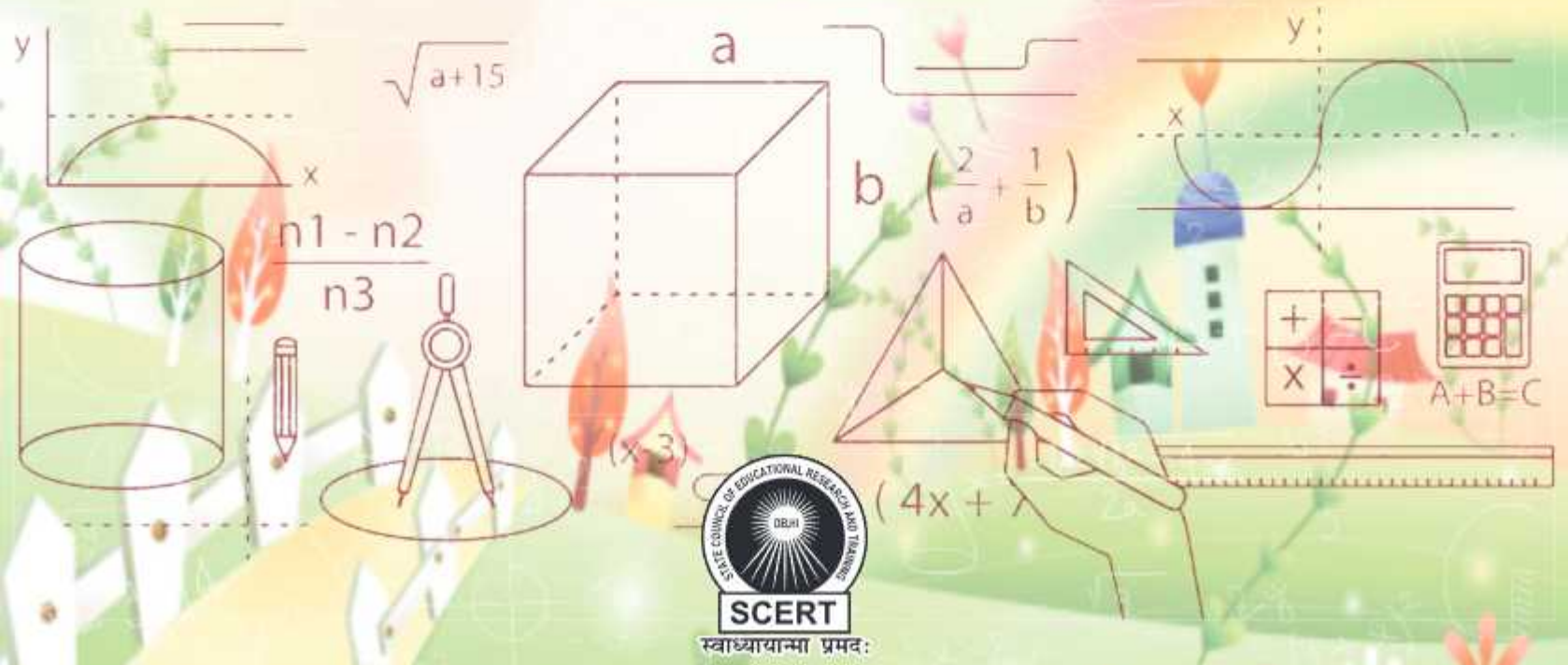
समग्र शिक्षा
सबको शिक्षा, अच्छी शिक्षा

UTKARSH

MY VOYAGE OF MATHEMATICS

Class - VII



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स्वाध्यायान्मा प्रमदः

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MESSAGE

The Government of Delhi has been putting up various efforts to provide universal access to quality education to the children studying in the schools of the Directorate of Education, Delhi. We have implemented many programs to ensure equitable and inclusive education in our schools.

The corona virus pandemic has affected the school education immensely in the last two years. Due to the closure of the schools, the students were confined to their homes. We introduced and managed online learning successfully. The teachers were constantly connected with the students through online classes and kept assessing their progress. But during this time, children who had continuously been in difficult circumstances could not join online classes, lagged behind and a great need was felt to connect them to the mainstream school education.

Taking these aspects into account, to encourage children for learning and to ensure their active participation in learning, **'Utkarsh'** book series has been created with the joint effort of State Council of Educational Research and Training, New Delhi and Samagra Shiksha to bridge the gap in education.

This series contains activities based on practical learning which will enable the students to read, write, and perform basic numerical operations and to develop basic competencies in school subjects. The books in this series will also act as an effective medium for their physical, cognitive, social, emotional, moral and cultural development.

The books are based on the concept of play-based, multi-dimensional and discovery-based learning for Hindi, English, Social Science, Science, Urdu, Punjabi, and Mathematics books of activities have been designed for Classes 6 to 8 (Middle Level). Social Science, Science and Mathematics books have been created in both Hindi and English language for achievement of better learning outcomes. Students will learn about human sensitivities, group work, mutual cooperation, courtesy through play and activities and will be able to imbibe these qualities in them to become ideal citizens. It is hoped that a new educational revolution will be ushered in through these books. Students will develop conceptual understanding and the tendencies of creative and logical thinking. Based on empirical pedagogy, these books incorporate diversity of local contexts, multilingualism and respect for the local environment.

I am sure that these books will provide a strong foundation to the students for equitable and inclusive education, and will prove to be a milestone in the world of education.

(MANISH SISODIA)

H. RAJESH PRASAD
IAS

सत्यमेव जयते

प्रधान सचिव (शिक्षा/प्रशिक्षण व तकनीकी शिक्षा/ उच्च शिक्षा)
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MESSAGE

Recent times have been extremely challenging for people all over the world. Now, after two formidable years of corona times, we are again moving towards normal life.

In the field of education in Delhi, though various successful efforts were made to keep students engaged in learning through online teaching, worksheets and online assessment for the last two years, but due to the lack of face-to-face mode of teaching- learning process or a direct contact and communication with students or due to some family and financial reasons there was a gap in the process of learning.

Keeping this new scenario in mind, **'Utkarsh'** book series has been prepared under the Learning Enrichment Program to rise up from the challenge of this learning gap. There are many activity sheets in these books which have been developed on the basis of context specific learning outcomes. Activities have been designed around the social context of learning, taking into account the culture, multilingualism, and environment of the students. These activities are designed according to the emotional and intellectual level of the students so as to ensure active participation of the students in the learning process.

We aim to initiate the all-round development of the students through our efforts.

We hope that the students will become active participants in the process of knowledge creation through these activities.

With best wishes,

(H. Rajesh Prasad)

HIMANSHU GUPTA, IAS
Director, Education & Sports

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MESSAGE

"It is said that when the going gets tough, the tough get going."

COVID Pandemic was one such trying time. Although as country, India, tried to deal with this time in a multipronged manner, we are still trying to rise above its negative effects in various aspects of life.

Education sector also saw its negative impact especially in school education. So it has become extremely important to bridge the gap of expected learning outcomes and the current status of learning outcomes. To achieve the goal of providing high quality education to all students we have developed **'Utkarsh'** series. These books have been created for students of classes 6 to 8 and have interesting activities which will develop curiosity, zeal to search, experience and create various opportunities for dialogue, which in turn will provide them a strong foundation for all aspects of life.

In the changing situations it is really important for students to master 21st century skills along with ethics, rationality, empathy and sensitivity so that in future they move towards an enriched life ahead. The 'Utkarsh' series books written on subjects of Mathematics, Science, Hindi, English, Social Science, Urdu and Punjabi will develop the creative abilities of the students and they will be able to connect to their environment and establish coordination.

These books have been designed keeping in view the goal of multidisciplinary and holistic education, in which ample opportunities for learning have been provided. Self-instructional activities like colourful pictures, songs, poems, puzzles, stories, cartoons, posters, games, puppets will attract the attention of the students and motivate them for self-assessment and will further pave the way for effective learning.

I firmly believe that learning difficulties of the students will be catered to and desired learning outcomes will be achieved through the 'Utkarsh' series. These books will prove to be an effective medium in the attainment of desired goals and will contribute directly to build an inclusive, egalitarian and just society.

With best wishes.

(HIMANSHU GUPTA)

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Director

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D.O. No. : 19(4)/Misc/SCERT/DPS/2021-22/212

MESSAGE

Dear students,

The last two years have been challenging due to the COVID pandemic for all of us. This pandemic impacted nearly every dimension of life, be it health, employment, economy or livelihood of human life. Even the education sector has not been left untouched by it because of the closure of schools. It not only affected the teaching-learning process, it also had a formidable impact on the possibilities of learning for students, limiting the opportunities of peer learning and directs guidance of teachers. Although online classes helped to maintain the continuity of the teaching-learning process but there were numerous challenges related to the accessibility of online education for students studying in the government schools of Delhi.

This context led to the development of the **'Utkarsh'** series to cater to the new learning needs of the students. This series is a compendium of the worksheets which aim to provide opportunities to the students for self-learning. These worksheets are child-centered and activity-based and they reflect regional, social and cultural domains of the students. These worksheets help the students to explore their environment as a learning resource, as they have many activities that require them to interact with and learn from family members, neighbours, community members, locality and nature.

I am hopeful that this initiative of State Council of Educational Research and Training would play a significant role in inspiring the students of classes 6 to 8 to take ownership of their learning process and to provide the opportunity of accessing quality education.

With best wishes.

(Rajanish Singh)

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Message

It is said that the trying times test out mettle the best. The corona period brought many challenges for us, but these challenges also changed our perspective and inspired us to adopt patience, indomitable courage and self-reliance. During the lockdown for some time, school education could not be done smoothly, due to which the learning process of the children was hampered. In this context, it is important to ask whether children studying online at home are able to acquire knowledge, skills and competencies according to their prescribed class and development level? In the present context, it is relevant that meaningful efforts should be made in the direction of reducing this gap of learning.

To bridge this gap in the level of learning, special course material, in the form of **Utkarsh** series, has been created for students with the combined effort of State Council of Educational Research and Training, New Delhi and Samagra Shiksha. This text material is interesting, responsive, informative and engaging for students. I am hopeful that it will be effective for self-development and will provide students the required competencies. These activities are designed to engage students in observation, critical thinking, creative thinking, questioning, problem- solving, effective communication, decision making, empathy and contemporary problems using play- based, story-based, art integrated and child- centered learning methods.

With best wishes for the bright future of our students.

(Dr. Nahar Singh)

Message for Teachers

Respected fellow educators,

Mathematics deals with logic of quantities, numbers and arrangements. Mathematics has it's own language. Mathematics is precise and concise. This COVID pandemic time has revolutionized the system of education. NEP 2020 opens the gateways of shifting the focus from teaching to facilitating children to observe, explore and reflect in their own unique ways. The digital divide leaves a great number of children aloof in the era of online education.

At this crucial time, these Mathematics sessions, developed under Learning Enhancement Programme humbly include the excluded children who left behind in their learning trajectory due to unavailability of mobiles or laptops to attend online classes. To bridge that gap amongst children due to the digital divide, these sessions are developed.

The idea is to develop sessions to not only engage each and every child but also to support her/him to explore and enhance her/his learning. Each child will enjoy learning the basic concepts of Mathematics with her/his own pace independently.

The objective is to enable each child to construct knowledge and develop understanding essential to learn mathematics in higher classes.

These sessions are written in simple and day to day language including examples from the surroundings. These self explanatory sessions provide space to the child to observe, express, drill, reflect and enrich her/his learning. Sessions cover contextual experiences to develop as well as enhance children's interest in Mathematics. We are sure and confident that these sessions will touch the head and heart of the last child who lags behind in the course of teaching-learning process. Let's hope that this self-paced learning material will boost the morale of each and every child and opens the doors of opportunities to learn mathematics joyfully .

All the very best to all of you.

Mathematics Coordinator

Message for Students

Dear Students,

This book has been developed to enhance your learning in Mathematics through your daily life experiences; and also to make you learn Mathematics easily and independently. Connecting with your teacher /facilitator is the key to succeed in Mathematics. Ask a lot of questions to clear your doubts then and their in the class, in this way Mathematics will become an interesting subject for you. Keep participating in classroom conversations with the teacher. Grab opportunities to attempt problems on the board in front of your class. These sessions will help you to learn and explore Mathematics joyfully.

This book will support you to solve problems independently. This book will enhance your observation skills and this will help you a lot in your daily life. The whole book is designed to create a Mathematics friendly learning rather than forced learning for you.

Mathematics Coordinator

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Contents

Session – 1
Number System

Learning outcome: -
Identifies situations of usage of integers in daily life.

Dear Student, how are you?

Student's response: _____

I am fine. How are you feeling? Explain your mood with emoji.

Student's response:

Look at this picture. What do you observe?

Student's response:

Salma and Ruchika travelled by metro. Here is the status of their metro card.

Situation 1 (in the card)

Salma's Card

Amount	=	Rs. 30.00
Rent paid	=	Rs. 25.00
Balance	=	Rs. 5.00

Situation 2 (in the card)

Ruchika's Card

Amount	=	Rs. 30.00
Rent paid	=	Rs. 35.00
Balance	=	Rs. - 5.00

Student's response:

Let's discuss the status of their Metro Card before travel and after travel.

Please complete the blanks.

(1) Salma had money in the card before travel = _____

(2) Salma paid the amount = _____

(3) How much money was left in her card? _____

Well done, Salma has now 5/- in her card. What does that mean?

Student's response:

Yes, she has 5/- in her card that she can use whenever she wants. Now observe situation (2) (Ruchika's card).

Once again what do you observe?

Student's response:

Answer the following questions.

(1) Ruchika had money in the card before travel - _____

(2) Ruchika paid the amount = _____

(3) How much money was left in her card? _____

Student's response:

What did you notice? Select the correct statement.

(1) Ruchika had Amount in the card before travel > Amount Paid ☐

(2) Salma had Amount in the card before travel > Amount Paid ☐

Student's response:

Here we noticed Ruchika had less amount in the card but she paid more fare. How was it possible. Please share your response.

Student's response:

Yes, she paid more fare but amount was less in the card. The number (-5) debits that Ruchika has to pay (5) Rs., first, when she will recharge the card. What does this mean?

Student's response:

This means when she will recharge the card, rupees 5 debt will be cleared first. Have you faced these type of situations in your day to day life.

Student's response:

Can we say debt and balance in hand have some relation?

Student's response:

Dear children, debt and balance in hand, both situations are opposite to each other. We call these positive and negative traits. What do you feel in this situation?

Student's response:

When something get increased or added to the existing situation. This is a positive trait. What do you think about the positive trait?

Student's response:

Opposite,	

When something is decreased or debited from existing situation. This is called negative trait. Which trait is good or bad? Please share.

Student Response: -

No situation is good or bad. We deal with these in daily life. How do you link these traits with the situation of metro card of Ruchika and Salma.

Student's response:

Ruchika had 5/- left extra in her card. This is a positive trait. What about Salma's card?

Student's response:

Great, you are doing well. In Salma's card she had 5/- less money, but she paid more. So this is the negative trait. What did you observe from these two situations?

Student's response:

These two situations are opposite to each other. Here are few situations. Write its opposite.

(1) Good _____ (3) Left _____

(2) Up _____ (4) Above _____

What do you observe from these?

Student's response:

These are the situations opposite to each other and we deal with these in everyday life. Here is a list of few situations categorize them into positive traits & negative trait.

			Positive trait	Negative trait
(1)	Loss of ₹ 10/-	=	_____	_____
(2)	Increase in weight	=	_____	_____
(3)	Deposit ₹ 50/-	=	_____	_____
(4)	Decrease in price	=	_____	_____
(5)	Profit of ₹ 100/-	=	_____	_____

Student's response:

Great, you are doing excellent! Here is a situation. Please mention positive and negative situation in the given blank.

Student's response:

Very good! How was your learning experience?

Student's response:

How are you feeling now?

Student's response:

I am feeling happy. Hope the same for you.

Student's response:

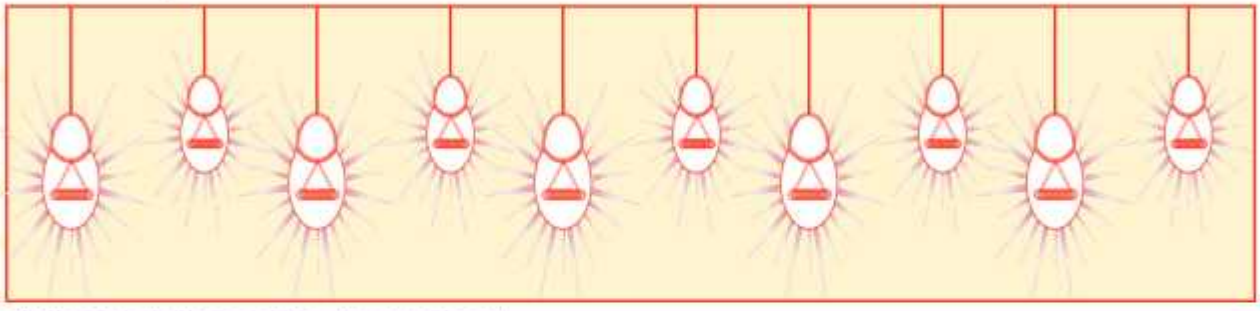
Happy learning.

Session – 2
Number System

Learning outcome:-
Applies integers in daily life.

Dear student, how are you?

Let me track your mood with this mood tracker.



Colour the bulb according to your mood.

(1) Blue - Happy (2) Green – Excited

(3) Yellow - Normal (4) Red - Smiling

Student's response:

Great, we had discussed positive and negative traits in the previous worksheet. Recall a situation where did you experience both the traits? Please share.

Student's response:

Well done. Look at the given pictures.

What numbers are written in the given pictures?

Student's response:

18°, 15°, _____, _____, _____, _____,

Some numbers are (+ve) and some are (-ve). Let's recall opposite of the given word and complete it.

(1) Cold - _____

(2) Far - _____

(3) Above - _____

(4) Positive - _____

(5) + 5 - _____

(6) - 4 - _____

Student's response:

Very nice! In the above discussion, we discuss opposite words and opposite number. Type of numbers we discussed in the picture.

Student's response:

Yes, we saw (+ve) and (-ve) numbers. Why do we need negative numbers?

Student's response:

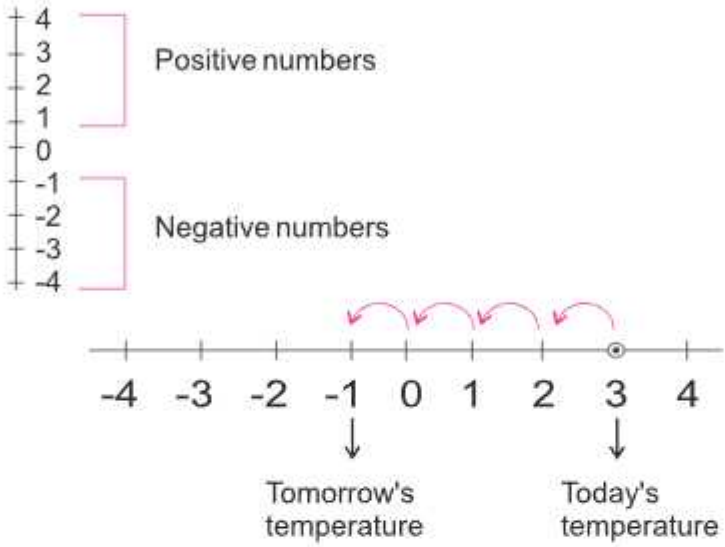
Today's temperature is 3 °C

News: I saw the forecast of tomorrow's temperature. Tomorrow's temperature will reduce by 4 °.

What will be tomorrow's temperature?

Student's response:

Let's show this on number line.



What did you observe?

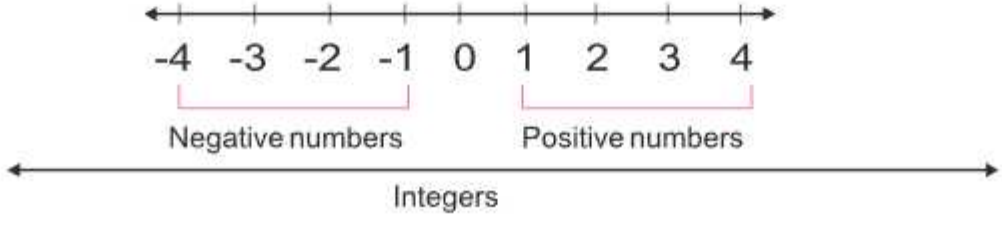
Student's response:

As we go 4° lower, we need another number '0', then we go to number '-1'. Which kind of number is this?

Student's response:

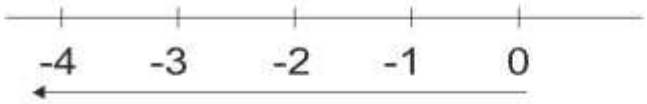
This is a negative number.

* The negative natural number, positive natural number and zero, together are called 'Integers'.



What sign we put before the numbers?

Which are to the left of Zero?



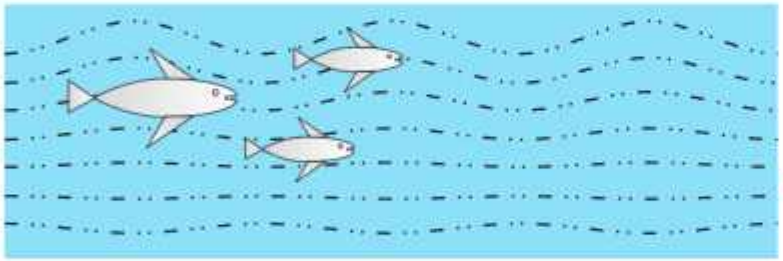
Student's response:

Negative numbers lie to the left side of '0' and which number lie to the right side of '0'?

Student's response:

Observe this picture.

Airplane is flying 400 meter above the sea level



Fishes are swimming 4 miles below sea level.

Answer the following questions, in numerical value:

(1) Height of Airplane from sea level = _____ m

(2) Depth of fishes from sea level = _____ m

Which situation can be represented by a positive number?

Student's response:

Airplane is above sea level. So we put + sign before the number to show its position.

Student's response:

+ 40 m, _____

Fishes are swimming below sea level. Show it by putting an appropriate sign before the number.

Well done, you are doing marvellous job. Here are few situations given. Use sign to represent these.

(1)	Profit of ₹ 100	= 100	(5)	Loss of ₹ 80	= -80
(2)	Height of 20 metre	= 20 metre	(6)	Depth of 50 metre	= -50 metre
(3)	10 feet below Sea level	= -10 feet	(7)	9 feet above Sea level	= 9 feet
(4)	Fall of 10°C from 0°C	= -10°C	(8)	Rise of 3°C from 0°C	= 3°C

Student's response:

You performed well. Now observe positive and negative numbers from your surrounding and share here.

Student's response:

You did a good job! Now, share your learning experience here.

Student's response:

How are you feeling now?

Student's response:

Great! Enjoy learning.

Session – 3
Number System

Learning outcome: -
Applies situations of comparison of integers in daily life.

Dear student, look at this picture.

What do you observe?

Student's response:

Yes. This is a shopping Mall and in the lift room let's see the Button Box.

6	3	0	-3
5	2	-1	-4
4	1	-2	↑ ↓

→ **Button Box**

Observe it carefully and respond.

Student's response:

Now answer the following questions by looking at the floor of the building of Shopping Mall.

Student's response:

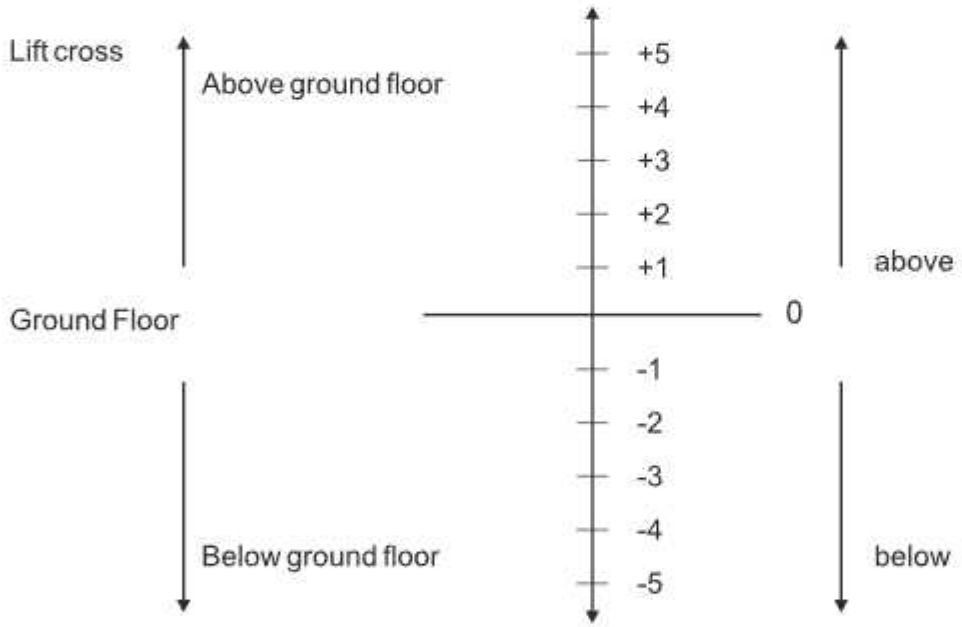
(1) Which number will you press to go to the fourth floor above the ground level? _____

(2) What will you press to go to the Book Shop? _____

(3) Which number will you press to go to store room? _____

(4) Your scooter is in parking area. Which button will you press to go to your scooter? _____

Great, you did well. Let's think about the Movement of lift and share what do you observe?



Student's response:

The above mentioned line which was showing the position of lift shows a number line.

What does '0' indicate on the number line?

Student's response:

Here '0' indicates the ground level. Which numbers do you see above ground level?

Student's response:

Which numbers do you see below ground level?

Student's response:

-1, -2, -3, -4, _____, _____, _____

Yes, we see numbers 1, 2, 3, 4, 5, -4, -5 and -3, -2, -1, etc., above and below the ground level. Why we do this?

Student's response:

You try to state some situations where positive number can be used?

Student's response:

In increasing situation or when we add something we describe it as positive situation in Mathematics. So we put (+ve) sign to show that numbers.

What do you observe for negative number?

Student's response:

Great, similarly in decreasing situation or when some number is deleted, we call it a negative situation. And we put (-ve) sign to show that number. What do you feel which situation is good (+ve) or (-ve)?

Student's response:

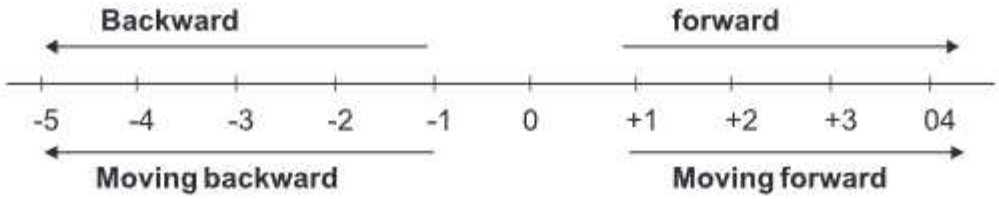
Dear students, look at your left and right hand, which is good? What do you feel?

Student's response:

Our both hands have equal importance and both have equal significance for us. Can you relate this situation with (+ve) and (-ve) numbers?

Student's response:

Yes, (+ve) number and (-ve) are also equally important, so we consider '0' as initial point. Now let's indicate some more situation on number line.



What do you observe?

What is the initial point = 0

Now complete the fill ups, with respect to the initial paint '0'

4 Steps forward = +4

3 Steps backward = -3

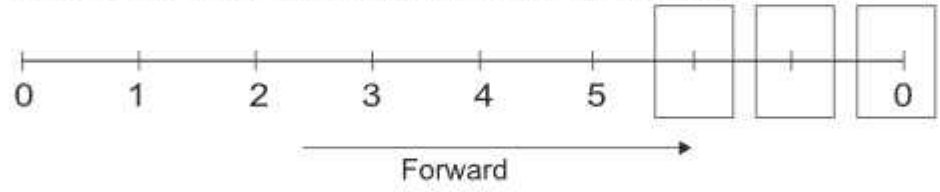
_____ = -1

_____ = -2

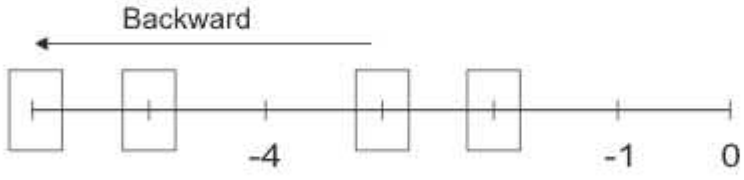
Student's response:

Great, you are doing good. Complete the number line

(1) A number line will show increase when we move forward.



(2)



A number line will show decrease when we move backward.

Student's response:

Let's compare the number

$6 > 3$

$3 < 6$ What do you observe?

Student's response:

Yes, 6 is greater than 3. Now look at the situation and complete these.

(1) Rs. 4000/- earned [+ 4000/-] [>] Rs., 2000 spend [- 2000/-]

(2) 2000 m below sea level [ ] 3000 m below sea level

↓ [ ] ↓

Write the numerical value _____ _____ Write the numerical value

Student's response:

Wow! You did well. compare the followings by using >, < or =

(1) 0 [ ] -34 (3) 13 [ ] 0

(2) 48 [ ] 48 (4) -25 [ ] -45

Wow! You have done an excellent job. Now mention one situation when you have noticed (+ve) and (–ve) situation simultaneously.

Student's response:

Great, you did well. Share your learning experience here.

Student's response:

What new you learn today?

Student's response:

Enjoy learning!

Session – 4
Number System

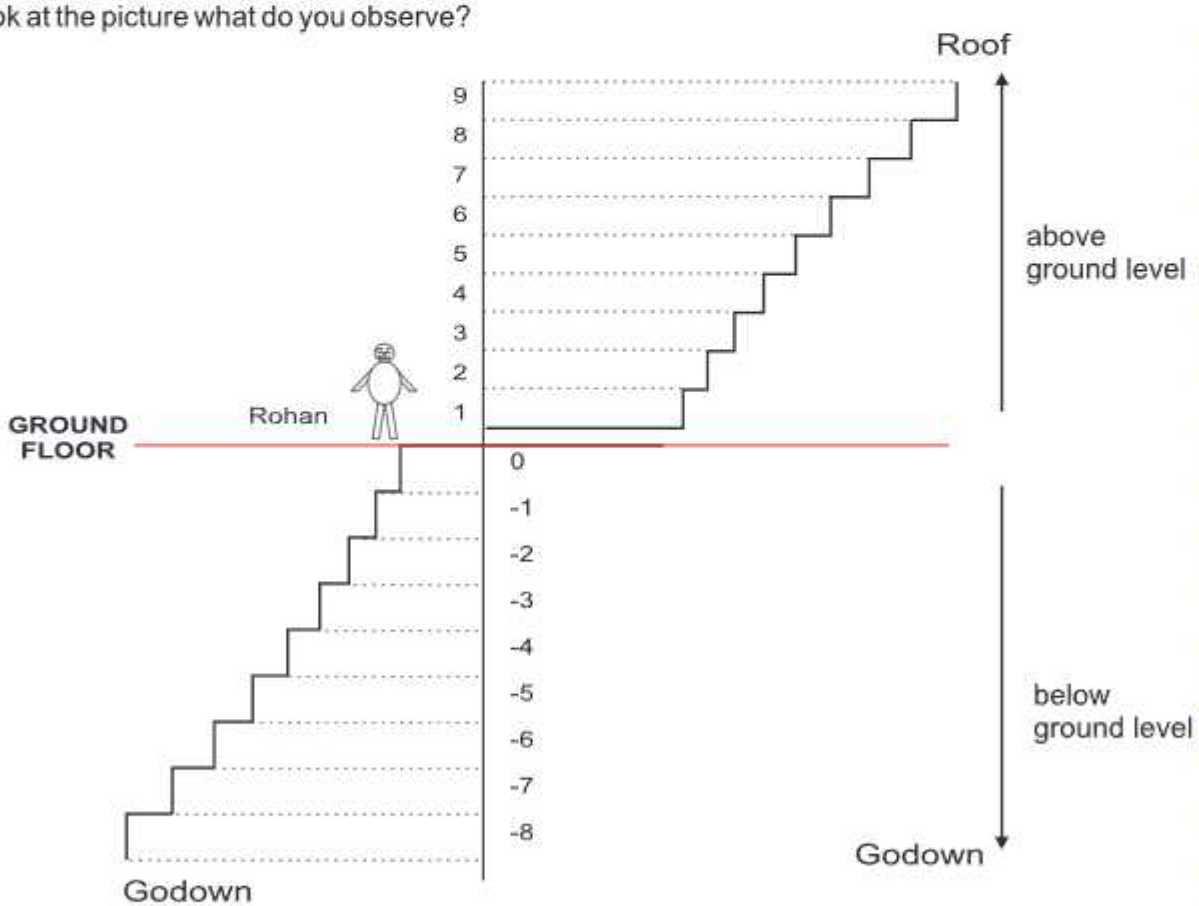
Learning outcome: -
Applies situations of addition of integers in daily life.

Dear student, Hope you are keeping well. Share your feelings in the box.

Student's response:

We had discussed (+ve), (-ve) numbers in the previous worksheet.

Look at the picture what do you observe?



Student's response:

What does this picture depicts? _____

Student's response:

Roof, _____, _____, _____

I saw Rohan is standing on the ground floor. What else did you observe?

Student's response:

From the ground floor where does the stairs go? Mark a tick (✓) or Cross (x)

(1) Only Upward = _____

(2) Only Downward = _____

(3) Upward and Downward both = _____

Student's response:

Nice, yes, stairs are going upward to the roof level from ground floor. Stairs are also going downward to the godown (basement. From ground floor after how many stairs will you reach at the roof?

Student Response:

Let's discuss – **Situation (1)**

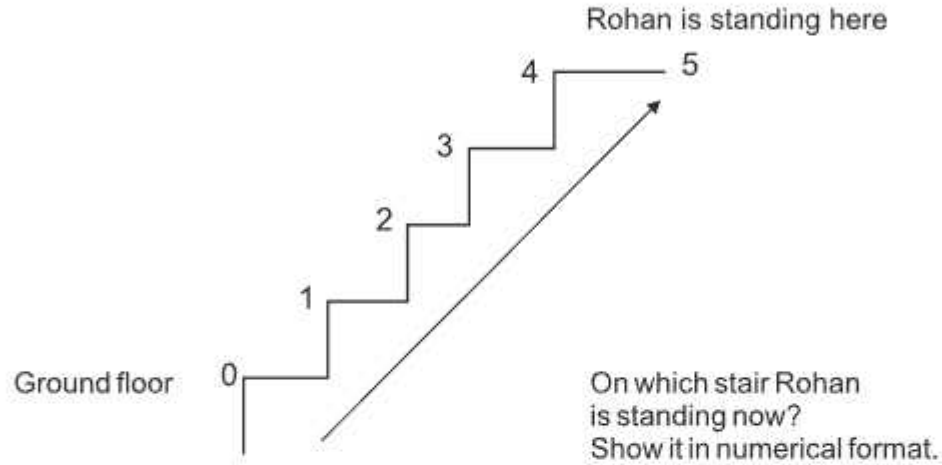
Go 5 steps up from ground floor. What do you say about this.

Student Response:

This means Rohan is standing on the ground floor. He moved 5 steps up.

Let's draw this

Student's response:



Student's response:

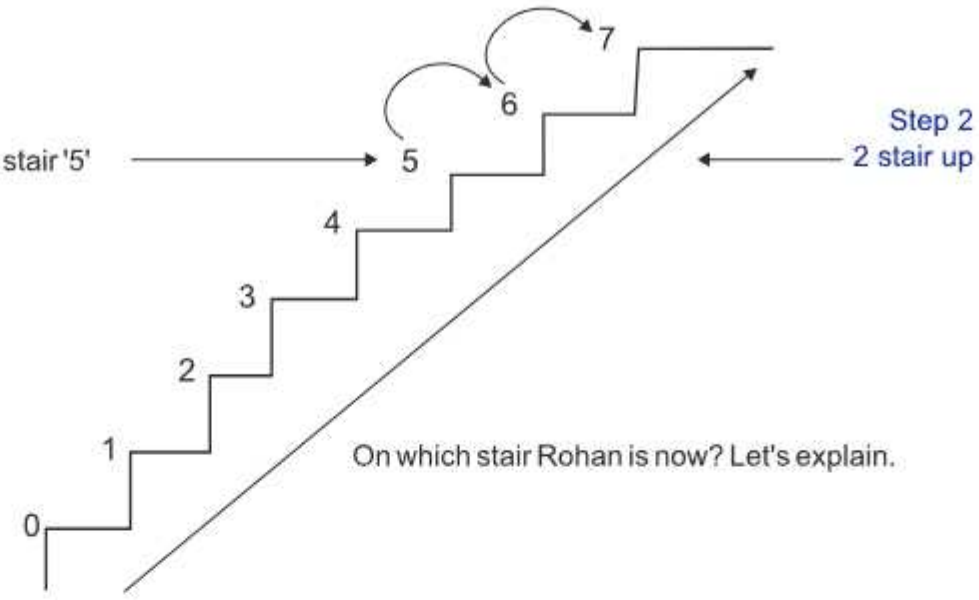
0 + 5 = 5

Great you are on the stair '5'. Now go upward 2 steps from here. Where are you now?

Situation (2)

Student's response:

Let's draw



Student's response:

Initially Rohan is at stair 5 + two stair up

+5 + (+2) = 7

What did we concluded from situation (1) and (2)?

Student's response:

Situation (1) = 0+ (+5) = 5

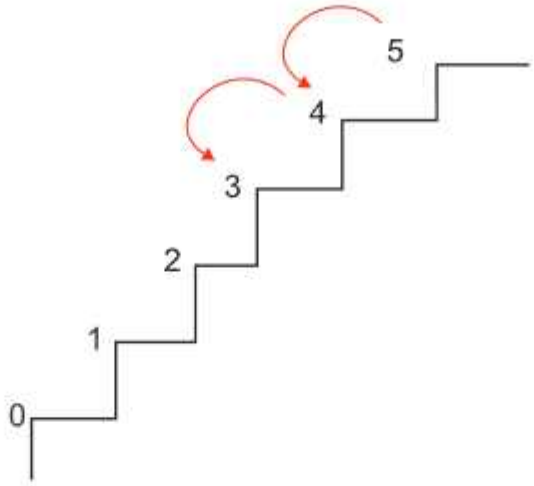
Situation (2) = (+5) + (+2) = +7

Conclusion: We add when we have positive integers.

Student's response:

Situation (3) – Rohan is at stair 5 and he goes down by 2 stair. Where is he now?

Let's Draw



Ground floor

On which stair Rohan is now?

Write numeral also.

Student's response:

Very good, Rohan is on the third stair. Let's write.

(+5) = Fifth stair (As it is above ground floor)

(-2) = 2 stairs down

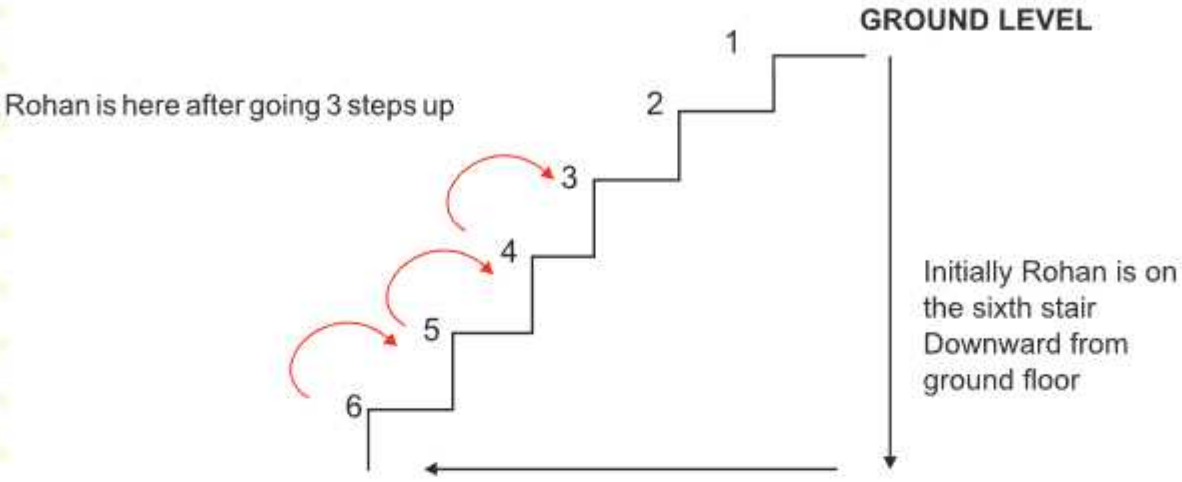
(+5) + (-2) = 3 (stair)

What did you observe?

Student's response:

Yes. Once go upward then 2 steps downward let's discuss one more situation.

Situation (4): Go 6 steps down from the ground floor and then go up by 3 steps from there.



Rohan is moving 3 steps up

Rohan is on 6th stair below ground floor + 3 steps up

(-6) + (+3) → = -3 (he is now on the 3rd stair below the ground floor).

Student's response:

For moving upward we used (+ve) sign. For moving downward we used (-ve) sign. What else did you observe?

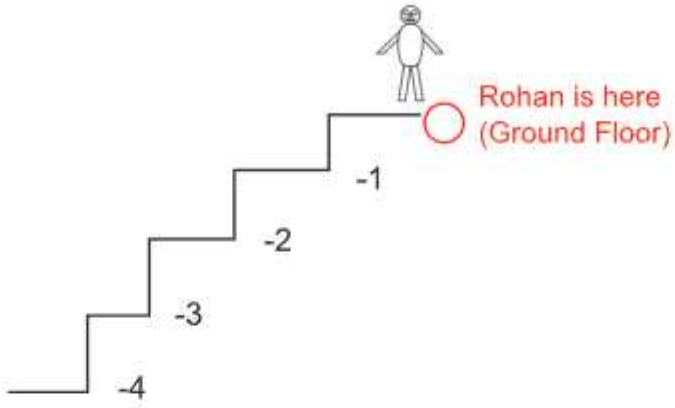
Student's response:

Conclusion: This means when we have one positive and one negative integer. We subtract these. Did you find it interesting and what about the sign?

Student's response:

Great, now I am giving you one more situation. You complete this and find the answer.

Look at the position of Rohan and fill the complete blank space.



(a) Rohan is at ground floor. He comes two stairs down. Where is he now?

0 + _____ = _____

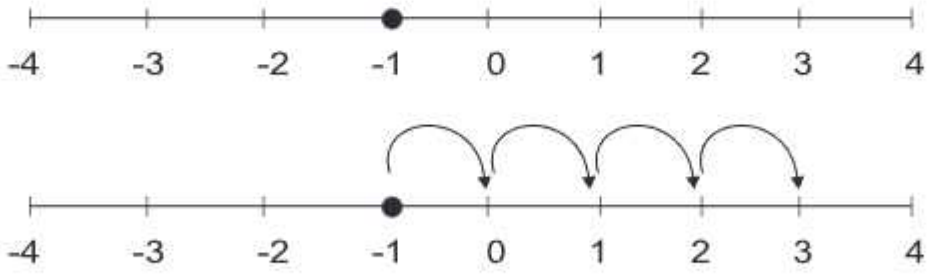
(b) Rohan is at stair 2 of godown (Basement) and comes 2 more stairs down. Where is he now?

-2 + _____ = _____

Student's response:

Well done, let's use number line to show some examples.

(a) 4 more than -1

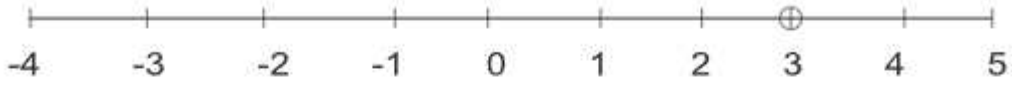


(-1) + (4) = (+3)

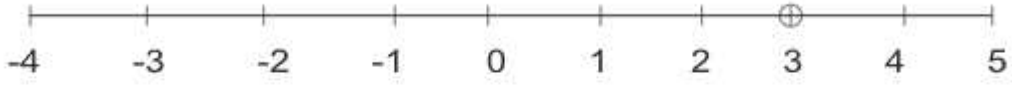
Student's response:

Great, now you do this

(a) 5 less than 3



(b) 5 more than -2.



Student's response:

Great, you did well. What new did you learn today? Please share.

Student's response:

Record your learning experience and share it with you friends.

Student's response:

Happy Learning.

Session – 5
Number System

Learning outcome: -
Applies the situation of multiplication of integers in daily life.

Dear student. How are you? Hope you are fit and fine.

Student's response:

We have discussed addition and subtraction of integers in the previous worksheet. Let's recall.

1 + 2= _____ 1 – 2 = _____

Student's response:

Great, let us add these numbers

5 + 5 + 5 = _____

Student's response:

Yes! It is 15. Can we express 5 + 5 +5 in another way?

Student's response:

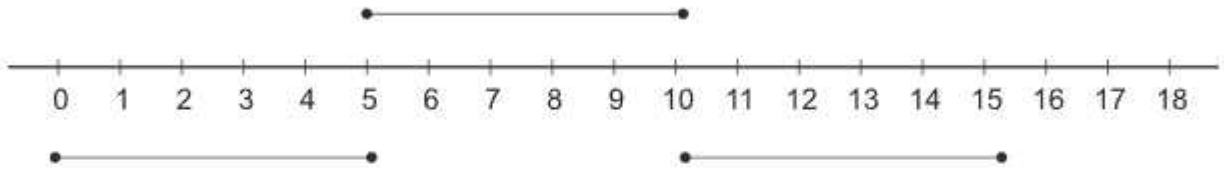
Can we write it as?

5 appears 3 times so

5 X 3 = _____

Student's response:

Yes, 5 + 5 + 5 = 15, can we show this number on a number line?



5 +5 + 5 = 15

As 5 is repeated 3 times we can write it as

5 X 3 = 15

Student's response:

Great! We know multiplication is a repeated addition.

So 5 + 5 + 5 = 15 and also 5 X 3 = 15

Can we use it for (-ve) value i.e.,

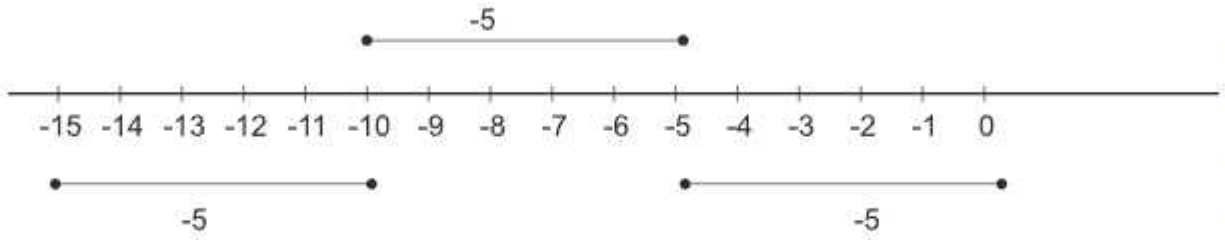
(-5) + (-5) + (-5) = _____

Student's response:

Yes, we can use it for the value.

Let's try to represent on the number line.

Student's response:



(-5) + (-5) + (-5) = -15

Can we represent it in another way?

Student's response:

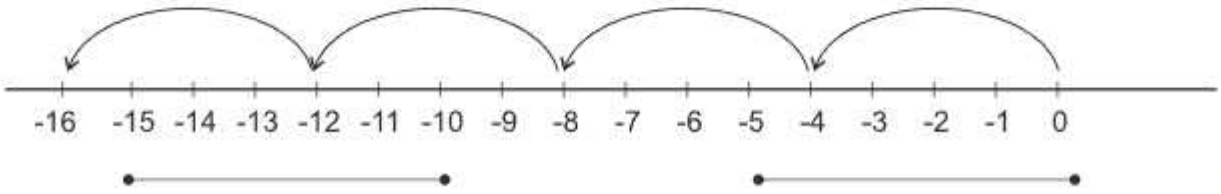
Yes (-5) is repeated three times.

So we can write it as

(-5) X 3 = -15

Student's response:

Great! Now look at this number line and express.



(1) -4) + (____) + (-4) + (____) = -16

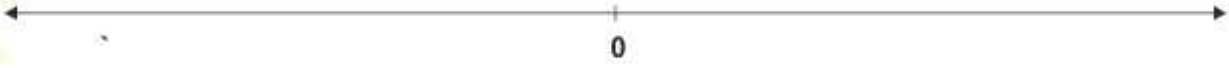
(2) (-4) X _____ = -16

Student's response:

Good work, now fill in the blanks given below and express the number on the number line.

(a)

(-2) + (-2) + (-2) + (-2) + (-2) + (-2) = _____ X _____ = _____



(b)

(-1) + (-1) + (-1) + (-1) + (-1) + (-1) = _____ X _____ = _____

Student's response:

Well done, you did a wonderful job.

Let's complete this.

(1) 4 X (-8) = _____ (3) 3 X (-7) = _____

(2) 6 X (-5) = _____ (4) 2 X (-9) = _____

We concluded that we discussed, (+ve) Integer multiplied by (-ve) Integer = (-ve) Integer.

Now look at this pattern and complete it.

(1) (-3) X 4 = _____

(2) (-3) X 3 = ___-9___

(3) (-3) X 2 = _____

(4) (-3) X 1 = _____

(5) (-3) X 0 = __0__

(6) (-3) X (-1) = _____

(7) (-3) X (-2) = __6__ What did you observe?

(8) (-3) X (-3) = _____

(9) (-3) X (-4) = __12__

Student's response:

We observed that

(-ve) integer multiplied by (-ve) integer.

Can you multiply two negative integers?

Student's response:

Well done. Fill the blanks.

(1) -3 X ____ = 12

(2) -4 X 2 = _____

(3) -4 X -3 = _____

(4) -3 X -3 = _____

(5) 2 X -3 = _____

(6) -5 X 3 = _____

Student's response:

You performed well; How are you feeling? Share your views.

Student's response:

Who helped you in completing this worksheet?

Student's response:

Did you enjoy learning?

Student's response:

Hoping for joyful learning in the next worksheet.

Session – 6
Number System

Learning outcomes: -
Applies the situations of division of integers in daily life.

Dear student. Hope you are keeping well. Draw a emoji to show your mood.

Student's response:

Great, We have discussed multiplication of integers in the previous worksheet. Now look at this picture. What do you observe? (Temperature of a place)

Pic 1	Pic 2
18°C London	

Student's response:

Temperature

What numbers are written in above picture?

Student's response:

+ve and -ve numbers	

Great, the above picture shows the temperature of a place at different time. In second picture temperature varies from ..... to .....

Student's response:

Very good, you did well. Let's discuss

One situation

At 12 O'clock of a day time, temperature of a place is $10^{\circ}C$ and it goes down by $2^{\circ}C$ after each hour. What will be temperature at 5 O'clock evening?

Student's response:

Temperature falls

Let's answer the following questions.

1. Temperature of a place at 12 O'clock = ...

2. Each hour temperature decreases by = ...

Student's response:

What will be the temperature at day time 1 O'clock?

Student's response:

$2^{\circ}C$ less

Temperature goes down by $2^{\circ}C$ every hour. Temperature at 1'O clock will be $(10-2) = 8^{\circ}C$

How can we find the temperature at 5 O'clock?

Student's response:

Temperature goes down by 2°C temperature at 1 O'clock will be (10-2) = 8°C What will be temperature at 2 O'clock?

Student's response:

Well done Let's make hour wise chart of the temperature,

Complete the table

Time	Temperature	Temperature fall by 2°C after each hour
10 O'clock	10°C	10-2 = 8°C
1 O'clock	8°C	
2 O'clock		6-2 = 4°C
3 O'clock	4°C	
4 O'clock		2-2 = 0°C
5 O'clock		

Wow, you did well. What will be the temperature at 5 O'clock?

Student's response:

Yes, temperature will be 0°C at 5 O'clock.

Student's response:

Great, you did well. Temperature of another day at 7 O'clock is 7°C and at 11 O'clock it is 12°C. Temperature is increasing at the same place. How is it increasing per hour?

Student's response :

Temperature at 7 O'clock	=	7°C
Temperature at 11 O'clock	=	19°C
Total difference of temperature	=	19°C-7°C = 12°C
Difference in time = 11 - 7	=	4 hours

Increase temperature per hour = $\frac{12}{4}$ = 3°C

What did you observe?

Student's response :

Here +ve number is divided by +ve numbers.

Yes 3°C temperature increased per hour. Let's discuss the situation where temperature at '1' O' clock in the day time is +25°C and temperature at night 8 O'clock is -3°C. And now temperature falls at the same place each hour.

What is the fall in temperature per hour?

Student's response :

Let's Complete this

Temperature at 1 O'clock =

Temperature at 8 O'clock =

Difference of temperature = 25 - (-3) = 28

Total time difference = [----] - [----] = 7

Decrease in temperature = $-\frac{28}{7} = -4^{\circ}C$

Student's response :

Yes, the temperature is decreased by $4^{\circ}C$. what this (-ve) sign shows?.

Student's response :

(-ve) Sign show decrease in temperature.

Great, you did well.

The above situation is of division of integers. A negative numbers is divided by positive number.

Student's response:

In these situations we observe:

Situation - 1	**Situation -2**
$\frac{\text{Positive numbers}}{\text{Positive numbers}} = +(ve)$	$\frac{\text{Negative numbers}}{\text{Positive numbers}} = +(ve)$
(+ve) sign shows increase in temperature	-ve sign shows decrease in temperature

Do you observe any other thing?

Student's response:

Reverse	

Very nice. (+ve) or (-ve) numbers are equally important.

Great, Now share one example when you divide a negative number by a positive number.

Student's response :

Well done, How are you feeling now?

Student's response :

Share your learning experience with your friends.

Student's response :

What new did you learn today?

Student's response :

Have a great day ahead.

Session - 7
Number System

Learning outcome: -
Interprets the multiplication of fractions.

Dear student, how are you?

I am_____. (Good/Happy/Excited/fine)

Come, Let us enjoy an activity today.

Get ready to see, think, explore and share.

Let us recall of distributing apples equally among a group of people. What have you observed?

Student observation :

When I have to distribute 4-4 apples each in a group of 15 people. I need to have 60 apples.

Some other time, I need to distribute 3 apples each in a group of 15 people, I need to have 45 apples.

- How are you reaching the solution?

Student 's response:

I am reaching my solution in different situations as

4 apples to 15 people each ⇒ 4+4+4+4+.....15 times 4 ⇒ 15 × 4 = 60 apples

3 apples to 15 people each ⇒3+3+3+3+..... 15 times 3 ⇒15 × 3 = 45 apples

2 apples to 15 people each ⇒2+2+2+2+..... 15 times2⇒15 × 2 = 30 apples

1 apple to 15 people each ⇒1+1+1+1+ ..... 15 times 1⇒15 × 1 = 15 apples

- Compare your response with my response. What similarities have you seen?

Student's response:

➢ How many apples are required to distribute among 1000 people if 4 each is needed to be distributed?

Student's response:

I can add 1000 times 4, but it will take time. So I am using table of 4 or I can also use multiplication to reach the solution.

Now Reflect upon the above observation:

Student's response:

- Why do we need to multiply? Explain.

Student's response:

- Do you find tables helpful to multiply? Why?

  I use multiplication when I need to find a number of quantity in case of repeating the same amount again and again. For example: 6 times 11 = 6 × 11 = 66

- What is your observation about multiplications and product?

Student's response:

I observed that multiplying natural numbers give us a greater number as product.

- How are we distributing the apples?

Student's response:

Well done

I am distributing whole apples to everyone.

You have actively participated.

Let us observe the pattern:

Pattern-1	**Pattern-2**
1 times 12 ⇒ 1 × 12 = 12	8 times 11 ⇒ 2 × 11 = 88
2 times 12 ⇒ 2 × 12 = 24	7 times 11 ⇒ 7 × 11 = 77
3 times 12 ⇒ 3 × 12 = 36	6 times 11 ⇒ 6 × 11 = 66
4 times 12 ⇒ 4 × 12 = 48	—— times —— ⇒ —— × = ——
—— times —— ⇒ —— × = ——	—— times —— ⇒ —— × = ——
—— times —— ⇒ —— × = ——	—— times —— ⇒ —— × = ——
—— times —— ⇒ —— × = ——	—— times —— ⇒ —— × = ——
—— times —— ⇒ —— × = ——	—— times —— ⇒ —— × = ——
—— times —— ⇒ —— × = ——	—— times —— ⇒ —— × = ——
—— times —— ⇒ —— × = ——	—— times —— ⇒ —— × = ——
—— times —— ⇒ —— × = ——	—— times —— ⇒ —— × = ——
—— times —— ⇒ —— × = ——	—— times —— ⇒ —— × = ——

- What have you observed in the patterns above?

Student's response:

I have observed that these are natural numbers representing quantities through multiplication.

- Compare both the patterns and express?

Student's response:

I have noticed that the pattern 1 is showing increase in the product as one of the multiplicand which is a natural number is increasing.

The pattern 2 is showing decrease in the product as one of the multiplicand which is a natural number is decreasing.

Student's reflection:

Great, You have observed , compared ,reflected and shared your learning.

Well done

Let us explore:

- Number of bananas in 10 dozens of it.
- Number of students in 35 classes of a school if 30 students in each class are enrolled.
- Amount in a pack of different currency notes (Rupees10, 20, 100, 500 etc.).
- Do you find yourself able to help others also by today's learning?

✓ **How are you feeling now:** I am _____. (Good/Happy/Excited/fine)

I need to learn again	I need help	yes, I have done it
★	★★	★★★

Great, we have done it.

Session - 8
Number System

Learning outcome: -
Interprets the multiplication of fractions.

Note: continued ..... refer session 7

Dear student, how are you!

I am _____. (Good/Happy/Excited/fine)

Come, Let us enjoy an activity today.

Get ready to see, think, explore and share.

Let us observe the pattern:

0 times 12 ⇒ 0 × 12 = 0	8 times 11 ⇒ 8 × 11 = 88
1 times 12 ⇒ 1 × 12 = 12	7 times 11 ⇒ 7 × 11 = 77
2 times 12 ⇒ 2 × 12 = 24	6 times 11 ⇒ 6 × 11 = 66
3 times 12 ⇒ 3 × 12 = 36	—— times —— ⇒ —— × = ——
—— times —— ⇒ —— × = ——	—— times —— ⇒ —— × = ——
—— times —— ⇒ —— × = ——	—— times —— ⇒ —— × = ——
—— times —— ⇒ —— × = ——	—— times —— ⇒ —— × = ——
—— times —— ⇒ —— × = ——	—— times —— ⇒ —— × = ——
—— times —— ⇒ —— × = ——	—— times —— ⇒ —— × = ——
—— times —— ⇒ —— × = ——	0 times 12 ⇒ 0 × 12 =

- What have you observed in the patterns above?

Student's response:

I have noticed that the pattern 1 is showing increase in the product. The pattern 2 is showing decrease in the product. These are multiplication within whole numbers.

- Compare both the patterns above? Share your observations.

Student's response:

- In pattern-1, What is the reason of increasing number in the products?

  _____

- In pattern-2, What is the reason of decreasing number in the products?

  _____

List the situations where you have used multiplication.

Student's response:

I have used multiplication to find

- ✓ Number of bangles in more than one boxes as there are 24 bangles in a box.
- ✓ Cost of things as rates are mentioned as per unit.
- ✓ Number of people in train as seats in a coach are fix.
- What happens when we multiply a number with zero?

  _____

  Give reason for getting product as zero on multiplying a number.

  _____

Well done

Great, you have observed, compared and shared your learning.

Let us explore

- Number of bananas in 10 dozens of it.
- Number of students in 35 classes of a school if 30 students in each class are enrolled.
- Number of seats in a 8 coaches Metro and 6 coaches metro respectively.
- Amount in a pack of different currency notes (Rupees10, 20, 100, 500 etc.)
- Do you find yourself able to help others also by today's learning?

✓ **How are you feeling now:** I am _____. (Good/Happy/Excited/fine)

I need to learn again 

I need help 

yes, I have done it 

Great, we have done it.

Session - 9
Number System

Learning outcomes: -
Interprets the multiplication of fractions.

Note: continued ….. Refer session 7 and 8

Dear student, how are you!

I am_____. (Good/Happy/Excited/fine)

Come, Let us enjoy an activity today.

Get ready to see, think, explore and share.

Dear students, you have done well in previous sessions.

Let us observe the pattern of distribution of apples among a group of people.

8 apples to 15 people each ⇒8 times 15 ⇒8 × 15 = 120

4 apples to 15 people each ⇒4 times 15 ⇒ 4 × 15 = 60

2 apples to 15 people each ⇒2 times 15 ⇒ 2 × 15 = 30

1 apple to 15 people each ⇒1 times 15 ⇒ 1 × 15 = 15

$\frac{1}{2}$ apples to 15 people each ⇒ $\frac{1}{2}$ of 15 ⇒ $7\frac{1}{2}$

$\frac{1}{4}$ apples to 15 people each ⇒ $\frac{1}{4}$ of 15 ⇒ $3\frac{3}{4}$

Student's response:

I have observed that the numbers of apples distributed are decreasing. It is also observed that the number is decreasing by 1/2 of total numbers.

- Compare your observation with my observation and share the other things you have noticed.

  _____

- What is the reason of decreasing number in the products?

  _____

- Why we need to cut the apple to distribute?

  _____

We need to cut the apple and distribute the apple slices when there is less number of apples than the people.

- Compare the distribution process of whole apples with the distribution process of pieces of apples among people?

Whole things	Parts of things
6 times 4= 6× 4 = 24 apples 	½ +½+½+½+½+½ = ½ times 6 =½× 6=3 apples 
Student response	Student response
Student response	Student response

Great , keep it up.

Well done

Let us enjoy completing the pattern –

$\frac{1}{2} \times 1 = \frac{1}{2}$

$\frac{1}{2} \times 2 = 1$

$\frac{1}{2} \times 3 = 1\frac{1}{2}$

$\frac{1}{2} \times 4 = 2\frac{1}{2}$

$\frac{1}{2} \times 5 = 2$

$\frac{1}{2} \times 6 = 3$

$\frac{1}{2} \times 7 = \_\_$

$\frac{1}{2} \times 8 = \_\_$

$\frac{1}{2} \times 9 = \_\_$

$\frac{1}{2} \times 10 = \_\_$

_____

_____

$\frac{1}{3} \times 1 = \frac{1}{3}$

$\frac{1}{3} \times 2 = \frac{2}{3}$

$\frac{1}{3} \times 3 = 1$

$\frac{1}{3} \times 4 = \frac{4}{3}$

$\frac{1}{3} \times 5 = \frac{5}{3}$

$\frac{1}{3} \times 6 = \_\_$

$\frac{1}{3} \times 7 = \_\_\_$

- What have you observed while completing the patterns?

_____

I can see it is like a table of $\frac{1}{2}$ and $\frac{1}{3}$.

- How can we know 25 times $\frac{1}{2}$? Explain.

_____

25 times $\frac{1}{2}$ will be $\frac{1}{2} \times 25 = 12\ \frac{1}{2}$

- How can we know 15 times 1/3? Explain.

_____

15 times $\frac{1}{3}$ will be $\frac{1}{3} \times 15 = 5$

Now reflect upon the above discussion.

Student Reflection :

Let us explore:

Patterns of $\frac{1}{4}$	Patterns of $\frac{2}{3}$

Great children we have learnt the part of a whole.

Now let us move forward to learn more about multiplication of fraction.

Observe the pattern given here -

$\frac{1}{2}$ of $\frac{1}{2} = \frac{1}{4}$

$\frac{1}{2}$ of $\frac{1}{4} = \frac{1}{8}$

$\frac{1}{2}$ of $\frac{1}{8} = \frac{1}{16}$

$\frac{1}{2}$ of $\frac{1}{16} = \frac{1}{32}$

Which can also be written as-

$\frac{1}{2} \times \frac{1}{2} = \frac{1}{4}$

$\frac{1}{2} \times \frac{1}{4} = \frac{1}{8}$

$\frac{1}{2} \times \frac{1}{8} = \frac{1}{16}$

$\frac{1}{2} \times \frac{1}{16} = \frac{1}{32}$

Student observation:

I observed that we are doing ½ of product in each step which gives us half part of a part.

- How can we express the part of a part?

Student's response:

Fraction is a way to represent part of a whole. I think part of a part can also be represented as a fraction.

- Compare your response with my response. What similarities have you seen?

_____

Reflect upon the above discussion.

Student reflection:

- List some situations when we need to multiply with a fraction? Explain.

Student expression:

I need to multiply a fraction to find price of a quantity. For example 300 grams ginger at rate of Rs. 120 per Kilogram.

$$\frac{300}{1000} \times 120 = \frac{3}{10} \times 120 = 36$$

I need to pay ₹ 36 for 300 grams of ginger at rate of ₹ 120 per Kilogram.

- How can multiplications affect increasing or decreasing of any unit?

_____

- What differences have you noticed while multiplying whole numbers and multiplying fractions?

_____

I have noticed that we are using 'times' while multiplying with a number besides we are using 'of' while multiplying with a fraction.

- Why are we doing so? Discuss with your family and friends.

Well done, you are actively responding. Keep it up

Well done children

Let us explore:

- What will happen to a carton of apples if ¼ apples have been eaten out of 3/5 part of the carton.
- Price of 2 packets when 800 g of a vegetable which costs Rs.60/kg is packed in 3 packs.
- Weekly income of a vendor if his monthly earnings are of Rs. 35000.

Share some situations where multiplication of parts can help you and your friends.

Student's response:

Your efforts are appreciable. Keep learning.

✓ **How are you feeling now:** I am _____. (Good/Happy/Excited/fine)

I need to learn again ★

I need help ★★

yes, I have done it ★★★

Great, we have done it.

Session - 10
Number System

Learning outcome: -
Interprets the Division of fractions.

Dear student, how are you!

I am _____. (Good/Happy/Excited/fine)

Come, Let us enjoy an activity today.

Get ready to see, think, explore and share.

Let us recall dividing of a dozen bananas among your family members. What have you observed?

Student observation:

I have observed that everyone will get 2 bananas as we are 6 family members.

- How are you reaching the solution?

Student's response:

I am reaching my solution by dividing number of bananas by the number of people.

12 by 6 as $12 \div 6 = \frac{12}{6} = 2$

Hence everyone will get 2 bananas.

- Compare your response with my response.

Student's response:

List some situations when we need to apply division.

_____

_____

_____

I need to apply division in case of-

- Equal distribution
- Equal grouping
- To know Consumption part

Now reflect upon the discussion

Student's response:

Well done

Now let us observe the pattern

$12 \div 1 = 12$

$12 \div 2 = 6$

$12 \div 3 = 4$

$12 \div 4 = 3$

$12 \div 5 = 2\frac{2}{5}$

$12 \div 6 = 2$

Student observation:

I have observed that on dividing a natural number with a natural number it gives us either a natural number or a fraction.

➢ How can we divide 12 units in 2 equal parts?

_____

It gives us 6 units each.

➢ How can we divide 12 in 3 equal parts?

_____

It gives us 4 units each.

➢ How can we divide 12 in 5 equal parts?

_____

It gives us 2 units and $\frac{2}{5}$ units each.

Compare your responses with my responses and share.

Student's response:

- When you get a natural number on dividing12?

_____

In case of equal grouping if no unit is left, we get a natural number in each group.

- When you get a fraction on dividing 12?

_____

In case of equal grouping if any unit is left, we need to further divide these units which can be expressed as fraction.

Now reflect upon the above discussion.

Student reflection:

Let us explore:

- Number of packets of 250 grams if 3 kg of pulses need to be packed.
- Length of a cloth if 8 equal pieces are required from 1000meteres.

Your efforts are appreciable. Keep learning.

✓ **How are you feeling now:** I am _____. (Good/Happy/Excited/fine)

I need to learn again ★

I need help ★★

yes, I have done it ★★★

Great, we have done it.

Session - 11
Number System

Learning outcomes: -
Interprets the division of fractions.

Continued session ….. refer session 10

Dear student, how are you!

I am_____. (Good/Happy/Excited/fine)

Come, Let us enjoy an activity today.

Get ready to see, think, explore and share.

Let us make a list of your routine activities in a day.

Student's response:

My routine is

1 hour	exercise and getting fresh
4 hour	household work
8 hours	office work
3 hours	travelling
1 hours	studying
1 hour	playing
7 hours	sleeping

Now let us know, how much part of a day we spent on these activities?

Student's response:

$\frac{1}{24}$ Hours exercise and getting fresh

$\frac{4}{24}$ Hours household work

$\frac{8}{24}$ Hours office work

$\frac{3}{24}$ Hours traveling

$\frac{1}{24}$ Hours studying

$\frac{1}{24}$ Hour playing

$\frac{7}{24}$ hours sleeping

Try to write, on which activities you spent half of your day?

Student's response:

I spent half of my day as following-

$\frac{4}{24}$ Hours household work

$\frac{8}{24}$ Hours office work

$\frac{12}{24}$ means $\frac{1}{2}$ of a day.

Compare your response with my response and share.

Student's response:

Other half day is spent on _____ activities.

Can you tell :–

Student's response:

- 1 is part of 2
- $\frac{1}{2}$ is part of 1
- $\frac{1}{4}$ is part of $\frac{1}{2}$
- $1 \div 2 = \frac{1}{2}$
- $\frac{1}{2} \div 1 = \frac{1}{2}$
- $\frac{1}{4} \div \frac{1}{2} = \frac{1}{4} \times \frac{2}{1} = \frac{1}{2}$

Compare your way of reaching the solution with mine and share.

Good, you are doing well.

Well done

Reflect upon the above discussion.

Student's response:

List some situations when we need to apply division in fraction?

I need to apply division in fraction –

To find the relation between two parts(fractions)

¾ is how much part of ¼

$\frac{3}{4} \div \frac{1}{4} = \frac{3}{4} \times \frac{4}{1} = 3$

- Observe the process of finding the quotient

Student's observation:

We are multiplying with reciprocal of division to solve.

Why we are multiplying with the reciprocal of division?

Student's observation:

See, $12 \div 3 = 4$, $12 \times \frac{1}{4} = 3$ are same

Similarly $\frac{3}{4} \div \frac{1}{4} = \frac{3}{4} \times \frac{4}{1} = 3$

Now reflect upon above discussion

Students reflection:

$\frac{1}{5}$ is how much part of $\frac{1}{2}$?

$$\frac{1}{5} \div \frac{1}{2} = \frac{1}{5} \times \frac{2}{1} = \frac{2}{5}$$

Now let us observe and complete the pattern

$12 \div 1 = 12$
$12 \div 2 = 6$
$12 \div 3 = 4$
$12 \div 4 = 3$
$12 \div 5 = 2\frac{2}{5}$
$12 \div 6 = 2$
$12 \div 7 = 1\frac{5}{7}$
$12 \div \_\_ = \_$
$12 \div \_\_ = \_$
$12 \div \_ = \_$
$12 \div \_ = \_$
$12 \div \_ = \_$
$12 \div \_ = \_$

➢ Can we get zero on diving 12 further? Why?

I have tried to divide 12 and never get a zero.

Now reflect upon the above discussion-

Student's reflection:

Let us explore:

- How many pieces of cloth can be cut if we have $\frac{3}{4}$ meters piece and $\frac{1}{5}$ meters each is required.
- A landlord have $\frac{3}{5}$ acre land. He equally divided this land among his children. If every child get $\frac{1}{5}$ acre land, then find the number of children.

Your efforts are appreciable. Keep learning.

✓ **How are you feeling now:** I am _____. (Good/Happy/Excited/fine)

I need to learn again ★

I need help ★★

yes, I have done it ★★★

Great, we have done it.

Session - 12
Number System

Learning outcome: -

Uses algorithms to multiply fractions and solves simple problems related to daily life situations involving fractions.

Dear student !

Draw an arrow ↓ on the expression which

Best matches your mood today

Great students!

I appreciate your participation in learning. You are extending your understanding of multiplication of whole numbers → integers → Fractions (previous session)

I have containers to keep masalas with capacity of containing $\frac{1}{4}$ kg of masala. I have 5 such containers. Help me to find how much masala can I keep in all 5 containers.

Operation we use - _____

How to multiply fraction by a whole number?

Student's response:

My working -

Total quantity of masala is 5 times $\frac{1}{4}$ kg

Which means: $\frac{1}{4} + \frac{1}{4} + \frac{1}{4} + \frac{1}{4} + \frac{1}{4} = \frac{5}{4}$

We can solve above problem by using multiplication.

We can write, $\frac{1}{4}+\frac{1}{4}+\frac{1}{4}+\frac{1}{4}+\frac{1}{4}$ as $5 \times \frac{1}{4}$ ← Multiply whole number by a fraction

$= 5 \times \frac{1}{4}$

$= \frac{5}{4}$

← multiply whole number by the numerator of a fraction, keeping the denominator same.

Can we relate this with a situation when a fraction is multiplied by a whole number,

for example: $\frac{3}{4}$ x 4?

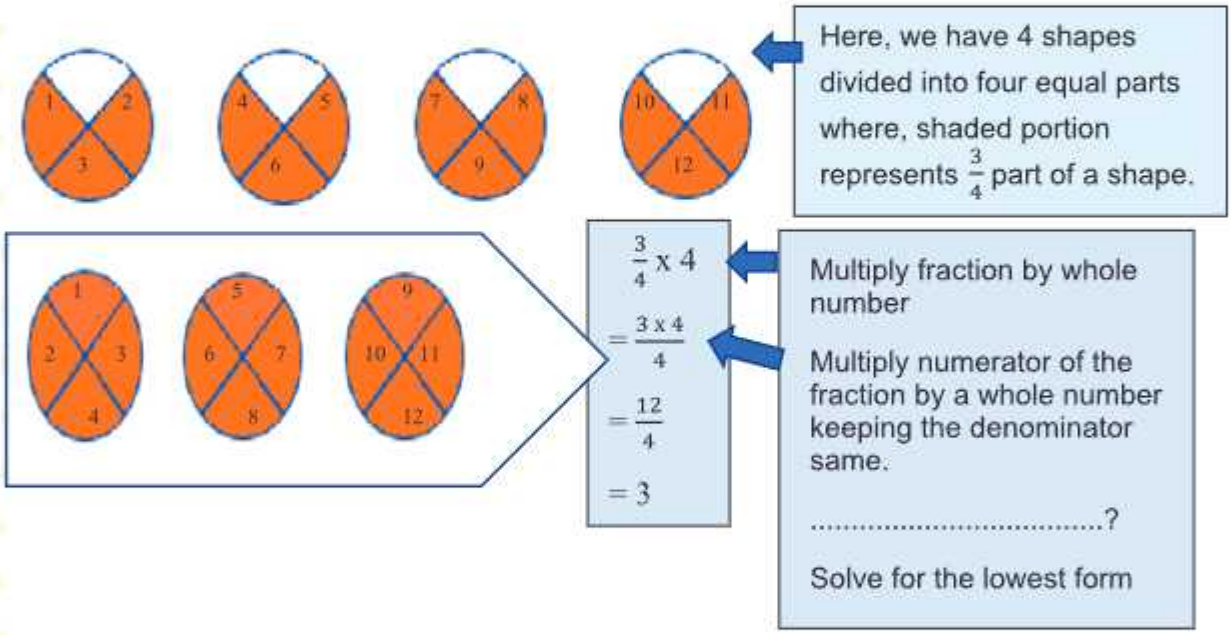
Think and try to write your thought

Student's response:

In this situation, multiply (x) works as an operator '**of**'

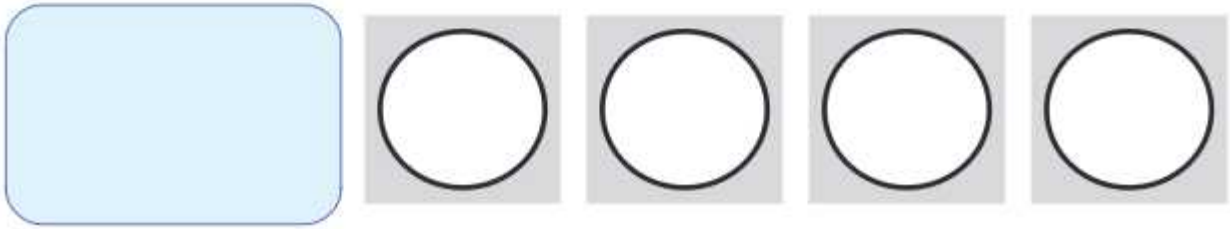
So, $\frac{3}{4}$ x 4 read as $\frac{3}{4}$ of 4, which means three fourth part of 4.

Let's observe the pictorial representation



Let's practice

1. Find $\frac{1}{4}$ of 4 and show this in the given pictures.



2. Find $\frac{1}{2}$ of 4 and show this in the given pictures.

Now what if a fraction is to be multiplied by a fraction.

Write the working that comes to your mind-

Student's response:

You have done great job !!

Observe my working to $\frac{5}{6} \times \frac{7}{8}$

To get the solution we have to multiply $\frac{5}{6}$ by $\frac{7}{8}$

$$= \frac{5}{6} \times \frac{7}{8}$$

$$= \frac{5 \times 7}{6 \times 8}$$

$$= \frac{35}{48}$$

Multiplication of fraction by a fraction

Multiply numerator of first fraction by numerator of second fraction and denominator of first fraction by the denominator of second fraction.

The first product is the numerator and the second product is the denominator of the required product.

Now reflect and try to write the algorithm for same.

Student's response:

$3 \times \frac{1}{5} = \frac{3}{1} \times \frac{1}{5} = \frac{3}{5}$

Observe the multiplication of whole number with fraction as a particular case of a fraction multiplied by a fraction.

Student's response:

I can observe it like-

Rewrite the whole number as a fraction with 1 as the denominator

Multiply just like any other fractions.

Now compare my observation with yours. Observe again and reflect.

Student's response:

Help Roshan

Roshan wants to join Indian Army for which he is practicing and runs for $5\frac{3}{5}$ kilometre daily. How many kilometres did he run in 20 days?

Student's response:

I am very happy, how are you feeling now ?

Share your learning with your parents and help them to resolve situations including fractional multiplication.

Session - 13
Number System

Learning outcome: -

Uses algorithms to divide fractions and solves simple problems related to daily life situations involving fractions.

Dear student !

Put a cross on the faces that do not match with your mood today.

I am happy to see you ready to learn.

We have learnt multiplication of fractions in the last session.

How did you find the session. (Easy/ moderate/ difficult).

I found it easy and can observe it as extension of what we already knew.

Let us see is division of fractions is also that easy?

Think of any situation where you need division of fractions.

Student's response:

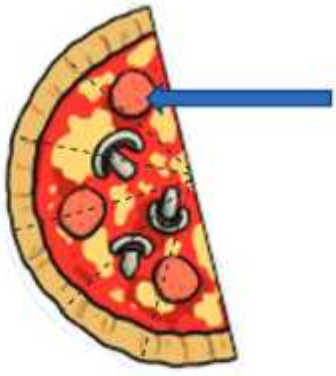
I could think of a situation

I have ½ pizza and we are 6 friends to share that pizza. If we want to share equal pizza slices. What part of whole pizza each of us will get?

Full pizza

Half of pizza=1/2 pizza

We divided $\frac{1}{2}$ of pizza into 6 parts i.e. $\frac{1}{2} \div 6$



My part of pizza is $\frac{1}{6}$ of $\frac{1}{2} = \frac{1}{2} \times \frac{1}{6} = \frac{1}{12}$

Observe the above way of dividing things.

I compiled it as-

$\frac{1}{2} \div 6 \longrightarrow$ divide fraction by a whole number

$= \frac{1}{2} \div \frac{6}{1} \longrightarrow$ write whole number in fractional form by putting '1' as denominator

$= \frac{1}{2} \times \frac{1}{6} \longrightarrow$ multiply $\frac{1}{2}$ by the reciprocal of $\frac{6}{1}$ i.e.,

$= \frac{1}{12} \longrightarrow$ solve and get the answer

Try to calculate $\frac{1}{2} \div \frac{1}{3}$ pictorially and following above steps too.

Reciprocal of $\frac{a}{b}$ is $\frac{b}{a}$.

Keep learning!!

Is dividing a whole number by a fraction can be solved by same algorithm?

Let us try $3 \div \frac{1}{3}$

Student's response:

You have learnt to solve it pictorially in last session.

So, show it in box below.

Student's response:

I try to verify it using above algorithm.

$3 \div \frac{1}{3} = \frac{3}{1} \div \frac{1}{3}$ (convert whole number to fractional form)

$= \frac{3}{1} \times \frac{3}{1}$ (multiply by the reciprocal of $\frac{1}{3}$ i.e., $\frac{3}{1}$)

$= \frac{9}{1} = 9$

Find the reciprocal of each of the following fractions -

$\frac{3}{4}$ $\frac{4}{5}$ $\frac{9}{7}$

Reciprocals -

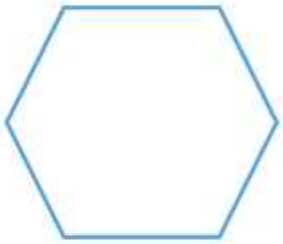
Check your understanding-

$5 \div \frac{8}{3}$ =

$\frac{1}{6} \div \frac{2}{3}$ =

$\frac{1}{5} \div 5$ =

If the measure each side of a regular hexagon is 3/4 cm.



Find the perimeter of the hexagon.

No. of sides of hexagon=

Perimeter of hexagon = _____ × Length of each side

In a recipe, for serving cake to 4 persons, 1/10 kg of sugar is required. But I have to prepare it for me only as all family members went to a wedding. How much sugar I take to prepare cake?

Are you feeling confident now to resolve yours and your siblings' small problems related to fractions.

Please share your learnings with your friends.

Celebrate your day of learning by giving a high five to your friend.

Session - 14
Number System

Learning outcome: -
Solves simple problems on daily life situations involving addition and subtraction of decimals.

Dear student !

Draw an arrow ↓ on the expression which

Best matches your mood today

Observe numbers in the table carefully, Relax and write your observation in the table?

Student's response:

Cost of sugar - 48.75
consumption of milk - 1.5 litres
Weight of potatoes -2.5 kilogram
batting average -6.5
my height -1.5 feet

My observations:

All numbers in this table are decimal numbers and dot (.) represents the decimal points.

Compare my observation with your, reflect and observe again.

Student's response:

Why do we use decimal point in the above units?

Student's response:

My observations: we use decimal to represent the quantities, where more precision is required than whole numbers.

Crore (C)		Lakh (L)		Thousands (TTh)		Ones (O)		
TC	C	TL	L	TTh	Th	H	T	O
10,00,00,000	1,00,00,000	10,00,000	100,000	10,000	1000	100	10	1

Observe the pattern of zeroes as you move left to right or right to left in the above place value table.

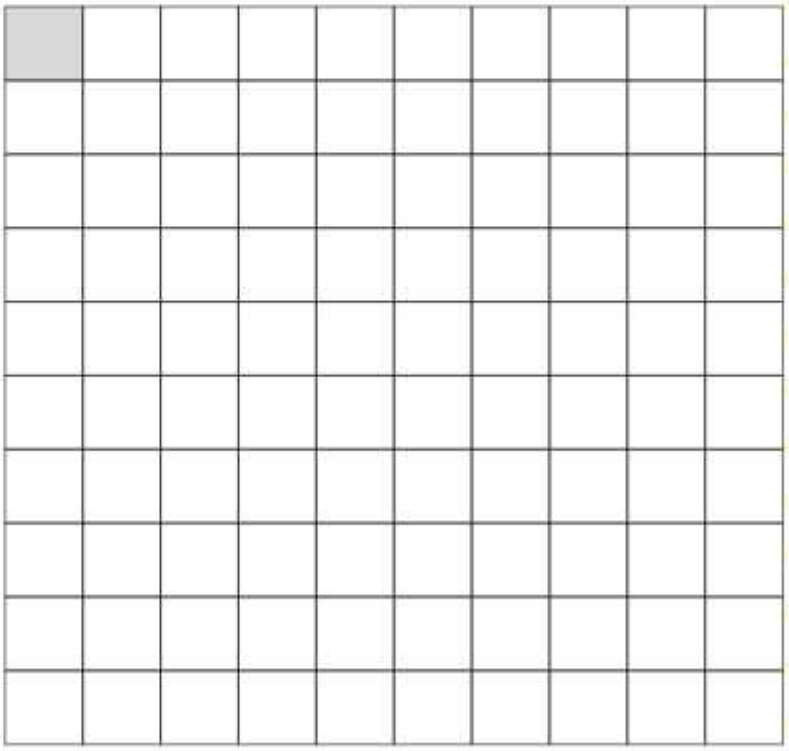
Student's response:

When as move from right to left a '0' gets added. each place is 10 times of just preceding it. Extending lakhs, we reach to crore period.

Crore (C)		Lakh (L)		Thousands (TTh)		Ones (O)		
TC	C	TL	L	TTh	Th	H	T	O
10,00,00,000	1,00,00,000	10,00,000	100,000	10,000	1000	100	10	1

When we move from left to right a '0' gets lessened. Each place is 1/10 times of just preceding it. when what after unit place?

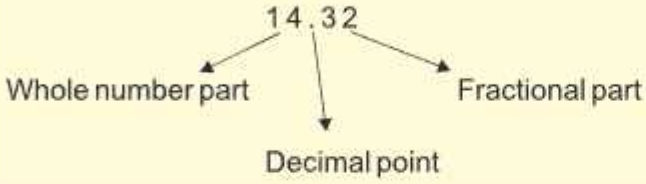
observe and write the fractions corresponding to the shaded part in the following.



$\frac{1}{10}$ th of one whole = 0.1 Tenth	$\frac{1}{100}$ th of one whole = 0.01 Hundredth	$\frac{1}{1000}$ th of one whole = 0.001 Thousandth

Observe the following -

Decimal numbers have two parts



Write the following decimals in place value table

a) 14.2 b) 22.14 c) 10.903 d) 210.047 e) 500.71

S.No.	Hundreds 100	Ten 10	One 1	Tenths $\frac{1}{10}$ th	Hundredths $\frac{1}{100}$ th	Thousandths $\frac{1}{1000}$ th
a		1	4	2	0	0
b						
c						
d						
e						

Write each of the following as decimals

$500+60+1+\frac{2}{10}+\frac{9}{100}+\frac{2}{1000}$	561.292
$70+\frac{1}{10}\ \ \frac{6}{100}\ \ \frac{2}{1000}$	
$200+40+9\frac{9}{100}+\frac{2}{1000}$	
$100+70+5+\frac{4}{10}+\frac{3}{1000}$	

Show the following decimals on number

0.13 1.5 1.9 0.7

Try to collate the points you keep in mind while addition and subtraction of numbers.

Student's response:

My points are:

Arrange the numbers one below another such that digits of same place value be in the same column.

Then add or subtract.

Now you reflect on the points you compiled.

Student's response:

Perfect!!

Same is the process for the addition and subtraction of digits.

Addition of decimals can be done by adding tenth in tenth, hundredths in hundredths	Subtraction of decimals can be done in the same manner by subtracting tenths from tenths, hundredths from hundredths and thousandths from thousandths. Sometimes we need to ....

Let us explore

observe some bills of last 3 months, like electricity bill, grocery.

Months	Electricity Units of consumption	Total Electricity consumption of 3 months	Compare units of two months
			I & II months
			II & III months
			III & I months

It was great learning day.

How are you feeling now.

Hopefully you would be confident now to resolve problems involving decimals.

Please share your leaning with your friends.

celebrate your day of learning by giving a high five to your friend.

Session - 15
Number System

Learning outcome: -

Uses algorithms to multiply decimals and solves simple problems related to daily life situations involving decimals.

Dear student, I am happy to see you all ready for another session!

Before starting the session,

Let us do an activity.

Fill the jar with the mood toffees according to your current mood.

MY 'MOOD TOFFEE' JAR

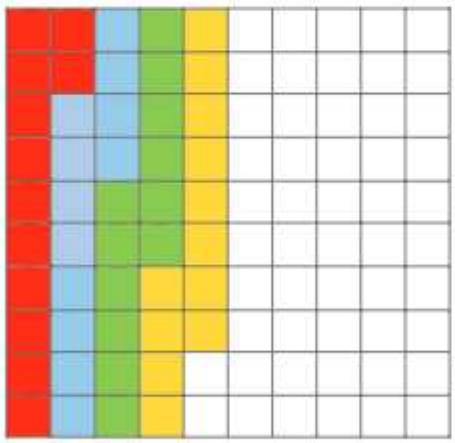
Happy Playful

Angry Sleepy

Sad Normal

You have learnt about multiplication of decimal numbers with whole number by pictorial representation.

Try to solve



To find 4 x 0.12

I represented the decimal number i.e. 0.12 as 12 in the 100's grid by shaded region (Red)

As 0.12 is multiplied by 4 so repeated it four times.

Counted the total number of shaded squares.

Since there are 48 shaded squares out of 100

So, they represent 0.48

Hence, **4 × 0.12 = 0.12 + 0.12 + 0.12+ 0.12 = 0.48**

But few questions come to my mind regarding multiplication of decimals.

Everytime to find such a product do we need to draw such a grid?

and what if I purchased 2.5 kg tomatoes at the rate of ₹48.75 per kg then how much money would I pay?

Do you feel same and have same queries? Yes/ No

We will try to resolve this.

Steps for multiplication of the decimal number with decimal number

- Ignore the decimal point in the given numbers and multiply them as whole numbers.
- Count the number of digits to the right of the decimal point in both the decimal numbers individually.
- Add the number of digits counted.
- Put the decimal point in the product by counting the digits equal to the sum obtained earlier from its right most place.

2.35	2 decimal points
× 6.4	1 decimal points
940	
14100	
15.040	3 decimal points

Would you like to verify product we found earlier using above steps?

4 × 0.12

Step 1 - 4 × 12 =48 (ignore decimals and multiply them as whole numbers)

Step 2 - There are two digits to the right of the decimal point in 0.12 and no digit to the right of decimal in 4.

Step 3 – So, 0+2= 2

Step 4 – Answer is 0.48 (putting decimal point in the product by counting the digits equal to the sum obtained earlier from its right most place.

What do you observe about both the approaches?

Student's response:

Ankit is being assigned the duty of decorating his classroom board. For that he bought 3.5 packs of A-4 size sheets and 0.75 pack of markers. If pack of A-4 size costs ₹ 23.50 and pack of markers costs ₹ 64.75. How much he spent in total?

While multiplying two decimal numbers,
Decimal places of one number
+
Decimal places of the second number
=
Decimal places of the product

Student's response:

Students, except money where else you, came across some situations where we need to multiply decimal numbers.

Student's response:

Weight, Length	

Now explore the pattern of movement of decimals when a decimal number get multiplied by 10, 100, 1000 etc.

Student's response:

you are capable of solving your problems yourself and even can help others too.

How are you feeling now?



Celebrate your learning.
Pat yourself.

Session - 16
Number System

Learning outcome: -

Uses algorithms to divide decimals and solves simple problems related to daily life situations involving decimals.

Dear student, How are you doing today? You can choose a slip from the picture or can add a slip with expression which best defines you current mood.

You already knew addition and subtraction of decimal numbers and have learnt about their multiplication in the last session.

Now which operation is left to learn? _____

Have you faced any situation where you need to divide decimal numbers?

_____

One situation which I faced in my childhood is –

I scored 82.5 marks as total of 5 subjects. My ma'am told me I got same marks in all the subjects.

When my parents asked me about marks in each subject, I was not able to tell. I knew I will get it by dividing 82.5 by 5 but How?

Let us see how we can find it.

Division of decimal number is performed in the same manner as of whole numbers.

Divide the decimal number (dividend), considering it as whole number (ignore decimal point) by the given whole number.

Count the digits to the right of the decimal point in dividend and

place the decimal point in quotient by counting the same number of digits from the right.

82.5 ÷ 5

825÷5 (ignore decimal in dividend)

=165

Number of digits to the right of the decimal point in dividend =1

Answer = 16.5 place the decimal point in quotient by counting the same number of digits from the right.

Another way

As we know decimals can be expressed as fractions and vice versa

So we apply our understanding of division of fractions to decimals.

Observe the division below :-

$$82.5 \div 5 = \frac{825}{10} \div 5 = \frac{825}{10} \times \frac{1}{5}$$

$$= \frac{1}{10} \times \frac{825}{5} = \frac{1}{10} \times 165$$

$$= \frac{165}{10} = 16.5$$

So, 82.5 ÷ 5 = 16.5

Now try to resolve a situation: 4 friends went for snacks party and spent ₹ 79.66 in total.

They split the cost equally among them. How much did each person pay?

(you can apply any of the way told above)

Sol.-

Food Business Center
23232, JAVA CITY, SELANGOR
NY, USA
TEL : 03-435435435

Table - 06

Check #: 622967 Pax(s): 04
Date : 11/01/2020 18:34
Cashier: David Smith

4	Chinese Buffet	51.96
4	Soda	7.96
4	Desserts	15.56
Subtotal :		75.48
Food Tax		2.90
Local Tax		1.28
Total :		79.66

Take home a bag of meatballs and 2 pkgs. of cream sauce for only $9.99
Made from an authentic recipe!

How are feeling now?

Leela has a collection of newspaper that weigh 0.08 kg each. She went to kabadi wala to sell it for recycling it. How many newspapers does he have if the total weight of the newspapers is 8.64 kg?

Total weight of all newspapers =

weight of one newspaper =

to find the number of newspapers-

But here both numbers are decimal numbers.
Do you know how to divide two decimal numbers?

Division of decimal number with decimal number is similar to the division of whole numbers, except the way of handling the decimal point. Now we will learn how to divide a decimal number with decimal number.

Division of decimal number with decimal number

Shift the decimal point in the divisor to the right until it becomes a whole number.

Count the number of decimal places that decimal point in the divisor moved to make it a whole number.

Shift the decimal point in the dividend to the right by the same number of places.

Now divide the new dividend by the new divisor.

Find : 8.64÷ 0.08

$$8.64 \div 0.08 = \frac{8.64}{0.08}$$

$$= \frac{864}{8}$$

$$= 108$$

So, 1.683 ÷ 0.09 = 18.7

Another way is converting the decimal numbers to fractions and proceed as for division of fractions.

Verify the above calculation using another method.

Student's response:

Now try to solve these simple questions :-

1. 0.846÷ 9

2. 30.94 ÷ 0.7

Observe or frame a situation where division of decimals is needed. Then try to solve it too.

Student's response:

Now explore the pattern of movement of decimals when a decimal number get divided by 10, 100, 1000 etc.

Student's response:

How are you feeling now?



Celebrate your learning.

Session - 17
Ratio and Proportion

Learning outcome: -
Compares quantities using ratios in different situations.

Dear student, how are you!

I am _____. (Good/Happy/Excited/fine)

Come, Let us enjoy an activity today.

Get ready to prepare a glass of lemon drink today.

Your observation

My observations:

I took a glass of water

½ lemons

¼ spoon of black salt

¼ spoon of sugar

Mix it well

Now, Taste it.

- How is it feeling? Share with us.

  _____

- I have tasted and found it soothing and yummy.

Let us discuss

How much part is the lemon as compare to salt in one glass lemon drink?

You:

_____

_____

Me: I used ½ lemons or 2 spoon of lemon juice and ¼ spoon of black salt. I can compare spoons of same size. 2 spoons lemon juice can be divided as:

2 spoons = ¼ + ¼ + ¼ + ¼ + ¼ + ¼ + ¼ + ¼ : ¼ spoons

':' is Colon

or

2 spoons = ¼ × 8 : ¼ × 1

8:1 Colon is indication for ratio.

8:1 8 times of lemon juice of black salt.

- How much part is the sugar as compare to salt in one glass lemon drink?

You:

_____

_____

Me: I used ¼ spoon sugar and ¼ spoon of black salt.

¼ spoon : ¼ spoon 1:1

Equal parts of sugar and black salt are used in a glass of lemon drink.

- If we want to prepare the lemon drink for 5 people, how many parts of lemons will be used as compare to black salt?

You:

_____

_____

Me – I used 8 times lemon juice of black salt. I will use same combination to get the same yummy and soothing taste.

Well done

Wow, you have done the activity with active participation.

- Share your feeling during this activity?

  _____

- Is it helpful for you? Explain?

  _____

- I am excited to know how you are going to use this learning?

  _____

Let us explore

➢ What is this combination of two quantities (in relation of multiplication) called?

Observe, recall and reflect

Your reflections- when you prepared tea or observed the process of making tea.

- How are we measuring tea and sugar? _____
- How are we measuring milk and water? _____
- Relation in quantity of tea and sugar is _____
- Relation in quantity of milk and water is _____

Let us compare the quantities in the images and reflect:

Your observations about cooking Rice

Your observations about kneading dough

To prepare the dough, wheat flour is used 3 times of water.	Wheat flour to water is 3:1
Or	It can also be expressed as $\frac{3}{1}$
I can also say that water taken is one third of wheat flour.	Water to wheat flour is 1:3 or $\frac{1}{3}$
I can also say that wheat flour is 3 times of water.	It can also be expressed as $\frac{1}{3}$

What have you noticed in my response? Share.

_____

_____

Yes, good. You know that we can express ratio in fraction form also.

Let us express some quantities in both the forms:

Quantities	Ratio	
	Colon form :	Fraction form
Combination of milk and water while preparing tea		
Comparing salt and lemon juice while preparing lemon drink.		

Ask your family and peers -

- How are they expressing these combinations?

  And share your learning with them.

✓ **How are you feeling now:** I am _____. (Good/Happy/Excited/fine)

I need to learn again	I need help	yes, I have done it
★	★★	★★★

Great, we have done it.

Session - 18
Ratio and Proportion

Learning outcome: -
Compares quantities using ratios in different situations.

Dear student, how are you!

I am _____. (Good/Happy/Excited/fine)

Come, Let us enjoy an activity today. Get ready to see, think, pair and share.

Write your observation here.

- Plants
- Soil
- Mixing of soil and compost in a given ratio to grow the plants.

Let us prepare soil for plants. Hope you are excited to do this activity.

- What we need to know to prepare a healthy soil mix for growing a plant in a pot?

I need to know the material required and the combination of their parts in which we need to mix well.

Hope you have collected the material and the information about the mix. You can take help of your family and friends.

Let us express the quantities in both ways of writing a ratio.

Student's response:

Great! You have written colon as well as fraction form.

Is there any similarity in fraction and ratio?

Student's response:

Is there any difference in fraction and ratio?

Student's response:

I find difference in fraction and ratio as-

- Fraction is a part of a whole, quantity.
- Ratio is about two quantities.

There can be more bases of difference.

I need your help to learn.

Compare your responses with my responses and share your reflections.

Student's response:

- Let us enjoy making new colours.

  Share your choice of colour you are making-_____

  What combination you are taking to make the colour? _____

  I am making pink colour using red and white colour in ratio of 3:2

I can also express combination of red and white colours as $\frac{3}{2}$

a. Total number of drops are _____

b. Red drops are _____

c. White drops are _____

d. Part of red drops in pink colour so formed is _____

e. Part of white drops in pink colour so formed is _____

f. Ratio of red drops to white drops in the pink colour formed is _____

- **Now your turn to share your colour combinations in details.**

Student's response:

Let's explore the ratio of following quantities from your family and friends:

- Salt and turmeric in a dish _____
- Soil and compost in a pot of plant _____
- Dal and rice to prepare Khichadi _____
- Building construction material (Cement, sand and crushed stones) _____

✓ **How are you feeling now:** I am _____. (Good/Happy/Excited/fine)

I need to learn again	I need help	yes, I have done it
★	★★	★★★

Great, we have done it.

Session - 19
Geometry

Learning outcome: -
Demonstrates an understanding about complementary angles.

Dear Student ! Are you ready for today's learning experience?

Student's responses:----------

Yes, I am also ready to be the part of learners team to experience something new.

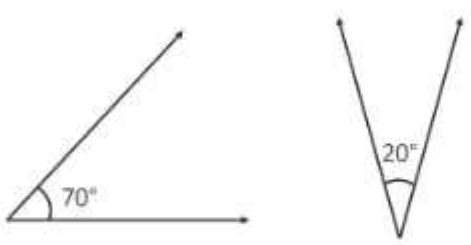
We are aware of angles and their types. Let us observe angles in the following images.

Student's observation:

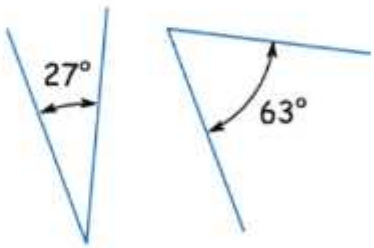
More than one angle	

Pairs of angles which make a right angle.

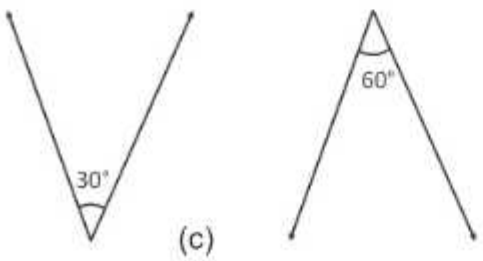
Observe the following pairs of angles and record your observation.



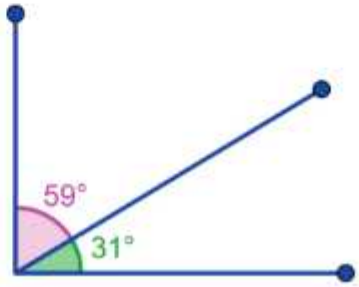
(a)



(b)



(c)



(d)

Student's observation :

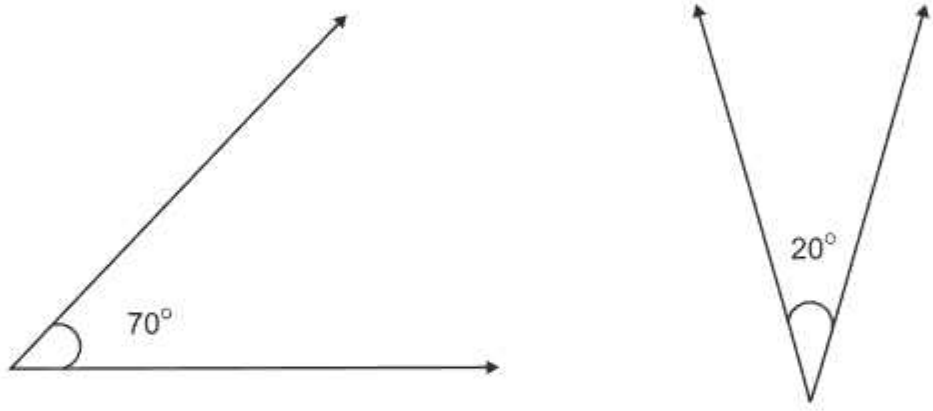
1. Each pair of angles have their sum 90°
2. In each pair both angles are acute.

Can we give a particular name to those pairs of angles whose sum is 90° or a right angle?

Student's comment: ----------

Wonderful, correctly said complementary angles. If the sum of two angles is 90° then those angles are known as complementary angles.

What is the relation between following angles?



Student record : ----------

1. Complementary angles
2. Each angle is the complement of other, like the angle of 70° is the complement of angle of 20°

Let us try

S.No.	Angles	Complement of the angles
1	30°	
2		50
3	45°	
4		20°
5	70°	

Well done! Good Efforts.

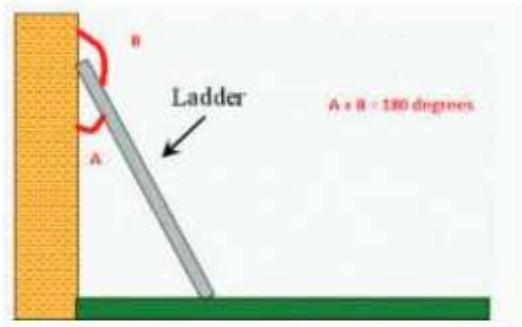
Session - 20
Geometry

Learning outcome: -
Demonstrates an understanding of supplementary angles.

Dear student, How are you feeling today.

Student's responses: .....

Observe the following figures



What did you observe?

Student's observation:

Pairs of angles	

Pairs of angles with sum 180°

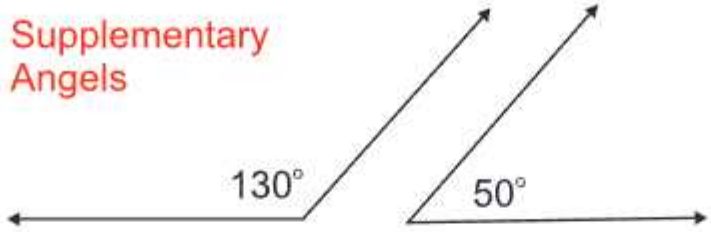
What do we name those pairs of angles whose sum is 180°?

Student's responses: ----------

Two angles whose sum is 180°, are known as supplementary angles.

What do we observe about the following angles?

Supplementary Angels



Student record: ----------

These are supplementary angles as their sum is 180° and the angle of 130° is the supplement of the angle of 50°

Let us try:

S.No.	Angles	Supplement of the angles
1		105°
2	35°	
3	155°	
4		160°
5		90°

Let us complete the worksheet and prepare the other worksheet for your classmates.

A) Supplement of 140° ----------.

B) Complement of 25°----------.

C) Supplement of 25° ----------.

D) 70° , 20°. ----------.

E) 145°,35°. ----------.

Worksheet by you

Well done! Good Efforts.

Let us explore: You can discuss with your friends /parents /teachers/siblings:

1) Which angle is equal to its complement?

Student's responses:

2) Is there any angle which is equal to its supplement?

Student's responses:

3) Find an angle which is equal to 4 times of its supplement.

Student's responses:

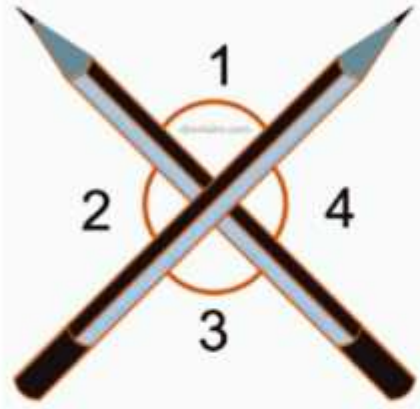
Let us celebrate by patting ourselves.

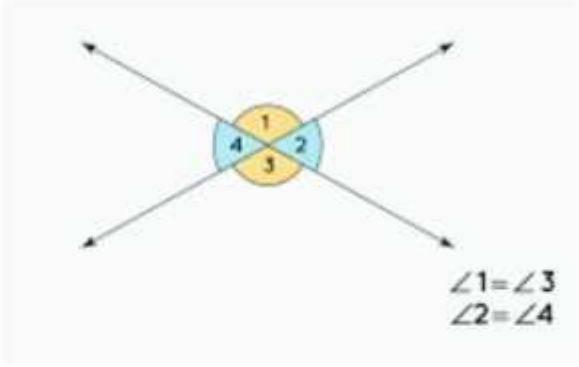
Session - 21
Geometry

Learning outcome: -
Demonstrates the understanding of vertically opposite angles.

Dear student,

Let us observe the angles formed by intersecting lines.





Student's observation: ----------

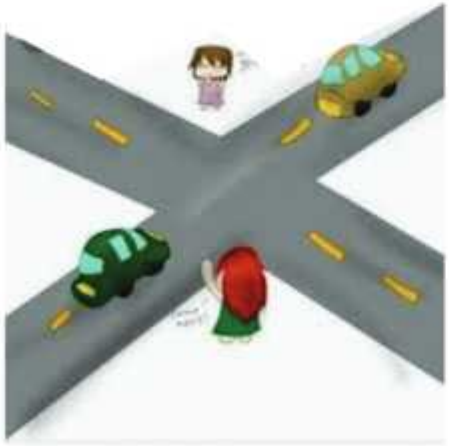
Vertically opposite angles.

Write the examples of vertically opposite angles from real life situations.

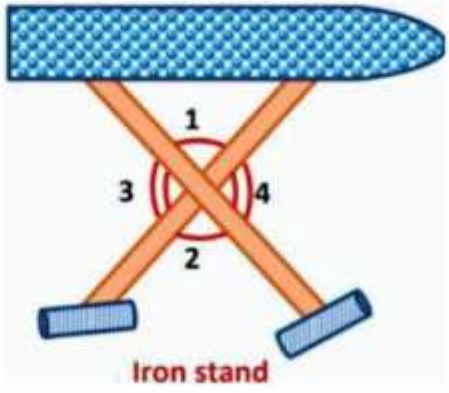
Student:

Angles formed by the edges of a pair of Scissors	

Angles between road crossing, angles between the legs of an iron stand.



vertically opposite angle ...



Vertically Opposite Angles C...

Let us focus again the angles formed by 2 intersecting pencils as shown above.

Which angle is vertically opposite of angle 3?

Student's responses:

Angle 1 is vertically opposite to angle 3

Write vertically opposite angle of angle 4

Student's responses: ----------

Angle 2

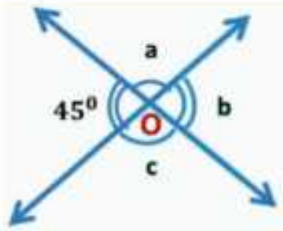
Are Vertically opposite angles equal.

Student's response:

Yes, vertically opposite angles are always equal?

Let's try:

Draw 4 to 5 figures of vertically opposite angles, measure their magnitude by using a protector. (One is done for you)

Figure	Angle a	Angle b	Angle c	Conclusion a=c or not	Conclusion b=?
 Vertically Opposite Angles	a=135°	b=45°	C=135°	a=c	b=45°

Exploration: (you can discuss with parents/ friends/ teachers /siblings).

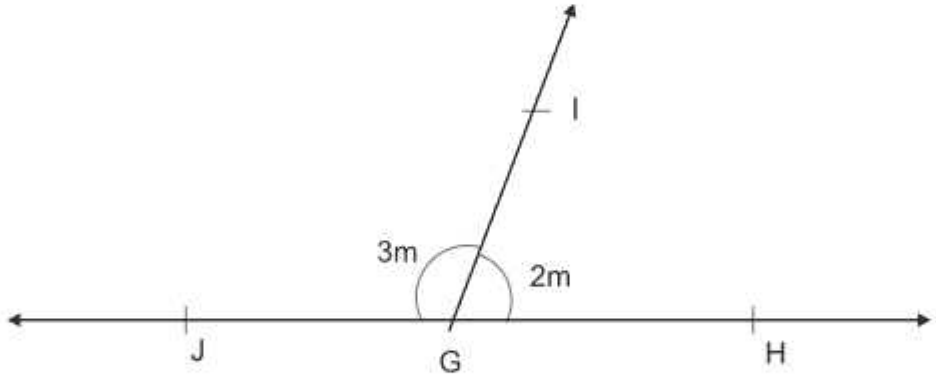
1. Record the difference between adjacent angles and a linear pair.

Student's response:

2. Draw 4-5 figures of vertically opposite angles, use a protector to check if the vertically opposite angles are always equal or not.

Student's response:

3. Find the value of m in the following figure.



m =

Let us celebrate our learning buy clapping for ourselves.

Session - 22
Geometry

Learning outcome: -
Demonstrates an understanding about adjacent angles and linear pair.

Dear student, how are you feeling now? Pick up the suitable word for you and write.

Student: ----------

Relaxed

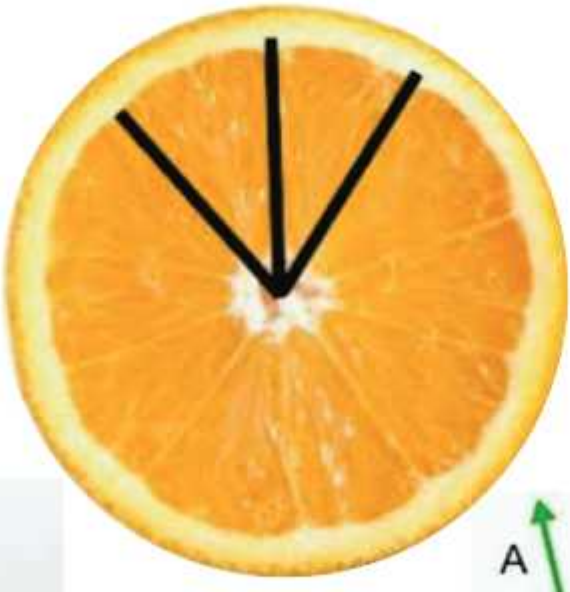
Let us recall the points of discussion of session 1.

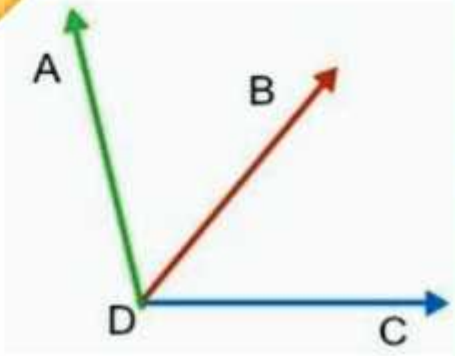
Student :

Complementary angles	

Great , yes we discussed about complementary angles and supplementary angles.

Observe the following figures and record your observation.





Student's observation:

Two angles with common vertex	

Rightly said, two angles with common vertex.

These angles have one common arm also.

Let us observe again the above figure, did we observe some more facts other than the two which are written above?

Student's observation: ----------

Their interiors do not overlap.

What we call the angles having a common vertex, one common arm and their Interiors do not overlap.

Student's response : ----------

Adjacent angles.

Record the figure having adjacent angles from the following figures.

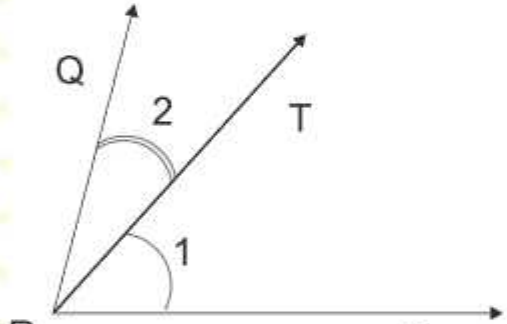


FIG. 1

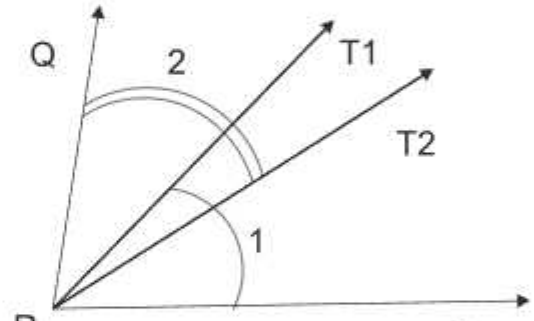


FIG. 2

Student's record : ----------

In figure 1 angles are adjacent angles.

Why angles are not adjacent in figure 2

Student's response: ----------

In figure 2 interiors of angle 1 and angle 2 are overlapping, hence these are not adjacent angles.

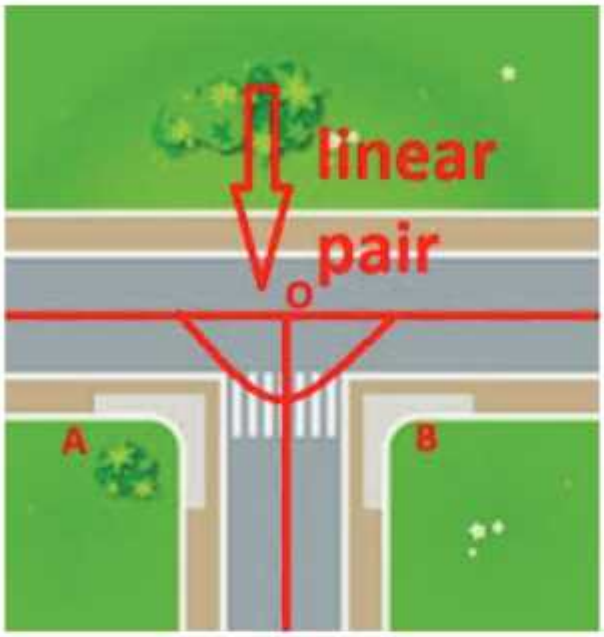
Let us draw some more pairs of adjacent angles.

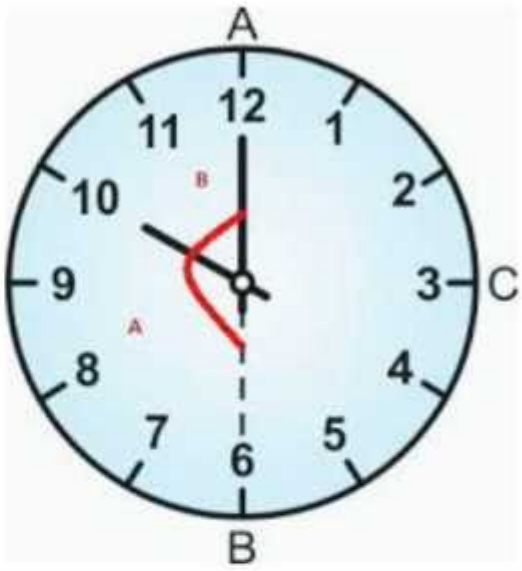
Student (can take help from parents /friends /siblings /teachers) :

Have you seen adjacent angles with their non common arms as opposite rays?

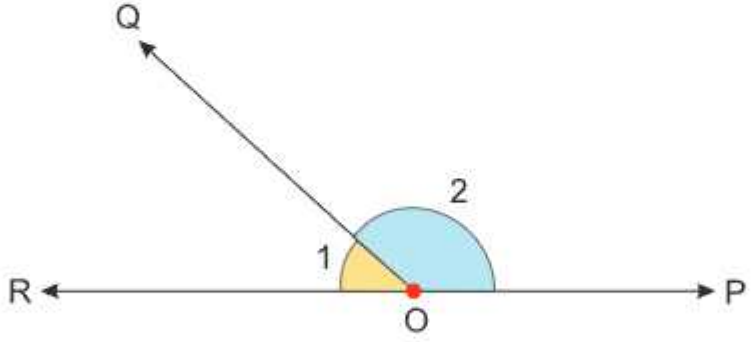
Student's response: ----------

Between Road crossing and between arms of the clock.





Observe the following figure also and record your observation.



Student's observation: ----------

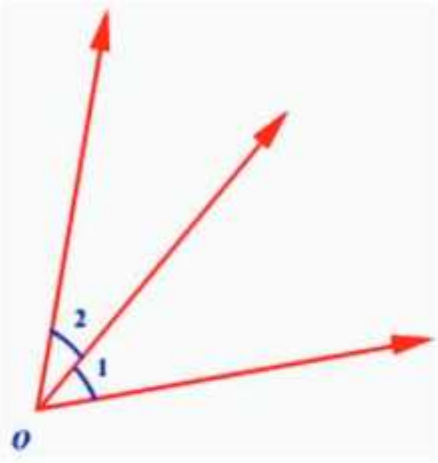
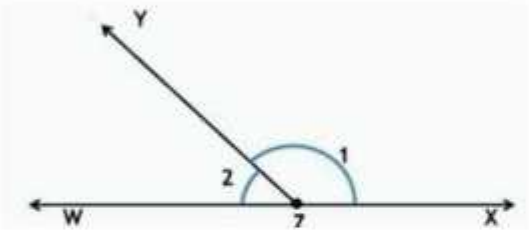
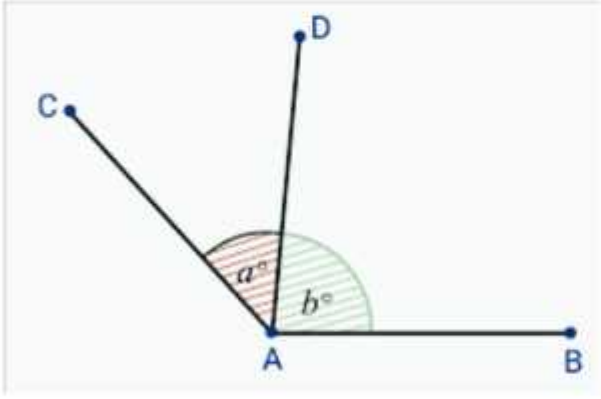
In this figure two adjacent angles have their sum as 180°

What is the name of such angles?

Student's response: ----------

Adjacent angles with sum 180 degrees form linear pair.

In the following worksheet check if the angles form a linear pair or not and prepare a worksheet for your fellow classmates.

Figure	Linear pair or not	Reasons for yes or no
  		

Student's worksheet :

Reflections: What did we learn today?

Student's response:

I also enjoyed the discussion when you put examples of adjacent angles and linear pair.

Pat yourself for wonderful learning experience.

Session - 23
Geometry

Learning outcome: -
Identifies the medians of a triangle.

Dear student ! Encircle the picture which best describes your mood today.



Great !

How was your last session?

.....

We learnt about the three sided closed figure called Triangle in our last session. Today we will do an activity with our triangle.

We will take an origami sheet.

- ★ Draw a triangle on the paper and cut it along its sides.
- ★ Name the triangle as you want.
- ★ Fold each side of the triangle such that the two corners coincide with each other.

Now write your observations. What do you observe about the triangle?

.....

How many folds of paper did you make?

.....

Could you mark the point on the side where it was folded?

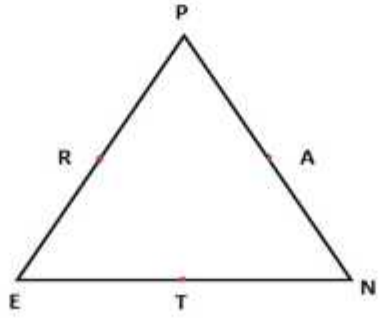
.....

This is nice!

Do you know what I have observed?

I have a triangle ▲ named PEN.

I could fold the triangle on its three sides. Also, I could mark the points on the sides where these were folded. So, I had three points on the three sides of the triangle. I have marked these points as R, A and T



Now let us join point A to point E. point R to point N and point P to point T.

What do you observe?

What do you observe about these line segments drawn inside the triangle?

Let me share my observations with you.

I observed that T is the midpoint of EN. Also, PT forms the median of the triangle. Similarly, NR and EA are also the medians.

Please draw and write the name of the medians of your triangle.

Student's response:

Great!

You have done a great job!

What more can you share about the medians?

I would like to share my observations about the medians. I observed that all medians pass through the same point.

Now reflect on the whole activity. Compare my observation with yours and write down your reflection.

You can paste/draw your triangle with its medians here.

Well done!

How are you feeling now?

You can now share your learning with your friends.

You can draw and cut different sized triangles with your friends and mark their medians. You can observe your triangles and compare them with your friends'.

Session - 24
Geometry

Learning outcome: -
Explores about the altitudes of a triangle.

Welcome dear student !

I hope you are feeling well!
Share how are you feeling today?

Beautiful!
How were your sessions on triangles and its medians?

Let us draw a triangle and its median, Name your triangle and its medians.

Great!

Let us move forward and play with our triangles.

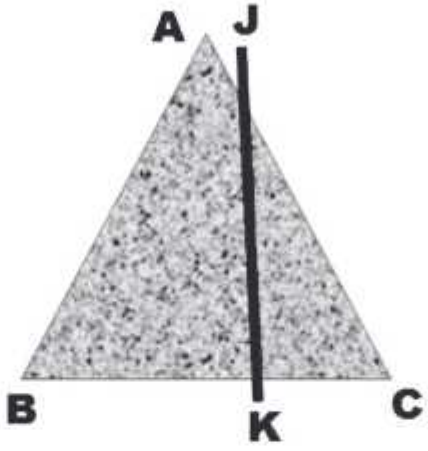
In today's session, we will do another activity with triangles.

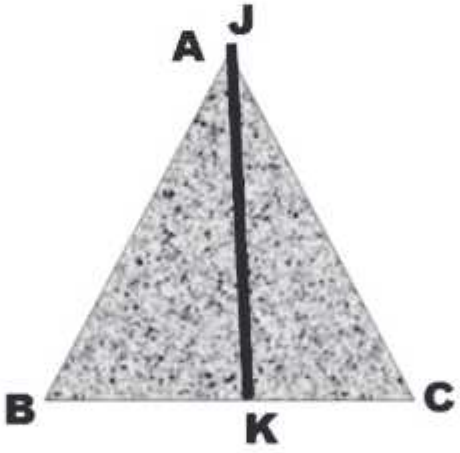
Draw a triangle on a newspaper or magazine paper, and cut it along its sides.

Now, cut another strip from the paper and fold it to form a thin straight and strong stick.

Name your triangle and the stick.

Move the stick JK on one of the sides, say BC till it touches the opposite vertex, i.e. A and point K will be on side BC.

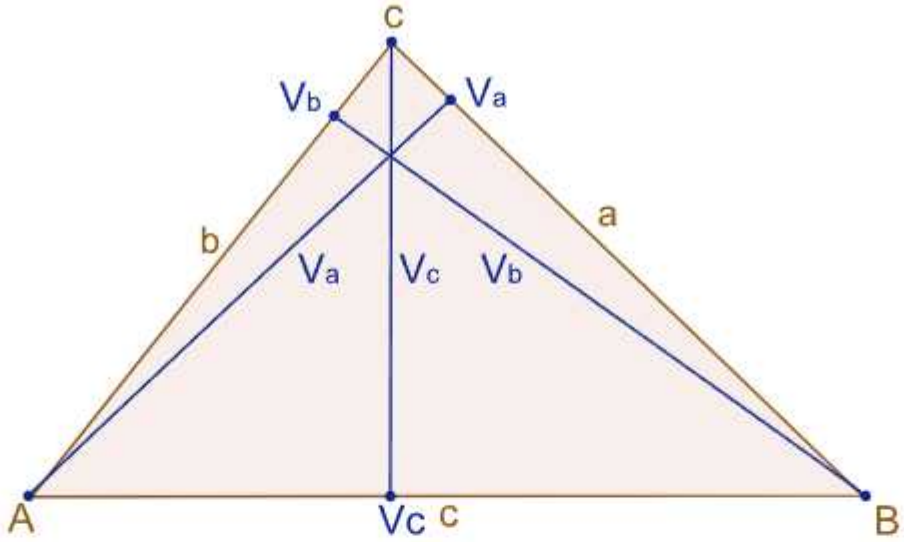




Draw this line with the help of a pencil.
What do you observe?

You can now move your Stick on the other two sides and draw those lines also.
What do you observe?

Now I would like to share my observations. I observed that all these lines are drawn from one vertex perpendicular to the opposite side and they intersect each other at one point.



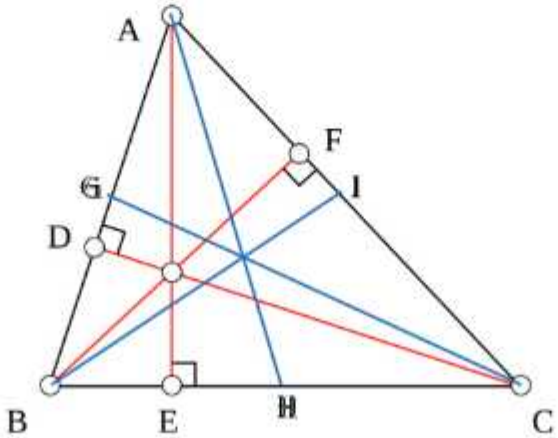
You may now observe your triangle, reflect on your observations, compare them with my observations and write.

Very good!
We call these perpendicular lines, the altitudes of the triangle.
What else do you observe about the altitudes?

Yes! You are right! We can draw three altitudes in a triangle. These attitudes intersect at one point.
You can now paste/draw your triangle with its altitudes, here.

So students, today has been a beautiful learning day.
How was your day?


ACTIVITY 1



1. Name the three altitudes in triangle ABC

2. Name the three medians in triangle ABC

.....

Wow! Great going!

You may now share your learning with your parents.

.....

Can you draw a triangle and write your name inside the triangle? Also, write your friend's name outside the triangle.

.....

How did you feel?

.....

Let us explore!

1) Find the concept of interior and exterior of a triangle in our surroundings

2) Find the things where we can use the median and altitude of a triangle.

3) Draw the medians and altitudes of a triangle which has two equal sides - isosceles triangle. What do you observe?

4) Draw the medians and altitudes of the triangle which has all equal sides - equilateral triangle. What do you observe?

5) Make a rangoli design using triangles and share it with your friends.

Session - 25
Geometry

Learning outcome: -

Applies the property that sum of the interior angles of a triangle is 180°

Greetings to everyone. I hope you are feeling well! Select your emojis to depict your mood today.



We learnt about the three-sided closed figure called Triangle in our previous class.

Let's recall and draw an isosceles right-angled triangle.

Isosceles means two equal sides. Right angled triangle means one of the angle is 90°	

Take out your cut out of triangles and observe/measure angles of different triangles you have.

Please record your discussion and be ready for presentation of your thoughts in 5 minutes

Measure of angles is 50°, 40°, 90° 	

I share my observations.

I observed that all the angles of a triangle are less than 180°.

Did you observe same? Observe again and compare with my observation.

Student's reflection:

Observe and please measure the angles try to find the sum of three angles of the triangle. Share how you reached to your result.

Measure of three angles =

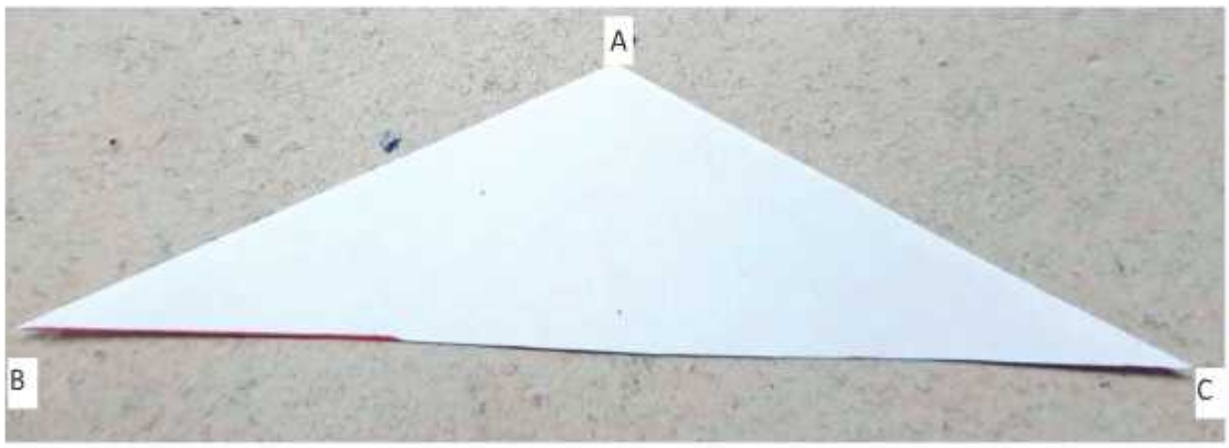
Sum of three angles =

Let's do an activity

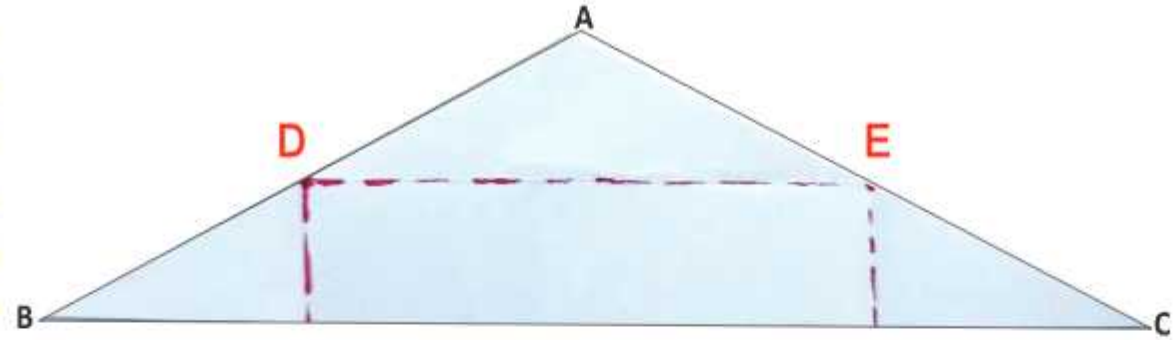
Now I would like to share my observations. I observed that sum of all the angles of a triangle is around 180°.

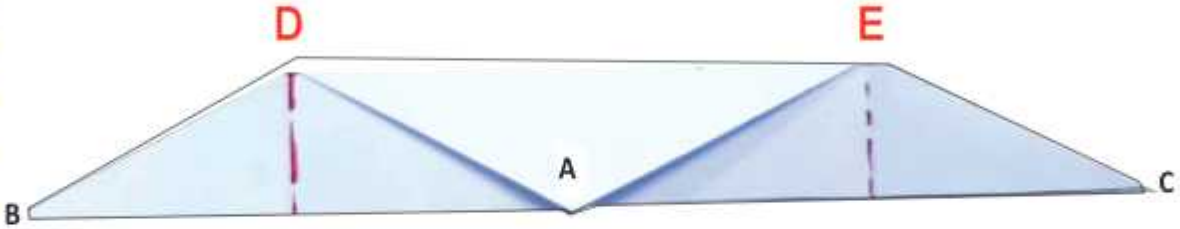
Cut a triangle from a newspaper or any other rough paper.

Place your triangle in such a way that longest side is at the base.

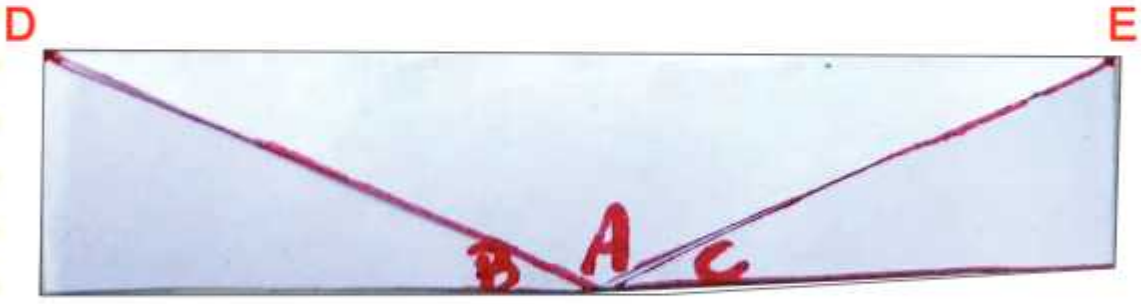


First Locate the midpoints of two sides (AB and AC as D & E respectively). And the fold lines are then made using the perpendiculars from D and E to the base BC.





Try to fit three angles on the base. Put ∠ B and ∠ C along with ∠ A by paper folding.



What do you observe?

Student's response:

Now I would like to share my observations. I observed that all three angles form a line. So Measure of straight line is 180^{0}.

You may now experience with your triangle, **reflect** on your observations.

Student's response:

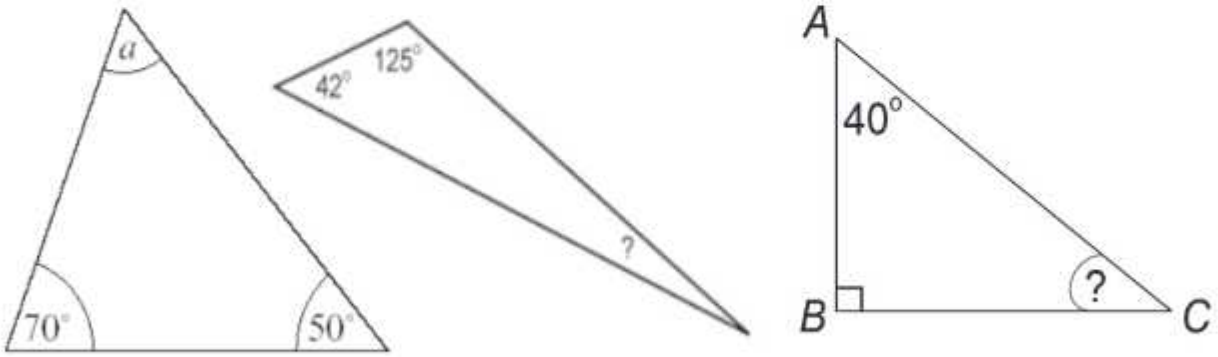
Sum of three angles of a triangle is 180^0 called **Angle sum property of triangle.**

Try to make some workable model to present this. Draw the triangle.

Repeat for various types of triangles.

S. No	Angle 1	Angle 2	Angle 3	Angle 1 + Angle 2 + Angle 3

Exploration - Find out the missing angle in the figures given below:



What learning you can construct today. How are you feeling now?

Celebrate your construction and express your feeling.

Express your feeling of wow on learning.

Record it and enjoy with owning your learning.

Session - 26
Geometry

Learning outcome: -
Finds the missing angle in a triangle when exterior angle is given.

Before working on this session please go through session on triangles and angle, sum property of triangles.

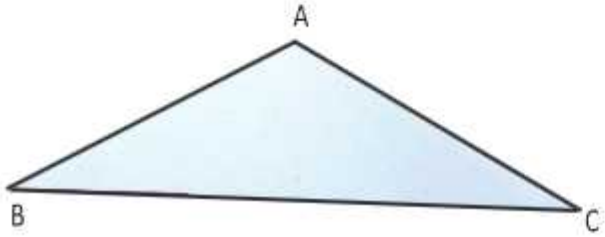
Dear student !
How are you feeling today?

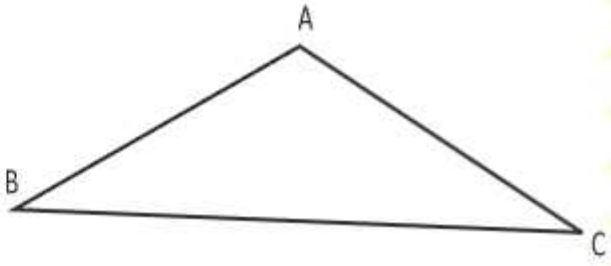
Dear students, now please take out cut-outs of triangles.
Put it on paper and draw the outline of a triangle.

If you have your cut-outs just 'PAT' yourself for taking good care of your material.

Student's response:

My working is as below -



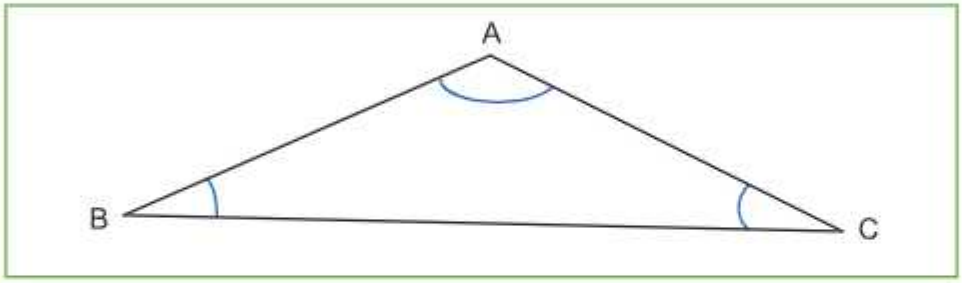


Mark the angles of the triangle. Observe the angles you marked.
Write in the given space.

Student's response:

There are three angles.	

I did it like this



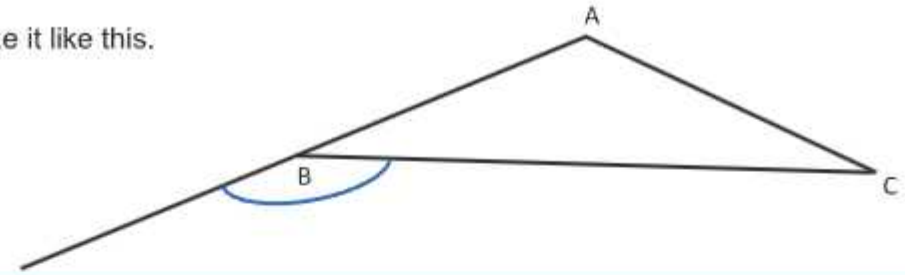
Now you reflect on your working

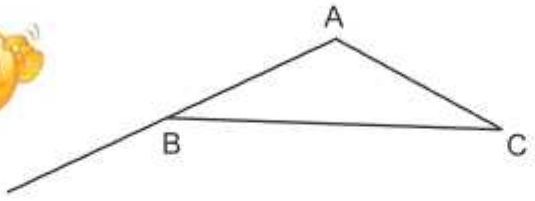
3 angles at 3 vertices. All angles are in the interior of the triangle.		

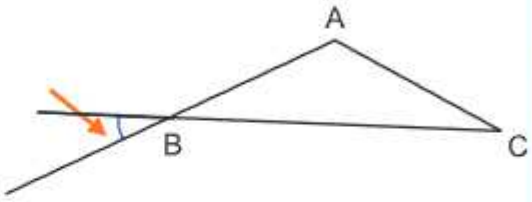
Try to make exterior angles to the triangle in the space given below.

Student's response:

I could make it like this.







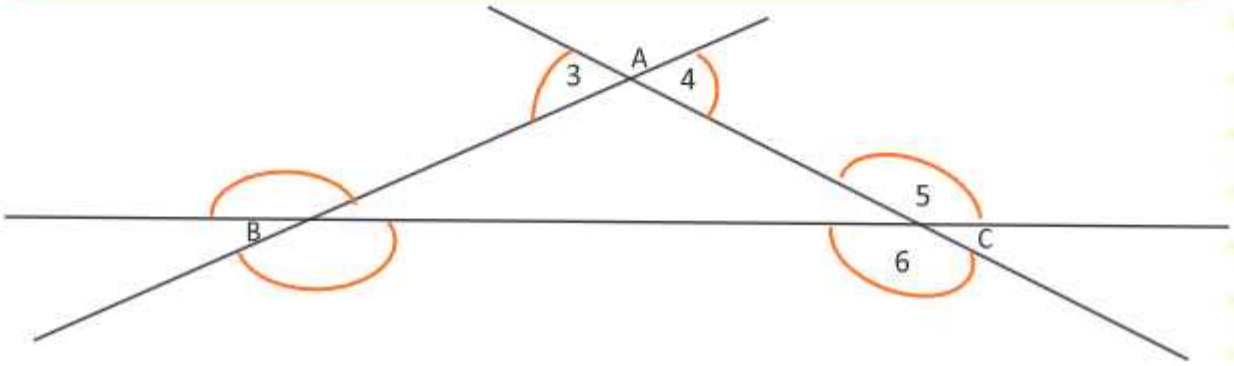
But I am confused
Let's discuss.

Are these marked angles also considered as exterior angle to triangle?

Exterior angle is the angle between a side of a polygon and an extended adjacent side.

Draw all the exterior angles that can be drawn to a triangle. Use the box below-

Student's response:



I extended sides AB, BC, CA on both sides and got 6 exterior angles.

Compare mine with yours and **reflect on yours (What new is added in your understanding)**

There are 6 exterior angles of a triangle.	

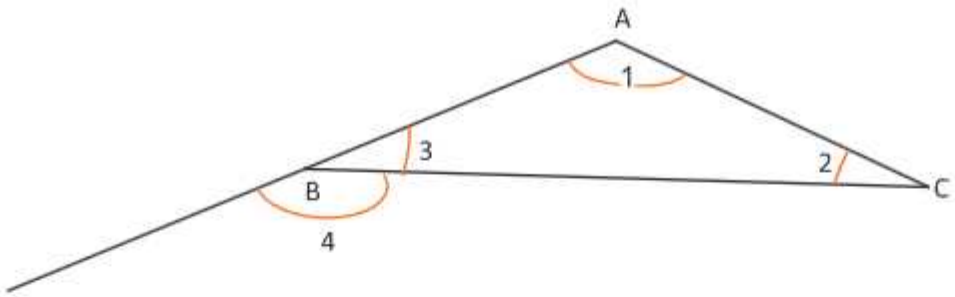
Now observe these exterior angles and try to find its relation with interior angles. If there is any relation between them discuss that, record it and be ready to present your thoughts.

Measure of $\angle A = 115^0$ Measure of $\angle B = 35^0$ Measure of $\angle C = 30^0$ Measure of extangle 1 = Measure of ext. angle 2= Measure of ext. angle 3= Measure of ext. angle 4= Measure of ext. angle 5= Measure of ext. angle 6=	$\angle A + \angle B =$ _____ $\angle B + \angle C =$ _____ $\angle C + \angle A =$ _____

My thought – As $\angle 1+\angle 2+\angle 3 = 180^0$ i.e., they make a straight line together.

Also, I can see $\angle 3$ and $\angle 4$ makes a straight-line means $\angle 3+\angle 4 = 180^0$

Thus, I came to result $\angle 4 = \angle 1+\angle 2$



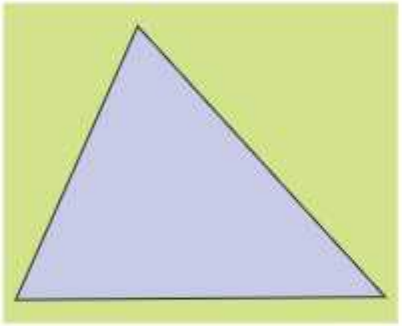
Now you reflect on your understanding (What new is added in your understanding)

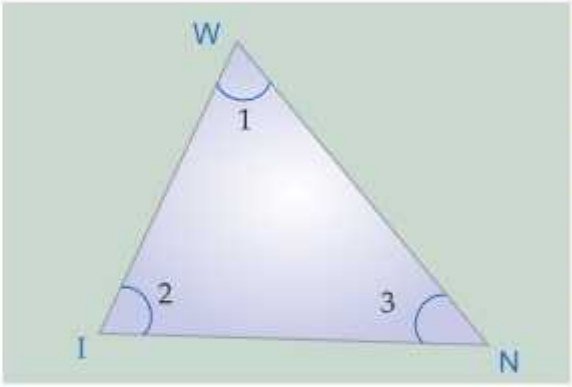
Student's response:

Well done!

Can you think of another way to verify the above result?

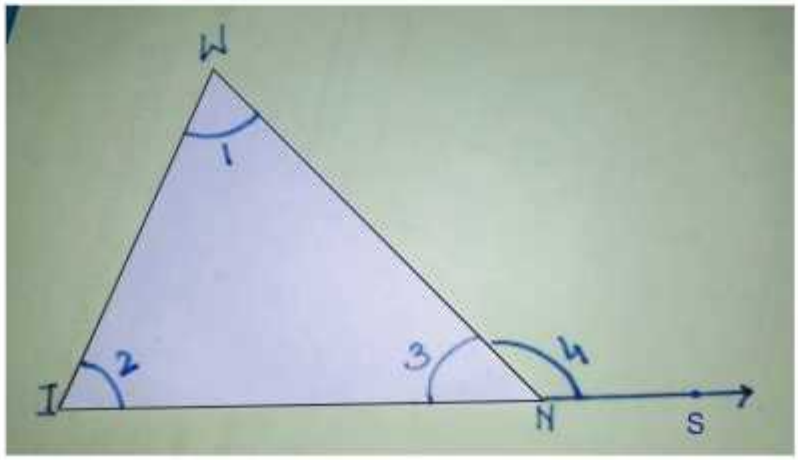
Let us take out a cut out of our triangle. Place it on a sheet of paper and name it as WIN.





Let us mark angles of our triangle and name them.

Extend one of the sides of the triangle, say IN to S.

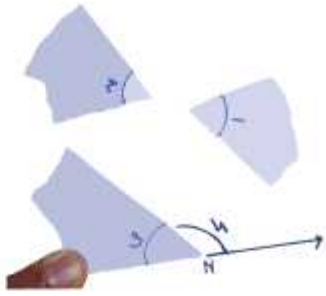


Also, mark the angle formed, ∠WNS as ∠4.

Now let us cut our angles ∠1 and ∠ 2.

How are you feeling now?

Student's response:



Place ∠1 on ∠ **4.**

What do you observe?

Does it cover 4 exactly? _____

Now, place ∠ 2 adjacent to ∠1 on ∠ 4.

What do you observe now?

Student's response:

What are your reflections?

Can we say, ∠1+∠2 = ∠4?

How can we generalize this? Write your reviewed observations.

Student's response:

What is ∠4 called?_____

∠4 is called an exterior angle of a triangle so we can generalise it as,

> Measure of an exterior angle is equal to the sum of interior opposite angles.

Let us now check whether this property of exterior angle holds true for all types of triangles.

You can paste your observation here.

For equilateral triangle-	For obtuse angled triangle-
For Isosceles triangle-	For right angled triangle-

Now reflect on the activity, its synthesis and reflect.

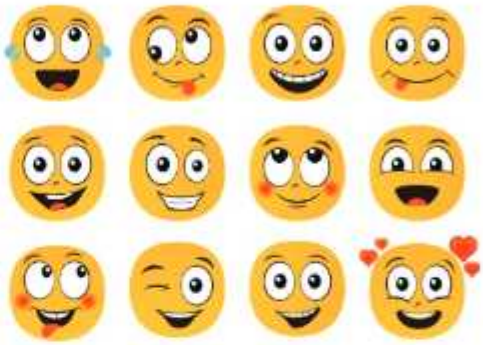
It was a great learning day today.

Session - 27
Geometry

Learning outcome: -
Applies the property: Sum of two sides of a triangle is greater than its third side.

Warm wishes to you, Dear student !

Pick an emoji that matches with your mood today.



It's nice to see you all ready for learning.

Beautiful! How were your sessions on Angle sum property of triangles?



Draw any triangle, name it as PAT.

Then $\angle P + \angle A + \angle T =$ _____

It's heartening to see you all growing.

Today we will do an activity with our triangle.

Activity

Take a straw / stick / pen. Cut it into three pieces and try to make a triangle from them without bending any of them. Write your observation and feeling while doing this activity.

My working

I couldn't make a triangle. My two smaller pieces were of same size and bigger one was double of them. But I could not make triangles joining them end to end.

Compare my observation with yours. Relax, observe and think again. Express orally or write in the space below.

Activity 2 : I have drawn two triangles. You can draw more triangles and complete the given table.

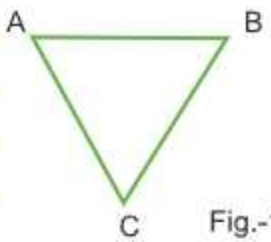


Fig.-1

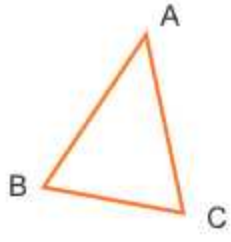


Fig.-2

	AB	AC	BC	AB+BC	BC+AC	AC+AB
Fig.-1						
Fig.-2						
Fig.-3						
Fig.-4						

and study the table.

Explore the relationship of sum of two sides to the third side

1. How does AB + BC related with AC?
2. In a similar way compare other pairs of sides.
3. Do you observe any pattern or can come to any conclusion?

My observation - A triangle can be formed when sum of two sides are greater than the third side.

You compare my observations with yours and reflect. Write down your reflections here.

Student's response:

Now check -

Can a triangle be made with lengths 12 cm, 2 cm and 8 cm? Why or why not?

Student's response:

'Can a triangle be made with lengths 10 cm, 5 cm and 5 cm?' Why or why not ?

Student's response:

So students, I think, today has been a beautiful learning day.

How was your day?

Let us share our learning with our siblings.

Session - 28
Geometry

Learning outcome:-
Demonstrates an understanding of Pythagoras Theorem in real life situation.

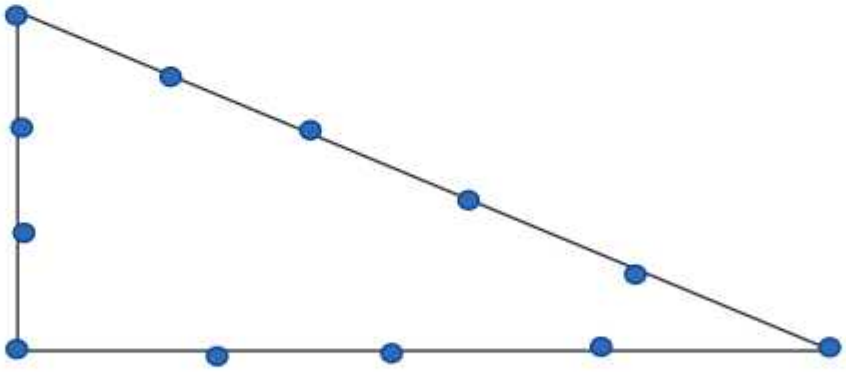
Hello children! Encircle the picture which best describes your mood today.

Great !

My friend challenged me to make right angled triangle using a rope with 12 knots and of length 12 units.

We can choose our own unit - m, cm, length of finger, or any other standard.

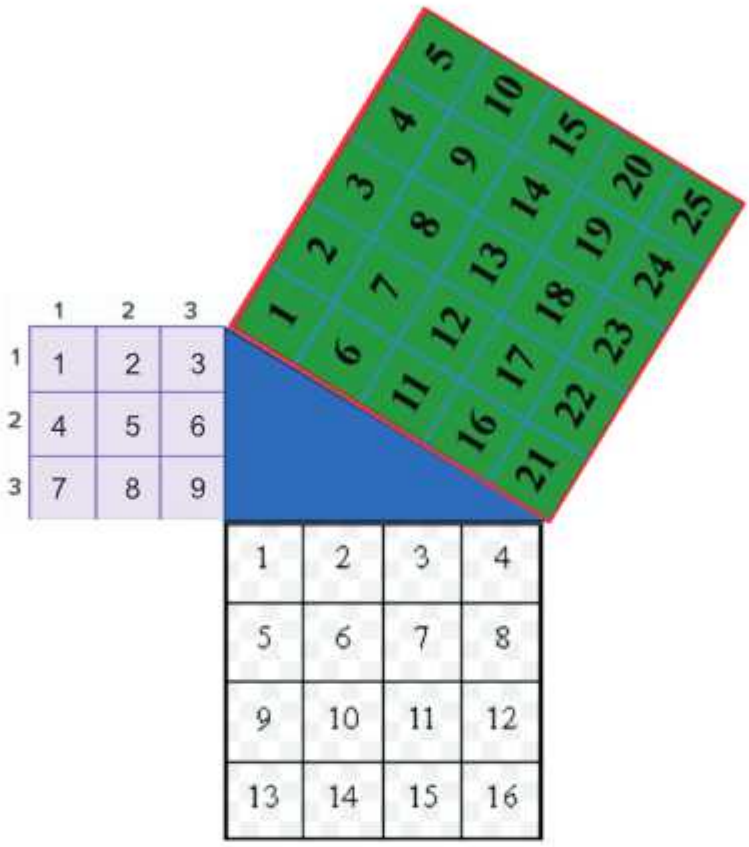
I made it like this



Can you suggest any other way?

Student's response:

Draw a right - angled triangle. Measure its sides in the units of your choice. Make a square of these lengths.



Try to do same with your triangle.

Are you also getting Sum of square of two smaller sides equal to square of largest side?

Do your experiment in the space below :-

Very good!

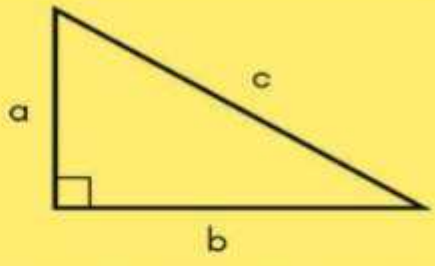
We call this Pythagoras theorem.

So, students, today has been a beautiful learning day.

How was your day?

Let us share our learning with our teacher.

Pythagorean Theorem



$$a^2 + b^2 = c^2$$

Session - 29
Mensuration

Learning outcome:
Finds out approximate area of closed shapes by using unit square grid/graph sheet.

Hello Dear student,

How are you?

Select the emoji from the following which represents your mood today:-

Happy 

Enthusiastic 

Playful 

Normal 

Dear children, look around you and observe the shape of surfaces of same objects.

Student's response:

I observed surfaces of my table, notebook, pen, bottle, handkerchief, etc.

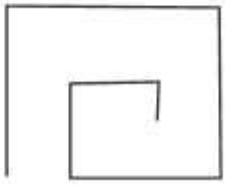
What idea came to your mind when you look at these surfaces.

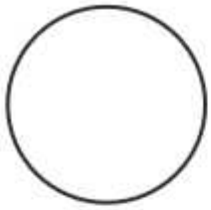
Student's response:

I noticed shapes, colour & closeness of these surfaces.

I found that these surfaces have closed shapes/boundaries.

Let's mark closed shapes from the following :–





Now reflect upon what special features do you observe in closed and open shapes.

Student's Response:

I found that an open figure/shape has distinct initial and end points which do not meet.

Re-think and write some more about closed and open figures.

Student's response:

What curiosity ignites in you when you look at these surfaces.

Student's response:

I feel like knowing about how big these surfaces are?

How can we find that?

Student's response:

I think by finding space/region enclosed by the boundaries of these surfaces.

What does that space called?

Student's response:

It is called area of that shape.

How can we find that area?

Student's response:

Let's look at some surfaces which have square checks on them.

Student's response:

I found

Dear children, you also select any such object.

How can we use these squares to find area of these surfaces.

Student's response:

For the floor (rectangle) of room, I counted the number of

- Complete Tiles
- More than half tiles

and added them. If I consider one tile as one square unit then area of rectangular floor will be total number of tiles.

What is the area of the surface you selected?

Student's response:

Also reflect upon the change in area of any surface if size of unit squares change.

Student's response:

Observe & reflect on size of squares on a

Handkerchief

Shirts

Floor or wall

Student's response:

I feel it leads to need of different units to express area.

Extend your understanding about it by reading some books and discussing with your teacher/peers.

Activity –

Take cutouts/pieces of different shapes and discuss with your peers. how can you find area of these shapes.

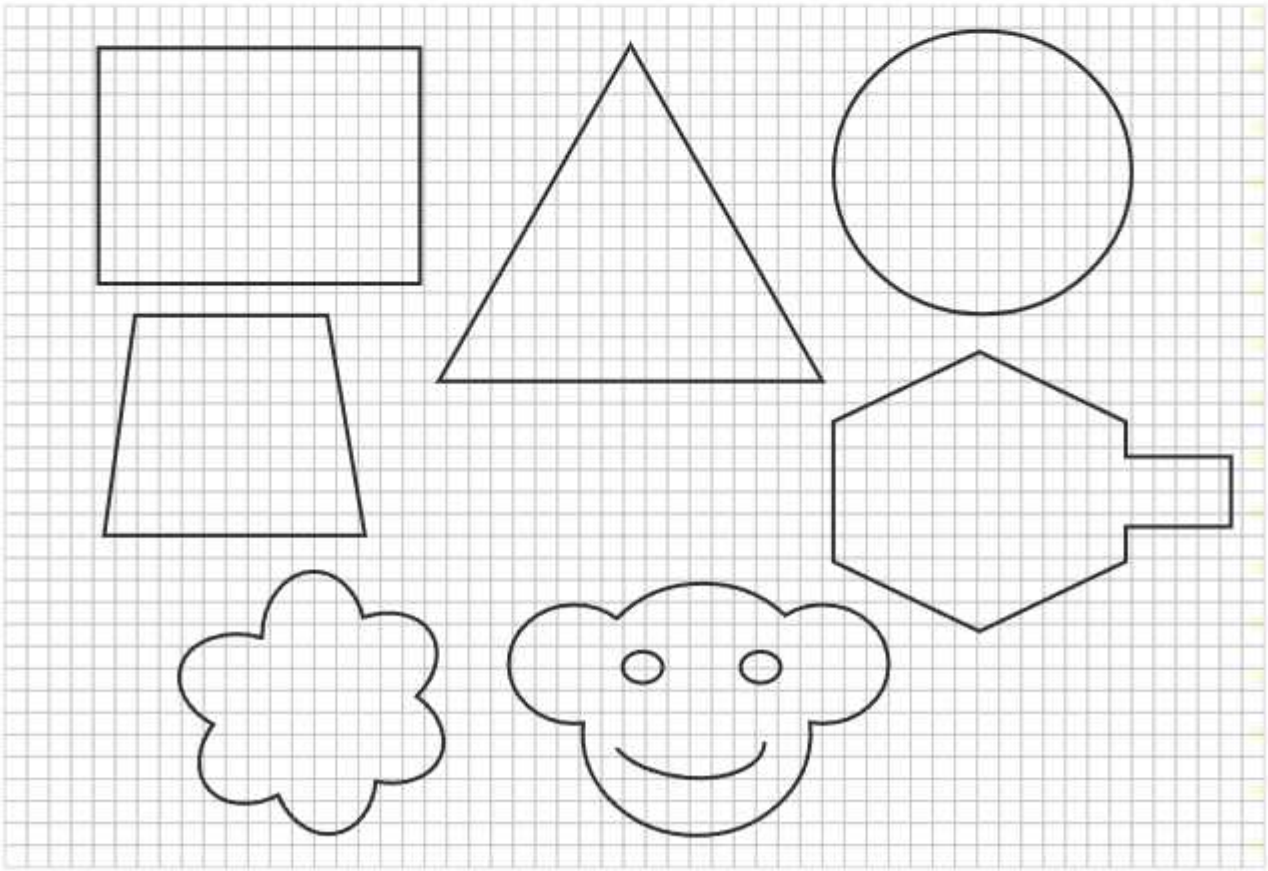
Student's response:

Let me share how I found areas of different pieces of shapes I had.

Take a Graph Paper

Put cutouts/Pieces on it & draw the shape

Count unit squares [complete & more then half] and area is total number of squares.



Dear children, you also try to find out areas of these shapes.

Student's response:

Great! 

Observe around you and look for situations where you need to find areas of different closed shapes.

Student's response:

Share your leanings with your family & celebrate it.

How are you feeling now?

Session - 30
Mensuration

Learning outcome: -
Calculates area of regions enclosed in rectangle and square.

Hello Dear student !

How are you feeling today? Select the emoji which represents your mood:-

Happy 

Delighted 

Playful 

Enthusiastic 

Lets revise what we did in our previous session

Student's response:

Let me share what I remember

We learned to find approximate area of closed shapes by using unit square gird/graph sheet.

Do you remember we discussed some surfaces having square checks. Write the surfaces you selected

Student's response:

I selected - A shirt, a Hanky with square cheks and tiled floor.

Dear children, reflect upon the size of checks on different objects you selected.

Student's Response

I found that check designs on Hanky were very small, on shirt were big and floor tiles were biggest in size.

What comes to your mind after that observation –

Student's response:

I felt it signifies need of different units such as cm^2, m^2 & so on.

Re-think about it and give your views about need of different units.

Student's response:

Now lets think and reflect on following situations, write what ideas come to your mind –

1. Decoration of Rangoli, table cloth, wall hanging etc.
2. Painting doors, windows, walls
3. Covering floors or wall with tiles
4. Making a box, bag or platforms for shop
5. Spreading ghee on Chapati

Student's response:

Let me share some of my observations or ideas that come to my mind-

I feel need of finding amount of Paint or materials required for different shapes involved.

I was making a bag with square shape Let's see how we find cloth required for different faces of the bag.

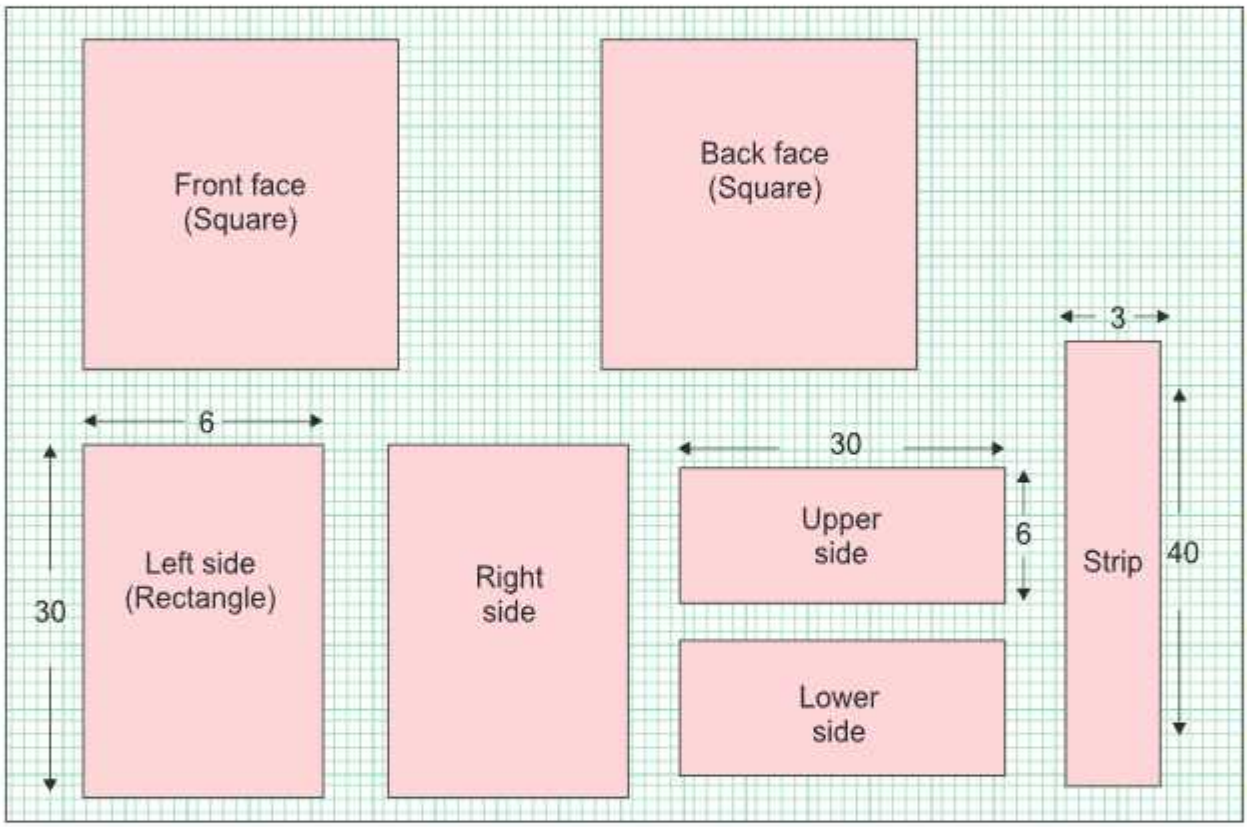
You can also select any of your bag and let's find our requirements.

Write dimensions of different surfaces of your bag

Student's response:

How do you think we can find the dimension and cloth required?

I placed all the surfaces (Cut on paper or Plastic sheet) on a graph paper.



How do you think we can find dimensions of all faces and then area?

Student's response:

I counted numbers of unit square lying inside different faces which will be area of these faces.

For front & back face, 30 lines of 30 unit squares gives

Area = 30x30 = 900 square units i.e.

= side x side = area of square

For left, right, upper and lower faces :-

Area = 30x6 = 180 sq. units i.e.

= length x breadth = area of rectangle

Write your reflections on the areas of these two shapes – Rectangle and square, and also on the formula of their area.

Student's response:

I think a Rectangle having length = breadth i.e. all four sides equal is called a square.

Activity

Now dear children, cut some rectangles and squares of different sizes using a plastic sheet or paper sheet, Put them on graph paper and find their area.

Look around you and observe surfaces having rectangular and square shapes.

Find their dimensions & then Area.

Student's response:

S.No.	Object	Shape	Area

Discuss with your family members about how you feel when you apply leanings of mathematics on the objects of your surroundings & celebrate it.

Session - 31
Mensuration

Learning outcome: -
Demonstrates an understanding of differentiating Area & Perimeter.

Hello dear Student ! How are you today? Select the flower of your choice from the following.

Red smiling Rose

Smiling Jasmine

Yellow smiling Sunflower

Orange Lily

Recall your learning of our previous sessions?

Student's response: ----------

I remember, we learned about Area & Perimeter, especially for Rectangle & Square.

Carpenter at my house was making glass doors for windows.

We want to know the length of wooden strip required to make the frame and the area of glass piece required for one door.

Dear children, you also select any such door of your house. [with or without glass, with door frame]

Student's response: ----------

What is the shape of your door/door frame?

My door/door frame is rectangular. What we need to find out for length of wooden strip?

Student's response: ----------

I think I need to find Perimeter of my rectangular door, which is 2 (30 + 60) = 180 cm = 2 (l+b)

What length of wooden strip is required for your door?

Student's response: ----------

What do you think we need to find to know out how big the glass piece should be ?

Student's response: ----------

I would calculate area for that, which is 30 x 60 = 1800 cm^2 = *l* x *b*

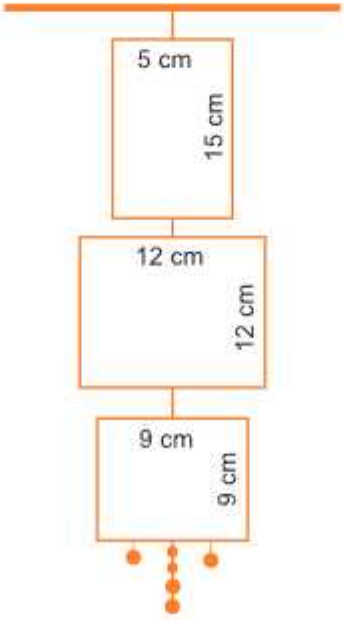
What is the Area of your glass piece?

Look around you and observe some more situations around you where we need to calculate Perimeter and Area

Student's response: ----------

I faced one more such situation, My sister made a wall hanging from card board.

I am supposed to paste coloured chart paper on its surfaces & decorative ribbon on its borders.



Children you also take any such object from you surroundings which has combination of shapes.

Student's response: ----------

What are different shapes it has ?

Student's response: ----------

What will be the length of ribbon required if you also want to decorate its borders?

Student's response: ----------

Let me share what my wall hanging requires –

Length of Ribbon = 2 [5+15] + 4 [12] + 4 [9]
= 40 + 48 + 36 = 124 cm

What will be the required chart paper if you want to cover its surfaces?

Student's response: ----------

The chart paper I need = 15x5 + 12x2 + 9x9
= 75 + 144 +81
= 300cm^2

Share your learning with your friends and celebrate.

Dear Childrens, Let play a game.

- Take 2 dice and a chart paper. 2 pens of different colours.
- First player throws 2 dice simultaneously. Suppose the numbers are 2 & 3. He/She will select and draw a rectangle having sides 2 & 3.
- Second Player will throw the dice & do the same i.e. draw his/her rectangle using a different colour pen.
- It is turn of first player now. But now he/she will draw second rectangle adjoining to his/her first one.
- At the end of game [when there is no space left on chart paper] the player having total area of all his/her rectangles, greater, will win.
- This game can be played by comparing perimeters also.
- Observe & reflect if there is a possibility that the player having greater total area has smaller perimeter.

Hope you will enjoy this game.

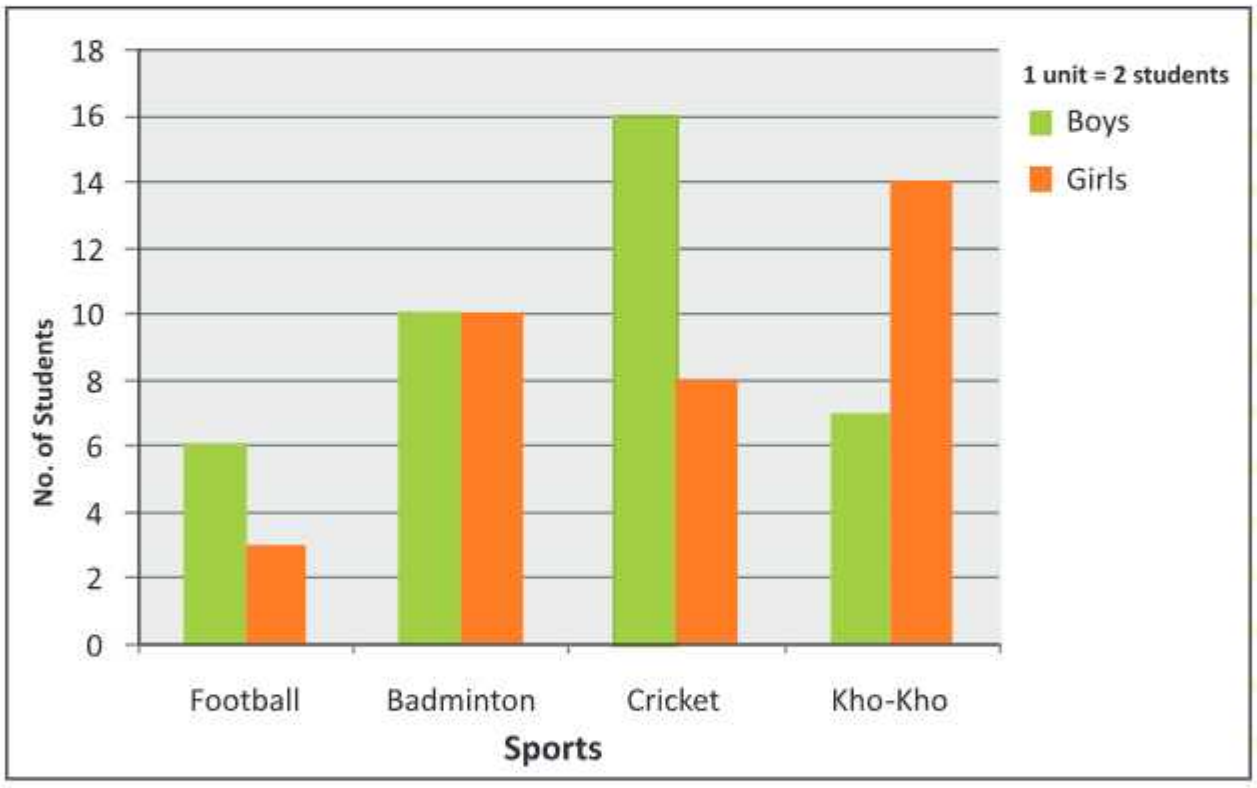
Session - 32
Data handling

Learning outcome:-
Interprets the double bar graph and draws conclusions.

Hello dear student, how are you feeling today?

Select smiley that is according to your mood.

Observe the given graph



Student's observation:

- The graph consists of two bar graphs.
- The orange colour bar showing the sports liked by girls and the green colour bar showing the sports liked by boys.
- The bars are showing the comparison between the sports liked by boys and girls.
- The scale of graph is 1 unit = 2 students.

You can further add or suggest in teacher's observation.

A bar graph which is used to display two sets of data on the same graph is called double bar graph.

It helps us to compare two data groups.

Answer the following questions:

Q. Which is the most preferred sports of the girls?

Ans. _____

Q. Which is the most preferred sports of the boys?

Ans. _____

Q. How many girls liked cricket?

Ans. _____

Q. Which sport is liked by more than 6 girls?

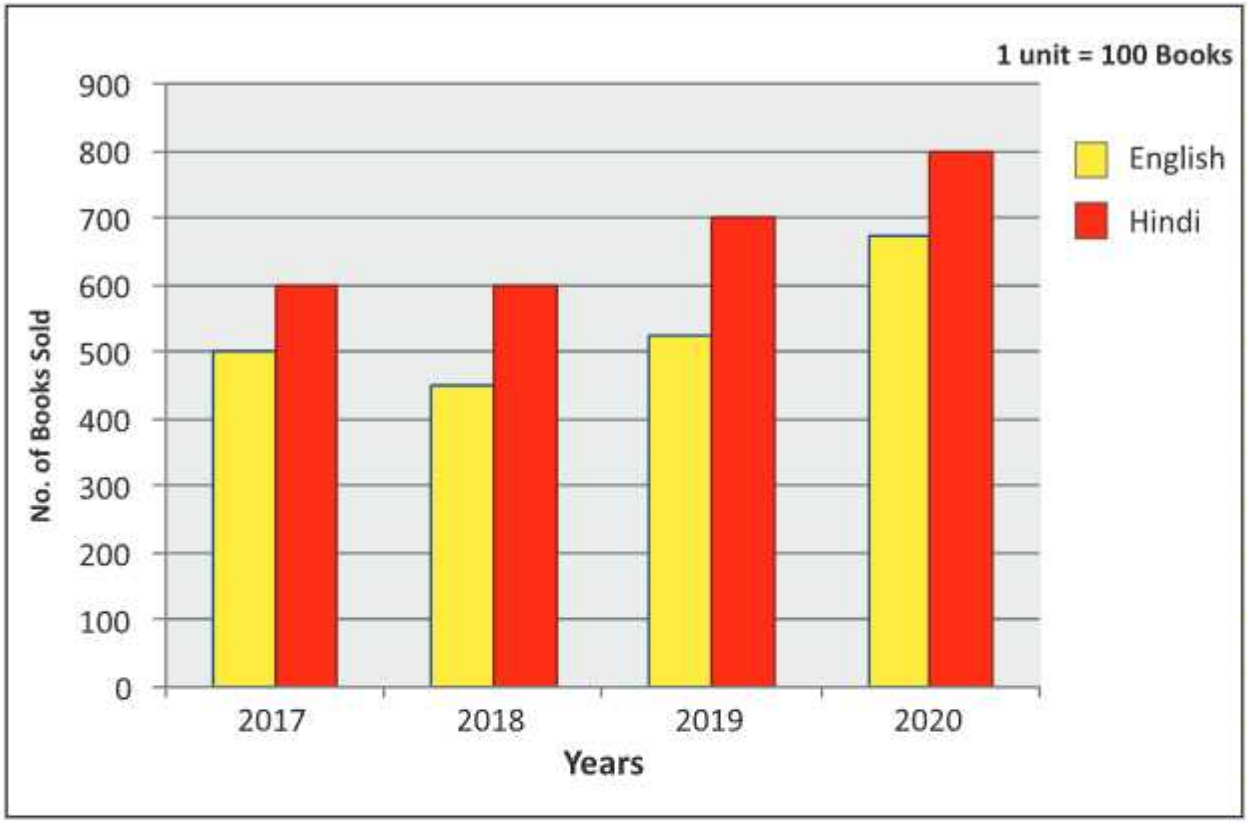
Ans. _____

Reflection: - What new is added in your learning?
Write in the give space.

My reflection	able to interpret double bar graph.
Student's reflection	

Observe and try to understand the given double bar graph.

Sale of English and Hindi books in the year 2017-2020 are given below:



Answer the following questions:

Q. In which year there was least difference of sale of two language books?

Ans. _____

Q. In which year there was maximum difference of sale of two language book?

Ans. _____

Congratulation for successful completion of the session

Session - 33
Data handling

Learning outcome:-
Represents the data through double bar graph.

Hello dear student, how are you feeling today?

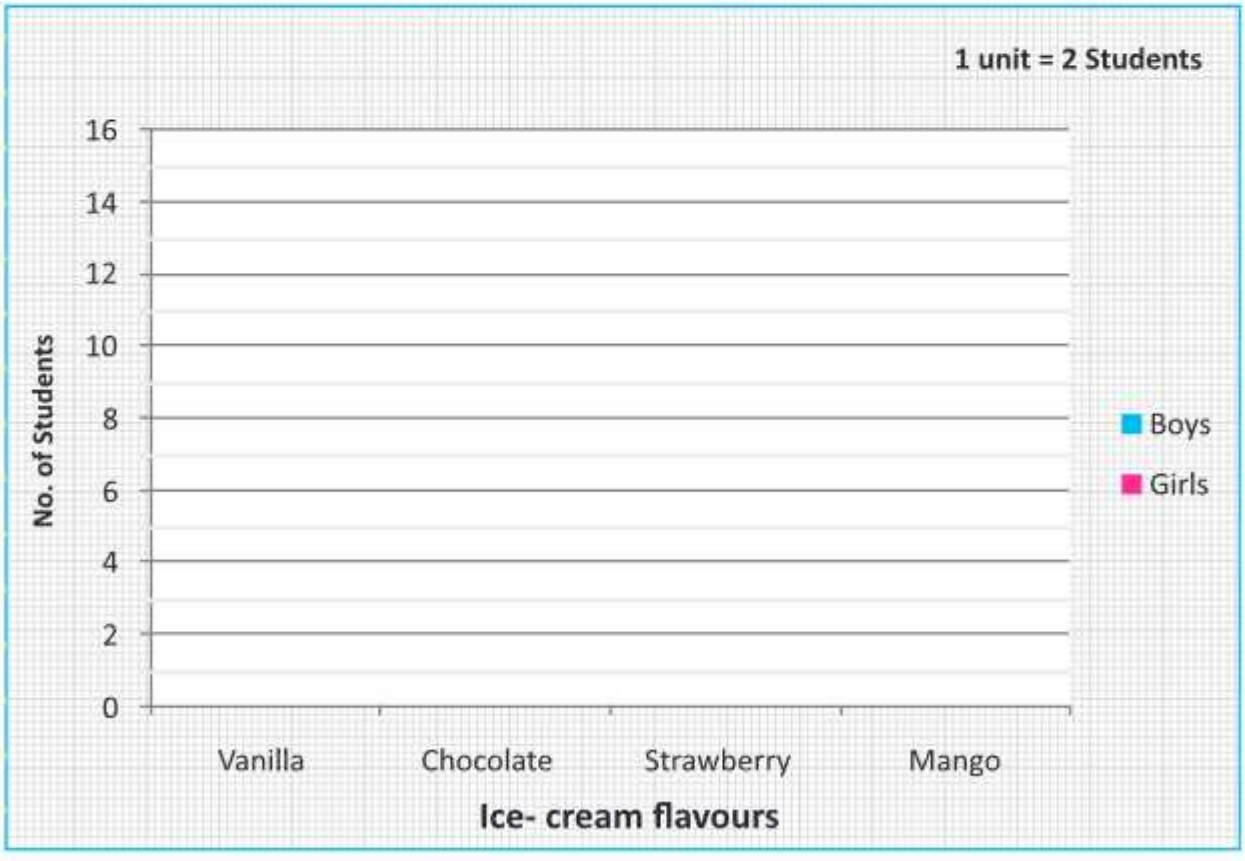
Select smiley that is according to your mood.

Happy **thankful** **celebration** **hopeful** **powerful**

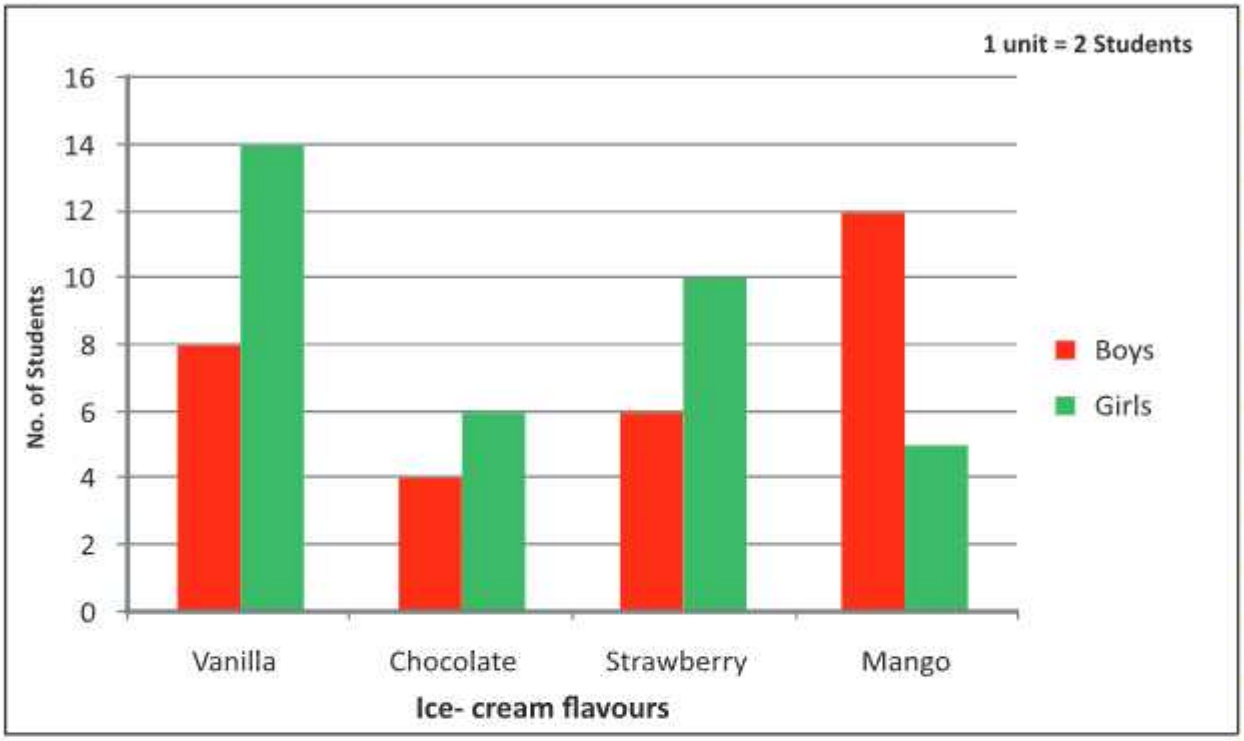
Draw a double bar graph to compare the favorite ice-cream flavours of girls and boys.

(You can take help from your friends, parents and teachers).

Ice- cream flavours	Vanilla	Chocolate	Strawberry	Mango
Boys	8	4	6	12
Girls	14	6	10	5



My response:



Reflection: - What new is added in your learning?

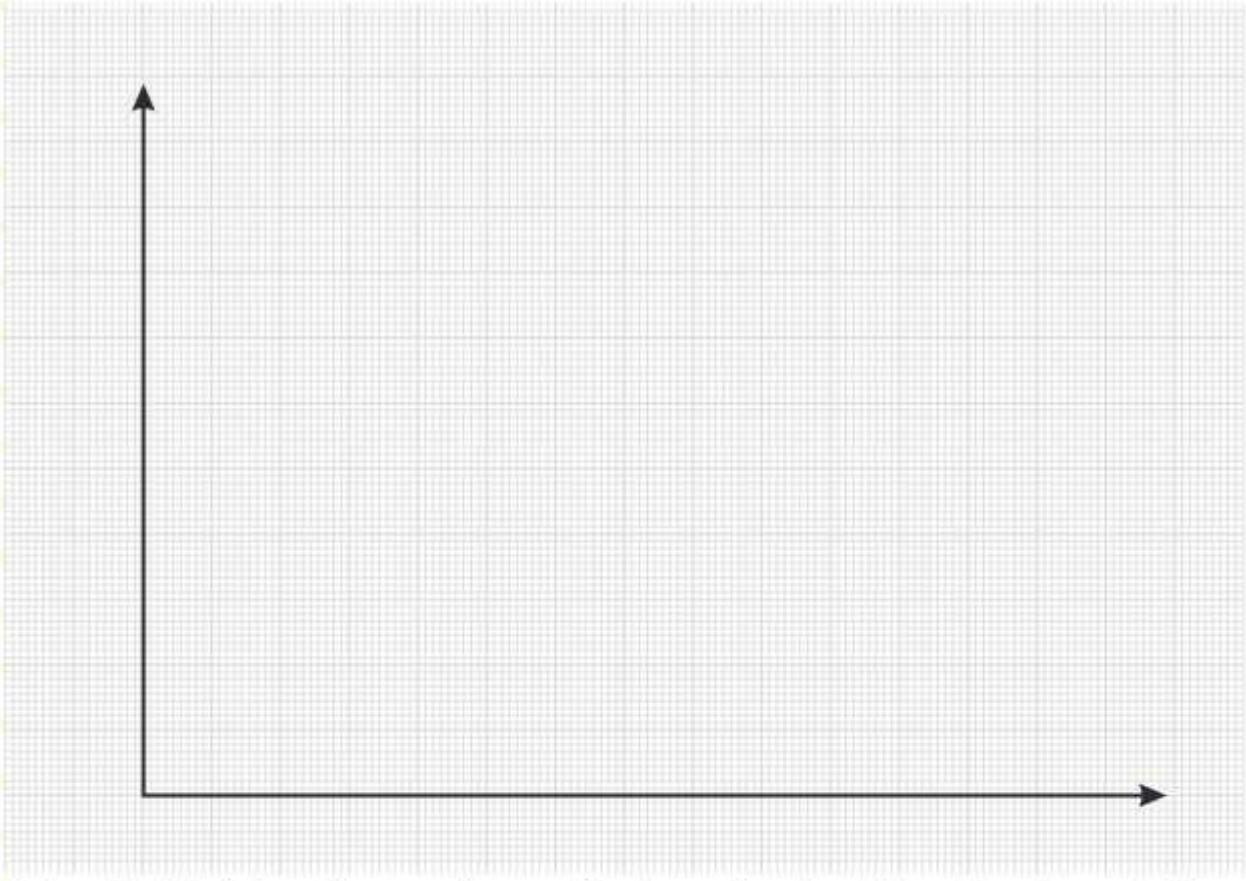
Write in the give space.

Teacher's reflection	able to interpret, compare and present the data through double bar graph.
Student's reflection	

Given below data is showing the participation of class VII and VIII students in extracurricular activities

Activities	Sports	Dance	Essay writing	Singing	Quiz
VII	12	10	5	7	6
VIII	16	7	6	4	7

Draw a double bar graph representing the given information.



Try to collect the information regarding your friend spend number of hours in a day on studies during a week.

Your friend's name: - _____

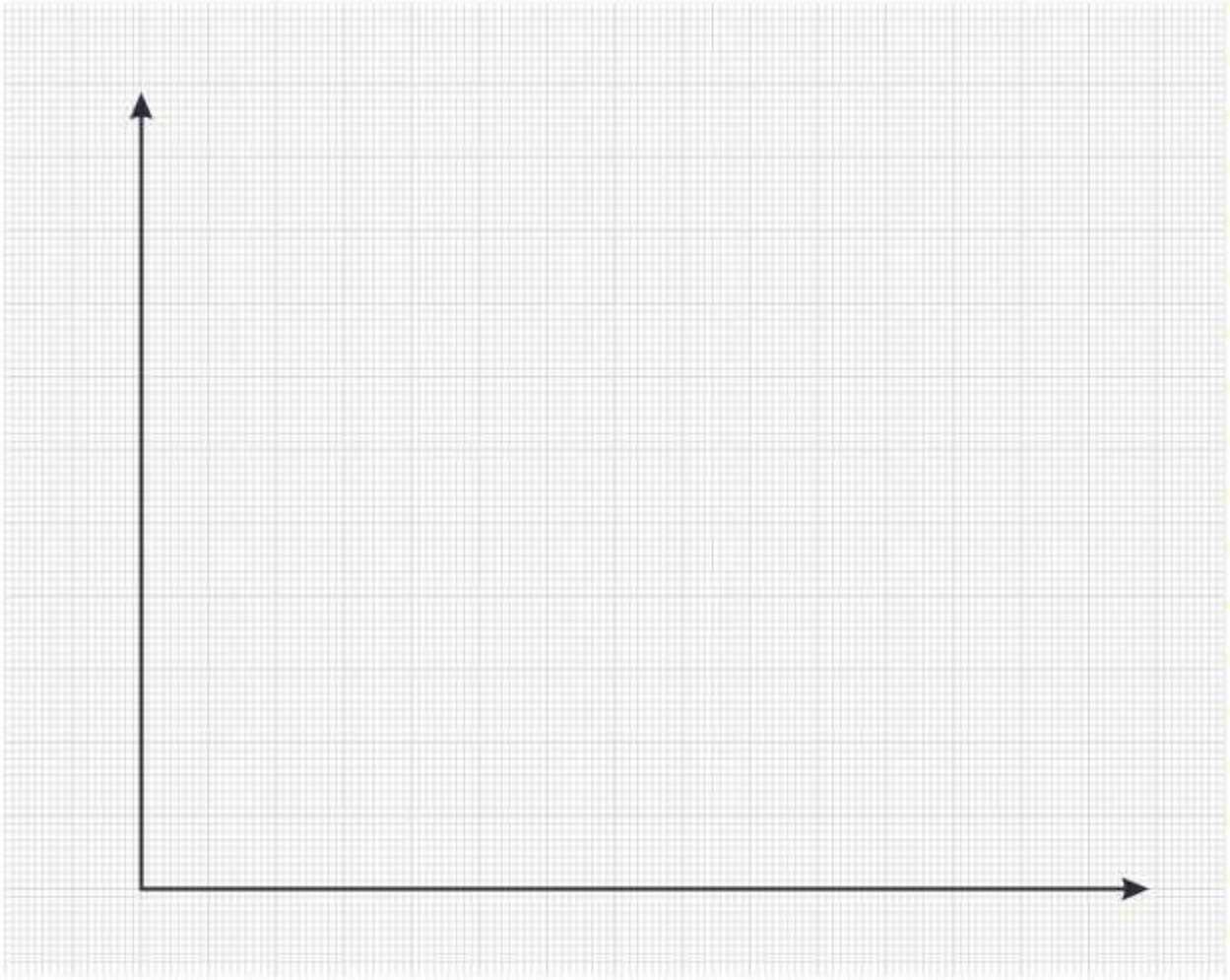
Day	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday	Sunday
Number of hours he studied in a day (in hour)							

Fill your information regarding number of hours in a day you spent on studies during the same week.

Your friend's name: - _____

Day	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday	Sunday
Number of hours he studied in a day (in hour)							

On the basis of above information, prepare a double bar graph showing the number of hours in a day you and your friend spent on studies during the week.



Congratulations for successfully completing the double graph session.

Session - 34
Data handling

Learning outcome:-
Explains the need of representation of values.

Hello dear student, how are you feeling today?

Select smiley that is according to your mood.

Let's observe conversation of student and a teacher.

Hello Banu!
Banu, I want to know how much time you spent on studies after school hours.

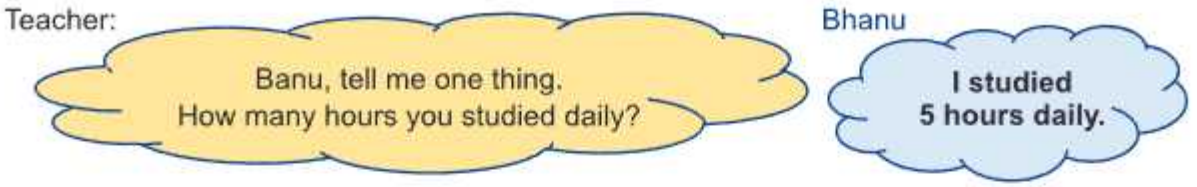
Try to note down the time you spent on studies after school hours for a week

After a week

Banu's study time record

Day	Number of hours studied
Monday	2
Tuesday	3
Wednesday	2
Thursday	3
Friday	5
Saturday	3
Sunday	3
Total	**21**

The teacher starts conversation with Banu, without checking his study time record.



What was the thinking behind Banu's answer?

Student's observations:

May be the maximum number of hours Banu studied in a day was 5 hours.

Banu studied different hours in every day of a week but teacher wants to know a value that represent his approximate study hours in a day.

Do you agree or disagree with Banu's answer?

Student's observations:

I am disagreeing with Banu's answer because only one day he studied 5 hours. He studied between 2 to 5 hours in a day.

If you are at place of Banu, what will be your answer?

Student's observations:

We get various responses with reason from other students.

Let's observe.

Rahul:

I studied approximately 3 hours daily because maximum number of times i studied 3 hours a day.

Ritika:

I studied approximate 2 hour daily because minimum number of hours i studied in a day was 2 hours.

Saleem:

I studied approximate 3 hours daily.
I divided total number of study hours equally in number of days i.e, extra 2 hours of Friday adjusted by giving 1 hour to Monday and another 1 hour to Wednesday.

Daizy:

I studied approximate 3 hours daily because
I divided total number of study hours equally in number of days i.e, 21÷7 = 3.

Sonu:

I studied approximate 3 hours daily because I first arranged the number of hours i studied in increasing order i.e, 2, 2, 3, 3, 3, 3, 5 and select the central value 3 as my answer.

Student's selected one representative value by using different ways.

As many students shared their point of view in deciding representative value.

After understanding other student's point of view, try to answer again:

If you are at place of Banu, what will be your answer?

Student's response:

My answer, I studied approximate 3 hours in a day. I divided total number of study hours equally in number of days.

We understand that as Banu studied different hours in a week. Now, we have to select a value that represent the whole data and that value of data is called representative value of the data.

Reflection: - What new is added in your learning?
Write in the give space.

Teacher's reflection	Able to explain need of representative values.
Student's reflection	

Try to write the situations when we need to find representative values.

Example- The age of VIII class students?

Student's response:

You have done a great work.

Share and discuss your work with your friends, parents and teachers.

Session - 35
Algebra

Learning outcome:
Identifies the patterns in various phenomena.

Welcome dear student, in the session of Algebra.

How are you feeling today?

Match the smiley with your mood today.

Observe your surroundings and write your observations in the given space.

Name of objects you observed	Student's observations

Now, try to observe the given pictures.





Try to identify repeated arrangement of shapes or colours in the above objects.

Write your observations in the given space.

Names of objects you observed	Student's observations

You can record and share your observations with your friends and teachers.

Names of objects you observed	Observations
Tea cup	Repeated arrangements of colours, i.e, yellow, white and blue. Repeated arrangements of vertical strips i.e, one small size vertical strip in between two big strips.
Biscuit	The circular shaped biscuit is divided into strips of increasing order from the exterior ends towards the middle part and there is a uniform space between the strips.
Window	The frame of window is divided into two similar parts. Each part is divided into 8 rectangular shapes arranged in vertical order. There is an alternative sequence of smaller and bigger rectangle in which bigger rectangle is double the size of smaller rectangle.
Chair	A design is formed when vertical and horizontal strips overlap.
Leaf	Each leaf is divided into two similar looking halves. Either half is further divided by parallel veins.

You can further add your observations in teacher's observations.

Now reflect and write in th given space:

Write in the given space.

My reflection	able to identify repeated arrangements of shapes or colours.
Student's reflection	

What new is added in your learning?

Student's response: _____

_____

Session - 36
Algebra

Learning outcome: -
Identifies the patterns in various phenomena.

Dear student, How are you feeling today?

Circle the smiley that matches your mood today.

What is pattern?

Discuss with your friends, parents and teacher.

After discussion, what do you understand about pattern?

Student's response:

My expression: -

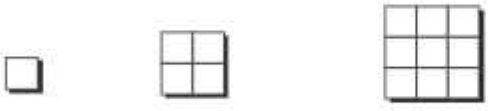
A pattern is a repeated arrangement of numbers, shapes or colours in an object(s) or event(s).

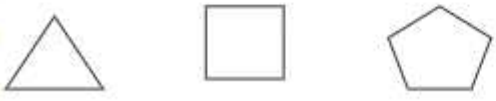
What new is added in your understanding of pattern?

Write in the give space.

Try to create pattern of your choice in the objects shown below.

Observe the patterns and draw next two in given spaces.





Try to create pattern of your choice.

Share with your friend and request him/her to extend your pattern.

Let's observe the calendar given below:

Try to identify number patterns and write in the given space.

Example: -4, 11, 18, 25

(All Sunday's)

(The common difference among them is 7)

Share your work with your friends, parents and teachers.

Appreciate each other's work.

Have a happy learning experience.

Session - 37
Algebra

Learning outcome:
Extends and creates more patterns.

Dear student, how are you feeling today?

Circle the smiley that matches your mood today.

Today we are going to form different patterns.

The paper straws are given below.

Try to form patterns of your choice by using straws.

Student's response:

Rohan and Sheela have formed pattern using paper straws.

Observe their pattern.

Now, try to extend the pattern.

Note the number of straws used in every step.

Number of V's	1	2	3	4	5	6	7	8	9	10
Straws used in pattern	2	4								

Can you observe any relation between number of straws used in this pattern?

Write your observations in the given space.

Number of straws required in a pattern is twice the number of V's formed.

After observing Rohan's and Sheela's work, try to form a new pattern in the given space.

Note number of straws used in every step.

Step	1	2	3	4	5	6	7	8	9	10
Straws used in pattern										

Can you observe any relation between number of straws used in your pattern?

Write your observations in the given space

Now reflect and write in the space given below: What new is added in your learning?

Write in the give space.

My reflection	**able to count number of straws used in every step.**
Student's reflection	

You have done a great work!!
Now, prepare some paper straws and try to make different patterns with them.

Let's explore Rohan's and Sheela's pattern

My observation:-

Number of straws required in a pattern = twice the number of V's formed.

Write your observations?

Number of straws required in a pattern = ____ × number of V's formed.

For convenience, let us write the letter n for the number of V's formed.

My expression:-

Number of straws required in the pattern = 2 × n = 2n

(2 × n is same as 2n)

Value of n is not fixed.
It can take any values 1,2,3,...
'n' is an example of variable.

Write your expression?

Number of straws required in the pattern = _____ = _____

Why did teacher used letter 'n' to represent number of V's formed?

Student's expression:

Teacher's expression:

The symbol 'n' can be any values(numbers).
For example, if we have to count number of straws required in 10th step or in 10 V's.
By applying the generalize rule for finding number of straws required = 2n
We can easily find number of straws required in 10th step or in 10 V's by putting 10 in place of n.

Number of straws required in 10th step or in 10 V's = 2(10) = 20

You can further add your observations in teacher's expression.

Write the number of straws used in each step (using the relation derived above)

Number of V's	1	2	3	4	5	6	7	8	9	10
Value of n	n = 1	n = 2	n = 3							
Straws used in pattern (2n)	2	4	6							

Share your work with your friends, parents and teachers.

Appreciate each other's work.

Reflect and write what new is added in your learning?

Write in the give space.

My reflection	Able to find number of straws used in each step by deriving a relation using alphabet.
Student's reflection	

Let's explore.

For convenience, let us write the letter _____ for the pattern formed in step 1.

What is your expression? (Express by using a letter)

Number of straws required in a pattern = _____

Write number of straws used in each step

Step	1	2	3	4	5	6	7	8	10	100

Share your work with your friends, parents and teachers.

_____

Appreciate each other's work.

_____

Very good

You have done a wonderful job.

Session - 38
Algebra

Learning outcomes:
Identifies arithmetic expression.

Dear student, how are you feeling today?

(✓) the smiley that is matches to your mood today.

Let's know each other.

Introduce yourself

Teacher's introduction

My name is Rakesh.

I am 40 years old.

I am working as a teacher.

I have 12 years of teaching experience.

Now, try to identify expression that contains numbers.

Student's response:

I am 40 years old.

I have 12 years of teaching experience

What is arithmetic expression?

Student's response:

An arithmetic expression is an expression that contains numbers and arithmetic operators (+, -, ×, ÷).

For example: - My age is 40 years.

My teaching experience is 12 years.

You can further add your observations in teacher's expression.

Reflect and write what new is added in your learning?
Write in the given space.

My reflection	Able to identify arithmetic expression.
Student's reflection	

Write any arithmetic expression of your choice in the given space.

Share your work with your parents, friends and teachers.

Appreciate each other's work.

Session - 39
Algebra

Note : To be continued from previous session

Learning outcome:-
Identifies and differentiates arithmetic and algebraic expressions.

Dear student, how are you feeling today?

Encircle a smiley that matches your mood today.

Try to understand the given table and fill the blanks.

(You can take help of your teacher and friends.)

Arithmetic expression	It says
3 + 7	7 is added to 3
9 - 4	___ is subtracted from ___
4 × 11	___ is multiplied by ___
20/5	___ is divided by ___
(3 × 5) + 2	3 is multiplied by ___ and then 2 is added

I am giving you some key words which tell you about operations to be use for given mathematical expressions.

Addition (combine) (+)	Subtraction (less) (-)	Multiplication (×) (grouping of equal values)	Division (divides into equal groups) (÷)
Add / Plus / Total / Increased by/ More than /	Minus / Difference/ Subtract / Less than / Decreased by / Take away /	Product / Times/ multiply/	Quotient / divide /

In 2nd session of algebra:-

We used letter 'n' for the number of V's formed.
So, number of straws required in a pattern = 2 × n = 2n
Is 2n is an arithmetic expression?

Student's response: - Yes / No

Teacher's response: - No

Value of n is not fixed.
It can take any values 1,2,3,...
n is an example of variable.

You can further add your agreements or disagreement in teacher's response.

Expressions can be formed from variables too.

For example: $3x$ or 3 x x (3 is multiplied by x)
p – 10 (10 is subtracted from p)

Note that $3x$ is same as 3 × x

What is an algebraic expression?

Student's response:

An algebraic expression is a combination of constants, variables and operators. (+, -, ×, ÷).

You can further add or suggest your agreements or disagreements in teacher's response.

Reflection: - What new is added in your learning?

Write in the given space.

My reflection	I will be able to identify algebraic expression.
Student's reflection	

Try to write some more examples of mathematical expressions that contains variables.

Now, complete the following table:

Expression in words	Algebraic expression
The product of 7 and p	7p
4 less than 8	
q divided by 4	
5 times y	
Sum of x and 3	
4 take away from y	
3 is multiplied by x and then 5 is subtracted from the product	
10 is multiplied by y and then 2 is added to the product	

Complete the given table:

Algebraic expression	Expression in words
x + 7	7 is added to x
y - 5	
p × 10	
x ÷ 5	
(2 y) + 3	

Share your work with your friends, parents and teachers.
Appreciate each other's work.

Session - 40
Algebra

Learning outcome:
Forms algebraic expressions.

Dear student, how are you feeling today?

put (✓) on smiley that is matches to your mood today.

Visit to cow farm

Sonu and Golu visitd a cow farm.

They start counting number of legs of cows and noted in the table below:

Now, you try to fill the given table further.

Number of cows	1	2	3	4	5	6	7	8	9	10
Total number of legs	4	8								

Can you observe any relation between number of Cows and total number of legs?

Student's expression:

Fill in the given blanks:

Total number of legs in a group of cow = _____ × number of Cows.

For convenience, let us write number of Cows be p (p is variable here)

Now, we can generalize a rule for total number of legs.

So, total number of legs = _____ × _____

Generalized rule for number of legs of p cows is 4p

This generalized rule is also called algebraic expression.

Now, fill the given table using the algebraic expression derived above.

Number of cows	1	2	3	4	5	6	7	8	35	100
Value of p	p = 1	p = 2	p = 3							
Total number of legs (4p)	2	4	6							

Reflection: - What new is added in your learning?

Write in the give space.

Teacher's reflection	able to form algebraic expressions in different situations.
Student's reflection	

Try to create a situation in which algebraic expression can be useful.

Student's expression: -

Your done a great work.

Share and discuss your work with your friends, parents and teachers.

Session - 41
Algebra

To be continued from previous session - 6

Learning outcome:
Applies algebraic expressions in real life situations.

Dear student, how are you feeling today?

Select the word that is matches to your mood today.

Happy **thankful** **celebration** **hopeful**

Let's explore Algebraic expression in some real-life situations.

John is younger brother of Mary.

Mary is 5 years older than John.

Now complete the table given below:

If John's age is (in years)	5	7	18	39	55	60	72
Then Mary's age is (in years)	10	12					

Try to find the rule or expression which gives the age of Mary with respect to age of john. (Use a variable to write the rule)

Student's response:

First I will suppose John's age.
So, let John's age is x years.
Then age of Mary is x + 5.

The rule or expression showing Mary's age is (x + 5)

The cost of 1 kg apple in Delhi is two times cost of 1 kg apple in Shimla's farm.

Why the apples in Delhi is costlier than apples in Shimla's farm?

Discuss with your friends.

Now complete the table given below:

If cost of 1 kg apple in Shimla's farm is (in rupees)	30	35	40	50	60	70
Then cost of 1 kg apple in Delhi is (in rupees)	60					

Try to find the rule or expression which shows the cost of 1 kg apples in Delhi.

(Use a variable to write the rule)

Student's response: -

Let cost of 1 kg apple in Shimla is y
Then the cost of 1 kg apple in Delhi is 2y

The rule or expression to show cost of 1 kg apple in Delhi is 2y

Reflect and write in the given space, what new is added to your learning.

Teacher's reflection	able to form algebraic expressions in different situations.
Student's reflection	

In a factory of Jeans, a worker is appointed to stitch 3 pockets in each Jeans.

Now complete the table given below:

If number of Jeans are	4	10	20	25	30	100
Then total pockets stitched are	12					

Try to find the rule or expression showing total number of pockets stitched.
(Use a variable to write the rule)

Student's response:

Share your work with your friends, parents and teachers.
Appreciate each other's work.

Session - 42
Algebra

Note : To be continued from previous session...

Learning outcome:
Applies algebraic expressions in real life situations.

Dear student, how are you feeling today?

Select the word to your mood.

Happy **thankful** **celebration** **hopeful**

Let's explore Algebraic expression in some more real-life situations.

Activity: How fast these animals are? (Fill the blanks)

Pictures of animal	Name of animals and allotted symbol	speed of Animal	Speed in numbers
	Chetah	C=80 km per hour	80 km per hour
	Lion	L = C - 10	70 km per hour
	Tiger	T = L + 5	_____
	Zebra	Z = C - 15	_____
	Rabbit	$R = \frac{C}{2}$	_____

Explore : Select your five favorite birds and research about their speed. Create a similar table showing results in which only one of the results is given.

Activity: Book a taxi cab

Taxi cab companies often have a fixed charge and then certain amount per kilometer.

Taxi charges

The fixed charge for first km is Rs 25 followed by Rs. 20 for each km after it.

You hired a taxi and travelled 10 km. How much amount you have to pay?

Fill the given table

Distance travelled	Fixed charge for first one km is Rs. 25 Rs	10 for every 1 km	Total Amount to pay
3 km	Rs 25	Rs. 20 for 2 km	Rs. 45
4 km			
			Rs. 35
		Rs. 50 for 4 km	
231 km			

Try to select a correct algebraic expression showing the amount charged by taxi cab driver.

Algebraic expression 1: 20 x : where x stands for distance travelled more than 1 km.
Algebraic expression 2: 25 + x: where x stands for distance travelled more than 1 km.
Algebraic expression 3: 25 + 10x: where x stands for distance travelled more than 1 km

Share your work with your friends, parents and teachers.
Give constructive feedback to each other's work.
Appreciate each other's work.

Note for Teacher:

Constructive feedback

Constructive feedback is the type of feedback aimed at achieving a positive outcome by providing someone with comments, advice or suggestions that are useful for their work.

Session - 43
SOLID SHAPES

Learning outcome: -
Demonstrates the properties of cube and cuboid.

Dear student, How are you feeling today?

Select your emoji

Observe some cuboidal shapes around you. Relax for 5 minutes and write what properties of cuboid you observed.

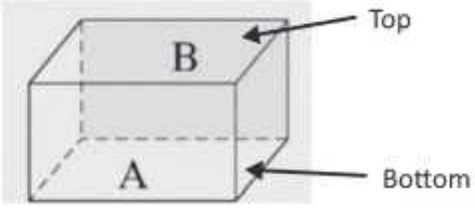
Student's response:

Mathematics book has 12 sides , 6 faces and 8 vertices Door has 12 sides , 6 faces and 8 vertices	

I observed that it has 3 pairs of opposite faces.

Pick one of the cuboidal objects e.g., empty shoe box and mark its front face as A and face directly opposite to it (shaded face in figure) as B. A and B are opposite faces.

(Shade A and B sides)



How many pairs of opposite faces does a cuboid have? _____

Mark the second pair of opposite faces as Cand D.

Mark the third pair of opposite faces as E and F.

Carefully cut out the faces. Fit face A on the top of face B.

What do you notice? Make a list of all properties you have discovered for a cuboid?

Student's response:

Opposite faces of cuboid are equal.	

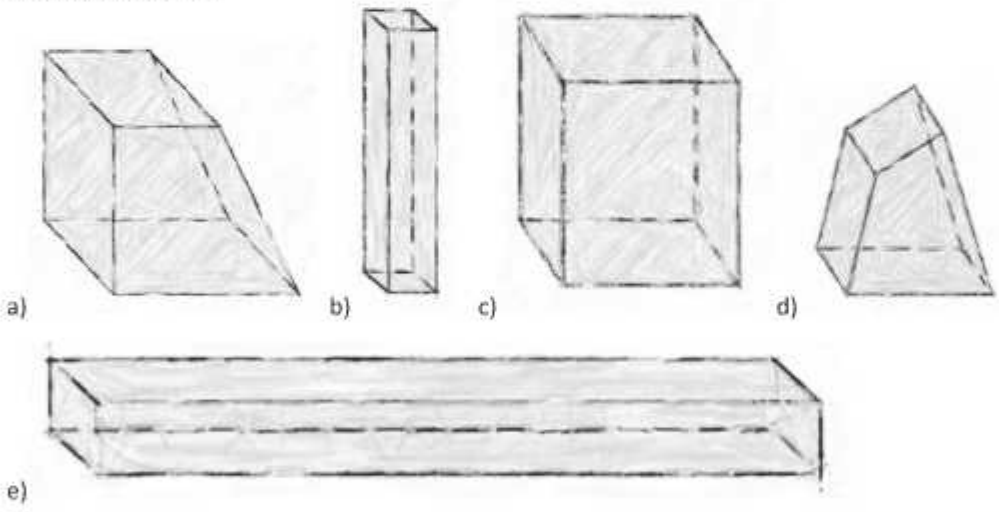
Let us now try same process with a box in the shape of a cube and make a list of all properties you have discovered for a cube?

Explore the relation between adjacent faces too.

Student's response:

All the faces of cube are equal.	

Now let us try to find out which of the given shapes are cuboids? Think of the reason and share it with your teacher.



Let us now reflect on what we learnt.

1. Are all cubes cuboids?
2. Are all cuboids cubes?

How are you feeling about your learning tour today?

Share your learning with your parents?

Session - 44
SOLID SHAPES

Learning outcome: -
Demonstrates the properties of cylinder and cones.

Dear student, A very good day !!!
How is your mood today.

Would you like to extend your learning of solid shapes?

Observe your surroundings. Take few minutes, relax and then make a list of few objects which are cylindrical in shape. You can draw also.

Student's response:

Pencil, cream - bottle	

Here is my collection of cylindrical objects.

Now you reflect and compare your observation with mine and observe again.

Student's response:

Look at these objects closely and try to answer

1. How many flat faces has it? _____.
2. How many curved faces has it? _____.
3. Are the flat faces opposite to each other? _____.

Try to answer these questions for each of the cylindrical object?

What can you say about number of faces of a cylinder?

Student's response: _____

Number of curved faces = _____

Number of flat faces = _____

How many vertices does a cylinder have? _____

Let us try to explore more properties of a cylinder.

Mark T (for Top) on one of the flat face of a cylinder.

Mark B (for bottom) on the other flat face.

Stand the cylinder on face B. Draw the outline of the face.

What shape is it? _____

Student's response: _____

Now place face T on the outline for face B.

Does it fit?_____

What can you say about two flat faces?

Student's response:

Repeat same procedure for other cylinders.

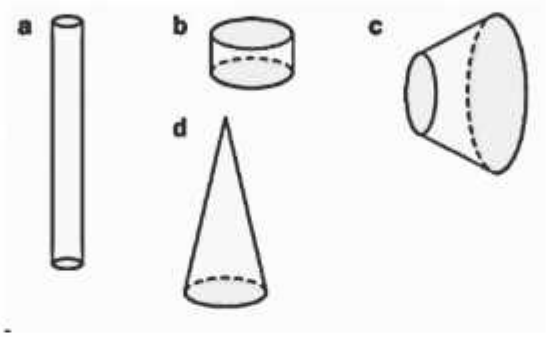
Do you get the same answer each time?

Student's response: _____

Now reflect and write down all the properties you discovered for cylinder?

Student's response:

Look at the images given below and try to find which of these are cylinders. Give reasons also.



Student's response:

So students, I think, today has been a beautiful learning day.

Extend your working for cones and try to collect its properties.

How was your day?



Let us share our learning with our siblings.

Session - 45
SOLID SHAPES

Learning outcome:
Extends the understanding of solid shapes to pyramids and prisms.

Note : Before working on these sessions go through session 43 & 44 on solid shapes.

Dear student! Encircle the picture which best describes your mood to learn today.



Great! You know to express your mood.

Observe this picture. Have you seen this before? Relax take 5 minutes to observe it and then write your observations in the space below.

The pyramids at Giza in Egypt were built some 4500 years ago. They are, of course, shaped like pyramids.

Student's observations:

Pyramid of Egypt	

My information about it is 'Pyramid of Egypt'. Egypt is on the other side of the world and we can not walk or drive to go there. Earlier I assumed the shape of the pyramids as a triangle.

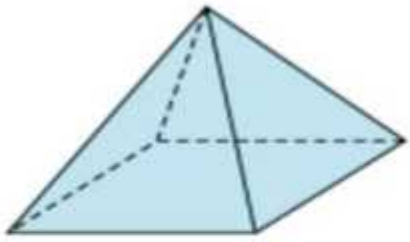




Now **reflect** on your observation compare your observation with mine and try to list out or draw objects which you can relate with the shape of pyramid.

Student's response:

This shape is a **pyramid.**



The base of this pyramid is a square. It is called a square-based pyramid.

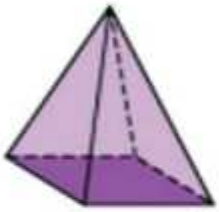


Fig. 1

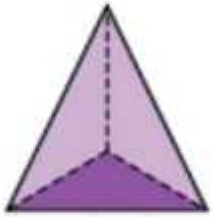


Fig. 2

Fig. 3

Here are some sketches of pyramids. The base of each has been shaded.

Try to name the pyramid by the shape of its base.

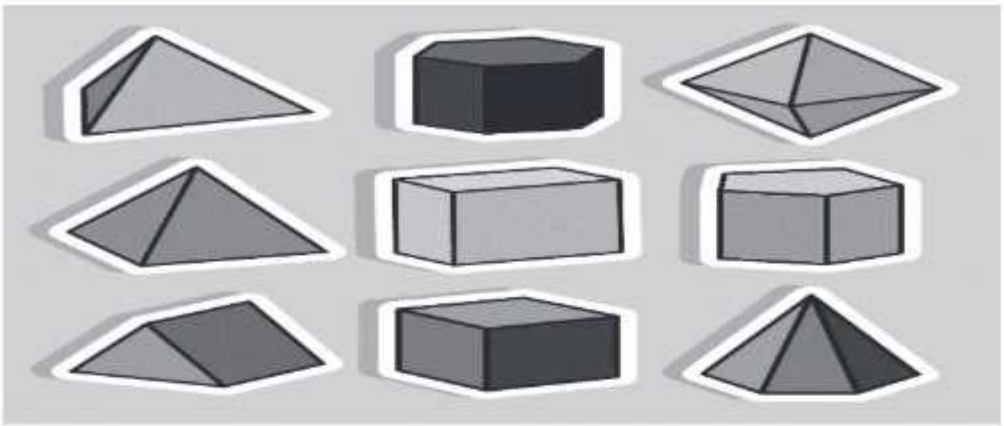
Student's response:

Fig. 1 can be named as square – based pyramid.

A triangular based pyramid is also called tetrahedron.

The sides of the pyramid will always be triangular in shape.

Observe the difference in the following shapes and try to write your observations



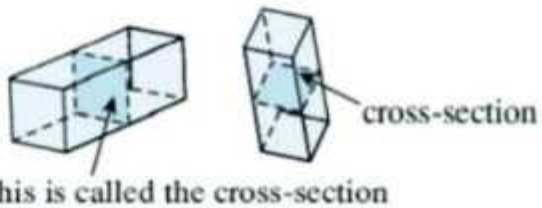
Student's response:

All the sides of some shapes meet at one point.	

Solid shapes which have two identical faces (any polygon) ; the other faces are rectangles is called a prism.

Here are some objects similar to the shape of prism.

A prism is a solid shape with constant cross section



Observe the things above and try to write the shape of cross section.

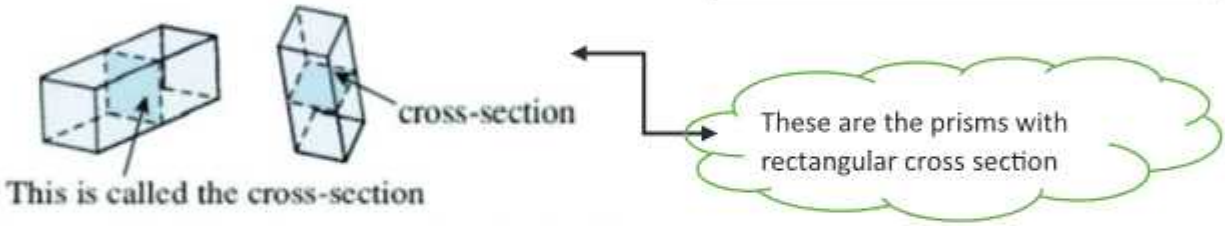
Student's response:

Watermelon – triangle Swing - triangle	

How a prism looks like if it has a rectangular cross section?

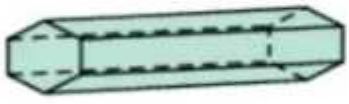
Student's response:

You are correct ....

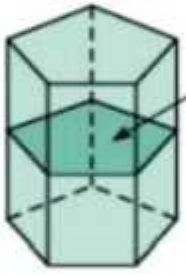


Observe and try to name these prisms

Triangular prism



_____



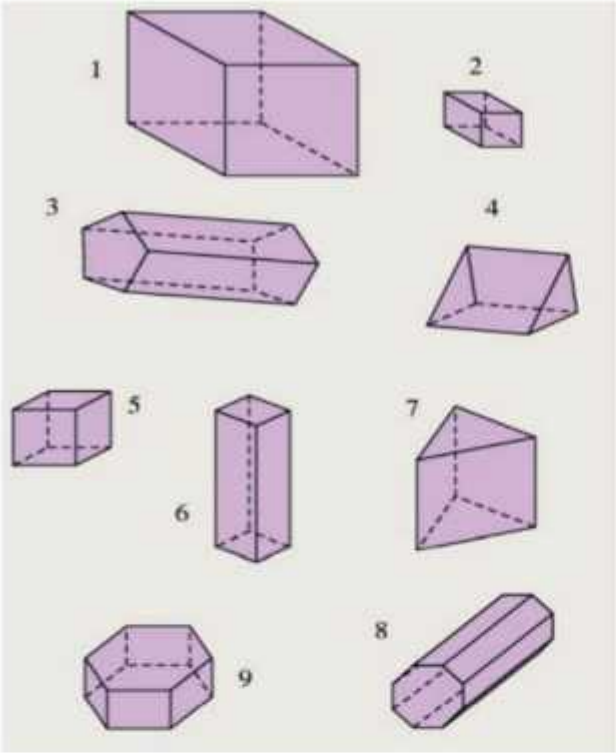
_____

Explore

Are all cubes prisms? _____

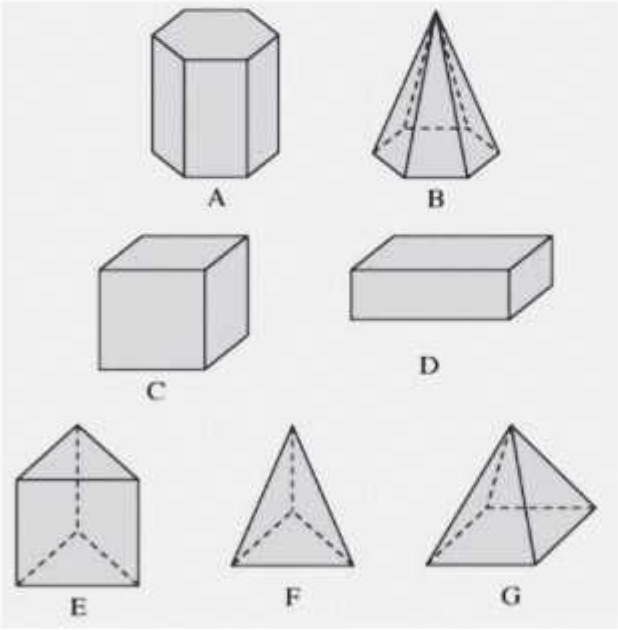
Are all prisms cubes? _____

Try to find which of the following prisms are cuboids, triangular prisms other prisms



Prism	Type
1	Cuboid
2	
3	
4	
5	
6	
7	
8	
9	

Classify these shapes as pyramids and prisms.



Shape	Pyramid/prism
A	
B	
C	
D	
E	
F	
G	

Celebrate your learning by looking forward to classify objects you get in various categories.

Share your learning with your mother.