

Pre 2nd Kyu

Section 1 : Calculation Test

数学検定

PROFICIENCY TEST IN PRACTICAL MATHEMATICS

Test Time : 50 minutes

Test Instructions

1. Make sure that you have the correct level (Kyu) test.
2. Do not open the booklet until you are told to do so.
3. Write your name and examinee number on this page.
4. Write your name, examinee number and other necessary information on the answer sheets.
5. Write only answers on the answer sheets provided.
6. If your answer contains a fraction, write the fraction in simplest form by reducing it to lowest terms.
7. If your answer contains a radical, write your answer in simplest radical form. For example, $\sqrt{12}$ must be expressed as $2\sqrt{3}$.
8. You may not use a calculator, ruler or compass.
9. Turn off your cell phone and do not use it during the test.
10. Ask an examination supervisor if your problem sheets have inconsistent page numbering or missing pages.
11. It is prohibited to disclose the problems to the general public, such as on the Internet, without permission.

Please submit this test upon agreeing to the following "handling of personal information".

Information regarding the handling of all personal information attached to this form

1. Name of Organization : The Mathematics Certification Institute of Japan
2. Title, Affiliation and Contact Information of Personal Information Protection Administrator :
Title : Personal Information Protection Administrator
Department: Secretariat Contact Information : 03-5812-8340
3. Purpose for Use of Personal Information : Management of examinee information, marking, and for the purpose of identifying candidates
4. Provision of Personal Information to Third Parties : In cases where an application is made through the organization's office, registration information, names, test level and test results for the purpose of informing certification results via the Internet, fax, mail or electronic mail attachment, etc. will be provided to the applicant.
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The Mathematics Certification Institute of Japan, Certification Inquiry Desk
Bunshodo Building 6F, 5-1-1 Ueno, Taito Ward, Tokyo, 110-0005
Tel : 03-5660-4804 (Monday to Friday 9:30 - 17:00 not including national holidays, New Year's holidays and organization holidays)
7. Voluntariness of the Provision of Personal Information : Whether to provide personal information to the Organization is entirely up to the examinee. However, if the Organization does not receive accurate information, it may not be possible to provide certain services in an appropriate manner.

Name

Examinee
Number

—



公益財団法人

日本数学検定協会

The Mathematics Certification Institute of Japan

[Pre-2nd Kyu] Section 1: Calculation Test**1**

Answer the following.

- (1) Expand and simplify the following expression.

$$(x + 2)^2 - x(x + 5)$$

- (2) Factorize the following expression.

$$25x^2 - 81y^2$$

- (3) Solve for x in the following equation.

$$x^2 - 8x + 1 = 0$$

- (4) Simplify the following expression.

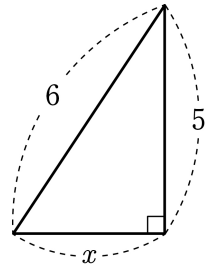
$$(1 - \sqrt{3})^2 + \sqrt{27}$$

- (5) y is directly proportional to the square of x and $y = 5$ when $x = 2$. Express y in terms of x .

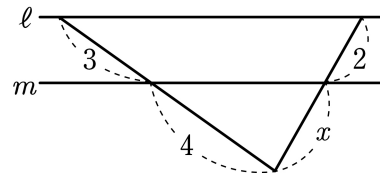
2

Answer the following.

- (6) In the figure of a right-angled triangle shown on the right, find the value of x .



- (7) In the figure on the right, find the value of x when $\ell \parallel m$.



- (8) Expand and simplify the following expression.

$$(x+1)(x+2)^2$$

- (9) Factorize the following expression.

$$xy + 2x + 2y + 4$$

- (10) Simplify the following expression. If the answer is a fraction, rationalize the denominator.

$$\frac{1}{1+\sqrt{2}} + \sqrt{2}$$

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Answer the following.

(11) Find the coordinates of the vertex for the parabola $y = x^2 + 4x - 3$.

(12) Solve for x in the quadratic inequality $x^2 + 7x + 10 > 0$.

(13) Find the following value.

$${}_5P_2 - {}_4C_2$$

(14) When $\cos \theta = \frac{\sqrt{2}}{5}$ for $0^\circ < \theta < 90^\circ$, find the following values.

① $\sin \theta$

② $\tan \theta$

(15) Consider the two sets, $A = \{3, 5, 7, 8\}$ and $B = \{4, 5, 6, 8\}$.

① Find the elements of set $A \cap B$ and list them using set notation.

② How many elements does set $A \cup B$ have?