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VCE Mathematical Methods ½ Exponentials [5.1]

Test Solutions

19 Marks. 1 Minute Reading. 20 Minutes Writing

Results:

Test Questions	/19	





Section A: Test Questions (19 Marks)

Question 1 (3 marks)

Tick whether the following statements are **true** or **false**.

	Statement	True	False
a.	The product law of exponents states that $a^{m+n} = a^m \times a^n$ for any real numbers m and n .	✓	
b.	The quotient law of exponents states that $a^{\frac{m}{n}} = (a^m)^{\frac{1}{n}}$ for any positive integers m and n .	✓	
c.	The power law of exponents states that $(a^m)^n = a^{m \times n}$ for any real numbers m and n .	✓	
d.	Any non-zero number raised to the zero power is equal to one.	<	
e.	Any number raised to the first power is equal to 0.		✓
f.	The power of a product rule states that the power of a product is equal to the product of the powers.	✓	

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Question 2 (4 marks)

Solve each of the following equations for x.

a. $3^x = 27$. (1 mark)

X=3

b. $(2.1)^{x+2} = (2.1)^5$. (1 mark)

X=3

c. $2^{3x} \times 8^{3x+2} = \left(\frac{1}{64}\right)^{x-5}$. (2 marks)

solve $2^{3 \cdot x} \cdot 8^{3 \cdot x + 2} = \left(\frac{1}{64}\right)^{x - 5}$

 $x = \frac{4}{3}$

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Question 3 (6 marks)

Simplify and express each of the following with positive indices.

a. $3^{4n} \times 9^{2n} \times 27^{3n}$. (1 mark)

 3^{17n}

b. $\frac{2^{2n} \times 8^{n+1}}{32^n}$. (1 mark)

 $\frac{2^{2}^{n} * 8^{n+1}}{32^{n}} = 8$

c. $\left(x^{\frac{1}{2}}y^{-\frac{1}{2}}\right)^{-2}$. (2 marks)

 $\frac{y}{x}$

d. $\frac{\left(16x^6y^{-2}\right)^{-\frac{1}{4}}}{x^{\frac{1}{2}}y^{-\frac{1}{2}}}$. (2 marks)

 $\frac{y}{2x^2}$

Question 4 (3 marks)

Solve the following inequalities for x.

a. $3^{2x-1} > 9$. (1 mark)

 $x > \frac{3}{2}$

b. $2^{\frac{1}{5}x+1} \le 8$. (1 mark)

 $x \le 10$

c. $\left(\frac{1}{4}\right)^{3x+4} > 16$. (1 mark)

3x + 4 > -2

3x > -6

x < -2

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Question 5 (3 marks)

Solve the following for x.

$$3^{2x+2} - 3^{x+2} - 54 = 0$$

$$3^{2} \cdot 3^{2x} - 3^{2} \cdot 3^{x} - 54 = 0$$

$$(et A = 3^{x}, A > 0) [Im]$$

$$9A^{2} - 9A - 54 = 0$$

$$A^{2} - A - 6 = 0$$

$$(A - 3)(A + 2) = 0$$

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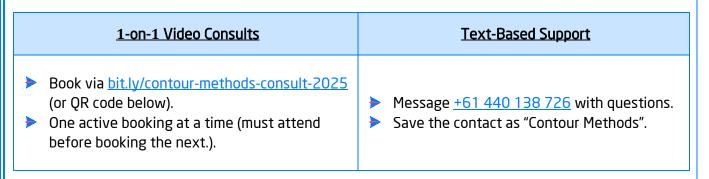
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VCE Mathematical Methods ½

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