

The Project for
Human Resource Development Scholarship (JDS)
Basic Mathematics Aptitude Test
2017

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 and Part IV are ‘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

$$1. \quad -9 - (-5.6) \qquad = -9 + 5.6 = -3.4$$

Answer: -3.4

$$2. \quad \frac{5}{24} - \left(\frac{1}{3} - \frac{3}{4}\right) \qquad = \frac{5}{24} - \left(\frac{4-9}{12}\right) = \frac{5+10}{24} = \frac{15}{24} = \frac{5}{8}$$

Answer: $\frac{5}{8}$ or 0.625

$$3. \quad -5 - (-3) \times (1 - 9) \qquad = -5 - (-3) \times (-8) = -5 - 24 = -29$$

Answer: -29

$$4. \quad 0.5 \div \left(\frac{1}{4} - 1.5\right) \times \frac{1}{\left(\frac{5}{2}\right)} \qquad = \frac{1}{2} \div \frac{-5}{4} \times 2 = -\frac{4}{5}$$

Answer: $-\frac{4}{5}$ or 0.8

$$5. \quad 2^{-2} \times 2^4 \div 2^{-1} \qquad = 2^{-2+4+1} = 2^3 = 8$$

Answer: 8

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

Answer: 19

$$7. \sqrt{50} \times \sqrt{2} = \sqrt{100} = 10$$

Answer: 10

8. Find the linear function passing through the following 2 points.

$$(x, y) = (1, 3) \text{ and } (0, 1)$$

Answer: $y = 2x + 1$

9. Find the linear function using the following information.

slope: 2, y intercept: -7

Answer: $y = 2x - 7$

10. Find the linear function using the following information.

x intercept: 1, y intercept: 2

Answer: $y = -2x + 2$

(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.

$$\frac{3+x}{4} = \frac{-x}{8} \qquad x = -2$$

Answer: $x = -2$

2. Solve the following simultaneous equations.

$$\begin{cases} 4x + 5y = 6 \\ 6x - 7y = -20 \end{cases} \qquad (x, y) = (-1, 2)$$

Answer: $(x, y) = (-1, 2)$

3. Solve the following inequality for x.

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

Answer: $x \geq 1$

4. Find the average of the following six values.

$$\left\{ 1.5, -\frac{1}{2}, 3, 0, -\frac{3}{2}, 0.5 \right\} \qquad 3/6 = 0.5$$

Answer: 0.5 or $\frac{1}{2}$

5. Round off 3.5918272636 to the hundredths digit (the second decimal place).

Answer: 3.59

6. Solve the following for x.

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

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

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

7. Solve the following inequality for x.

$$7^{3x-1} < 1$$

$$7^{3x-1} < 7^0$$

$$3x - 1 < 0$$

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. There is a job that takes 20 days to do alone by Tom or 30 days to do alone by Ken. On this job, at first Tom works by himself for 5 days and after that Tom and Ken work together and finish the job. All together, how many days does it take to complete the job?

Answer: 14 days

2. A 10 % concentration salt solution and a 15% concentration salt solution were mixed to make 600 grams of 12% salt solution. How many grams of each of the two kinds of salt solution were mixed together?

Answer: 10% salt solution 360 grams, 15% salt solution 240 grams

3. Solve the following equation.

$$\log_6(2x - 3) = \log_6(x + 2) \qquad 2x - 3 = x + 2$$

Answer: $x = 5$

4. Determine the first-derivative of the following.

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

Answer: $f(x)' = 9x^2 + 2x - 1$

5. Find the following definite integral.

$$\int_0^1 (6x - 9) dx \quad [3x^2 - 9x]_0^1 = 3 - 9 = -6$$

Answer: **-6**