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VCE Mathematical Methods ½
Exponentials [5.1]
Test

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)

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

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

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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)

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

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

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

Question 4 (3 marks)

Solve the following inequalities for x.

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

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

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

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Question 5 (3 marks)

Solve the following for x.

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

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