Mathematics in the Workplace

Media Type: Microsoft® PowerPoint®
Duration: 163 slides

Goal: To analyze mathematical concepts used commonly in the workplace.

Description: People use math every day. This presentation discusses how math is used by various professionals in each of the career clusters. In addition, basic math concepts are explained including: fractions, decimals, percentages, ratios and formulas. Types of graphs and procedures for creating graphs are also discussed.

Objectives:

1. To explain the importance of mathematics in various workplace settings.
2. To perform basic mathematical calculations.
3. To examine mathematical calculations involving fractions, decimals, percentages and ratios.
4. To use mathematical formulas to perform various calculations.
5. To discuss methods of graphing quantitative data.
6. To use appropriate mathematics to perform job-specific tasks.

Common Core Standards

College & Career Readiness Anchor Standards for Speaking and Listening

Speaking & Listening Standards		
Comprehension & Collaboration	Prepare for and participate effectively in a range of conversations and collaborations with diverse partners, building on others′ ideas and expressing their own clearly and persuasively.	
	9-12.1	Initiate and participate effectively in a range of collaborative discussions with diverse partners on grades 9–12 topics, texts, and issues, building on others′ ideas and expressing their own clearly and persuasively.
	Present information, findings, and supporting evidence such that listeners can follow the line of reasoning and the organization, development, and style are appropriate to task, purpose, and audience.	
	Make strategic use of digital media and visual displays of data to express information and enhance understanding of presentations.	
Presentation of Knowledge & Ideas	*9-10.4*	Present information, findings, and supporting evidence clearly, concisely, and logically such that listeners can follow the line of reasoning and the organization, development, substance, and style are appropriate to purpose, audience, and task.
	11-12.4	Present information, findings, and supporting evidence, conveying a clear and distinct perspective, such that listeners can follow the line of reasoning, alternative or opposing perspectives are addressed, and the organization, development, substance, and style are appropriate to purpose, audience, and a range of formal and informal tasks.
	9-12.5	Make strategic use of digital media in presentations to enhance understanding of findings, reasoning, and evidence and to add interest.

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Common Core Standards

College & Career Readiness Anchor Standards for Math

Number & Quantity

Quantities

Reason quantitatively and use units to solve problems.	CCSS.Math.Content.HSN-Q.A.1	Use units as a way to understand problems and to guide the solution of multi-step problems; choose and interpret units consistently in formulas; choose and interpret the scale and the origin in graphs and data displays.
	CCSS.Math.Content.HSN-Q.A.2	Define appropriate quantities for the purpose of descriptive modeling.
	CCSS.Math.Content.HSN-Q.A.3	Choose a level of accuracy appropriate to limitations on measurement when reporting quantities.

Algebra

Seeing Structure in Expressions

Interpret the structure of expressions.	CCSS.Math.Content.HSA-SSE.A.1	Interpret expressions that represent a quantity in terms of its context.★
	CCSS.Math.Content.HSA-SSE.A.1a	Interpret parts of an expression, such as terms, factors, and coefficients.
	CCSS.Math.Content.HSA-SSE.A.1b	Interpret complicated expressions by viewing one or more of their parts as a single entity. For example, interpret $P(1+r)n$ as the product of P and a factor not depending on P.
	CCSS.Math.Content.HSA-SSE.A.2	Use the structure of an expression to identify ways to rewrite it. For example, see $x4 - y4$ as $(x2)2 - (y2)2$, thus recognizing it as a difference of squares that can be factored as $(x2 - y2)(x2 + y2)$.
Write expressions in equivalent forms to solve problems.	CCSS.Math.Content.HSA-SSE.B.3	Choose and produce an equivalent form of an expression to reveal and explain properties of the quantity represented by the expression.★
	CCSS.Math.Content.HSA-SSE.B.4	Derive the formula for the sum of a finite geometric series (when the common ratio is not 1), and use the formula to solve problems. For example, calculate mortgage payments.★

Creating Equations

Create equations that describe numbers or relationships.	CCSS.Math.Content.HSA-CED.A.1	Create equations and inequalities in one variable and use them to solve problems. Include equations arising from linear and quadratic functions, and simple rational and exponential functions.
	CCSS.Math.Content.HSA-CED.A.2	Create equations in two or more variables to represent relationships between quantities; graph equations on coordinate axes with labels and scales.
	CCSS.Math.Content.HSA-CED.A.3	Represent constraints by equations or inequalities, and by systems of equations and/or inequalities, and interpret solutions as viable or nonviable options in a modeling context. For example, represent inequalities describing nutritional and cost constraints on combinations of different foods.
	CCSS.Math.Content.HSA-CED.A.4	Rearrange formulas to highlight a quantity of interest, using the same reasoning as in solving equations. For example, rearrange Ohm's law $V = IR$ to highlight resistance R.

Reasoning with Equations & Inequalities

Understand solving equations as a process of reasoning and explain the reasoning.	CCSS.Math.Content.HSA-REI.A.1	Explain each step in solving a simple equation as following from the equality of numbers asserted at the previous step, starting from the assumption that the original equation has a solution. Construct a viable argument to justify a solution method.
	CCSS.Math.Content.HSA-REI.A.2	Solve simple rational and radical equations in one variable, and give examples showing how extraneous solutions may arise.
Solve equations and inequalities in one variable.	CCSS.Math.Content.HSA-REI.B.3	Solve linear equations and inequalities in one variable, including equations with coefficients represented by letters.
Represent and solve equations and inequalities graphically.	CCSS.Math.Content.HSA-REI.D.10	Understand that the graph of an equation in two variables is the set of all its solutions plotted in the coordinate plane, often forming a curve (which could be a line).

Mathematics in the Workplace

College & Career Readiness Anchor Standards for Writing

Writing Standards

Text Types & Purposes	Write informative/explanatory texts to examine and convey complex ideas and information clearly and accurately through the effective selection, organization, and analysis of content.	
	9-12.2	Write informative/explanatory texts to examine and convey complex ideas, concepts, and information clearly and accurately through the effective selection, organization, and analysis of content.
Production & Distribution of Writing	Produce clear and coherent writing in which the development, organization, and style are appropriate to task, purpose, and audience.	
	Use technology, including the Internet, to produce and publish writing and to interact and collaborate with others.	
	9-12.4	Produce clear and coherent writing in which the development, organization, and style are appropriate to task, purpose, and audience.
	9-10.6	Use technology, including the Internet, to produce, publish, and update individual or shared writing products, taking advantage of technology's capacity to link to other information and to display information flexibly and dynamically.
	11-12.6	Use technology, including the Internet, to produce, publish, and update individual or shared writing products in response to ongoing feedback, including new arguments or information.
Research to Build & Present Knowledge	Gather relevant information from multiple print and digital sources, assess the credibility and accuracy of each source, and integrate the information while avoiding plagiarism.	
	9-10.8	Gather relevant information from multiple authoritative print and digital sources, using advanced searches effectively; assess the usefulness of each source in answering the research question; integrate information into the text selectively to maintain the flow of ideas, avoiding plagiarism and following a standard format for citation.
	11-12.8	Gather relevant information from multiple authoritative print and digital sources, using advanced searches effectively; assess the strengths and limitations of each source in terms of the task, purpose, and audience; integrate information into the text selectively to maintain the flow of ideas, avoiding plagiarism and overreliance on any one source and following a standard format for citation.

Mathematics in the Workplace

Lesson Plan

Class 1: Begin class by asking students to name some ways they think they will use math in their future careers. Pass out the *Mathematics in the Workplace Vocabulary Handout* and *Student Notes* for students to use as reference materials during the presentation. Show slides 1 to 20 of the *Applications* segment of *Mathematics in the Workplace*. Introduce the *Math in My Career Project* for students to begin at home.

Slides 1-20

Class 2: Show slides 21 to 42 of the *Applications* segment of *Mathematics in the Workplace*. Follow the segment with its *Assessment*. Allow students to work on the *Math in My Career Project* for the remainder of the class.

Slides 21-42

Class 3: Remind students to continue using the *Vocabulary Handout* and *Student Notes*. Show the *Basic Math* segment of the presentation. Follow the segment with its *Assessment*. Allow students to work on the *Math in My Career Project* for the remainder of class.

Slides 43-57

Class 4: Remind students to continue using the *Vocabulary Handout* and *Student Notes*. Show the *Fractions, Decimals & Percentages* segment of *Mathematics in the Workplace*. Follow the segment with its *Assessment*. Introduce the *Real-Life Math Activity* and allow students to work on it or the *Math in My Career Project*.

Slides 58-84

Class 5: Remind students to continue using the *Vocabulary Handout* and *Student Notes*. Show the *Conversion* and *Ratios & Proportions* segments of *Mathematics in the Workplace*. Follow each segment with its corresponding *Assessment*. Allow students to finish the *Real-Life Math Activity*.

Slides 85-107

Class 6: Remind students to continue using the *Vocabulary Handout* and *Student Notes*. Show the *Basic Formulas* segment of the presentation. Follow the segment with its *Assessment*. Discuss the *Real-Life Math Activity* as a class.

Slides 108-130

Have students complete part 1 of the *Math Worksheet Activity* for homework.

Class 7: Remind students to continue using the *Vocabulary Handout* and *Student Notes* as reference materials. Show the *Data Analysis* segment of *Mathematics in the Workplace*. Follow the segment with its *Assessment*. Introduce the *Data Analysis Project* and allow students to begin.

Slides 131-153

Class 8: Administer the *Mathematics in the Workplace Final Assessment*. Have students complete part 2 of the *Math Worksheet Activity*. If time allows, have students continue working on the *Projects*.

Slides 154-163

Class 9: Have students present their *Math in My Career Projects*.

Lesson Links

Vocational Information Center: Math on the Job
- http://www.khake.com/page56.html

WeUseMath.org
- http://weusemath.org/

Career & Technical Student Organizations

BPA
- Financial Math & Analysis Concepts

DECA
- Financial Literacy Promotion Project

FBLA
- Business Math

SkillsUSA
- Medical Math
- Related Technical Math

Career Connections

- iCEV50721, Pat Vesper, Meteorologist in Charge, National Weather Service
- iCEV50976, Juan Martinez, Hatchery Biologist, Texas Freshwater Fisheries
- iCEV50464, Wilfred Carter, Financial Advisor, Morgan Stanley Wealth Management
- iCEV50203, Yan Wang, Senior Accountant, Atmos Energy

Mathematics in the Workplace

Lab Activities

Real-Life Math
Directions:
Students will work with a partner to practice using math to solve real-life problems, including comparing pay rates and determining interest on a loan. They should follow the discussed process for solving math problems as stated on the *Activity* handout. After all students have finished all problems, discuss problems as a class to verify all students understand how to solve all problems.

Math Worksheet
Directions:
Students will develop math problems involving the concepts discussed. For part 1, each student will create a worksheet with 10 math problems, as well as an answer key for their worksheet. For part 2, students will exchange and complete each other's worksheets. Then the worksheet creator should check their classmate's work against the answer key, and they should discuss any incorrect answers as a team. For more detail, see the *Math Formulas Worksheet Activity* sheet.

Projects

Math in My Career
Directions:
Students will identify a possible career path and will research math used in that profession. They will create a Microsoft® PowerPoint® presentation explaining their findings, and share their presentation with the class. For more details concerning requirements, see the *Math in My Career Project* handout.

Data Analysis
Directions:
Students will find quantitative data related to their career field of choice and will create a graph or chart to display the information in a easily understood manner. They should have the data approved by you before moving forward with the *Project*. Students should choose the most appropriate type of graph for the information and create a well-organized, visually appealing graphical representation of the data. They may use computer software, online programs or other resources for assistance.