

Str. 256-257

$$100 \text{ mln} = 100\,000\,000$$

zad. 1

A.  $100^4 = 100 \cdot 100 \cdot 100 \cdot 100 = 10\,000\,0000 =$

**B.**  $1000^3 = 1000 \cdot 1000 \cdot 1000 = 1\,000\,000\,000$

C.  $10\,000^2 = 10\,000 \cdot 10\,000 = 100\,000\,000$

D.  $10^8 = 100\,000\,000$

zad. 2

$$\frac{(7^4)^5}{7^4 \cdot 7^5} = \frac{7^{4 \cdot 5}}{7^{4+5}} = \frac{7^{20}}{7^9} = 7^{20-9} = 7^{11} \quad \text{D. } 7^{11}$$

zad. 3

a)  $3^2 \cdot 3^6 : 3^4 = 3^{2+6-4} = 3^{8-4} = 3^4 = 81$  NIE

b)  $\frac{(5^3)^3}{5^6} = \frac{5^{3 \cdot 3}}{5^6} = \frac{5^9}{5^6} = 5^{9-6} = 5^3 = 125$  NIE

c)  $\frac{12^3}{6^3} \cdot 3^2 = \frac{(2 \cdot 6)^3}{6^3} \cdot 3^2 = \frac{2^3 \cdot \cancel{6^3}^1}{\cancel{6^3}_1} \cdot 3^2 = 2^3 \cdot 3^2 = 8 \cdot 9 = 72$  TAK

d)  $\frac{7^2 + 7^2}{7^4} = \frac{2 \cdot \cancel{7^2}^1}{7^2 \cdot \cancel{7^2}_1} = \frac{2}{49}$  NIE

zad. 4

$$0,0002 = 2 \cdot 10^{-4}$$

D. cztery

$$10^{-1} = 0,1$$

$$10^{-3} = 0,001$$

$$10^{-5} = 0,00001$$

$$10^{-7} = 0,0000001$$

$$10^{-2} = 0,01$$

$$10^{-4} = 0,0001$$

$$10^{-6} = 0,000001$$

zad. 5

Pytanie w zadaniu; Czy  $a^{10}$  jest zawsze większe od  $a^5$  (jeśli  $a \neq 0$ )?

**(II)** Nie, ponieważ **(D)** na przykład  $(0,1)^5$  to więcej niż  $(0,1)^{10}$   

$$\begin{array}{ccc} \downarrow & & \downarrow \\ 0,00001 & & 0,000000001 \end{array}$$

zad. 6

A.  $3^7 + 3^7 + 3^7 = 3 \cdot 3^7 = 3^1 \cdot 3^7 = 3^8$

B.  $(3^4)^2 = 3^{4 \cdot 2} = 3^8$

**C.**  $3^{24} : 3^3 = 3^{24-3} = 3^{21}$

D.  $3^2 \cdot 3^2 \cdot 3^2 \cdot 3^2 = 3^{2+2+2+2} = 3^8$

zad. 7

a)  $320 \text{ m} = 32000 \text{ cm} = 3,2 \cdot 10000 \text{ cm} = 3,2 \cdot 10^4 \text{ cm}$

b)  $0,21 \text{ mm} = 0,021 \text{ cm} = 2,1 : 100 \text{ cm} = 2,1 \cdot 10^{-2} \text{ cm}$

c)  $56 \text{ km} = 56000 \text{ m} = 5,6 \cdot 10000 \text{ m} = 5,6 \cdot 10^4 \text{ m}$

d)  $45 \text{ mm} = 0,045 \text{ m} = 4,5 : 100 \text{ m} = 4,5 \cdot 10^{-4} \text{ m}$

zad. 8

$$3,57 \cdot 10^5 \text{ km}^2 = 3,57 \cdot 100000 \text{ km}^2 = 357000 \text{ km}^2$$

$$3,13 \cdot 10^5 \text{ km}^2 = 3,13 \cdot 100000 \text{ km}^2 = 313000 \text{ km}^2$$

$$357000 - 313000 = 44000 \text{ km}^2 \rightarrow \text{C}$$

zad. 9

$$1,2 \text{ m} \times 90 \text{ cm} = 120 \text{ cm} \times 90 \text{ cm} = 1200 \text{ mm} \times 900 \text{ mm} = 1080000 \text{ mm}^2 =$$

$$= 1,08 \times 10^6 \text{ mm}^2$$

zad. 10

$$\sqrt[3]{a} = 1,5, \text{ to znaczy że } a = (1,5)^3 = \left(\frac{3}{2}\right)^3 = \frac{27}{8} = 3,375$$

Punkt M odpowiada liczbie a

zad. 11

$$\text{A. } \sqrt[3]{7} - \sqrt[3]{12} = \sqrt[3]{7} - (-\sqrt[3]{12}) = \sqrt[3]{7} + \sqrt[3]{12} > 0$$

$$\text{B. } -\sqrt[3]{15} = -(-\sqrt[3]{15}) = \sqrt[3]{15} > 0$$

$$\text{C. } 2 + \sqrt[3]{-27} = 2 - \sqrt[3]{27} = 2 - 3 = -1 < 0$$

$$\text{D. } -1 - \sqrt[3]{-2} = -1 - (-\sqrt[3]{2}) = -1 + \sqrt[3]{2} > 0$$

większe od 1

zad. 12

↓ mnożenie

$$\text{a) } \sqrt{p} = 2,6 \quad | \cdot 2$$

$$2 \cdot \sqrt{p} = 2 \cdot 2,6$$

$$\sqrt{4 \cdot p} = 5,2$$

$$\sqrt{4 \cdot p} = 5,2$$

TAK

$$\text{b) } \sqrt{q} = 18 \quad | : 3$$

$$\frac{\sqrt{q}}{3} = \frac{18}{3}$$

$$\frac{\sqrt{q}}{3} = 6$$

$$\sqrt{\frac{q}{9}} = 6$$

TAK

$$\text{c) } \sqrt[3]{r} = 0,74 \quad | : 10$$

$$\frac{\sqrt[3]{r}}{10} = 0,74 : 10$$

$$\frac{\sqrt[3]{r}}{1000} = 0,074$$

$$\sqrt[3]{r : 1000} = 0,074$$

TAK

zad. 14 Wyciągam czynniki przed pierwiastki

$$\text{A. } 3\sqrt{6} \cdot 2\sqrt{2} = 6\sqrt{6 \cdot 2} = 6\sqrt{12} = 6 \cdot \sqrt{4 \cdot 3} = 6 \cdot \sqrt{4} \cdot \sqrt{3} = 12\sqrt{3}$$

$$\text{B. } \sqrt{12} \cdot 6\sqrt{2} = \sqrt{4 \cdot 3} \cdot 6\sqrt{2} = 2\sqrt{3} \cdot 6\sqrt{2} = 12\sqrt{3 \cdot 2} = 12\sqrt{6}$$

$$\text{C. } 4\sqrt{3} \cdot \sqrt{8} = 4\sqrt{3} \cdot \sqrt{4 \cdot 2} = 4\sqrt{3} \cdot 2\sqrt{2} = 8\sqrt{3 \cdot 2} = 8\sqrt{6}$$

$$\text{D. } 2\sqrt{24} \cdot \sqrt{3} = 2 \cdot \sqrt{4 \cdot 6} \cdot \sqrt{3} = 2 \cdot 2\sqrt{6} \cdot \sqrt{3} = 4\sqrt{2 \cdot 3} \cdot \sqrt{3} = 4\sqrt{3} \cdot \sqrt{3} \cdot \sqrt{2} = 12\sqrt{2}$$

zad. 12 szacujemy pierwiastki

a)  $\sqrt{95} - \sqrt{81} < 1$       b)  $\sqrt{17} - \sqrt{5} < 9$   
 $\sqrt{81} < \sqrt{95} < \sqrt{100}$        $\sqrt{16} < \sqrt{17} < \sqrt{25}$        $\sqrt{4} < \sqrt{5} < \sqrt{9}$   
 $9 < \sqrt{95} < 10$        $4 < \sqrt{17} < 5$        $2 < \sqrt{5} < 3$

~~c)~~  $\sqrt{130} + \sqrt{150} > \sqrt{380}$   
 $\sqrt{121} < \sqrt{130} < \sqrt{144}$        $\sqrt{361} < \sqrt{390} < \sqrt{400}$   
 $11 < \sqrt{130} < 12$        $\sqrt{144} < \sqrt{150} < \sqrt{169}$        $19 < \sqrt{390} < 20$   
 $12 < \sqrt{150} < 13$

razem (po zsumowaniu) dadzą liczbę bliską 24

d)  $4\sqrt{80} > 6\sqrt{27}$   
 $\sqrt{81} < \sqrt{80} < \sqrt{100}$        $\sqrt{25} < \sqrt{27} < \sqrt{36}$   
 $9 < \sqrt{80} < 10$        $5 < \sqrt{27} < 6$

zad. 15 wyłaczamy czynniki i stosujemy własności pierwiastków → szacujemy

$a = \sqrt{50} = \sqrt{25 \cdot 2} = \sqrt{25} \cdot \sqrt{2} = 5\sqrt{2}$

$b = 2\sqrt{2} + \sqrt{2} = 3\sqrt{2}$

$r = 2\sqrt{8} = 2\sqrt{4 \cdot 2} = 2 \cdot \sqrt{4} \cdot \sqrt{2} = 4\sqrt{2}$

$t = \sqrt{2} \cdot \sqrt{2} = 2$

$n = 3 \cdot 2\sqrt{2} = 6\sqrt{2}$

$\sqrt{1} < \sqrt{2} < \sqrt{4}$   
 $1 < \sqrt{2} < 2$

t y r a n

$2 < 3\sqrt{2} < 4\sqrt{2} < 5\sqrt{2} < 6\sqrt{2}$

zad. 16

$(3 + \sqrt{2})(2 - 3\sqrt{5}) + \sqrt{5}(3\sqrt{2} + 9) = 3 \cdot 2 - 3 \cdot 3\sqrt{5} + 2\sqrt{2} - 3\sqrt{5} \cdot \sqrt{2} + 3\sqrt{2} \cdot \sqrt{5} + 9 \cdot \sqrt{5} =$   
 $= 6 - 9\sqrt{5} + 2\sqrt{2} - 3\sqrt{10} + 3\sqrt{10} + 9\sqrt{5} = 6 + 2\sqrt{2}$   
 $a + b\sqrt{c}$

$a = 6$

$b = 2$

$c = 2$