

STEP BY STEP

MATHS FOR ALL



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ABOUT THE BOOK

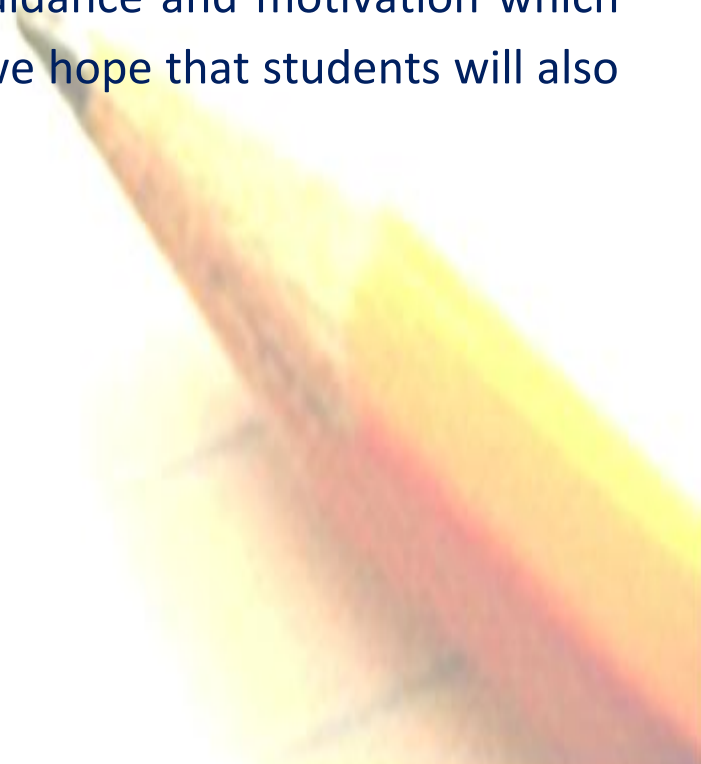
Everything around us can be understood better with Mathematics as it can help children to think about many aspects of their world through its connection with them.

For students, learning usually happens in the best way when they can relate it to real life situations. With each higher class, it becomes more advanced and challenging. Many students find it difficult to understand the abstract mathematical concepts and have to work harder and practice longer for this.

However, by infusing real life examples with mathematical concepts, teachers can help students view mathematics from an entirely different point of view.

The booklet **"STEP BY STEP"** fulfils the objective that concepts in Mathematics can be learnt in a joyful manner. It will also enhance the CCT skill of learning.

We are thankful to the **DIRECTOR OF SCHOOL EDUCATION, SH. RUBINDERJIT SINGH BRAR** for his guidance and motivation which helped us to complete this task and we hope that students will also get benefit from this booklet.





Good Morning Students,

Abhi aapka health checkup hua tha, Now all of you write down your height in notebook.

Sameer, how tall you are? Tell me.

My height is 146 cm.



So you are measuring only your height i.e one dimension only.

Now Siya, Can you tell me about the shape of front page of your maths CCT book.



It is rectangular in shape having pair of opposite sides equal.



Measures its sides.

Its sides are 15cm & 10 cm.



10cm

15cm





See, it has two dimensions i.e. length & breadth.

Length = 15 cm & breadth = 10 cm.

See the following room, do you know this room has 3 dimensions i.e length, breadth & height. So it is 3 dimensional shape.



Students now you write examples from your surrounding of 3 dimensional objects.



Pencil Bread

Chalk Door

Duster

Biscuit Notebooks

We can easily identify 2D and 3D shapes.



Yeah! We have done it.



Bacho,

Now hopefully it is clear to all of you about dimensions. Let me define it.

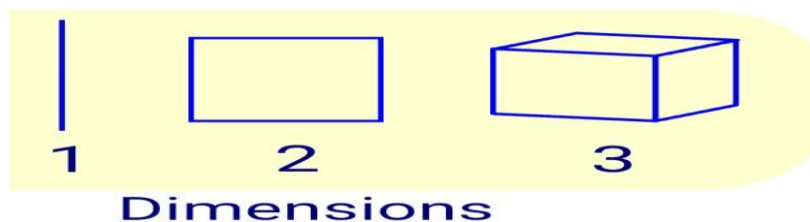
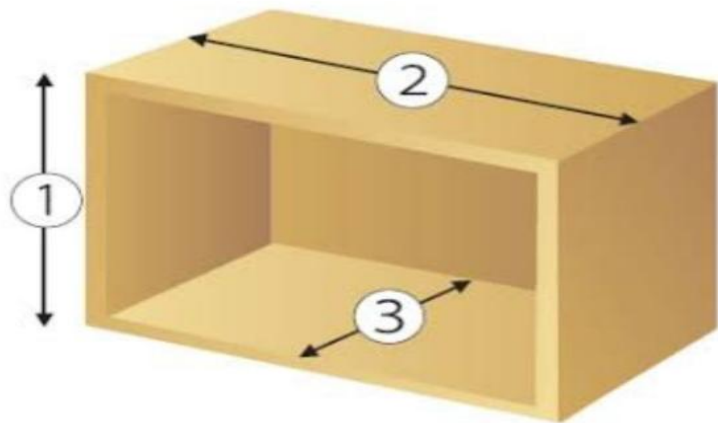
Definition: - A measurement of length in one direction is called dimension.

SEE FIGURE BELOW



dimensions

- ① height
- ② width
- ③ depth



A line has one dimension (1D)

A square has two dimensions (2D)

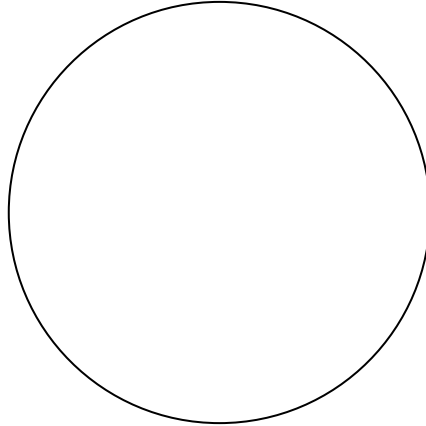
A cube has three dimensions (3D)

COMPARISON BETWEEN 2D AND 3D FIGURE.

	2D	3D
Definition	Two-Dimensional	Three-Dimensional
Dimension	Length and breadth	Length, breadth and height
Mathematical Definition	x- and y- axis	x-,y- and z-axis
Ease of construction	Simple to create on a plain surface.	Quite complex to create on a plain surface.
Edges	Are completely visible.	Not visible or hidden due to overlapping.
Thickness	No thickness, we can't hold it.	Has thickness, we can hold it.
Examples	Square, circle, triangle, rectangle etc.	Cube, sphere, cone, cuboid etc.



Bacho, See circle below and tell me it has one dimension, 2-dimensions or 3-dimensions?



CIRCLE



It has no dimension.

No Sameer, you are wrong. It has one dimension.



No.. No..

Let me clear it by following definition. It has 2-dimensions.

A circle is a plain figure bounded by one curved line and occupying some space on the plain surface. It has two dimensions.



OK Students, Today is **ACTIVITY DAY**. We will start a new project by making 5 groups of class. We will make a kitchen garden in our school. Come on students find out the space for it where we can get maximum sunlight.



- i. Each group will maintain two vegetable beds. All of you will put fencing around allotted vegetables bed. So tell me how much wire is required for fencing by each group?
- ii. How will you measure it?

We can measure it with the help of thread, wool or rope. Starting from any point & take a complete round on outer boundary by returning to the same point.



Good, so let me tell you that this distance is known as Perimeter.



Definition of Perimeter

Distance around any closed object is known as Perimeter. In case of Circle, its perimeter is called as Circumference of circle.



Now each group will tell me that how much part of the ground is covered in your allocated vegetable bed.



What is this, how can we measure it?





Bachol!!! This is called area. REMEMBER THAT...

THE AMOUNT OF SPACE INSIDE THE BOUNDARY OF A TWO DIMENSIONAL SHAPE IS DEFINED AS AREA.

But how can we measure it???

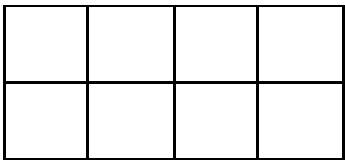
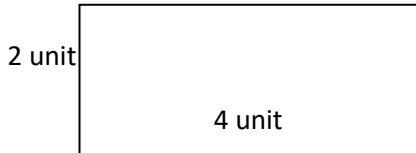


There are different ways of calculating areas of regular and irregular figures.

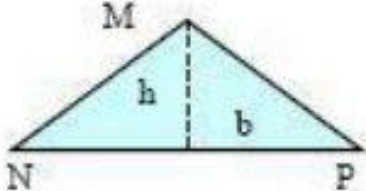
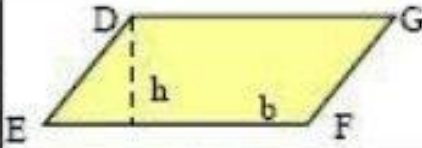
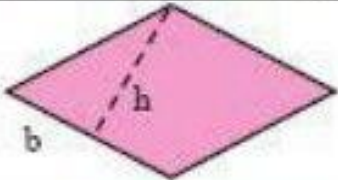


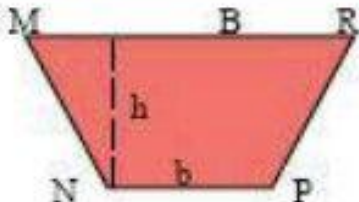

Area can be calculated by:

1. By method of counting squares.
2. By using formula.

Let me illustrate you with an example of area of rectangle

BY COUNTING THE SQUARE	BY USING FORMULA
	
<p>Area = area of number of squares. = 8 square units.</p>	<p>Area = length x breadth = 4x2 = 8 square units.</p>
<p>Remember:-</p> <ol style="list-style-type: none"> 1. By using method of counting the square we can find area of all regular and irregular 2D shapes. 2. By using formula we can find the area of only regular 2D figure as it is more convenient and easier method. 	

Formulas of area and perimeter of some regular 2D figure

NAME	FIGURE	AREA	PERIMETER CIRCUMFERENCE
TRIANGLE		$A = \frac{b \times h}{2}$	$P = MN + NP + PM$
PARALLELOGRAM		$A = b \times h$	$P = DE + EF + FG + GD$
RHOMBUS		$A = b \times h$	$P = b + b + b + b$ $P = 4b$
RECTANGLE		$A = L \times w$	$P = L + w + L + w$ $P = 2L + 2w$
SQUARE		$A = l^2$	$P = l + l + l + l$ $P = 4l$
TRAPEZOID		$A = \frac{(B + b) \times h}{2}$	$P = MN + NP + PR + RM$
CIRCLE		$A = \pi r^2$	$C = 2\pi r = \pi d$



Let's sing and dance!!!



Area and Perimeter Songs

To the tune of "Pop Goes the Weasel"

Perimeter

All around a shape you must go
To add up all the edges
And once you find the sum of them all
Perimeter's what you found

Area

If you really want to find out
The space inside a shape
You multiply the length and the width
And area's what you get

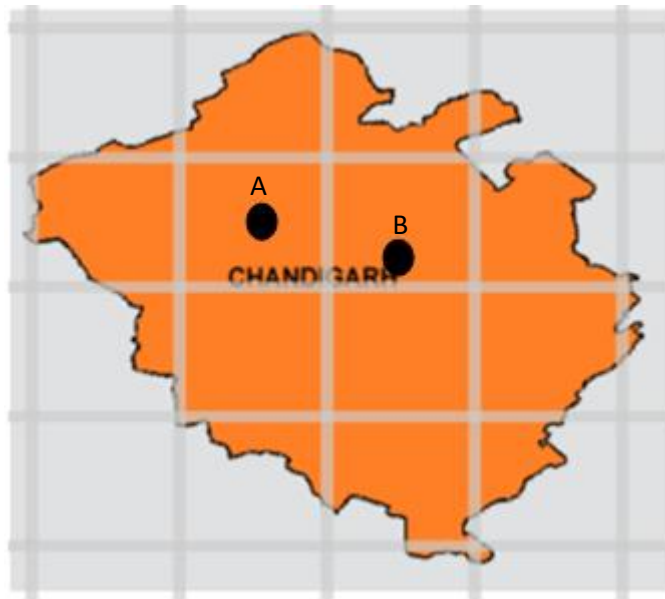


SOME SURPRISING FACTS

क्या आप जानते हो???

We can estimate the areas of different countries, states and cities through maps using scale.

Let us find the area of **City Beautiful:- Chandigarh**



Scale:- 1 Unit on the grid is 3.5 Km.

Solution:

Number of complete Squares = 4

Number of $\frac{3}{4}$ th Squares = 5

Number of $\frac{1}{2}$ Squares = 2

Number of $\frac{1}{4}$ th Squares = 2

Total squares = $4 + 5 \times \frac{3}{4} + 2 \times \frac{1}{2} + 2 \times \frac{1}{4} = 9 \frac{1}{4}$

Area of 1 Square = $3.5 \times 3.5 = 12.25 \text{ km}^2$

Area of $9 \frac{1}{4}$ Squares = $9 \frac{1}{4} \times 12.25 = 113.31 \text{ km}^2$

Hence approximate area of City beautiful Chandigarh = 114 km^2

We can also find distance between two places A and B on a map.

Here distance between A and B is approximately equal to 1 unit = 3.5 Km.

WOW, Very Interesting

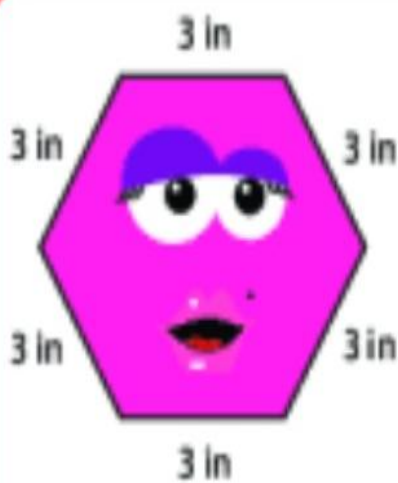


Let's do some challenges.

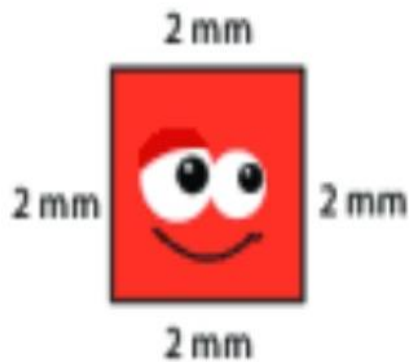


Challenge - 1

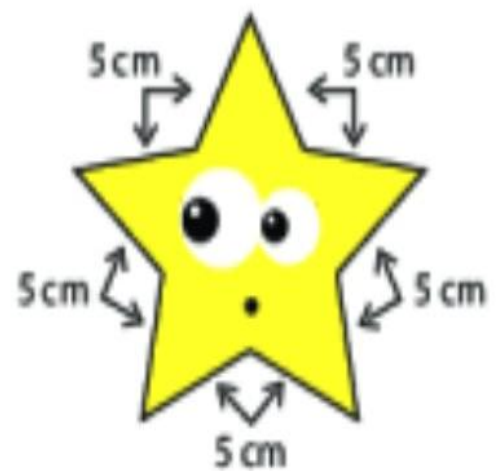
Find the perimeters of the following figures.



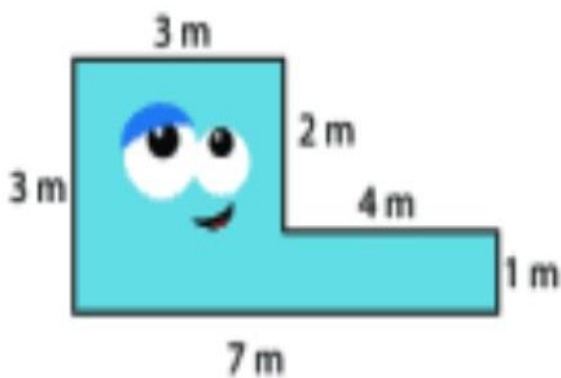
perimeter = _____



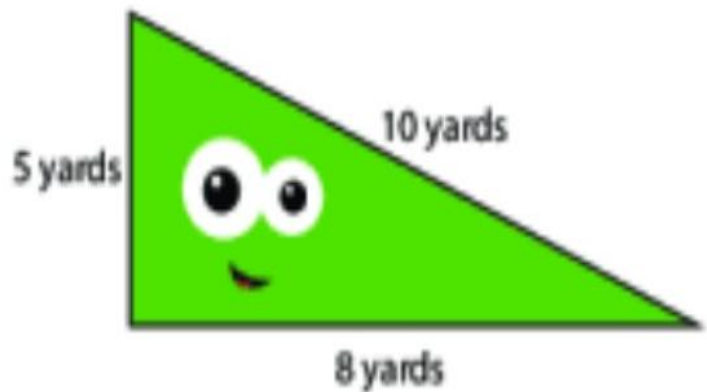
perimeter = _____



perimeter = _____



perimeter = _____



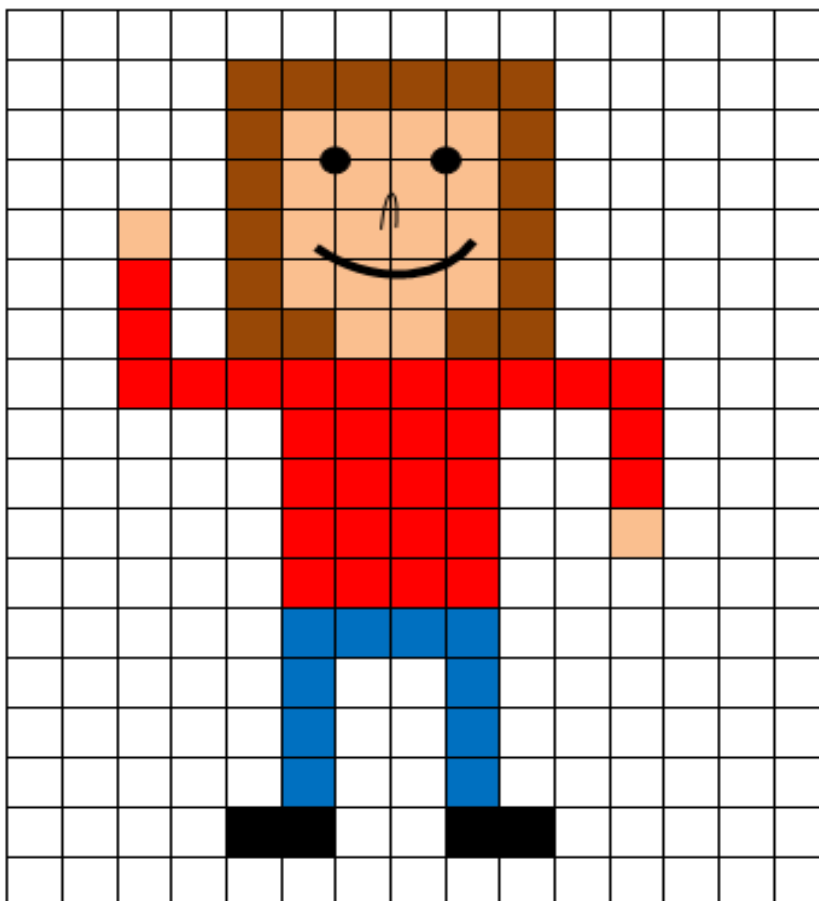
perimeter = _____

Challenge - 2



Come on children, let's draw a figure on a graph sheet and colour it.

See this!!! I have done it.



But, why we have drawn it on graph sheet, why not on drawing sheet.

That's what I want to show.

MATHS IS EVERYWHERE.



1. Find perimeter of the above figure by counting the square. (Assume side of square as 1 unit).
2. Find the area of Red, Blue, Black, Peach, brown region (Ignoring eyes, mouth and nose).
3. Find the total area of figure.

BACHO, Maja aaya na.

This is integration of maths with Arts.

Challenge - 3

Math's Investigation

Sameer draw a rectangle that has an area of 20 square inches. What is the length and width of his rectangle? What is the perimeter of his rectangle? Are there other possible lengths and widths of Sameer's rectangle?



Challenge - 4



What will you find?

AREA or PERIMETER

Mr. Surrender wants to fence around 80 acre of farm house. He needs to buy enough wooden fence posts and wire to do the job. Circle the correct one.



AREA or PERIMETER

Mr. Narender wants to buy tiles to put around his swimming pool. How many tiles will he need?



AREA or PERIMETER

Challenge - 5

The Big Mess

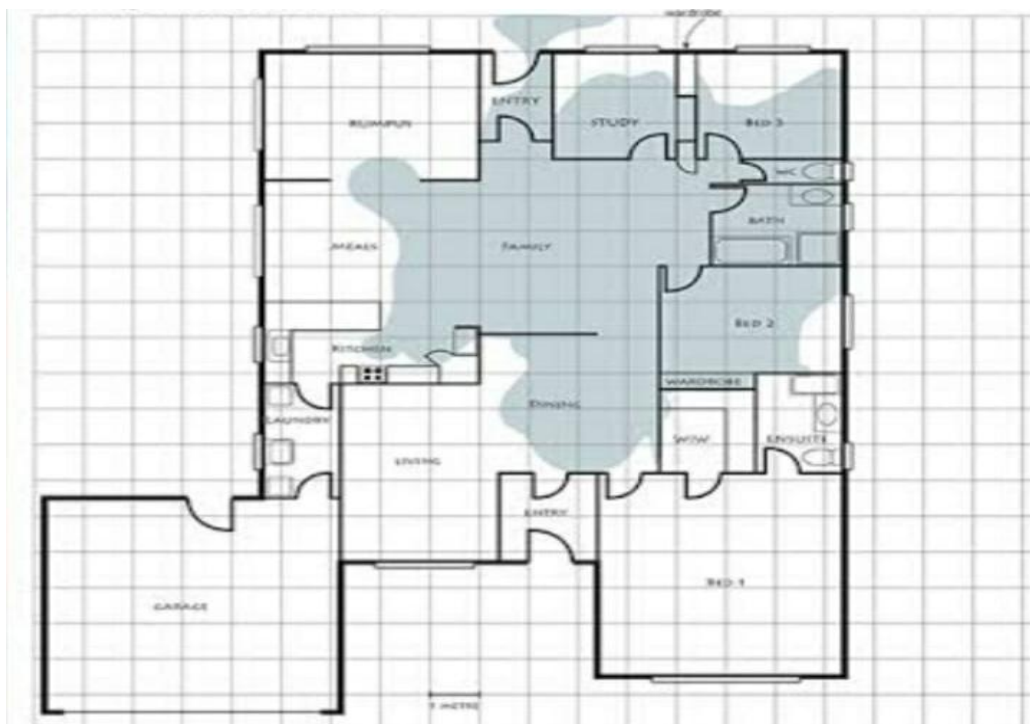


Why were you absent yesterday?

We went away for the weekend outing, but someone left the tap open. when we came back last night, we have to clean a huge mess



MAP OF SIYA'S HOUSE



Estimate the area that was flooded with water inside the house.

Challenge - 6

BAKING BROWNIES

Anurag request his sister to bake brownies with greatest possible amount of crispy edge for his friend. As all of them don't like the middle part of the brownie, they love the edge pieces with more crunch.



Now Raveena has three pans for baking brownie. Her brownie batter could fit into anyone of three pans which are 2 inch deep.

- 8 inch by 6 inch
- 12 inch by 4 inch
- 9 inch by 3 inch



Which pan she should choose to get the greatest possible amount of crispy edge.

Challenge - 7

MAGIC SQUARE

Sameer's Dadi Maa makes beautiful patch work bedsheet out of waste clothes which she collect from different boutique of her locality. She cut square pieces of 8 cm by 8 cm then she stitched square piece together to make beautiful bedsheets. The best way to use the waste material.



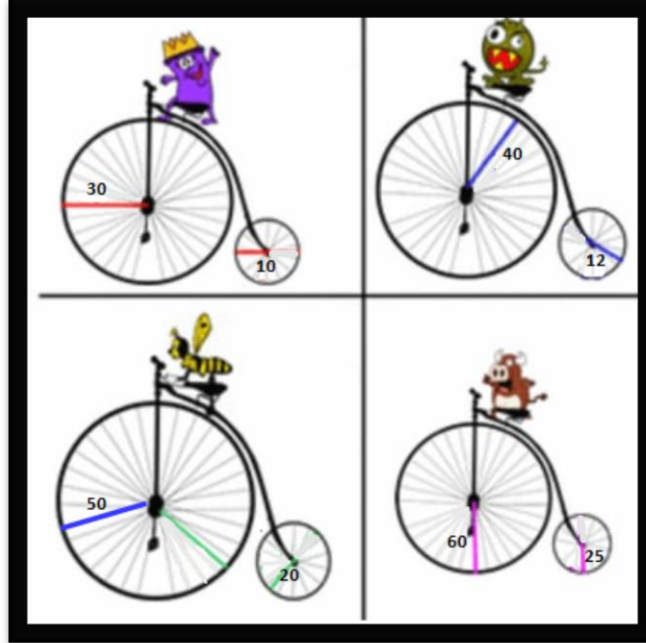
1. Dadi Maa has 30 squares in shade of red. Find the different ways that she could make rectangular shapes using all 30 square.
2. Can you make a square bedsheet with the help of these 30 pieces?
3. Find the total length of ribbon required for each of bedsheet you found in question 1.
4. Find the area of each bedsheet. Is it same or different?

Challenge 8

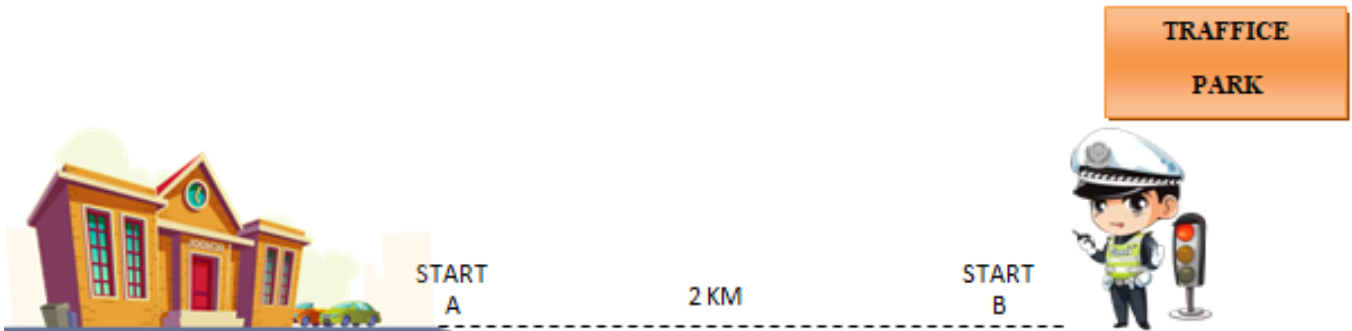
World Bicycle Day

3rd June

चलो चलें लेके अपनी अपनी साइकिलें



Sameer, Siya and their two friend's Raja and Reena have different type of bi-cycles with different dimensions of wheels. They have to cover the distance from their school to nearby traffic park on world cycle day.



1. How many revolutions does each wheel of each cycle will have to make to cover the distance?
2. Find the areas of all the big wheels of the cycle.

Challenge 9



1. Using the scale in the map, Estimate the area of “Jammu & Kashmir” and “Rajasthan”.
2. Calculate the distance from Chandigarh to Bangalore by using scale of map.

YOU CAN ALSO FIND AREA OF ANY COUNTRY OR ANY STATE WITH THE HELP OF SCALE GIVEN ON THE MAP

Challenge 10

MATHS IS EVERY WHERE



द्रोपदी का **DURYODHAN PAR** व्यंग

पाँच फुट लम्बा, है तीन फुट सरोवर चौड़ा।
हँसता है तुझ पर अरे दुर्योधन थोड़ा थोड़ा ।
सरोवर के चारों ओर एक फुट चौड़ी पगडंडी ।
क्यों कूद कर पानी में आ मिले, दुर्योधन पाखंडी ।
नाहिं यह दोष तेरा, है कर्मों का फल ।
कितने क्षेत्रफल का नजर नहीं आता थल ?





THINKING ABOUT
THE ANSWERS,
TRYING TO SOLVE
IT



KYA TUMHE
QUESTIONS
SAMJH
AAYE?



Mujhe sab samajh
aa gya. These
questions were very
easy. Anyone can
solve them if their
basics are clear

Siya, hopefully
you can solve all
these questions
now



Keep on doing Bacho.
I will share the answers next
time.





LEARNING OUTCOMES ACHIEVED



CLASS 6

- Calculate perimeter and area of rectangular 2D objects to measure them for real life objects.

CLASS 7

- Using units square grids/graph sheet in order to calculate the area of closed shapes.
- Apply properties of simple shape in order to calculate the area of the region enclosed in a rectangle and a square.



CLASS 8

- Using units square grids/graph sheet estimate the area of various polygons.
- User appropriate method/formula to find the area of polygon.

CLASS 9

- Applies appropriate formula in order to find areas of all 2D shapes.



CLASS 10

- Applies appropriate formula in order to find areas of all 2D shapes.

STEP 3

(ANSWER KEY)

Match your IQ with my answers of our previous book.



<div>CHALLENGE 1</div> <div>4</div>	<div>CHALLENGE 2</div> <table><tr><td>Exponential Form</td><td>$2^5 = 32$</td><td>$10^3 = 1000$</td><td>$3^{-2} = 1/9$</td><td>$16^{1/2} = 4$</td></tr><tr><td>Logarithm Form</td><td>$\log_2 32 = 5$</td><td>$\log_{10} 1000 = 3$</td><td>$\log_3 1/9 = -2$</td><td>$\log_{16} 4 = 1/2$</td></tr></table>	Exponential Form	$2^5 = 32$	$10^3 = 1000$	$3^{-2} = 1/9$	$16^{1/2} = 4$	Logarithm Form	$\log_2 32 = 5$	$\log_{10} 1000 = 3$	$\log_3 1/9 = -2$	$\log_{16} 4 = 1/2$	<div>CHALLENGE 3</div> <div>1. d</div> <div>2. a</div> <div>3. a</div>
Exponential Form	$2^5 = 32$	$10^3 = 1000$	$3^{-2} = 1/9$	$16^{1/2} = 4$								
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<div>CHALLENGE 4</div> <div>a. acidic</div> <div>b. basic</div> <div>c. pure water</div> <div>d. 2</div>	<div>CHALLENGE 5</div> <div>For 4 years = ₹ 4,39,200</div> <div>For 8 years = ₹ 6,43,100</div>	<div>CHALLENGE 6</div> <div>a. 53 Students</div> <div>b. 9 days</div>										
<div>CHALLENGE 7</div> <div>(C)</div>	<div>Challenge 8</div> <div>a) 10.6 Billions people</div> <div>b) Population doubled after 63 years i.e. in 2064</div>	<div>CHALLENGE 9</div> <div>4 people i.e. ABCD.</div> <div>First A & B go to other side and A comes back with total time = 3 min.</div> <div>Secondly C & D go to the other side & B comes back with total time = 12min.</div> <div>last A & B go with total time = 2min</div> <div>Hence total time = 17 min</div>										
<div>CHALLENGE 10</div> <div>(3-1)+(3-1)+ (3-1)+(3-1)+ (3-1)+(3-1)+ (3-1)+(3-1)+ (3-1)+2= 38</div> <div>कृष्ण जी को मिलने के लिए सुदामा जी को 38 कदम चलने पड़े।</div>		