GRADE 11_CAPS Curriculum

11.4 Exponents and surds

1.1 Simplify:

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

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

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

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

(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)
$$\frac{6.3^{2y} - 3^{2y+1}}{3^{2y}}$$

(d)
$$\frac{2^{4x+1} + 4^{2x+1}}{2^{4x}}$$

(e)
$$\frac{5.3^{4a} + 25}{3^{4a+2} + 45}$$

1.3 Simplify using negative exponents

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

(b)

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

(c)

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

(d)

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

MEMO

1.1 Simplify: [4.3.1.5; 4.3.1.7; 4.3.1.8]

(a)

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

(b)

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

(c)

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

(d)

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

(e)

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

1.2 Simplify: [4.3.3.1; 4.3.3.2; 4.3.3.3]

(a)

$$3^{1+4y} + 9^{2y+1}$$
$$= 3^1.3^{4y} + (3^2)^{2y+1}$$
$$= 3^1.3^{4y} + 3^{4y}3^2$$
$$= 3^{4y}(3+9)$$
$$= 12.3^{4y}$$

(b)

$$27^{4y+3} \times 9^{2y-2}$$
$$= (3^3)^{4y+3} \times (3^2)^{2y-2}$$
$$= 3^{12y+9}.3^{4y-4}$$
$$= 3^{16y+5}$$

(c)

$$\frac{6.3^{2y}-3^{2y+1}}{3^{2y}}$$
$$=\frac{6.3^{2y}-3^{2y}.3^{1}}{3^{2y}}$$
$$=\frac{3^{2y}(6-3)}{3^{2y}}$$
$$=3$$

(d)

$$\frac{2^{4x+1}+4^{2x+1}}{2^{x}}$$
$$=\frac{2^{4x}.2^{1}+(2^{2})^{2x+1}}{2^{4x}}$$
$$=\frac{2^{4x}.2^{1}+2^{4x}.2^{2}}{2^{4x}}$$
$$=\frac{2^{4x}(2+4)}{2^{4x}}$$
$$=6$$

(e)

$$\frac{5.3^{4a}+25}{3^{4a+2}+45}$$
$$=\frac{5.3^{4a}+25}{3^{4a}.3^{2}+45}$$
$$=\frac{5(3^{4a}+5)}{9(3^{4a}+5)}$$
$$=\frac{5}{9}$$

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

(a)

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

(b)

$$(\frac{f^5}{m^4})^{-3}$$
$$=\frac{f^{-15}}{m^{-12}}$$
$$=\frac{m^{12}}{f^{15}}$$

(c)

$$(\frac{3^2 f^{-5}}{f^{-2}})$$
$$=9f^{-3}$$
$$=\frac{9}{f^3}$$

(d)

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