

Unit 5B Review

Convert to exponential form:

1)  $\log_8 \frac{1}{64} = -2$

$$8^{-2} = \frac{1}{64}$$

2)  $\log_2 64 = 6$

$$2^6 = 64$$

Convert to logarithm form:

3)  $8^3 = 512$

$$\log_8 512 = 3$$

4)  $5^{-2} = \frac{1}{25}$

$$\log_5 \left(\frac{1}{25}\right) = -2$$

Solve for x (no decimal answers):

5)  $\log_7 x = 4$

$$7^4 = x$$

$$2401 = x$$

6)  $\log_5 625 = x$

$$5^x = 625$$

$$5^x = 5^4$$

$$x = 4$$

7)  $\log_{32} 32 = \frac{5}{2}$

$$\left[ x \right]^{5/2} = (32)^{2/5}$$

$$x = (\sqrt[5]{32})^2$$

$$x = (2)^2$$

$$x = 4$$

8)  $\log_{11} \sqrt{11} = x$

$$11^x = \sqrt{11}$$

$$11^x = 11^{1/2}$$

$$x = 1/2$$

Evaluate (no decimal answers):

9)  $\log_3 81 = x$

$$3^x = 81$$

$$3^x = 3^4$$

$$x = 4$$

10)  $\log_{32} 8 = x$

$$32^x = 8$$

$$2^{5x} = 2^3$$

$$5x = 3$$

$$x = \frac{3}{5}$$

11)  $\log_6 36^7 = x$

$$6^x = 36^7$$

$$6^x = 6^{2(7)}$$

$$x = 14$$

12)  $2^{\log_2 12} = x$

$$\log_2 x = \log_2 12$$

$$x = 12$$

13)  $\log_7 7^3 + 3^{\log_3 7} = x$

$$\log_7 7^3 = x$$

$$7^x = 7^3$$

$$x = 3$$

$$3^{\log_3 7} = x$$

$$\log_3 x = \log_3 7$$

$$x = 7$$

$$3 + 7 = 10$$

Given  $\log_7 5 \approx 0.8271$  and  $\log_7 9 \approx 1.1292$ , approximate the value of each logarithm.

14)  $\log_7 45$

$$\log_7 5 + 9$$

$$\log_7 5 + \log_7 9$$

$$0.8271 + 1.1292$$

$$1.9563$$

15)  $\log_7 \frac{5}{9}$

$$\log_7 5 - \log_7 9$$

$$0.8271 - 1.1292$$

$$-0.3021$$

16)  $\log_7 35$

$$\log_7 7 + 5$$

$$\log_7 7 + \log_7 5$$

$$1 + 0.8271$$

$$1.8271$$

Write as a single logarithm:

17)  $\log_3 4x + 2 \log_3 y$

$$\log_3 4x + \log_3 y^2$$

$$\log_3 4xy^2$$

18)  $\log_5 y - 4 \log_5 r + 2 \log_5 x$

$$\log_5 y - \log_5 r^4 + \log_5 x^2$$

$$\log_5 \frac{y}{r^4} + \log_5 x^2$$

$$\log_5 \frac{x^2 y}{r^4}$$

$$19) \log_4 2 + 2\log_4 y + \frac{1}{2}\log_4 x$$

$$\log_4 2 + \log_4 y^2 + \log_4 x^{1/2}$$

$$\log_4 2 + \log_4 y^2 + \log_4 \sqrt{x}$$

$$\boxed{\log_4 2y^2\sqrt{x}}$$

$$20) 2\log x - (\log y + 3\log z)$$

$$\log x^2 - (\log y + \log z^3)$$

$$\log x^2 - \log yz^3$$

$$\boxed{\log \left( \frac{x^2}{yz^3} \right)}$$

Expand:

$$21) \log_5 a^2 b^5$$

$$\log_5 a^2 + \log_5 b^5$$

$$\boxed{2\log_5 a + 5\log_5 b}$$

$$22) \log_7 \frac{ab^4}{c^8}$$

$$\log_7 a + \log_7 b^4 - \log_7 c^8$$

$$\boxed{\log_7 a + 4\log_7 b - 8\log_7 c}$$

$$23) \log_3 3x^{2/3}y^5$$

$$\log_3 3 + \log_3 x^{2/3} + \log_3 y^5$$

$$\boxed{\log_3 3 + \frac{2}{3}\log_3 x + 5\log_3 y}$$

Solve:

$$24) \log_3 3x = \log_3 (2x + 5)$$

$$3x = 2x + 5$$

$$\boxed{x = 5}$$

$$25) \log x = \log 15 - \log 5$$

$$\log x = \log \frac{15}{5}$$

$$\log x = \log 3$$

$$\boxed{x = 3}$$

$$26) \log_3 7 + \log_3 x = \log_3 14$$

$$\log_3 7x = \log_3 14$$

$$7x = 14$$

$$\boxed{x = 2}$$

$$27) \log_2 (x + 13) + \log_2 x = \log_2 30$$

$$\log_2 (x^2 + 13x) = \log_2 30$$

$$x^2 + 13x = 30$$

$$x^2 + 13x - 30 = 0$$

$$(x + 15)(x - 2) = 0$$

$$x = -15, 2$$

$$29) \log_2 8 + \log_2 (-4x) = 1$$

$$\log_2 (-32x) = 1$$

$$2^1 = -32x$$

$$\boxed{-\frac{1}{16} = x}$$

$$31) 3\log_4 (x + 3) + 16 = 22$$

$$\frac{3\log_4 (x+3)}{3} = \frac{6}{3}$$

$$\log_4 (x+3) = 2$$

$$4^2 = x + 3$$

$$16 = x + 3$$

$$\boxed{13 = x}$$

$$28) \log_2 x = \frac{1}{2}\log_2 81$$

$$\log_2 x = \log_2 81^{1/2}$$

$$\log_2 x = \log_2 \sqrt{81}$$

$$\boxed{x = 9}$$

$$30) \log_8 (x - 3) + \log_8 (x + 4) = 1$$

$$\log_8 (x^2 + x - 12) = 1$$

$$8^1 = x^2 + x - 12$$

$$0 = x^2 + x - 20$$

$$0 = (x + 5)(x - 4)$$

$$x = -5, 4$$