MEDICAL MATH

Contest Date:
Test Window: March 8-12, 2021
(Test MUST BE PROCTORED AT SCHOOL LOCATION)
Contest Link:

https://www.classmarker.com/online-test/start/?quiz=rbe60259538e5f1b

(Only registered contestants for the 2021 SkillsUSA Ohio State Championships may take the test)

PURPOSE
To evaluate the student's ability to understand and solve mathematical problems commonly used in the various health care settings.

ELIGIBILITY
Open to active SkillsUSA members enrolled in a health care science technology program. 3 contestants per region based on regional competitions, in accordance with the SkillsUSA Ohio Program Guidelines.

CLOTHING REQUIREMENTS
Official SkillsUSA dress or business attire. Nothing identifying the student or school may be displayed.

Men	Official red blazer or jacket, black dress slacks, white dress shirt, plain black tie with no pattern or SkillsUSA black tie, black socks and black shoes.
Women	Official red blazer or jacket; black dress skirt (knee length) or slacks with businesslike white, collarless blouse or white blouse with small, plain collar that may not extend onto the lapels of the blazer; black sheer or skin-tone hose and black shoes.

Note: Contestants must wear their contest clothing to the contest orientation meeting.

OBSERVER RULE
This competition is closed to observers.

Order of events for the contest:
- Instructions will be given for completing the contest.
- Contestants will be given an opportunity to ask questions.
- Written test and any other materials will be distributed.
- Contest will start when judges make the announcement to begin.
- Contestants work on contest.
- Contest will end 1 hours after the start of the contest. Test and scratch paper will be collected.

TOOLS PROVIDED BY CONTESTANTS
1. Two #2 pencils (sharpened) or mechanical pencils
2. Eraser

TOOLS PROVIDED BY TECHNICAL COMMITTEE
1. Calculator
2. Scratch Paper

SPECIAL INFORMATION
Smart watches and cell phones are not permitted.

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SCOPE OF THE CONTEST
Knowledge of Performance

This contest is a written exam given to all contestants.

1. The test questions will be taken from problems encountered in the medical field and are selected from the area that might be used in real world applications. Contestants will demonstrate their ability to solve math problems that deal with the following areas:
   a. Measurements including vital signs, temperature conversions, and height and weight
   b. Metric and household measurements
   c. Conversions
   d. Ratio and proportion
   e. Percentage
   f. Intake and output
   g. Roman numerals
   h. Dosage calculations
2. The test will comprise 48 problems that will allow contestants the opportunity to use their problem-solving skills as well as their mathematical ability.
3. The contestants will have two hours to complete the test. No bonus points will be given for early completion of the test, and no contestant will be allowed to go in or out of the testing site during the testing.

Judging Criteria

Students will be judged based on their number of correct answers. See the Rubric for Medical Math.

STANDARDS AND COMPETENCIES
Ohio Technical Standards

1.1.1	Identify the knowledge, skills and abilities necessary to succeed in careers.
1.1.5	Develop strategies for self-promotion in the hiring process (e.g., filling out job applications, résumé writing, interviewing skills, portfolio development).
1.1.7	Apply problem-solving and critical-thinking skills to work-related issues when making decisions and formulating solutions.
1.2.14	Use motivational strategies to accomplish goals.

Ohio Academic Standards
English Language Arts
Reading

Ohio Technical Competencies	ELA Standard	ELA Standard Description
1.1.7	RI.9-10.2	Analyze informational text development. a. Determine a central idea of a text and analyze its development over the course of the text, including how it emerges and is shaped and refined by specific details b. Provide an objective summary of the text that includes the development of the central idea and how details impact this idea.
1.1.7	RI.9-10.3	Analyze how the author unfolds an analysis or series of ideas or events, including the order in which the points are made, how they are introduced and developed, and the connections that are drawn between them.
1.1.7	RI.11-12.2	Analyze informational text development. a. Determine two or more central ideas of a text and analyze their development over the course of the text, including how they interact and build on one another. b. Craft an informative abstract that delineates how the central ideas of a text interact and build on one another.

1.1.7	RI.11-12.3	Analyze a complex set of ideas or sequence of events and explain how specific individuals, ideas, or events interact and develop over the course of the text.

Writing

Ohio Technical Competencies	ELA Standard	ELA Standard Description
1.1.5	W.9-10.4	Produce clear and coherent writing in which the development, organization, and style are appropriate to task, purpose, and audience. (Grade-specific expectations for writing types are defined in standards 1–3 above.)
1.1.5	W.11-12.4	Produce clear and coherent writing in which the development, organization, and style are appropriate to task, purpose, and audience. (Grade-specific expectations for writing types are defined in standards 1–3 above.)
1.1.1	W.11-12.7	Conduct short as well as more sustained research projects to answer a question (including a self-generated question) or solve a problem; narrow or broaden the inquiry when appropriate; synthesize multiple sources on the subject, demonstrating understanding of the subject under investigation.

Speaking and Listening

Ohio Technical Competencies	ELA Standard	ELA Standard Description

1.1.1	SL.9-10.1	Initiate and participate effectively in a range of collaborative discussions (one-on-one, in groups, and teacher-led) with diverse partners on *grades 9–10 topics, texts, and issues,* building on others' ideas and expressing their own clearly and persuasively.
		    a. Come to discussions prepared, having read and researched material under study; explicitly draw on that preparation by referring to evidence from texts and other research on the topic or issue to stimulate a thoughtful, well-reasoned exchange of ideas.
		    b. Work with peers to set rules for collegial discussions and decision- making (e.g., informal consensus, taking votes on key issues, presentation of alternate views), clear goals and deadlines, and individual roles as needed.
		    c. Propel conversations by posing and responding to questions that relate the current discussion to broader themes or larger ideas; actively incorporate others into the discussion; and clarify, verify, or challenge ideas and conclusions.
		    d. Respond thoughtfully to diverse perspectives, summarize points of agreement and disagreement, and, when warranted, qualify or justify their own views and understanding and make new connections in light of the evidence and reasoning presented.

1.1.7	SL.9-10.2	Integrate multiple sources of information presented in diverse media or formats (e.g., visually, quantitatively, orally) evaluating the credibility and accuracy of each source.

1.1.1	SL.11-12.1	Initiate and participate effectively in a range of collaborative discussions (one-on-one, in groups, and teacher-led) with diverse partners on *grades 11–12 topics, texts, and issues*, building on others' ideas and expressing their own clearly and persuasively.
		    a. Come to discussions prepared, having read and researched material under study; explicitly draw on that preparation by referring to evidence from texts and other research on the topic or issue to stimulate a thoughtful, well-reasoned exchange of ideas.
		    b. Work with peers to promote civil, democratic discussions and decision making, set clear goals and deadlines, and establish individual roles as needed.
		    c. Propel conversations by posing and responding to questions that probe reasoning and evidence; ensure a hearing for a full range of positions on a topic or issue;

		clarify, verify, or challenge ideas and conclusions; and promote divergent and creative perspectives. d. Respond thoughtfully to diverse perspectives; synthesize comments, claims, and evidence made on all sides of an issue; resolve contradictions when possible; and determine what additional information or research is required to deepen the investigation or complete the task.
1.1.7	SL. 11-12.2	Integrate multiple sources of information presented in diverse formats and media (e.g., visually, quantitatively, orally) in order to make informed decisions and solve problems, evaluating the credibility and accuracy of each source and noting any discrepancies among the data.

Mathematics

Standard	Description
N.Q.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. ★
N.Q.2	Define appropriate quantities for the purpose of descriptive modeling.★
N.Q.3	Choose a level of accuracy appropriate to limitations on measurement when reporting quantities.★
A.CED.1	Create equations and inequalities in one variable and use them to solve problems. *Include equations and inequalities arising from linear, quadratic, simple rational, and exponential functions.* ★ a. Focus on applying linear and simple exponential expressions. (A1, M1) b. Focus on applying simple quadratic expressions. (A1, M2) c. Extend to include more complicated function situations with the option to solve with technology. (A2, M3)
A.REI.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.
F.IF.6	Calculate and interpret the average rate of change of a function (presented symbolically or as a table) over a specified interval. Estimate the rate of change from a graph. ★ (A2, M3)

F.BF.1	Write a function that describes a relationship between two quantities.★
	 a. Determine an explicit expression, a recursive process, or steps for calculation from context.
	   i. Focus on linear and exponential functions. (A1, M1)
	   ii. Focus on situations that exhibit quadratic or exponential relationships. (A1, M2)
	 b. Combine standard function types using arithmetic operations. *For example, build a function that models the temperature of a cooling body by adding a constant function to a decaying exponential, and relate these functions to the model.* (A2, M3)
	 c. (+) Compose functions. *For example, if T(y) is the temperature in the atmosphere as a function of height, and h(t) is the height of a weather balloon as a function of time, then T(h(t)) is the temperature at the location of the weather balloon as a function of time.*

Science
None identified.