Website: contoureducation.com.au | **Phone:** 1800 888 300
Email: hello@contoureducation.com.au

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.	✓	

Space for Personal Notes

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)

$$\text{solve}\left(2^{3\cdot x}\cdot 8^{3\cdot x+2}=\left(\frac{1}{64}\right)^{x-5},x\right) \qquad x=\frac{4}{3}$$

Space for Personal Notes

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)

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

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

$\frac{y}{x}$

d. $\frac{(16x^6 y^{-2})^{-\frac{1}{4}}}{x^{\frac{1}{2}} y^{-\frac{1}{2}}}$. (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. $2^{\frac{1}{5}x+1} \leq 8$. (1 mark)

$$x \leq 10$$

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

$$3x + 4 > -2$$

$$3x > -6$$

$$x < -2$$

Space for Personal Notes

Question 5 (3 marks)

Solve the following for x.

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

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

let $A = 3^x$, $A > 0$ [1m]

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

$A^2 - A - 6 = 0$

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

So $A = 3$ or $A = -2$, but $A > 0$ so reject $A = -2$ [1m]

$\Rightarrow 3^x = 3$, $x = 1$ [1A]

Space for Personal Notes

CONTOUREDUCATION

Website: contoureducation.com.au | **Phone:** 1800 888 300 | **Email:** hello@contoureducation.com.au

VCE Mathematical Methods ½

Free 1-on-1 Support

Be Sure to Make the Most of These (Free) Services!

- Experienced Contour tutors (45 + raw scores, 99 + ATARs).
- For fully enrolled Contour students with up-to-date fees.
- After-school weekdays and all-day weekends.

1-on-1 Video Consults	Text-Based Support
➢ Book via bit.ly/contour-methods-consult-2025 (or QR code below). ➢ One active booking at a time (must attend before booking the next.).	➢ Message +61 440 138 726 with questions. ➢ Save the contact as "Contour Methods".

Booking Link for Consults
bit.ly/contour-methods-consult-2025

Number for Text-Based Support
+61 440 138 726