

ŘEŠENÍ' - 11.5. - 15.5.2020

DOBROVOLNÝ ÚKOL

a) $a = 8 \text{ cm}$
 $S_S = ?$



Rozdělím si čtverec na dvě poloviny (ružová čára v náčrtku).
Pak zeleně vyšrafované části jsou shodné. \Rightarrow
 \Rightarrow Stačí mi vypočítat obsah jednoho obdélníku
(= obsahu poloviny čtverce).

$$S_S = \frac{1}{2} S_{\square}$$

$$S_S = \frac{1}{2} \cdot a^2$$

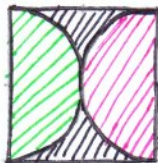
$$S_S = \frac{1}{2} \cdot 8^2$$

$$S_S = \frac{1}{2} \cdot 64$$

$$S_S = 32 \text{ cm}^2$$

Obsah šedé plochy je 32 cm^2 .

b) $a = 8 \text{ cm}$
 $S_S = ?$



$$S_S = S_{\square} - S_0$$

$$S_S = 64 - 50,24$$

$$S_S = 13,76 \text{ cm}^2$$

$$S_{\square} = a^2$$

$$S_{\square} = 8^2$$

$$S_{\square} = 64 \text{ cm}^2$$

$$S_0 = \pi \frac{d^2}{4}$$

$$S_0 = 3,14 \cdot \frac{8^2}{4}$$

$$S_0 = 3,14 \cdot \frac{64}{4}$$

$$S_0 = 50,24 \text{ cm}^2$$

Obsah šedé plochy je $13,76 \text{ cm}^2$.

Když dáme ružový a zelený půlkruh k sobě,
vznikne mi celý kruh. \Rightarrow Od obsahu čtverce
odčtu obsah kruhu.

DOBROVOLNÝ ÚKOL

c) $a = 8 \text{ cm}$

$S_S = ?$



Když dáme „rožky“ (ružový a zelený) „k sobě“, vznikne mi půlkruh. \Rightarrow Od obsahu čtverce odečtu obsah půlkruhu (polovina obsahu kruhu).

$$S_S = S_{\square} - \frac{1}{2} S_0$$

$$S_S = 64 - \frac{1}{2} \cdot 50,24$$

$$S_S = 64 - 25,12$$

$$S_S = 38,88 \text{ cm}^2$$

$$S_{\square} = 64 \text{ cm}^2$$

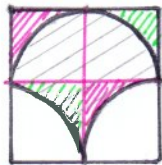
$$S_0 = 50,24 \text{ cm}^2$$

\swarrow \searrow
vypočty ze cv. b

Obsah šedé plochy je $38,88 \text{ cm}^2$.

d) $a = 8 \text{ cm}$

$S_S = ?$



Rozdělím čtverec na 4 shodné čtverce. Pak růžové plochy jsou shodné a zelené plochy jsou také shodné. \Rightarrow Stačí mi vypočítat obsah poloviny čtverce.

$$S_S = \frac{1}{2} S_{\square} \quad \left. \begin{array}{l} \text{vypočít} \\ \text{ze cv. a} \end{array} \right\}$$

$$S_S = 32 \text{ cm}^2$$

Obsah šedé plochy je 32 cm^2 .

e) $a = 8 \text{ cm}$

$S_S = ?$



Bílé „rožky“ jsou čtverhrany. \Rightarrow Když je dáme „k sobě“, vznikne mi kruh. \Rightarrow Od obsahu čtverce odečtu obsah kruhu.

$$S_S = S_{\square} - S_0$$

$$S_S = 64 - 50,24$$

$$S_S = 13,76 \text{ cm}^2$$

$$S_{\square} = 64 \text{ cm}^2$$

$$S_0 = 50,24 \text{ cm}^2$$

Obsah šedé plochy je $13,76 \text{ cm}^2$.

Připomínám, že tvrzení je rozvětlený příklad!

98/6

$$\begin{aligned} a) \quad & 3^1 = \underline{\underline{3}} \\ & (-8)^1 = \underline{\underline{-8}} \\ & 6,5^1 = \underline{\underline{6,5}} \end{aligned}$$

$$\begin{aligned} b) \quad & 0^1 = \underline{\underline{0}} \\ & 0^3 = \underline{\underline{0}} \\ & 0^{12} = \underline{\underline{0}} \end{aligned}$$

$$\begin{aligned} & 3^4 = 3 \cdot 3 \cdot 3 \cdot 3 = 9 \cdot 9 = 81 \\ c) \quad & 3^4 = \underline{\underline{81}} \\ & \left(\frac{2}{3}\right)^2 = \underline{\underline{\frac{4}{9}}} \\ & 4,5^2 = \underline{\underline{20,25}} \end{aligned}$$

98/7

$$(-1)^1 = \underline{\underline{-1}} \quad (-1)^2 = \underline{\underline{1}} \quad (-1)^3 = \underline{\underline{-1}} \quad (-1)^4 = \underline{\underline{1}} \quad (-1)^5 = \underline{\underline{-1}} \quad (-1)^6 = \underline{\underline{1}}$$

98/8

$$\begin{aligned} & (-4)^3 = \underline{\underline{-64}} \quad (-4)^3 = (-4) \cdot (-4) \cdot (-4) = -64 \\ & 5^4 = 5 \cdot 5 \cdot 5 \cdot 5 = 25 \cdot 25 = \underline{\underline{625}} \quad 0^2 = \underline{\underline{0}} \\ & (-1)^{10} = \underline{\underline{1}} \quad 1^{138} = \underline{\underline{1}} \\ & (-7)^2 = \underline{\underline{49}} \quad (-2)^5 = (-2) \cdot (-2) \cdot (-2) \cdot (-2) \cdot (-2) = \underline{\underline{-32}} \end{aligned}$$

98/9

$$\begin{aligned} a) \quad & 7 - 2^6 = 7 - 64 = \underline{\underline{-57}} \\ b) \quad & 5 \cdot 3^3 = 5 \cdot 27 = \underline{\underline{135}} \\ c) \quad & 8 \cdot (-3)^4 = 8 \cdot 81 = \underline{\underline{648}} \\ d) \quad & (-10 + 4 \cdot 2)^3 = (-10 + 8)^3 = (-2)^3 = \underline{\underline{-8}} \\ e) \quad & (4 - 6)^5 = (-2)^5 = \underline{\underline{-32}} \\ f) \quad & -(-10)^4 - (-10)^5 = -(10000) - (-100000) = \\ & = -10000 + 100000 = \underline{\underline{90000}} \end{aligned}$$

99/11

$$\begin{aligned} a) \quad & 7\,500\,000\,000 = \underline{\underline{7,5 \cdot 10^9}} \\ b) \quad & 1\,400 \text{ milionů} = \underline{\underline{1,4 \cdot 10^9}} \quad 1\,400 \text{ milionů} = 1\,400\,000\,000 \\ c) \quad & 6\,000\,000\,000\,000\,000\,000\,000\,000 \text{ kg} = \underline{\underline{6 \cdot 10^{24} \text{ kg}}} \\ d) \quad & \underline{\underline{1,5 \cdot 10^8}} \\ e) \quad & 30\,000\,000\,000\,000\,000\,000\,000 = \underline{\underline{3 \cdot 10^{22}}} \\ f) \quad & \underline{\underline{9,4608 \cdot 10^{15} \text{ m}}} \\ g) \quad & \underline{\underline{1,9 \cdot 10^{27} \text{ kg}}} \end{aligned}$$

U 99/12

- a) $(-2)^8 = (-2) \cdot (-2) \cdot (-2) \cdot (-2) \cdot (-2) \cdot (-2) \cdot (-2) \cdot (-2) = \underline{\underline{256}}$
- b) $(-5)^3 = (-5) \cdot (-5) \cdot (-5) = \underline{\underline{-125}}$
- c) $0,3^4 = 0,3 \cdot 0,3 \cdot 0,3 \cdot 0,3 = \underline{\underline{0,0081}}$
- d) $0^{84} = \underline{\underline{0}}$
- e) $0,7^5 = 0,7 \cdot 0,7 \cdot 0,7 \cdot 0,7 \cdot 0,7 = \underline{\underline{0,16807}}$
- f) $(-0,1)^7 = (-0,1) \cdot (-0,1) \cdot (-0,1) \cdot (-0,1) \cdot (-0,1) \cdot (-0,1) \cdot (-0,1) = \underline{\underline{-0,0000001}}$
- g) $10^5 = 10 \cdot 10 \cdot 10 \cdot 10 \cdot 10 = \underline{\underline{100000}}$
- h) $187^1 = \underline{\underline{187}}$
- i) $8,3^4 = 8,3 \cdot 8,3 \cdot 8,3 \cdot 8,3 = \underline{\underline{4745,8321}}$

U 99/13 je tam 6 píček

- a) $5 \cdot 5 \cdot 5 \cdot 5 \cdot 5 \cdot 5 = \underline{\underline{5^6}}$
- b) $x^4 y \cdot x^4 y \cdot x^4 y \cdot x^4 y = \underline{\underline{(xy)^4 = x^4 \cdot y^4}}$
- c) $(z+1) \cdot (z+1) \cdot (z+1) = \underline{\underline{(z+1)^3}}$
- d) $(-0,3a)(-0,3a)(-0,3a) = \underline{\underline{(-0,3a)^3 = -0,027a^3}}$
- e) $\frac{3}{4}b \cdot \frac{3}{4}b \cdot \frac{3}{4}b \cdot \frac{3}{4}b \cdot \frac{3}{4}b \cdot \frac{3}{4}b = \underline{\underline{(\frac{3}{4}b)^6}}$

U 99/14 v součinu bude čtyřkrát (-7x)

- a) $(-7x)^4 = \underline{\underline{(-7x)(-7x)(-7x)(-7x)}}$
- b) $(2-t)^1 = \underline{\underline{2-t}}$
- c) $(a+b+c)^2 = \underline{\underline{(a+b+c) \cdot (a+b+c)}}$
- d) $(\frac{2x-y}{z})^2 = \underline{\underline{\frac{2x-y}{z} \cdot \frac{2x-y}{z}}}$

U 99/15 posunu desítkovou čárku o 4 místa doprava

- a) $6,7 \cdot 10^4 - 4,3 \cdot 10^3 - 5 \cdot 10 = 67000 - 4300 - 50 = \underline{\underline{62650}}$
- b) $8,3 \cdot 10^3 + 5,7 \cdot 10^2 - 3,85 \cdot 10 = 8300 + 570 - 38,5 = \underline{\underline{8831,5}}$
- c) $7 \cdot 10^5 - 0,8 \cdot 10^4 + 11 \cdot 10^3 = 700000 - 8000 + 11000 = \underline{\underline{703000}}$
- d) $9,4 \cdot 10^8 - 5,6 \cdot 10^7 + 7 \cdot 10^5 = 940000000 - 56000000 + 700000 = \underline{\underline{884700000}}$

U99/16

- a) $(-3)^4 \cdot 1000 = 81 \cdot 1000 = \underline{81000}$
- b) $(4^3 - 3 \cdot 5) : 10^5 = (64 - 15) : 10^5 = 49 : 10000 = \underline{0,0049}$
- c) $(3 - 5 \cdot 4)^6 = (3 - 20)^6 = (-17)^6 = (-17) \cdot (-17) \cdot (-17) \cdot (-17) \cdot (-17) \cdot (-17) = \underline{24137569}$
- d) $(2 + 3^2)(2 - 3)^2 = (2 + 9)(-1)^2 = 11 \cdot 1 = \underline{11}$
- e) $(8^2 - 5 \cdot 3^2) - (2^4 - 3 \cdot 5) = (64 - 5 \cdot 9) - (16 - 15) = (64 - 45) - 1 = 19 - 1 = \underline{18}$
- f) $(5 \cdot 0,2 - 2)^{20} = (1 - 2)^{20} = (-1)^{20} = \underline{1}$
- g) $(-3 + 2)^{11} = (-1)^{11} = \underline{-1}$
- h) $[(-4) \cdot 5 + 6^2 - 2^4]^7 = (-20 + 36 - 16)^7 = 0^7 = \underline{0}$

U100/1

- a) $6a - 5 + 4a + 7 = \underline{10a + 2}$
- b) $8x + 3y - 5x - 7y + 6y = \underline{3x + 2y}$
- c) $3m + (2m - 5n) - n = \underline{3m + 2m - 5n - n = 5m - 6n}$

U100/2

- a) $4a^2 - 2a + 3a^2 + a = \underline{7a^2 - a}$
- b) $5k^2 + (-2k^3) - k^2 - 9k^3 = \underline{5k^2 - 2k^3 - k^2 - 9k^3 = 4k^2 - 11k^3}$
- c) $7a^3 - 5k^2 - 3a^2 - 4k^2 + 2a^3 + 8k^2 = \underline{9a^3 - 3a^2 - k^2}$
- d) $7v^2 + 3u^2 - 4u^2 + 5v - v^2 = \underline{-u^2 + 6v^2 + 5v}$
- e) $5y - 2 + 2a + 2 - y = \underline{4y + 2a}$

U100/3

- a) $7^3 \cdot 7^2 = 7 \cdot 7 \cdot 7 \cdot 7 \cdot 7 = \underline{7^5}$
- b) $3^4 \cdot 3^2 = 3 \cdot 3 \cdot 3 \cdot 3 \cdot 3 \cdot 3 = \underline{3^6}$
- c) $10 \cdot 10^5 = 10 \cdot 10 \cdot 10 \cdot 10 \cdot 10 \cdot 10 = \underline{10^6}$
- d) $8^5 \cdot 8^3 = 8 \cdot 8 \cdot 8 \cdot 8 \cdot 8 \cdot 8 \cdot 8 = \underline{8^8}$

Przebieg:

U 100/4

$$a^m \cdot a^n = a^{m+n}$$

a) $3^2 \cdot 3^4 = 3^{2+4} = \underline{3^6}$

d) $x^3 \cdot x^7 = x^{3+7} = \underline{x^{10}}$

b) $a^3 \cdot a^5 = a^{3+5} = \underline{a^8}$

e) $p^4 \cdot p^5 \cdot p = p^{4+5+1} = \underline{p^{10}}$

c) $7^2 \cdot 7^2 = 7^{2+2} = \underline{7^4}$

f) $6 \cdot A^5 \cdot A = 6 \cdot A^{5+1} = \underline{6 \cdot A^6}$

U 100/5

a) $2a^3b \cdot 3ab^4 = 6a^{3+1}b^{1+4} = \underline{6a^4b^5}$

b) $7x^3y^5 \cdot (-4x^2y^6) = -28x^{3+2}y^{5+6} = \underline{-28x^5y^{11}}$

c) $m \cdot (-m)^3 = -m^{1+3} = \underline{-m^4}$

U 101/6

$$a^m : a^n = a^{m-n}$$

a) $2^6 : 2^2 = 2^{6-2} = \underline{2^4}$

b) $x^5 : x^3 = x^{5-3} = \underline{x^2}$

U 101/7

$$a^0 = 1 \quad (a \neq 0)$$

a) $3^2 : 3^2 = 3^{2-2} = 3^0 = \underline{1}$

b) $y^4 : y^4 = y^{4-4} = y^0 = \underline{1}$

U 101/8

a) $8^2 : 8^4 = \frac{8^2}{8^4} = \frac{8 \cdot 8}{8 \cdot 8 \cdot 8 \cdot 8} = \frac{1}{8 \cdot 8} = \underline{\frac{1}{8^2}}$

b) $12^3 : 12^5 = \frac{12^3}{12^5} = \frac{12 \cdot 12 \cdot 12}{12 \cdot 12 \cdot 12 \cdot 12 \cdot 12} = \frac{1}{12 \cdot 12} = \underline{\frac{1}{12^2}}$

c) $10^3 : 10^4 = \frac{10^3}{10^4} = \frac{10 \cdot 10 \cdot 10}{10 \cdot 10 \cdot 10 \cdot 10} = \underline{\frac{1}{10}}$

d) $a^2 : a^5 = \frac{a^2}{a^5} = \frac{a \cdot a}{a \cdot a \cdot a \cdot a \cdot a} = \frac{1}{a \cdot a \cdot a} = \underline{\frac{1}{a^3}}$

U 101/9

$$a^m : a^n = a^{m-n}$$

$$a^0 = 1 \quad (a \neq 0)$$

a) $3x^4 : 4x^3 = \frac{3}{4} \cdot x^{4-3} = \underline{\frac{3}{4}x}$

b) $12c^5 : (-6c^5) = -2c^{5-5} = -2c^0 = -2 \cdot 1 = \underline{-2}$

c) $15y : 5y^6 = 3y^{1-6} = 3y^{-5} = \underline{\frac{3}{y^5}}$

$$a^{-m} = \frac{1}{a^m}$$

U101/10

$$(a \cdot b)^n = a^n \cdot b^n$$

$$a) (m \cdot n)^3 = \underline{\underline{m^3 n^3}}$$

$$b) (3ab)^4 = 3^4 a^4 b^4 = \underline{\underline{81a^4 b^4}}$$

$$c) (3 \cdot 4)^3 = 3^3 \cdot 4^3 = 27 \cdot 64 = \underline{\underline{1728}}$$

$$d) (-2m)^5 = (-2)^5 m^5 = \underline{\underline{-32m^5}}$$

$$e) (-3xy)^4 = (-3)^4 x^4 y^4 = \underline{\underline{81x^4 y^4}}$$

$$f) 7(-2)^2 \cdot (-a)^5 = 7 \cdot 4 \cdot (-1)^5 \cdot a^5 = 28 \cdot (-1) a^5 = \underline{\underline{-28a^5}}$$

U102/11

$$\left(\frac{a}{b}\right)^2 = \frac{a^2}{b^2} \quad b \neq 0$$

$$a) \left(\frac{3}{8}\right)^2 = \frac{3^2}{8^2} = \underline{\underline{\frac{9}{64}}}$$

$$b) \left(\frac{a}{b}\right)^2 = \frac{a^2}{b^2} \quad \underline{\underline{b \neq 0}}$$

musíme zapomenout na podmínku!
(jmenovatel se nesmí rovnat 0.)

U102/12

$$a) \left(\frac{2x}{y}\right)^4 = \frac{(2x)^4}{y^4} = \frac{2^4 x^4}{y^4} = \frac{16x^4}{y^4} \quad \underline{\underline{y \neq 0}}$$

$$b) \left(\frac{5ab}{c}\right)^3 = \frac{(5ab)^3}{c^3} = \frac{5^3 a^3 b^3}{c^3} = \frac{125a^3 b^3}{c^3} \quad \underline{\underline{c \neq 0}}$$

$$c) \left(\frac{1}{a}\right)^5 = \frac{1^5}{a^5} = \frac{1}{a^5} \quad \underline{\underline{a \neq 0}}$$

$$d) \left(-\frac{1}{a}\right)^5 = (-1)^5 \frac{1^5}{a^5} = -\frac{1}{a^5} \quad \underline{\underline{a \neq 0}}$$

U102/13

$$(a^m)^n = a^{m \cdot n}$$

$$a) (2^3)^2 = 2^{3 \cdot 2} = \underline{\underline{2^6}}$$

$$b) (x^4)^5 = x^{4 \cdot 5} = \underline{\underline{x^{20}}}$$

$$c) \left(\frac{3}{y}\right)^7 = y^{3 \cdot 7} = \underline{\underline{y^{21}}}$$

U102/14

$$a) (5x^2y^3)^5 = 5^{1 \cdot 5} x^{2 \cdot 5} y^{3 \cdot 5} = 5^5 x^{10} y^{15} = \underline{\underline{3125 x^{10} y^{15}}}$$

$$b) (8^5)^6 = 8^{5 \cdot 6} = \underline{\underline{8^{30}}}$$

$$c) (4a^3b^4)^3 = 4^{1 \cdot 3} a^{3 \cdot 3} b^{4 \cdot 3} = 4^3 a^9 b^{12} = \underline{\underline{64a^9b^{12}}}$$

$$d) (-3r^5)^4 = (-3)^{1 \cdot 4} r^{5 \cdot 4} = (-3)^4 r^{20} = \underline{\underline{81r^{20}}}$$

$$e) [6 \cdot (-2a^3)]^2 = (-12a^3)^2 = (-12)^{1 \cdot 2} a^{3 \cdot 2} = (-12)^2 a^6 = \underline{\underline{144a^6}}$$

$$f) 5(-a^2b^3)^3 = 5 \cdot (-1)^{1 \cdot 3} a^{2 \cdot 3} b^{3 \cdot 3} = 5 \cdot (-1)^3 \cdot a^6 b^9 = 5 \cdot (-1) a^6 b^9 = \underline{\underline{-5a^6b^9}}$$