

Computerized Pre-Professional Skills Test: Mathematics (5730)

Test at a Glance

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| Test Name | Computerized Pre-Professional Skills Test: Mathematics | | |
| Test Code | 5730 | | |
| Time | 75 minutes | | |
| Number of Questions | 46 | | |
| Format | Multiple-choice questions (Calculators prohibited) | | |
| | Content Categories | Approximate Number of Questions | Approximate Percentage of Examination |
| | I. Conceptual Knowledge and Procedural Knowledge | 21 | 45% |
| | II. Representations of Quantitative Information | 13 | 30% |
| | III. Measurement and Informal Geometry, Formal Mathematical Reasoning | 12 | 25% |

About this test

The Computerized Pre-Professional Skills Test in Mathematics measures those mathematical skills and concepts that an educated adult might need. It focuses on the key concepts of mathematics and on the ability to solve problems and to reason in a quantitative context. Many of the problems require the integration of multiple skills to achieve a solution.

The test questions are from three content categories: conceptual and procedural knowledge, representations of quantitative information, and measurement and informal geometry and formal mathematical reasoning.

Computation is held to a minimum, and few technical words are used. Terms such as area, perimeter, ratio, integer, factor, and prime number are used, because it is assumed that these are commonly encountered in the mathematics all examinees have studied. Figures are drawn as accurately as possible and lie in a plane, unless otherwise noted.

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Topics Covered

Representative descriptions of topics covered in each category are provided below.

I. Conceptual Knowledge and Procedural Knowledge

Demonstrate number sense and operation sense — that is, an understanding of the foundational ideas of numbers, number properties, and operations defined on numbers (whole numbers, fractions, and decimals).

- Order: demonstrate an understanding of order among whole numbers, fractions, and decimals
- Equivalence: demonstrate an understanding that a number can be represented in more than one way
- Numeration and place value: demonstrate an understanding of how numbers are named, place value, and order of magnitude of numbers
- Number properties: demonstrate an understanding of the properties of whole numbers without necessarily knowing the names of the properties
- Operation properties: demonstrate an understanding of the properties (commutative, associative, and distributive) of the basic operations (addition, subtraction, multiplication, and division) without necessarily knowing the names of the properties; recognize equivalent computational procedures

Procedural Knowledge

Demonstrate an understanding of the procedures required to represent quantitative relationships and the ability to plan, execute, interpret, or complete operations to solve problems.

- Computation: perform computations; adjust the result of a computation to fit the context of a problem; identify numbers or information or operations needed to solve a problem
- Estimation: estimate the result of a calculation; determine the reasonableness of an estimate
- Ratio, proportion, and percent: solve problems involving ratio, proportion, and percent
- Probability: interpret numbers used to express simple probability; assign a probability to a possible outcome
- Equations: solve simple equations and inequalities; predict the outcome of changing some number or condition in a problem
- Algorithmic thinking: demonstrate an understanding of the algorithmic point of view — that is, follow a given procedure; recognize various ways to solve a problem; identify, complete, or analyze a procedure; discover patterns in a procedure

II. Representations of Quantitative Information

Demonstrate an ability to interpret visual displays of quantitative information, to retrieve information from data, to determine if statements based on data are true or false, to recognize relationships in and make inferences from data, and to represent a given set of data graphically.

- Interpretation: read and interpret visual displays of quantitative information, such as bar graphs, line graphs, pie charts, pictographs, tables, stemplots, scatterplots, schedules, simple flowcharts, and diagrams; recognize relationships in data; determine an average, a range, a mode, or a median
- Trends: given a data display, observe groupings, make comparisons, and make predictions or extrapolations
- Inferences: given a data display, draw conclusions or make inferences from the data
- Patterns: identify and recognize patterns in data, such as variation
- Connections: demonstrate an understanding of the relationship between numerical values in a table, the symbolic rule relating table values, and the corresponding graphical representation of the table and the rule; choose a graph appropriate to represent a given set of data; recognize quantitative relationships in symbols or in words

III. Measurement and Informal Geometry and Formal Mathematical Reasoning

Demonstrate a basic understanding of measurement, of the U.S. customary and metric systems of measurement, and of geometric properties and relationships. At least half the questions will focus on informal geometry.

- Systems of measurement: demonstrate basic literacy in the U.S. customary and metric systems of measurement; convert from one unit to another within the same system; recognize and use appropriate units for making measurements; read a calibrated scale

- Measurement: determine the measurements needed to solve a problem; recognize and use geometric concepts in making linear, area, and volume measurements; solve measurement problems by using a formula, estimating, employing indirect measurement, using rates as measures, making visual comparisons, using scaling/proportional reasoning, or using a nonstandard unit
- Geometric properties: recognize and use geometric properties and relationships in both pure and real-world situations, such as recognizing a symmetrical design or determining a distance using the Pythagorean relationship

Formal Mathematical Reasoning

Demonstrate an ability to use the basics of logic in a quantitative context.

- Logical connectives and quantifiers: interpret statements that use logical connectives (and, or, if – then) as well as quantifiers (some, all, none)
- Validity of arguments: use deductive reasoning to determine whether an argument (a series of statements leading to a conclusion) is valid or invalid
- Generalization: identify an appropriate generalization, an example that disproves an inappropriate generalization, or a hidden assumption

Sample Test Questions

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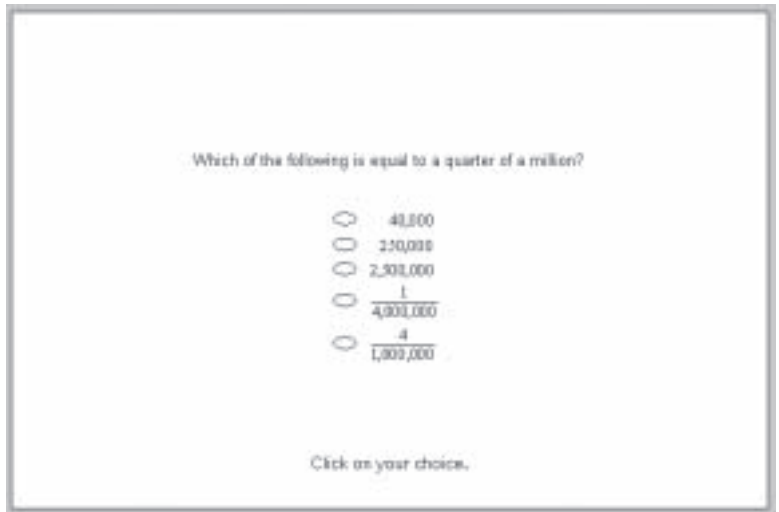
The sample questions that follow illustrate the types of questions in the test. They are not, however, representative of the entire scope of the test in either content or difficulty. Answers with explanations follow the questions. There are additional sample questions for this test on pages 55-58.

Directions: Each of the questions or incomplete statements below is followed by five suggested answers or completions. Select the one that is best in each case and then click on the oval to the left of your choice. Remember, try to answer every question.

1. On the computer screen you will see the following:

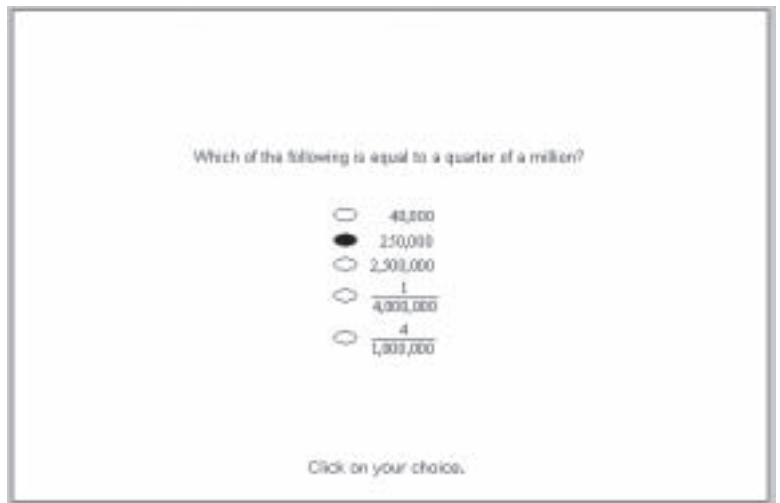
Click on the oval next to your choice.

Special Note: Figures that accompany problems in this test are intended to provide information useful in solving the problem. The figures are drawn as accurately as possible except when it is stated in a specific problem that its figure is not drawn to scale. Figures can be assumed to lie in a plane unless otherwise indicated. Position of points can be assumed to be in the order shown, and lines shown as straight can be assumed to be straight. The symbol \square denotes a right angle.



Since one million is 1,000,000, a quarter of a million is $\frac{1}{4}$ of 1,000,000 or 250,000.

The correct answer is 250,000.



2. On the computer screen you will see the following:

Click on the oval next to your choice.

Which of the following fractions is least?

$\frac{11}{10}$

$\frac{99}{100}$

$\frac{23}{24}$

$\frac{3}{2}$

$\frac{501}{500}$

Click on your choice.

Of the five fractions, four are greater than 1. Only one of the fractions, $\frac{99}{100}$, is less than 1, so it must be the least.

The correct answer is $\frac{99}{100}$.

Which of the following fractions is least?

$\frac{11}{10}$

$\frac{99}{100}$

$\frac{23}{24}$

$\frac{3}{2}$

$\frac{501}{500}$

Click on your choice.

Sample Test Questions

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3. On the computer screen you will see the following:

Click on the oval next to your choice.

Which of the sales commissions shown is greatest?

- 1% of \$1,000
- 10% of \$200
- 12.5% of \$100
- 15% of \$100
- 25% of \$40

Click on your choice.

Since 15% of \$100 is greater than 12.5% of \$100, 12.5% of \$100 is not the correct choice.

Of the remaining four choices, 1% of \$1,000 is \$10, 10% of \$200 is \$20, 15% of \$100 is \$15, and 25% of \$40 is \$10. Of these \$20 is greatest.

The correct answer is 10% of \$200.

Which of the sales commissions shown is greatest?

- 1% of \$1,000
- 10% of \$200
- 12.5% of \$100
- 15% of \$100
- 25% of \$40

Click on your choice.

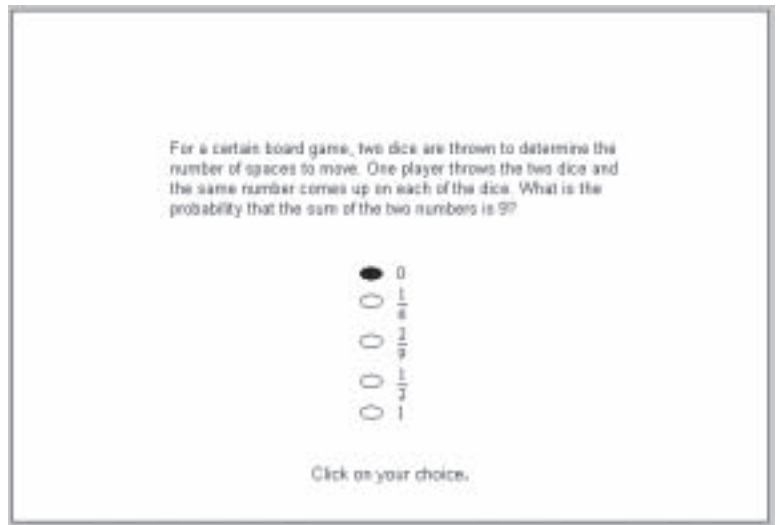
4. On the computer screen you will see the following:

Click on the oval next to your choice.



If two dice are thrown and the same number appears on both, the sum will always be 2 times the number thrown on either of the dice and thus must be an even number. Since 9 is an odd number, the sum cannot be 9; therefore the probability must be 0.

The correct answer is 0.

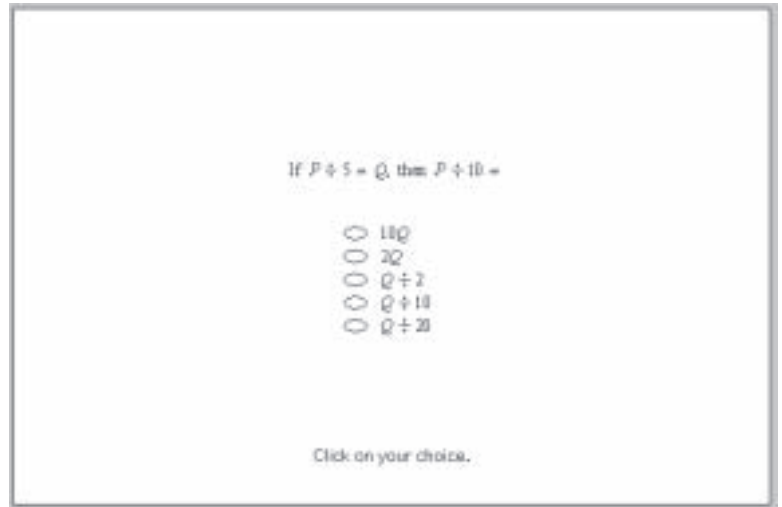


Sample Test Questions

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5. On the computer screen you will see the following:

Click on the oval next to your choice.



There are several ways to solve this problem.

One way is to express $P \div 5 = Q$ as $\frac{P}{5} = Q$.

Then $P = 5Q$, and $\frac{P}{10} = \frac{5Q}{10} = \frac{Q}{2}$ or $Q \div 2$.

Alternatively, $\frac{P}{5} = Q$, $\frac{1}{2}\left(\frac{P}{5}\right) = \frac{1}{2}Q$, and $\frac{P}{10} = \frac{Q}{2}$.

Another way is to divide a few numbers, such as 30 or 100, by both 5 and 10 and compare results. All of these examples illustrate the fact that if $P \div 5 = Q$, then $P \div 10$ must be $1/2$ of Q , or $Q \div 2$.

$Q \div 2$ is the correct answer.

