Subject: Mathematics

Topic: Expansion of algebraic expression

Week:1

Class:Year 8

An algebraic expression is a mathematical phrase that combines numbers, variables and operations. An expression can contain one or more terms, which are separated by addition or subtraction signs. For example, 3x + 4 is an algebraic expression with two terms: 3x and 4.

How to expand an algebraic expression?

Expanding an algebraic expression means multiplying out the brackets and combining like terms to simplify the expression. This is an important skill in algebra, as it helps us solve more complex equations and express them in their simplest form.

Examples:

Let's look at some examples to understand the expansion of algebraic expressions better.

Example 1: Expand (x + 2)

We can expand the given expression by multiplying x with each term inside the brackets.

$(x + 2) = x + 2x$

Note: In algebra, we always multiply the term outside the brackets with each term inside the brackets.

Example 2: Expand (3x + 4)

Similarly, for this example, we multiply 3x with each term inside the brackets.

$(3x + 4) = 3x + 12$

Note: Remember, we can only combine like terms, which means we add or subtract terms with the same variable and exponent.

Example 3: Expand $(2x + 3)(x + 5)$

For this example, we use the distributive property of multiplication to expand the given expression.

$(2x + 3)(x + 5) = 2x(x + 5) + 3(x + 5)$

We multiply 2x with x and 5, and 3 with x and 5, as shown in the expression above. Finally, we combine like terms to get the final result.

$(2x + 3)(x + 5) = 2x^2 + 13x + 15$

Subject: Mathematics

Topic:Factorization of algebraic expression

Week:2

Class:Year 8

Algebraic expressions are simply mathematical phrases, involving numbers, operations, and variables. It is essential to learn how to transform and manipulate these expressions into simpler forms.

The factorization of algebraic expressions is a crucial topic in Year 8 Mathematics. It has applications in geometry, physics, economics, and other branches of mathematics. Let us take a closer look at what this involves.

Factorization is the process of breaking down complex expressions into simpler forms, known as factors. We use this process in algebra to solve equations and simplify expressions. Factorization is related to multiplication, where we split the product of two or more numbers into smaller components.

For example, the expression 2x + 6 can be factorized as 2(x + 3). Here, 2 is a common factor to both 2x and 6. We can express 2x + 6 as a product of 2 and another expression, (x + 3), known as the second factor.

Factorization can also involve splitting an algebraic expression into two or more factors that are added or subtracted. For instance, the expression x^2 - 4 can be factorized as (x + 2)(x - 2).

In factorizing algebraic expressions, we need to identify the common factor, which is the greatest number or the expression, that divides exactly into each term of the original expression. We then divide each term by this factor and rearrange the expression.

There are various techniques for factorizing algebraic expressions, such as grouping terms, using common factors, and factoring by splitting the middle term. You can explore each of these techniques in detail to strengthen your understanding.

Factorization of algebraic expressions is essential because it simplifies expressions, leading to easier problem-solving. Moreover, it helps identify patterns and relationships between algebraic expressions. Fundamentally, mastering factorization will enhance your general math skills and aid your academic progress.

Subject:Mathematics

Topic: Algebraic fraction

Week:3

Class:Year 8

Introduction to Algebraic Fractions

Algebraic fractions are expressions that involve two or more variables and are written in the form of a fraction. In simpler terms, it is just a fraction with variables in the numerator, denominator, or both. Algebraic fractions are important in solving mathematical equations and can help us simplify complicated expressions.

Key Terms:

Variables: Unknown numbers represented by letters, such as x, y, or z.

Numerator: The top number in a fraction, representing the part.

Denominator: The bottom number in a fraction, representing the whole.

Getting Started:

To start working with algebraic fractions, you need to know the basic rules of fractions, such as finding common denominators and simplifying fractions. It is also important to understand the order of operations, commonly known as BEDMAS (Brackets, Exponents, Division, Multiplication, Addition, Subtraction).

Adding and Subtracting Algebraic Fractions:

To add or subtract algebraic fractions, we first need to make sure they have the same denominator. This can be done by finding the lowest common denominator (LCD) between the fractions and converting each one to have the same denominator. Then, we can simply add or subtract the numerators and keep the common denominator.

Example:

Question: Simplify the expression $2x/3x + 4/3x$

Solution:

First, we convert both fractions to have the same denominator:

$2x/3x$ becomes $2/3$

4/3x becomes 4/3

The expression now looks like this:

2/3 + 4/3

We can now add the numerators, keeping the common denominator of 3:

2 + 4 = 6

6/3 = 2

Therefore, the simplified expression is 2.

Multiplying and Dividing Algebraic Fractions:

To multiply algebraic fractions, we simply multiply the numerators and denominators together. To divide algebraic fractions, we take the reciprocal of the second fraction (flipping the numerator and denominator) and then multiply them.

Example:

Question: Simplify the expression (2x/3) / (4/3x)

Solution:

First, we take the reciprocal of the second fraction (flipping the numerator and denominator):

(2x/3) / (4/3x) becomes (2x/3) * (3x/4)

Then, we can simply multiply the numerators and denominators together:

(2 * 3x) / (3 * 4) = 6x/12 = 1/2

Therefore, the simplified expression is 1/2.

Subject:Mathematics

Topic: Simple equation

Week:4

Class:Year 8

We use equations to represent a balance or relationship between two expressions. A simple equation consists of one variable, for example, 5 + x = 12. In this equation, the variable x represents the unknown value that we need to find.

Let's Practice!

Let's try solving this simple equation together: 2 + x = 10

First, we need to isolate the variable on one side of the equation. We can do this by performing the opposite operation to both sides. In this case, we need to subtract 2 from both sides to get: x = 8

Congratulations! You just solved a simple equation. Now let's try a few more fun exercises together.

Importance of Simple Equations

Simple equations are an essential building block in Mathematics. They help us solve real-life problems, especially in Science and Engineering. By mastering simple equations, you will be well equipped to tackle more complex equations in the future.

Remember to always read and understand the problem carefully, isolate the variable, and perform the opposite operation to both sides of the equation.

Subject: Mathematics

Topic:Linear inequalities in one variable

Week:5

Class:Year 8

Linear inequalities are a key concept in mathematics that helps us understand relationships between numbers and how they can be compared. In this topic, we will explore linear inequalities in one variable, which involves a single unknown value in an algebraic equation. It's important to note that these inequalities can be represented on a number line, making them useful for visualizing and solving problems.

Markdown tip: To properly format your notes on linear inequalities, surround variables and equations in $ symbols. For example, x > 3 would be formatted as $x > 3$.

First, let's define what exactly a linear inequality is. It is an algebraic expression that compares two numbers using one of the following symbols: < (less than), > (greater than), ≤ (less than or equal to), or ≥ (greater than or equal to). These types of inequalities can also use variables in place of specific numbers, making them more versatile and applicable to real-world situations.

When solving linear inequalities, there are two main steps to follow: isolate the variable on one side of the inequality and then check if the solution is valid for the given inequality. This can be done by using basic algebraic operations such as addition, subtraction, multiplication, and division. Remember, whenever you perform an operation on an inequality, you must do the same operation on both sides to maintain its validity.

A helpful method for solving linear inequalities is to graph them on a number line. To do this, we draw a horizontal line with a solid dot or open circle to represent the variable's value. For example, if we have the inequality x ≥ 2, we would draw a solid dot at 2 on the number line. From there, we can determine which values make the inequality true by shading in the appropriate direction on the line. A solid line is used for ≥ or ≤, while a dashed line is used for > or <.

Subject:Mathematics

Topic:Plane shapes and figures

Week:6

Class:Year 8

The most basic form of a shape is called a point. A point, by definition, has no length, no width, and no depth. It is represented by a dot.

Another basic shape is a line. A line is a collection of points that extend infinitely in both directions. A line is an important concept in ${subject} and is essential to understand when discussing more complex shapes.

Triangles

A triangle is a three-sided polygon with three angles. Triangles have specific types, including equilateral triangles, where all sides are equal, isosceles triangles with two sides equal, and scalene triangles with no equal sides.

These properties are important to remember when working with triangles, as they can help you solve problems by identifying the triangle type.

Quadrilaterals

A quadrilateral is a four-sided polygon. The most common types of quadrilaterals are squares, rectangles, and parallelograms.

A square has four equal sides and four right angles, while a rectangle has four sides with opposite sides being equal and four right angles. A parallelogram has two pairs of parallel sides.

Circles

A circle is a shape consisting of all points in a plane with a fixed distance from a fixed point. Circles have several properties, including diameter, radius, circumference, and area, that are important to remember when working with them.

Subject:Mathematics

Topic:Angles in a polygon

Week:7

Class:Year 8

Angles in a Polygon

In mathematics, a polygon is a two-dimensional shape with three or more straight sides and angles. Angles in polygons form the basis of geometry and are essential in understanding the properties of different shapes.

In this lesson, we will focus on angles in a polygon and the different concepts associated with it. This topic is part of your Year 8 Mathematics curriculum as stated by the Nigerian Educational Research and Development Council (NERDC).

First, let's define a few key terms. A polygon is a closed shape made up of straight line segments, while an angle is the measurement of the amount of turn between two lines. The angles in a polygon can be classified into two categories - interior angles and exterior angles.

Interior angles are the angles formed within the polygon, while exterior angles are those formed outside the polygon. For example, in a triangle, the angles within are interior angles, and the angles formed outside the triangle are exterior angles.

So how do we find the sum of the interior angles in a polygon? To do this, we use a simple formula: (n-2) x 180, where n is the number of sides in the polygon. For example, a triangle has 3 sides, so (3-2) x 180 = 180 degrees. A square has 4 sides, so (4-2) x 180 = 360 degrees.

We can also use this formula to find the unknown interior angle of a regular polygon. To do this, we divide the sum of the interior angles of the polygon by the number of sides. For example, in a regular hexagon, the sum of the interior angles is (6-2) x 180 = 720 degrees. Therefore, each interior angle will be 720/6 = 120 degrees.

Now let's take a look at exterior angles. These angles are formed by extending the sides of a polygon. The sum of the exterior angles in any polygon is always 360 degrees. For example, in a regular pentagon, each exterior angle will be 360/5 = 72 degrees.

Subject:Mathematics

Topic:Scale drawing

Week:8

Class:Year 8

Scale Drawing

Scale drawing is a fun and engaging topic in mathematics that helps us understand how to draw objects or places to scale. This skill is important as it is commonly used by architects, engineers, and cartographers. We hope that by the end of this note, you will have a better understanding of scale drawing and be able to create your own scale drawings!

What is Scale Drawing?

A scale drawing is a representation of an object or place that is smaller or larger than its actual size. It is drawn on a reduced or enlarged scale compared to the real thing, but it maintains the correct proportions between the different parts. In other words, it is a miniature version of the real thing.

Why is Scale Drawing Important?

Scale drawing is important because it allows us to accurately represent objects or places that are too big or too small to be drawn at actual size. It also helps us to create accurate blueprints and maps that are used in various industries. By understanding scale drawings, we can visualize and conceptualize objects and places in a more realistic manner.

How to Create a Scale Drawing

Step 1: Choose a Scale

The first step in creating a scale drawing is to choose a scale. A scale is a ratio or proportion that shows the relationship between the actual size and the drawing size. For example, a scale of 1:100 means that one unit on the drawing represents 100 units in real life.

Step 2: Measure the Object

The next step is to measure the object or place that you want to draw. Use a ruler or measuring tape to get the actual dimensions of the object. Make sure to write down your measurements, as you will need them for the next step.

Step 3: Multiply the Measurements

To create a scale drawing, you need to multiply the actual measurements by the scale. For example, if the actual length of an object is 10 cm and the scale is 1:100, you would multiply 10 by 100 to get 1000 cm. This will be the length of the object in your scale drawing.

Step 4: Draw the Object

Now that you have the correct dimensions, you can start drawing your object. Use a ruler and a pencil to draw straight lines and create accurate proportions. You can also use different colors or shading to make your drawing more visually appealing.

Step 5: Label the Drawing

To make your scale drawing more informative, make sure to label the different parts of the object. This will help you and others understand the drawing more clearly.

Subject:Mathematics

Topic:Graphs

Week:9

Class:year 8

Graphs are visual representations of data that are used to show the relationship between two or more variables. They consist of two main parts - the x-axis and the y-axis. The x-axis represents the independent variable, while the y-axis represents the dependent variable.

Types of graphs

There are many types of graphs, but some of the most common ones include line graphs, bar graphs, and pie charts. Each type of graph is used to represent different types of data, making them useful tools for analyzing and understanding information.

Reading graphs

To read a graph, you need to pay attention to the scale of each axis, the labels, and the data points. The scale helps you understand the range of values for each variable, while the labels give you context for what the data represents. The data points are the actual values of the variables plotted on the graph.

Making graphs

Creating graphs is easy! All you need is a set of data, and you can use any spreadsheet software like Microsoft Excel or Google Sheets to plot the data points and generate a graph. You can also hand-draw a graph by drawing the axes and plotting the data points.

Importance of graphs

Graphs are an essential tool in data analysis and interpretation. They help us see patterns and trends in data that would otherwise be difficult to observe. They also allow us to make predictions and draw conclusions based on the data.

Graphs are visual representations of data that are used to show the relationship between two or more variables. They consist of two main parts - the x-axis and the y-axis. The x-axis represents

the independent variable, while the y-axis represents the dependent variable.

Types of graphs

There are many types of graphs, but some of the most common ones include line graphs, bar graphs, and pie charts. Each type of graph is used to represent different types of data, making them useful tools for analyzing and understanding information.

Reading graphs

To read a graph, you need to pay attention to the scale of each axis, the labels, and the data points. The scale helps you understand the range of values for each variable, while the labels give you context for what the data represents. The data points are the actual values of the variables plotted on the graph.

Making graphs

Creating graphs is easy! All you need is a set of data, and you can use any spreadsheet software like Microsoft Excel or Google Sheets to plot the data points and generate a graph. You can also hand-draw a graph by drawing the axes and plotting the data points.

Importance of graphs

Graphs are an essential tool in data analysis and interpretation. They help us see patterns and trends in data that would otherwise be difficult to observe. They also allow us to make predictions and draw conclusions based on the data.

Subject:Mathematics

Topic:Angle of elevation and depression

Week:10

Class:Year 10

bookmark

Mathematics - Angles of elevation and depression

Fun with angles of elevation and depression

Angles of elevation and depression are very interesting topics that can make math fun. Don't believe it? Well, then let's explore it together!

In this lesson, we will cover:

A quick reminder on angles

What are angles of elevation and depression

Examples of angles of elevation and depression

Why does it matter?

Test your knowledge

Angles

Remember how angles are a fun way of measuring how far two lines are from each other? Our minds work hard to open up the adventure that lies ahead at the sight of angles! Alright, alright, sometimes that does not happen. But we at NERDC (Nigerian Educational Research and Development Council) think that the more you learn about angles, the more you get to see how cool they are. Trust us on that one!

So, we use angles to measure the distance between two lines. We place one endpoint (the point from which the angle begins) at one of the lines and the other endpoint (the point where the angle ends) at the second line, and we measure the amount of turn between them. These lines are called rays, if you remember from previous lessons, so we can say that an angle is just a bunch of rays. We could relate an angle to a clock, too, as one complete turn around the face of the clock is equal to 360°, and these degrees are nothing but tiny angles!

What are angles of elevation and depression

Angles of elevation and depression are pretty easy to get your head around. Remember what elevation means? It simply means that you are moving up. Easy, right? Depression means that you are moving down- quite the opposite! We associate the words "elevation" and "depression"

with our way of expressing how high or low something is. For instance, we say "He's in good spirits" if we're talking about someone feeling happy, or "It only took him a little time to get out of his depression". So, just like we measure our moods (which also relies heavily on scientific understanding, by the way) are measured in terms of elevation and depression, angles can also be talked about along these lines.

But when do we come across angles of elevation and depression? If you're out on a trek, and you look at a mountain top, then you're getting a great view of the angle of elevation that you have to cover- the angle that you would be making, a portion of which includes the mountain's surface. If you stand facing the mountain, with your legs shoulder-width apart and look at the peak, you have made an imaginary line right up to that peak. The angle between you and the base of the mountain is an angle of elevation. Similarly, when we see airplanes taking off, our eyes seem to follow it around, and the plane seems to climb to the sky- the angle between us and the plane is now an angle of elevation.

On the other hand, what happens if you're witnessing an pull-over on the road? If you're in your car as you see another one trying to overtake you from the left, the angle formed between the road from your starting point, to the point the car is at while you're looking at the car, and the location in front of you is termed an angle of depression.

Examples of angles of elevation and depression

Let's talk about two other types of angles that also fall within these categories- angles of inclination and declination. These three angles are more common to come across in our daily routines than we think they are.

Angle of elevation: This is the angle by which the line of sight rises to meet the horizontal line. In the case of the car, it would be the angle that the car lies at as it is traveling. In the case of the trek lover, it would be the angle that the mountain begins to rise at as opposed to the ground level.

Angle of depression: Now, this would be the angle at which the line of sight falls to meet the horizontal line. Our friend who's on the other side of the mountain would have this perspective because he sees what lies ahead of the mountain, and it is also an angle of depression that leads him away from the mountain instead of towards it.

Angle of inclination: This angle is the slope of the ramp that you can use to move form one area to the other, easily. Say, the slope of the pavement outside your home (if there is one) is the angle of inclination.

Angle of declination: Lastly, you can think of the angle of declination as the backstop to previous angles. This angle measures the angle from true north in a clockwise direction, through 360°.