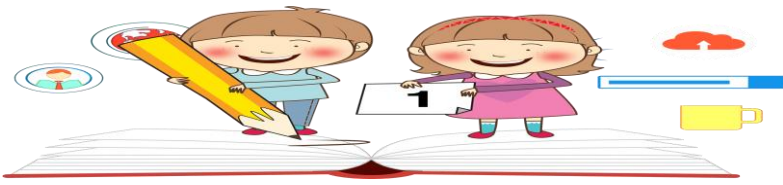


ii. What is the length of each side of ΔABC ?

iii. What is the area of ΔABC ?

iv. Find the radius of green circle?

v. How much area is covered in semi-circles?



**Challenge
Yourself...**



EXAMINATIONS DURING COVID-19

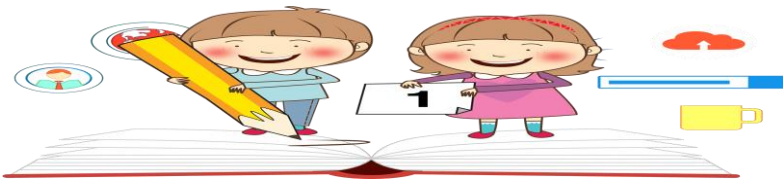
During the Covid-19 period, travelling in a bus or any other mode of public transportation was prohibited. In order to maintain social distancing for everyone's safety, the students of class 10 in a school were requested to arrange their own transportation for commuting during the pre-board examinations. On a particular day, the total number of vehicle (scooters and cars) in the school parking were 70. Whereas the total number of wheels were 240.



- i. Calculate the number of students who used 2 wheelers and the number of students who used 4 wheelers.

- ii. If each student who uses a car was allowed to bring 1 more student along, how many students appeared for the examination, considering the above given data of vehicles and wheels ?

- iii. If only 10 students were seated in one room, how many rooms were required to conduct the examination for part (i) and part(ii)?



Challenge
yourself...

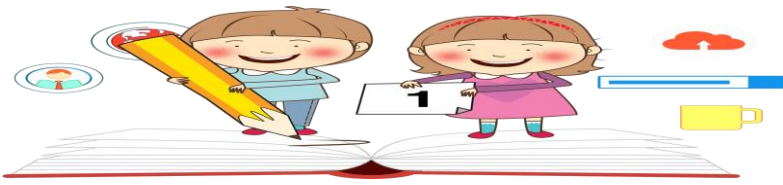


FIGHT AGAINST COVID 19

In INDIA, the COVID vaccine was launched on 16th January, 2021. The first group included healthcare and frontline workers. The second group to receive COVID 19 vaccine was of persons over 60 years of age as of January 1st, 2022 and persons between 45 and 59 years with comorbid conditions. This group was eligible for vaccinations from March 1st 2021.



After the health workers and frontline workers were administered COVID 19 vaccine, the hospital had to make the arrangements for vaccinating the persons over 60 years of age and the persons between 45 and 59 years of age. There were 312 persons above 60 years of age and 240 people between 45 to 59 years of age with diabetes and hypertension who were registered for COVID 19 vaccine administration on a certain day. The hospital had to accommodate maximum number of people in a room with the same number of people in each room. All of them being from the same age group.

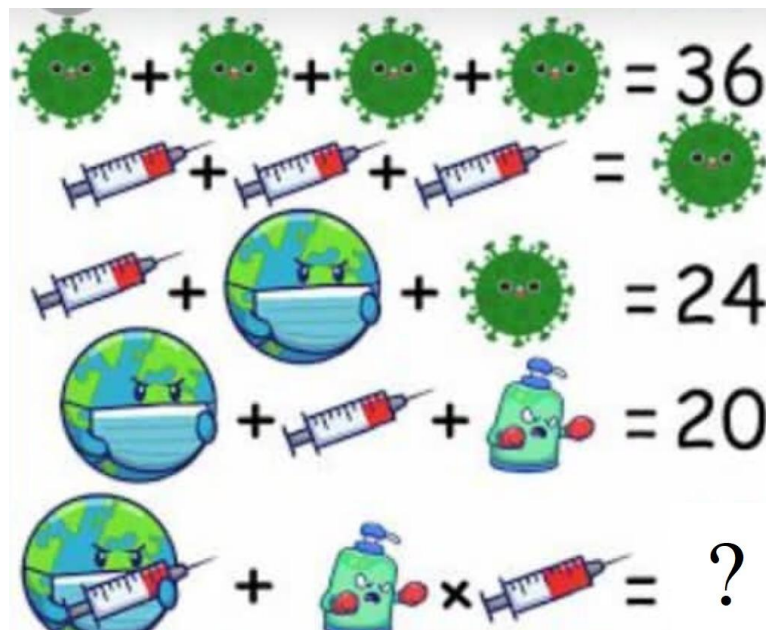


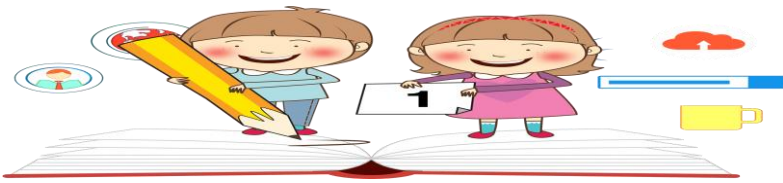
Challenge
yourself...



- i. Find the number of people accommodated in each room.

- ii. How many rooms for each group were used?





Challenge
yourself...



BEEHIVE

A beehive is an enclosed cell structure in which some honeybee species of the subgenus *Apis* live and raise their young. Each cell is the form of hexagonal shape. In a regular hexagon, there are six edges of equal lengths. Taking O as centre, join all the vertices with the centre.



Fig.-1

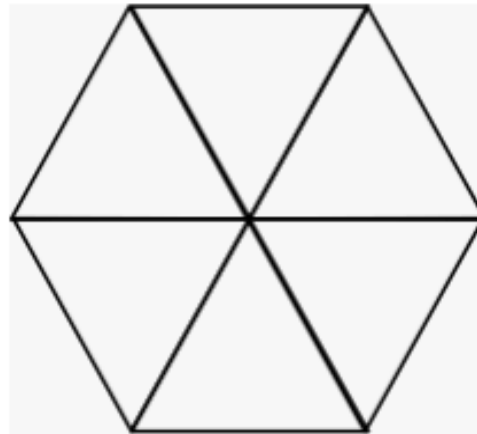


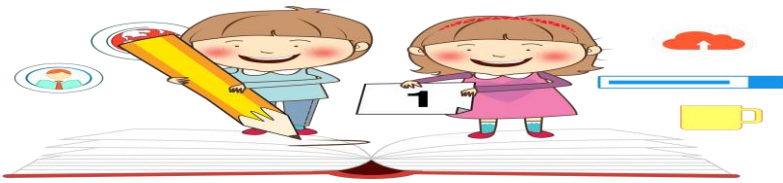
Fig.-2

Similarity of Triangles

Two triangles are said to be similar if

- Corresponding angles are equal and
- Corresponding sides are proportional.

- i. Find the number of equilateral triangles in the given Fig.-2.



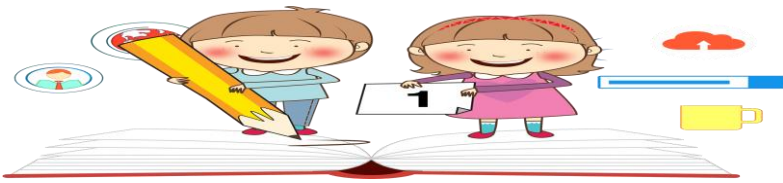
Challenge
yourself...



- ii. If the areas of two triangles are equal, then the triangles are always.....
- iii. How many triangles are similar in the given Fig.-2?

- iv. Find the area of equilateral triangle if each edge is 4 units.

- v. Find the area of hexagon, if each edge is 4 units.



**Challenge
Yourself...**



ANSWERS

1. ROCKING LISTENERS

No. of callers to receive both the vouchers = LCM of 100 & 30 = 300

Therefore, 299 callers must get through before the first one i.e. 300th caller gets both the vouchers.

2. DANCING LIGHTS

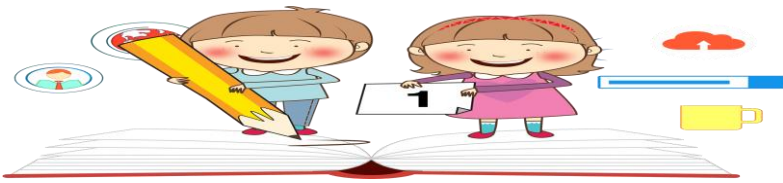
- (I) 360 seconds
- (II) 1st light – 60 times
2nd light – 45 times
3rd light – 40 times
4th light – 36 times

3. MATHS SCIENCE COCKTAIL

- (i) Group I - $4m + 0$
Group II - $4m + 1$
Group III - $4m + 2$
Group IV - $4m + 3$
- (ii) Group I – 4,8,12,16.....,52
Group II – 1,5,9,13.....,49
Group III – 2,6,10,14.....,50
Group IV – 3,7,11,15.....,51

4. ROLLER COASTER RIDE

- (i) B
- (ii) 3 zeroes



**Challenge
Yourself...**



(iii) $-2, 2, 5$

(iv) $x^3 - 5x^2 - 4x + 20$

5. MEDICINE CONCOCTION

(i) -56mg/decilitre

(ii) Degree 3

(iii) False, because degree is 3 so it is a cubic polynomial.

(iv) 1

6. HOME ALONE

(i) $X^2 = (x - 2)^2 + (x+4)^2$

$$X^2 - 12x + 20 = 0$$

(ii) $X = 2, 10$

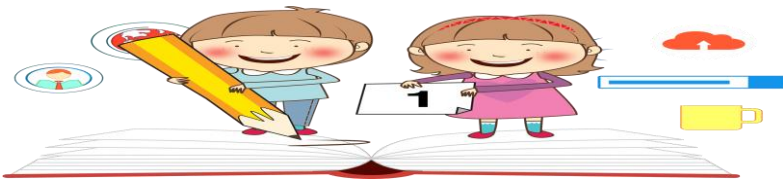
$X = 2$ (rejected)

$X = 10 \text{ m}$

7. BAKING IS FUN

(i) $p(x) = A + \frac{1}{4}B + \frac{1}{3}C + 2D + \frac{1}{2}E$

(ii) $5p(x) = 5A + \frac{5}{4}B + \frac{5}{3}C + 10D + \frac{5}{2}E$



**Challenge
Yourself...**



8. SANTA CLAUS ON HIS WAY!

A	$\frac{1}{2}xyz$
B	$-x^2yz$
C	$-2x^2y^3$
D	$\frac{1}{2}x^4y^4z^3$
E	$-\frac{1}{2}x^4y^4z$
F	$-2x^8y^{10}z^4$
G	$-x^{31}y^{36}z^{16}$

9. THE GUITAR CLASS

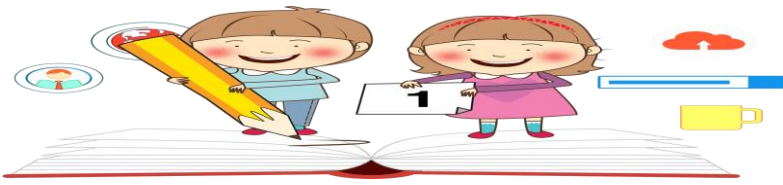
- (i) $p = nf - c = 70n - 400$
- (ii) $n = \frac{40}{7}$ (rejected, not an integer)
- (iii) $n = 10$

10. AQUARIUM

- (i) $v = 3 + 2.5t$ (t minutes)
- (ii) $v = 8$ gallons
- (iii) 10 minutes
- (iv) 26.5 gallons

11. ON YOUR OWN

Option (b) is the best deal as he can afford \$75 monthly payment.



**Challenge
Yourself...**



12. ANXIOUS MOTHER

- (i) Maths – 8 marks , Hindi – 14 marks
- (ii) Length = 10m , Bradth = 8m
- (iii) Pranshu's age = 12 years , Teacher's age 38 years.

13. A NATURAL GEYSER

- (i) $12n + 34$
- (ii) 15 minutes

14. ELANTE SHOPPING MALL PARKING CHARGES

- (i) $30 + 10n$
- (ii) Rs 45

15. TILES DESIGN

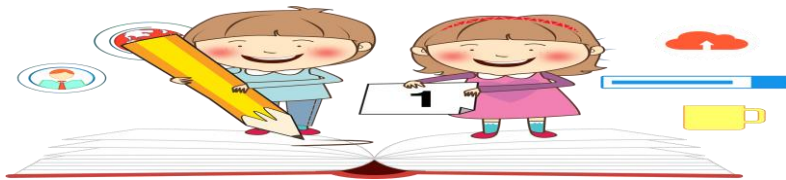
i.

Diagram	1	2	3	4	5	6	7
No. of square tiles	8	12	16	20	24	28	32

- ii. $4n + 4$
- iii. 156
- iv. 71

16. ARRAY OF NUMBERS

- (i) 135
- (ii) $9x$



**Challenge
Yourself...**



(iii) 23

17. BAISAKHI

- (i) 8, 6
- (ii) 10 units
- (iii) 384 quintals

18. CAMPAIGNING

- (i) D (5,3)
- (ii) Area = 16 sq. units
- (iii) $BD = 4\sqrt{2}$ units

19. WATCHING MOVIE

- (i) Option b – (9,5)
- (ii) 10 units
- (iii) No

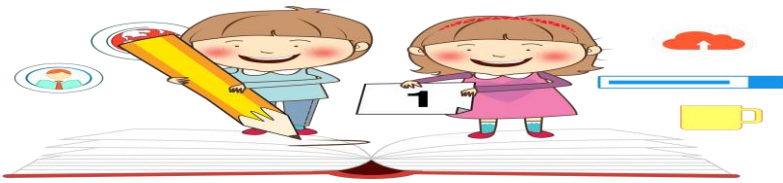
20. A RIDE ON MG HECTOR SUV CAR

- (i) 15 litres
- (ii) Yes, 20 litres
- (iii) $500/33 = 15.15$ km/litre

21. FARMING

- (i)

Figure	Area (in sq.m)
ΔABC	10
ΔDEF	6



**Challenge
Yourself...**



Trap. PQRS	18
Left out area	56

(iii) Farmer will choose left out area to grow vegetables.

22. TEMPLE GATE

- (i) $CA = 6\sqrt{3}$ units , $BC = 6$ units
- (ii) $DA = DB = 6\sqrt{2}$ units
- (iii) $EA = 6$ units , $EB = 6\sqrt{3}$ units
- (iv) Area of $\triangle ABC = 18\sqrt{3}$ sq.units ,
Area of $\triangle ABD = 36$ sq.units ,
Area of $\triangle ABE = 18\sqrt{3}$ sq.units ,

23. SYMMETRICAL WONDER

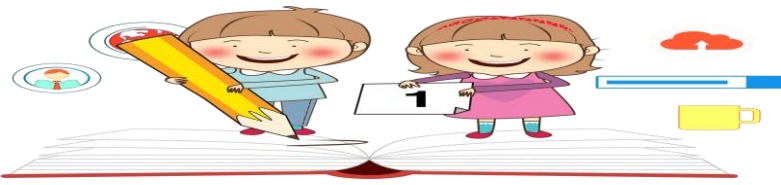
- (i) 560 ft
- (ii) 45°
- (iii) $6da0^\circ$
- (iv) i – b , ii – c , iii – a

24. IRRIGATION

- (i) $x = 16$ cm
- (ii) depth = $CD = 4$ cm
- (iii) $C = 125.6$ cm
- (iv) $\text{ar}(\triangle ACO) = 96 \text{ cm}^2$

25. CIRCULAR PLATE

- (i) $10\sqrt{2}$ cm
- (ii) Radius = $\frac{1}{2}$ of diameter



**Challenge
Yourself...**



26.HORSE STABLE

- (i) 77 sq. m
- (ii) 28 sq. m
- (iii) 126 sq. m
- (iv) 28 sq. m

27.FARMERS'S FIELD

- (i) 52.34 m^2

28.MATHEMATICS AND ARCHITECTURE

- (i) 128.73 sq.m
- (ii) 137.31 sq.m
- (iii) No
- (iv) Volume of 3rd tank

29. ROAD ROLLER

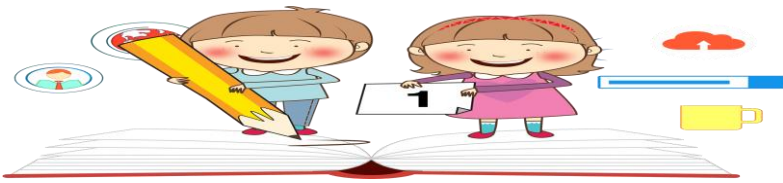
- (i) 1.51 m
- (ii) 7 cylinders
- (iii) 3 buckets
- (iv) 4 rounds ,
- (v) 4 hours

30.FACTORY VISIT

- (i) $x= 260, y=135$

31.FUN WITH MATHS

- (i) $X = 8 , y = 6$



**Challenge
Yourself...**



- (ii) 12 students
- (iii) 20
- (iv) 20

32.DATA ENTRY

- (i) 79.3636

33.LEARNING WITH GRAPH

- (i) Median= 22
- (ii) Frequency distribution

Interval	Frequency
0-10	5
10-20	15
20-30	25
30-40	3
45-50	2

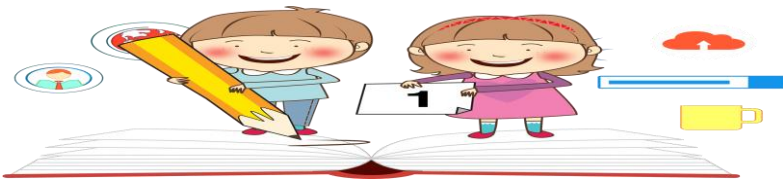
- (iii) Median class = 20-30

34.SWACHH BHARAT ABHIYAN

- (i) 50 persons
- (ii) 26 years, it will remain the same

35. JIGSAW PUZZLE

- (i) 1/151 (c)



**Challenge
Yourself...**



(ii) $2/377$ (a)

(iii) $1/151$ (c)

36. BULL'S EYE

(i) White colour has higher probability

(ii) $1/36$

(iii) $1/9$

37. AN APPLE A DAY KEEPS THE DOCTOR AWAY

(i) (a) $x/18$

(ii) (c) 8

(iii) (b) $5/9$

38. PICNIC

(i) $18/85$

(ii) $17/85$

(iii) $2/3$

39. OBESITY

(i) $18/35$

(ii) $17/35$

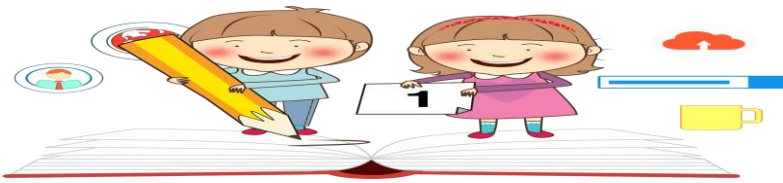
40. BIRTHDAY CAKE

(i) 48.2304 gm

(ii) 101 cherries

(iii) 12.06 gm

41. TOY TELEPHONE



**Challenge
Yourself...**



- (i) $A(3,2)$, $A'(3,-2)$, $A''(-3,2)$, $A'''(-3,-2)$
- (ii) Ram & Shyam = 4 units
Ram & Mohan = 6 units
- (iii) (0,0)
- (iv) (0,0)
- (v) Area = 24 sq. units

42. SUNDIAL

- (i) Circle
- (ii) 15°
- (iii) 4:00 pm

43. Decreasing CO_2 Level

- (i) $6727 - 6049 = 678$,
 $(678 / 6049) \times 100\% = 11\%$.
- (ii) As per the child's logic.
- (iii) Australia and Canada had the biggest percent increase.

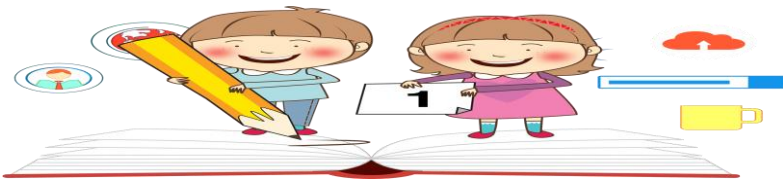
44. Sphere and cylinder

- (i) $2/3$
- (ii) $2/3$

45. CLINOMETER

- (i) NO, $30\sqrt{3}$ m
- (ii) $30\sqrt{3} + 1.2$ m
- (iii) $10\sqrt{3}$ m

46. STATUE OF UNITY



**Challenge
Yourself...**



- (i) No
- (ii) (C) – Both A & B
- (iii) 45^0

47. SITTING AROUND TABLES

- (i) $2n+2$
- (ii) 26
- (iii) 9

48. Quarter Pipe

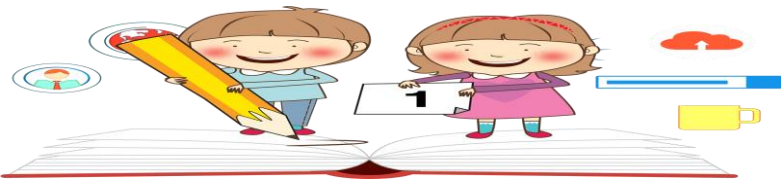
- (i) 3.14m
- (ii) 13.35 m^2
- (iii) 44.4m
- (iv) 18.18 times

49.FUN ON NO BAG DAY

- (i) $\sqrt{3} \text{ cm}$
- (ii) $4\sqrt{3} \text{ cm}$
- (iii) $12\sqrt{3} \text{ cm}$
- (iv) 2 cm
- (v) $9\pi \text{ sq. cm}$

50.Examinations During Covid-19

- (i) There were 20 Two wheelers and 50 Four wheelers
- (ii) 120 students appeared for the examinations
- (iii) For part(i) , 7 rooms are required and for part(ii) 12 rooms were required



**Challenge
Yourself...**



51.FIGHT AGAINST COVID-19

(i) 24 people were accommodated in each room.

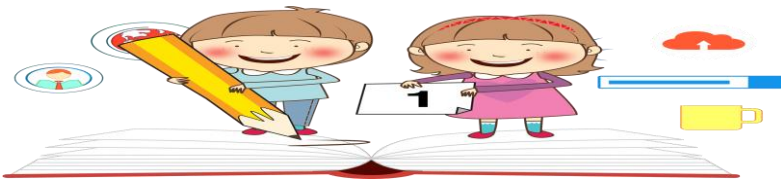
(ii) Rooms Used for:

Persons of age 60 and above = 13

Persons between 45 and 59 years of age = 10

52.BEEHIVE

- (i) 6
- (ii) Congruent
- (iii) 6
- (iv) $4\sqrt{3}$ sq. units
- (v) $24\sqrt{3}$ sq. Units



Challenge
yourself...

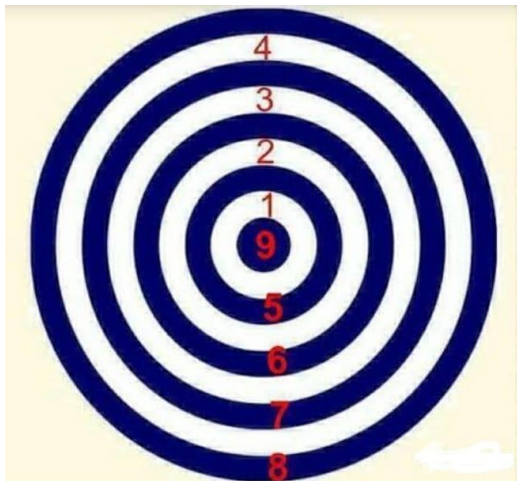


Answers of Brain Teasers

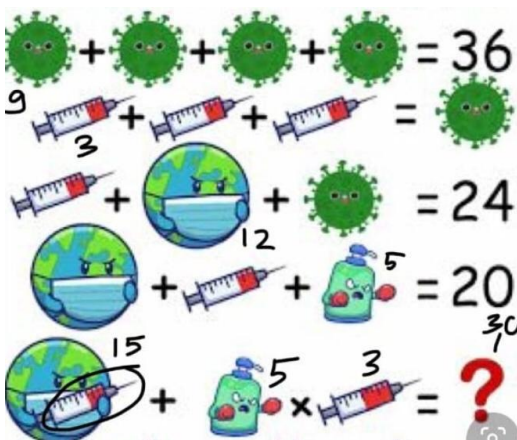
BRAIN TEASER-1



BRAIN TEASER-2



BRAIN TEASER-3



Credits:

Coordinators:

- Mrs. Kavita C. Das, Principal, St. John's High School-26, Chandigarh
- Mr. Rajeev, Principal GMSSS-22, Chandigarh
- Ms. Rajeesvari (KVS, ZIET, Chandigarh)

Resource Group:

- Ms. Neeru Sood Abrol (St. John's High School-26, Chandigarh)
- Ms. Nisha Behl (St. John's High School-26, Chandigarh)
- Ms. Gurpreet Kaur (GMSSS-23, Chandigarh)
- Ms. Abha Kumar (GMSSS-19, Chandigarh)
- Ms. Hemlata Malhotra (GMSSS-21, Chandigarh)
- Mr. Vijaypal Singh (GMSSS-20, Chandigarh)
- Ms. Garima Aneja (DPS-40, Chandigarh)
- Ms. Sangeeta Gill (DAV Model-15, Chandigarh)
- Ms. Jyoti Sharma (GMSSS -15, Chandigarh)
- Mr. Kapil Mohan Sood (GHS-53, Chandigarh)
- Ms. Vineeta Sharma (Sacred Heart-26, Chandigarh)
- Ms. Monika Khurana (Bhavan Vidyalaya-27, Chandigarh)
- Mr. Pardeep Singh (GMSSS-40B, Chandigarh)
- Mr. Dilpreet Singh (GHS-54, Chandigarh)
- Ms. Gorvi Bedi (Chitkara International-25, Chandigarh)
- Ms. Simmi Puniani (Carmel Convent-9, Chandigarh)
- Ms. Gurpreet Kaur (GMSSS-Khuda Alisher, Chandigarh)

- Ms. Simranjeet Kaur (GHS-Maloya, Chandigarh)
- Ms. Gurleen Kaur (SGGSCPS-26, Chandigarh)
- Ms. Poonam Kukreja (St. Anne's Convent-32, Chandigarh)
- Ms. Shifali Singla (SCERT-32, Chandigarh)
- Ms. Sugandha Rampal (St. Kabir Public School -26, Chandigarh)
- Mr. Navjot Singh (GMHS-25, Chandigarh)
- Mr. Vikram Singh Yadav (SCERT, Chandigarh)
- Ms. Pardeep Rani (JNV, Chandigarh)
- Ms. Rachna Tuteja (KV-47, Chandigarh)
- Ms. Geetanjali Kalia (St. Stephen's-45, Chandigarh)
- Mr. Gaurav Sharma (FirstSteps IB World School, Chandigarh)
- Ms. Indu Bala (GMHS-40A, Chandigarh)
- Mr. Baljit Singh (GMSSS-22A, Chandigarh)

CRITICAL AND CREATIVE THINKING (CCT)

Resource Material Developed

Mathematical Literacy

- 4 modules (classes 7 to 10) in English and Hindi medium
- 'Step by Step' Mathematics Booklet Series
- 'Mathlete' fortnightly series
- CCT Booklets for classes 8th, 9th and 10th (100 pages)

Scientific Literacy

- 5 Modules (classes 6 to 10) in English and Hindi medium
- 'Harshit /Joyful Learning' weekly series
- CCT Booklet for classes 8th -10th (100 pages)

Reading Literacy English

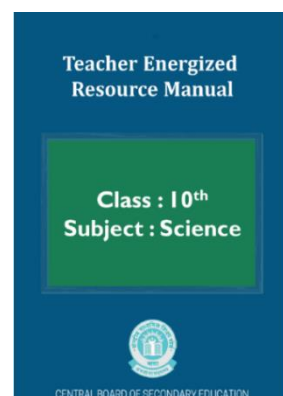
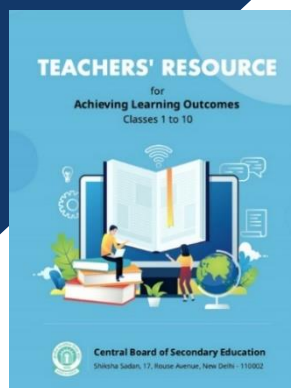
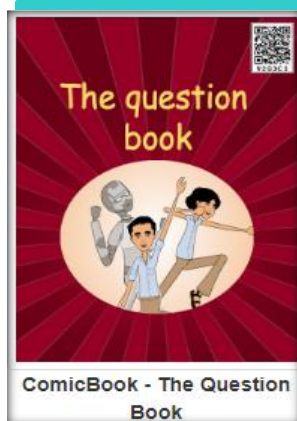
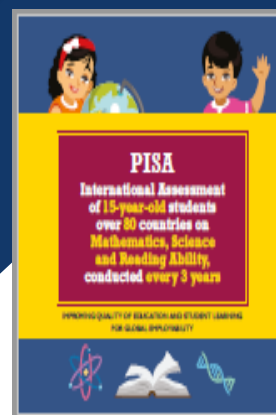
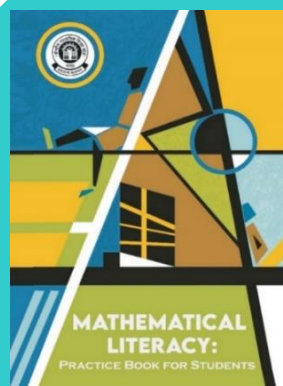
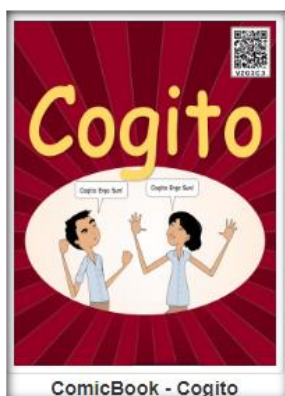
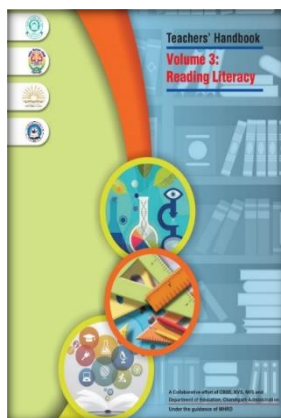
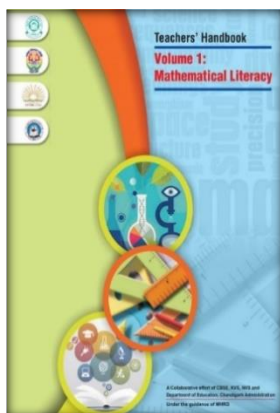
- 5 Handbooks/modules of Reading Literacy (classes 6 to 10)
- 3 Handbooks/modules of Reading Literacy for supplementary reader (classes 8 to 10)
- CCT Booklets for classes 8th, 9th and 10th (100 pages)

Reading Literacy Hindi

- 5 modules (Classes 6 to 10)
- 'Sankalp' Fortnightly Series
- Monthly CCT booklets for classes 6th- 8th and 9th-10th (January 2021 onwards)
- CCT Practice Booklets for classes 8th, 9th and 10th (100 pages)

CBSE Handbooks

- Vol.I Mathematical Literacy
- Vol.I Scientific Literacy
- Vol.I Reading Literacy
- Experiential Learning
- Joyful Teaching and Learning of Mathematics
- Art Integration
- Self-learning Resources
- Artificial Intelligence Integration Manual
- The Question Book
- Cogito
- 21st Century Skill Handbook
- Cyber Safety Manual
- Mathematical Literacy: Practice Book for Students
- PISA Primer
- Handbook of Joyful Learning



STATE COUNCIL OF EDUCATIONAL RESEARCH AND TRAINING (SCERT)
 Sector- 32, UT Chandigarh, Email id : scert-chd@nic.in, Phone No: 0172-2676011