

Capítulo 2 Potências de expoente natural

TAREFA 1 (pág. 36, parte 1)

(B); (E)

TAREFA 2 (pág. 36, parte 1)

1. $4 : \frac{1}{2} = 4 \times 2 = 8$
2. $3 : \frac{2}{4} = 3 \times \frac{4}{2} = 3 \times 2 = 6$
3. $\left(\frac{3}{4} + \frac{3}{2}\right) : \frac{1}{4} = \left(\frac{3}{4} + \frac{6}{4}\right) : \frac{1}{4} = \frac{9}{4} \times 4 = 9$
4. $\frac{9}{2} - \frac{1}{2} \times \frac{3}{2} - \frac{5}{2} : 2 = \frac{9}{2} - \frac{3}{4} - \frac{5}{2} \times \frac{1}{2} =$
 $= \frac{9}{2} - \frac{3}{4} - \frac{5}{4} = \frac{18}{4} - \frac{3}{4} - \frac{5}{4} =$
 $= \frac{15}{4} - \frac{5}{4} = \frac{10}{4} = \frac{5}{2}$
5. $\frac{5}{4} : \frac{5}{9} - \frac{1}{4} : \frac{1}{3} = \frac{5}{4} \times \frac{9}{5} - \frac{1}{4} \times 3 =$
 $= \frac{9}{4} - \frac{3}{4} = \frac{6}{4} = \frac{3}{2}$
6. $\left(2 + \frac{3}{4}\right) : \left(\frac{10}{12} - \frac{1}{3}\right) = \frac{11}{4} : \frac{6}{12} = \frac{11}{4} : \frac{1}{2} =$
 $= \frac{11}{4} \times 2 = \frac{22}{4} = \frac{11}{2}$
7. $5 : 0,1 + \frac{4}{9} : \frac{1}{9} = 5 \times 10 + \frac{4}{9} \times 9 = 54$
8. $0,2 : 0,01 : 0,5 = 20 : 0,5 = 40$
9. $\left(7 + \frac{1}{4}\right) : \left(\frac{5}{12} + \frac{7}{18}\right) = \left(\frac{28}{4} + \frac{1}{4}\right) : \left(\frac{15}{36} + \frac{14}{36}\right) =$
 $= \frac{29}{4} : \frac{29}{36} = \frac{29}{4} \times \frac{36}{29} = 9$
10. $14 - 2 : \frac{1}{3} \times 0,5 = 14 - 2 \times 3 \times 0,5 =$
 $= 14 - 3 = 11$
11. $(2 - 1,5) : 0,5 = 0,5 : 0,5 = 1$
12. $\frac{1}{10} : 0,1 \times \frac{3}{4} + \frac{1}{4} =$
 $= 1 \times \frac{3}{4} + \frac{1}{4} = \frac{3}{4} + \frac{1}{4} = \frac{4}{4} = 1$

TAREFA 3 (pág. 37, parte 1)

1. $\frac{2}{5} \times 600 = 240$
 $600 - (240 + 150) = 210$
 $\frac{1}{3} \times 210 = 70$
 Resposta: Dentro da caixa estão 70 botões vermelhos.
2. $\frac{1}{4} + \frac{7}{20} = \frac{5}{20} + \frac{7}{20} = \frac{12}{20} = \frac{3}{5}$
 $1 - \frac{3}{5} = \frac{5}{5} - \frac{3}{5} = \frac{2}{5}$
 16 metros corresponde a $\frac{2}{5}$ do comprimento total da ponte.
 8 metros corresponde a $\frac{1}{5}$ do comprimento total da ponte.
 $8 \times 5 = 40$
 Resposta: O comprimento total da ponte é 40 metros.

TAREFA 4 (pág. 38, parte 1)

- 1.1. 7^2 1.2. 5^4 1.3. 2^3
- 2.1. $6^3 = 6 \times 6 \times 6 = 216$
- 2.2. $0^4 = 0 \times 0 \times 0 \times 0 = 0$
- 2.3. $3^4 = 3 \times 3 \times 3 \times 3 = 81$
- 2.4. $2^5 = 2 \times 2 \times 2 \times 2 \times 2 = 32$
- 3.1. $\left(\frac{2}{3}\right)^3$
- 3.2. Base: $\frac{2}{3}$; expoente: 3
- 3.3. Dois terços ao cubo.
- 3.4. $\frac{8}{27}$
- 4.1. O número de fatores iguais à base que constituem o produto.
- 4.2. $\left(\frac{1}{5}\right)^4 = \frac{1}{5} \times \frac{1}{5} \times \frac{1}{5} \times \frac{1}{5}$; $0,2^4 = 0,2 \times 0,2 \times 0,2 \times 0,2$
- 4.3. $\left(\frac{1}{5}\right)^4 = \frac{1}{625}$
 $0,2^4 = 0,0016$
5. $5^1 = 5$; $0^7 = 0$

VOU APLICAR (pág. 39, parte 1)

- 1.1. $\frac{5}{2} \times \frac{5}{2} = \left(\frac{5}{2}\right)^2$
 1.2. $1,5 \times 1,5 \times 1,5 = 1,5^3$
 1.3. $1\frac{1}{2} \times 1\frac{1}{2} \times 1\frac{1}{2} = \left(1\frac{1}{2}\right)^3$
 1.4. $35,25 \times 35,25 \times 35,25 \times 35,25 \times 35,25 = 35,25^5$

2.

Potência	Base	Expoente	Leitura	Produto de fatores iguais	Valor da potência
2^6	2	6	Dois elevado a 6	$2 \times 2 \times 2 \times 2 \times 2 \times 2$	64
$\left(\frac{2}{3}\right)^3$	$\frac{2}{3}$	3	Dois terços ao cubo	$\frac{2}{3} \times \frac{2}{3} \times \frac{2}{3}$	$\frac{8}{27}$
$\left(\frac{5}{12}\right)^2$	$\frac{5}{12}$	2	Cinco doze avos ao quadrado	$\frac{5}{12} \times \frac{5}{12}$	$\frac{25}{144}$
$0,1^5$	0,1	5	Uma décima à quinta	$0,1 \times 0,1 \times 0,1 \times 0,1 \times 0,1$	0,00001
$\left(\frac{2}{5}\right)^3$	$\frac{2}{5}$	3	Dois quintos ao cubo	$\frac{2}{5} \times \frac{2}{5} \times \frac{2}{5}$	$\frac{8}{125}$

- 3.1. $\left(\frac{1}{2}\right)^4 = \frac{1}{2} \times \frac{1}{2} \times \frac{1}{2} \times \frac{1}{2} = \frac{1}{16}$
 3.2. $\left(\frac{1}{10}\right)^5 = \frac{1}{10} \times \frac{1}{10} \times \frac{1}{10} \times \frac{1}{10} \times \frac{1}{10} = \frac{1}{100\,000}$
 3.3. $\left(\frac{4}{5}\right)^2 = \frac{4}{5} \times \frac{4}{5} = \frac{16}{25}$
 3.4. $0,1^3 = 0,1 \times 0,1 \times 0,1 = 0,001$
 3.5. $0,5^2 = 0,5 \times 0,5 = 0,25$
 3.6. $\left(\frac{1}{3}\right)^3 = \frac{1}{3} \times \frac{1}{3} \times \frac{1}{3} = \frac{1}{27}$
 3.7. $\left(\frac{9}{7}\right)^2 = \frac{9}{7} \times \frac{9}{7} = \frac{81}{49}$
 3.8. $\left(\frac{15}{13}\right)^1 = \frac{15}{13}$
 4. $\left(\frac{3}{4}\right)^2 = \frac{3}{4} \times \frac{3}{4} = \frac{9}{16}$
 $\frac{3^2}{4} = \frac{3 \times 3}{4} = \frac{9}{4}$
 $\frac{3}{4^2} = \frac{3}{4 \times 4} = \frac{3}{16}$
 Como $\frac{3}{16} < \frac{9}{16} < \frac{9}{4}$, então $\frac{3}{4^2} < \left(\frac{3}{4}\right)^2 < \frac{3^2}{4}$
 5. Afirmações verdadeiras: (B), (D), (G) e (H)
 Afirmações falsas: (A), (C), (E), (F) e (I)

$$(A) \left(\frac{2}{3}\right)^3 = \frac{2}{3} \times \frac{2}{3} \times \frac{2}{3} = \frac{8}{27}$$

$$\left(\frac{2}{3}\right)^3 = \frac{8}{27}$$

$$(C) 0,2^3 = 0,2 \times 0,2 \times 0,2 = 0,008$$

$$0,2^3 = 0,008$$

$$(E) \left(\frac{1}{2}\right)^5 = \frac{1}{2} \times \frac{1}{2} \times \frac{1}{2} \times \frac{1}{2} \times \frac{1}{2} = \frac{1}{32}$$

$$\left(\frac{1}{2}\right)^5 = \frac{1}{32}$$

$$(F) \frac{6^2}{7} = \frac{6 \times 6}{7} = \frac{36}{7}$$

$$\frac{6^2}{7} = \frac{36}{7}$$

$$(I) 0,01^3 = \left(\frac{1}{100}\right)^3$$

6.1. $a = 1$ 6.2. $a = 10$ 6.3. $a = 0,1$

6.4. $a = \frac{1}{4}$ 6.5. $a = \frac{2}{3}$ 6.6. $a = \frac{35}{41}$

TAREFA 5 (pág. 40, parte 1)

$$4^2 \times 4^3 = (4 \times 4) \times (4 \times 4 \times 4) =$$

$$= 4 \times 4 \times 4 \times 4 \times 4 = 4^5$$

$$\text{Então } 4^2 \times 4^3 = 4^{2+3} = 4^5$$

TAREFA 6 (pág. 40, parte 1)

1. $(4^3)^2 = (4 \times 4 \times 4)^2 =$
 $= (4 \times 4 \times 4) \times (4 \times 4 \times 4) =$
 $= 4 \times 4 \times 4 \times 4 \times 4 \times 4 = 4^6$
 Então $(4^3)^2 = 4^{3 \times 2} = 4^6$
 2. $(4^3)^2 = 4^6$ e $4^{3^2} = 4^9$.
 Logo, $(4^3)^2 \neq 4^{3^2}$

TAREFA 7 (pág. 40, parte 1)

$$6^5 \times 4^5 = (6 \times 6 \times 6 \times 6 \times 6) \times (4 \times 4 \times 4 \times 4 \times 4) =$$

$$= (6 \times 4) \times (6 \times 4) \times (6 \times 4) \times (6 \times 4) \times (6 \times 4) = (6 \times 4)^5$$

$$\text{Então } 6^5 \times 4^5 = (6 \times 4)^5 = 24^5$$

VOU APLICAR (pág. 43, parte 1)

- 1.1. $7 \times 7 \times 7 \times 7 \times 7 = 7^5$
 1.2. $5^2 \times 5^2 = 25^2$ (p.e.)
 1.3. $3^2 \times 3^2 \times 3^4 = 3^4 \times 3^4 = 3^8$ (p.e.)
 1.4. $4^2 \times 15^2 = 60^2$
 1.5. $(6^2)^4 = 6^8$
 1.6. $8^5 \times 2^5 \times 10^5 = 16^5 \times 10^5 = 160^5$
 1.7. $2^4 \times 5^4 \times 10^4 = 10^4 \times 10^4 = 10^8$ (p.e.)
 1.8. $(10^3)^2 \times (10^2)^3 = 10^6 \times 10^6 = 10^{12}$ (p.e.)
 1.9. $12^5 \times 12 = 12^6$
 1.10. $\left(\frac{1}{3}\right)^2 \times \left(\frac{1}{3}\right)^3 \times \frac{1}{3} = \left(\frac{1}{3}\right)^6$

1.11. $2^3 \times 0,1^3 = 0,2^3$

1.12. $2,75^9 \times 2,75^{11} = 2,75^{20}$

1.13. $9^{17} \times \left(\frac{1}{9}\right)^{17} = \left(\frac{9}{9}\right)^{17} = 1^{17} = 1$

1.14. $(0,01^3)^3 = 0,01^9$

1.15. $5^{3^2} = 5^9$

2.1. $12^8 \times 12^{15} = 12^{23}$

2.2. $7^2 \times 7^8 \times 7 = 7^{11}$

2.3. $20^7 \times 20^4 \times 20^9 = 20^{20}$

2.4. $5^{12} = (5^3)^4$

2.5. $11^{30} = (11^{15})^2$

2.6. $4^5 \times 4^{6^2} = 4^{41}$

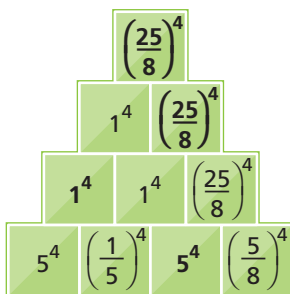
2.7. $0,5^6 \times 0,5^2 \times 0,5 = 0,5^9$

2.8. $\left(\frac{17}{5}\right)^{10} \times \left(\frac{17}{5}\right)^6 \times \left(\frac{17}{5}\right)^2 = \left(\frac{17}{5}\right)^{18}$

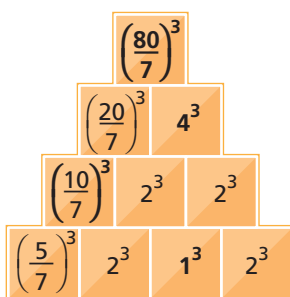
2.9. $\left(\frac{1}{3}\right)^8 = \left(\frac{1}{3}\right)^{2^3}$

2.10. $(2,5)^{100} = (2,5^{25})^4$

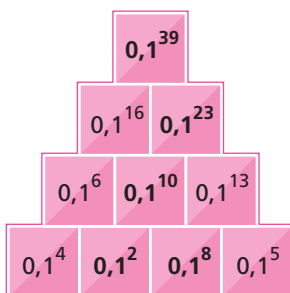
3. (A)



(B)



(C)



4. Afirmações falsas: (A), (B), (D), (E) e (G)

(A) $(11^3)^2 = 11^6$

(B) $7^{2^3} = 7^8$

(D) $6^5 - 6^3 = 7776 - 216 = 7560$

(E) $10^4 + 10^3 = 10\,000 + 1000 = 11\,000$

(G) $\left(\frac{2}{3}\right)^5 \times \left(\frac{2}{3}\right)^7 = \left(\frac{2}{3}\right)^{12}$

5.1. $81 \times 32 \times 17 = 2^5 \times 3^4 \times 17$

5.2. $200 \times 21 = 2^3 \times 5^2 \times 3 \times 7 = 2^3 \times 3 \times 5^2 \times 7$

$$\begin{array}{r|l} 200 & 2 \\ 100 & 2 \\ 50 & 2 \\ 25 & 5 \\ 5 & 5 \\ 1 & \end{array}$$

5.3. $65 \times 9 \times 15 = 5 \times 13 \times 3^2 \times 3 \times 5 = 3^3 \times 5^2 \times 13$

$$\begin{array}{r|l} 65 & 5 \\ 13 & 13 \\ 1 & \end{array}$$

5.4. $140 \times 34 = 2^2 \times 5 \times 7 \times 2 \times 17 = 2^3 \times 5 \times 7 \times 17$

$$\begin{array}{r|l} 140 & 2 \\ 70 & 2 \\ 35 & 5 \\ 7 & 7 \\ 1 & \end{array}$$

TAREFA 8 (pág. 44, parte 1)

$$\frac{4^5}{4^3} = \frac{4 \times 4 \times 4 \times 4 \times 4}{4 \times 4 \times 4} = 4 \times 4 = 4^2$$

Então, $\frac{4^5}{4^3} = 4^{5-3} = 4^2$

TAREFA 9 (pág. 44, parte 1)

$$\frac{12^2}{4^2} = \frac{12 \times 12}{4 \times 4} = \frac{12}{4} \times \frac{12}{4} =$$

$$= \left(\frac{12}{4}\right)^2 = 3^2$$

Então, $\frac{12^2}{4^2} = \left(\frac{12}{4}\right)^2 = 3^2$

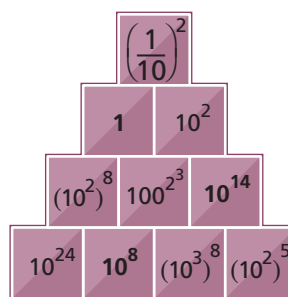
DESAFIO (pág. 44, parte 1)

$$\begin{aligned} \frac{7^a}{7^b} &= \frac{\overbrace{7 \times 7 \times \dots \times 7}^{a \text{ fatores}}}{\underbrace{7 \times 7 \times \dots \times 7}_{b \text{ fatores}}} = \\ &= \underbrace{7 \times 7 \times \dots \times 7}_{(a-b) \text{ fatores}} = \\ &= 7^{a-b} \end{aligned}$$

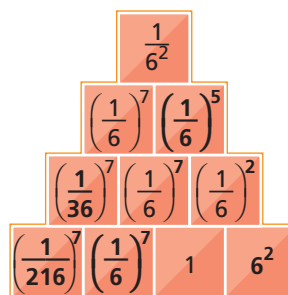
VOU APLICAR (pág. 46, parte 1)

- 1.1.** $9^8 : 9^4 = 9^4$
1.2. $10^2 : 5^2 = 2^2$
1.3. $12^3 : 4^3 = 3^3$
1.4. $5^{3^2} : 5^2 = 5^9 : 5^2 = 5^7$
1.5. $(6^2)^4 : (6^4)^2 = 6^8 : 6^8 = 1$
1.6. $35^{3^2} : 7^{9^2} = 35^{81} : 7^{81} = 5^{81}$
1.7. $9^8 : 9^3 : 9^2 = 9^5 : 9^2 = 9^3$
1.8. $24^2 : 4^2 : 3^2 = 6^2 : 3^2 = 2^2$
1.9. $28^6 : 7^6 : 4 = 4^6 : 4 = 4^5$
1.10. $17^{11} : 17^5 : 17 = 17^6 : 17 = 17^5$
1.11. $13^{3^2} : (13^3)^2 = 13^9 : 13^6 = 13^3$
1.12. $(8^5)^2 : 8^{2^2} : (4^3)^2 = 8^{10} : 8^4 : 4^6 = 8^6 : 4^6 = 2^6$
1.13. $(21^3)^4 : 21 : 7^{11} = 21^{12} : 21 : 7^{11} = 21^{11} : 7^{11} = 3^{11}$
1.14. $\left(\frac{1}{2}\right)^3 : \left(\frac{1}{2}\right) = \left(\frac{1}{2}\right)^2$
1.15. $4^3 : \left(\frac{1}{4}\right)^3 = \left(4 : \frac{1}{4}\right)^3 = (4 \times 4)^3 = 16^3$
1.16. $6^4 : \left(\frac{1}{3}\right)^4 = \left(6 : \frac{1}{3}\right)^4 = (6 \times 3)^4 = 18^4$
1.17. $\left(\frac{3}{4}\right)^7 : 0,75^7 = 1$
1.18. $\left(\frac{2}{5}\right)^2 : \left(\frac{4}{5}\right)^3 = \frac{4}{25} : \frac{64}{125} = \frac{4}{25} \times \frac{125}{64} = \frac{5}{16}$
1.19. $\left(\frac{2}{3}\right)^7 : \left(\frac{5}{7}\right)^7 = \left(\frac{2}{3} : \frac{5}{7}\right)^7 = \left(\frac{2}{3} \times \frac{7}{5}\right)^7 = \left(\frac{14}{15}\right)^7$
1.20. $\left(\frac{1}{10}\right)^{11} : \left(\frac{3}{2}\right)^{11} : \left(\frac{1}{15}\right)^5 : \left(\frac{1}{15}\right)^2 =$
 $= \left(\frac{1}{10} : \frac{3}{2}\right)^{11} : \left(\frac{1}{15}\right)^5 : \left(\frac{1}{15}\right)^2 =$
 $= \left(\frac{1}{10} \times \frac{2}{3}\right)^{11} : \left(\frac{1}{15}\right)^5 : \left(\frac{1}{15}\right)^2 =$
 $= \left(\frac{1}{15}\right)^{11} : \left(\frac{1}{15}\right)^5 : \left(\frac{1}{15}\right)^2 =$
 $= \left(\frac{1}{15}\right)^6 : \left(\frac{1}{15}\right)^2 = \left(\frac{1}{15}\right)^4$
2.1. $9^7 : 9^2 = 9^5$
2.2. $12^7 : 4^7 = 3^7$
2.3. $26^3 : 2^3 = 13^3$
2.4. $14^{11} : 14^6 = 14^5$
2.5. $25^{10} : 25^3 : 25^2 = 25^5$
2.6. $\left(\frac{4}{9}\right)^8 : \left(\frac{4}{9}\right)^3 = \left(\frac{4}{9}\right)^5$
2.7. $15^3 : \left(\frac{3}{4}\right)^3 = 20^3$
2.8. $\left(\frac{3}{5}\right)^{11} : \left(\frac{3}{5}\right)^2 : \left(\frac{3}{5}\right)^4 = \left(\frac{3}{5}\right)^5$

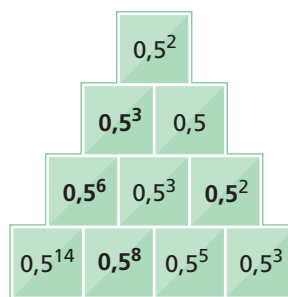
(A)



(B)



(C)



4. Afirmações falsas: (B), (D) e (F)

(B) $15^5 : 15 = 15^4$

(D) $5^{2^3} : 5 = 5^8 : 5 = 5^7$

(F) $0,75^5 : \left(\frac{1}{4}\right)^5 : 3^2 = 3^5 : 3^2 = 3^3$

5.1. $(10^2)^6 \times 10^3 \times 10 = 10^{12} \times 10^3 \times 10 = 10^{16}$

5.2. $2 \times 5 \times 2 \times 5 \times 100 \times \frac{1}{10} =$
 $= 10 \times 10 \times 10^2 \times \frac{1}{10} = 10^3$

5.3. $(10^5)^3 : 10^{2^2} : (10^3)^2 = 10^{15} : 10^4 : 10^6 =$
 $= 10^{11} : 10^6 = 10^5$

5.4. $100 \times \frac{1}{10^2} \times 10^4 =$
 $= 10^2 \times \frac{1}{10^2} \times 10^4 = 10^4$

VOU APLICAR (pág. 49, parte 1)

- 1.1.** $4^6 - 6^4 = 4096 - 1296 = 2800$
1.2. $3^2 + 2^4 \times 5 = 9 + 16 \times 5 = 9 + 80 = 89$
1.3. $7 \times (5^3 - 4^3) = 7 \times (125 - 64) = 7 \times 61 = 427$
1.4. $2^3 \times 2 - (2^3)^3 = 2^8 \times 2 - 2^9 = 2^9 - 2^9 = 0$
1.5. $1^{25} \times 25 = 1 \times 25 = 25$
1.6. $11^5 \times 11^2 - 11^2 = 11^7 - 11^2 =$
 $= 19\,487\,171 - 121 = 19\,487\,050$
1.7. $10 \times 3^4 - 3^3 \times 2^3 =$
 $= 10 \times 81 - 6^3 = 810 - 216 = 594$
1.8. $10^3 - 8^3 - 11 \times 2^3 = 1000 - 512 - 11 \times 8 =$
 $= 488 - 88 = 400$
1.9. $3^2 \times 3^2 - 2^2 = 3^4 - 2^2 = 81 - 4 = 77$

1.10. $\left(\frac{2}{3}\right)^4 : \left(\frac{2}{3}\right)^2 \times \left(\frac{2}{3}\right)^3 =$

$$= \left(\frac{2}{3}\right)^2 \times \left(\frac{2}{3}\right)^3 =$$

$$= \left(\frac{2}{3}\right)^5 = \frac{32}{243}$$

1.11. $0,1^2 \times 10^2 : \left(\frac{1}{5}\right)^2 =$
 $= 1^2 : \left(\frac{1}{5}\right)^2 = \left(1 : \frac{1}{5}\right)^2 =$
 $= (1 \times 5)^2 = 5^2 = 25$

1.12. $0,3^2 \times \left(\frac{3}{10}\right)^2 - \frac{3^4}{10^4} =$
 $= \left(\frac{3}{10}\right)^2 \times \left(\frac{3}{10}\right)^2 - \frac{3^4}{10^4} =$
 $= \left(\frac{3}{10}\right)^4 - \left(\frac{3}{10}\right)^4 = 0$

2.

Linguagem natural	Linguagem simbólica
O quociente da oitava potência de dois terços pelo cubo de três quintos.	$\left(\frac{2}{3}\right)^8 : \left(\frac{3}{5}\right)^3$
A soma do cubo de cinco com oito.	$5^3 + 8$
O triplo da diferença entre o quadrado de cinco e cinco décimas.	$3 \times (5^2 - 0,5)$
O quadrado da diferença entre o cubo de dez e o cubo de cinco.	$(10^3 - 5^3)^2$
O quociente do cubo do quadrado de dois pelo quadrado do cubo de três.	$(2^2)^3 : (3^3)^2$

- 3.1.** (A) Valor do custo do automóvel que a Ana pagou a pronto.
 (B) Valor do custo do automóvel que a Ana pagou em prestações.
 (C) Valor de cada uma das prestações que a Ana pagou.

3.2. $\left(\frac{2}{3} \times 13\,500\right) : 20 = 9000 : 20 = 450$

Resposta: A Ana pagou, em cada prestação, 450 euros.

VOU APLICAR MAIS (pág. 50, parte 1)

- 1.1.** $5 \times 5 \times 5 \times 5 \times 5 \times 5 = 5^6$
1.2. $0,7 \times 0,7 \times 0,7 = 0,7^3$
1.3. $\left(\frac{1}{4}\right) \times \left(\frac{1}{4}\right) = \left(\frac{1}{4}\right)^2$
1.4. $\frac{7}{3} \times \frac{7}{3} \times \frac{7}{3} \times \frac{7}{3} = \left(\frac{7}{3}\right)^4$
2. (C)
3. (C)
4. (A) - 6; (B) - 5; (C) - 4; (D) - 2; (E) - 1; (F) - 3
5.1.

Expoente	Base 2	Base 3	Base 6
2	4	9	36
5	32	243	7776
6	64	729	46 656

- 5.2.** a) $2^5 \times 6^5 = 32 \times 7776 = 248\,832$
 b) $3^6 \times 2^6 \times 6^2 = 729 \times 64 \times 36 = 1\,679\,616$
 c) $2^2 \times 3^2 \times 6^2 = 4 \times 9 \times 36 = 1296$
6. $2^8 \times 2^8 : 2^5 = 2^{16} : 2^5 = 2^{11}$
7. $10^6 = 10 \times 10 \times 10 \times 10 \times 10 \times 10 = 1\,000\,000$
 $10^3 = 10 \times 10 \times 10 = 1000$
 Logo, $2 \times 10^3 = 2000$
 Resposta: O Luís é quem tem razão.
8. $12^{50} : 3^{50} : 4^{48} = (12 : 3)^{50} : 4^{48} =$
 $= 4^{50} : 4^{48} = 4^2 = 4 \times 4 = 16$
 (A)

- 9.1.** Dois ao cubo: 2^3
 $2^3 = 8$
9.2. O produto do quadrado de cinco pelo seu cubo:
 $5^2 \times 5^3$
 $5^2 \times 5^3 = 5^5 = 3125$
9.3. A soma do quadrado de seis com o cubo de seis:
 $6^2 + 6^3$
 $6^2 + 6^3 = 36 + 216 = 252$
9.4. O quociente entre a quarta potência de três e três ao quadrado: $3^4 : 3^2$
 $3^4 : 3^2 = 3^2 = 9$
9.5. O produto do cubo da diferença entre sete e três pelo quadrado de quatro: $(7 - 3)^3 \times 4^2$
 $(7 - 3)^3 \times 4^2 = 4^3 \times 4^2 = 4^5 = 1024$
10.1. $7^9 \times 7^6 = 7^{15}$
10.2. $5^{10} \times 3^{10} \times 15^{10} = 15^{20}$
10.3. $6^{17} : 3^{17} \times 2^4 = 2^{21}$

10.4. $6^{14} : 6^5 : 6^4 = 6^5$

10.5. $\left(\frac{3}{2}\right)^3 \times \left(\frac{3}{2}\right)^2 : \left(\frac{3}{2}\right)^4 = \frac{3}{2}$

10.6. $1^4 + 1^5 = 2$

11.1. $100^6 = 100^8 : 100^2$ (p.e.)

11.2. $16^2 = 32^2 : 2^2$ (p.e.)

11.3. $11^{2^3} = 11^{14} : 11^6$ (p.e.)

12.1. $\left(1\frac{3}{5}\right)^2 : \left(3\frac{1}{2}\right)^2 = \left(\frac{8}{5}\right)^2 : \left(\frac{7}{2}\right)^2 =$
 $= \left(\frac{8}{5} : \frac{7}{2}\right)^2 = \left(\frac{8}{5} \times \frac{2}{7}\right)^2 = \left(\frac{16}{35}\right)^2 = \frac{256}{1225}$

12.2. $\frac{10}{5^2} \times \frac{2}{3} = \frac{10}{25} \times \frac{2}{3} = \frac{2}{5} \times \frac{2}{3} = \frac{4}{15}$

12.3. $81 + (3^2)^2 \times 9^2 = 81 + (3^2)^2 \times (3^2)^2 =$
 $= 81 + (3^4)^2 = 81 + 3^8 = 81 + 6561 = 6642$

12.4. $2^4 + 5\frac{1}{3} - 1^{13} = 16 + \frac{16}{3} - 1 = \frac{48}{3} + \frac{16}{3} - \frac{3}{3} = \frac{61}{3}$

12.5. $\frac{3}{4} - 0,25 + 0,5^2 = \frac{3}{4} - 0,25 + 0,25 = \frac{3}{4}$

12.6. $6^2 : \left(\frac{10^4}{10^3} - 4\right)^2 = 6^2 : (10 - 4)^2 = 6^2 : 6^2 = 1$

12.7. $\left(\frac{5}{7}\right)^{17} : \left(\frac{5}{7}\right)^{11} : \left(\frac{7}{5}\right)^6 = \left(\frac{5}{7}\right)^6 : \left(\frac{7}{5}\right)^6 =$
 $= \left(\frac{5}{7} : \frac{7}{5}\right)^6 = \left(\frac{5}{7} \times \frac{5}{7}\right)^6 = \left(\frac{25}{49}\right)^6$

12.8. $\left(\frac{2}{5}\right)^3 : \left(\frac{1}{5}\right)^3 \times 2^4 = \left(\frac{2}{5} : \frac{1}{5}\right)^3 \times 2^4 =$
 $= \left(\frac{2}{5} \times \frac{5}{1}\right)^3 \times 2^4 = 2^3 \times 2^4 = 2^7 = 128$

12.9. $9^7 : 3^{12} \times \left(\frac{2}{3}\right)^2 = (3^2)^7 : 3^{12} \times \left(\frac{2}{3}\right)^2 =$
 $= 3^{14} : 3^{12} \times \left(\frac{2}{3}\right)^2 =$
 $= 3^2 \times \left(\frac{2}{3}\right)^2 = \left(3 \times \frac{2}{3}\right)^2 = 2^2 = 4$

VOU FAZER AUTOAVALIAÇÃO (pág. 54, parte 1)

1. (D) 2. (D) 3. (B) 4. (D)

5. $\left(\frac{1}{3}\right)^4 = \frac{1}{3} \times \frac{1}{3} \times \frac{1}{3} \times \frac{1}{3} = \frac{1}{81}$

$\frac{1^4}{3} = \frac{1}{3}$

$\frac{1}{3^4} = \frac{1}{3 \times 3 \times 3 \times 3} = \frac{1}{81}$

(C)

6. (B)

7. (C)

8. $15^2 \times 15^8 \times 15 = 15^{11}$
(B)

9. $3^2 \times 27 = 3^2 \times 3^3 = 3^5$

(D)

10. $16 \times 4 \times 64 = 4^2 \times 4 \times 4^3 = 4^6$

(C)

11. (A) $33^{10} > 3^5 \times 11^5$

$33^{10} > 33^5$ é uma afirmação verdadeira.

(B) $1^{75} \times 1^{25} = 1$

$1 \times 1 = 1$ é uma afirmação verdadeira.

(C) $\left(\frac{1}{7}\right)^{15} \times \left(\frac{1}{7}\right)^2 < \left(\frac{1}{7}\right)^{16}$

$\left(\frac{1}{7}\right)^{17} < \left(\frac{1}{7}\right)^{16}$ é uma afirmação verdadeira.

(D) $25^6 \times 4^6 < 100^2$

$100^6 < 100^2$ é uma afirmação falsa.

(D)

12. (A) $2,5^8 : 2,5^7 > 2,5$

$2,5 > 2,5$ é uma afirmação falsa.

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

A afirmação é verdadeira.

(C) $100^9 : 10^9 : 5^9 > 2^9$

$(100 : 10)^9 : 5^9 > 2^9$

$10^9 : 5^9 > 2^9$

$2^9 > 2^9$ é uma afirmação falsa.

(D)

$\left(\frac{2}{3}\right)^{11} : \left(\frac{2}{3}\right)^2 < \left(\frac{2}{3}\right)^{13}$

$\left(\frac{2}{3}\right)^9 < \left(\frac{2}{3}\right)^{13}$ é uma afirmação falsa.

(B)

13. $(4 \times 2 \times 8^7) : (8 \times 8 \times 8) = (8 \times 8^7) : 8^3 = 8^8 : 8^3 = 8^5$

(B)

14. (C)

15. $\left(\frac{a^8}{5^8}\right) = 100\,000\,000$

$\left(\frac{a}{5}\right)^8 = 10^8$

$a = 50$

(C)

16. $\frac{12^5 : 6^5 - 4^2}{4^2} = \frac{2^5 - 4^2}{4^2} = \frac{32 - 16}{16} = \frac{16}{16} = 1$

(B)

17. $A = \frac{1}{27} \times \frac{1}{27} = \left(\frac{1}{3}\right)^3 \times \left(\frac{1}{3}\right)^3 = \left(\frac{1}{3}\right)^6$

(D)

$$\begin{aligned}
 18. \quad & 3\frac{1}{2} + \left(1\frac{2}{3}\right)^2 - 1^{100} = \frac{7}{2} + \left(\frac{5}{3}\right)^2 - 1 = \\
 & = \frac{7}{2} + \frac{25}{9} - 1 = \frac{63}{18} + \frac{50}{18} - \frac{18}{18} = \\
 & = \frac{113}{18} - \frac{18}{18} = \frac{95}{18} = 5\frac{5}{18} \\
 & (2^2)^6 : 2^{3^2} + \left(\frac{2}{3}\right)^2 = 2^{12} : 2^9 + \frac{4}{9} = \\
 & = 2^3 + \frac{4}{9} = 8 + \frac{4}{9} = 8\frac{4}{9} \\
 & \text{(B)}
 \end{aligned}$$

VOU PREPARAR O TESTE (pág. 56, parte 1)

$$1.1. A = 2,5 \times 2,5 = 2,5^2$$

$$1.2. A = 2,5^2 = 6,25 \text{ m}^2$$

Resposta: O canteiro de flores tem $6,25 \text{ m}^2$ de área.

2. Números cujos quadrados estão compreendidos entre 200 e 500: 15, 16, 17, 18, 19, 20, 21 e 22.

3.

	a	b	c	d	e	f
a	3	6		8		1
b	2	4	0		9	
c	4			5		7
d		1	2	5		
e	6	2	5		8	9
f	2	5			1	

$$4.1. (15 - 3^2) \times \left(\frac{1}{3}\right)^2 = \frac{2}{3}$$

$$4.2. (3^2)^3 \times 2^6 : 6^2 = 6^4$$

$$4.3. 10^2 - 5^2 \times (6 - 4)^2 = 0$$

$$5. 15^6 \times 15^4 : 2^{10} = 15^{10} : 2^{10} = \left(\frac{15}{2}\right)^{10}$$

6. (D)

$$\begin{aligned}
 7. \quad & \frac{2}{3} + \frac{1}{6} : \left(\frac{1}{4}\right)^2 = \frac{2}{3} + \frac{1}{6} : \frac{1}{16} = \frac{2}{3} + \frac{1}{6} \times \frac{16}{1} = \\
 & = \frac{2}{3} + \frac{16}{6} = \frac{2}{3} + \frac{8}{3} = \frac{10}{3}
 \end{aligned}$$

$$8. \text{(A)} 5^{20} \times 12^{20} = 60^{20}$$

$$\text{(B)} 8^{3^2} : 5^9 = 8^9 : 5^9 = \left(\frac{8}{5}\right)^9$$

$$\text{(C)} 10^{12} : 10^8 = 10^4$$

$$\text{(D)} 14^5 \times 7^5 = 98^5$$

$$9.1. 0,25^5 \times 4^5 - 0,25 + \left(\frac{1}{2}\right)^2 = 1 - 0,25 + 0,25 = 1$$

$$\begin{aligned}
 9.2. \quad & 3^4 \times \left(\frac{2}{5}\right)^4 : \left(\frac{3}{4}\right)^4 : 1,6^4 = \left(3 \times \frac{2}{5}\right)^4 : \left(\frac{3}{4}\right)^4 : 1,6^4 = \\
 & = \left(\frac{6}{5}\right)^4 : \left(\frac{3}{4}\right)^4 : 1,6^4 = \left(\frac{6}{5} \times \frac{4}{3}\right)^4 : 1,6^4 = \\
 & = \left(\frac{8}{5}\right)^4 : 1,6^4 = \left(\frac{8}{5} \times \frac{10}{16}\right)^4 = \left(\frac{10}{5 \times 2}\right)^4 = 1^4 = 1
 \end{aligned}$$

$$9.3. \frac{12^7 \times 12^3 : 12^4}{4^6} = \frac{12^{10} : 12^4}{4^6} = \frac{12^6}{4^6} = 3^6 = 729$$

$$9.4. 3^4 - 2^3 + \frac{(5+1)^7}{(7-1)^6} = 81 - 8 + \frac{6^7}{6^6} = 81 - 8 + 6 = 79$$

10.1. Primeiras oito potências de base 3 e expoente natural: 3, 9, 27, 81, 243, 729, 2187, 6561.

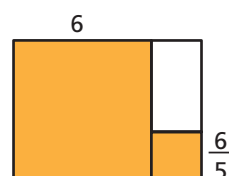
10.2. O algoritmo das unidades é 3, 9, 7 ou 1, por esta ordem.

10.3. 7

$$11. 1 + 3 + 5 + 7 + 9 + 11 + 13 + 15 + 17 + 19 = 10^2 = 5^2 \times 2^2$$

$$12. A = 6^2 + \left(\frac{6}{5}\right)^2 = 6^2 + \left(\frac{1}{5} \times 6\right)^2$$

(B)



Área total da figura =

$$6 \times \left(6 + \frac{1}{5} \times 6\right) = 6 \times \left(6 + \frac{6}{5}\right) = 6 \times \frac{36}{5} = \frac{6^3}{5}$$

Área da parte a branco da figura =

$$\begin{aligned}
 & \left(\frac{1}{5} \times 6\right) \times \left(6 - \frac{1}{5} \times 6\right) = \frac{6}{5} \times \left(6 - \frac{6}{5}\right) = \\
 & = \frac{6}{5} \times \frac{24}{5} = \frac{144}{5^2} = \frac{12^2}{5^2}
 \end{aligned}$$

$$\text{Área da figura sombreada} = \frac{6^3}{5} - \frac{12^2}{5^2}$$

(C)

Resposta: (B) e (C)

DESAFIO 1 (pág. 59, parte 1)

- $10^2 = 100$;
 $10^3 = 1000$;
 $10^4 = 10\,000$;
 $10^5 = 100\,000$;
 $10^6 = 1\,000\,000$;
 $10^7 = 10\,000\,000$;
 $10^8 = 100\,000\,000$;
 $10^9 = 1\,000\,000\,000$;
 $10^{10} = 10\,000\,000\,000$

2. Todas as potências têm base 10.

3. O número de zeros do valor da potência é igual ao expoente da potência.

4. 1 000 000 000 000 000

DESAFIO 2 (pág. 59, parte 1)

$$58\,000\,000 = 5,8 \times 10\,000\,000 = 5,8 \times 10^7$$

$$110\,000\,000 = 1,1 \times 100\,000\,000 = 1,1 \times 10^8$$

$$2\,800\,000\,000 = 2,8 \times 1\,000\,000\,000 = 2,8 \times 10^9$$