MATH - MAGIC

Book 5 Textbook in Mathematics for Class V

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राष्ट्रीय शैक्षिक अनुसंधान और प्रशिक्षण परिषद् NATIONAL COUNCIL OF EDUCATIONAL RESEARCH AND TRAINING 9

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Textbook for Class V

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Foreword

The National Curriculum Framework (NCF), 2005, recommends that children's life at school must be linked to their life outside the school. This principle marks a departure from the legacy of bookish learning which continues to shape our system and causes a gap between the school, home and community. The syllabi and textbooks developed on the basis of NCF signify an attempt to implement this basic idea. They also attempt to discourage rote learning and the maintenance of sharp boundaries between different subject areas. We hope these measures will take us significantly further in the direction of a child-centred system of education outlined in the National Policy on Education (1986).

The success of this effort depends on the steps that school principals and teachers will take to encourage children to reflect on their own learning and to pursue imaginative activities and questions. We must recognise that given space, time and freedom, children generate new knowledge by engaging with the information passed on to them by adults. Treating the prescribed textbook as the sole basis of examination is one of the key reasons why other resources and sites of learning are ignored. Inculcating creativity and initiative is possible if we perceive and treat children as participants in learning, not as receivers of a fixed body of knowledge.

These aims imply considerable change in school routines and mode of functioning. Flexibility in the daily time-table is as necessary as rigour in implementing the annual calendar so that the required number of teaching days are actually devoted to teaching. The methods used for teaching and evaluation will also determine how effective this textbook proves for making children's life at school a happy experience, rather than a source of stress or boredom. Syllabus designers have tried to address the problem of curricular burden by restructuring and reorienting knowledge at different stages with greater consideration for child psychology and the time available for teaching. The textbook attempts to enhance this endeavour by giving higher priority and space to opportunities for contemplation and wondering, discussion in small groups, and activities requiring hands-on experience.

National Council of Educational Research and Training (NCERT) appreciates the hard work done by the Textbook Development Committee responsible for this book. We wish to thank the Chairperson of the Advisory Committee, Professor Anita Rampal and the Chief Advisor for this book, Professor Amitabha Mukherjee for guiding the work of this committee. Several teachers contributed to the development of this textbook; we are grateful to their principals for making this possible. We are indebted to the institutions and organisations which have generously permitted us to draw upon their resources, material and personnel. We are especially grateful to the members of the National Monitoring Committee, appointed by the Department of Secondary and Higher Education, Ministry of Human Resource Development under the Chairpersonship of Professor Mrinal Miri and Professor G.P. Deshpande, for their valuable time and contribution. As an organisation committed to the systemic reform and continuous improvement in the quality of its products, NCERT welcomes comments and suggestions which will enable us to undertake further revision and refinement.

Reprint 2024-25

New Delhi 30 November 2007 Director National Council of Educational Research and Training



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The following are applicable to all the maps of India used in this book

- © Government of India, Copyright 2006 1. The responsibility for the correctness of internal details rests with the publisher.
- 2. The territorial waters of India extend into the sea to a distance of twelve
- nautical miles measured from the appropriate base line. The administrative headquarters of Chandigarh, Haryana and Punjab are at 3. Chandigarh.
- The interstate boundaries amongst Arunachal Pradesh, Assam and Meghalaya 4. shown on this map are as interpreted from the "North-Eastern Areas (Reorganisation) Act.1971," but have yet to be verified.
- 5. The external boundaries and coastlines of India agree with the Record/Master Copy certified by Survey of India.
- 6 The state boundaries between Uttarakhand & Uttar Pradesh, Bihar & Jharkhand and Chhattisgarh & Madhya Pradesh have not been verified by the Governments concerned.
- 7. The spellings of names in this map, have been taken from various sources.

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Constitution of India

Part IV A (Article 51 A)

Fundamental Duties

It shall be the duty of every citizen of India —

- (a) to abide by the Constitution and respect its ideals and institutions, the National Flag and the National Anthem;
- (b) to cherish and follow the noble ideals which inspired our national struggle for freedom;
- (c) to uphold and protect the sovereignty, unity and integrity of India;
- (d) to defend the country and render national service when called upon to do so;
- (e) to promote harmony and the spirit of common brotherhood amongst all the people of India transcending religious, linguistic and regional or sectional diversities; to renounce practices derogatory to the dignity of women;
- (f) to value and preserve the rich heritage of our composite culture;
- (g) to protect and improve the natural environment including forests, lakes, rivers, wildlife and to have compassion for living creatures;
- (h) to develop the scientific temper, humanism and the spirit of inquiry and reform;
- (i) to safeguard public property and to abjure violence;
- (j) to strive towards excellence in all spheres of individual and collective activity so that the nation constantly rises to higher levels of endeavour and achievement;
- *(k) who is a parent or guardian, to provide opportunities for education to his child or, as the case may be, ward between the age of six and fourteen years.
- Note: The Article 51A containing Fundamental Duties was inserted by the Constitution (42nd Amendment) Act, 1976 (with effect from 3 January 1977).

*(k) was inserted by the Constitution (86th Amendment) Act, 2002 (with effect from 1 April 2010).



The Fish Tale

Deep under the sea See the lovely coloured fish Swimming peacefully

This special poem in three lines is called a Haiku. Such poems about nature are popular in Japan. Here is another Haiku—

The lake, calm, smooth, still A fish jumps up and returns Ripples shake the lake

Do you know any poems about fish?

Here are some drawings made by children.

When you think of fishes what shapes come to your mind?

* Try to use a square and a triangle to draw a fish.









Look for fish designs around you — on cloth, in paintings, on mats, etc.

'Meen' means a fish and 'Meenakshi' is a girl whose eyes look like a fish. Can you think of someone who has such eyes?

* Draw a face with 'fish eyes'.

, Man Mar

Fishes can have very different sizes. The smallest fish is about 1 cm long. How long is the biggest fish you can imagine?

₩ How many times longer is your big fish than the smallest fish?

[°]The biggest fish is the **whale shark**. It is actually not a whale but



is a big, big fish. Whales are different from fish. Whales breathe like we do, through their noses. But fish have no noses and they take in water, not air. Whales give birth to babies, but fish lay eggs. The whale shark fish looks big and dangerous, but is quite harmless. It does not attack humans.

One whale shark was as long as 18 m. Just think how long that is – almost 12 children of your size standing one on top of the other! And guess what it weighed? Well, much, much more than what 12 of you together weigh! Its weight was about 16000 kg!

- * About how many kilograms do you weigh?_____
- * So 12 children like you put together will weigh about _____ kg.

* About how much more does the whale shark weigh than 12 children like you put together?

The Fish Tail

To see the difference between whales and fish look carefully at their tails. Can you see that the fish tail stands flat along its body, but the tail of the whale almost looks like two legs. Can you spot the fish in the picture?

"Schools" of Fish!

Fish like to swim together in the sea in big groups called "schools" of fish. In their school they feel safe from the bigger fish. (Do you feel safe in your school?)



This is a thematic chapter which presents to children the world of fish and fish workers through an integrated approach. Mathematical concepts, such as shapes, estimation, sense of large numbers, simple operations, speed, loans, etc. are woven into real-life contexts to allow a creative revision of some ideas learnt earlier.



To scare away the bigger fish, some small fish drink up a lot of water, swell up and look big!

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Jincy used these shapes to make drawings of fish. Now you also use some shapes to draw the different sea animals shown below.

Sea urchin Lobster Eel Red snapper Reprint :



* Which of these sea animals have you seen before?

Fishermen in their Boats

How many of you have seen the sea? Where did you see it? Did you see it in a movie or for real? How deep do you think the sea could be? Find out.

Do you know how to swim? Would you be scared of the high sea waves?

* Close your eyes and imagine the sea with waves rising high.

Maria Maria

* How high do you think the waves can go?_





The Man Man Man Man Man Man Man Man

Imagine that there are fishermen in their boats, going up and down with the waves. They start their trip when it is still dark. Some go on a simple boat made from logs of wood tied together. If the sea is rough, with very high tides and a strong wind, then these fishermen have a very difficult time.

Log boat

These log boats do not go very far. If the wind is helpful, they travel about 4 km in one hour.

- * How long will they take to go a distance of 10 km?
- ✤ Guess how far you can go in one hour if you walk fast.







Fishermen can feel the wind and look at the sun to find out which way to go. Many of us would get lost and not be able to find our way on the sea where you only see water, water, and nothing else!



Find out

Look at the sun and find out the direction from where it rises.

- * From where you are, what interesting thing do you see to your east?
- * Name two things that are lying to your west.

What a Catch!

Out on the sea, fishermen look for a place where they hope to find a good catch of fish. There they spread their nets. They will have to wait for many hours for the fish to come into their nets.



What a long sword-fish!

シント

* Look at the different types of boats.

Some boats have motors and go further into the sea. Since they go far out they can catch more fish. These boats travel faster, at



Oar boat

the speed of about 20 km in one hour.

- * How far would the motor boats go in three and a half hours?
- * How much time will they take to go 85 km?













But the fishermen are now very worried. There are some very big machine boats (trawlers) in the business. They go far out and put their big nets deep in the sea. This way they collect a whole lot of fish, leaving very few near the sea shore. They also stay out on the sea for many days.

These big machine boats also catch the small baby fish, which have yet to grow up. Fishermen in the smaller boats always let the baby fish pass

through their nets to go back into the sea. They choose a net size in such a way that only the grown up fish are caught.

For hundreds of years fishermen have cared for the sea and its fishes, and fished only a little to eat and sell. They say that if trawlers catch thousands of kilograms of fish everyday, there will be no fish left in the sea!

Write a news report about the dangers faced by the fishes in our rivers and seas.

Which Boat Gets How Much?

In one trip the log boat brings about 20 kg of fish. But other types of boats bring a bigger catch as

given in the table. The table also shows the speed of each type of boat, which is how far each boat goes in one hour. Look at the table and calculate —

- a) About how much fish in all will each type of boat bring in seven trips?
- b) About how far can a motor boat go in six hours?
- c) If a long tail boat has to travel 60 km how long will it take?

Type of boat	Catch of fish in one trip (in kg)	Speed of the boat (how far it goes in one hour)
Log boat	20	4 km per hour
Long tail boat	600	12 km per hour
Motor boat	800	20 km per hour
Machine boat	6000	22 km per hour



Some Big, Big Numbers!

0

In the Class IV Math-Magic you heard of the number **'lakh'** which is equal to a hundred thousand. You had read that there are about one lakh brick kilns in our country, where bricks are made.

- * What other things have you heard of in lakhs?
- Write the number one thousand. Now write one hundred thousand. So how many zeroes are there in the number one lakh? Easy, isn't it?
- * There are about two lakh boats in our country. Half of them are without a motor. What is the number of boats with a motor? Write it.
- * About one fourth of the boats with a motor are big machine boats. How many thousand machine boats are there? Come on, try to do it without writing down.

We might wonder about the number of people whose lives are related to fish. In all there are about one hundred lakh fishworkers — who catch fish, clean and

> sell them, make and repair nets and boats, etc. We also have a name for this big number — **'one hundred lakh'** is called a **crore**.

- Where have you heard of a crore? What was the number used for?
- Try writing the number one crore. Don't get lost in all the zeroes!



The Fish Market

Have you been to a fish market? If you have then you might know why a very noisy place is sometimes called a 'fish market'!

This fish market is busy today.

Many boats have brought a good catch. The fisherwomen are shouting out their prices to the buyers.

Mini — "Come here! Come here! Take sardines at ₹ 40 a kg".

Gracy — "Never so cheap! Get sword-fish for ₹ 60 a kg".

Floramma sells prawns for ₹ 150 a kg.

Karuthamma sells squid for ₹ 50 a kg.

Look, Fazila can hardly carry this big kingfish! She says, "This fish weighs 8 kg. I will sell the whole for ₹ 1200".

Practice Time

- 1) At what price per kg did Fazila sell the kingfish?
- 2) Floramma has sold 10 kg prawns today. How much money did she get for that?
- 3) Gracy sold 6 kg sword fish. Mini has earned as much money as Gracy. How many kg of sardines did Mini sell?







 Basheer has ₹ 100. He spends one-fourth of the money on squid and another three-fourth on prawns.

- a. How many kilograms of squid did he buy?
- b. How many kilograms of prawns did he buy?

Try saying this fast!

Here is a tongue twister. Repeat it fast! She sells sea shells on the sea-shore. She is sure that the shells that she sells will be there no more.

Women's 'Meenkar Bank'

The meeting of the Meenkar Bank has just begun. Fazila is the president. Twenty fisherwomen have made their own bank. Each saves ₹ 25 every month and puts it in the bank.

- * How much money does the group collect each month?
- * How much money will be collected in ten years?

Practice time

Gracy needs money to buy a net. Jhansi and her sister want to buy a log boat. So they take a loan from their bank. They will return it with interest.

a) Gracy took a loan of ₹ 4000 to buy a net. She paid back ₹ 345 every month for one year. How much money did she pay back to the Bank?



b) Jhansi and her sister took a loan of ₹ 21,000 to buy a log boat. They paid back a total of ₹ 23,520 in one year. How much did they pay back every month?

Earlier women did not go on the boat to fish. But now Jhansi and some others are going on the boats during the day. Things are changing now and their Bank helps them. They have also got a special bus to take their baskets full of fish.



Why Don't We Start a New Fish-drying Factory?

The women of Meenkar Bank also want to start a factory to dry fish. The Panchayat has given them some land for that. Over the years they have saved ₹ 74,000. They find out how much they will need for the factory.

とう

Fazila writes the things they need to buy to begin. See the table for the cost of each item and the number of items they want to buy. Find the total cost.



Item	Price of each	Number of items	Cost
Bore well for fresh water	₹ 3000	1	
Bamboo rack for fish drying	₹ 2000	20	
Cement tank	₹ 1000	4	All Raily
Tray and knife	₹ 300	20	
Bucket	₹ 75	20	

Total cost to set up the factory =

When fresh fish is dried it becomes $\frac{1}{3}$ its weight. In one month they plan to dry 6000 kg of fresh fish. How much dried fish will they get in a month?

Floramma — Let us first calculate for 6 kg of fresh fish.

We buy fresh fish for	₹ 15 per kg
We sell dried fish for	₹ 70 per kg

We dry 6 kg fresh fish to get _____ kg dried fishFor 6 kg fresh fish we have to pay $6 \times _ = ₹ 90$ We will sell 2 kg dried fish and get $2 \times _ = ₹ _$ So if we dry 6 kg fresh fish we will earn $_ 90 = ₹ _$ But if we dry 6000 kg we can earn ₹ $_ × 1000$ in one month! \bigcirc



Jhansi — I found that for 6000 kg fish we would need 1500 kg salt every month! Its price is ₹ 2 per kg.

Monthly costs:

a) Salt

1500×2 = ₹___

b) Packing and bus charges = ₹3000

So the total monthly cost of drying, packing and bus charges $= \overline{\mathbf{x}}$

Fazila — That sounds very good! Our calculations tell us that every month our Bank will earn ₹ 44,000!

* Check to see if you also get the same answer.

Find out

Songs sung by fishermen are beautiful. Find out about the words and tunes of such songs.



Rohini and Mohini are twin sisters. They love doing the same things. One day when they were making shapes with matchsticks, Shaila gave them a challenge. (Popini will make a shape

Rohini will make a shape. Mohini has to make the

same without looking at it, but she can ask questions. Oh! That is so simple.

Rohini made this shape.

× <

* * Mohini — Is it a closed shape or an open shape?

Rohini — It is a closed shape.

Mohini — How many sides are there?

Rohini — It has 6 sides.

Mohini made this.

Now you give the answers.

Is it a closed shape? _____. Does it have 6 sides? _____.

But it is not the same as the one made by Rohini. So Mohini tried again.

16

This is what she made.



- Is there some way to say in what way these shapes are different?
- * Mohini tried again but got different shapes. Guess and make two more shapes Mohini could have made.

Mohini is now tired of trying and asks Shaila what to do.

If you ask for the angles that the matchsticks make at the corners, you can do it.

Oh! So let us look for the angles.

* Look at the angles marked in these shapes. Can you see the difference?





See, how the matchsticks make a small angle, , a big angle, , and a bigger angle Mohini



It is important to encourage children to think about the way in which shapes can differ even when the number of sides is the same. This will help them to get a sense of how angles determine the shape of a polygon.

Reprint 202

Practice Time

*

- 1) Look at the shape and answer.
- * The angle marked in _____ colour is the biggest angle.
- 2(a) Are the angles marked with yellow equal?
 - b) Are the angles marked with green equal?_____
 - c) Are the angles marked with blue equal?_____



3) Four different angles are marked in four colours. Can you find other angles which are the same as the one marked in red? Mark them in red. Do this for the other colours.



4) How many different shapes can you make by changing the angle between the matchsticks in each of these? Try.

8 matchsticks

b)



4 matchsticks



5 matchsticks

c)



Matchstick Puzzles

- 1) Make 8 triangles using 6 matchsticks. Try!
- 2) Take 8 matchsticks and make a fish like this. Now pick up any 3 matchsticks and put them in such a way that the fish now starts swimming in the opposite direction. Did it?
- 3) Using 10 matchsticks make this shape. Pick up 5 matchsticks and put them in such a way that you get the shape of a house.

If you have not been able to solve these then look for the answers on page 29.

Reprint 202



Rohini tested the angle of the Maths book and the pencil box.



Go around with your tester and draw here those things in which the tester opens like the letter L. Are you sure they are all right angles?



Practice time

1) Look at the angles in the pictures and fill the table.



Reprint 202



2) Sukhman made this picture with so many angles.



Use colour pencils to mark.

*

*

A Sta

- * right angles with black colour.
- * angles which are more than a right angle with green.
- * angles which are less than a right angle with blue.
- 3) Draw anything of your choice around the angle shown. Also write what kind of angle it is. The first one is done.



Activity

- a) Take a square sheet of paper.
- b) Fold it in half.
- c) Fold it once more and press it.
- d) Open the last fold so that the sheet is folded in half.
- e) Take one corner and fold it to meet the dotted line.

On the paper you will find lines making a right angle, an angle less than a right angle and an angle more than a right angle.

Look for each of the angles and mark them with different colours.

Activity — Angles with your body

Can you make these angles?

- a) A right angle with your hand?
- b) An angle less than a right angle with your leg?
- c) An angle more than a right angle with your arm?
- d) An angle more than a right angle with your body?

Try them out. It's fun! Draw them in your notebook using stick drawings like these.

Angle Garden

1

My angle dance shows the way!

When I see flowers for making honey, I want to tell other bees. To show them the way I start dancing. My dance shows the angle between the sun and the flower.

Activity

Collect some leaves from the garden. Colour each leaf and print it. Look at the angles on the leaves. Which of them are more/less than a right angle?

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I am a woodpecker. My beak is sharp because it has to cut the wood. Hey! Look at that bird. Its beak has an angle less than a right angle. Look for the birds which have beaks with angles smaller than a right angle.

In the picture mark angles between the two branches. Which two branches have the biggest angle?

Angles in Names



In my name there are 11 right angles. There are also 10 angles less than a right angle.

* Write 3 names using straight lines and count the angles.

Name	Number of right angles	Number of angles more than a right angle	Number of angles less than a right angle
	(C)		

Activity

- a) Put 10 Math-Magic books on top of each other. Keep one book slanting to make a slide.
- b) Now do this with six books.
- Roll a ball from the top. From which slide does the ball roll down faster?

MATH MAGIN

* Which slide has the smaller angle?



These are two slides in a park.

- * Which slide has a larger angle?
- * Which slide do you think is safer for the little boy? Why?

Changing Shapes

-

*

- * Things you need used (or new) matchsticks. Piece of rubber tube used in cycle valves.
 - i) Clean the black end of the matchsticks.





- ii) Cut small pieces of the tube (about 1 cm long).
- iii) Push two matchsticks into each end of a tube piece.





iv) Add more matchsticks to form a triangle.

Now make these 4, 5, 6 sided shapes by using tube pieces and matchsticks.



Find out how many angles are there in each of these shapes. Mark them.

Now push each shape downwards with the tip of your finger.

Does the angle change when pushed down by the finger?

* Find out and write your results in the table given.



Reprint 202

Shapes and Towers

*

*

Look for triangles in the pictures below.



* From the activity 'Changing Shapes' can you guess why triangles are used in these towers, bridges etc?

* Look around and find out more places where triangles are used.



* There are many times in a day when the hands of a clock make a right angle. Now you draw some more.







Triangles are shapes which are strong and do not change easily when pressed. In fact, children can also observe how different shapes are made stronger by using diagonal beams (like in the bridge) which divide shapes into triangles.

* Write what kind of angle is made by the hands at these times. Also write the time.



* Draw the hands of the clock when they make an angle which is less than a right angle. Also write the time.



Degree Clock

ć

*

*

Appu and Kittu are playing carromboard. Appu hit the striker.



* In the picture three points A, B and C are shown. Draw a line to show from which point Kittu should hit to get the queen.



Activity: Making a degree clock

- **1.** Cut a circle out of paper.
- 2. Fold it into half.
- 3. Fold it once again into a quarter.
- 4. Fold it once more.
- 5. Open the paper. You will see lines like this.
- 6. Now mark <mark>0°, 45°, 90° and 180° a</mark>s shown.
- 7. Paste it on <mark>an old card.</mark>
- 8. From the centre draw one hand. ^{180°}
- 9. Make a red hand with a thick paper and fix it to the centre with a drawing pin, so that it is free to move.

Your degree clock is ready.

* Use your degree clock to measure the right angle of your pencil box. ______ is the measure of the right angle.

45[°]

180°

45

90° is called

right angle.

- * Can you guess how many degrees is the angle which is
 - $\frac{1}{2}$ of a right angle _____
 - $\frac{1}{3}$ of a right angle _____
 - 2 times of a right angle _____
- * Measure the angle from where Kittu should hit the striker on page 30.

Angles in a Paper Aeroplane

- 1. Take a square sheet of paper.
- 2. Fold it in half and open it.
- 3. Fold the corners to the centre. Your paper looks like this.

Q

Q

- 4. Fold the green triangle such that P touches Q.
- 5. Fold the top two corners of this rectangle along the dotted lines.
- 6. Your paper will look like this. There is a small triangle in the picture which has to be folded up.
- 7. Turn it over and fold it in half along the dotted line.
- 8. Now, to make a wing fold the yellow edge over the red edge.
- 9. Turn it and do the same on the other side as well.
 Your plane is ready to fly. How well does it fly?
 * Find the angles of 45° and 90° when you open your plane.

In the aeroplane there are folds of 45°, 90° and other angles. The cut-outs of 30° and 60° are on the last page of the book. Children can be encouraged to measure various angles around them.



Angles with Yoga

Rahmat is doing Yoga. These are the pictures of different 'Asanas' he does everyday.



* Estimate the measure of many angles as you can made by different parts of the body while doing 'Asanas'.

The D Game

You can play the 'D' game with your friends. You draw an angle. Your friend will guess the measure of that angle. Then you use your 'D' to measure it. The difference between the measured angle and the guess will be your friend's score. The one with the lowest score will be the winner.

Come on, play!





- * Measure the side of the red square on the dotted sheet. Draw here as many rectangles as possible using 12 such squares.
- * How many rectangles could you make?



Each rectangle is made out of 12 equal squares, so all have the same area, but the length of the boundary will be different.

Length of the boundary is called perimeter.

* Which of these rectangles has the longest perimeter?

* Which of these rectangles has the smallest perimeter?

Children are not expected to learn the definition of the term 'area', but develop a sense of the concept through suitable examples. Give them many opportunities in the classroom to compare things in terms of area and guess which is bigger. Things like stamps, leaves, footprints, walls of the classroom etc. can be compared.



Measure Stamps



Look at these interesting stamps.

a) How many squares of one centimetre side does stamp A cover?

And stamp B?

b) Which stamp has the biggest area?

How many squares of side 1 cm does this stamp cover?

How much is the area of the biggest stamp? _____ square cm.

c) Which two stamps have the same area?_____

How much is the area of each of these stamps? _____ square cm.

d) The area of the smallest stamp is _____ square cm.

The difference between the area of the smallest and the biggest stamp is _____ square cm.

Collect some old stamps. Place them on the square grid and find their area and perimeter.

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Stamp D covers 12

squares. Each square is of

side 1 cm. So the area of stamp D is 12 square cm.



Guess

a) Which has the bigger area — one of your footprints or the page of this book?

b) Which has the smaller area—two five-rupee notes together or a hundredrupee note?



d) Is the area of the blue shape more than the area of the yellow shape? Why?



e) Is the perimeter of the yellow shape more than the perimeter of the blue shape? Why?

How Big is My Hand?

Trace your hand on the squared sheet on the next page.



How will you decide whose hand is bigger — your hand or your friend's hand?

What is the area of your hand? ______square cm.

What is the area of your friend's hand? _____ square cm.









- * Guess which animal's footprint will have the same area as yours. Discuss.
- Here are some footprints of animals in actual sizes. Guess the area of their footprints.







* Write the area (in square cm) of the shapes below.



In this exercise children are expected to notice the geometrical symmetry of the shapes to find out their area. Encourage children to evolve their own strategies. Rounding off is not needed in these examples.







Yes you are right. And you know what!! You can draw many more triangles of area 10 square cm in this rectangle. Try drawing them.

Help Sadiq in finding some more such triangles. Draw at least 5 more.

Complete the Shape

Suruchi drew two sides of a shape. She asked Asif to complete the shape with two more sides, so that its area is 10 square cm.



Oh, I thought of doing it differently! If you draw like this, the area is still 10 square cm.



- * Is Suruchi correct? How much is the blue area? Explain.
- Can you think of some other ways of completing the shape?
- * Try some other ways yourself.
- * Now ask your friends at home to solve these.



Every time guests come home, I ask them to do this. But why do they run away!



Practice time

1) This is one of the sides of a shape. Complete the shape so that its area is 4 square cm.





2) Two sides of a shape are drawn here. Complete the shape by drawing two more sides so that its area is less than 2 square cm.

Children can be encouraged to make shapes with either straight edges or curved edges to cover the given area. This exercise can be extended by asking children to draw on squared paper as many shapes as they can of a given area and making guesses for the largest or the smallest perimeter. They can also be asked to check their guesses by measuring the dimensions of the shapes. In case of curved edges, thread can be used for measuring the perimeter.











a) Draw one straight line in this rectangle to divide it into two equal triangles. What is the area of each of the triangles?

- b) Draw one straight line in this rectangle to divide it into two equal rectangles. What is the area of each of the smaller rectangles?
- c) Draw two straight lines in this rectangle to divide it into one rectangle and two equal triangles.





- * What is the area of the rectangle?
- What is the area of each of the triangles?

Puzzles with Five Squares

Measure the side of a small square on the squared paper on page 45. Make as many shapes as possible using 5 such squares. Three are drawn for you.







Did you get all the 12 shapes using 5 squares?



All 12 shapes are arranged here to make a rectangle. This is a 10 X 6 rectangle as there are 10 rows and 6 columns. You will be surprised to know that there are more than 2000 ways in which these shapes make a 10 X 6 rectangle.

Draw all the 12 shapes on a sheet of cardboard and cut them.

Try to arrange your 12 shapes in some other way to make a 10×6 rectangle. Could you do it?

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Try another puzzle

You have to make a 5×12 rectangle with these 12 shapes. There are more than 1000 ways to do it. If you can find even one, that's great!

Game Time

Here is a chessboard. Play this game with your partner, with one set of 12 shapes.



The first player picks one shape from the set and puts it on the board covering any five squares.

The other player picks another shape and puts it on the board, but it must not overlap the first shape.

Keep taking turns until one of you can't go any further.

Whoever puts the last piece wins!

Make Your Own Tile

Remember the floor patterns in Math-Magic Book 4 (pages 117-119). You had to choose the correct tile which could be repeated to make a pattern so that there were no gaps left.

Encourage children to try to do these 'pentomino' puzzles at home. Such exercises can be designed for shapes with 6 squares (hexominoes) in which case there will be 35 different shapes possible.



Ziri went to a shop and was surprised to see the different designs of tiles on the floor. Aren't these beautiful!

* Can you find the tile which is repeated to make each of these floor patterns? Circle a tile in each pattern.







After looking at the patterns Ziri wanted to make her own yellow tile. You too make a tile this way.

Step 1: Take a piece of cardboard or thick paper. Draw a square of side 3 cm on it.

Step 2: Draw a triangle on any one of the sides of this square.

Step 3: Draw another triangle of the same size on another side of

the square. But this time draw it inside the square.

Step 4: Cut this shape from the cardboard. Your tile is ready! What is it's area?



Make a pattern using your tile. Trace the shape to repeat it on a page, but remember there must be no gaps between them.

Ziri made a pattern using her yellow tiles.(You know the area of her tile.)



Answer these -

- ✤ How many tiles has she used?
- * What is the area of the floor pattern Ziri has made here?

Practice time

Ziri tried to make some other tiles. She started with a square of 2 cm side and made shapes like these.

В

D

Look at these carefully and find out:

- * Which of these shapes will tile a floor (without any gaps)? Discuss. What is the area of these shapes?
- * Make designs in your copy by tiling those shapes.
- * Now you create your own new tiles out of a square. Can you do the same with a triangle? Try doing it.

In Class III and IV basic shapes like squares, rectangles, hexagons, triangles, circles etc were used to examine which of those can tile and which do not tile to make floor patterns. Children must now be able to modify basic shapes to create different tiling shapes. In the exercise above they may create new shapes out of a square that do not tile even though their area remains the same as that of the square from which they are made.

