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INTERDISCIPLINING: A SHOW OF PRACTICAL MATHEMATICS CLASSES

INTERDISCIPLINANDO: UM SHOW DE AULAS PRÁTICAS DE MATEMÁTICA

INTERDISCIPLINACIÓN: UNA MUESTRA DE CLASES PRÁCTICAS DE MATEMÁTICAS

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ABSTRACT

The content of a book holds the power of education, and it is with this power that we can shape the future and change lives. (YOUSAFZAI, 2013) The New High School proposal brings with it desires, expectations, and challenges for teachers. However, it intends to bring young people closer to the school environment, offering them not only a setting for the development of knowledge but also an interesting and dynamic environment that prepares them for society and its technologies of the future. In this context, our idea was to bring you an environment of success, collaboration, integration, coexistence, and comprehensive education that provides young students with meaningful and interdisciplinary learning through practical mathematics classes, seeking to modify teaching and learning situations, promoting change in the school community, and contributing to the country's educational growth. In accordance with the practical classes encouraged by our PIBID students and the institution's mathematicians in a contextualized and interdisciplinary manner, our students have been developing mathematical knowledge in a collaborative and meaningful way. In this material, you will find solutions to your daily challenges as an educator that can be adapted to your school environment, taking into account the potential of your students. Enjoy!

Keywords: Education. Interdisciplinarity. Collaboration.

RESUMO

O conteúdo de um livro guarda o poder da educação e é com esse poder que conseguimos moldar o futuro e mudar vidas. (YOUSAFZAI, 2013) A proposta do Novo Ensino Médio traz para os professores anseios, expectativas e desafios. Contudo tem a intenção de aproximar os jovens do espaço escolar ofertando a eles não somente um cenário para o desenvolvimento de conhecimentos,como também um ambiente interessante e dinâmico que os prepare para a sociedade e suas tecnologias no futuro. Nesse contexto, nossa ideia foi trazer até você um ambiente de sucesso, de colaboração, de integração, de convivência e de formação integral que oportunize aos jovens educandos uma aprendizagem significativa e interdisciplinar através das aulas práticas de matemática procurando modificar as situações de ensino e de aprendizagem, promovendo as mudanças na comunidade escolar e colaborando para que o país cresça no âmbito educacional. Em conformidade com as aulas práticas estimuladas pelos nossos alunos pibidianos e os matemáticos da instituição de forma contextualizada e interdisciplinar os nossos educandos vêm desenvolvendo o conhecimento matemático de maneira colaborativa e significativa. Neste material produzido, você encontrará soluções para os seus desafios diários como educador que poderão ser

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adequadas à sua realidade escolar, levando em conta as potencialidades de seus estudantes. Bom proveito!

Palavras-chave: Educação. Interdisciplinaridade. Colaboração.

RESUMEN
El contenido de un libro encierra el poder de la educación, y es con este poder que podemos moldear el futuro y transformar vidas. (YOUSAFZAI, 2013) La propuesta de la Nueva Preparatoria conlleva deseos, expectativas y desafíos para el profesorado. Sin embargo, busca acercar a los jóvenes al entorno escolar, ofreciéndoles no solo un espacio para el desarrollo del conocimiento, sino también un ambiente interesante y dinámico que los prepare para la sociedad y sus tecnologías del futuro. En este contexto, nuestra idea fue brindarles un entorno de éxito, colaboración, integración, convivencia y educación integral que brinde a los jóvenes estudiantes un aprendizaje significativo e interdisciplinario a través de clases prácticas de matemáticas, buscando modificar las situaciones de enseñanza y aprendizaje, promoviendo el cambio en la comunidad escolar y contribuyendo al crecimiento educativo del país. Gracias a las clases prácticas, impulsadas por nuestros estudiantes de PIBID y los matemáticos de la institución de manera contextualizada e interdisciplinaria, nuestros estudiantes han venido desarrollando conocimientos matemáticos de forma colaborativa y significativa. En este material, encontrarás soluciones a tus retos diarios como educador, adaptables a tu entorno escolar y teniendo en cuenta el potencial de tu alumnado. ¡Disfrútalo!

Palabras clave: Educación. Interdisciplinariedad. Colaboración.

1 DISCOVERING THE VALUE OF π

Figure 1

Practice worked by mathematicians: Gregório, Xavier, Sidney and students from PIBID/IFRN/2023

Source: prepared by the authors.

1.1 INTRODUCTION

The history of the number π (pi) is long. It is seen in the literature that there were many ancient civilizations that tried to discover the value of pi, but it was up to the great Greek mathematician Archimedes to make the best approximation when he divided the length of the circumference with its diameter, and found the approximate value to 3.14.

1.2 GENERAL OBJECTIVE

Find out the value of the circumference length ratio and its diameter.

1.3 SPECIFIC OBJECTIVES

Measure circular objects to find the length and diameter, and find the value of pi.

Use measuring instruments such as ruler, string and tape measure. Carry out studies with proportion and decimal numbers.

1.4 KNOWLEDGE INVOLVED

Mathematics, Engineering and Technology.

1.5 PROCEDURES

It is asked to measure objects with circular shapes (perimeter) and diameter.

Divides the perimeter of the circular object by its diameter.

The model follows.

Figure 2

Model

Objeto	Perímetro da circunferência	Diâmetro	Perímetro do objeto circular/diâmetro

Source: The authors.

1.6 RESULT AND DISCUSSION

The student must realize that when dividing the perimeter of the circumference by its diameter, he always finds a constant close to 3.14 that the famous Greek mathematician, engineer, physicist, inventor and astronomer of Classical Antiquity called an irrational number represented by the Greek letter

1.7 EVALUATION

The student will be evaluated on an ongoing basis with activities and games that emphasize the value of

2 UNDERSTANDING AVERAGE SPEED

Figure 3

Practice worked by mathematicians: Gregório, Xavier, Sidney and PIBID/IFRN/2023 students

Source: prepared by the authors.

2.1 INTRODUCTION

Average velocity can be defined as a physical quantity in which the speed with which a body or an object moves in a displacement in a given time is measured. It is considered an average because its calculation is an arithmetic average of the speed at all points of the course. The formula below is used to calculate the average speed:

Vm = Velocity is measured in m/s.

2.2 GENERAL OBJECTIVE

Calculate the average velocity from an experiment.

2.3 SPECIFIC OBJECTIVES

Measure the length of the court.

To demonstrate to students that Mathematics is present in our lives.

2.4 KNOWLEDGE INVOLVED

Mathematics, Physics and Physical Education.

2.5 PROCEDURES

Students are asked to measure the length of the court, and mark the time spent of their run on the length of the court. The length of the court is divided by the time traveled.

2.6 RESULT AND DISCUSSION

Figure 4

The student should realize that by dividing the length of the block by the time he spent to go through it, they are finding the value of the average speed

Source: prepared by the authors.

2.7 EVALUATION

The student will be evaluated continuously with activities and games that emphasize the calculation of the average speed.

3 MATHEMATICAL EXPRESSION THAT RELATES THE NUMBER OF THE SHOE AND THE SIZE OF THE FOOT

Figure 5

Practice worked by mathematicians: Gregório, Xavier, Sidney and students from PIBID/IFRN/2023

Source: prepared by the authors.

3.1 INTRODUCTION

The shoe number varies depending on the size of each person's foot. Therefore, the shoe number will vary from country to country. Here in Brazil, for example, the mathematical equation S = (5p +28): 4 is used to calculate the number of the shoe where the feet will be measured in centimeters. In this sense, the S stands for the shoe number and p stands for the foot size measured in centimeters.

3.2 GENERAL OBJECTIVE

Calculate the shoe measurement having the foot size measured in centimeters, as well as the foot size having the shoe number.

3.3 SPECIFIC OBJECTIVES

Demonstrate to students that Mathematics is present in everyday life. Solve the mathematical equation to calculate the size of the foot.

Tell the story of footwear in various countries. Locate the countries with the shoe measurements.

3.4 KNOWLEDGE INVOLVED

Mathematics, History and Geography.

3.5 PROCEDURES

Students are asked to measure the size of the foot, and calculate the size of the shoe.

The production of a text with the history of shoes, as well as the location of footwear in the countries researched.

3.6 OUTCOME AND DISCUSSION

The student understood how the history of shoes took place and the calculation of the mathematical equation to find the size of the foot and the number of the shoe.

3.7 EVALUATION

The student will be evaluated on an ongoing basis with activities and games that emphasize shoe measurement and foot size.

4 BUILDING GEOMETRIC SOLIDS

Figure 6

Practice worked by mathematicians: Gregório, Xavier, Sidney and students from PIBID/IFRN/2023

Source: prepared by the authors.

4.1 INTRODUCTION

In this practical class we present the Platonic solids. In the Timaeus, a philosophical treatise used by Plato to explain nature, he associates each of the classical elements (earth, air, water, and fire) with a regular polyhedron. Earth as cube, air as octahedron, water as icosahedron, and fire as tetrahedron. Interestingly, in relation to the fifth Platonic solid, the dodecahedron, Plato writes: "A fifth construction was still missing that the God used to organize all the constellations of the sky." It is found in Euclid in Book XIII of The Elements

for each solid, he calculated the ratio between the diameter of the circumscribed sphere and the length of the edge of the solid. In proposition 18, he demonstrates that there are no other regular polyhedra. During the class, we also show, through planning, why there are only five regular polyhedra, we make the constructions, we present Euler's theorem V A + F = 2 and, at the end, we suggest some pedagogical activities of polyhedra construction that can be used in order to help the students' visualization and understanding.

4.2 GENERAL OBJECTIVE

Present and build the Platonic solids.

4.3 SPECIFIC OBJECTIVES

Demonstrate to students that Mathematics is present in everyday life.

Build the geometric solids using toothpicks, modeling clay or jelly beans.

Identify vertex, edge, and faces. Solve Euler's relation. Differentiate plane from spatial.

Name the solids brought to class.

4.4 KNOWLEDGE INVOLVED

Mathematics, History, Philosophy and Technology.

4.5 PROCEDURES

Students are asked to identify plane and space, and make their constructions of the requested solids.

4.6 RESULT AND DISCUSSION

The student understood how the history of the Platonic solids took place and solve Euler's Relation.

4.7 EVALUATION

The student will be evaluated continuously with activities and games that emphasize geometric solids.

5 KITE FLYING AND LEARNING ABOUT DIAMONDS

Figure 7

Kite game

Source: prepared by the authors.

5.1 INTRODUCTION

It is seen in the literature that kites were born in ancient China, around the year 1200 BC. Since then they have been used for various purposes, among them we can mention: use as a military beacon, use as a meter of atmospheric conditions, participation in the invention of the lightning rod and even today when kites are used as a very popular toy among children, adolescents and young people around the world. The basic composition of a kite is a reinforced structure that supports a tissue paper plane that acts as a wing. Making and flying kites for the students of CEEP Professor Francisco de Assis Pedrosa will be a lot of fun, however this game is to improve the knowledge of Physics, because the kites, also called star, parrot, pandorga or ray, are toys that fly, the flight takes place by the force of opposition that the wind causes in the kite that is held by its operator. In Mathematics and Geometry classes, students were able to work on length measurements, unit transformation, polygons, here the rhombus, angles, symmetry and face identification. In Geography, it was possible to teach about seasons, differences between atmospheric weather and climate and elements of climate. For the student, consolidating and expanding mathematical concepts was fundamental, so that they could see them in new extensions, representations or connections with other concepts. The purpose of this practice was to offer students opportunities to enjoy mathematical knowledge, as one of the most important assets culturally constructed by man. Based on Freire (1987) and Sousa (2007), because it was understood that this would facilitate the learning of students in the 1st grade A of the nutrition course at this school institution.

5.2 GENERAL OBJECTIVE

Build kites and play with them.

5.3 SPECIFIC OBJECTIVES

Calculate diamond area.

Solve problems with diamond perimeter. Transform length measurements.

Find angles in polygons. Identify faces.

5.4 KNOWLEDGE INVOLVED

Physics, Mathematics, Geometry, Geography.

5.5 PROCEDURES

Students will build kites. Fly kites. Solve problem situations involving the rhombus.

5.6 RESULTS AND DISCUSSIONS

The process occurred in a pleasant way and the learning flowed satisfactorily.

5.7 EVALUATION

The student will be evaluated on an ongoing basis with activities and games that emphasize the rhombus.

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