departamento de matemática **universidade de aveiro**

1. Escreva na forma de potência:

   (a) $5 \times 5 \times 5$ (b) $3 \times 3 \times 3 \times 3 \times 3$ (c) $\frac{2}{3} \times \frac{2}{3} \times \frac{2}{3} \times \frac{2}{3}$

2. Escreva na forma de produto ou radical:

   (a) 4^3 (b) $\left(\frac{1}{2}\right)^2$ (c) $\left(-\frac{3}{8}\right)^4$ (d) $\left(\frac{2}{5}\right)^{-4}$ (e) $\frac{7^3}{6}$

   (f) -3^2 (g) $\left(-\frac{1}{9}\right)^{-6}$ (h) $-\left(\frac{1}{8}\right)^2$ (i) $5^{\frac{3}{4}}$ (j) $\left(\frac{4}{7}\right)^{-\frac{1}{2}}$

3. Escreva na forma de uma potência:

   (a) $10^5 \times 10^3$ (b) $16^4 \times 16$ (c) $\left(\frac{2}{5}\right)^5 \times \left(\frac{2}{5}\right)^3$

   (d) $2^4 \times 8$ (e) $\left(-\frac{5}{2}\right)^2 \times \left(-\frac{5}{2}\right)^5$ (f) $\left(\frac{2}{3}\right)^8 \times \left(-\frac{5}{4}\right)^8$

   (g) $3^9 \times \left(\frac{2}{7}\right)^9$ (h) $\left(\frac{2}{5}\right)^8 : \left(\frac{2}{5}\right)^3$ (i) $\frac{18^3}{6^3}$

   (j) $\left(2^7\right)^3$ (k) $\left(\left(\frac{1}{3}\right)^2\right)^4$ (l) $\left(\frac{1}{5}\right)^2 : \left(\frac{2}{3}\right)^2$

   (m) $\left(5^2\right)^4 : \left(5^2\right)^3$ (n) $\left(6^3\right)^2 : 3^6$ (o) $\left(\frac{1}{4}\right)^{-6} \times 4^6$

4. Calcule:

   (a) $(-2)^4 - (-2)^2 + (-2)^3$ (b) $-5^2 + (-5)^2 - 1^3 - 2^2 - (-1)^3$

   (c) $(-2)^3 + (-2)^4 - (-2)^2$ (d) $-(-1)^3 - (-4+1)^2 + \frac{(-1)^2 - 1^2}{3}$

   (e) $(-3)^7 : (-3)^3 \times (-2)^4 - 6^4$ (f) $(-1)^{10} - (-3)^3 + (-1)^{21} \times (-1)^3$

   (g) $(-2)^3 - (-3+1)^2 + (-3+1)^3 : (-2)$ (h) $6^5 : 6^3 \times (-6)^3$

   (i) $5^{11} : \left(5^4\right)^2 \times \frac{2}{\sqrt{25}}$ (j) $5^5 \times 2^5 : (1+3^2)^3$

5. Complete:

(a) As operações indicadas dentro de parênteses têm _____.

(b) Na ausência de parênteses, o cálculo das potências tem prioridade relativamente a todas as outras _____.

(c) A multiplicação e a divisão têm prioridade relativamente à _____ e à _____.

(d) Quando só há multiplicações e _____, as operações efetuam-se pela ordem em que se apresentam, o mesmo acontecendo quando só há adições e subtrações.

6. Calcule, aplicando, sempre que possível, as regras das operações com potências:

(a) $\left(\frac{1}{6}\right)^4 \times \left(-\frac{1}{3}+\frac{1}{2}\right)^2 : \left(\frac{5}{6}\right)^6$

(b) $(-7)^5 \times (-7)^3 : (-7)^7 \times (1^2)^3$

(c) $\frac{((-4)^3)^6}{(-4)^{15}}$

(d) $(-3)^8 \times (-3)^4 : (-3)^2 + 4^3$

(e) $(-2)^3 \times \left(\frac{1}{4}\right)^3 : \left(-\frac{1}{2}\right) - \left(\frac{1}{2}\right)^2$

(f) $30 + (-5)^7 : \left((-5)^2\right)^3$

(g) $(-1)^5 - (-1)^4 + (-3)^2$

(h) $\frac{2^7 \times 2^9 \times 2}{(2^3)^5} + 6^3 : 6^2$

(i) $(7^2)^3 \times 2^6 : 14^5$

(j) $\left(-\frac{1}{6}\right)^4 \times \left(-\frac{1}{6}\right)^2 : \left(\frac{1}{3}\right)^6$

(k) $\left(\left(-\frac{1}{2}\right)^2\right)^3 \times 2^6 + 2^3$

(l) $\frac{(-2)^5}{(-2)^3} \times 2^6 : (-2)^5$

(m) $\frac{\left((-3)^5\right)^{10}}{(-3)^{31}} \times \left(\frac{1}{3}\right)^{19}$

(n) $\frac{2^3 \times (-1)^{40}}{-5} : \left(-\frac{4}{5^2}\right)$

(o) $\left((-4)^3\right)^6 : (-4)^{15}$

(p) $(-3)^4 : \left(-\frac{1}{2}\right)^4 \times \left(\frac{1}{6}\right)^4$

(q) $\left((-9)^5\right)^5 : \left((-9)^3\right)^8$

(r) $\left(\frac{1}{2}\right)^3 \times \frac{1}{2} \times 2^3 + \left(\frac{1}{2}\right)^3$

(s) $(5-3)^2+\left(4^4\right)^3:\left(4^{2^3}\times 4^3\right)$

(t) $\left(\left(-\frac{3}{8}\right)^2\right)^3:\left(-\frac{3}{8}\right)^6$

(u) $\left(\frac{1}{3}\times\frac{1}{2}\right)^2\times 15^2$

(v) $\frac{4^7\times 4^7}{8^7}:(2^3)^2$

(w) $\left(\frac{1}{5}\right)^2\times\left(\frac{1}{10}\right)^2+1$

(x) $\left(\frac{1}{2}\right)^{-17}-(0,5)^{-14}:2^{-3}$

(y) $\left(\left(\frac{5}{7}\right)^{-2}\right)^{-1}-\frac{5}{7}$

(z) $\left(\frac{1}{2}\right)^{-1}\times\left(\frac{1}{2}\right)^4\times(-2)^3$

(aa) $\frac{5^2\times\left(\frac{1}{5}\right)^{-3}}{5^8}\times 5^6$

(ab) $\left((5^2)^{-1}\times 3^{-2}\times 15^{-1}\right)^{-1}:15^3$

(ac) $\left(\frac{1}{4}\right)^{-2}\times\left(-\frac{1}{5}\right)^{-2}\times(-20)^{-6}:\left(-\frac{1}{10}\right)^4$

(ad) $\left(2^2-3^2\right)^2\times\left(1-\frac{3}{5}\right)^2:\left(\left(\frac{1}{2}\right)^{-1}\right)^3$

(ae) $\left(3^2-2^2\right)^{-1}\times\left(1-\frac{1}{2}\right)^4:\left(\frac{5}{2}\right)^4$

(af) $\left(\frac{5}{3}\right)^{-2}:\left(\frac{4}{5}-1\right)^4\times\left(2^2-(-1)^2\right)^{-4}$

(ag) $\left(3^2-(-1)^2\right)^5\times\left(\frac{1}{4}-\frac{3}{8}\right)^5:\left(\frac{3}{5}\right)^{-2}$

(ah) $\left(3^2+(-1)^2\right)^5\times\left(\frac{1}{2}-\frac{3}{5}\right)^3:\left(\frac{5}{6}\right)^{-2}$

(ai) $\left(2^3-(-1)^3\right)^4\times\left(\frac{5}{9}-\frac{2}{3}\right)^4:\left(-\frac{2}{3}\right)^{-3}$

(aj) $\left(1-\frac{1}{7}\right)^4\times\left(2^3+(-1)^3\right)^4:\left(\frac{1}{36}\right)^{-1}$

(ak) $\left(\left(\frac{1}{2}\right)^4\times\left(\frac{7}{2}\right)^4:\left(\frac{7}{3}\right)^4\right)^7:\left(\left(\frac{3}{2}\right)^2\times\left(\frac{3}{8}\right)^2\right)^7$

(al) $\left(\frac{2}{3}-\frac{1}{2}\right)^{-8}:6^4\times\left(\left(\frac{4}{3}\right)^2+(-1)^2\right)^2$

(am) $\left(\left(\frac{1}{2}\right)^{-6}\times\left(\frac{5}{4}-1\right)^2\right)^3:\left(3^2-(-4)^2\right)^6$

(an) $\left(3^2-(-1)^2\right)^7\times\left(1-\frac{3}{8}\right)^7:\left(\frac{1}{25}\right)^{-3}$

7. Escreva em notação científica:

(a) 600 000 (b) 30 000 000 (c) 500 000 000 000 000

(d) 0.000 4 (e) 0.000 000 01 (f) 0.000 000 000 000 000 67

(g) 31 000 (h) 0.004 52 (i) 245 000 000

(j) 0.001 25 (k) 8 120 (l) 0.093

8. Escreva em decimal:

(a) 7.77×10^{2} (b) 2.175×10^{-4} (c) 1.1×10^{3}

(d) 3.987×10^{5} (e) 9.51×10^{-6} (f) 2.57×10^{-7}

(g) 5.32×10^{-1} (h) 1.147×10^{-3} (i) 3.7×10^{4}

9. Aplicando as regras das operações de potências sempre que possível e apresentando o resultado em notação científica, calcule:

(a) $2 \times 10^{3} \times 11.5 \times 10^{2}$ (b) $(26 \times 10^{5}) : (2 \times 10^{-4})$

(c) $\dfrac{4.6 \times 10^{6} \times 0.2}{50 \times 10^{3} \times 2.3 \times 10^{-2}}$ (d) $\dfrac{7 \times 10^{5}}{2 \times 10^{-2} \times 2.5 \times 10^{9}}$

(e) $9.8 \times 10^{-7} - 1.3 \times 10^{-6}$ (f) $3.6 \times 10^{3} + 7.3 \times 10^{4}$

(g) $3.9 \times 10^{5} - 9.5 \times 10^{6}$ (h) $7.9 \times 10^{9} + 6.5 \times 10^{8}$

(i) $4.9 \times 10^{4} + 82 \times 10^{2}$ (j) $1.1 \times 10^{-8} - 1.4 \times 10^{-9}$

(k) $8.2 \times 10^{-5} + 0.4 \times 10^{-3}$ (l) $4.1 \times 10^{-2} - 2.6 \times 10^{-3}$

(m) $10^{5} + \left(\dfrac{2 \times 10^{-4} \times 10^{6}}{4 \times 10^{-2}}\right) + 1.5 \times 10^{4}$ (n) $7.77 \times 10^{-2} + \dfrac{2.175 \times 10^{2}}{1.5 \times 10^{3}} - 1.1 \times 10^{-3}$

1. (a) 5^3; (b) 3^5; (c) $\left(\frac{2}{3}\right)^4$.
2. (a) $4\times4\times4$; (b) $\frac{1}{2}\times\frac{1}{2}$; (c) $\left(-\frac{3}{8}\right)\times\left(-\frac{3}{8}\right)\times\left(-\frac{3}{8}\right)\times\left(-\frac{3}{8}\right)$ (d) $\frac{5}{2}\times\frac{5}{2}\times\frac{5}{2}\times\frac{5}{2}$; (e) $\frac{7\times7\times7}{6}$; (f) -3×3; (g) $(-9)\times(-9)\times(-9)\times(-9)\times(-9)\times(-9)$; (h) $-\frac{1}{8}\times\frac{1}{8}$; (i) $\sqrt[4]{5\times5\times5}$; (j) $\sqrt{\frac{7}{4}}$.
3. (a) 10^8; (b) 16^5; (c) $\left(\frac{2}{5}\right)^8$ (d) 2^7; (e) $\left(-\frac{5}{2}\right)^7$; (f) $\left(-\frac{5}{6}\right)^8$; (g) $\left(\frac{6}{7}\right)^9$; (h) $\left(\frac{2}{5}\right)^5$; (i) 3^3; (j) 2^{21}; (k) $\left(\frac{1}{3}\right)^8$; (l) $\left(\frac{3}{10}\right)^2$; (m) 5^2; (n) 2^6; (o) 16^6.
4. (a) 4; (b) -4; (c) 4 (d) -8; (e) 0; (f) 29; (g) -8; (h) -7776; (i) 50; (j) 100.
5. (a) prioridade; (b) operações; (c) adição e subtração; (d) divisões.
6. (a) $\frac{1}{15625}$; (b) -7; (c) -64; (d) 59113; (e) 0; (f) 25; (g) 7; (h) 10; (i) 14; (j) $\frac{1}{64}$; (k) 9; (l) -8; (m) -1; (n) 10; (o) -64; (p) 1; (q) -9; (r) $\frac{5}{8}$; (s) 8; (t) 1; (u) $\frac{25}{4}$; (v) 2; (w) $\frac{2501}{2500}$; (x) 0; (y) $-\frac{10}{49}$; (z) -1; (aa) 125; (ab) 1; (ac) $\frac{1}{16}$; (ad) $\frac{1}{2}$; (ae) $\frac{1}{3125}$; (af) $\frac{25}{9}$; (ag) $-\frac{9}{25}$; (ah) $-\frac{625}{9}$; (ai) $-\frac{8}{27}$; (aj) 36; (ak) 1; (al) 10000; (am) $\frac{64}{117649}$; (an) 5.
7. (a) 6×10^5; (b) 3×10^7; (c) 5×10^{14}; (d) 4×10^{-4}; (e) 1×10^{-8}; (f) 6.7×10^{-16}; (g) 3.1×10^4; (h) 4.52×10^{-3}; (i) 2.45×10^8; (j) 1.25×10^{-3}; (k) 8.12×10^3; (l) 9.3×10^{-2}.
8. (a) 777; (b) 0.000 217 5; (c) 1 100; (d) 398 700; (e) 0.000 009 51; (f) 0.000 000 257; (g) 0.532; (h) 0.001 147; (i) 37 000.
9. (a) 2.3×10^6; (b) 1.3×10^{10}; (c) 8×10^2; (d) 1.4×10^{-2}; (e) -3.2×10^{-7}; (f) 7.66×10^4; (g) -9.11×10^6; (h) 8.55×10^9; (i) 5.72×10^4; (j) 9.6×10^{-9}; (k) 4.82×10^{-4}; (l) 3.84×10^{-2}; (m) 1.2×10^5; (n) 2.216×10^{-1}.