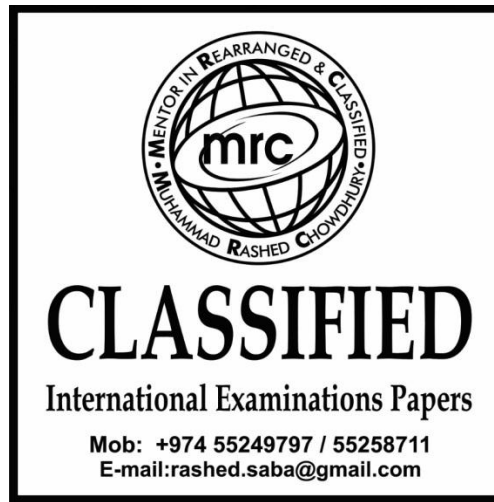



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PURE MATHEMATICS 2/P2

TOPIC- Exponentials & logarithms

Sub-topic: Graph, laws & solving



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Muhammad Rashed Chowdhury
B.Sc (Hons), M.Sc
Assistant Professor & HOD
Mathematics Instructor

Master Trainer on Creative Question Setting,
Moderating & Marking, SESDP,
Ministry of Education

Mobile : +974 5525 8711, +974 55249797
Whatsapp : +974 5525 8711
E-mail : muhammad@mrc-papers.com

www.mrc-papers.com

EXPONENTIALS AND LOGARITHMS

1.

(i) Find, giving your answer to 3 significant figures, the value of y for which

$$3^y = 12$$

(2)

(ii) Solve, giving an exact answer, the equation

$$\log_2(x + 3) - \log_2(2x + 4) = 4$$

(You should show each step in your working.)

(4)

JU-I-12-15-(5)

EXPONENTIALS AND LOGARITHMS

2.

(a) Show that the equation

$$2\log_2 y = 5 - \log_2 x \quad x > 0, y > 0$$

may be written in the form $y^2 = \frac{k}{x}$ where k is a constant to be found.

(3)

(b) Hence, or otherwise, solve the simultaneous equations

$$2\log_2 y = 5 - \log_2 x$$

$$\log_x y = -3$$

for $x > 0, y > 0$

(5)

JU-I-12-16-(5)

EXPONENTIALS AND LOGARITHMS

3.

Given that a and b are positive constants, solve the simultaneous equations

$$ab = 25$$

$$\log_4 a - \log_4 b = 3$$

Show each step of your working, giving exact values for a and b .

(6)

JA-I-12-14-(6)

EXPONENTIALS AND LOGARITHMS

4.

Given that

$$2\log_4(2x + 3) = 1 + \log_4 x + \log_4(2x - 1), \quad x > \frac{1}{2}$$

(a) show that

$$4x^2 - 16x - 9 = 0 \tag{5}$$

(b) Hence solve the equation

$$2\log_4(2x + 3) = 1 + \log_4 x + \log_4(2x - 1), \quad x > \frac{1}{2} \tag{2}$$

JA-I-12-15-(6)

EXPONENTIALS AND LOGARITHMS

5.

(a) Find, to 3 significant figures, the value of x for which $8^x = 0.8$.

(2)

(b) Solve the equation

$$2\log_3 x - \log_3 7x = 1.$$

(4)

JU-7-(6)

EXPONENTIALS AND LOGARITHMS

6.

Given that

$$\log_x(7y + 1) - \log_x(2y) = 1, \quad x > 4, \quad 0 < y < 1$$

express y in terms of x .

(5)

JA-I-2-14-(6)

EXPONENTIALS AND LOGARITHMS

7.

(i) Write down the value of $\log_6 36$.

(1)

(ii) Express $2 \log_a 3 + \log_a 11$ as a single logarithm to base a .

(3)

JU-6-(3)

EXPONENTIALS AND LOGARITHMS

8.

Solve

(a) $5^x = 8$, giving your answer to 3 significant figures,

(3)

(b) $\log_2(x + 1) - \log_2 x = \log_2 7$.

(3)

JU-5-(2)

EXPONENTIALS AND LOGARITHMS

9.

Given that a and b are positive constants, solve the simultaneous equations

$$a = 3b,$$

$$\log_3 a + \log_3 b = 2.$$

Give your answers as exact numbers.

(6)

JA-8-(5)

EXPONENTIALS AND LOGARITHMS

10.

Given that $0 < x < 4$ and

$$\log_5(4-x) - 2\log_5 x = 1,$$

find the value of x .

(6)

JA-9-(4)

EXPONENTIALS AND LOGARITHMS

11.

(a) Find the value of y such that

$$\log_2 y = -3 \quad (2)$$

(b) Find the values of x such that

$$\frac{\log_2 32 + \log_2 16}{\log_2 x} = \log_2 x \quad (5)$$

JU-9-(8)

EXPONENTIALS AND LOGARITHMS

12.

(a) Find the positive value of x such that

$$\log_x 64 = 2 \quad (2)$$

(b) Solve for x

$$\log_2(11 - 6x) = 2\log_2(x - 1) + 3 \quad (6)$$

JA-10-(5)

EXPONENTIALS AND LOGARITHMS

13.

(a) Given that

$$2\log_3(x-5) - \log_3(2x-13) = 1,$$

show that $x^2 - 16x + 64 = 0$.

(5)

(b) Hence, or otherwise, solve $2\log_3(x-5) - \log_3(2x-13) = 1$.

(2)

JU-10-(7)

EXPONENTIALS AND LOGARITHMS

14.

Find, giving your answer to 3 significant figures where appropriate, the value of x for which

(a) $5^x = 10$, (2)

(b) $\log_3(x - 2) = -1$. (2)

JU-11-(3)

EXPONENTIALS AND LOGARITHMS

15.

Given that $y = 3x^2$,

(a) show that $\log_3 y = 1 + 2\log_3 x$

(3)

(b) Hence, or otherwise, solve the equation

$$1 + 2\log_3 x = \log_3(28x - 9)$$

(3)

JA-12-(4)

EXPONENTIALS AND LOGARITHMS

16.

Find the values of x such that

$$2 \log_3 x - \log_3(x - 2) = 2$$

(5)

JU-12-(2)

EXPONENTIALS AND LOGARITHMS

17.

Given that

$$2 \log_2(x+15) - \log_2 x = 6$$

(a) Show that

$$x^2 - 34x + 225 = 0$$

(5)

(b) Hence, or otherwise, solve the equation

$$2 \log_2(x+15) - \log_2 x = 6$$

(2)

JA-13-(6)

EXPONENTIALS AND LOGARITHMS

18.

(i) Find the exact value of x for which

$$\log_2(2x) = \log_2(5x + 4) - 3 \quad (4)$$

(ii) Given that

$$\log_a y + 3\log_a 2 = 5$$

express y in terms of a .

Give your answer in its simplest form.

(3)

JU-13-(7)

EXPONENTIALS AND LOGARITHMS

19.

- (i) Use logarithms to solve the equation $8^{2x+1} = 24$, giving your answer to 3 decimal places.

(3)

- (ii) Find the values of y such that

$$\log_2(11y - 3) - \log_2 3 - 2 \log_2 y = 1, \quad y > \frac{3}{11}$$

(6)

JU-15-(7)

EXPONENTIALS AND LOGARITHMS

20.

(i) Given that

$$\log_3(3b + 1) - \log_3(a - 2) = -1, \quad a > 2$$

express b in terms of a .

(3)

(ii) Solve the equation

$$2^{2x+5} - 7(2^x) = 0$$

giving your answer to 2 decimal places.

(Solutions based entirely on graphical or numerical methods are not acceptable.)

(4)

JU-16-(8)

EXPONENTIALS AND LOGARITHMS

21.

(i) $2\log(x + a) = \log(16a^6)$, where a is a positive constant

Find x in terms of a , giving your answer in its simplest form.

(3)

(ii) $\log_3(9y + b) - \log_3(2y - b) = 2$, where b is a positive constant

Find y in terms of b , giving your answer in its simplest form.

(4)

JU-17-(7)

EXPONENTIALS AND LOGARITHMS

22.

(a) Given that

$$y = \log_3 x$$

find expressions in terms of y for

(i) $\log_3 \left(\frac{x}{9} \right)$

(ii) $\log_3 \sqrt{x}$

Write each answer in its simplest form.

(3)

(b) Hence or otherwise solve

$$2\log_3 \left(\frac{x}{9} \right) - \log_3 \sqrt{x} = 2$$

(4)

JA-I-17-(5)

EXPONENTIALS AND LOGARITHMS

23.

Given that

$$\log_x(7y + 1) - \log_x(2y) = 1, \quad x > 4, \quad 0 < y < 1$$

express y in terms of x .

(5)

JA-14-(6)

24. (i) solve $5^y=8$

EXPONENTIALS AND LOGARITHMS

Giving your answer 3 significant figures.

(ii) Use algebra to find the value of x for which

$$\log_2(x + 15) - 4 = \frac{1}{2}\log_2 x$$

unknown