

The Project for Human Resource Development Scholarship (JDS)

Basic Mathematics Aptitude Test 2024

Note:

- The test is a computer-scored multiple-choice test.
- You have 60 minutes to complete.
- No calculators are allowed.
- Part I and Part II are ‘Basic Math,’ and Part III, IV and V are ‘Applied Math.’
- Select one(1) integer 0 to 9 for each square.
- Each square correspond to each answer number of computer-scored answer sheet.

Example:

Please select integer number that correspond to .

➤ $3 \times 8 =$ (2 digits)

↓
No.1 ↓
No.2

Fill the oval shape completely with a pencil that you think it is the appropriate answer as shown in the picture below.

| No. | Answer |
|-----|--|
| 1 | 0 <input checked="" type="radio"/> 3 4 5 6 7 8 9 0 |
| 2 | 0 2 3 <input checked="" type="radio"/> 5 6 7 8 9 0 |
| 3 | 0 2 3 4 5 6 7 8 9 0 |
| 4 | 0 2 3 4 5 6 7 8 9 0 |

Application Number: _____

Name: _____

(Please show all your work here and write your answers in the designated space)
[PART I] Calculate the followings.

1. $2 - (2 - 4 \times (3 + (4 - 7)))$

Answer :

→ No.1

2. $\left(\frac{3}{2} - \frac{1}{2} \div \frac{1}{3}\right) \times \left(\frac{3}{8} \div \frac{3}{16} - \frac{3}{16}\right)$

Answer :

→ No.2

3. $(\sqrt{48} - \sqrt{75}) \times \sqrt{3}$

Answer :

→ No.3

4. $(3^3 \times \left(\frac{1}{3}\right)^3)^2 \div \left(\frac{1}{3}\right)^{-3}$

Answer : $\overline{\overline{1}}$

 (2 digits)
→ No.4
→ No.5

(Please show all your work here and write your answers in the designated space)
[PART II] Answer the following questions.

1. Solve the following equations: $4x+2=6x-6$

Answer : $x =$

→No.6

2. Solve the following simultaneous equations for x and y .

$$\begin{aligned}3x + 2y - 1 &= 7 \\-x + 5y &= 3\end{aligned}$$

Answer : $x =$, $y =$

→No.7

→No.8

3. Find the region x satisfying the following inequality, where $||$ indicates the absolute value.

$$\left| \frac{2x+3}{4} \right| < 2$$

Answer :
$$-\frac{\boxed{} + \boxed{}}{2} < x < \frac{\boxed{}}{2}$$

(2 digits)

No.9 No.10 No.11

4. Find the difference between the arithmetic mean and median values in the following observations x_i : $Mean(x_i) - Median(x_i)$ where $x_i = \{22, 4, 8, 5, 11, 10\}$.

Answer :

$$\boxed{}$$

→ No.12

(Please show all your work here and write your answers in the designated space)

[PART III] Answer the following questions:

1. Solve the following equation for x . Consider only real number solutions.

$$\frac{5x^3}{2} - 7 = 13$$

Answer : $x = \boxed{}$

→ No.13

2. Find the region of x satisfying the following inequality.

$$x^2 - 4x < x - 6$$

Answer : $\boxed{} < x < \boxed{}$

→ No.14 → No.15

3. Solve the following equation for x .

$$2\log_3(x) = \log_3(2) + \log_3(3x - 4)$$

Answer : $x = \boxed{\quad}, \boxed{\quad}$

→ No.16 → No.17

4. Consider the following six values, [6, 4, 12, 8, 10, 14]. Suppose that the median of six values is 3^{2x} . Find the value of x .

Answer : $x = \boxed{\quad}$

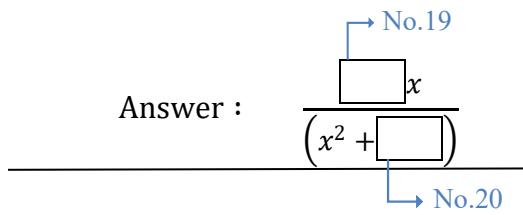
→ No.18

(Please show all your work here and write your answers in the designated space)

[PART IV] Answer the following questions:

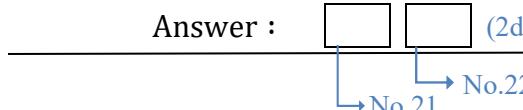
1. Determine the first-order derivative of the following. Note that \log is the natural logarithm.

$$y = \log(x^2 + 4)$$

Answer : 

2. Find the following definite integral.

$$\int_1^2 (2x + 3x^2) dx$$

Answer : 

3. Let $A = \begin{bmatrix} 1 & 1 \\ -2 & a \end{bmatrix}$ and $B = \begin{bmatrix} 1 & 1 \\ 2 & 2 \end{bmatrix}$.

Assume determinant of the matrix A is 5. Find $A^{-1} \times B$.

Answer :
$$\begin{bmatrix} \boxed{}/5 & 1/5 \\ 4/5 & \boxed{}/5 \end{bmatrix}$$

→ No.23

→ No.24

4. Find the maximum total revenue (TR) for a firm, given the flowing functions: $TR = P \times Q$ and $P = 16 - 2Q$, where P and Q are the price and quantity of goods, respectively.

Answer :
$$\boxed{} \boxed{} \text{ (2digits)}$$

→ No.25

→ No.26

(Please show all your work here and write your answers in the designated space)

[PART V] Answer the following questions:

1. Find the following trigonometric function value: $\sin\left(\pi - \frac{5\pi}{6}\right) + \cos\left(\frac{\pi}{3}\right)$ where π represents the mathematical constant and the angles are in radians.

Answer :

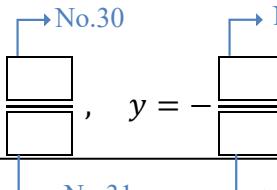
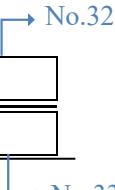
→ No.27

2. Given a sequence $\left(\frac{1}{3}\right)^{n-1}$, find $\sum_{n=1}^{\infty} \left(\frac{1}{3}\right)^{n-1}$ where n is an integer.

Answer :

→ No.29

3. Suppose that $\vec{a} = (4x - 5, 2)$ and $\vec{b} = (3, y)$ are vertical and that $x - y = 3$. Find x and y .

Answer : $x =$  , $y =$ 

4. In the Econometrics course, there are 5 Japanese students and 7 non-Japanese students. The professor plans to form a group for assignment, by selecting two members from each group. Find the total number of different teams that can be formed.

Answer : 