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MATHS WISE

Teaching Guide

4

SECOND EDITION

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Plan Your Work and Work Your Plan

Before creating a lesson plan, it's essential to understand the art of teaching. Effective teaching involves connecting with students' daily lives and revisiting previously learned material. A well-structured lesson plan is crucial to engaging every student in the classroom. There are three key components to lesson planning:

A. Curriculum:

A curriculum should be tailored to meet students' needs and school objectives, avoiding overambition and haphazard planning, particularly in math education.

B. Instruction:

Teachers can use various methods, such as verbal explanations, visual aids, and inquiry-based learning, to deliver instruction. The best teachers adapt their approach to suit their students' needs, continuously updating their skills and methodology.

C. Evaluation:

Evaluation is a tool to assess not only students' understanding but also the effectiveness of the teacher's instruction. It helps teachers refine their approach and ensure students achieve their full potential.

By considering these three facets, teachers can create comprehensive lesson plans that promote meaningful learning and student engagement.

D. Long-term Lesson Plan

A long-term lesson plan covers the entire term and typically involves school coordinators outlining the core syllabus and unit studies. When planning, two crucial factors to consider are:

- **Time frame:** Allocating sufficient time for each topic to ensure comprehensive coverage.
- **Prior knowledge:** Assessing students' existing knowledge of the topic to inform the planning process.

An experienced coordinator will consider the topic's complexity and the students' ability to grasp it within the given time frame. Assigning the optimal number of lessons for each topic is essential to avoid overspending time on easier topics, which could impact the time needed for more challenging topics later.

E. Suggested Unit Study Format

Weeks	Dates	Month	Number of Days	Remarks

Short-term Lesson Planning

The responsibility of the course teacher. The term "lesson" originates from the Latin word "lectio," meaning the action of reading, but in this context, it refers to the action of teaching a topic in the classroom. To plan a topic effectively, consider the following suggested format, while also being open to adapting and improving your approach based on your school's and colleagues' methods.

When planning a lesson, consider the following steps:

1. **Topic:** Identify the topic title.
2. **Overview:** Assessing students' prior knowledge of a topic is a crucial step in the learning process, involving the evaluation of what students already know, understand, and can do related to the topic before instruction begins.

To assess prior knowledge, teachers can use various methods, including:

- Pre-assessment quizzes or tests to gauge students' understanding of the topic.
- Class discussions to explore students' thoughts, ideas, and experiences related to the topic.

By assessing prior knowledge, teachers can create a more effective and engaging learning environment, ultimately leading to better student outcomes.

3. **Objectives:** Clearly defining the learning objectives for a topic is a crucial step in the lesson planning process. Learning objectives specify what students are expected to know, understand, and be able to do by the end of the lesson or topic.

By clearly defining learning goals, teachers can create a roadmap for instruction, guide assessment, and promote student understanding, ultimately leading to more effective teaching and learning.

4. **Time Frame:** Accurately estimating the time required for each topic is vital to ensure a successful lesson plan. However, class dynamics can be unpredictable, and flexibility is essential to adapt to the unique needs and responses of each class. Note that introductory sessions often require more time, but as the topic progresses, students may learn faster, allowing for potential reductions in the allocated timeframe.

To effectively manage classroom time, teachers should:

- establish a general time frame for each topic,
- be prepared to adjust as needed,
- monitor student progress,
- prioritize essential tasks, and leave buffer time for unexpected events or questions, ensuring a flexible and adaptive lesson plan.

5. **Methodology:** This refers to how you will demonstrate, discuss, and explain the topic to your students. Effective methodology involves using a range of teaching methods to cater to different learning styles, incorporating technology, providing opportunities for questions and feedback, and encouraging active learning through group work and problem-solving activities. By using varied methodologies, teachers can create an engaging, interactive, and student-centred learning environment that promotes deeper understanding and application of the topic.

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6. **Resources Used:** Refers to the materials and tools needed to support teaching and learning.
   - **Tangible materials:** Everyday objects that will help students to visualize and understand complex concepts.
   - **Printed materials:** Exercise books, worksheets, and test worksheets to provide students with hands-on practice and assessment opportunities.
   - **Assignments and projects:** Longer-term tasks that require students to apply their knowledge and skills.
   - **Digital resources:** Online tools, software, and multimedia resources, such as educational apps, videos, and interactive simulations, to enhance engagement and understanding.

By identifying and listing the resources needed, teachers can ensure that they have everything required to deliver effective instruction and support student learning.

7. **Continuity:** Continuity refers to reinforcing learning throughout a topic to ensure students retain and build upon previously acquired knowledge. To achieve continuity, teachers can alternate between class work and homework, gradually increase task difficulty, use varied teaching methods and resources, and provide regular feedback and assessment. By planning for continuity, teachers help students develop a strong foundation of knowledge and skills, making connections between lessons and topics, and promoting deeper understanding and application of the subject matter.
8. **Supplementary Work:** To further enhance student learning, teachers can consider additional activities to complement their instruction.
   - **Group projects or individual research:** Encourage students to work collaboratively or independently on projects that delve deeper into the topic, promoting critical thinking, problem-solving, and creativity.
   - **Presentations or assignments:** Provide opportunities for students to demonstrate their understanding through presentations, reports, or other assignments, helping to develop their communication and critical thinking skills.
9. **Evaluation:** Ongoing assessment is essential to monitor student progress, identify areas of improvement, and inform teaching adjustments. Strategies include:
   - **Regular quizzes and self/peer correction:** Administer quizzes to check students' understanding and provide opportunities for self-reflection and peer feedback.
   - **Formal tests at the end of the topic:** Conduct comprehensive tests to assess students' mastery of the topic and identify areas where they may need additional support.
   - **Continuous monitoring of student progress:** Regularly review student work, observe their participation, and engage in one-on-one discussions to inform teaching adjustments and ensure students are on track to meet learning objectives.

By incorporating supplementary work and ongoing evaluation, teachers can create a comprehensive and supportive learning environment that fosters student growth and achievement.

Scheme of Work

Unit: Estimated number of Lessons:

Specific Learning Outcomes (SLOs):

These are the expected changes or improvements in students' knowledge, attitudes, or skills by the end of a lesson. Teachers should list the SLOs in a precise format, ensuring they are SMART (Specific, Measurable, Achievable, Relevant, Time-bound). There can be multiple SLOs for a lesson.

Prior Knowledge Assessment:

Teachers should list clear, concise questions to assess students' awareness before introducing new concepts and skills. These questions can be asked randomly or as a quiz but should be brief. This assessment demonstrates students' readiness to learn and stimulates interest. Teachers should have a clear idea of the expected answers.

Resources:

Plan a short activity or strategy to capture students' attention and transition from the previous lesson. This activity should be interesting and relevant to the students, such as a discussion on scientific exploration, interesting facts, or real-life applications of the topic. Outline the teaching activities and steps in sequence, specifying their impact on student learning.

Class Assignment:

Specify the written work students will complete in their notebooks during the lesson.

Home Assignment:

Specify the work students will do at home. Home assignments should reinforce or extend what was learned in class, not repeat the same work or introduce entirely new topics.

Evaluation:

Evaluation should occur within the lesson through activities or tools that assess students' learning based on the lesson's objectives. Home assignments should not be used for evaluation. Teachers should evaluate students during and after learning to understand their progress and adjust teaching methods accordingly. Assessment is ongoing and can be formative or summative.

Ways to Evaluate Teaching and Student Learning:

- Oral Assessment: Ask concept-check questions.
- Written Assessment: Use quizzes, games, classwork, homework, and tests.
- Teacher's Assessment: Engage students in discussions or observe them during activities.
- Peer Assessment: Students provide feedback on their classmates' work.
- Personal Assessment: Students evaluate their own performance.

Bringing Innovative Mathematical Pedagogy to the Classroom

Introduction

Effective mathematics instruction is a complex and dynamic process that necessitates a combination of theoretical foundations, practical strategies, and a comprehensive understanding of how students learn.

Creating a Supportive Learning Environment

A supportive learning environment is essential for cultivating a positive and inclusive classroom atmosphere. This involves establishing a space where students feel secure in taking risks, posing questions, and delving into mathematical concepts. Teachers can accomplish this by utilizing strategies such as:

Think-Pair-Share: This method encourages students to collaborate in pairs to solve mathematical problems and exchange their solutions with the class.

Number Talks: This technique entails discussing mathematical concepts and resolving problems collectively as a class, enhancing active engagement and communication among students.

Math Centers: This approach pertains to organizing various stations or centers in the classroom where students can engage in diverse mathematical activities, fostering hands-on learning and exploration.

The Concrete-Representational-Abstract (CRA) Framework

Concrete-Representational-Abstract (CRA) is a core framework for teaching mathematics that consists of introducing concepts using tangible objects, progressing to representational models, and ultimately, abstract symbols. This framework enables students to cultivate a profound understanding of mathematical concepts by linking abstract ideas to concrete experiences.

For instance, when instructing on addition, students can begin with counting blocks, advance to number lines, and finally utilize numerical equations. This gradual transition from concrete to abstract aids students in establishing a solid foundation in mathematics.

Differentiated Instruction

Differentiated instruction is vital for addressing various learning needs and abilities within the classroom. Teachers can implement different strategies, such as:

Choice Boards: This technique entails offering students a board or chart that presents various learning activities or tasks, allowing them to select the activities that best align with their learning style and capability.

Choice boards can be customized to specific learning objectives and may include a wide array of activities, such as:

- Completing a worksheet or practice exercise
- Creating a visual project or presentation
- Conducting an experiment or investigation
- Participating in a group discussion or debate

This strategy empowers students to take ownership of their education, progress at their own rate, and make selections that resonate with their interests and strengths.

Math Journals: This strategy includes having students keep a journal or notebook where they can document their thoughts, ideas, and solutions to mathematical challenges.

Students can utilize their journals to:

- Record their thinking and problem-solving processes
- Draw diagrams or illustrations to assist them in understanding mathematical concepts
- Write reflections on their learning and identify areas requiring further practice
- Create concept maps or vocabulary lists to aid them in organizing their thoughts

Resource-Based Learning: This strategy consists of supplying students with an assortment of resources and materials to improve their learning, such as:

- Manipulatives (e. g., Geo boards, base ten blocks, pattern blocks)
- Games and puzzles
- Real-world objects and materials (e. g., measuring cups, scales, geometry shapes)
- Printed or photocopied worksheets and activity sheets

This approach enables students to interact with mathematical ideas in a practical and engaging manner, even without technology.

Inquiry-Based Learning and Problem-Solving

Inquiry-based learning and problem-solving are essential elements of math education that focus on motivating students to explore, examine, and share their discoveries. Instructors can create open-ended tasks that encourage students to think critically, reason mathematically, and formulate problem-solving techniques.

For instance, while teaching geometry, students can engage in a "shape scavenger hunt," where they identify and describe different shapes found in their surroundings. This kind of inquiry-driven learning aids students in attaining a more profound comprehension of mathematical principles and enhances their critical thinking and problem-solving abilities.

Assessment and Feedback

Assessment and feedback are crucial aspects of successful math instruction that guide teaching and support student development. Educators can apply a variety of methods, including:

- **Formative assessments:** This method involves consistently evaluating student comprehension and development throughout a lesson or unit, offering feedback and modifying instruction as necessary.

- **Self-assessment:** This approach involves encouraging students to ponder their own learning and comprehension, recognizing both strengths and weaknesses.
- **Peer feedback:** This technique involves having students give support and feedback to one another, fostering collaboration and communication.

Technology Integration- Digital

Incorporating technology is another vital element of contemporary math education that can enrich teaching and learning. Instructors can employ digital instruments, such as math software, applications, and online materials, to:

- **Engage students:** Digital resources can offer interactive and immersive learning situations that capture students' attention and enhance motivation.
- **Promote interactive learning:** Digital tools can encourage active learning and investigation, allowing students to discover and experiment with mathematical ideas.
- **Provide real-time feedback:** Digital resources can deliver instant feedback and evaluations, assisting educators in pinpointing areas where students require further assistance.

Cultural Relevance and Responsiveness

Cultural relevance and responsiveness are significant factors in math education that involve recognizing and appreciating the varied backgrounds, experiences, and viewpoints of students. Educators can implement culturally responsive teaching methodologies, such as:

- **Incorporating real-world examples:** Instructors can use practical examples and applications to demonstrate mathematical concepts, making them more meaningful and understandable for students.
- **Using multicultural resources:** Teachers can utilize multicultural materials and resources to expose students to a variety of perspectives and experiences.
- **Promoting student voice and agency:** This is a powerful way to engage students in mathematics education, foster a sense of ownership and motivation, and develop essential skills for lifelong learning. By offering students opportunities to take charge of their learning, educators can help them develop into confident, self-directed, and mathematically literate individuals.

Conclusion

To summarize, effective math instruction necessitates a thorough and diversified approach that encompasses various strategies, techniques, and tools. By establishing a nurturing learning space, applying the CRA framework, customizing instruction, fostering inquiry-based learning, leveraging assessment and feedback, integrating technology, and encouraging cultural relevance and responsiveness, educators can cultivate deep understanding, inspire a passion for mathematics, and equip students for success in a more intricate and interconnected world.

The Features of a Dynamic Classroom: A Comprehensive Approach to Effective Teaching and Learning

Introduction

A dynamic classroom is a learning environment that is characterized by engagement, motivation, and a sense of community. It is a space where students feel valued, supported, and challenged to reach their full potential. In this essay, we will explore the features of a dynamic classroom and discuss how teachers can create such an environment to promote effective teaching and learning.

Student-Centered Learning

- **Personalized Learning:** Students have different learning styles, interests, and abilities. A dynamic classroom accommodates these differences by offering personalized learning experiences.
- **Inquiry-Based Learning:** Students are encouraged to explore, investigate, and discover concepts and ideas through hands-on activities and real-world applications.

Collaborative Learning

- **Teamwork and Communication:** Students work together in groups to complete tasks, projects, or activities, promoting teamwork, communication, and problem-solving skills.
- **Diverse Perspectives:** Collaborative learning allows students to share their ideas, perspectives, and experiences, creating a rich and diverse learning environment.
- **Peer Feedback and Support:** Students provide feedback and support to each other, promoting a sense of community and responsibility.

Technology Integration

- **Digital Tools and Resources:** Technology is used to support teaching and learning, enhance student engagement, and promote collaboration.
- **Online Learning Platforms:** Online platforms provide access to a wide range of resources, including online textbooks, educational apps, and multimedia content.
- **Virtual Field Trips and Guest Speakers:** Technology allows students to participate in virtual field trips and interact with guest speakers from around the world.
- **Case Studies:** Real life case scenarios integrating story sums in mathematics classes.

Flexible Learning Spaces

- **Learning Zones:** Teachers create different learning zones or areas, each with its own unique characteristics and features, to promote movement, collaboration, and creativity.
- **Outdoor Learning Spaces:** Outdoor learning spaces provide opportunities for hands-on learning, exploration, and discovery in a natural environment.

Real-World Applications

- **Project-Based Learning:** Students work on real-world projects that require them to apply what they have learned to solve problems and create solutions.
- **Industry Partnerships:** Schools partner with industries and organizations to provide students with opportunities to work on real-world projects and gain practical experience.
- **Service Learning:** Students participate in service-learning projects that require them to apply what they have learned to make a positive impact in their community.

Ongoing Assessment and Feedback

- **Formative Assessments:** Teachers use formative assessments to monitor student progress and understanding throughout the learning process.
- **Feedback and Self-Assessment:** Students receive regular feedback and are encouraged to reflect on their own learning, set goals, and identify areas for improvement.
- **Summative Assessments:** Teachers use summative assessments to evaluate student learning at the end of a lesson, unit, or semester.

Teacher Reflection and Professional Development

- **Reflective Practice:** Teachers reflect on their teaching practices, seeking ways to improve and innovate.
- **Professional Learning Communities:** Teachers participate in professional learning communities to share best practices, collaborate with colleagues, and learn from each other.
- **Workshops and Conferences:** Teachers attend workshops and conferences to stay up to date with best practices and new technologies.

Embracing Diversity and Inclusion

- A dynamic classroom values diversity and promotes inclusion.
- Teachers create a welcoming environment using diverse texts, images, and resources that reflect students' backgrounds and experiences.
- This helps students feel seen, heard, and valued, building trust, motivation, and a sense of belonging.

Fostering a Growth Mindset

- A dynamic classroom fosters a growth mindset.
- Teachers encourage students to view challenges as opportunities for growth and learning, rather than threats to their ego.
- Teachers praise effort, persistence, and progress, rather than just talent or ability, to help students develop a growth mindset.

Key Takeaways

- A dynamic classroom empowers students to take ownership of their learning, unleash their creativity, and reach their full potential.
- Educators can create a learning ecosystem that fosters academic excellence, social growth, and emotional well-being by embracing the features of a dynamic classroom.

Creating a Sustainable Learning Environment

- A dynamic classroom is a sustainable learning environment that promotes long-term growth and development.
- Teachers can create a sustainable learning environment by establishing clear routines, providing opportunities for student reflection, and encouraging ongoing feedback and assessment.
- By creating a sustainable learning environment, educators can help students develop the skills and habits necessary to succeed in an ever-changing world.

Review and Assess Exercises

- **Regular Review:** Regular review and assess exercises help students reinforce their understanding of key concepts, identify areas for improvement, and develop problem-solving skills.
- **Adjusting Instruction:** By regularly reviewing and assessing student progress, teachers can adjust their instruction to meet the diverse needs of their students.

A dynamic classroom is a transformative environment that empowers students to take ownership of their learning, unleash their creativity, and reach their full potential. By embracing the features outlined in this essay, educators can create a learning ecosystem that fosters academic excellence, social growth, and emotional well-being.

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Unit

1 Whole Numbers and Operations

Learning Framework

Counting up to 6-Digit Numbers

The student will demonstrate an understanding of the number system by counting up to 6-digit numbers, showcasing their ability to represent and communicate numerical information effectively. In the "Number Sequence" activity, students will count and write numbers up to 6-digit numbers in sequence, starting from 1,000,000, and identify patterns in the number sequence.

Reading and Writing 6-Digit Numbers

The student will accurately read and write numbers up to 6-digit numbers in both numerals and words, demonstrating their understanding of numerical representation. Through the "Number Bingo" game, students will practice reading and writing 6-digit numbers by marking the corresponding numeral on their bingo card when a number is called out in words.

Recognizing Place Value

The student will demonstrate a thorough understanding of place value by recognizing and identifying the value of each digit within a 6-digit number. In the "Place Value Puzzle" activity, students will arrange digits in the correct order to form a 6-digit number, identifying the place value of each digit and explaining their reasoning.

Comparing Numbers

The student will utilize symbols (<, >, =) correctly to indicate the relationship between numbers up to 99,999 and demonstrate the ability to arrange numbers in ascending or descending order. Through the "Number Sorting Game", students will sort numbers into order, using comparison symbols to check their work and explain their reasoning.

Rounding Numbers

The student will reinforce their understanding of rounding numbers by accurately rounding numbers to the nearest tens, hundreds, and thousands. In the "Rounding Scavenger Hunt" activity, students will find numbers in the classroom or school and round them to the nearest specified place value, explaining their reasoning.

Rounding to the Nearest Ten Thousand

The student will demonstrate the ability to round numbers to the nearest ten thousand, showcasing their understanding of numerical approximation and estimation. Through the "Rounding Bingo" game, students will practice rounding numbers to the nearest ten thousand by marking the correct answer on their bingo card.

Adding and Subtracting 5-Digit Numbers

The student will demonstrate proficiency in performing mental and written calculations involving addition and subtraction of up to 5-digit numbers. In the "Math War" game, students will solve addition and subtraction problems and compare answers, explaining their reasoning and identifying patterns in the calculations.

Solving Real-Life Addition and Subtraction Problems

The student will apply mathematical skills to real-life situations, using addition and subtraction to solve problems that require calculation. Through the "Real-Life Math" project, students will work in groups to solve real-life scenarios that require mathematical problem-solving, such as calculating the cost of groceries or the area of a room.

Estimating Answers

The student will develop estimation skills, enabling them to approximate answers to mathematical questions involving addition and subtraction. In the "Estimation Station" activity, students will estimate answers to addition and subtraction problems, then calculate the exact answer and compare it to their estimate, explaining their reasoning.

Multiplying 4 and 5-Digit Numbers

The student will demonstrate the ability to multiply up to 4 and 5-digit numbers by 1-digit, 2-digit, and 3-digit numbers, both mentally and in written form. Through the "Multiplication Bingo" game, students will practice multiplying numbers by marking the correct answer on their bingo card.

Solving Real-Life Multiplication Problems

The student will apply multiplication skills to real-life situations, using mathematical modeling to solve problems that involve multiplication. In the "Multiplication in Real Life" project, students will work in groups to solve real-life scenarios that require multiplication, such as calculating the area of a room or the cost of materials.

Dividing 4-Digit Numbers

The student will demonstrate the ability to divide up to 4-digit numbers by 1-digit and 2-digit numbers. Through the "Division War" game, students will solve division problems and compare answers, explaining their reasoning and identifying patterns in the calculations.

Solving Real-Life Division Problems

The student will apply mathematical skills to real-life situations, using division to solve problems that require calculation. Through the "Division in Real Life" project, students will work in groups to solve real-life scenarios that require division, such as sharing food or materials among a group of people, explaining their reasoning and identifying patterns in the calculations.

Using Appropriate Operations

The student will develop problem-solving skills by using appropriate operations to solve real-life situations involving addition, subtraction, multiplication, and division. In the "Math Problem-Solving" activity, students will work in groups to solve real-life scenarios that require mathematical problem-solving, selecting the appropriate operation to use and explaining their reasoning.

Describing Patterns

The student will identify and describe patterns found in tables, charts, and number sequences, developing an understanding of pattern rules. Through the "Pattern Detective" activity, students will analyze tables and charts to identify and describe patterns, stating the pattern rule and explaining their reasoning.

Completing Number Patterns

The student will recognize and complete given increasing and decreasing number patterns by stating a pattern rule. In the "Pattern Completion" activity, students will complete number patterns by identifying the next number in the sequence, stating the pattern rule and explaining their reasoning.

Writing Expressions

The student will identify and write expressions or number sentences to represent problems that may involve unknowns. Through the "Expression Builder" activity, students will work in groups to build expressions or number sentences to represent real-life scenarios, identifying the unknowns and explaining their reasoning.

Using Relationships in Patterns

The student will identify and use relationships in well-defined patterns, developing an understanding of pattern rules. In the "Pattern Relationships" activity, students will analyze patterns to identify relationships between numbers, stating the pattern rule and explaining their reasoning.

Reading and Writing Roman Numerals

The student will accurately read and write Roman numerals 1–100, demonstrating an understanding of numerical representation. Through the "Roman Numeral Bingo" game, students will practice reading and writing Roman numerals by marking the correct answer on their bingo card.

Lesson Plan

Suggested Time: 2 periods

Objectives

- Count up to 6-digit numbers (one hundred thousand 100,000).
- Read and write up to 6-digit numbers (one hundred thousand 100,000) in numerals and in words.
- Recognise the place value of each digit up to 6-digits (100,000).

Concept Connector

Using ***Concept Connector*** given on ***Page 2*** reinforce the concept of place value of 4-digit numbers. Ask students why numbers are important. They will have many real-life examples of how and why they use numbers and see them being used in their lives. Ask the students if they think that numbers are complicated. They have, so far, learnt a lot about numbers, and they realise they have much more to learn. Ask them to justify their answers. Point out that everything they have learnt about numbers has been helpful for them when working with numbers. For example, knowing about place value made it much easier for them to add and subtract big numbers. Discuss ***Maths in Action on Page 2*** to make the connection with real life.

Exploring the Objective

Explain the place value of each digit 5-digit numbers using place-value chart on ***Page 2.*** Using the example of adding 1 to the greatest 5-digit number on ***Page 2,*** introduce the smallest 6-digit number to the class. Explain the new place value 'hundred thousand' using examples of various 6-digit numbers. Reinforce the concept by assigning ***Math Lab Page 2*** and take feedback from the class.

Activity

Fun with Patterns

What You Need:

Numeral Cards

Numbers in words Cards

Baskets

How to Play:

Divide the class into 4 groups A, B, C, and D. The first competition will be between group A and group B. One member of group A will pick a card and read the number. Group B will listen to it carefully, then discuss among themselves and choose a member to write that number in figures and in words on the whiteboard and show it to the class. A blank ***Place Value Chart*** like the one given on ***Page 2*** can be provided to the class to provide support. Now, group B will pick a card and group A will write the number in figures and in words on the white board. Three cards will be picked by

each group. The group with all correct answers will be the winner. Follow the same procedure for group C and group D.

Next the two winning groups will compete against each other. This time read a number and the group that writes all correct answers first will be the winner.

Reflection

- Identified and recognized place value of digits in a number
- Students demonstrated an understanding of writing numbers in words and in numerals

Exercise

Question 1 of Exercise 1 on Page 3 tests numbers' place value skills. ***Question 2 and 3*** deals with the skills of writing numbers in words and in numerals. Assign ***Question 1(a, b, c, d), 2(a, b, d), and Question 3(a, b, d)*** as individual task to monitor their learning. You can give the remaining questions as homework for further practice and reinforcement. Have students sharpen their mathematical skills by practicing the questions given in ***QR Code Activity Sheet*** given on ***Page 4.***

Extension Activity

- Create riddles about numbers based on their place value of their digits. For example: "I have 4 digits. My tens digit is 3 less than my ones digit and hundreds digit is twice my thousands digit. I have the greatest digit at ones place and smallest digit at thousands place. What number am I?"
- Students can create their own riddles and challenge their classmates to solve them.

Whole Numbers

Learning Objective:

- Identify the place values of numbers up to one hundred thousand (100 000).
- Read and write numbers up to one hundred thousand (100 000).

Let's Talk Math:

- Ask pupils why numbers are important.
- They will have many real-life examples of how and why they use numbers and see them being used in their lives.

Make Sure You Have:

- Activity Cards
- Bowls

Activity: Number Match Challenge

Duration: 1 Lesson **Group Activity**

Let's Try It:

- Prepare two sets of 6-digit number cards: Cards with numbers written in numerals and cards with numbers written in words.
- Divide the class into 4 groups: A, B, C, and D.
- Group A picks a card from the "Numerals" basket and reads the number aloud.
- Group B listens, discusses, and writes the number in figures on the whiteboard.
- Group B then picks a card from the "Numerals" basket. And Group A writes the number in figures on the whiteboard.
- The group with all correct answers wins the round
- The other two groups follow the same steps as in the first round.
- The teacher reads a number aloud, and both groups must write the correct answer.
- The first group to write all correct answers wins.
- Reversed Process: Instead of reading the number, groups pick cards from the "Numbers in Words" basket.
- They show the card to the other group, and the opposing group writes the number in figures

Assessment:

- Read out five 6-digit numbers, and after each number, say a place value up to hundred thousand. Ask pupils to write them down, in digits, and circle the stated place value. Ask them to peer review at the end.

Addition and Subtraction

Learning Objective:

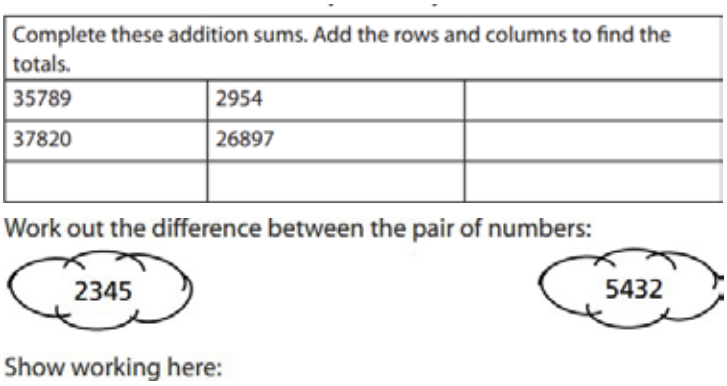
- Add numbers up to 5-digits.
- Subtract numbers up to 5-digits.

Let's Talk Math:

- Ask the pupils if they think that numbers are complicated.
- Ask pupils how they feel about learning different kind of numbers.

Make Sure You Have:

- Activity Cards



Complete these addition sums. Add the rows and columns to find the totals.

35789	2954	
37820	26897	

Work out the difference between the pair of numbers:

2345 5432

Show working here:

Activity: Number Adventure

Duration: 1 Lesson **Individual Activity**

Let's Try It:

- Part 1: Addition
- Provide each student with an activity card containing numbers arranged in rows and columns.
- Pupils will add the rows horizontally and add the columns vertically.
- They will write their answers in the given spaces on the card.
- Once completed, the activity cards will be peer checked.
- Part 2: Subtraction of Complex Numbers
- Distribute activity cards containing subtraction sums of complex numbers.
- Time the activity to introduce a challenge.
- Once finished, the activity cards will be peer reviewed.

Assessment:

- Give pupils time at their desks to go through the activity cards to understand the given task well. This should be done silently. After, have pupils peer review, remind them to remember to write numbers in correct rows and columns.

Division and Multiplication

Learning Objective:

- Solve real-life situations involving multiplication of numbers up to 4-digit by 2-digit.
- Solve real-life situations involving division of numbers up to 4-digit by a number up to 2-digits.

Let's Talk Math:

- Ask them to think out loud about how their knowledge of numbers improves the quality of their lives.

Make Sure You Have:

- Activity Cards
- A4 Sheets

Activity: Number Puzzles

Duration: 1 Lesson **Pair Activity**

Let's Try It:

- Pupils have prior experience with multiplying and dividing smaller numbers, so they will now tackle complex numbers.
- Prepare activity cards with multiplication and division sums of complex numbers.
- Distribute the cards to each student.
- Time the activity for added challenge.
- After completion, have the activity cards peer checked.
- Make pairs of the students and provide each pair with an A4 sheet.
- Ask each pair to create at least five sums of 3-digit number patterns, containing 5 to 10 terms.
- After completing their sums, the students will swap sheets with their peers.
- Each partner will complete the sequence and define the rule for finding the next term.
- They will also identify whether the sequence is in ascending or descending order.

Assessment:

- Show them activity cards with simple multiplication and division word problems. Ask them to solve individually and write their answers on the white boards to share with other pupils.

Name: _____

Date : _____

Place Value Chart

Hundred Thousands	Ten Thousands	Thousands	Hundreds	Tens	Ones

Hundred Thousands	Ten Thousands	Thousands	Hundreds	Tens	Ones

Hundred Thousands	Ten Thousands	Thousands	Hundreds	Tens	Ones

Pair up 2 to 3 numbers from the following pages at random and put them appropriately in the **place value chart**.	*Whole numbers*

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Name: _____

Date : _____

Place Value Cards

0	1	2	3	4
5	6	7	8	9
00	10	20	30	40
50	60	70	80	90
000	100	200	300	
400	500	600	700	
	800	900		

Pick out number pairs at random and First correctly write them according to their **place values**, then compare and order to determine which is **larger and smaller**. Ask students to use these cards to help them learn to read and write numbers up to 100,000.	*Whole numbers*

Name: _____

Date : _____

Note: Page is left blank for cutting purposes

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Name: _____

Date : _____

Place Value Cards

0000	1000
2000	3000
4000	5000
6000	7000
8000	9000

Ask students to use these cards to help them learn to read and write numbers up to 100,000.	*Whole numbers*

Name: _____

Date : _____

Note: Page is left blank for cutting purposes

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Name: _____

Date : _____

Place Value Cards

00000	10000
20000	30000
40000	50000
60000	70000
80000	90000

Ask students to use these cards to help them learn to read and write numbers up to 100,000.	*Whole numbers*

Name: _____

Date : _____

Note: Page is left blank for cutting purposes

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Name: _____

Date : _____

Place Value Cards

000000	100000
200000	300000
400000	500000
600000	700000
800000	900000

Ask students to use these cards to help them learn to read and write numbers up to 100,000.	*Whole numbers*

Name: _____

Date : _____

Note: Page is left blank for cutting purposes

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Name: _____

Date : _____

Number Cards

1	5	10	15
100	150	1250	
1500	1000	17500	
1750	10000	12500	
100000		15000	

Ask students to use these cards to help them learn to read and write numbers up to 100,000.	*Whole numbers*

Name: _____

Date : _____

Note: Page is left blank for cutting purposes

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Name: _____

Date : _____

What's in the Box?

Item	Cost	Quantity	Total
Apple	30	11	
Orange		12	144
Mangoes	50	5	
Lychees	20	20	
Cherries	30		90
Bananas		15	150

Item	Cost	Quantity	Total
Pencil		5	165
Pen	30	11	
Ink		2	120
Sharpener	25		375
Eraser		5	25
Notebook	90	3	

Fill in the blanks to complete the given receipts. Show your working.	*Multiplication and Division*

Name: _____

Date : _____

Four Operations

1. Zain has just finished writing the second chapter of her book. If the first chapter is of 11,300 words, and the second is of 13,955, how many words has she written altogether?

2. Mustafa buys a 18,500 g bag of dog food, and puts 5960 g in a storage container. How much food will be left in the bag?

3. At a school, there are 1050 students and 42 teachers. If every teacher has the same number of students, how many would that be?

4. Alina writes a story book with 322 pages. If she has 10,550 books printed, how many pages will that be?

Show your working in the above box.	*Whole numbers and operations*

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Name: _____

Date : _____

Number Pattern Cards

18760	29760		51760	

4350	4450			4750	4850	4950	

9460	8460		6460	5460	4460		

320084	330084	340084		

Complete each pattern by putting in the **missing values**. Then make your own **patterns**. Swap your book with a peer and complete each other's patterns.	*Number patterns*

Name: _____

Date : _____

Number Patterns in a chart

1	2	3	4	5	6	7	8	9	10
11	12	13	14	15	16	17	18	19	20
21	22	23	24	25	26	27	28	29	30
31	32	33	34	35	36	37	38	39	40
41	42	43	44	45	46	47	48	49	50
51	52	53	54	55	56	57	58	59	60
61	62	63	64	65	66	67	68	69	70
71	72	73	74	75	76	77	78	79	80
81	82	83	84	85	86	87	88	89	90
91	92	93	94	95	96	97	98	99	100

- Write the number pattern in green and describe the rule.

  _____

- Write the number pattern in blue and describe the rule.

  _____

Ask the students to colour their own patterns and describe the rule.	*Number patterns*

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Review and Assess

Whole Numbers and Operations

1. Write the place value of each underlined digit.

a. 1<u>9</u>409 ____ b. <u>5</u>51643 ____

c. 10345<u>6</u> ____ d. 4732<u>9</u> ____

e. 564<u>5</u>41 ____ f. <u>1</u>00088 ____

2. Write these numbers in words.

a. 37,942 _____

b. 628,807 _____

c. 200,368 _____

3. Fill in the blanks with < or > to compare the given numbers.

a. 65,356 ☐ 65,358 | b. 32,567 ☐ 23,578 | c. 6538 ☐ 789

4. Write these numbers in descending order (from largest to the smallest).

a. 22,456 23,678 21,556 _____

b. 43,256 34,257 42,357 _____

5. Write rules for each increasing and decreasing pattern.

	Pattern	Rule
a.	0, 3, 6, 9, 12, ...	
b.	100, 95, 90, 85, ...	
c.	150, 200, 250, 300, …	

6. Complete the following patterns.

a. 56, 53, 50, ____, 44

b. 110, ____, 130, 140, 150, ____

c. ____, 19, 15, 11, ____, 3

7. Follow the rule and write down the first three terms of the pattern.

	Rule	Pattern
a.	Start with 7 and add 10.	
b.	Start with 55 and subtract 5.	

8. Arrange the numbers vertically and solve.

a. 42,352 + 67,543	b. 24,568 + 35,312
c. 74,638 – 33545	d. 85,964 – 74,544
e. 6048 × 53	f. 7973 × 67
g. 6125 ÷ 10	h. 1200 ÷ 75

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9. Solve the following real-life problems.

	Problems	Working
a.	There were 86,284 tourists who visited a zoo in the months of June and July. If 47,876 of them visited in June how many tourists visited in July?	
	Answer: ☐ tourists	
b.	Shoaib donates Rs 56,780 to an orphanage for their education and Rs 46,980 for their food. What is the total amount that Shoaib donated?	
	Answer: Rs ☐	
c.	Saad had 67,388 marbles. If he lost 29,985 of them, how many marbles are left?	
	Answer: ☐ marbles	
d.	Javeria needs Rs 67,500 to buy a new TV. If she has Rs 58,450, how much more does she need?	
	Answer: Rs ☐	

e. A factory produces 1084 footballs in a day. How many will it produce in 25 days?

Answer: ☐ footballs

f. Khursheed has 1998 metres of material to make curtains. He distributes the material equally among his 54 tailors, how much does each receive?

Answer: ☐ m

g. A shopkeeper has 2150 boxes of erasers. If each box contains 25 erasers, then how many erasers are there in the boxes altogether?

Answer: ☐ erasers

h. The cost of 32 toy buses is Rs 9920. What is the cost of one toy bus?

Answer: Rs ☐

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i. There are 20,755 total students in a town school. If 9800 of them are girls, how many boys are there?

Answer: ☐ boys

j. An NGO plants 21,345 trees in one month and 30,993 in another month. How many total trees does it plant in both the months?

Answer: ☐ trees

k. There were 3198 sheep to be shared equally into 39 paddocks. How many sheep would there be in each paddock?

Answer: ☐ sheep

l. A school collects Rs 25 from each of its student for charity. If there are 1820 students in the school, what is the total amount collected?

Answer: Rs ☐

Whole Numbers and Operations

1. Write the place value of each underlined digit.

a. 1**9**409 — 9 thousans

b. **5**51643 — 5 hundred thousands

c. 10345**6** — 5 tens

d. 4732**9** — 9 ones

e. 564**5**41 — 5 hundreds

f. **1**00088 — 1 hundred thousands

2. Write these numbers in words.

a. 37,942 — Thirty-seven thousand, nine hundred and forty two

b. 628,807 — six hundred and twenty-eight thousand, eight hundred and seven

c. 200,368 — two hundred thousand, three hundred and sixty-eight

3. Fill in the blanks with < or > to compare the given numbers.

a. 65,356 [<] 65,358 | b. 32,567 [>] 23,578 | c. 6538 [>] 789

4. Write these numbers in descending order (from largest to the smallest).

a. 22,456 23,678 21,556 — 23,678; 22,456; 21,556

b. 43,256 34,257 42,357 — 43,256; 42,357; 34,257

5. Write rules for each increasing and decreasing pattern.

	Pattern	Rule
a.	0, 3, 6, 9, 12, ...	add 3 to next term
b.	100, 95, 90, 85, ...	Subtract from previous term
c.	150, 200, 250, 300, ...	Add 50 to next term

6. Complete the following patterns.

a. 56, 53, 50, [47], 44

b. 110, [120], 130, 140, 150, [160]

c. [23], 19, 15, 11, [7], 3

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7. Follow the rule and write down the first three terms of the pattern.

	Rule	Pattern
a.	Start with 7 and add 10.	7, 17, 27
b.	Start with 55 and subtract 5.	55, 50, 45

8. Arrange the numbers vertically and solve.

a. 42,352 + 67,543

$$\begin{array}{r} 42352 \\ +\,67542 \\ \hline 109895 \end{array}$$

b. 24,568 + 35,312

$$\begin{array}{r} 24568 \\ +\,35312 \\ \hline 59880 \end{array}$$

c. 74,638 – 33545

$$\begin{array}{r} 74638 \\ -\,33545 \\ \hline 41093 \end{array}$$

d. 85,964 – 74,544

$$\begin{array}{r} 85964 \\ -\,74544 \\ \hline 11420 \end{array}$$

e. 6048 × 53

$$6048 \times 53 = 320544$$

f. 7973 × 67

$$7973 \times 67 = 534191$$

g. 6125 ÷ 10

$$= 61.25$$

h. 1200 ÷ 75

$$= 16$$

9. Solve the following real-life problems.

	Problems	Working
a.	There were 86,284 tourists who visited a zoo in the months of June and July. If 47,876 of them visited in June how many tourists visited in July?	86284 -47876 38408
	Answer: 38408 tourists	
b.	Shoaib donates Rs 56,780 to an orphanage for their education and Rs 46,980 for their food. What is the total amount that Shoaib donated?	56780 +46980 103760
	Answer: Rs 103760	
c.	Saad had 67,388 marbles. If he lost 29,985 of them, how many marbles are left?	67388 -29985 37403
	Answer: 37403 marbles	
d.	Javeria needs Rs 67,500 to buy a new TV. If she has Rs 58,450, how much more does she need?	67500 -58450 9050
	Answer: Rs 9050	

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e. A factory produces 1084 footballs in a day. How many will it produce in 25 days?

1084 × 25
= 27100

Answer: 27100 footballs

f. Khursheed has 1998 metres of material to make curtains. He distributes the material equally among his 54 tailors, how much does each receive?

1998 ÷ 54
= 37m

Answer: 37 m

g. A shopkeeper has 2150 boxes of erasers. If each box contains 25 erasers, then how many erasers are there in the boxes altogether?

2150 × 25
= 53,750

Answer: 53750 erasers

h. The cost of 32 toy buses is Rs 9920. What is the cost of one toy bus?

9920 ÷ 32
= 310

Answer: Rs 310

i. There are 20,755 total students in a town school. If 9800 of them are girls, how many boys are there?

```
  20755
- 09800
  10955
```

Answer: 10955 boys

j. An NGO plants 21,345 trees in one month and 30,993 in another month. How many total trees does it plant in both the months?

```
  21345
+ 30993
  52338
```

Answer: 52338 trees

k. There were 3198 sheep to be shared equally into 39 paddocks. How many sheep would there be in each paddock?

3198 ÷ 39
= 82

Answer: 82 sheep

l. A school collects Rs 25 from each of its student for charity. If there are 1820 students in the school, what is the total amount collected?

1820 × 25
= 45500

Answer: Rs 45500

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Unit 2 Factors and Multiples

Learning Framework

Divisibility Rules and Multiple/ Factor Identification

The student will be able to identify and apply divisibility rules for 2, 3, 5, and 10 to determine if a number up to 4 or 5 digits is divisible by these numbers. They will also be able to differentiate between multiples and factors, recognizing that multiples are the products of a number and an integer, while factors are the numbers that divide a given number without leaving a remainder.

Factor Pairs and Common Factors

The student will be able to find all factor pairs of a given number, recognizing that factor pairs are pairs of numbers that multiply to give the original number. They will also be able to identify common factors of two or more 2-digit numbers, understanding that common factors are the factors shared by multiple numbers.

Common Multiples

The student will be able to find common multiples of two or more 2-digit numbers, recognizing that common multiples are the multiples shared by multiple numbers. They will understand that the least common multiple (LCM) is the smallest multiple shared by two or more numbers.

Prime and Composite Numbers

The student will be able to identify and differentiate between 2-digit prime and composite numbers up to 50. They will understand that prime numbers are numbers greater than 1 that have only two factors: 1 and themselves. In contrast, composite numbers are numbers greater than 1 that have more than two factors.

Lesson Plan

Suggested Time: 3 periods

Objectives

- Identify and differentiate between multiples and factors.
- Find:
  - all factor pairs of numbers.
  - common factors of two or more 2-digit numbers.
- Find:
  - multiples of numbers.
  - common multiples of two or more 2-digit numbers.
- Identify and differentiate between 2-digit prime and composite numbers up to 50.

Concept Connector

Introduce this unit as a continuation of multiplication and division. Before explaining the concept of factors and multiples reinforce multiplication tables of 2 to 10 and divisibility rules of 2, 3, 5, and 10. Students can attempt ***Math Lab Page 7*** to recall the divisibility rules.

Exploring the Objective

Explain the concept of factors to the class by telling them that a factor of a number is a number which divides the number completely i.e. with no reminder. You can explain the topic by using multiplication and division facts. Like 3 x 2 = 6 means 2 and 3 are factors of 6. Explain the difference between prime and composite numbers.

Activity

Discovering Prime and Composite Numbers

What You Need:

Photocopies of ***Number chart given on Page 21***

Colour pencils: Pink, blue, green, yellow, purple

Different coloured counters

How to Play:

Distribute the number chart to the class. Ask students to colour the numbers as follows.

Colour the square containing 1 with pink colour.

Colour all the squares containing numbers that are divisible by 2 with blue colour, except 2 itself.

Colour all the squares containing numbers that are divisible by 3 with green colour, except 3 itself.

Colour all the squares containing numbers that are divisible by 5 with purple colour, except 5 itself.

Colour all the squares containing numbers that are divisible by 7 with yellow colour, except 7 itself.

Circle the numbers that are not coloured.

Discuss the result of the activity with them. Relate the activity with the recognition of composite and prime numbers.

Now Divide the class in groups of 4 and distribute the number of counters (12, 13, 14, 15, 16, ...) to each group. Ask them to arrange the counters to form a rectangle (refer to ***page 23***). Have them try different combinations and record the number of rows and columns each time they make a rectangle. Lead this activity to the introduction of factors.

Reflection

Identified and differentiated prime and composite numbers.

Students demonstrated deeper understanding of factors while solving the questions.

Exercise

Question 2(h) of Exercise 1 can be given as a whole class discussion point. Take feedback from the class and guide them towards the correct answer. Assign the rest of the parts as individual tasks to reinforce the concept of composite and prime numbers. Have students practice factors and common factors by assigning questions of ***Exercise 2*** as classwork. Provide support while doing the classwork. Assign ***QR Code Activity Sheet*** given on ***Page 22*** for reinforcement of the concept.

Extension Activity

Have students explore patterns in prime numbers, such as twin primes (pairs of prime numbers that differ by 2, like 3 and 5, 11 and 13).

Divisibility Tests

Learning Objective:

- Identify divisibility rules for 2, 3, 5, and 10.
- Use divisibility tests for 2, 3, 5 and 10 on numbers up to 5-digits

Let's Talk Math:

- Introduce this unit as a continuation of multiplication and division.
- Before explaining the concept of factors and multiples reinforce multiplication tables of 2 to 10.

Make Sure You Have:

- Activity Cards

Number	Divisible by 2	Divisible by 3	Divisible by 5	Divisible by 10
18702	Yes	Yes	No	No
24900				
15672				
87534				
42207				
59345				

Activity: Number Match Challenge

Duration: 1 Lesson **Group Activity**

Let's Try It:

- First revise the divisibility rules with the class.
- Let the pupils work in pairs.
- Provide each pair with an activity card.
- Time the activity and announce the winning pair, who finished first with all correct answers

Assessment:

- Write ten numbers on the board, all are divisible by only one number. Ask the pupils to use the divisibility rules and figure out which number these are divisible by.

Factors and Multiples

Learning Objective:

- Find factors of a number up to 50.

Let's Talk Math:

- Tell pupils that a factor of a number is a number that divides the number completely, i.e. with no remainder.

Make Sure You Have:

- Cards sheets in light colours.

Activity: Factor Flower Challenge

Duration: 1 Lesson **Whole Class Activity**

- Prepare multicoloured flower cut-outs and place them in a basket.
- Create large flowerpot cut-outs for each student. On each flowerpot, paste a bold, clearly visible number that pupils will find factors for.
- Each student will find the factors of the number on their assigned flowerpot and write the factors on the flower cut-outs.
- Place the flowers back into the basket once factors are written.
- Give one flowerpot to each student.
- Students will then sort the flowers from the basket, selecting the ones with the correct factors of the number on their flowerpot.
- Have the students paste the flowers on their flowerpots.
- Add a challenge by setting a time limit for completing the task.

Assessment:

- Ask the pupils to write four facts about factors of a number.

Name: _____

Date : _____

Divisibility Rules

1	2	3	4	5	6	7	8	9	10
11	12	13	14	15	16	17	18	19	20
21	22	23	24	25	26	27	28	29	30
31	32	33	34	35	36	37	38	39	40
41	42	43	44	45	46	47	48	49	50
51	52	53	54	55	56	57	58	59	60
61	62	63	64	65	66	67	68	69	70
71	72	73	74	75	76	77	78	79	80
81	82	83	84	85	86	87	88	89	90
91	92	93	94	95	96	97	98	99	100

Create your own colour code! On the chart, colour in multiples of 2, 3, 5, and 10.

Use a different colour for each number.

2	3	5	10

Colour in the above boxes to create your own colour code for the chart. Once it is coloured, see if you can identify any patterns or similarities.	*Divisibility tests*

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Name: _____

Date : _____

True or False

1. All numbers that are divisible by 5 end in 0. ☐
2. If the ones digit of a number is divisible by 2 or 0, than the number is divisible by 2. ☐
3. All numbers that are divisible by 10 end in 0. ☐
4. If a number is divisible by 2 it is not divisible by 3. ☐
5. Only numbers that end in 0, 3, 6, and 9 are divisible by 3. ☐
6. 3044 is divisible by 3. ☐
7. 405 is divisible 2. ☐
8. 56354 is divisible by 2. ☐
9. 38001 is divisible by 10. ☐
10. 30609 is divisible by 3. ☐

Try to identify which divisibility rules are correct, and write true or false in the boxes.	*Divisibility tests*

Name: _____

Date : _____

Number Chart

1	2	3	4	5	6	7	8	9	10
11	12	13	14	15	16	17	18	19	20
21	22	23	24	25	26	27	28	29	30
31	32	33	34	35	36	37	38	39	40
41	42	43	44	45	46	47	48	49	50
51	52	53	54	55	56	57	58	59	60
61	62	63	64	65	66	67	68	69	70
71	72	73	74	75	76	77	78	79	80
81	82	83	84	85	86	87	88	89	90
91	92	93	94	95	96	97	98	99	100

- Circle **Prime Numbers** with green
- Cancel **Multiples** of three and five in red
- Colour **Composite Numbers** in blue

Fill in this chart appropriately, following the instructions.	*Prime and composite numbers*

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Name: _____

Date : _____

Number Chart

1	2	3	4	5	6	7	8	9	10
11	12	13	14	15	16	17	18	19	20
21	22	23	24	25	26	27	28	29	30
31	32	33	34	35	36	37	38	39	40
41	42	43	44	45	46	47	48	49	50
51	52	53	54	55	56	57	58	59	60
61	62	63	64	65	66	67	68	69	70
71	72	73	74	75	76	77	78	79	80
81	82	83	84	85	86	87	88	89	90
91	92	93	94	95	96	97	98	99	100

- Colour all **factors** of 36 with blue.
- Colour out all **multiples** of 5 with red.

Fill in this chart appropriately, following the instructions.	*Prime and composite numbers*

Name: _____

Date : _____

Finding Factors

Using prime factors, factorise the following. The first one is done for you.

147	510	285
147 = 3 * 7 * 7		

True or False:

1. 2, 3, 6, and 4 are the only common factors fo 36, 360, and 32.
   _____

2. 92 and 30 are common multiples of 2 and 3. _____

3. 48 and 96 are common multiples of 12 and 16. _____

4. 1 is the only common factor for 33 and 85. _____

5. 9 and 3 are the only common factors for 27 and 72. _____

Solve above questions in pairs.	*Prime factorisation*

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Factors and Multiples

1. Circle all the numbers that are not divisible by 5?

552	6785	76,480	1183
790	1389	70	
6637	95	55,556	3865

2. Underline the numbers which are divisible by 2, circle the numbers that are divisible by 10 and then fill in the given box.

	Numbers divisible by both 2 and 10
152 830 78 2225 777 76,331 2676 2570 6003 214 647 13,130 3876 888	

3. Which is the only even prime number?

_____

4. Write all prime numbers between 30 and 45.

_____

5. Make a list of the factors of each of the given numbers.

a. 16 ☐ b. 32 ☐

c. 24 ☐ d. 49 ☐

6. Write the first four multiples of each of the given numbers.

a. 8 ☐ b. 6 ☐

c. 4 ☐ d. 9 ☐

7. Find the prime factors of the following numbers.

a.

2	36

b.

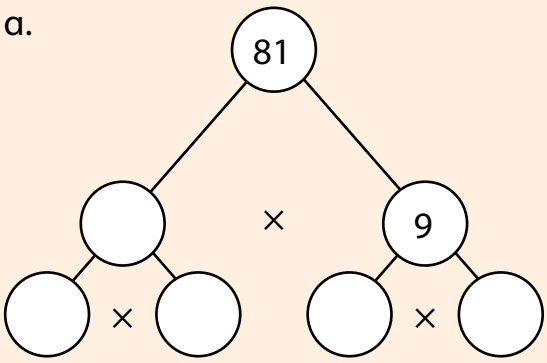
	30

c.

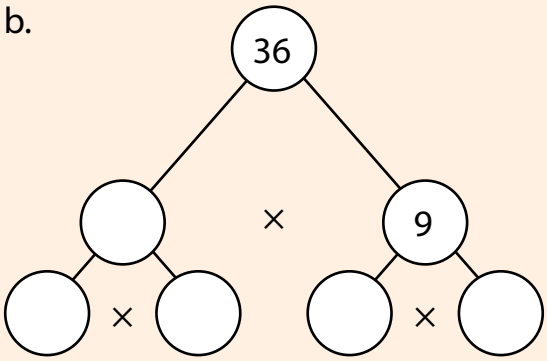
	44

8. Complete the following factor trees to show the prime factors of the given numbers.

a.



b.



9. Find the first three common multiples of the following set of numbers.

	Numbers	3 Common Multiples		Numbers	3 Common Multiples
a.	12 and 14		c.	4 and 6	
b.	10, 12, and 15		d.	3, 6, and 12	

10. Find common factors of the following set of numbers.

	Working	Common factors
26 and 78		
13 and 39		
32, 48, and 56		

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Factors and Multiples

1. Circle all the numbers that are not divisible by 5?

552	6785	76,480	1183
790	1389	70	
6637	95	55,556	3865

2. Underline the numbers which are divisible by 2, circle the numbers that are divisible by 10 and then fill in the given box.

152	830	78	2225
777	76,331	2676	
2570	6003	214	647
13,130	3876	888	

Numbers divisible by both 2 and 10
830, 2570, 13130

3. Which is the only even prime number?

2

4. Write all prime numbers between 30 and 45.

31, 37, 41, 43

5. Make a list of the factors of each of the given numbers.

a. 16 — 1, 2, 4, 8, 16

b. 32 — 1, 2, 4, 8, 16, 32

c. 24 — 1, 2, 3, 4, 6, 8, 12, 24

d. 49 — 1, 7, 49

6. Write the first four multiples of each of the given numbers.

a. 8 — 8, 16, 24, 32

b. 6 — 32, 64, 96, 192

c. 4 — 4, 8, 12, 16

d. 9 — 9, 18, 27, 36

7. Find the prime factors of the following numbers.

a.

2	36
2	18
3	9
3	3
	1

b.

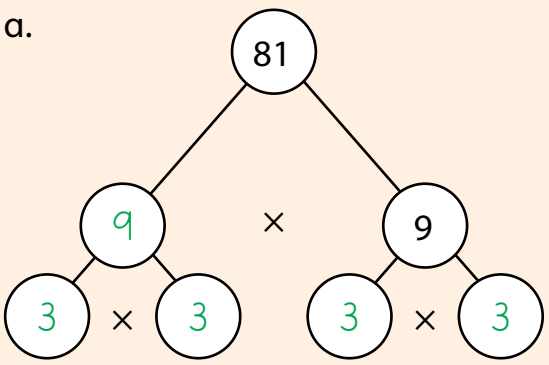
2	30
3	15
5	5
	1

c.

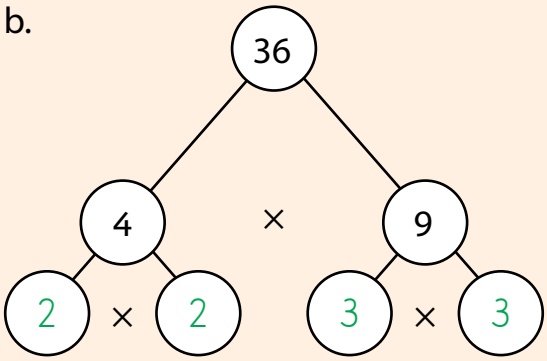
2	44
2	22
11	11
	1

8. Complete the following factor trees to show the prime factors of the given numbers.

a.



b.



9. Find the first three common multiples of the following set of numbers.

	Numbers	3 Common Multiples		Numbers	3 Common Multiples
a.	12 and 14		c.	4 and 6	
b.	10, 12, and 15		d.	3, 6, and 12	

10. Find common factors of the following set of numbers.

	Working	Common factors
26 and 78		2 and 13
13 and 39		13
32, 48, and 56		2, 4, 8

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Unit 3 Fractions

Learning Framework

Fraction Identification and Conversion

The student will be able to identify and differentiate between unit fractions, proper fractions, improper fractions, and mixed numbers. They will also be able to convert improper fractions to mixed numbers and vice versa, demonstrating an understanding of the relationships between these different forms of fractions.

Like and Unlike Fractions

The student will be able to recognize like fractions (fractions with the same denominator) and unlike fractions (fractions with different denominators). They will also be able to compare two unlike fractions by converting them to equivalent fractions with the same denominator.

Fraction Comparison and Ordering

The student will be able to arrange unlike fractions in ascending and descending order, demonstrating an understanding of the relative sizes of different fractions.

Fraction Operations

The student will be able to add and subtract like and unlike fractions (with denominators that are multiples of the same number), demonstrating an understanding of the concepts of equivalence and ordering. They will also be able to multiply and divide proper, improper fractions, and mixed numbers by a whole number, and multiply two fractions and/or mixed numbers.

Real-World Applications

The student will be able to solve real-world word problems involving fractions by identifying appropriate number operations, demonstrating an understanding of the practical applications of fractions in everyday life.

Lesson Plan

Suggested Time: 3 periods

Objectives

- Identify and differentiate between unit fraction, proper, and improper fractions and mixed numbers.
- Convert improper fractions to mixed numbers and vice versa.
- Recognise like and unlike fractions.
- Compare two unlike fractions by converting them to equivalent fractions with the same denominator.
- Arrange unlike fractions in ascending and descending order.

Concept Connector

Using ***Concept Connector given on Page 29,*** make students recall the concept of fractions. Ask the class to discuss how one might use fractions in one's real lives. Examples they might give you from what they have learnt in previous classes may include cooking, or for working with objects that have multiple parts. Ask them to think about why we use fractions, instead of using whole numbers. For example, saying three slices of pizza might be simpler than saying three-eighth of a pizza. As they discuss whether this would be workable, encourage them to use the real-life examples discussed earlier. Prior exploring the objective brainstorm to recall the method of making fractions equivalent by assigning the ***QR Code Activity Sheet*** given on ***Page 29*** in pairs.

Exploring the Objective

Introduce different types of fractions by writing unit, proper, improper fractions, and mixed numbers on the board. Put an example in front of each name and ask them if they get any idea from them. Add two more examples to each type and prompt the class to discuss them. If they are not able to reach a conclusion, explain that in a proper fraction the numerator is always smaller than the denominator, while in an improper fraction the numerator is always equal to or bigger than the denominator. Mixed fraction is made up of a proper fraction and a whole number. Explain the method of converting mixed fractions into improper fractions and vice versa using the table given on ***Page 30*** and solving ***Examples given on Page 30***. Unit fractions are fractions with one as a numerator. Remind pupils that a unit fraction is also a proper fraction. Go over this explanation a few times and ask the class to give you more examples of each type. Write the following fractions on board and ask the students to identify and make groups of proper, improper, and mixed fractions. Explain how to compare unlike fractions by converting them into like fractions using equivalent fractions (***Concept Connector*** given on ***Page 31***).

Activity

Fractions in ascending and descending order

What You Need:

Fraction chits or cards

A bowl/basket

How to Play:

Prepare a bowl full of various types of fractions. Make groups of at least six each and ask each pupil to pick out a fraction. Ask to pick out five fractions and arrange them in ascending order, within their groups. Give them enough time to convert and remind them that even though converting fractions into their simplest form may be a good starting point when trying to order them, sometimes more needs to be done. If any group is struggling, ask them to try to work it out on the board, and prompt the rest of the class to help out. Since this is a very new concept, it allows pupils to try to work it out on their own, however if they. are stuck, help them get to the answer. If all the groups are able to order their fractions, ask them to place their chits back into the bowl, shuffle them, and hand them out again so that the groups can arrange them in descending order.

Reflection

Identified different types of fractions and gave the correct examples of each type.

Students demonstrated deeper understanding of converting mixed numbers into improper fractions and vice versa using appropriate methods.

Exercise

Questions 1 to 4 of Exercise 1 are given in a progression in such a way that start with identifying types of fractions and then converting improper fractions to mixed numbers and vice versa. To practice basic concepts of fractions, assign ***Question 1, 2, 3(a, b, f, g, j)***, and ***4(a, d, f, g, h, I, j)*** as classwork. ***Question 5*** is related to real-life situations. Encourage students to show each step of the solution clearly when they have extracted all the information from the question. ***Exercise 2, Questions 1 to 5*** deal with the comparison of unlike fractions. Have students solve ***Question 1, 2, 3, 4(d), and 5(c)*** in classwork and remaining questions as homework. Assign ***Beyond the Horizon given on Page 41*** in pairs and take feedback from the class.

Extension Activity

Have students solve the following questions.

1. If you ate 1/4 of a pizza and your friend ate 3/8 of a pizza, who ate more? How much more?
2. Place the following fractions on a number line: 1/4, 3/8, 1/2, 5/8, ¾
3. A recipe calls for 2/8 cup of flour and 3/4 cup of sugar. Which ingredient is needed in a larger amount?

Fractions and Types of Fractions

Learning Objective:

- Recognise like and unlike fractions.
- Compare two unlike fractions by converting them to equivalent fractions with the same denominator. Identify (unit, proper, improper) fractions and mixed numbers.
- Convert improper fractions to mixed numbers and vice versa.

Let's Talk Math:

- Ask the class to discuss how one might use fractions in their real lives.
- They may give you examples from the previous classes such as cooking, or for working with objects that have multiple parts.

Make Sure You Have:

- Chits
- Blocks,
- Rubber bands,
- Fraction charts

Activity: Fraction Fun: Comparison, Types, and Conversion

Duration: 1 Lesson **Whole Class Activity**

Let's Try It:

- Prepare chits with fractions (varying denominators).
- In pairs, pupils pick a chit each and compare fractions on the board to determine which is greater, lesser, or equal.
- After solving, the class will review their work.
- Allow up to seven pairs to participate, ensuring five have unlike fractions.
- Form groups of 5-7 students to compare fractions using tools or diagrams. Encourage them to simplify fractions and share tricks.
- On the board, write unit, proper, improper, and mixed fractions.
- Ask pupils to explain each type; if they struggle, provide examples.
- Proper fraction: numerator smaller than the denominator.
- Improper fraction: numerator equal to or greater than the denominator.
- Mixed fraction: whole number and proper fraction, convertible to improper.
- Unit fraction: numerator is 1.
- Have pupils group fractions and convert improper fractions to mixed and vice versa.

Assessment:

- Ask the pupils to compare fractions individually, or in pairs if they are struggling.

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Addition and Subtraction of Fractions

Learning Objective:

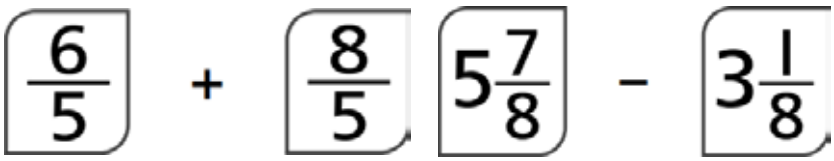
- Add fractions with like denominators.
- Subtract fractions with like denominators

Let's Talk Math:

- Ask them to think about why we use fractions, instead of using whole numbers. For example, saying three slices of pizza might be simpler then saying three-eighth of a pizza.

Make Sure You Have:

- Set of Blocks



Activity: Simplifying and Adding Unlike Fractions

Duration: 1 Lesson **Group Activity**

Let's Try It:

- If the class is comfortable adding and subtracting like fractions, introduce blocks to explain unlike fractions.
- Prepare ten pairs of blocks bound together with rubber bands beforehand.
- Write the problem 2/6 + 1/3 on the board. Explain that these are unlike fractions (different denominators) but can still be added.
- Use blocks to demonstrate how fractions can be represented and simplified visually.
- Draw a diagram on the board to match the blocks.
- Explain that 2/6 = 1/3, showing how the same value can be expressed differently.
- Define simplification as reducing a fraction to its simplest form, making it easier to work with or add/subtract.
- Give an example of simplification: 30/100 simplifies to 3/10.
- Return to the problem and ask pupils to add the fractions now that they understand how to simplify them into like fractions.

Assessment:

- Reinforce the concept of four operations involving fractions before starting this activity.

Multiplication and Division of Fractions

Learning Objective:

- Multiply a fraction (proper, improper), and mixed number by a whole number.
- Multiply two fractions, proper, improper, and mixed number.
- Divide a fraction (proper, improper) and mixed numbers by a whole number.
- Analyse real-life situations involving fractions by identifying appropriate number operations.

Let's Talk Math:

- Discuss with the pupils how multiplying and dividing fractions is like splitting things into smaller and smaller parts.

Make Sure You Have:

- A4 Sheets

Activity: Keep, Flip, Multiply

Duration: 1 Lesson **Individual Activity**

Let's Try It:

- Reinforce the concept of the four operations on fractions.
- Prepare sample activity sheets.
- Give each pupil an A4 sheet, ask them to make question involving multiplication division of fractions and related to real-life scenarios.
- Once they have written the questions ask them to swap the sheets and solve the questions.
- When the task is complete, get it peer checked.

Assessment:

- Make a basket of ample like fraction chits in quantity.
- Ask the first student to write their fraction on the board and make an fraction.
- Instruct the other two to write their fractions on the board.
- Instruct one of them to add a the fraction to the previous fraction.

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Name: _____

Date : _____

One in Four

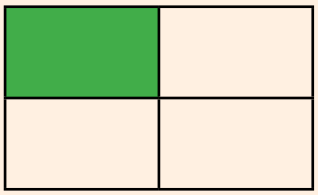
1. When Ali makes coffee for his team, he uses $\frac{3}{4}$ of instant coffee from the jar. On Wednesday, there will be $\frac{1}{2}$ as many people, so how much instant coffee will he need?	+ – * ÷
2. In one day Samana uses $3\frac{2}{3}$ of her phone battery. How much will she use in a week?	+ – * ÷
3. In one week, Aimen uses $\frac{18}{5}$ tanks of fuel. How many tanks does she use in a day?	+ – * ÷
4. Muneeza accidentally adds twice as much sugar to her tea as she wanted. If the tea has $\frac{7}{2}$ teaspoons of sugar, how many teaspoons did she want?	+ – * ÷
5. Saleem drinks $\frac{20}{5}$ glasses of water in a day. How many glasses will he drink in the month of june?	+ – * ÷

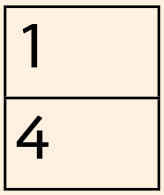
Go through the real-life story sums asking pupils to correctly identify which number operations to use. When they have chosen, ask them to solve the questions in pairs.	*Fractions*

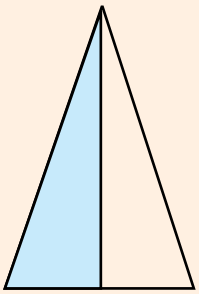
Name: _____

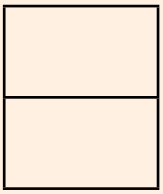
Date : _____

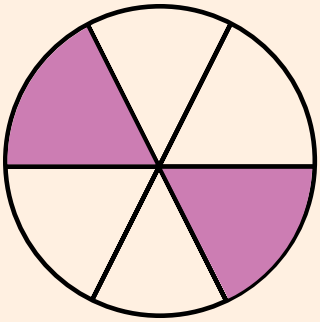
Fun with Fractions

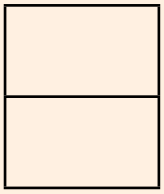


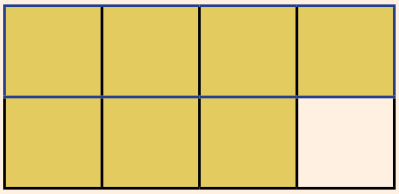


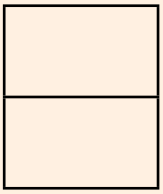


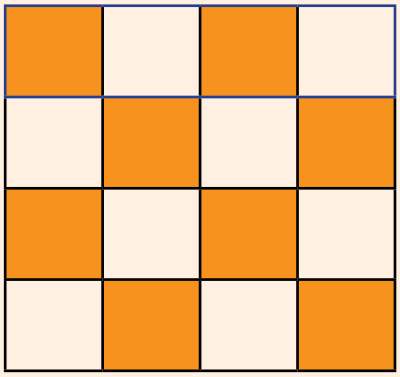


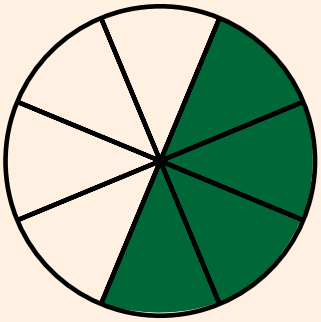












Write the fractions for the coloured parts.	*Fractions*

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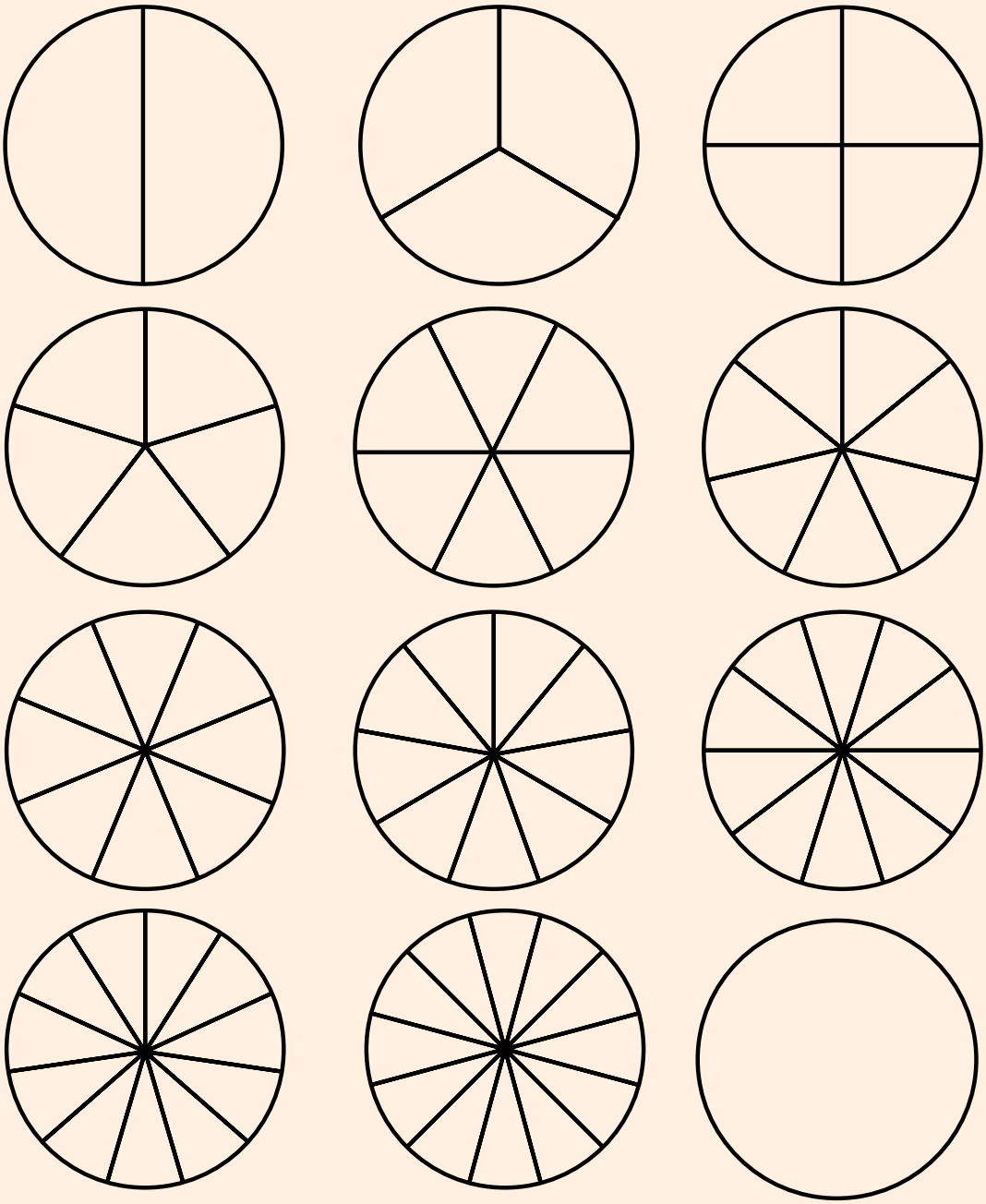
Name: _____

Date : _____

Fraction Discs



Have the students trade books with their peers. They should shade the discs at random and return the book back. In their own books, the students must **represent the shaded figures with fractions.**	*Fractions*

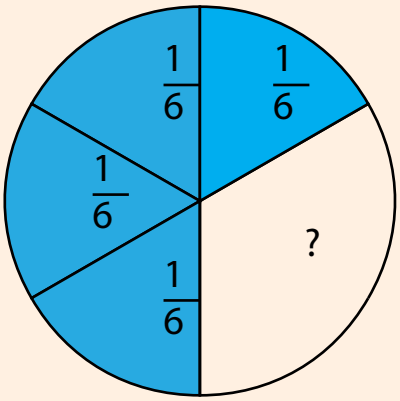
Note: Fraction circles can be used to explore fractions.

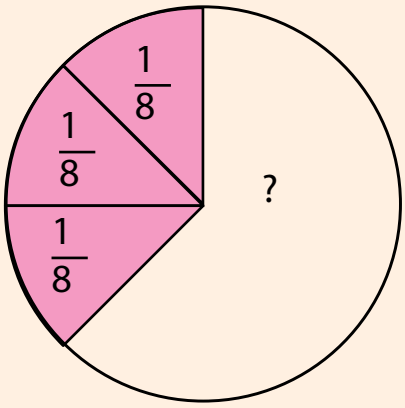
Name: _____

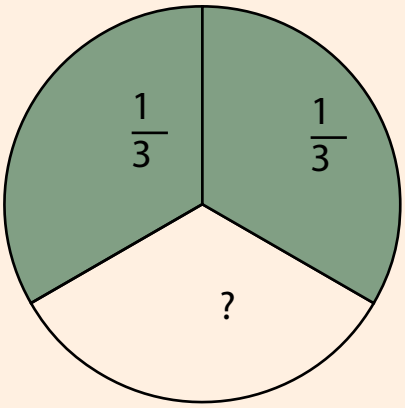
Date : _____

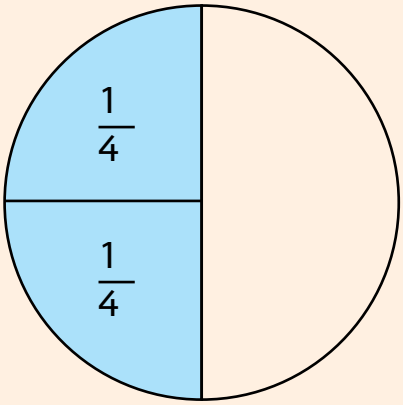
Like Fractions

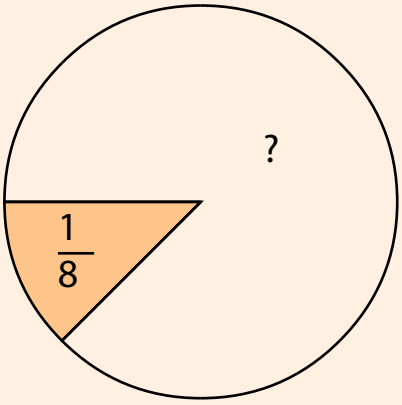
Write the missing fraction in the box for each shape.

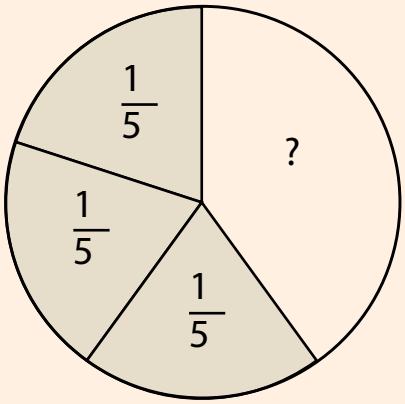












Tell the students to divide each figure by the denominator of the fraction and find the missing fraction for each shape.	*Fractions*

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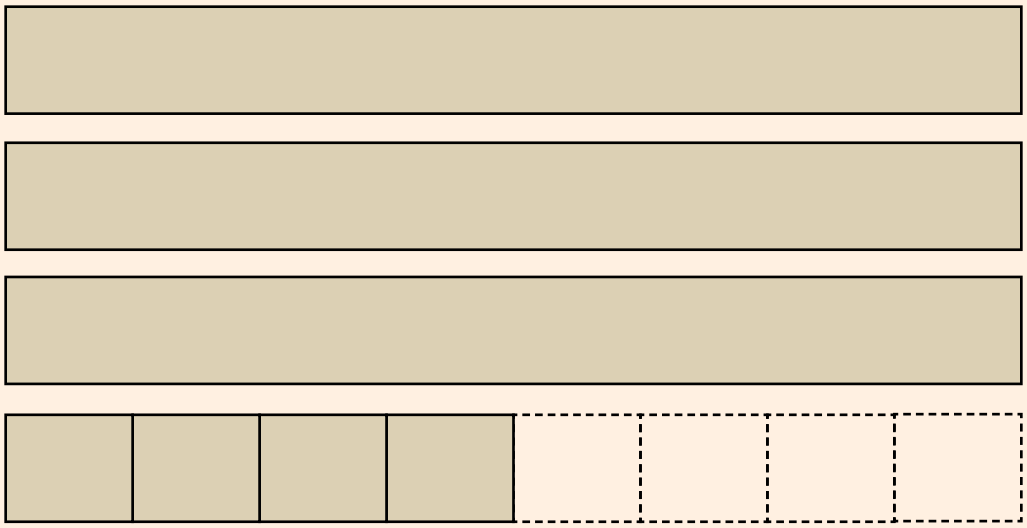
Name: _____

Date : _____

Fraction Bars

$3\frac{1}{2}$

$3\frac{4}{8}$



Once the students have identified these as **equivalent fractions**, have them draw and shade their own examples.	*Fractions*

Note: Cuisenaire rods, fractional pieces, and fraction blocks can be used to conduct these activities.

Name: _____

Date : _____

Fraction Cards

$\frac{1}{2}$	$\frac{1}{3}$	$\frac{2}{3}$	$\frac{1}{4}$
$\frac{2}{4}$	$\frac{3}{4}$	$\frac{1}{5}$	$\frac{2}{5}$
$\frac{3}{5}$	$\frac{4}{5}$	$\frac{1}{6}$	$\frac{2}{6}$

Group these fractions in such a way that all the **equivalent fractions** are in one set together, and all the **unlike fractions** are in another set.	*Fractions*

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Name: _____

Date : _____

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Name: _____

Date : _____

Fraction Cards

$\frac{3}{6}$	$\frac{4}{6}$	$\frac{5}{6}$	$\frac{1}{7}$
$\frac{2}{7}$	$\frac{3}{7}$	$\frac{4}{7}$	$\frac{5}{7}$
$\frac{6}{7}$	$\frac{1}{8}$	$\frac{2}{8}$	$\frac{3}{8}$

These fraction cards are to be cut out for the activities given on pages 26 and 27.

Fractions

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Name: _____

Date : _____

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Name: _____

Date : _____

Fraction Cards

$\frac{4}{8}$	$\frac{5}{8}$	$\frac{6}{8}$	$\frac{7}{8}$
$\frac{1}{9}$	$\frac{2}{9}$	$\frac{3}{9}$	$\frac{4}{9}$
$\frac{5}{9}$	$\frac{6}{9}$	$\frac{7}{9}$	$\frac{8}{9}$

These fraction cards are to be cut out for the activities given on pages 26 and 27.

Fractions

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Name: _____

Date : _____

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Name: _____

Date : _____

Fraction Cards

$\frac{1}{10}$	$\frac{2}{10}$	$\frac{3}{10}$
$\frac{4}{10}$	$\frac{5}{10}$	$\frac{6}{10}$
$\frac{7}{10}$	$\frac{8}{10}$	$\frac{9}{10}$

These fraction cards are to be cut out for the activities given on pages 26 and 27.

Fractions

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Name: _____

Date : _____

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Name: _____

Date : _____

Improper Fraction Cards

$\frac{11}{3}$

$\frac{18}{5}$

$\frac{47}{8}$

$\frac{14}{5}$

$\frac{25}{3}$

$\frac{9}{2}$

Express each fraction as a **mixed number**.	*Types of fractions*

Name: _____

Date : _____

Note: Page is left blank for cutting purposes

Name: _____

Date : _____

Improper Fraction Cards

$\frac{16}{12}$

$\frac{37}{1}$

$\frac{26}{4}$

$\frac{24}{10}$

$\frac{33}{7}$

$\frac{30}{8}$

Express each fraction as a **mixed number**.	*Types of fractions*

Name: _____

Date : _____

Note: Page is left blank for cutting purposes

Name: _____

Date : _____

Mixed Number Cards

$2\frac{2}{5}$ = ☐

$5\frac{1}{7}$ = ☐

$4\frac{3}{8}$ = ☐

$6\frac{5}{9}$ = ☐

$5\frac{7}{10}$ = ☐

$11\frac{1}{2}$ = ☐

$6\frac{5}{6}$ = ☐

$3\frac{7}{8}$ = ☐

Convert each mixed fraction into an improper fraction.	*Types of fractions*

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Name: _____

Date : _____

Note: Page is left blank for cutting purposes

Name: _____

Date : _____

Mixed Fraction Cards

$\frac{5}{3}$ × $\frac{16}{7}$

$\frac{6}{5}$ + $\frac{8}{5}$

$5\frac{7}{8}$ − $3\frac{1}{8}$

$4\frac{4}{5}$ ÷ $3\frac{1}{2}$

Shuffle the cards to make new questions. Express your answer as a **mixed fraction** if possible.	*Types of fractions* *Addition and subtraction of fractions* *Multiplication of fractions* *Division of fractions*

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Name: _____

Date : _____

Note: Page is left blank for cutting purposes

Name: _____

Date : _____

The Perfect Match

$\frac{5}{8} * \frac{3}{3} = \frac{\square}{\square}$

$\frac{8}{9} * \frac{\square}{\square} = \frac{\square}{27}$

$\frac{3}{4} * \frac{\square}{\square} = \frac{9}{12}$

$\frac{3}{\square} * \frac{\square}{\square} = \frac{15}{25}$

$\frac{\square}{\square} * \frac{2}{2} = \frac{6}{10}$

$\frac{6}{10} * \frac{\square}{\square} = \frac{36}{60}$

Complete the bubbles to make pairs of **equivalent fractions**.	*Multiplication of fractions*

Note: Arrays can be used to conduct the activity.

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Fractions

1. Compare the given fractions and fill in the blanks with < or >.

a. $\frac{2}{5}$ ☐ $\frac{3}{10}$ b. $\frac{3}{4}$ ☐ $\frac{5}{8}$ c. $\frac{11}{2}$ ☐ $\frac{9}{10}$

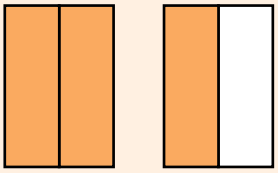
d. $\frac{7}{14}$ ☐ $\frac{12}{28}$ e. $\frac{15}{24}$ ☐ $\frac{7}{12}$ f. $\frac{1}{3}$ ☐ $\frac{5}{9}$

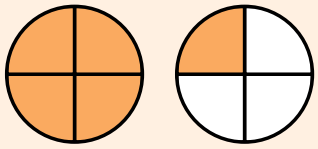
2. Reduce the following to the lowest form.

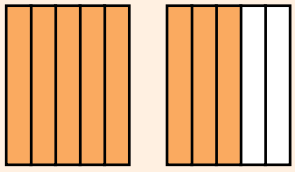
a. $\frac{16}{20} \rightarrow$ ☐ b. $\frac{28}{40} \rightarrow$ ☐ c. $\frac{60}{84} \rightarrow$ ☐

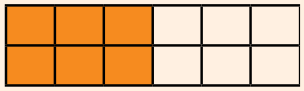
d. $\frac{15}{64} \rightarrow$ ☐ e. $\frac{25}{100} \rightarrow$ ☐ f. $\frac{12}{144} \rightarrow$ ☐

3. Express the following shaded regions as mixed numbers.

a.  ☐

b.  ☐

c.  ☐

d.  ☐

4. Write the following as mixed numbers.

	Improper Fractions	Mixed Number		Improper Fractions	Mixed Number
a.	$\frac{14}{3}$		b.	$\frac{76}{12}$	
c.	$\frac{35}{4}$		d.	$\frac{11}{5}$	

5. Express the following as improper fractions.

	Mixed Number	Improper Fractions		Mixed Number	Improper Fractions
a.	$6\frac{3}{5}$		b.	$5\frac{2}{9}$	
c.	$5\frac{6}{8}$		d.	$3\frac{4}{7}$	

6. Make the denominators of given fractions same and then arrange them in ascending order (from smallest to largest).

Fractions			Fractions with same denominators			Ascending order
$\frac{3}{7}$	$\frac{9}{14}$	$\frac{1}{2}$				
$\frac{11}{16}$	$\frac{5}{8}$	$\frac{3}{4}$				

7. Solve the the following.

a. $\frac{4}{9} + \frac{3}{9} = \frac{\square}{\square}$

b. $\frac{7}{12} + \frac{2}{3} = \frac{\square}{\square}$

c. $\frac{4}{18} + \frac{5}{3} = \frac{\square}{\square}$

d. $\frac{10}{11} - \frac{2}{11} = \frac{\square}{\square}$

e. $\frac{12}{3} - \frac{14}{15} = \frac{\square}{\square}$

f. $\frac{19}{20} - \frac{9}{10} = \frac{\square}{\square}$

8. Solve the following and then simplify the fraction to the lowest form.

Multiplication	Solution	Lowest form
a. $\frac{5}{8} \times 2$		
b. $2\frac{5}{4} \times 5$		

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9. Divide the following.

a. $\frac{49}{4} \div 7 =$ _____

b. $2\frac{4}{5} \div 4 =$ _____

c. $5\frac{7}{9} \div 35 =$ _____

10. Solve the following real-life problems.

	Problems	**Working**
a.	Maheen had $\frac{3}{12}$ of a cake. Shuja had $\frac{7}{12}$ of a similar cake. How much cake did they have altogether?	
	Answer: _____ cake	
b.	Ali took $\frac{3}{8}$ of a plate of biryani, and gave $\frac{1}{3}$ to his friend. What fraction of the biryani is still left?	
	Answer: _____	
c.	Umair takes $\frac{3}{4}$ hours to complete a painting. How long does he take to paint $\frac{1}{6}$ of the painting?	
	Answer: _____ hours	
d.	Sumera cuts a $\frac{9}{10}$ m long rope into 3 equal pieces. What is the length of each piece?	
	Answer: _____ m	
e.	Qadir spent $\frac{4}{5}$ of Rs 360 on fast food. How much did he spend?	
	Answer: Rs _____	

Fractions

1. Compare the given fractions and fill in the blanks with < or >.

a. $\frac{2}{5}$ [>] $\frac{3}{10}$

b. $\frac{3}{4}$ [2] $\frac{5}{8}$

c. $\frac{11}{2}$ [2] $\frac{9}{10}$

d. $\frac{7}{14}$ [2] $\frac{12}{28}$

e. $\frac{15}{24}$ [2] $\frac{7}{12}$

f. $\frac{1}{3}$ [2] $\frac{5}{9}$

2. Reduce the following to the lowest form.

a. $\frac{16}{20} \rightarrow \frac{4}{5}$

b. $\frac{28}{40} \rightarrow \frac{7}{10}$

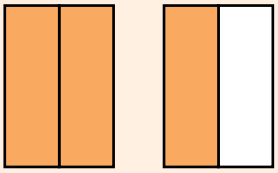
c. $\frac{60}{84} \rightarrow \frac{5}{7}$

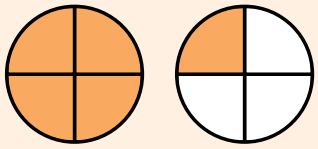
d. $\frac{15}{64} \rightarrow \frac{15}{64}$

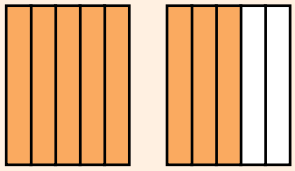
e. $\frac{25}{100} \rightarrow \frac{1}{4}$

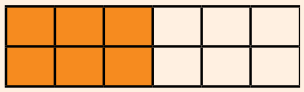
f. $\frac{12}{144} \rightarrow \frac{1}{12}$

3. Express the following shaded regions as mixed numbers.

a.  $\frac{11}{2}$

b.  $\frac{11}{4}$

c.  $\frac{13}{5}$

d.  $\frac{6}{12}$, $\frac{1}{2}$

4. Write the following as mixed numbers.

	Improper Fractions	Mixed Number		Improper Fractions	Mixed Number
a.	$\frac{14}{3}$	$4\frac{2}{3}$	b.	$\frac{76}{12}$	$6\frac{4}{12}$ $6\frac{1}{3}$
c.	$\frac{35}{4}$	$8\frac{3}{4}$	d.	$\frac{11}{5}$	$2\frac{1}{5}$

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5. Express the following as improper fractions.

	Mixed Number	Improper Fractions		Mixed Number	Improper Fractions
a.	$6\frac{3}{5}$	$\frac{33}{5}$	b.	$5\frac{2}{9}$	$\frac{47}{9}$
c.	$5\frac{6}{8}$	$\frac{46}{8}$	d.	$3\frac{4}{7}$	$\frac{25}{7}$

6. Make the denominators of given fractions same and then arrange them in ascending order (from smallest to largest).

Fractions			Fractions with same denominators			Ascending order
$\frac{3}{7}$	$\frac{9}{14}$	$\frac{1}{2}$				
$\frac{11}{16}$	$\frac{5}{8}$	$\frac{3}{4}$				

7. Solve the the following.

a. $\frac{4}{9}+\frac{3}{9}=\boxed{\frac{7}{9}}$

$\frac{(4+3)}{9}$

b. $\frac{7}{12}+\frac{2}{3}=\boxed{\frac{15}{12}}$

$\frac{(7+8)}{12}$

c. $\frac{4}{18}+\frac{5}{3}=\boxed{\frac{34}{18}}$

$\frac{(4+30)}{18}$

d. $\frac{10}{11}-\frac{2}{11}=\boxed{\frac{8}{11}}$

$\frac{(10-2)}{11}$

e. $\frac{12}{3}-\frac{14}{15}=\boxed{\frac{46}{14}}$

$\frac{(60-14)}{9}$

f. $\frac{19}{20}-\frac{9}{10}=\boxed{\frac{1}{20}}$

$\frac{(19-18)}{20}$

8. Solve the following and then simplify the fraction to the lowest form.

Multiplication	Solution	Lowest form
a. $\frac{5}{8}\times 2$	$\frac{10}{8}$	$\frac{5}{4}$
b. $2\frac{5}{4}\times 5$	$\frac{65}{4}$	$16\frac{1}{4}$

9. Divide the following.

a. $\frac{49}{4} \div 7 = \frac{7}{4}$

b. $2\frac{4}{5} \div 4 = \frac{7}{10}$

c. $5\frac{7}{9} \div 35 = \frac{52}{315}$

10. Solve the following real-life problems.

	Problems	Working
a.	Maheen had $\frac{3}{12}$ of a cake. Shuja had $\frac{7}{12}$ of a similar cake. How much cake did they have altogether?	3/12 + 7/12 = (3 +7)/12 = 10/12 = 5/6
	Answer: _____ cake	
b.	Ali took $\frac{3}{8}$ of a plate of biryani, and gave $\frac{1}{3}$ to his friend. What fraction of the biryani is still left?	3/8 - 1/3 = 9/24 - 8/24 = 1/24
	Answer: _____	
c.	Umair takes $\frac{3}{4}$ hours to complete a painting. How long does he take to paint $\frac{1}{6}$ of the painting?	3/4 ÷ 1/6 = 1/8
	Answer: _____ hours	
d.	Sumera cuts a $\frac{9}{10}$ m long rope into 3 equal pieces. What is the length of each piece?	9/10 ÷ 3 = 9/10 x 1/3 = 3/10
	Answer: _____ m	
e.	Qadir spent $\frac{4}{5}$ of Rs 360 on fast food. How much did he spend?	360 x 4/5 = 1440/5 = 288
	Answer: Rs _____	

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Unit 4 Decimals

Learning Framework

Recognising Decimal Numbers as Fractions

The student will demonstrate a thorough understanding of decimal numbers as alternative representations of fractions, showcasing their ability to translate between different numerical forms. Through the "Decimal-Fraction Match" activity, students will engage in a matching exercise where they pair decimal numbers with their equivalent fraction representations, explaining their reasoning and identifying patterns in the relationships between decimals and fractions.

Recognising, Reading, and Writing Decimal Numbers

The student will accurately recognise, read, and write decimal numbers up to three decimal places, identifying the place value of each digit and demonstrating a solid grasp of decimal notation. In the "Decimal Place Value" activity, students will participate in a collaborative exercise where they identify the place value of digits in decimal numbers, explain their reasoning, and provide examples to illustrate their understanding.

Dividing Numbers by 10 and 100

The student will understand the effects of dividing 1-digit or 2-digit numbers by 10 and 100, identifying the value of digits in the answer as ones, tenths, and hundredths, and demonstrating an awareness of the relationships between numbers and their decimal representations. Through the "Division Exploration" activity, students will engage in an investigative exercise where they explore the effects of dividing numbers by 10 and 100, recording their findings and explaining their reasoning.

Expressing Decimal Numbers as Fractions

The student will express decimal numbers as fractions with denominators of 10, 100, and 1000, showcasing their ability to translate between decimal and fraction forms. In the "Decimal to Fraction" activity, students will work in pairs to convert decimal numbers to fractions with specified denominators, explaining their reasoning and providing examples to illustrate their understanding.

Expressing Fractions as Decimal Numbers

The student will express fractions in their decimal equivalents (tenths, hundredths, or thousandths) when the denominator is 10, 100, or 1000, or can be converted to these denominators, demonstrating a solid grasp of fraction-decimal conversions. Through the "Fraction to Decimal" activity, students will engage in a conversion exercise where they transform fractions into decimal numbers, explaining their reasoning and providing examples to illustrate their understanding.

Recognising and Writing Special Fractions as Decimals

The student will accurately recognise and write a quarter, a half, and three-quarters (1/4, 1/2, 3/4) as their decimal equivalents, demonstrating an awareness of common fraction-decimal conversions. In the "Special Fractions" activity, students will participate in a matching exercise where they pair special fractions with their decimal equivalents, explaining their reasoning and identifying patterns in the relationships between fractions and decimals.

Comparing and Ordering Decimal Numbers

The student will demonstrate the ability to compare and order decimal numbers with up to two decimal places, showcasing their understanding of decimal relationships and notation. Through the "Decimal Number Sort" activity, students will engage in a sorting exercise where they compare and order decimal numbers, explaining their reasoning and identifying patterns in the relationships between decimals.

Rounding Decimal Numbers

The student will accurately round decimal numbers (up to three decimal places) to the nearest whole number and to one and two decimal places, demonstrating an understanding of numerical approximation and estimation. In the "Rounding Decimals" activity, students will practice rounding decimal numbers to specified place values, explaining their reasoning and providing examples to illustrate their understanding.

Adding and Subtracting Decimal Numbers

The student will demonstrate proficiency in performing addition and subtraction operations with 3-digit numbers (up to two decimal places), showcasing their ability to apply mathematical operations to decimal numbers. Through the "Decimal Calculation" activity, students will engage in a calculation exercise where they add and subtract decimal numbers, explaining their reasoning and identifying patterns in the calculations.

Multiplying and Dividing Decimal Numbers

The student will accurately multiply and divide a 2-digit number with one decimal place by a 1-digit number and a 2-digit number, demonstrating an understanding of decimal multiplication and division. In the "Decimal Multiplication and Division" activity, students will practice multiplying and dividing decimal numbers by whole numbers, explaining their reasoning and providing examples to illustrate their understanding.

Multiplying and Dividing by Powers of 10

The student will demonstrate the ability to multiply and divide a 2-digit number with one decimal place by 10, 100, and 1000, showcasing their understanding of decimal place value and multiplication/division patterns. Through the "Powers of 10" activity, students will engage in a calculation exercise where they multiply and divide decimal numbers by powers of 10, explaining their reasoning and identifying patterns in the calculations.

Solving Real-World Word Problems

The student will apply mathematical operations to solve real-world word problems involving 2-digit numbers with one decimal place, including problems related to money, quantities, and measures. In the "Real-World Application" activity, students will work in groups to solve word problems, explaining their reasoning and justifying their solutions.

Understanding the Order of Operations

The student will demonstrate an understanding of the order of operations and apply it to solve mathematical expressions involving whole numbers, decimals, and fractions. Through the "Order of Operations" activity, students will engage in a calculation exercise where they apply the order of operations to solve mathematical expressions, explaining their reasoning and identifying patterns in the calculations.

Understanding Percentages

The student will recognise the percent symbol (%) and understand that percent represents the 'number of parts per hundred', demonstrating a basic understanding of percentage concepts. In the "Percentage Introduction" activity, students will engage in a discussion where they explore the concept of percentages, explaining their understanding and providing examples to illustrate their knowledge.

Lesson Plan

Suggested Time: 3 periods

Objectives

- Recognise a decimal number as an alternative way of writing a fraction.
- Recognise, read, write decimal numbers and identify the place value of decimal numbers up to three decimal places.

Concept Connector

Using concept connector given on Page 43, recall the concept of decimal numbers with 1 and 2 decimal places. Reinforce that a decimal is a fraction represented in a special form. Like the fraction 3/5 can be written as 0.6, when 0 is in the ones place and 6 is in the tenth place. The point between 0 and 6 in known as decimal point. Explain that not all numbers are whole numbers but there are lots of members in between there. Decimal is a fraction whose denominator is 10, 100, or 1000. Decimals can be converted to common fractions and vice versa.

Exploring the Objective

Link the concept connector with the explanation of decimal numbers with 3 decimal places or the concept of one-thousandths using the ***figure given on Page 43***. Explain the place value chart for decimal numbers with ***examples given on Page 44***. Solve ***Examples 3 and 4*** to explain the conversion of decimals into fractions and vice versa. For comparing and ordering decimal numbers draw a ***Place value chart (Page 45)*** on the board for writing the numbers according to the place value and then comparing each digit. Take ***Example 5 and 6*** to elaborate the steps of comparing decimal numbers.

Activity

The Perfect Match

What You Need:

Fraction cards

Decimal Cards

How to Play:

Each student should perform this activity individually. Prepare fraction number card and decimal number cards as shown.

Fraction number card	Decimal number card
$\frac{14}{100}$	0.14

Make fraction number cards with denominators 10, 100, and 1000 and respective decimal number

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cards. Place the piles of fraction number cards and decimal number cards upside down on the table. Ask students to take out their whiteboards. Then call one student and ask him/her to pick up one card from either of the two piles and show it to the class. Ask the rest of the class to write the respective fraction or decimal number on white board. Meanwhile, the students who picked the card will also find the respective fraction or decimal card from the pile.

Make sure that he/she picks the correct card. Ask the students to show their answer written on the whiteboard. Thumbs up for the correct answers.

Reflection:

Students converted the fractions in to decimal numbers and vice versa.

They demonstrated deeper understanding of concept while comparing decimal numbers.

Exercise

Question 1 of Exercise 1 based on the basic concept of fractions. The figures are given with coloured parts to show the parts in fractions and decimals. Assign ***Question 2(c, d, g, h, k, l), 3, 4(c, d, g, h)*** as classwork. Have students practice the skill of converting fractions into decimals and vice versa by solving ***Question 2, 3, and 4.*** Guide students to make a place value chart of decimal numbers, so that they can use the chart to compare decimal numbers while solving ***Question 5 and 6***. ***Question 7 and 8*** deals with the real-life problems. Provide support and guidance to the students to solve these questions. Provide ***QR activity*** sheets given on ***Page 45*** and ***Math Lab Page 44*** to practice decimal numbers.

Extension Activity

Assign ***Maths Quest given on Page 47*** and following questions.

- Write the number that has 3 in the tenths place, 5 in the hundredths place, and 7 in the thousandths place.
- Arrange the following decimals in ascending order: 0.75, 0.57, 0.705, 0.5
- I am a decimal number. When you add me to 0.25, the result is 1. What number am I?
- I am a decimal number. When you subtract 0.15 from me, the result is 0.8. What number am I?

Conversion Between Fractions and Decimal

Learning Objective:

- Express a decimal number as a fraction whose denominator is 10, 100, or 1000.
- Convert a given fraction to a decimal if:
- denominator of the fraction is 10, 100 or 1000.
- denominator of the fraction is not 10, 100 or 1000 but can be converted to 10,100 or 1000.

Let's Talk Math:

- Discuss with pupils that a decimal is a fraction represented in a special form.

Make Sure You Have:

- Fraction number cards
- Decimal number cards

Activity: Flip and Match

Duration: 1 Lesson **Whole Class Activity**

Let's Try It:

- Prepare two sets of cards: one set with fractions (denominators 10, 100, 1000) and the other set with the corresponding decimal numbers.
- Place the fraction and decimal card piles face down on a table.
- Ask the pupils to take out their whiteboards and markers.
- Call one pupil to pick a card from either the fraction or decimal pile.
- The pupil shows the card to the class.
- The rest of the class writes the corresponding fraction or decimal on their whiteboards.
- While the class writes, the pupil who picked the card finds the matching card from the other pile.
- Ensure the pupil selects the correct matching card.
- Ask all pupils to show their answers written on their whiteboards.
- Give a thumbs up for the correct answers!

Assessment:

- Ask pupils to solve some realistic questions that involve decimals. Here is an example below:
- Javeria and Tina drove to their aunt's house. Javeria drove 9.75 km. Tina drove 3.50 km before they arrived. How many kilometres had they driven altogether?

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Basic Operations on Decimal Numbers

Learning Objective:

- Add and subtract 3-digit numbers (up to 2 decimal places).

Let's Talk Math:

- Explain to pupils that decimal are an extension of whole numbers while tenths and hundreds are linked to fractions.

Make Sure You Have:

- Dice
- A4 Sheets

Activity: Operation of Decimal Numbers

Duration: 1 Lesson **Whole Class Activity**

Let's Try It:

- Prepare paper cubes or use regular dice with stickers showing different decimal numbers on each face.
- Create worksheets for each pupil to record the results of the activity.
- Divide the class into 4 or 5 groups and give each group two dice and individual worksheets.
- Each pupil rolls the dice twice and note the decimal numbers in the provided worksheet.
- Pupils will then add and subtract the decimal numbers they rolled.
- After completion, pupils will peer-check each other's answers.
- The group that finishes first with all correct answers wins the challenge!

Assessment:

- Ask the pupils to weigh different objects and divide them into two categories:
- mass in whole numbers and
- mass in decimal numbers.
- Now, ask the students to round off the decimal numbers to the nearest whole number and arrange all of them in an ascending and descending order.

Name: _____

Date : _____

Converting with Bars

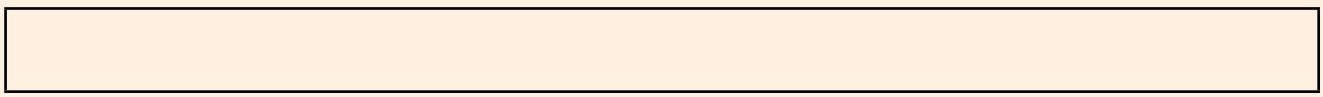
1 whole

1 tenth

Fraction = ☐ Decimal = ☐

Fraction = ☐ Decimal = ☐

Fraction = ☐ Decimal = ☐



Fraction = ☐ Decimal = ☐

Fill in the blanks by using the above bars as a reference and simplify.

$\frac{1}{5} = 0.2$ $\frac{170}{100} = \square$ $\square = 0.55$ $\square = 9.55$

$\frac{17}{100} = \square$ $\square = 7.35$ $\frac{90}{1000} = \square$ $\square = 0.75$

Express the above as a fraction and a decimal number.	*Decimals* *Conversion between fractions and decimal numbers*

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Name: _____

Date : _____

Decimal Place Value Chart

Ones	Tenth

Tens	Ones	Tenths

Ones	Tenths	Hundredths

Tens	Ones	Tenths	Hundredths

Ones	Tenths	Hundredths	Thousandths

Tens	Ones	Tenths	Hundredths	Thousandths

	Decimals

Name: _____

Date : _____

Operating with Decimals

3.5 + 0.9	4.3 + 1.4
7.4 − 0.5	9.1 − 0.9
6.65 + 9.1	2.25 − 1.16
3.19 − 0.69	5.7 × 10
1.9 × 10	2.3 × 100
8.9 × 1000	9.1 × 3
8.6 ÷ 2	9.9 ÷ 3

Have students solve these and then plug the numbers into the **decimal chart** on the previous pages.	*Basic operations on decimal numbers*

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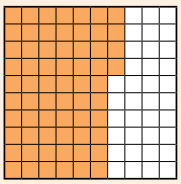
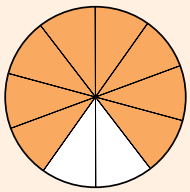
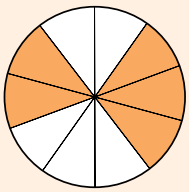
Decimals

1. Write a fraction and decimal number for each shaded region.

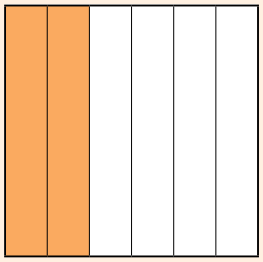
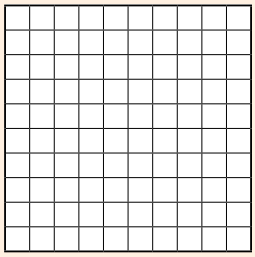
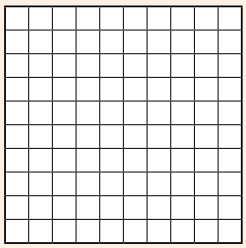
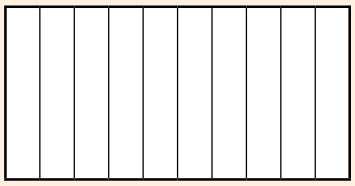
a. 	b. 	c. 
decimal:	decimal:	decimal:
fraction:	fraction:	fraction:

2. Solve the riddles. Select the numbers from the given number bank.

54.259 46.879 6.86 7.83 8.48

	Riddle	Tens	Ones	•	Tenths	Hundredths	Thousandths
a.	I am a 3-digit number. My ones digit is an odd number. The digit at tenths place is greater than the digit at hundredths place. Who am I?			•			
b.	I am a 5-digit number. I have 5 at my tens place. The digit at ones place is an even number. The digit at thousandths place is greatest among all digits. Who am I?			•			
c.	I am a 3-digit number. I am between 4.24 and 7.24. My ones digit and the digit at hundredths place are same. Who am I?		•				
d.	I am a 5-digit number. The digit at thousandths place is a multiple of 3. My tenths digit is twice my tens digit. My hundredths digit is not a composite number. Who am I?			•			

3. Complete the following table.

Shaded parts	Fraction	Decimal
a. 		
b. 	$\frac{75}{100}$	
c. 		0.38
d. 	$\frac{3}{10}$	

4. Convert the following into decimal numbers.

		Equivalent fraction	Decimal Number			Equivalent fraction	Decimal Number
a.	$\frac{2}{5}$	$\frac{\quad}{10}$		b.	$\frac{177}{20}$	$\frac{\quad}{100}$	
c.	$\frac{1}{2}$	$\frac{\quad}{10}$		d.	$\frac{457}{250}$	$\frac{\quad}{1000}$	

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5. Solve the following.

a. 4.28 + 2.6	b. 61.1 – 3.87	c. 9.2 + 1.18
d. 6.4 × 2	e. 8.1 × 100	f. 2.5 × 5
g. 2.4 ÷ 10	h. 8.4 ÷ 4	i. 6.5 ÷ 100

6. Round off the following numbers.

a. 6173 → ☐ (nearest 10)

b. 4565 → ☐ (nearest 10)

c. 5324 → ☐ (nearest 100)

d. 1855 → ☐ (nearest 100)

e. 8529 → ☐ (nearest 1000)

f. 9045 → ☐ (nearest 1000)

g. 67.28 → ☐ (nearest whole number).

h. 19.7 → ☐ (nearest whole number)

7. Tick the correct option(s) for each rounded number given in column B. (There can be multiple correct options).

	A	B	Rounded off to the nearest 10	Rounded off to the nearest 100	Rounded off to the nearest 1000
a.	8263	8300			
b.	1029	1000			
c.	8546	9000			

8. Solve the following real-life problems.

	Problems	Working
a.	A two-coloured ribbon is 9.8 cm long. 5.9 cm of the ribbon is blue and the remaining part is red in colour. What is the length of the red coloured part?	
	Answer: ☐ cm	
b.	A leopard eats 4.5 kg of meat per day. How much will it eat in a week? (Hint: 7 days in a week).	
	Answer: ☐ kg	
c.	Babar invites his 9 friends on iftar and prepares 3.6 l of juice for them. If he distributes the juice equally among his friends, then how much juice will each get?	
	Answer: ☐ l	
d.	Zehra bought two pencils for Rs 4.6 and Rs 7.9 each. How much did she pay for the pencils?	
	Answer: Rs ☐	

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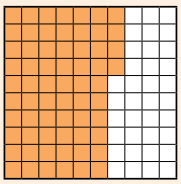
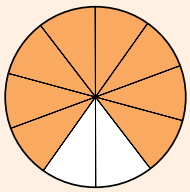
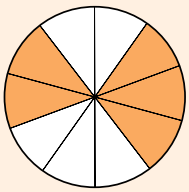
Decimals

1. Write a fraction and decimal number for each shaded region.

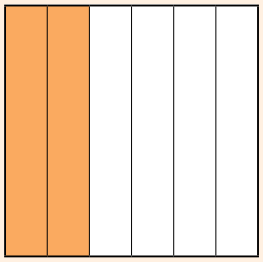
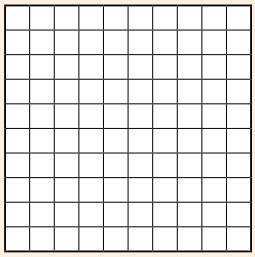
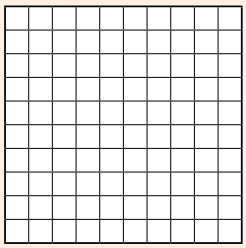
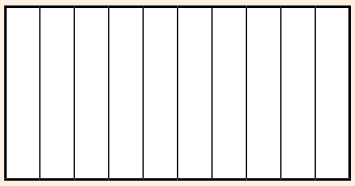
a. 	b. 	c. 
decimal: 0.64	decimal: 0.8	decimal: 0.5
fraction: 64/100	fraction: 8/10	fraction: 5/10

2. Solve the riddles. Select the numbers from the given number bank.

54.259 46.879 6.86 7.83 8.48

Riddle	Tens	Ones	.	Tenths	Hundredths	Thousandths
a. I am a 3-digit number. My ones digit is an odd number. The digit at tenths place is greater than the digit at hundredths place. Who am I?		7	.	8	3	
b. I am a 5-digit number. I have 5 at my tens place. The digit at ones place is an even number. The digit at thousandths place is greatest among all digits. Who am I?	5	4	.	2	5	9
c. I am a 3-digit number. I am between 4.24 and 7.24. My ones digit and the digit at hundredths place are same. Who am I?	6	.	8	6		
d. I am a 5-digit number. The digit at thousandths place is a multiple of 3. My tenths digit is twice my tens digit. My hundredths digit is not a composite number. Who am I?	4	6	.	8	7	9

3. Complete the following table.

	Shaded parts	Fraction	Decimal
a.		$\frac{2}{6}$	0.33
b.		$\frac{75}{100}$	0.75
c.		$\frac{19}{50}$	0.38
d.		$\frac{3}{10}$	0.3

4. Convert the following into decimal numbers.

		Equivalent fraction	Decimal Number			Equivalent fraction	Decimal Number
a.	$\frac{2}{5}$	$\frac{4}{10}$	0.4	b.	$\frac{177}{20}$	$\frac{885}{100}$	8.85
c.	$\frac{1}{2}$	$\frac{5}{10}$	0.5	d.	$\frac{457}{250}$	$\frac{1828}{1000}$	1.828

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5. Solve the following.

a. 4.28 + 2.6 4.28 +2.60 6.88	b. 61.1 – 3.87 61.10 − 3.87 57.23	c. 9.2 + 1.18 9.20 +1.18 10.38
d. 6.4 × 2 12.8	e. 8.1 × 100 810.0	f. 2.5 × 5 2.5
g. 2.4 ÷ 10 0.24	h. 8.4 ÷ 4 2.1	i. 6.5 ÷ 100 0.065

6. Round off the following numbers.

a. 6173 → 6170 (nearest 10)

b. 4565 → 4570 (nearest 10)

c. 5324 → 5300 (nearest 100)

d. 1855 → 1860 (nearest 100)

e. 8529 → 9000 (nearest 1000)

f. 9045 → 9000 (nearest 1000)

g. 67.28 → 67 (nearest whole number).

h. 19.7 → 20 (nearest whole number)

7. Tick the correct option(s) for each rounded number given in column B. (There can be multiple correct options).

	A	B	Rounded off to the nearest 10	Rounded off to the nearest 100	Rounded off to the nearest 1000
a.	8263	8300		✔	
b.	1029	1000			✔
c.	8546	9000			✔

8. Solve the following real-life problems.

	Problems	Working
a.	A two-coloured ribbon is 9.8 cm long. 5.9 cm of the ribbon is blue and the remaining part is red in colour. What is the length of the red coloured part?	9 . 8 - 5 . 9 3 . 9
	Answer: 3.9 cm	
b.	A leopard eats 4.5 kg of meat per day. How much will it eat in a week? (Hint: 7 days in a week).	4 . 5 × . 7 31 . 5
	Answer: 31.5 kg	
c.	Babar invites his 9 friends on iftar and prepares 3.6 l of juice for them. If he distributes the juice equally among his friends, then how much juice will each get?	3.6 ÷ 9 = 0.4
	Answer: 0.4 l	
d.	Zehra bought two pencils for Rs 4.6 and Rs 7.9 each. How much did she pay for the pencils?	4 . 6 - 7 . 9 12 . 5
	Answer: Rs 12.5	

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Unit 5 Geometry

Learning Framework

Recognising Parallel and Non-Parallel Lines

The student will demonstrate a thorough understanding of parallel and non-parallel lines by recognising and identifying them in various geometric contexts, showcasing their ability to apply mathematical concepts to real-world applications. Through the "Line Explorer" activity, students will engage in a comprehensive sorting exercise where they identify and categorise parallel and non-parallel lines, explaining their reasoning and providing examples to illustrate their understanding of the relationships between lines.

Recognising Angle Formation

The student will understand that an angle is formed by the intersection of two lines (rays), demonstrating a solid grasp of basic angle concepts and their role in geometric shapes. In the "Angle Introduction" activity, students will explore and identify angles formed by intersecting lines, explaining their understanding and providing examples to illustrate their knowledge of angle formation and its significance in geometry.

Measuring Angles

The student will accurately measure angles in degrees using a protractor, showcasing their ability to apply mathematical tools to geometric measurements and solve problems involving angle measurements. Through the "Angle Measurement" activity, students will practice measuring angles using a protractor, explaining their reasoning and identifying patterns in angle measurements to develop their understanding of geometric relationships.

Drawing Angles

The student will draw an angle of a given measurement and use the symbol (°) to represent it, demonstrating their ability to apply geometric concepts to real-world applications and communicate mathematical ideas effectively. In the "Angle Drawing" activity, students will draw angles of specified measurements, explaining their reasoning and providing examples to illustrate their understanding of angle properties and notation.

Identifying Angle Types

The student will recognise, identify, and differentiate acute, right, and obtuse angles, showcasing their understanding of angle classifications and their ability to apply mathematical concepts to geometric shapes. Through the "Angle Sort" activity, students will engage in a comprehensive sorting exercise where they categorise angles as acute, right, or obtuse, explaining their reasoning and providing examples to illustrate their knowledge of angle properties and relationships.

Comparing and Ordering Angles

The student will compare and order angles up to 180 degrees by size, demonstrating their ability to apply mathematical concepts to geometric comparisons and solve problems involving angle relationships. In the "Angle Comparison" activity, students will compare and order angles, explaining their reasoning and identifying patterns in angle relationships to develop their understanding of geometric properties and relationships.

Understanding Circle Components

The student will describe the radius, diameter, and circumference of a circle, showcasing their understanding of basic circle concepts and their ability to apply mathematical concepts to geometric shapes. Through the "Circle Explorer" activity, students will engage in a discovery exercise where they explore and identify the components of a circle, explaining their reasoning and providing examples to illustrate their knowledge of circle properties and relationships.

Recognising Lines of Symmetry

The student will recognise and draw lines of symmetry in 2-D shapes and complete symmetrical figures with respect to a given line of symmetry on a square grid/dot pattern, demonstrating their understanding of symmetry and its role in geometric shapes. In the "Symmetry Artist" activity, students will create symmetrical figures by drawing lines of symmetry and completing shapes, explaining their reasoning and providing examples to illustrate their knowledge of symmetrical properties and relationships.

Comparing and Sorting 3-D Objects

The student will compare, and sort 3-D objects (cubes, cuboids, pyramids, cylinder, cone, sphere) based on their characteristics, demonstrating their ability to apply mathematical concepts to real-world applications and solve problems involving geometric relationships. Through the "3-D Object Sort" activity, students will engage in a comprehensive sorting exercise where they categorise 3-D objects, explaining their reasoning and providing examples to illustrate their knowledge of geometric properties and relationships.

Lesson Plan

Suggested Time: 4 periods

Objectives

- Recognise an angle is formed by intersection of two lines (rays).
- Measure angles in degrees by using protractor.
- Recognise, identify and differentiate acute, right, and obtuse angles.

Concept Connector

Start with the recall of lines using the ***Concept Connector given on Page 57***. Reinforce different types of lines and rays by drawing each on the board and asking students to identify each. Lead this reinforcement to the introduction of angles using real-life examples such as angles formed by clock hands by moving doors, etc.

Exploring the Objective

Explain the concept of angles and other terms related to the angle (arms, vertex, etc.) using the figures given on ***Page 59***. Bring a big protractor to the class and explain how to use a protractor to measure angles using ***Examples 1 and 2, Page 50***. Using ***Maths in Action*** given on ***Page 61*** introduce types of angles as acute, obtuse, and right angles. While discussing the types of angles ask students to attempt ***Maths Quest given on Page 63*** to identify right angles. Take feedback from the class and provide guidance when required.

Activity

Finding Angles

What You Need:

Activity sheets

Activity Sheet	
Objects	Type of angles

How to Play:

Divide the class into groups of 3 to 5 students each. Distribute activity sheets to each group. Allow them to move around the school and spend 10 minutes looking for different kinds of angles that they can identify in their surroundings. Ask them to note down their findings in the activity sheet.

For example, they may spot a tree branch making an obtuse or an acute angle with the tree trunk etc. Students only need to identify the kind of angle that the object is making and not calculate it.

Reflection

Students correctly identified the angles.

Confidently used protractor to measure the angles.

Exercise

Question 1 of Exercise 2 asks to read and write the measurement of angles. Support is provided in the form of already drawn and aligned protractors with each angle. However, in ***Question 2*** students are required to use their own protractors to measure the angles. Assign ***Question 1 and Question 2(a, c, e, f)*** as classwork. Provide individual support while solving Question 2 to ensure the correct placement of the protractor. Students will identify the type of angles in ***Question 4*** after measurement. For further practice assign ***QR Code Activity Sheet*** given on ***Page 64*** and ***Math Lab Page 50.***

Extension Activity

Ask students to use various objects around them and trace the outlines of the objects.

For example, keep a pencil box on the page and draw its outline.

Identify angles found in the shape as acute, obtuse, and right angles.

Lines and Angles

Learning Objective:

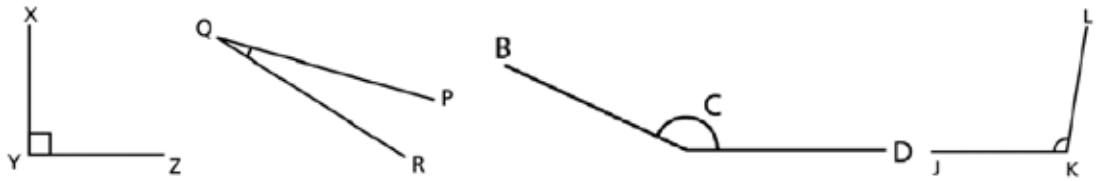
- Recognise and identify parallel and non-parallel lines.
- Recognise an angle formed by intersection of two rays.
- Differentiate acute, obtuse and right angles.

Let's Talk Math:

- Ask the class to volunteer any information they remember about shapes, and which shapes they can name.

Make Sure You Have:

- Blank paper chits



Activity: Which Angle is That?

Duration: 1 Lesson **Whole Class Activity**

Let's Try It:

- Distribute blank paper chits to all pupils.
- Ask each pupil to write one measure of their choice for an acute angle and one for an obtuse angle on the chit.
- Pupils fold their chits and place them in an empty basket.
- Distribute blank A4 sheets to all pupils.
- Shuffle the chits and pass the basket around.
- Each pupil draws a chit from the basket.
- Pupils draw the acute and obtuse angles written on the chit on their activity sheet.
- Spot check the measures of the angles for accuracy.
- At the end, allow pupils to peer check each other's activity sheets.

Assessment:

- Give the following activity sheet as a class assignment.

Perimeter, Area and Symmetry

Learning Objective:

- Find perimeter of a 2-D figures on a square grid.
- Find area of 2-D figures on a square grid.
- Recognise lines of symmetry in two-dimensional (2-D) shapes.
- Complete a symmetrical figure with respect to a given line of symmetry on square grid/dot pattern.

Let's Talk Math:

- Ask pupils to look around them and spot where they find uses of geometry.
- Guide them to observe different geometrical shapes and patterns in leaves, flowers, stamps, and so on.

Make Sure You Have:

- Centimetre grid

Activity: Exploring Area, Perimeter, and Symmetry

Duration: 1 Lesson **Whole class activity**

Let's Try It:

- Provide each pupil with a centimetre grid.
- Ask pupils to draw a square using measurements of their choice.
- Have them calculate the area and perimeter of their squares.
- Pupils compare the area and perimeter with their classmates to determine whose square has the largest area.
- Ask each pupil to prepare a question related to the use of perimeter and area in real life.
- On a sheet of paper, paste a shape and draw a line of symmetry.
- Have the pupils copy the exact shape on the other side of the line.

Assessment:

- Provide the pupils with tangrams made from coloured paper and ask them to make as many shapes and objects as possible.

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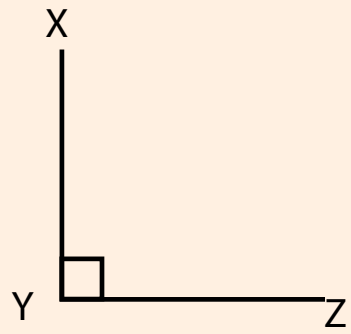
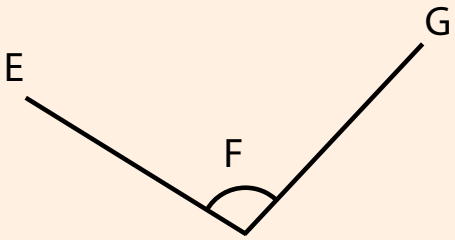
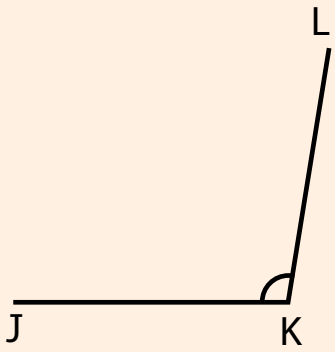
Name: _____

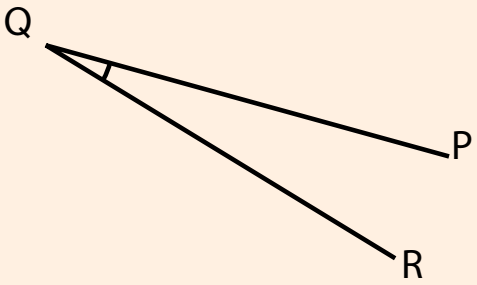
Date : _____

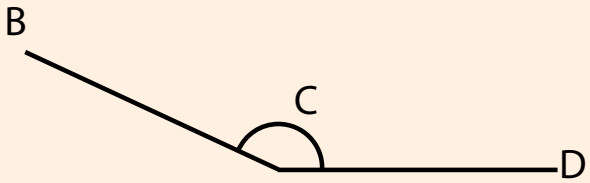
Diagrams of Angles











Using a protractor, draw angle of 45°, 90°, and 150°.

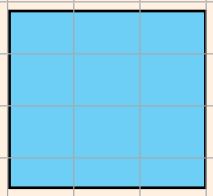
Name the angles according to the size, before constructing your own.	*Lines*

Note: Geo strips can be used to form variety of angles.

Name: _____

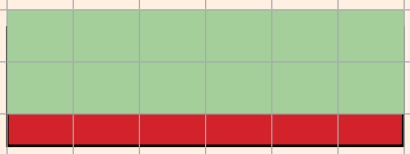
Date : _____

Area and Perimeter on Square Grid



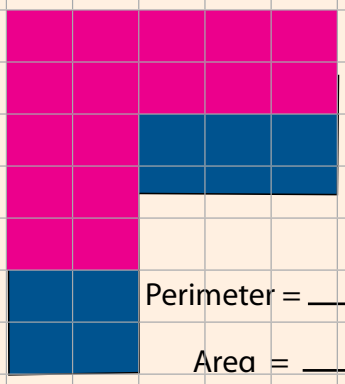
Perimeter = _____ cm

Area = _____ cm^2



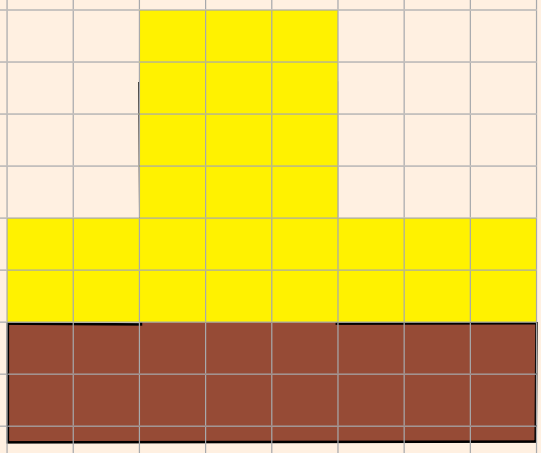
Perimeter = _____ cm

Area = _____ cm^2



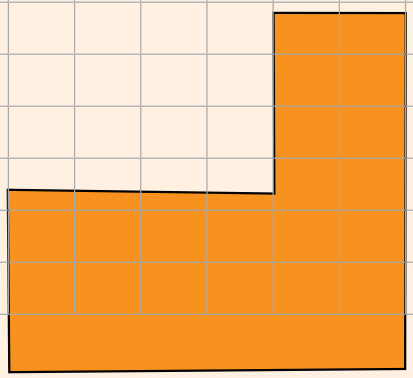
Perimeter = _____ cm

Area = _____ cm^2



Perimeter = _____ cm

Area = _____ cm^2



Perimeter = _____ cm

Area = _____ cm^2

Tell the students that side of each square is 1 cm. The area of each square is 1 cm^2 . Help them to count the squares occupied by each shape to find perimeter and area of the shape. Also, ask them to see how many sets of parallel line, and how many right angles they can identify.	*Perimeter and area*

Note: Geo boards can be used to find perimeter and area of shapes.

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Name: _____

Date : _____

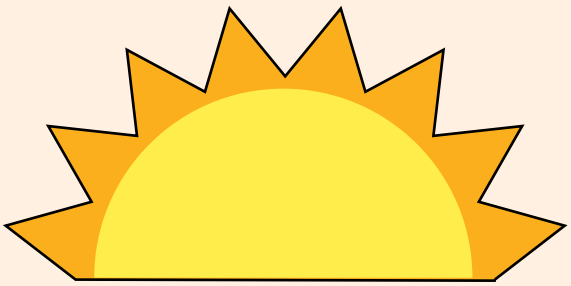
Square Grid

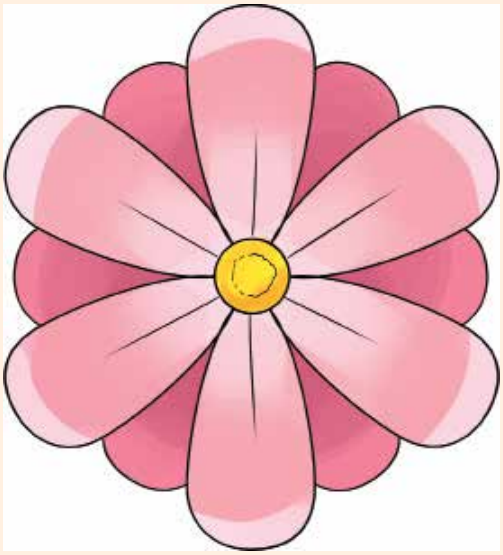
Help the students to draw a representation of their school's playground on this square grid and **estimate its dimensions**. Once the figure is drawn, find the **perimeter**.	*Perimeter and area*

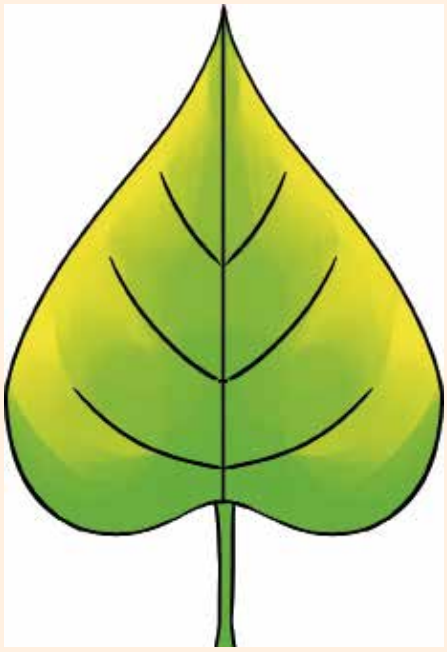
Name: _____

Date : _____

Symmetry in Nature







Tell the students to find as many **lines of symmetry** as possible for each. Then come up with examples of things in nature with at least one line of symmetry.	*Symmetry*

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Name: _____

Date : _____

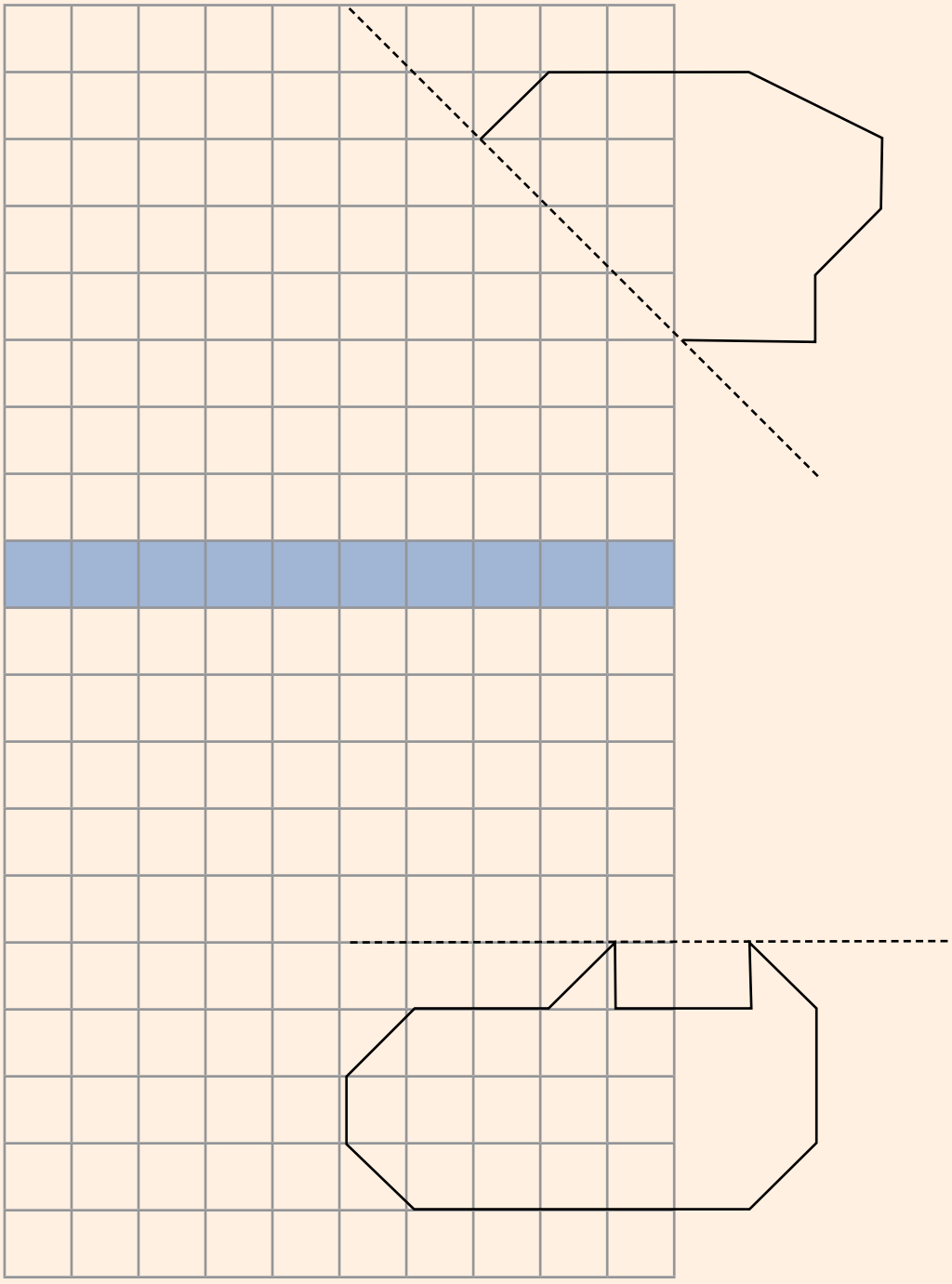
Symmetry in Nature

Draw real-life objects of your choice with one or more **lines of symmetry.**	*Symmetry*

Name: _____

Date : _____

Symmetric Figures on Square Grid



Complete the figures based on the **given line of symmetry**.	*Symmetry*

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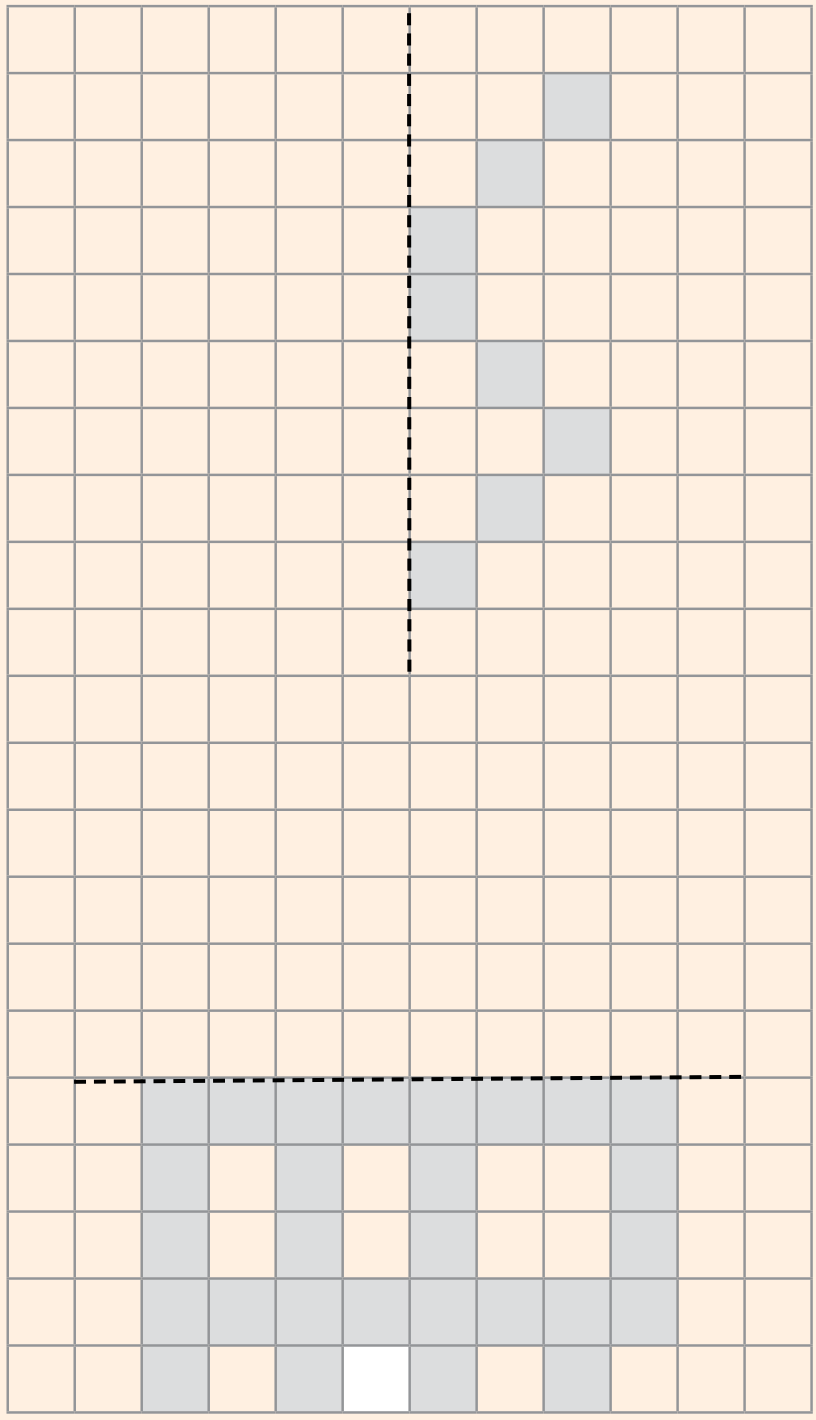
Name: _____

Date : _____

Symmetric Figures on Square Grid

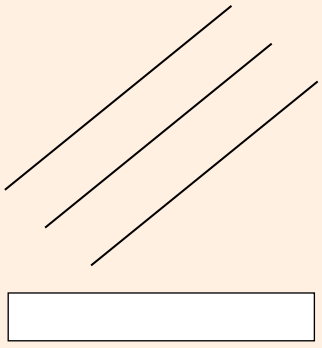


Shade the squares to complete the figures based on the given **line of symmetry**.	*Symmetry*

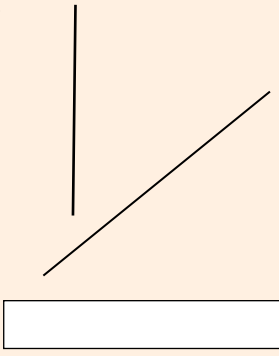
Geometry

1. Identify the following as parallel and non-parallel lines.

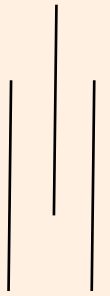
a.



b.

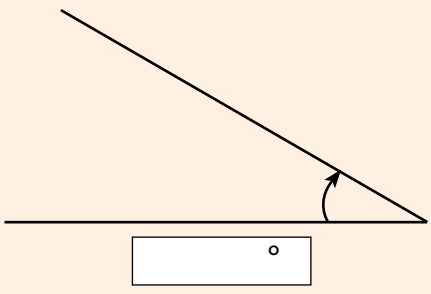


c.

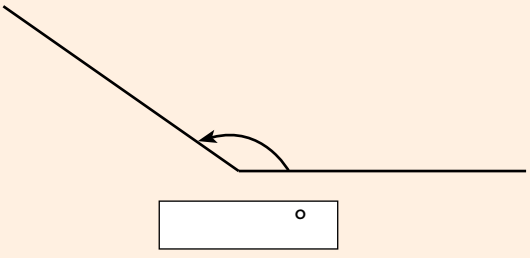


2. Measure these angles using a protractor.

a.

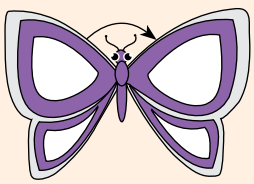


b.

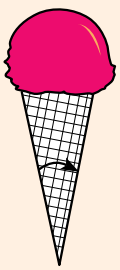


3. Identify the marked angles as acute, obtuse, and right angles.

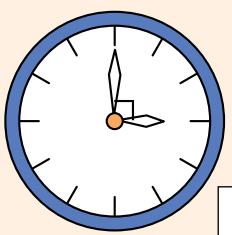
a.



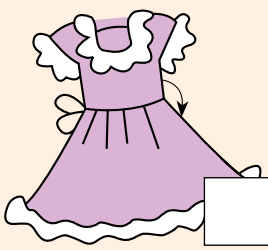
b.



c.



d.



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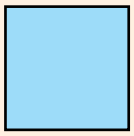
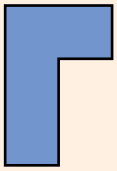
4. Use the base line to construct the angles using a protractor.

a.	b.
80°	155°

5. How many lines of symmetry do the following shapes have?

a. 

b. 

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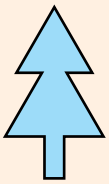
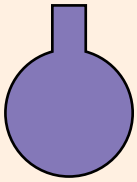
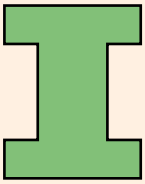
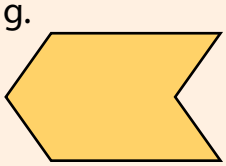
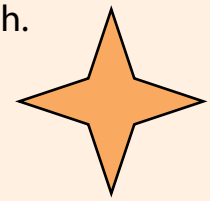
d. 

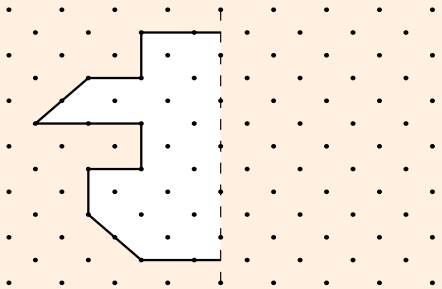
e. 

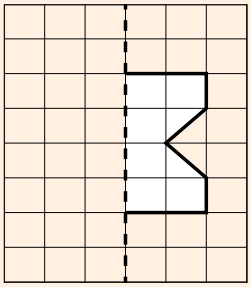
f. 

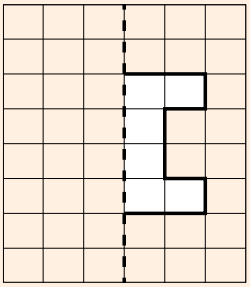
g. 

h. 

6. Complete each shape with respect to the given line of symmetry. Lines of symmetry are shown by dotted lines.

a. 

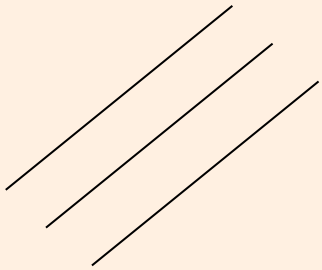
b. 

c. 

Geometry

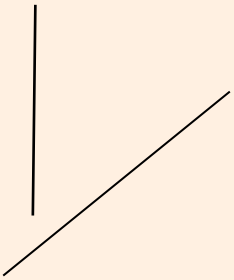
1. Identify the following as parallel and non-parallel lines.

a.



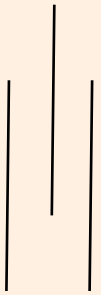
Parallel

b.



Parallel

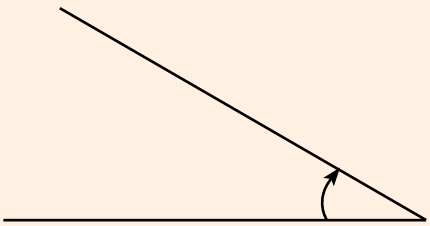
c.



Parallel

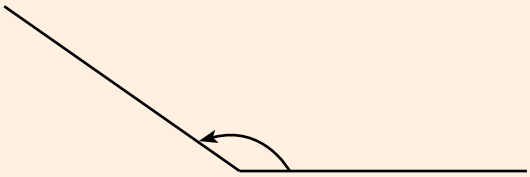
2. Measure these angles using a protractor.

a.



°

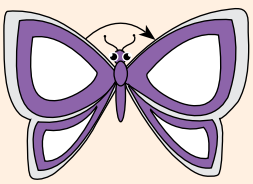
b.



°

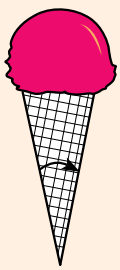
3. Identify the marked angles as acute, obtuse, and right angles.

a.



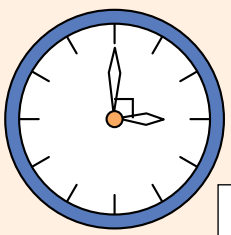
Obtuse

b.



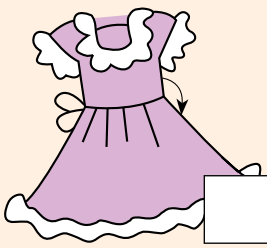
Acute

c.



Right

d.



Obtuse

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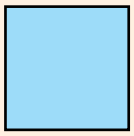
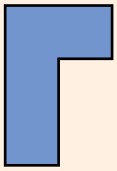
4. Use the base line to construct the angles using a protractor.

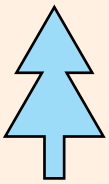
a.	b.
80°	155°

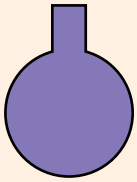
5. How many lines of symmetry do the following shapes have?

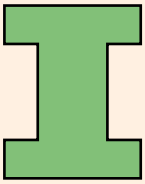
a.  4

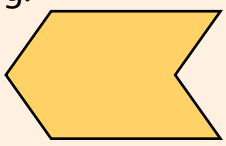
b.  None

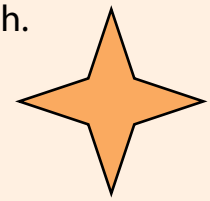
c. 4

d.  1

e.  1

f.  2

g.  1

h.  4

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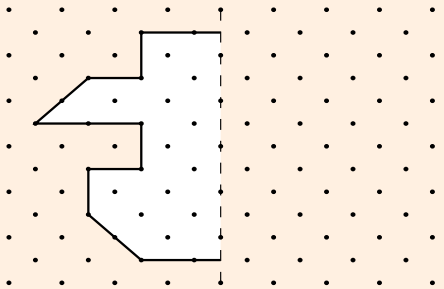
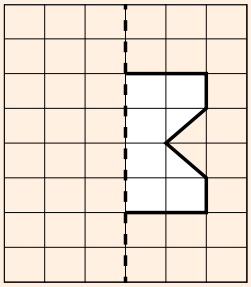
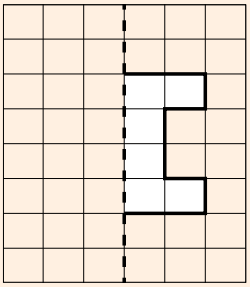
a. 

b. 

c. 

Unit

6 Measurement: Length, Mass, Capacity and Time

Learning Framework

Converting Units of Length

The student will demonstrate a thorough understanding of the relationships between different units of length, including kilometre, metre, centimetre, and millimetre, and apply this knowledge to convert between these units with accuracy and precision. Through the "Length Conversion" activity, students will engage in a comprehensive conversion exercise where they transform lengths from one unit to another, explaining their reasoning and providing examples to illustrate their knowledge of measurement equivalencies and conversion factors.

Solving Real-Life Length Problems

The student will apply mathematical skills to solve real-life problems involving length, including converting, adding, and subtracting lengths in the same units, and demonstrate the ability to interpret and communicate mathematical information in a clear and concise manner. In the "Real-Life Length Scenarios" activity, students will work in groups to solve real-life scenarios that require length calculations, such as measuring the perimeter of a room or the length of a path, explaining their reasoning and justifying their solutions with mathematical evidence.

Converting Units of Mass

The student will demonstrate a solid grasp of the relationships between different units of mass, including kilogram and gram, and apply this knowledge to convert between these units with accuracy and precision. Through the "Mass Conversion" activity, students will engage in a comprehensive conversion exercise where they transform masses from one unit to another, explaining their reasoning and providing examples to illustrate their knowledge of measurement equivalencies and conversion factors.

Solving Real-Life Mass Problems

The student will apply mathematical skills to solve real-life problems involving mass, including converting, adding, and subtracting masses in the same units, and demonstrate the ability to interpret and communicate mathematical information in a clear and concise manner. In the "Real-Life Mass Scenarios" activity, students will work in groups to solve real-life scenarios that require mass calculations, such as measuring the weight of ingredients for a recipe or the mass of objects in a science experiment, explaining their reasoning and justifying their solutions with mathematical evidence.

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Converting Units of Capacity

The student will demonstrate a thorough understanding of the relationships between different units of capacity, including litre and millilitre, and apply this knowledge to convert between these units with accuracy and precision. Through the "Capacity Conversion" activity, students will engage in a comprehensive conversion exercise where they transform capacities from one unit to another, explaining their reasoning and providing examples to illustrate their knowledge of measurement equivalencies and conversion factors.

Solving Real-Life Capacity Problems

The student will apply mathematical skills to solve real-life problems involving capacity, including converting, adding, and subtracting capacities in the same units, and demonstrate the ability to interpret and communicate mathematical information in a clear and concise manner. In the "Real-Life Capacity Scenarios" activity, students will work in groups to solve real-life scenarios that require capacity calculations, such as measuring the volume of liquids for a recipe or the capacity of containers, explaining their reasoning and justifying their solutions with mathematical evidence.

Calculating Time Durations

The student will demonstrate the ability to calculate the duration of different events using start and end times and apply this knowledge to solve real-life problems involving time calculations. Through the "Time Calculation" activity, students will engage in a comprehensive calculation exercise where they determine the duration of events, explaining their reasoning and providing examples to illustrate their knowledge of time calculations and relationships.

Adding and Subtracting Measures of Time

The student will apply mathematical skills to add and subtract measures of time without carrying and borrowing, and convert measures of time to solve real-life problems, demonstrating the ability to interpret and communicate mathematical information in a clear and concise manner. In the "Time Calculation Scenarios" activity, students will work in groups to solve real-life scenarios that require time calculations, such as scheduling appointments or planning events, explaining their reasoning and justifying their solutions with mathematical evidence.

Recognising Temperature Scales

The student will demonstrate a thorough understanding of different temperature measuring scales, including Kelvin, Celsius, and Fahrenheit, and apply this knowledge to convert between these scales with accuracy and precision. Through the "Temperature Scale Exploration" activity, students will engage in a comprehensive discovery exercise where they explore and compare different temperature scales, explaining their reasoning and providing examples to illustrate their knowledge of temperature equivalencies and conversion factors.

Lesson Plan

Suggested Time: 4 periods

Objectives

- Calculate the duration of different events using start time and end time.
- Add and subtract measures of time (without carrying and borrowing) and convert measures of time to solve real-life situations.

Concept Connector

Reinforce the concept of reading time from digital and analogue clocks using a.m. and p.m. by referring to the ***Concept Connector given on Page 79***. Ask students to make their own time schedule sheet for a whole day. Ask them to prepare a list of activities they do from morning till night. Swap their worksheet with their partner to write whether the time is a.m. or p.m. Make sure that they use a.m. and p.m. appropriately.

Activityre	Time	a.m. or p.m.
Wake up at	6:30	
Breakfast	7:15	

Exploring the objective

Explain the conversion of units of time using conversion table given in ***Concept Connector on Page 81*** emphasising multiplication operation while converting from larger to smaller units of time. Step-by-step explanation using examples, ***Page 81*** can be done on board involving students' feedback. Explain the solution of real-life word problem given on ***Page 81***. Write the questions, of ***Examples page 82***, on board to explain each and every step involved in addition and subtraction of units of time. Volunteer students can be called to the board to solve the questions and explain the steps to the class.

Activity

Time Intervals

What You Need:

Digital watches/Clocks

Time sheets

Time (in hrs and min) after every 5 minutes	Time in minutes
Starting time:	

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How to play:

Divide the students in pairs. Distribute the time sheet to each pair. Display digital clocks with different timings and ask students to choose any clock and start the activity. Tell them to first note down the starting time in the sheet and then write the time after every 5 minutes. They must start converting the time in minutes as soon as they note down a new time. If two or more pairs have chosen the same clock, then ask them to exchange their sheets and peer check the results.

Example: Starting time: 11:15

Time in minutes: (11 x 60) min + 15 min = (660 +15) min = 675 min

Reflection

Students successfully record the time from clocks.

Demonstrated deeper understanding of time interval by correctly adding and subtracting units of time.

Converted units of time from larger to smaller units.

Exercise

Exercise 4 comprises questions related to conversion, addition and subtraction of units of time. ***Question 2*** completely covers the conversion and ***Question 3*** involves the basic concept of addition and subtraction of time. Have students practice addition and subtraction of time solving these questions. Use ***Question 5*** as the whole class activity. Assign ***QR Code Activity sheet*** given ***on Page 84*** and ***Math Lab Page 49*** to further practice the concept. Give ***Question 2, 3(c, e to h), 3(c to e), and 6(a, c, d)*** as individual task in classwork. Assign ***Maths Quest*** given on ***Page 81, 82, and 85*** in pairs and take feedback to have discussion on the correct answers. Ask students to practice at home by assigning the rest of the questions as homework.

Extension Activity

Assign ***Beyond the Horizon given on Page 87***. Take feedback from the class and discuss the method of how they solved the problem.

Length

Learning Objective:

- Use standard metric units to measure the length of different objects.
- Add and subtract measures of length in same unit.

Let's Talk Math:

- Explain that certain number of smaller units make up one bigger unit.

Make Sure You Have:

- Ruler

Activity:

- Measure & Compare

Duration: 1 Lesson **Whole Class Activity**

Let's Try It:

- Give pupils 30 seconds to find an object that is not too bulky (e.g., books, pencils, erasers, etc.) to measure.
- Once selected, form groups of three and have them assist each other in measuring the objects' height (top to bottom) and width (side to side).
- Measurements should be in centimetres, rounded to whole numbers.
- For oddly shaped objects, encourage collaboration to determine the best way to measure.
- Each group will list their objects and measurements on A4 sheets, ensuring they note the units (cm).

Assessment:

- Ask pupils to solve the following individually and include units in their answers.
- 55 km – 34 km
- 7292 mm + 381 mm
- 291 cm + 201 cm
- 3291 mm – 728 mm
- 6820 km – 83 km
- 2700 km – 829 km

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Mass

Learning Objective:

- Use standard metric units to measure the mass of different objects.
- Convert larger to smaller metric units (2-digit numbers with one decimal place).
  - Kilograms into grams
  - Grams into milligrams
- Add and subtract measures of mass in same units.

Let's Talk Math:

- Explain that certain number of smaller units make up one bigger unit.
- The system of measurement based on multiples of 10 is called the metric system.

Activity:

- Book Weight Challenge

Duration: 1 Lesson **Whole Class Activity**

The weight of individual books is given below.

Book 1: 8.23 kg Book 2: 7.95 kg Book 3: 5.58 kg
Book 4: 2.41 kg Book 5: 6.47 kg Book 6: 9.36 kg

Task 1: Which set of 3 books do I put on each shelf?

Shelf A: _____ kg + _____ kg + _____ kg = 20 kg

Shelf B: _____ kg + _____ kg + _____ kg = 20 kg

Task 2: Covert mass of each book into grams.

Book 1: 8.23 kg = _____ g
Book 2: 7.95 kg = _____ g
Book 3: 5.58 kg = _____ g
Book 4: 2.41 kg = _____ g
Book 5: 6.47 kg = _____ g
Book 6: 9.36 kg = _____ g

Let's Try It:

- Create a real-life scenario involving mass.
- For example, tell pupils that you want to arrange some books on your shelf.
- There are only two shelves, capable of holding a total of three books.
- The total weight of the books on each shelf should not b more than 20 kg.

Assessment:

- Ask pupils to solve some sums individually, and inclue units in their answers
- 892 kg – 63 kg
- 1091 mg + 937 mg
- 8025 kg – 112 kg

Capacity

Learning Objective:

- Solve real-life situations involving conversion, addition and subtraction of measures of length, mass and capacity.

Let's Talk Math:

Make Sure You Have:

- Buckets
- Jugs and containers

Activity:

- Fun with Water

Duration: 1 Lesson **Group Activity**

Let's Try It:

- Take the pupils to the play area.
- Arrange 4 buckets or containers with a 4-litre capacity and small jugs or containers with capacities of 100 ml, 200 ml, 300 ml, and 500 ml.
- Fill two buckets with water.
- Divide the pupils into four groups.
- Group 1: Use a 500 ml jug to fill one bucket with water.
- Group 2: Choose any small container to fill the other bucket.
- Instruct them to count how many times they use their container to fill the bucket.
- Ask both groups how many jugs or containers they used to fill their bucket.
- Repeat the activity with the remaining two groups.
- Compare the results of each group's measurements.

Assessment:

- Ask pupils to solve the following individually and include units in their answers.
- 505 l – 234 l
- 729 ml + 108 ml
- 913 ml + 341 ml
- 22 l – 438 l
- 820 ml + 2921 ml
- 2032 l – 99 l

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Time

Learning Objective:

- Read and write the time using digital and analogue clocks on 12-hour and 24-hour format.
- Convert hours to minutes and minutes to seconds.
- Convert years to months, months to days, and weeks to days.
- Add and subtract measures of time without carrying and borrowing.

Let's talk math:

- Time is a very important factor, and we find it inevitable in our daily life, for example, travelling, working and other activities involve time.

Make Sure You Have:

- Analogue Clock

Activity: Time Magic

Duration: 1 Lesson **Whole Class Activity**

Let's Try It:

- For this activity, set a time on an analogue clock. Ask pupils what time it shows.
- Once they give you the answer, ask them what time it would be after two hours.
- Then point at another number on the clock and ask what time it would be after four hours.
- Tell them that calculating a later time is the same as addition.
- Continue pointing at different time on clock and adding few hours to it.
- Similarly, explain that just like addition, where they counted forward on the clock, to subtract they just need to count backwards on the clock for subtraction.
- Ask pupils to prepare few questions based on addition and subtraction for their partner to solve.
- For example, 4 o'clock + 3 hours, 6 o'clock + 6 hours, 9 o'clock –3 hours, 8 o'clock – 6 hours.

Assessment:

- Ask pupils, in groups, to create maps. Each group may pick a room, or a building, and draw a map to scale.

Name: _____

Date : _____

What's in the Bag?

Mass				

Length				

Capacity				

Empty out the contents of your school bag and sort them according to their **weight** and **length**. Estimate the correct **units** for each as you sort them into the table. Also see what items can be used as containers.	*Length* *Mass* *Capacity*

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Name: _____

Date : _____

Classroom Explorer

1. Measure your pen/pencil, and state the length in mm: _____

   cm: _____

   Now add the length of your pencil to the length of your partners pen/pencil, and state the answer in

   cm: _____

2. Weigh your school bag, and state the mass in

   kg: _____

   g: _____

   mg: _____

   Remove two books and weigh it again, stating the new mass, and the difference in

   kg: _____ kg: _____

   g: _____ g: _____

   mg: _____ mg: _____

3. Measure and state capacity of your water bottle in

   l: _____

   ml: _____

   Now calculate the combined capacity of your and your partner's bottles

   l: _____

   ml: _____

Encourage pupils to continue to explore classroom and find more objects that they can measure and compare, using units km, m, cm, mm, kg, g, mg, l, and ml.	*Length* *Mass* *Capacity*

Name: _____

Date : _____

Time Zones

KARACHI 10:30

Rome: 3 hours behind

New York: 9 hours behind

Anadyr: 7 hours ahead

Calgary: 11 hours behind

Melbourne: 6 hours ahead

Beijing: 3 hours ahead

The clock above shows the time in Karachi. The list of cities below show their **time zones** relative to Karachi. Using the clues, write the time in each city in the clocks on the right.	*Time*

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Measurement: Length, Mass, Capacity, Time, and Temperature

1. Which measuring unit would you use to measure:

a. the thickness of your maths book? (cm, m, km)

b. the distance between Karachi and Islamabad? (mm, cm, km)

c. the length of a needle? (mm, m, km).

d. the height of a door? (cm, m, km)

e. the mass of a small feather? (mg, g, kg)

f. the mass of your friend? (mg, g, kg)

g. the mass of small pack of chips? (mg, g, kg)

h. the capacity of a teaspoon? (ml, l)

i. the capacity of a car's petrol tank? (ml, l)

2. Convert the following as required.

a. 50 km = ☐ m	b. 6.5 cm = ☐ mm
c. 723 m = ☐ cm	d. 738 kg = ☐ g
e. 6.9 g = ☐ mg	f. 32 kg 167 g = ☐ g
g. 48 *l* = ☐ ml	h. 16 *l* 217 ml = ☐ ml

3. Solve the following.

a. 91 km + 15 m	b. 2 m + 16 cm
c. 5 km – 20 m	d. 35 cm – 150 mm
e. 4 kg + 154 g	f. 61 g + 63 mg
g. 72 kg – 45 kg	h. 4 l + 792 ml
i. 34 l + 387 ml	j. 58 g – 300 mg

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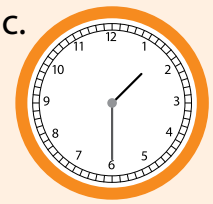
4. Solve the following real-life problems.

	Problems	Working
a.	K2 is the second highest peak in the world. Its height is 8 km 611 m. The height of Mount Everest is 8 km 848 m. Calculate the difference between their heights. Give your answer in metres.	
	Answer: ☐ m	
b.	The mass of Sahil is 35 kg. Tariq's mass is 8 kg more than Sahil's mass. What is the mass of Tariq? Express the mass in grams.	
	Answer: ☐ g	
c.	A fully filled water tanker delivered 5525 l water to a house. 4475 l is left in the tanker. How much is the capacity of the water tanker?	
	Answer: ☐ l	
d.	A packet of rice weighs 365 g. If 45 g of extra rice is added to it what will be the new mass of the packet?	
	Answer: ☐ g	
e.	Kanwal wants to make 3.56 l of lemon juice. She has 2.67 l of lemon concentrate. How much water does she need to add to make the required amount of juice? Give your answer in terms of ml.	
	Answer: ☐ ml	

5. Write the time in 12-hour and 24-hour format.

The following shows the time when:

Clocks	12-hour format	24-hour format
a. Sumbul wakes up.		
b. Sumbul plays in a park.		
c.  Sumbul has her lunch.		
d. Sumbul eats her breakfast.		
e. Sumbul goes to sleep.		

6. Convert the following as required.

a. 3 h = ☐ min

b. 150 min = ☐ sec

c. 15 h 20 min = ☐ min

d. 22 min 30 sec = ☐ sec

e. 5 years = ☐ months

f. 8 months = ☐ days

g. 12 weeks = ☐ days

h. 22 weeks 3 days = ☐ days

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7. Solve the following real-life problems.

	Problems	Working
a.	Mishaal went abroad for higher studies. She came back to her hometown after 4 years and 3 months. How many months did she stay away from the hometown?	
	Answer: ____ months	
b.	A plumber worked for 5 hr 30 min in the morning and 4 hr 23 min later in the day. How long did he work?	
	Answer: ____ hr ____ min	
c.	A train left a station at 09:19 and reached another station after 5 hour 25 minute. At what time did the train reach?	
	Answer: ____ hr ____ min	
d.	Sarim arrived at the bus stop at 09:15 a.m. He was late and the bus left 10 minutes before he reached the terminal. At what time did the bus leave?	
	Answer: ____ a.m.	
e.	A movie started at 06:20 p.m. and ended at 08:35 p.m. What was the duration of the movie? Express your answer in minutes.	
	Answer: ____ min	

Measurement: Length, Mass, Capacity, and Time

1. Which measuring unit would you use to measure:

a. the thickness of your maths book? (cm, m, km)

b. the distance between Karachi and Islamabad? (mm, cm, km)

c. the length of a needle? (mm, m, km).

d. the height of a door? (cm, m, km)

e. the mass of a small feather? (mg, g, kg)

f. the mass of your friend? (mg, g, kg)

g. the mass of small pack of chips? (mg, g, kg)

h. the capacity of a teaspoon? (ml, l)

i. the capacity of a car's petrol tank? (ml, l)

2. Convert the following as required.

a. 50 km = 50000 m

b. 6.5 cm = 65 mm

c. 723 m = 72300 cm

d. 738 kg = 738000 g

e. 6.9 g = 6900 mg

f. 32 kg 167 g = 32167 g

g. 48 *l* = 48000 ml

h. 16 *l* 217 ml = 16217 ml

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3. Solve the following.

a. 91 km + 15 m Convert km to m 91 x1000 = 91000 m 91000 m + 15m = 91015 m	b. 2 m + 16 cm Convert km to m 91 x1000 = 91000 m 91000 m + 15m = 91015 m
c. 5 km – 20 m	d. 35 cm – 150 mm
e. 4 kg + 154 g	f. 61 g + 63 mg
g. 72 kg – 45 kg	h. 4 l + 792 ml
i. 34 l + 387 ml	j. 58 g – 300 mg

4. Solve the following real-life problems.

	Problems	Working
a.	K2 is the second highest peak in the world. Its height is 8 km 611 m. The height of Mount Everest is 8 km 848 m. Calculate the difference between their heights. Give your answer in metres.	km m - 8 848 8 611 0 237
	Answer: 0 237 m	
b.	The mass of Sahil is 35 kg. Tariq's mass is 8 kg more than Sahil's mass. What is the mass of Tariq? Express the mass in grams.	35 kg + 8 kg = 43 kg Tariq's mass = 43 kg
	Answer: 43000 g	
c.	A fully filled water tanker delivered 5525 l water to a house. 4475 l is left in the tanker. How much is the capacity of the water tanker?	5525 l + 4475 l 10000 l
	Answer: 10000 l	
d.	A packet of rice weighs 365 g. If 45 g of extra rice is added to it what will be the new mass of the packet?	weight of packet = 365 g Extra rice added = 45 g 410 365 g + 45 g = 410 g
	Answer: 410 g	
e.	Kanwal wants to make 3.56 l of lemon juice. She has 2.67 l of lemon concentrate. How much water does she need to add to make the required amount of juice? Give your answer in terms of ml.	Amount of juice to be made 3.56 l Lemon concentrate 2.67 l 3.56 - 2.67 = 0.89 l Amount of water needed = 0.89
	Answer: 0.89 ml	

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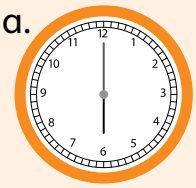
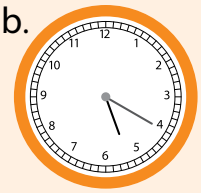
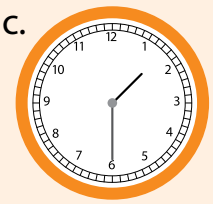
5. Write the time in 12-hour and 24-hour format.

The following shows the time when:

Clocks	12-hour format	24-hour format
a.  Sumbul wakes up.	6 : 00 a.m.	06 00
b.  Sumbul plays in a park.	5 : 20 p.m.	05 20
c.  Sumbul has her lunch.	1 : 30 p.m.	13 30
d. Sumbul eats her breakfast.	7 : 30 a.m.	07 30
e. Sumbul goes to sleep.	9 : 30 p.m.	21 30

6. Convert the following as required.

a. 3 h = 180 min

b. 150 min = 9000 sec

c. 15 h 20 min = 920 min

d. 22 min 30 sec = 1350 sec

e. 5 years = 60 months

f. 8 months = 240 days

g. 12 weeks = 84 days

h. 22 weeks 3 days = 157 days

7. Solve the following real-life problems.

	Problems	Working
a.	Mishaal went abroad for higher studies. She came back to her hometown after 4 years and 3 months. How many months did she stay away from the hometown?	4 years x 12 = 48 months 48 months + 3 months = 51 months
	Answer: 51 months	
b.	A plumber worked for 5 hr 30 min in the morning and 4 hr 23 min later in the day. How long did he work?	5 3 0 + 4 2 3 9 5 5
	Answer: 9 hr 55min	
c.	A train left a station at 09:19 and reached another station after 5 hour 25 minute. At what time did the train reach?	5 2 5 + 9 1 9 14 4 4
	Answer: 14hr 44min	
d.	Sarim arrived at the bus stop at 09:15 a.m. He was late and the bus left 10 minutes before he reached the terminal. At what time did the bus leave?	9 1 5 - 0 1 0 9 0 5
	Answer: 9:05 a.m.	
e.	A movie started at 06:20 p.m. and ended at 08:35 p.m. What was the duration of the movie? Express your answer in minutes.	8 3 5 - 6 2 0 2 1 5
	Answer: 135 min	

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Unit

7 Measurement: Perimeter and Area

Learning Framework

Identifying Units of Measurement for Perimeter and Area

The pupil will demonstrate a thorough understanding of the units of measurement for perimeter and area, recognizing that perimeter is measured in units of length (such as meters, centimeters, or kilometers) and area is measured in square units (such as square meters or square centimeters). Through the "Measurement Match" activity, pupils will engage in a matching exercise where they pair units of measurement with their corresponding attributes (perimeter or area), explaining their reasoning and providing examples to illustrate their knowledge of measurement units.

Differentiating Between Perimeter and Area

The pupil will demonstrate the ability to differentiate between the perimeter and area of various 2D shapes, including squares, rectangles, and rectilinear shapes. Through the "Shape Explorer" activity, pupils will engage in a discovery exercise where they explore and identify the perimeter and area of different shapes, explaining their reasoning and providing examples to illustrate their knowledge of shape attributes.

Finding Perimeter and Area of 2D Figures

The pupil will apply mathematical skills to find the perimeter and area of 2D figures on a square grid, using formulas and calculations to determine the perimeter and area of squares, rectangles, and rectilinear shapes. Through the "Grid Explorer" activity, pupils will engage in a calculation exercise where they find the perimeter and area of 2D figures on a square grid, explaining their reasoning and providing examples to illustrate their knowledge of perimeter and area calculations.

Applying Formulas for Perimeter and Area

The pupil will demonstrate the ability to apply formulas to find the perimeter and area of squares, rectangles, and rectilinear shapes, showcasing their understanding of mathematical relationships and calculations. Through the "Formula Frenzy" activity, pupils will engage in a calculation exercise where they apply formulas to find the perimeter and area of various shapes, explaining their reasoning and providing examples to illustrate their knowledge of mathematical formulas and calculations.

Lesson Plan

Suggested Time: 2 periods

Objectives

Find area of 2D figures on a square grid and apply formulas to find the perimeter and area of squares, rectangles, and rectilinear shapes.

Concept Connector

Discuss the real-life scenario given in ***Maths in Action given on Page 93*** to make connection with real life. Using ***Concept Connector given on Page 89***, have students recall the concepts of perimeter and area of figures drawn on square grids. Provide each student with cut-outs of square and rectangular shapes and square grids. Ask them to write the name of the shape on each cut-out. Paste cut-outs of rectangle and square on the given grids. Ask them to write the perimeter and area of these shapes by counting the number of squares covered by the shapes

Exploring the objective

Draw a rectangle and square on a white board. Derive the formulae for area and perimeter of square and rectangle with explanation. Refer to ***Page 92, 93***. and encourage students to give their input while derivation. Application of formulae can be explained by solving ***Example 5, Page 93***. Draw any rectilinear shape (given on ***Page 94***) on the board and explain that this shape can be divided into rectangles and squares. Explain that the area can be calculated after dividing the shape into rectangles and squares by solving ***Example 6, Page 93***. Real-life application can be explained by solving ***Example 7, Page 95***.

Activity:

I am an Architect

What You Need:

Chart papers

Coloured markers

rulers

How to Play:

Hand out chart paper and ask students to design their dream house. Remind them to make a rough sketch in their notebooks before using the chart paper. Tell them that there must only be straight lines, and they must only make shapes that are square or rectangle. They may assign their own measurements but will have to think realistically about what units to use. Once they are done, put the chart papers up around the class. Have them calculate the area and peimeter of different rooms.

Reflection:

Students demonstrated a deeper understanding of the concept of calculating area.

Correct application of formula to calculate area.

Exercise

Question 1 and 2 of Exercise 1 deal with the basic concept of applying formula of area. Whereas ***Question 2*** asks to calculate perimeter and area of rectilinear shapes for which students need support. Assign these questions in pairs to provide support. Assign ***Question 4(c to f, i, j)*** as classwork and the rest for homework. ***QR Code Activity sheet,*** Page 97 can be given for further practice.

Extension Activity:

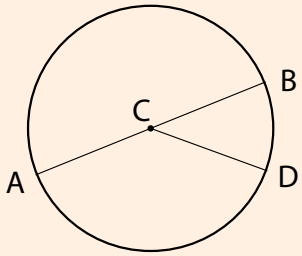
Assign ***Maths Quest given on Page 95*** and ***Beyond the Horizon given on Page 97*** to enhance students' critical thinking skills.

Measurement: Perimeter and Area

1. Match the following.

The length of a line from the centre of a circle to any point on its boundary.	**Diameter**
Any straight-line segment that passes through the centre of the circle and its endpoints lie on its boundary.	**Circumference**
The distance around a circle.	**Radius**

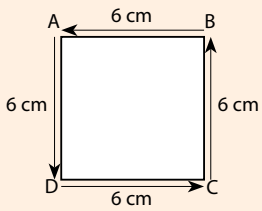
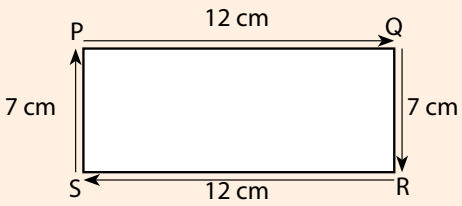
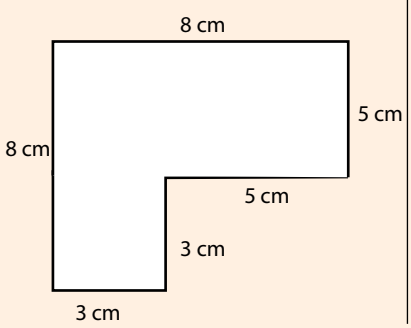
2. Write names of parts of the given circle using points A, B, C, and D.



a. Centre: ☐ b. Radius: ☐

c. Diameter: ☐

3. Find the perimeter and area of the given shapes.

	Perimeter	Area
a. 		
b. 		
c. 		

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4. Solve the following real-life problems.

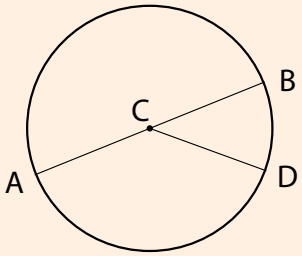
	Problems	Working
a.	Fahim is jogging on a rectangular track 300 m long and 150 m wide. What distance does he cover in one round?	
	Answer: ☐ m	
b.	A farmer has a rectangular field of length 850 m and a width of 600 m. If he wants to put a fence around the field, what will be the total length of the fence?	
	Answer: ☐ m	
c.	Find the area of rectangular field with length 125 m and breadth 78 m.	
	Answer: ☐ m^2	
d.	Sarim wants to build a pet house on a square plot of length 25 m. What will be the area of the pet house?	
	Answer: Rs ☐ m^2	

Measurement: Perimeter and Area

1. Match the following.

The length of a line from the centre of a circle to any point on its boundary.	Radius
Any straight-line segment that passes through the centre of the circle and its endpoints lie on its boundary.	Diameter
The distance around a circle.	Circumference

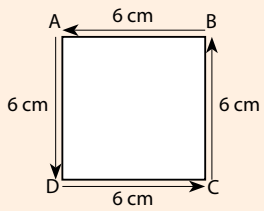
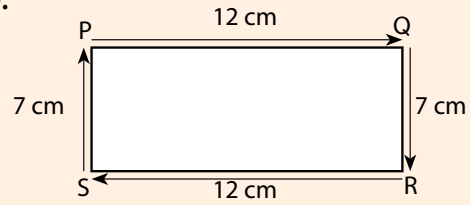
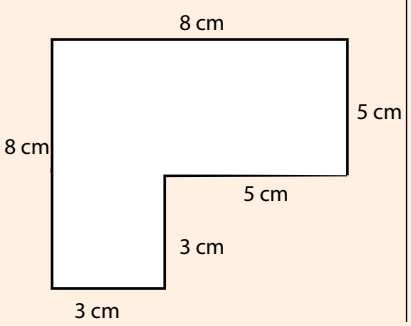
2. Write names of parts of the given circle using points A, B, C, and D.



a. Centre: C b. Radius: CD

c. Diameter: AB

3. Find the perimeter and area of the given shapes.

	Perimeter	Area
a. 	4 x 6 = 24cm	6 x 6 = 36cm^2
b. 	2(12 + 7) 2(19) = 38cm	12 x 7 = 84cm^2
c. 	add all sides = 32cm	8 x 3 = 24 5 x 5 = 25 24 + 15 = 49cm^2

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4. Solve the following real-life problems.

Problems	Working
a. Fahim is jogging on a rectangular track 300 m long and 150 m wide. What distance does he cover in one round?	2(300 + 150) 2(450) = 900m
Answer: 900 m	
b. A farmer has a rectangular field of length 850 m and a width of 600 m. If he wants to put a fence around the field, what will be the total length of the fence?	2(850 + 600) 2(1450) = 2900m
Answer: 2900 m	
c. Find the area of rectangular field with length 125 m and breadth 78 m.	125 x 78 = 9750m^2
Answer: 9750 m^2	
d. Sarim wants to build a pet house on a square plot of length 25 m. What will be the area of the pet house?	25 x 25 = 625m^2
Answer: Rs 625 m^2	

Unit 8 Data Handling and Probability

Learning Framework

Reading and Drawing Bar Graphs

The pupil will demonstrate the ability to read and draw horizontal and vertical, single and double bar graphs, showcasing their understanding of graphical representations and data visualization. Through the "Bar Graph Explorer" activity, pupils will engage in a graphing exercise where they create and interpret bar graphs, explaining their reasoning and providing examples to illustrate their knowledge of graphical representations.

Interpreting Real-Life Situations with Bar Graphs

The pupil will apply mathematical skills to interpret real-life situations using data presented in bar graphs, demonstrating their ability to analyze and make sense of graphical data. In the "Bar Graph Analysis" activity, pupils will work in groups to interpret and analyze real-life scenarios presented in bar graphs, explaining their reasoning and justifying their conclusions.

Reading Line Graphs

The pupil will demonstrate the ability to read line graphs, showcasing their understanding of graphical representations and data visualization. Through the "Line Graph Explorer" activity, pupils will engage in a graphing exercise where they create and interpret line graphs, explaining their reasoning and providing examples to illustrate their knowledge of graphical representations.

Interpreting Real-Life Situations with Line Graphs

The pupil will apply mathematical skills to interpret real-life situations using data presented in line graphs, demonstrating their ability to analyze and make sense of graphical data. In the "Line Graph Analysis" activity, pupils will work in groups to interpret and analyze real-life scenarios presented in line graphs, explaining their reasoning and justifying their conclusions.

Reading Pie Charts

The pupil will demonstrate the ability to read pie charts, showcasing their understanding of graphical representations and data visualization. Through the "Pie Chart Explorer" activity, pupils will engage in a graphing exercise where they create and interpret pie charts, explaining their reasoning and providing examples to illustrate their knowledge of graphical representations.

Interpreting Real-Life Situations with Pie Charts

The pupil will apply mathematical skills to interpret real-life situations using data presented in pie charts, demonstrating their ability to analyze and make sense of graphical data. In the "Pie Chart Analysis" activity, pupils will work in groups to interpret and analyze real-life scenarios presented in pie charts, explaining their reasoning and justifying their conclusions.

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Describing Probability Outcomes

The pupil will demonstrate the ability to describe the outcome of a simple probability experiment (spinner and dice), using mathematical language (i.e., impossible, less likely, more likely, equally likely, unlikely, and certain), showcasing their understanding of probability concepts and terminology. Through the "Probability Explorer" activity, pupils will engage in a probability experiment where they describe and analyze the outcomes, explaining their reasoning and providing examples to illustrate their knowledge of probability concepts.

Lesson Plan

Suggested Time: 2 periods

Objectives

- Read and draw horizontal and vertical, single and double bar graphs.
- Interpret real-life situations using data presented in bar graphs.

Concept Connector

Make your class recall the concepts of graphs and charts to represent information. Ask them to go through the ***Concept Connector***, bar graphs and text given on ***Page 99*** to relate it with their previous learning. Recap the use of tally marking and completing a table of given data. Inform them that when information is organised in a table, it becomes useful to draw bar graphs.

Exploring the Objectives

Link to the concept connector, explain vertical and horizontal bar graphs. The same information can be represented using vertical graphs and using horizontal bar graphs as well. Explain the use of ***double bar graph*** by asking a question given on ***Page 100***. Take feedback as whole class to generate discussion to highlight the requirement of double bar graph. Draw bar graphs for ***Page 100*** and ***Example on Page 101*** to explain the steps in detail. Encourage students to give input during the drawing and explanation of double bar graphs.

Activity

Breakfast Survey

What You Need:

Paper plates

Colour pencils

Markers

How to Play:

Ask students to write down what they had for breakfast that morning, and to draw a picture of it on the plate. If a student says he/she did not have breakfast, then they must write 'nothing'. Write few breakfast items such as milk, juice, cereal, fruits, toast, and eggs, etc. on board. Ask pupils to read their list one by one. Use tally marks for each item (if a new item comes up add it to the list). Represent the data on a bar graph drawn on the board. Discuss the data and analyse the bar graph. Write few related questions on the board and encourage students to find the answers from the bar graph and write them on whiteboards. For example:

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1. How many pupils had milk in the morning?
2. Which food is liked by most of the pupils?
3. Which food is least favourite of the Students?
4. How many pupils did not have breakfast?

Have students draw a double bar graph to show the same information divided into 2 categories: for number of boys and number of girls.

Reflection

Students collected the data correctly.

Represented information using bar graphs.

Successfully catagorised the gathered information.

Demonstrated deeper understanding of drawing double bar graphs.

Exercise

Start with the ***QR Code Activity Sheet given on Page 99*** and assign ***Questions 1, 4, 5, and 6 of Exercise 1*** as classwork. Since, in ***Questions 5 and 6***, students need to draw the graphs, make sure to provide support. Ensure that the labeling is done correctly and height of the bars are according to the respective values. Questions 2 and 3 can be assigned as homework. ***QR Code Activity Sheet*** given on ***Page 100*** and ***Math Lab Page 57*** can be assigned to further practice the concept.

Extension Activity

Ask Students to attempt ***Maths Quest given on Page 104***. Encourage students to provide feedback. Have discussion on the students' feedback.

Bar Graph

Learning Objective:

- Read simple bar graphs given in horizontal and vertical form.
- Interpret real-life situations using data presented in bar graphs
- Read line graphs.
- Interpret real-life situations using data using data presented in line graphs.
- Read pie chart.
- Interpret real-life situations using data presented in pie chart.

Let's Talk Math:

- Inform them that when information is organised in a table, it becomes useful to draw bar graphs.
- Line graphs give a quick analysis of data. Bar graph summarises a big data to making it easy to visualise it.
- Data interpretation is important because it helps with making decisions.

Make Sure You Have:

- Paper Plates

Activity:

Duration: 1 Lesson **Whole class activity**

Let's Try It:

- Start by discussing the importance of having a healthy breakfast in the morning.
- Distribute paper plates to each pupil.
- Ask pupils to write down what they had for breakfast and draw a picture of it on the plate.
- If a pupil didn't have breakfast, they must write 'nothing'.
- Write common breakfast items (e.g., milk, juice, cereal, fruits, toast, eggs) on the board.
- Ask pupils to read their lists one by one.
- Use tally marks for each item mentioned; if a new item comes up, add it to the list.
- Represent the data on a bar chart drawn on the board.
- Discuss and analyse the data from the bar chart with the class.

Assessment:

- Make a bar graph on a large chart paper and paste it on the classroom board.
- Let pupils study the graph and ask them to identify its topic and quantities on vertical and horizontal axes.

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Name: _____

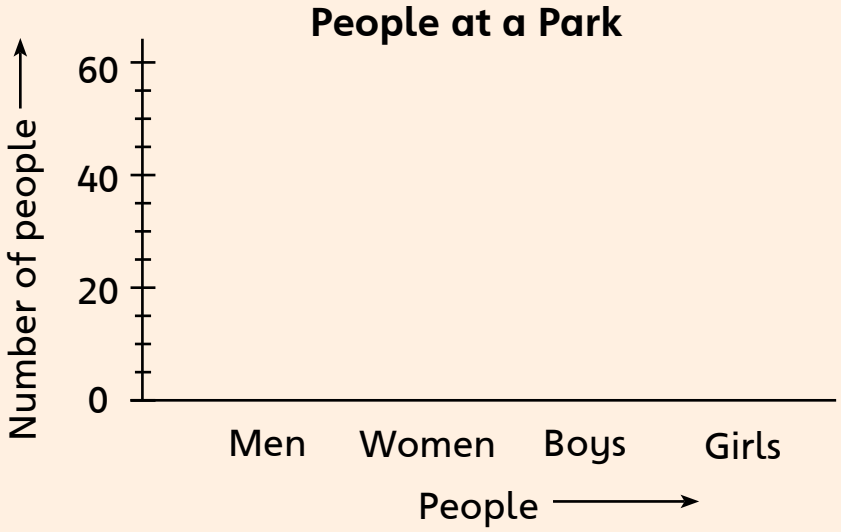
Date : _____

Drawing Bar Graph

The table shows the number of people at a park.

Men	Women	Boys	Girls
25	40	50	15

Draw a bar graph using the information above.



Use the bar graph to answer the questions.

(a) How many total number of people are there? _____

(b) How many males are there? _____

(c) Sara says there are 55 females at the park.
Is she correct? Why?

_____

(d) Adil says there are 60 children at the park.
Is he correct? Why?

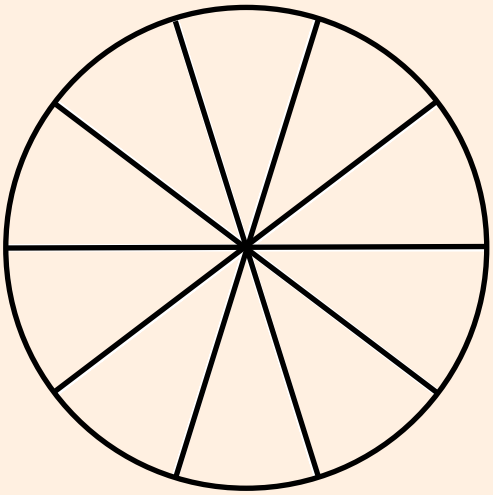
_____

	Bar graph

Name: _____

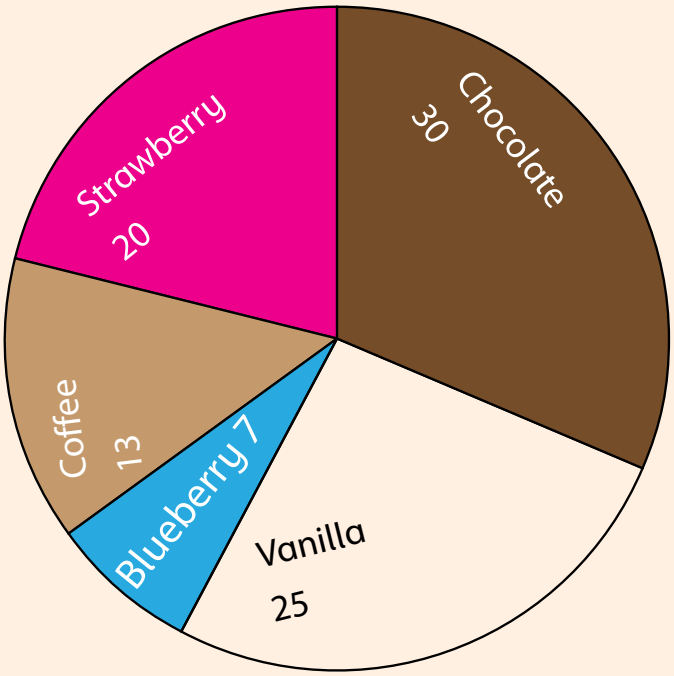
Date : _____

Pie Charts



10 people were asked their favourite drink.
Colour the graph to represent the results.

Coffee	4
Orange Juice	2
Tea	3
Mango Juice	1



Shade the first figure to create your own pie chart. Then read and interpret the second one to answer the questions on the next page.	*Pie chart*

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Name: _____

Date : _____

Pie Charts

1. Which is the most popular ice cream?

_____

2. How many more like vanilla over coffee?

_____

3. How many people participated in total?

_____

4. Which is the least popular ice cream?

_____

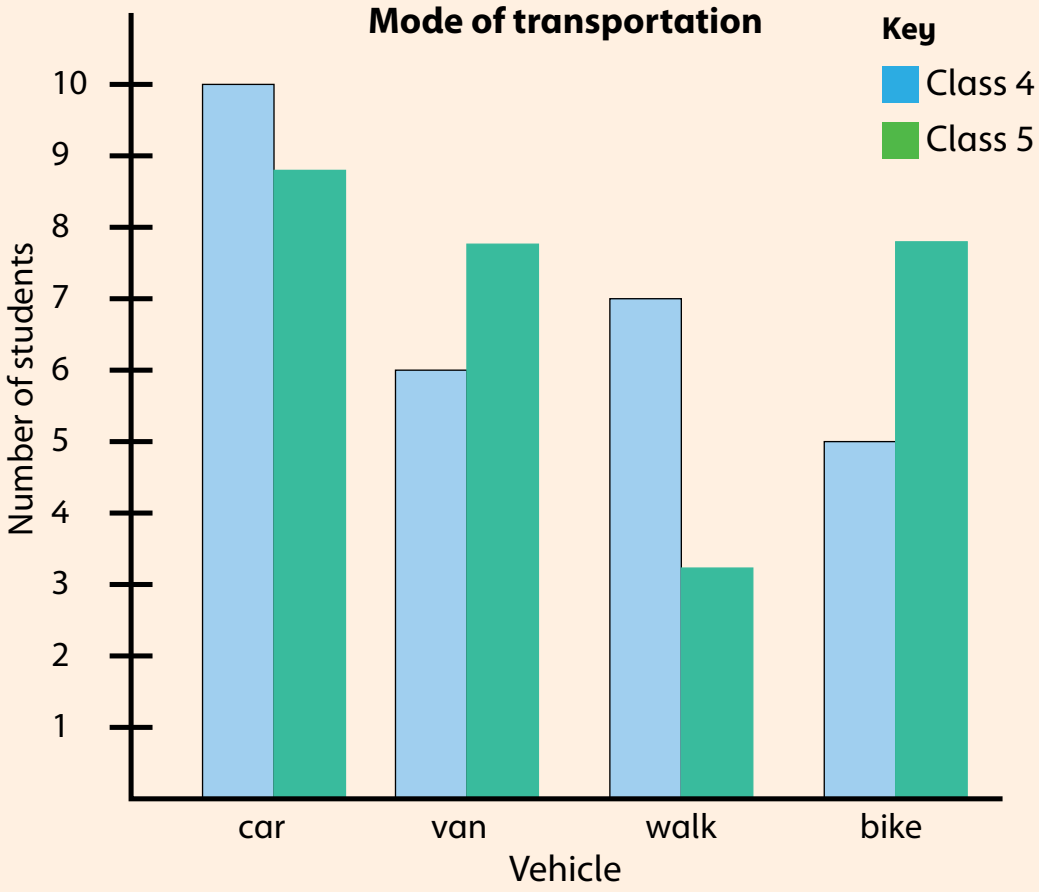
5. Which flavours' fans can be divided into two groups equally?

_____

Fill in the blanks.	*Pie chart*

Data Handling and Probability

1. Students of Class 4 and Class 5 were asked how they travelled to school. Results were shown using a bar graph given below.



Use the bar graph to answer the following.

a. How many children travelled to school by

i. car? ☐ ii. van? ☐ iii. bike? ☐

b. How many children are there

i. in Class 4? ☐ ii. in Class 5? ☐

c. How many more children travelled by car than by bike? ☐

d. How many more children of Class 4 than Class 5 walked to school? ☐

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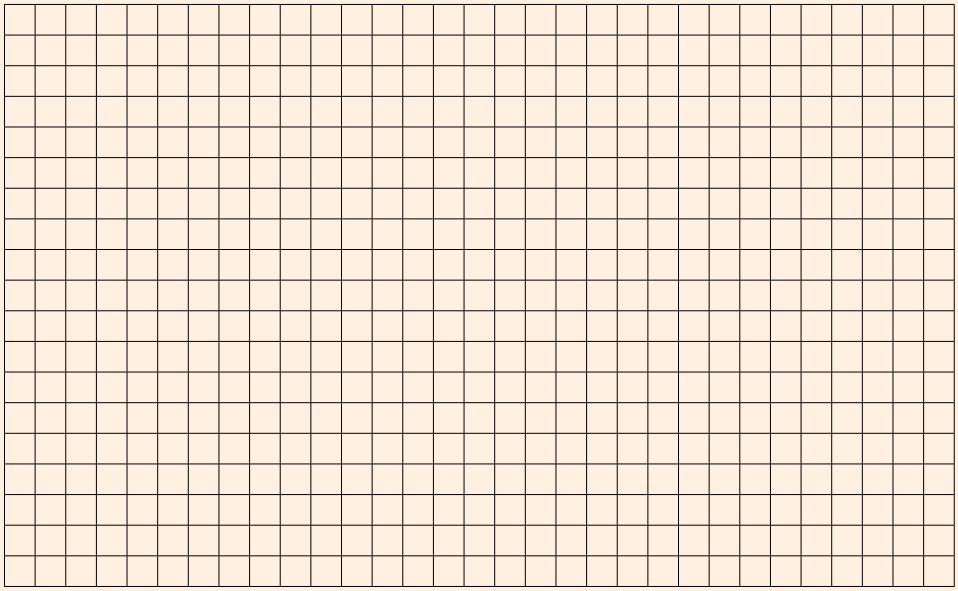
2. The number of bed sheets manufactured by a factory during five consecutive weeks is given in the following table.

Week	First	Second	Third	Fourth	Fifth	Sixth
Number of bedsheets	600	450	520	500	600	630

Draw a vertical bar graph representing the above data.



3. Choose the correct probability term from the words given below for the spinner landing on

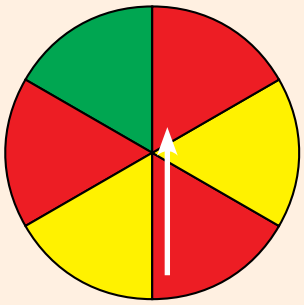
a. red.

b. green.

c. white.

impossible more likely

less likely



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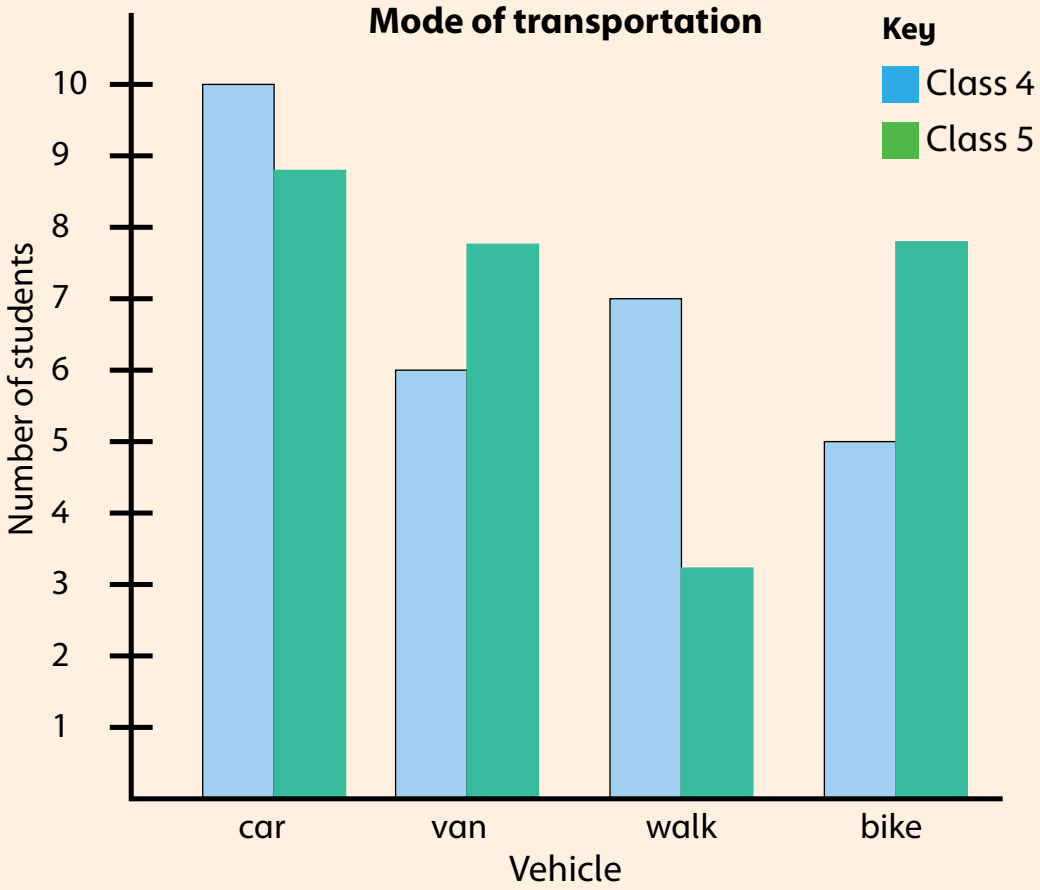

Use the bar graph to answer the following.

a. How many children travelled to school by

i. car? 19 ii. van? 14 iii. bike? 13

b. How many children are there

i. in Class 4? 29 ii. in Class 5? 28

c. How many more children travelled by car than by bike? 6

d. How many more children of Class 4 than Class 5 walked to school? 1

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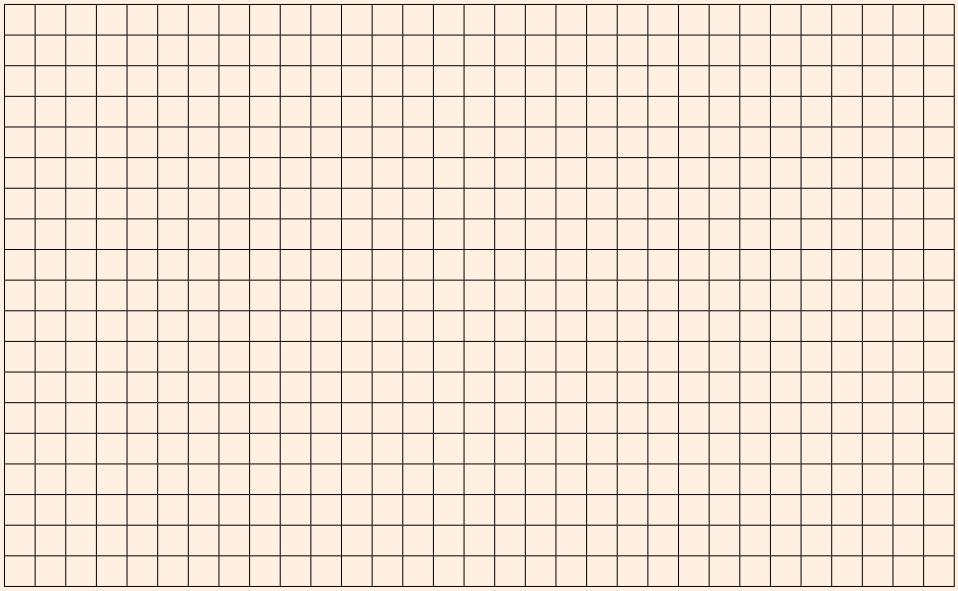


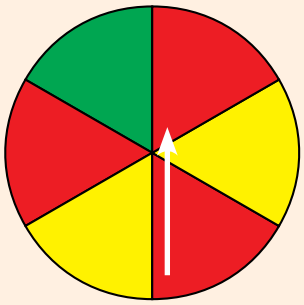
3. Choose the correct probability term from the words given below for the spinner landing on

impossible more likely less likely

a. red. more likely

b. green. less likely

c. white. impossible



Unlocking the Power of Math: The Essential Glossary

A glossary in mathematics is a valuable tool that enhances learning and understanding. It serves as a reference guide, providing clear definitions and explanations of mathematical terms and concepts. Here are some key reasons why a glossary is important in math:

Clarity and Understanding: A glossary helps students understand the precise meaning of mathematical terms. This clarity is crucial because math often involves complex and abstract concepts. By having a glossary, students can quickly look up definitions and ensure they are using terms correctly.

Consistency: Mathematical language needs to be consistent. A glossary ensures that everyone uses the same definitions and understands terms in the same way. This consistency is important for effective communication, whether in the classroom, in textbooks, or in discussions.

Learning Aid: For students, a glossary is an essential learning aid. It helps them review and reinforce their understanding of key terms. When studying or doing homework, students can refer to the glossary to refresh their memory and clarify any doubts.

Problem-Solving: Understanding the terminology is the first step in solving math problems. A glossary helps students decode the language of math problems, making it easier to identify what is being asked and how to approach the solution.

Confidence Building: Having a glossary at hand can boost students' confidence. Knowing that they can easily find the meaning of unfamiliar terms reduces anxiety and encourages them to tackle challenging problems without fear of misunderstanding.

Accessibility: A glossary makes mathematical knowledge more accessible. It breaks down barriers for students who might struggle with the language of math, providing them with a tool to independently explore and understand new concepts.

In summary, a glossary in mathematics is an indispensable resource that supports clarity, consistency, learning, problem-solving, confidence, and accessibility. It empowers students to navigate the language of math with ease and enhances their overall learning experience.

Glossary

acute angle: an angle with a measure less than 90 degree.
addition: a mathematical operation that combines two or more numbers to calculate a sum.
adjacent angle: two angles that are side by side and share a common vertex and a common arm.
angle: a geometric figure formed by joining two rays that share a common endpoint (vertex).
area: the amount of space a flat 2D shape or region covers.
bar graph: a graph that represents of data using bars of equal width on a grid.
centimetre: unit of measuring length.
complementary angles: two angles whose sum is 90 degree.
composite number: a number with more than 2 factors.
cube: a 2D shape with 6 faces that are squares of same side lengths.
data: information collected from a survey.
decimal number: a way to express a fraction.
decimal point: a point that separates the whole number part and the fractional part in a decimal number.
denominator: the number below the fraction line that tells the number of equal parts that a whole has been divided into.
difference: the result of subtraction.
dividend: the value to be divided in a division problem.
divisibility: the ability to divide one whole number by another whole number without any remainder.
divisor: the number by which another number is divided.
equally like: two or more events, each of which is as likely to happen as other.
estimate: an approximate reasonable value that is close to the exact value.
formula: a general mathematical equation that relates two or more terms or values.
gram: unit of measuring of mass.
impossible event: an event that can never happen.
kilogram: unit of measuring mass.
kilometre: unit of measuring length/distance.
line of symmetry: a line that divides a shape into two equal parts that are mirror images of each other.
litre: unit of measuring capacity.
metre: unit of measuring length.
millilitre: unit of measuring capacity.
millimetre: unit of measuring length.
minute: a unit of time.
mixed number: a number which is a combination of a whole number and a proper fraction.
multiplication: a mathematical operation that tells how many times a number is added to itself.
numerator: the number above the fraction line that shows the number of parts that have been used or consumed.
obtuse angle: an angle whose measure is greater than 90 degree but less than 180 degree.
order of operations: the sequence in which specific rules of four operations mathematics are performed.
percent: represents a special fraction as parts out of hundred. Its symbol is %.
perimeter: the sum of all the sides of a polygon.
place value: the value of a numeral based on the position of each digit in the number.
polygon: a closed 2D shape with three or more sides.
prime number: a number that has exactly two different factors, one and itself.
prism: a 3D shape with identical bases.
probability: the measure of the likelihood of the occurrence of an event.
product: the result of multiplying two or more numbers.
proper fraction: a fraction whose numerator is smaller than its denominator.
pyramid: a 3D shape with one base and all faces join at a vertex.
rectangle: a quadrilateral with two pairs of equal parallel sides and four right angles.
right angle: an angle that is equal to 90 degree.
right-angled triangle: a triangle with a right angle.

Glossary

round off: to approximate the value of a number to a specified place value.
square: a quadrilateral with all equal sides and four right angles.
square unit: unit of area.
straight angle: an angle that is equal to 180 degree.
subtraction: a mathematical operation that calculates the difference between numbers.
sum: the result of addition.
supplementary angles: two angles whose sum is 180 degree.
triangle: a polygon with three sides.
vertex: a point where two or more sides of a shape meet.
vertices: plural form of vertex.