



# CAMI Mathematics: Grade 11

## GRADE 11 CAPS Curriculum

### 11.4 Exponents and surds

#### 1.1 Simplify:

(a)

$$\left(\frac{y^7 z^8}{y^3 z^4}\right)^{12}$$

(b)

$$\frac{2(2x^2)^3}{8x^4}$$

(c)

$$(6n^2 p^4)(n^3 p^2)$$

(d)

$$\left(-\frac{1}{2}x^2 y^2\right)^3$$

(e)

$$-(-2a^4 b^2)^2$$

#### 1.2 Simplify:

(a)

$$3^{1+4y} + 9^{2y+1}$$

(b)

$$27^{4y+3} \times 9^{2y-2}$$

(c)

$$\frac{6 \cdot 3^{2y} - 3^{2y+1}}{3^{2y}}$$

(d)

$$\frac{2^{4x+1} + 4^{2x+1}}{2^{4x}}$$

(e)

$$\frac{5 \cdot 3^{4a} + 25}{3^{4a+2} + 45}$$

#### 1.3 Simplify using negative exponents

(a)

$$\left(\frac{4^2 d^{-3}}{y^{-4} q^3}\right)$$



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(b)

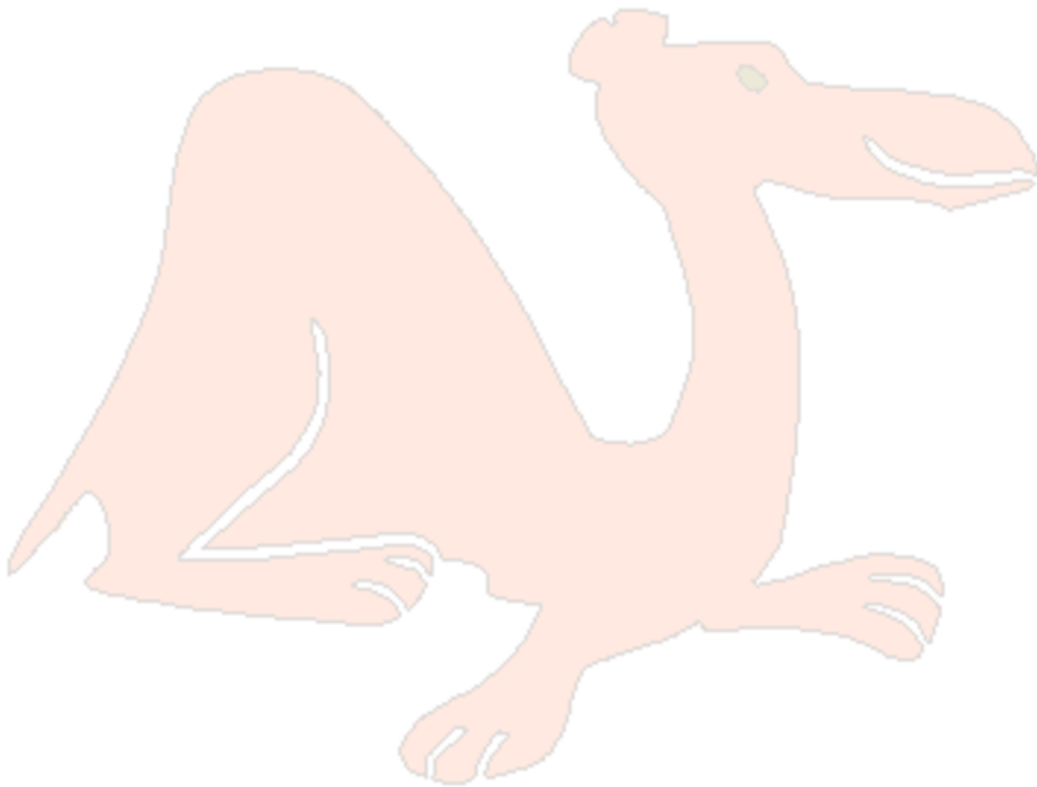
$$\left(\frac{f^5}{m^4}\right)^{-3}$$

(c)

$$\left(\frac{3^2 f^{-5}}{f^{-2}}\right)$$

(d)

$$\left(\frac{8^4 f^{-4}}{y^{-3} m^4}\right)$$





## MEMO

### 1.1 Simplify: [4.3.1.5; 4.3.1.7; 4.3.1.8]

(a)

$$\left(\frac{y^7 z^8}{y^3 z^4}\right)^{12} = y^{48} z^{48}$$

(b)

$$\begin{aligned} & \frac{2(2x^2)^3}{8x^4} \\ &= \frac{2(2^3 x^6)}{8x^4} \\ &= \frac{16x^6}{8x^4} \\ &= 2x^2 \end{aligned}$$

(c)

$$(6n^2 p^4)(n^3 p^2) = 6n^5 p^6$$

(d)

$$\left(-\frac{1}{2}x^2 y^2\right)^3 = -\frac{1}{8}x^6 y^6$$

(e)

$$-(-2a^4 b^2)^2 = -4a^8 b^4$$

### 1.2 Simplify: [4.3.3.1; 4.3.3.2; 4.3.3.3]

(a)

$$\begin{aligned} & 3^{1+4y} + 9^{2y+1} \\ &= 3^1 \cdot 3^{4y} + (3^2)^{2y+1} \\ &= 3^1 \cdot 3^{4y} + 3^{4y} \cdot 3^2 \\ &= 3^{4y} (3 + 9) \\ &= 12 \cdot 3^{4y} \end{aligned}$$

(b)

$$\begin{aligned} & 27^{4y+3} \times 9^{2y-2} \\ &= (3^3)^{4y+3} \times (3^2)^{2y-2} \\ &= 3^{12y+9} \cdot 3^{4y-4} \\ &= 3^{16y+5} \end{aligned}$$



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(c)

$$\begin{aligned} & \frac{6 \cdot 3^{2y} - 3^{2y+1}}{3^{2y}} \\ &= \frac{6 \cdot 3^{2y} - 3^{2y} \cdot 3^1}{3^{2y}} \\ &= \frac{3^{2y}(6-3)}{3^{2y}} \\ &= 3 \end{aligned}$$

(d)

$$\begin{aligned} & \frac{2^{4x+1} + 4^{2x+1}}{2^x} \\ &= \frac{2^{4x} \cdot 2^1 + (2^2)^{2x+1}}{2^x} \\ &= \frac{2^{4x} \cdot 2^1 + 2^{4x} \cdot 2^2}{2^x} \\ &= \frac{2^{4x}(2+4)}{2^x} \\ &= 6 \end{aligned}$$

(e)

$$\begin{aligned} & \frac{5 \cdot 3^{4a} + 25}{3^{4a+2} + 45} \\ &= \frac{5 \cdot 3^{4a} + 25}{3^{4a} \cdot 3^2 + 45} \\ &= \frac{5(3^{4a} + 5)}{9(3^{4a} + 5)} \\ &= \frac{5}{9} \end{aligned}$$

## 1.3 Simplify using negative exponents [4.3.2.1; 4.3.2.2; 4.3.2.3]

(a)

$$\left( \frac{4^2 d^{-3}}{y^{-4} q^3} \right) = \frac{16y^4}{q^3 d^3}$$



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(b)

$$\begin{aligned} & \left(\frac{f^5}{m^4}\right)^{-3} \\ &= \frac{f^{-15}}{m^{-12}} \\ &= \frac{m^{12}}{f^{15}} \end{aligned}$$

(c)

$$\begin{aligned} & \left(\frac{3^2 f^{-5}}{f^{-2}}\right) \\ &= 9f^{-3} \\ &= \frac{9}{f^3} \end{aligned}$$

(d)

$$\left(\frac{8^4 f^{-4}}{y^{-3} m^4}\right) = \frac{4096y^3}{f^4 m^4}$$

