Japanese Grant Aid for Human Resource Development Scholarship (JDS)

Basic Mathematics Aptitude Test

2018

Solution

Prepared by Japanese Development Service Co., Ltd.

Note:

- You have 60 minutes to complete.
- No calculators are allowed.
- Show all your work and write your answers in the designated space.
- Part I and Part II are 'Basic Math,' and Part III is 'Applied Math.' The test result is only for the reference purpose and basically does not affect the selection procedure. However, some accepting universities may require the candidates who apply for the economics-related fields of study to have analytical and numerical skills.

Registration No.: _____

Name: _____

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

[PART I] Answer the following questions. **Points: 3/each, Total:30**

1. $-7.4-(-5.2)$ $= -7.4 + 5.2 = -2.2$

Answer: -2.2

2. $\frac{5}{9}\times\left(-\frac{1}{12}-\frac{2}{3}\right)$ $= \frac{5}{9}\times\left(\frac{-1-8}{12}\right) = \frac{5\times-9}{9\times12} = \frac{-5}{12}$

Answer: $-\frac{5}{12}$

3. $-(-2)\times(3-9)-7$ $= 2\times(-6)-7 = -12-7 = -19$

Answer: -19

4. $\frac{1}{(\frac{1}{2})}\times 0.5\div\left(\frac{1}{2}-1.5\right)$ $= 2\times\frac{1}{2}\div(0.5-1.5) = 1\div-1 = -1$

Answer: -1

5. $3^2\div3^{-4}\div3^3$ $= 3^{2+4-3} = 3^3 = 27$

Answer: 27

6. $100^{\frac{1}{2}} + \left(\frac{1}{3}\right)^{-2}$ $= 10 + 9 = 19$

Answer: 19

7. $\sqrt{20} \div \sqrt{5}$ $= \frac{\sqrt{20}}{\sqrt{5}} = \sqrt{4} = 2$

Answer: 2

8. Find the linear function passing through the following 2 points.
   $(x,\ y) = (5,\ 3)$ and $(x,\ y) = (5,\ 1)$

Answer: $x = 5$

9. Find the linear function using the following information.
   $slope: -1,\ y\ intercept: 3$

Answer: $y = -x + 3$

10. Find the linear function using the following information.
    $(x,\ y) = (2,\ 7),\ y\ intercept: -2$

Answer: $y = \frac{9}{2}x - 2$

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

[PART II] Answer the following questions. **Points: 5/each, Total:35**

1. Solve the following equation for x.

$$\frac{-x}{9} = \frac{3+x}{3}$$

$-x = 3(3+x)$

$-4x = 9$

Answer: $x = -\frac{9}{4}$

2. Solve the following simultaneous equations.

$$\begin{cases} 3x + 7y = -6 \\ 8x - 7y = -5 \end{cases}$$

Answer: $(x,\ y) = (-1,\ -\frac{3}{7})$

3. Solve the following inequality for x.

$$1 \geq \frac{3x-1}{2}$$

$2 \geq 3x - 1$

$3 \geq 3x$

Answer: $x \leq 1$

4. Find the average of the following six values.

$$\left\{1.5,\ -\frac{1}{2},\ 3,\ 0,\ -\frac{3}{2},\ 0.5\right\}$$

$3/6 = 0.5$

Answer: 0.5

5. Round off 789.5918272636 to the hundredths digit (the second decimal place).

Answer: *789.59*

6. Solve the following for x.

$2x + 4x^2 - 2 = 0$ $2(2x - 1)(x + 1) = 0$

Answer: $x = \frac{1}{2},\ -1$

7. Solve the following inequality for x.

$1 < 5^{3x-1}$

$5^0 < 5^{3x-1}$

$0 < 3x - 1$

Answer: $x > \frac{1}{3}$

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

[PART III] Answer the following questions. **Points: 7/each, Total:35**

1. A 8 % concentration salt solution and a 12% concentration salt solution were mixed to make 100 grams of 10% salt solution. How many grams of each of the two kinds of salt solution were mixed together?

Answer: *8% salt solution 50 grams, 12% salt solution 50 grams*

2. There is a job that takes 15 days to do alone by Koji or 10 days to do alone by Taro. On this job, at first Taro works by himself for 5 days and after that Taro and Koji work together and finish the job. All together, how many days does it take to complete the job?

Answer: *8 days*

3. Solve the following equation.

$\log_{\frac{1}{7}} x = -1$

$$log_{\frac{1}{7}} x = log_{\frac{1}{7}}(\frac{1}{7})^{-1}, \qquad x = 7$$

Answer: $x = 7$

4. Determine the first-derivative of the following.

$f(x) = 2x^3 + 3x^2 - x + 1$

Answer: $f(x)' = 6x^2 + 6x - 1$

5. Find the following definite integral.

$\int_0^2 (8x + 4)\, dx$

$$[4x^2 + 4x]_0^2 = (4 \times 2^2 + 4 \times 2) - (0 + 0) = 16 + 8 = 24$$

Answer: 24