RJEŠENJA

$$y \in \mathbb{Z}$$

$$3x + 2y = 0$$
$$x + y + 2 = 0$$

$$\text{Nacrtaj dva pravca.}$$

$$n \in \mathbb{N}$$

$$a = \frac{3}{4}$$

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PRIPREMA, POZOR,
MATEMATIKA

8

ispiti znanja za 8. razred osnovne škole

1. Točna je tvrdnja **c)**.

$N = \{1, 2, 3, 4, 5...\}$, $Q^+ = \left\{\dfrac{a}{b} : a, b \in N\right\}$, $Z = \{...-3, -2, -1, 0, 1, 2, 3...\}$.

2.

razlomak	mješoviti broj	decimalni broj
$\dfrac{-21}{5}$	$\dfrac{21}{5} = 21 : 5 = 4\dfrac{①}{5}$ ① ← nazivnik ostaje isti $-4\dfrac{1}{5}$	$\dfrac{21}{5} = 21 : 5 = 4.2$ 10 0 -4.2
$2\dfrac{1}{4} = \dfrac{2 \cdot 4 + 1}{4} = \dfrac{9}{4}$	$2\dfrac{1}{4}$	$\dfrac{9}{4} = 9 : 4 = 2.25$ 10 20 0
$-3.59 = \dfrac{-359}{100}$ ← dvije nule u dekadskoj jedinici dva decimalna mjesta	$-3\dfrac{59}{100}$	-3.59
$-3\dfrac{7}{10} = \dfrac{3 \cdot 10 + 7}{10} = -\dfrac{37}{10}$	$-3\dfrac{7}{10}$	$-3\dfrac{7}{10} = -3.7$ jedna nula u dekadskoj jedinici jedno decimalno mjesto
$\dfrac{43}{8}$	$\dfrac{43}{8} = 43 : 8 = 5\dfrac{③}{8}$ ③	$\dfrac{43}{8} = 43 : 8 = 5.375$ 30 60 40 0
$2.002 = \dfrac{2\,002}{1\,000} = \dfrac{1\,001}{500}$ $\dfrac{2\,002}{1\,000}$ skraćujemo s 2	$2.002 = 2\dfrac{2}{1\,000} = 2\dfrac{1}{500}$	2.002

3. **a)** Znanstveni zapis je zapis oblika $a \cdot 10^n$, $n \in Z$, $0 < |a| < 10$.

$2\,000 = 2 \cdot 1\,000 = 2 \cdot 10^3$

b) $34 = 3.4 \cdot 10^1$

c) $0.007 = \dfrac{7}{1\,000} = 7 \cdot \dfrac{1}{1\,000} = 7 \cdot 10^{-3}$

d) $311.02 = 3.1102 \cdot 100 = 3.1102 \cdot 10^2$

4. **a)** *1. način*

Razlomke možemo prvo svesti na zajednički nazivnik i potom usporediti brojnike.

$V(4, 5) = 20$

najmanji zajednički višekratnik

$\dfrac{5}{4}^{\mid \cdot 5} = \dfrac{25}{20}$ $\qquad$ $\dfrac{6}{5}^{\mid \cdot 4} = \dfrac{24}{20}$ $\qquad\qquad$ $\dfrac{25}{20} > \dfrac{24}{20} \Rightarrow \dfrac{5}{4} > \dfrac{6}{5}$

$\dfrac{5}{4}$ proširujemo brojem 5

1

2. način

Mogli smo razlomke zapisati kao decimalne brojeve.

$\frac{5}{4} = 5 : 4 = 1.25$ $\frac{6}{5} = 6 : 5 = 1.2$ $1.25 > 1.2$
     10   10
       20   0 $1.2 = 1.20$
         0

Prvo uspoređujemo cijeli dio broja, a
potom redom jednu po jednu decimalu.

Dakle, $\frac{5}{4} > \frac{6}{5}$.

Razlomke možemo usporediti i tako da ih prikažemo na brojevnom pravcu (veći je onaj broj koji se nalazi više desno).

b) $-\frac{2}{3}$ i $\frac{-4}{6}$

$V(3, 6) = 6$ $-\frac{2}{3} = \frac{-2}{3}^{|\cdot 2} = \frac{-4}{6}$ Dakle, $-\frac{2}{3} = \frac{-4}{6}$.

c) -2.73 i -2.9

Kad uspoređujemo dva negativna broja, veći je onaj koji ima manju apsolutnu vrijednost.

$|-2.73| = 2.73$ $|-2.9| = 2.9$

$2.73 < 2.9 \Rightarrow -2.73 > -2.9$

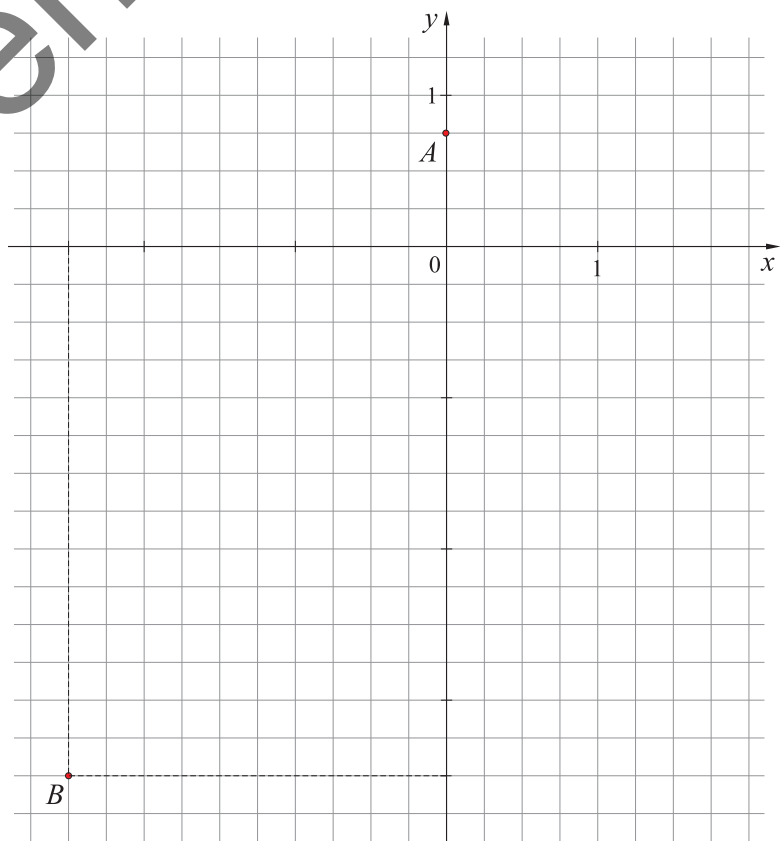**d)** $-2\frac{3}{5}$ i $-\frac{17}{6}$

$-2\frac{3}{5}$ $-2\frac{5}{6}$ Možemo uočiti da je $\frac{3}{5} < \frac{5}{6} \Rightarrow -2\frac{3}{5} > -2\frac{5}{6}$.

                   $\frac{18}{30}$ $\frac{25}{30}$

5. $A\left(0, \frac{3}{4}\right)$

vrijednost 0   vrijednost $\frac{3}{4}$
   na *x*-osi   na *y*-osi

6. **a)** $\dfrac{3^{\lfloor \cdot 2}}{7} + \dfrac{5}{14} = \dfrac{6}{14} + \dfrac{5}{14} = \dfrac{11}{14}$ Prvo razlomke svodimo na zajednički nazivnik, a potom zbrojimo brojnike, a nazivnike prepišemo.

b) $\dfrac{^3\cancel{12}}{5} \cdot \dfrac{-3}{\cancel{8}_2} = \dfrac{-9}{10}$

Prije množenja skraćujemo ako možemo (12 i 8 dijelimo s 4), a potom množimo brojnik s brojnikom, a nazivnik s nazivnikom.

c) $\dfrac{7}{4} : 1\dfrac{2}{3} = \dfrac{7}{4} : \dfrac{5}{3} = \dfrac{7}{4} \cdot \dfrac{3}{5} = \dfrac{21}{20} = 1\dfrac{1}{20}$

Mješoviti broj prvo zapisujemo kao razlomak.

Podijeliti neki broj s $\dfrac{5}{3}$ isto je kao taj broj pomnožiti s brojem koji je recipročan broju $\dfrac{5}{3}$, a to je razlomak $\dfrac{3}{5}$.

Svako rješenje, ako je to moguće, zapisujemo kao mješoviti broj.

7. **a)**
$$21 + 4x = 5x - 7 \; / - 5x$$ Oduzimamo $5x$ s obje strane jednadžbe.
$$21 + 4x - 5x = \cancel{5x} - \cancel{5x} - 7$$
$$21 - x = -7 \; / - 21$$ Oduzimamo 21 s obje strane jednadžbe.
$$21 - x - 21 = -7 - 21$$
$$\cancel{21} - x - \cancel{21} = -7 - 21$$
$$-x = -28$$
$$x = 28$$

suprotan broj broju $-x$ suprotan broj broju -28

b)
$$7x - 11 = 4(x + 3)$$ Primjenjujemo distributivnost množenja prema zbrajanju
$$7x - 11 = 4x + 12 \; / - 4x$$ (broj 4 množi oba pribrojnika u zagradi).
$$3x - 11 = 12 \; / + 11$$
$$3x = 23 \; / : 3$$ Dijelimo obje strane jednadžbe brojem 3.
$$x = \dfrac{23}{3}$$ Znamo da je $23 : 3 = \dfrac{23}{3}$.

c)
$$2 - \dfrac{3x - 1}{4} = \dfrac{-7}{2}x \; / \cdot 4$$ Množimo cijelu jednadžbu s $V(4, 2) = 4$.
$$2 \cdot 4 - \overset{1}{\cancel{4}} \cdot \dfrac{3x - 1}{\cancel{4}_1} = \overset{2}{\cancel{4}} \cdot \dfrac{-7}{\cancel{2}_1}x$$ Provodimo skraćivanje.
$$8 - 1 \cdot (3x - 1) = -14x$$
$$8 - 3x + 1 = -14x$$
$$9 - 3x = -14x \; / + 14x$$
$$9 + 11x = 0 \; / - 9$$
$$11x = -9 \; / : 11$$
$$x = -\dfrac{9}{11}$$

8. **a)** $\underline{3x^2} - 7x + \underline{x^2} - 19x$ Zbrajamo istovrsne monome.
$$= 3x^2 + x^2 - 7x - 19x$$ Znamo da je $x^2 = 1x^2$.
$$= (3 + 1)x^2 + (-7 - 19)x$$
$$= 4x^2 - 26x$$

b) $4a \cdot (2a - 3) - 9a^2 = \underline{8a^2} - 12a - \underline{9a^2} = -1a^2 - 12a = -a^2 - 12a$

3

9.

A B

D C

Suprotni vektori su vektori istog smjera (leže na istom ili na usporednim pravcima), iste duljine, ali suprotne orijentacije.

10. **a)** $30 \overset{|:10}{:} 40 \overset{|:10}{=} 3 : 4$ Oba člana omjera podijelili smo brojem 10.

    b) $50 \overset{|:50}{:} 100 \overset{|:50}{=} 1 : 2$

    c) $14 \overset{|:7}{:} 21 \overset{|:7}{=} 2 : 3$ Parovi su: **a)** i **3)**, **b)** i **1)**, **c)** i **2)**.

11. $11.52 : 3 = 3.84$ Prvo računamo cijenu jednog kilograma jagoda.

    25

      12

       0            $3.84 \cdot 5 = 19.20$

Pet kilograma jagoda platila bi 19.20 €.

12. Računamo $17 \% \cdot 200 = 0.17 \cdot 200 = 34$.

$$17 \% = \frac{17}{100} = 0.17$$

13. Nakon popusta od 12 %, računamo 100 % – 12 % = 88 % od cijene majice.

$$0.88 \cdot 30 = 26.4$$

Cijena majice na popustu bit će 26.40 eura.

14. Duljina polumjera kruga je 3 cm.

Npr.
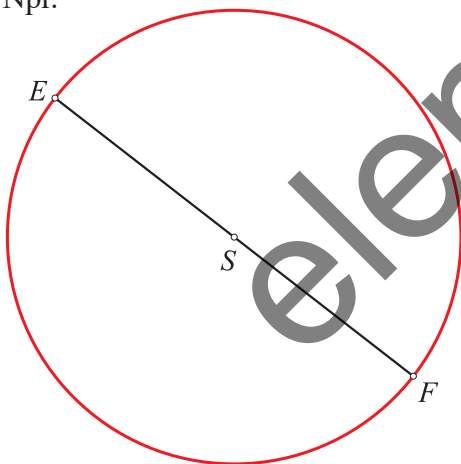
Uočimo da je nacrtana tetiva promjer kruga.

$\underline{r = 3 \text{ cm}}$

$o, P = ?$

$o = 2r\pi$

$o = 2 \cdot 3 \cdot \pi$

$o = 6\pi \approx 6 \cdot 3.14 = 18.84 \text{ cm}$

$P = r^2\pi$

$P = 3^2\pi$

$P = 9\pi \approx 9 \cdot 3.14 = 28.26 \text{ cm}^2$

15. Npr.
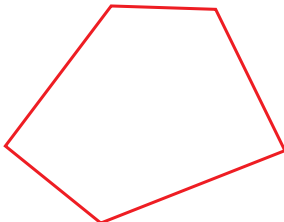
16. Pravilni mnogokut ima sve stranice jednakih duljina.

$\underline{a = 53 \text{ mm}}$

$o = ?$

$o = 20 \cdot a$

$o = 20 \cdot 53$

$o = 1\,060 \text{ mm}$

1. Točne su jednakosti **b)** i **c)**.

Vrijedi $\mathbf{N} \cap \mathbf{N}_0 = \mathbf{N}$ i $\mathbf{Q} \cup \mathbf{N} = \mathbf{Q}$

          presjek skupova   unija skupova

2.   **a)** $\dfrac{7}{5} = 7 : 5 = 1\dfrac{2}{5}$

     b) $1\dfrac{3}{8} = \dfrac{1 \cdot 8 + 3}{8} = \dfrac{11}{8} = 11 : 8 = 1.375$

                               30
                                   60
                                     40
                                       0

     c) $2.71 = 2\dfrac{71}{100}$ → dvije nule u dekadskoj jedinici

         cijeli   dva decimalna
      dio broja   mjesta

     d) $-\dfrac{19}{4}$

        $\dfrac{19}{4} = 19 : 4 = 4\dfrac{3}{4}$

        $-\dfrac{19}{4} = -4\dfrac{3}{4} = -4.75$

     e) $-3\dfrac{7}{10} = -\dfrac{37}{10}$

        $-3\dfrac{7}{10} = -3.7$

     f) $-8.2 = -8\dfrac{2}{10} = -8\dfrac{1}{5}$

               Skraćujemo $\dfrac{2}{10}$ brojem 2.

3.   **a)** $3.1 \cdot 10^3 = 3.1 \cdot 1\,000 = 3\,100$

     b) $8 \cdot 10^{-4} = 8 \cdot \dfrac{1}{10^4} = 8 \cdot \dfrac{1}{10\,000} = 0.0008$

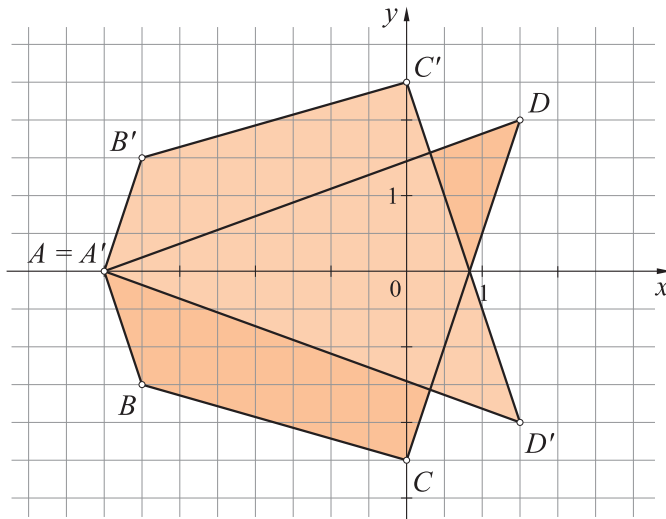   **c)** $2.17 \cdot 10^{-2} = 2.17 \cdot \dfrac{1}{10^2} = 2.17 \cdot \dfrac{1}{100} = 0.0217$

4.   **a)** Kad prikazujemo decimalne brojeve s jednom decimalom, za duljinu jedinične dužine često odaberemo 1 cm.

                    -2.7 -1.4 0   1   2.8   3.8
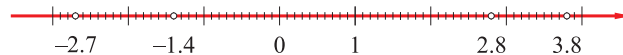
     b) $V(2, 4) = 4$ Za jediničnu dužinu odabiremo dužinu koju lagano dijelimo na četiri jednaka dijela.

     c)
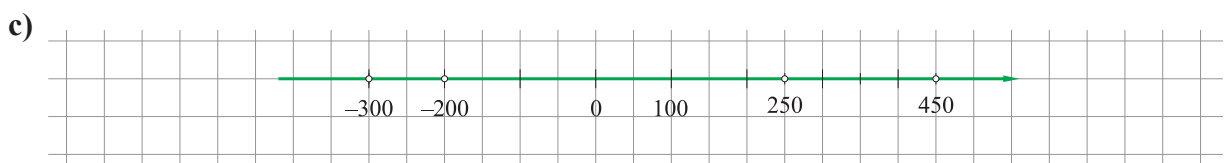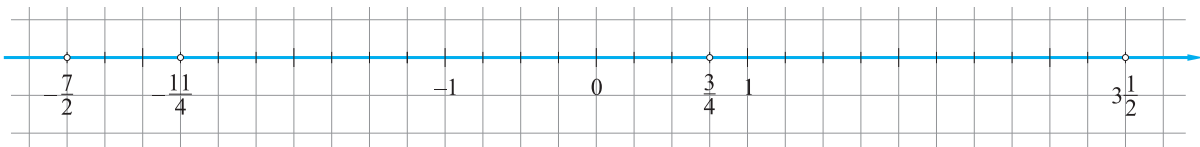
5. $A(-4, 0)$, $B(-3.5, -1.5)$, $C(0, -2.5)$, $D(1.5, 2)$

$A'(-4, 0)$

$B'(-3.5, 1.5)$

$C'(0, 2.5)$

$D'(1.5, -2)$

6. **a)** $2.7 - 8.31 = -5.61$

$$\begin{array}{r} 8.31 \\ -2.7 \\ \hline 5.61 \end{array}$$

b) $5.4 : 9 \cdot 2 = 0.6 \cdot 2 = 1.2$ $5.4 : 9 = 0.6$

$$\begin{array}{r} 5\ 4 \\ \hline 0 \end{array}$$

c) $1.8 - 0.8 \cdot \underbrace{(3 + 1.21)}_{\text{prvo rješavamo zagradu}}$

$= 1.8 - \underbrace{0.8 \cdot 4.21}_{\text{prednost ima množenje}}$

$$\begin{array}{r} 4.21 \cdot 0.8 \\ \hline 3.368 \end{array} \qquad \begin{array}{r} 3.368 \\ -1.8 \\ \hline 1.568 \end{array}$$

$= 1.8 - 3.368$

$= -1.568.$

7. Označimo s x cijenu jednog kilograma malina. Tada je $x - 3$ cijena jednog kilograma banana.
Vrijedi
$$3 \cdot (x - 3) + 2x = 14$$
$$3x - 9 + 2x = 14$$
$$5x = 23 \quad / :5$$
$$x = \frac{23}{5} = 4.6.$$

Cijena kilograma malina je 4.60 eura.

8. Uvrstimo u izraz broj -4 umjesto varijable m:

$-2 \cdot (-4)^2 + 7 \cdot (-4) + 19 = -2 \cdot 16 - 28 + 19$
$= -32 - 28 + 19$
$= -60 + 19$
$= -41.$

9.
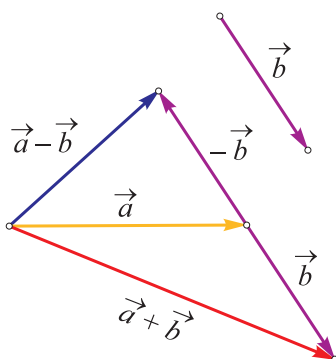
10.   broj strojeva   vrijeme rada (h)

broj strojeva	vrijeme rada (h)
10	3
1	30
8	$\dfrac{30}{8}$

: 10 (...) · 10

· 8 (...) : 8

$\dfrac{30}{8}$ h $= \dfrac{15}{4}$ h $= 3\dfrac{3}{4}$ h = 3 h i 45 min = 225 min.

11.   Parovi su: **a)** i **3)**, **b)** i **2)**, **c)** i **4)**.

12. x – traženi broj

$$30\,\% \cdot x = 24$$
$$0.3\,x = 24 \quad /: 0.3$$
$$x = 80$$

Od broja 80.

13. x – traženi postotak

$$200 + x \cdot 200 = 248 \quad /-200$$
$$200\,x = 48 \quad /: 200$$
$$x = \dfrac{48}{200} = \dfrac{24}{100} = 24\,\%. \qquad \text{Povećana je za 24 \%.}$$

14. $\underline{r = 9\ \text{dm}}$

$l = ?, \ P = ?$

$$l = \dfrac{r\pi\alpha}{180°} \qquad\qquad P = \dfrac{r^2\pi\alpha}{360°}$$

$$l = \dfrac{\overset{3}{\cancel{9}} \cdot \pi \cdot \overset{1}{\cancel{30°}}}{\underset{2}{\cancel{180°}}} \qquad P = \dfrac{9^2 \cdot \pi \cdot \overset{1}{\cancel{30°}}}{\underset{12}{\cancel{360°}}}$$

$$l = \dfrac{3}{2}\pi \approx \dfrac{3}{2} \cdot 3.14 \qquad P = \dfrac{\overset{27}{\cancel{81}}\pi}{\underset{4}{\cancel{120}}}$$

$$l \approx 4.71\ \text{dm} \qquad\qquad P \approx \dfrac{27}{4} \cdot 3.14$$

$$P \approx 21.195\ \text{dm}^2.$$

15.   Vrijedi da je duljina polumjera opisane kružnice jednaka duljini stranice tog šesterokuta.
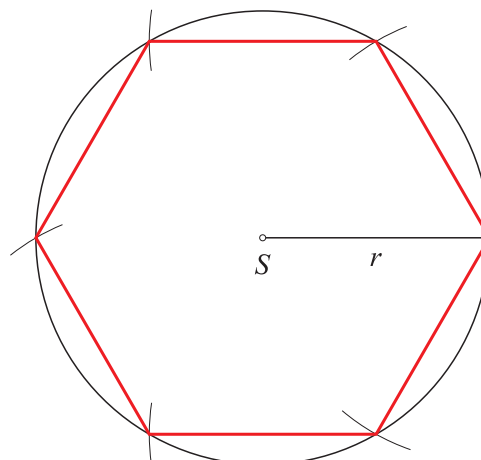
16. $n = 10$

$\underline{P_1 = 2.7\ \text{m}^2}$

$P = ?$

$$P = n \cdot P_1$$
$$P = 10 \cdot 2.7$$
$$P = 27\ \text{m}^2.$$

1.

$$x \quad y$$
$$\left(2, \frac{-3}{5}\right)$$

U obje jednadžbe uvrštavamo broj 2 umjesto x i broj $\frac{-3}{5}$ umjesto y:

$$\frac{1}{5} \cdot 2 - \frac{-3}{5} = 1 \qquad\qquad 3 \cdot 2 + \overset{2}{\underset{1}{\cancel{10}}} \cdot \overset{-1}{\underset{1}{\cancel{-3}}} = 4$$

$$\frac{2}{5} + \frac{3}{5} = 1 \qquad\qquad 6 - 2 = 4$$

$$1 = 1 \qquad\qquad 4 = 4.$$

Obje su jednakosti istinite. Uređeni par jest rješenje sustava jednadžbi.

2. Izrazimo npr. y s pomoću x iz prve jednadžbe:

$$3x + y = 1 \implies y = 1 - 3x.$$

Uvrstimo $1 - 3x$ umjesto y u drugu jednadžbu:

$$-5x - 2(1 - 3x) = -3.$$

Dobili smo linearnu jednadžbu s jednom nepoznanicom koju lagano rješavamo:

$$-5x - 2 + 6x = -3 \quad / + 2$$
$$\underline{x = -1}.$$

Uvrštavamo -1 u jednakost $y = 1 - 3x$:

$$y = 1 - 3 \cdot (-1)$$
$$y = 1 + 3$$
$$\underline{y = 4}.$$

Rješenje zadanog sustava jednadžbi uređeni je par brojeva $(-1, 4)$.

3. Možemo npr. "eliminirati" nepoznanicu x.

$V(2, 3) = 6$

$$2x + 3y = -5 \quad / \cdot 3$$
$$\underline{3x - 4y = 18 \quad / \cdot (-2)}$$
$$\cancel{6}x + 9y = -15 \Big\}$$
$$\underline{-\cancel{6}x + 8y = -36} \quad +$$
$$17y = -51 \quad / : 17$$
$$\underline{y = -3}$$

Nakon množenja uz x će biti suprotni koeficijenti 6 i -6.

Zbrajamo jednadžbe.

Uvrštavamo broj -3 umjesto y u npr. prvu jednadžbu:

$$2x + 3y = -5$$
$$2x + 3 \cdot (-3) = -5$$
$$2x - 9 = -5 \quad / + 9$$
$$2x = 4 \quad / : 2$$
$$\underline{x = 2}.$$

Rješenje zadanog sustava jednadžbi je uređeni par brojeva $(2, -3)$.

4.

$$2 \cdot \overparen{(x - 3)} + y = 4$$
$$\underline{-(y + 2) = x - 3}$$
$$2x - 6 + y = 4 \quad / + 6$$
$$\underline{-y - 2 = x - 3 \quad / + 2 - x}$$
$$2x + y = 10$$
$$\underline{-y - x = -1}$$
$$\left.\begin{array}{r}2x + y = 10 \\ \underline{-x - y = -1}\end{array}\right\} +$$
$$\underline{x = 9}$$

Ako je ispred zagrade znak "−", brišemo zagradu i mijenjamo predznak pribrojnicima u zagradi.

Sustav rješavamo metodom suprotnih koeficijenata.

Broj 9 uvrštavamo umjesto x u npr. jednadžbu $2x + y = 10$:

$$2 \cdot 9 + y = 10$$
$$18 + y = 10$$
$$y = -8 \,.$$

Rješenje zadanog sustava jednadžbi uređeni je par brojeva $(9, -8)$.

b)
$$\frac{1}{2} - \frac{x+3}{5} = y - \frac{3}{2} \qquad / \cdot 10 \qquad\qquad V(2, 5) = 10$$
$$\underline{-4x + (2y - 1) = -7} \qquad\qquad \text{Ako je ispred zagrade znak "+", brišemo zagradu.}$$

$${}^{5}\cancel{10} \cdot \frac{1}{\cancel{2}_1} - {}^{2}\cancel{10} \cdot \frac{x+3}{\cancel{5}_1} = 10 \cdot y - {}^{5}\cancel{10} \cdot \frac{3}{\cancel{2}_1}$$
$$\underline{-4x + 2y - 1 = -7} \qquad / + 1$$
$$5 - 2(x + 3) = 10y - 15$$
$$\underline{-4x + 2y = -6}$$
$$5 - 2x - 6 = 10y - 15 \qquad / + 1$$
$$\underline{-4x + 2y = -6}$$
$$-2x = 10y - 14 \qquad / - 10y$$
$$\underline{-4x + 2y = -6} \qquad / : 2$$
$$-2x - 10y = -14 \qquad / : (-2)$$
$$\underline{-2x + y = -3}$$
$$x + 5y = 7 \quad\Rightarrow\quad \boxed{x = 7 - 5y} \qquad \text{Sustav rješavamo npr. metodom supstitucije.}$$
$$-2x + y = -3$$

$$-2(7 - 5y) + y = -3$$
$$-14 + 10y + y = -3 \quad / + 14$$
$$11y = 11 \quad / : 11$$
$$y = 1 \,.$$

Broj 1 uvrštavamo umjesto y u npr. jednadžbu $x + 5y = 7$:

$$x + 5 \cdot 1 = 7$$
$$x + 5 = 7 \quad / -5$$
$$x = 2 \,.$$

Rješenje zadanog sustava jednadžbi uređeni je par brojeva $(2, 1)$.

5. x – prvi traženi broj
y – drugi traženi broj

Postavljamo sustav jednadžbi:

$$x + y = 5$$
$$x = y + \frac{1}{5}.$$

Sustav rješavamo npr. metodom supstitucije tako da $y + \frac{1}{5}$ uvrštavamo umjesto x u prvu jednadžbu:

$$y + \frac{1}{5} + y = 5 \quad / - \frac{1}{5}$$
$$2y = 5 - \frac{1}{5}$$
$$2y = 5 - 0.2$$
$$2y = 4.8 \quad / : 2$$
$$y = 2.4 \,.$$

Broj 2.4 uvrštavamo umjesto y u drugu jednadžbu:

$$x = 2.4 + \frac{1}{5}$$
$$x = 2.4 + 0.2$$
$$x = 2.6.$$

Traženi brojevi su 2.4 i 2.6.

6.
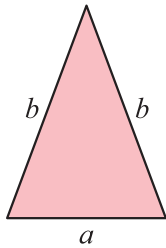
$$a = 70\ \%\ b$$
$$a + 2b = 81$$

Sustav možemo riješiti npr. metodom supstitucije.

Umjesto a u drugu jednadžbu uvrštavamo $0.7b$:

$$0.7b + 2b = 81$$
$$2.7b = 81 \quad / : 2.7$$
$$b = 30.$$

Uvrštavamo vrijednost 30 u npr. prvu jednadžbu umjesto b:

$$a = 70\ \% \cdot 30$$
$$a = 0.7 \cdot 30$$
$$a = 21.$$

Duljina osnovice tog trokuta je 21 cm.

7. x – cijena jednog kilograma banana
y – cijena jednog kilograma marelica

$$2x + 3y = 10.20 \quad / \cdot 4 \qquad\qquad V(3, 4) = 12$$
$$0.5x + 4y = 10.35 \quad / \cdot (-3)$$
$$\begin{aligned} 8x + 12y &= 40.80 \\ -1.5x - 12y &= -31.05 \end{aligned} \Bigg\} +$$
$$6.5x = 9.75 \quad / : 6.5$$
$$x = 1.5$$
$$2 \cdot 1.5 + 3y = 10.20$$
$$3 + 3y = 10.20 \quad / - 3$$
$$3y = 7.20 \quad / : 3$$
$$y = 2.4$$

Cijena jednog kilograma banana je 1.50 eura, a cijena jednog kilograma marelica iznosi 2.40 eura. Stoga je cijena 3 kg banana i 2 kg marelica $3 \cdot 1.5 + 2 \cdot 2.4 = 4.5 + 4.8 = 9.30$ eura.

8. S – trenutačne Sarine godine
L – trenutačne Lukine godine

$$S = L + 4$$
$$S + 3 = 2 \cdot (L + 3)$$
$$L + 4 + 3 = 2 \cdot (L + 3)$$
$$L + 7 = 2 \cdot (L + 3)$$
$$L + 7 = 2L + 6 \quad / - 2L$$
$$-L + 7 = 6 \quad / - 7$$
$$-L = -1$$
$$L = 1$$

Luka ima jednu godinu.

1.   • Ako je $x = 0$, tada je $0 + 2y = 7 \Rightarrow y = \dfrac{7}{2} \notin \mathbf{N}_0$.

• Ako je $x = 1$, tada je $1 + 2y = 7 \quad /- 1$
$$2y = 6 \quad /: 2$$
$$y = 3.$$

Jedno je rješenje uređeni par $(1, 3)$.

• Ako je $x = 2$, tada je $2 + 2y = 7 \quad /- 2$
$$2y = 5 \quad /: 2$$
$$y = \dfrac{5}{2} \notin \mathbf{N}_0.$$

• Ako je $x = 3$, tada je $3 + 2y = 7 \quad /- 3$
$$2y = 4 \quad /: 2$$
$$y = 2.$$

Drugo rješenje je uređeni par $(3, 2)$.

• Ako je $x = 4$, tada je $4 + 2y = 7 \quad /- 4$
$$2y = 3 \quad /: 2$$
$$y = \dfrac{3}{2} \notin \mathbf{N}_0.$$

• Ako je $x = 5$, tada je $5 + 2y = 7 \quad /- 5$
$$2y = 2 \quad /: 2$$
$$y = 1.$$

Treće rješenje je uređeni par $(5, 1)$.

• Ako je $x = 6$, tada je $6 + 2y = 7 \quad /- 6$
$$2y = 1 \quad /: 2$$
$$y = \dfrac{1}{2} \notin \mathbf{N}_0.$$

• Ako je $x = 7$, tada je $7 + 2y = 7 \quad /- 7$
$$2y = 0 \quad /: 2$$
$$y = 0.$$

Četvrto rješenje je uređeni par $(7, 0)$.

• Ako je $x = 8$, tada je $8 + 2y = 7 \quad /- 8$
$$2y = -1$$
$$\Rightarrow y < 0.$$

Za svaki $x > 7$ vrijedi da je $y < 0$ te $y \notin \mathbf{N}_0$.

Rješenja su uređeni parovi $(1, 3)$, $(3, 2)$, $(5, 1)$ i $(7, 0)$.

2.   Uočimo da je drugi sustav lakše riješiti metodom supstitucije. Stoga ćemo prvi sustav riješiti metodom suprotnih koeficijenata.

a) $3x + 2y = 8 \quad /\cdot 5 \qquad V(2, 5) = 10$
$$4x - 5y = 3 \quad /\cdot 2$$

$$\left. \begin{array}{r} 15x + 10y = 40 \\ 8x - 10y = 6 \end{array} \right\} +$$
$$23x = 46 \quad /: 23$$
$$x = 2$$

$$3 \cdot 2 + 2y = 8$$
$$6 + 2y = 8 \quad /- 6$$
$$2y = 2 \quad /: 2$$
$$y = 1$$

Rješenje sustava je uređen par $(2, 1)$.

b) $3x + y = 8 \implies \boxed{y = 8 - 3x}$

$\underline{5x + 3y = 10}$

$5x + 3(8 - 3x) = 10$

$5x + 24 - 9x = 10 \quad / -24$

$-4x = -14 \quad / : (-4)$

$x = \dfrac{14}{4} = \dfrac{7}{2}$

$y = 8 - 3x$

$y = 8 - 3 \cdot \dfrac{7}{2}$

$y = 8 - \dfrac{21}{2}$

$y = \dfrac{16}{2} - \dfrac{21}{2}$

$y = -\dfrac{5}{2}$

Rješenje sustava je uređeni par $\left(\dfrac{7}{2}, -\dfrac{5}{2}\right)$.

3. $5(x + 1) - (-2y + 5) = 11$

$\underline{2x + (3y - 7) = 4}$

$5x + \cancel{5} + 2y - \cancel{5} = 11$

$\underline{2x + 3y - 7 = 4 \quad / + 7}$

$5x + 2y = 11 \implies 2y = 11 - 5x \quad / : 2 \implies \boxed{y = 5.5 - 2.5x}$

$\underline{2x + 3y = 11}$

$2x + 3(5.5 - 2.5x) = 11$

$2x + 16.5 - 7.5x = 11 \quad / - 16.5$

$-5.5x = -5.5 \quad / : (-5.5)$

$x = 1$

$y = 5.5 - 2.5x$

$y = 5.5 - 2.5 \cdot 1$

$y = 3$

Rješenje sustava je uređeni par $(1, 3)$.

4. $4 - \dfrac{3x + y}{4} = \dfrac{1}{3}x \quad / \cdot 12$

$\dfrac{4x}{5} - 0.3 = 0.2y \quad / \cdot 10$

$\overline{48 - 3(3x + y) = 4x}$

$\underline{8x - 3 = 2y \quad / - 2y}$

$48 - 9x - 3y = 4x \quad / - 4x$

$\underline{8x - 2y - 3 = 0 \quad / + 3}$

$48 - 13x - 3y = 0 \quad / - 48$

$\underline{8x - 2y = 3}$

$-13x - 3y = -48 \quad / \cdot (-2) \qquad V(2, 3) = 6$

$\underline{8x - 2y = 3 \quad / \cdot 3}$

$\left. \begin{array}{r} 26x + \cancel{6y} = 96 \\ 24x - \cancel{6y} = 9 \end{array} \right\} +$

$$50x = 105 \quad /:50$$
$$x = \frac{105}{50} = \frac{21}{10} = 2.1$$

$$8x - 2y = 3$$
$$8 \cdot 2.1 - 2y = 3$$
$$16.8 - 2y = 3 \quad /-16.8$$
$$-2y = -13.8 \quad /:(-2)$$
$$y = 6.9$$

Rješenje sustava je uređeni par $(2.1, 6.9)$.

5. x – veći traženi broj
y – manji traženi broj

$$x - y = 17$$
$$y = 75\,\%\,x$$
$$\overline{x - y = 17}$$
$$\boxed{y = \frac{3}{4}\,x}$$

$$x - \frac{3}{4}x = 17$$
$$\frac{1}{4}x = 17 \quad /\cdot 4$$
$$x = 68$$

$$y = \frac{3}{4}\,x$$
$$y = \frac{3}{4} \cdot \overset{17}{\cancel{68}}_{1}$$
$$y = 51$$

To su brojevi 51 i 68.

6.
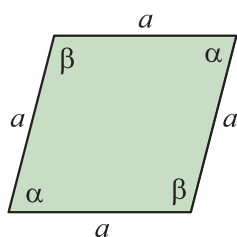
$$\alpha + \beta = 180°$$
$$\boxed{\alpha = \beta - 29°}$$
$$\beta - 29° + \beta = 180° \quad /+29$$
$$2\beta = 209° \quad /:2$$
$$\beta = 104.5°$$

Veličina većeg kuta je 104.5°.

7. **a)** $\quad a = \frac{2}{3}b$
$\quad\quad\quad a + 2b = 14$

b) $\quad a + 4b = 60$
$\quad\quad\quad a - b = 35.$

8. Z – broj Zvonimirovih sličica
T – broj Teinih sličica

$$Z - 37 = T + 37 \quad /+37$$
$$3 \cdot (T - 48) = Z + 48$$

$$\boxed{Z = T + 74}$$
$$\overline{3T - 144 = Z + 48}$$

$$3T - 144 = T + 74 + 48$$
$$3T - 144 = T + 122 \quad /+144$$
$$3T = T + 266 \quad /-T$$
$$2T = 266 \quad /:2$$
$$T = 133$$

$$Z = T + 74$$
$$Z = 133 + 74$$
$$Z = 207$$

Zajedno imaju 340 sličica.

1. Potrebno je odrediti jednadžbu pravca oblika

$$y = ax + b.$$

koeficijent   odsječak na osi y
smjera

$b = 5$ te je tražena jednadžba $y = ax + 5$.

Točka $A(1, -1)$ pripada pravcu pa njezine koordinate zadovoljavaju jednadžbu pravca.

$$\begin{array}{cc} x & y \end{array}$$
$$A(1, -1)$$

$$y = ax + 5$$
$$-1 = a \cdot 1 + 5 \quad / - 5$$
$$-1 - 5 = a$$
$$\underline{a = -6}$$

Jednadžba pravca je $y = -6x + 5$.

2. *1. način*

Odredimo koordinate dviju točaka koje pripadaju pravcu.

x	$y = 4x - 1$	
0	$4 \cdot 0 - 1 = -1$	$\Rightarrow \ (0, -1)$
1	$4 \cdot 1 - 1 = 3$	$\Rightarrow \ (1, 3)$

Biramo dvije mogućnosti.

Ucrtavamo točke u koordinatnoj ravnini i crtamo pravac koji prolazi tim točkama.
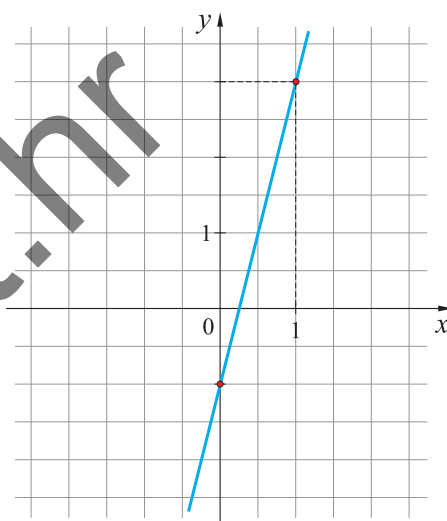
2. način

Koristimo se koeficijentom smjera i odsječkom na y-osi.

$y = 4x - 1$

+4
(pomak za 4 jedinične dužine gore jer je koeficijent smjera 4)

−1

+1
(pomak za 1 jediničnu dužinu desno)

točka određena odsječkom na osi y
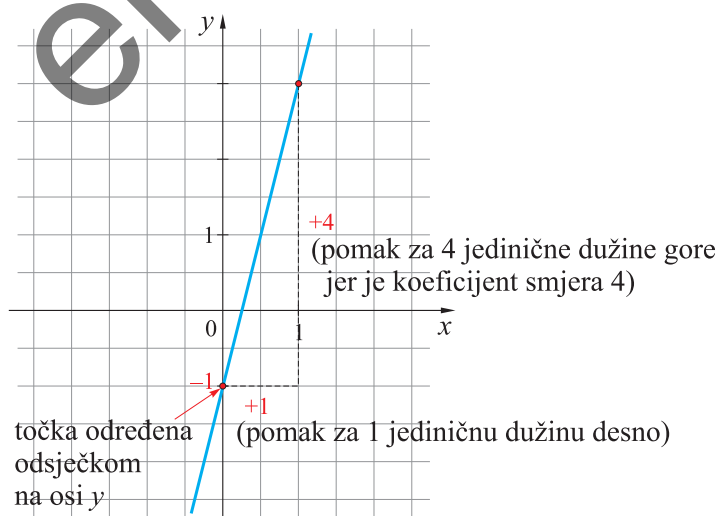
3. $x = -4$.

4. Određujemo jednadžbu oblika $y = ax + b$.

Potrebno je odrediti vrijednosti a i b.

Točke C i D pripadaju pravcu i njihove koordinate zadovoljavaju jednadžbu pravca.

$$\begin{array}{ll} & x \quad y \\ & C(3,\,-2) \\ & y = ax + b \\ & -2 = a \cdot 3 + b \end{array} \qquad \begin{array}{ll} & x \quad y \\ & D(5,\,2) \\ & y = ax + b \\ & 2 = a \cdot 5 + b \end{array}$$

Rješavamo sustav jednadžbi.

$$\begin{array}{ll} 3a + b = -2 & \\ 5a + b = 2 & /\cdot(-1) \\ \hline 3a + b = -2 & \\ -5a - b = -2 & \Big\} \; + \\ \hline -2a = -4 & /:(-2) \\ a = 2 & \end{array}$$

$$3a + b = -2$$
$$3 \cdot 2 + b = -2$$
$$6 + b = -2 \qquad /-6$$
$$b = -8$$

Tražena jednadžba pravca glasi:

$$y = 2x - 8.$$

5.
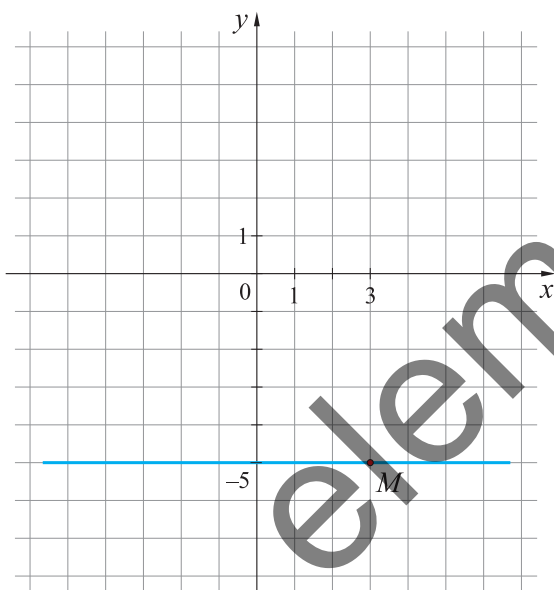
Tražena jednadžba pravca je $y = -5$.

6.
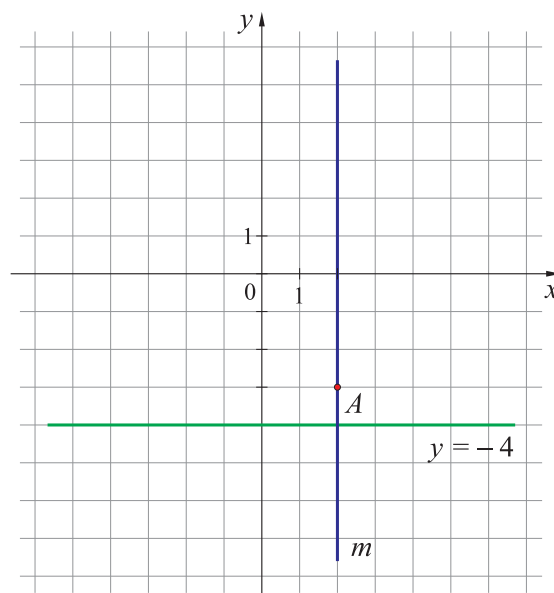
7. *1. način*

Uočimo točke koje pripadaju pravcu.

To su točke s koordinatama $(0, 4)$ i $(1, 1)$.

Uvrštavamo koordinate u traženu jednadžbu pravca oblika $y = ax + b$.

$$
\begin{array}{ll}
x \quad y & x \quad y \\
(0, 4) & (1, 1) \\
y = ax + b & y = ax + b \\
4 = a \cdot 0 + b & 1 = a \cdot 1 + b \\
b = 4 & 1 = a + 4 \quad /-4 \\
& -3 = a
\end{array}
$$

Jednadžba pravca glasi $y = -3x + 4$.

2. način

uočimo $b = 4$ $-3 \longrightarrow$ uočimo $a = -3$
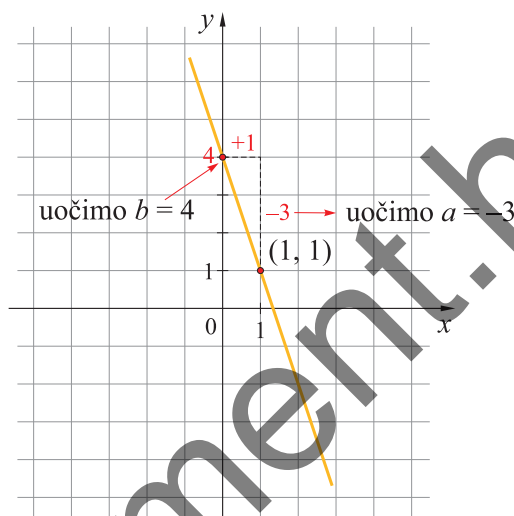
Jednadžba pravca glasi $y = -3x + 4$.

8. Usporedni pravci imaju iste koeficijente smjera.

Zaključujemo $a = 2$.

Potrebno je još odrediti odsječak na osi y:

$$
\begin{array}{l}
x \quad y \\
T(-3, 5) \\
y = ax + b \\
5 = 2 \cdot (-3) + b \\
5 = -6 + b \quad / + 6 \\
b = 11 \; .
\end{array}
$$

Jednadžba pravca glasi $y = 2x + 11$.

9. Potrebno je nacrtati pravce u koordinatnom sustavu u ravnini.

$$2x - y - 5 = 0 \implies -y = -2x + 5 \implies y = 2x - 5$$

x	$y = 2x - 5$
0	−5
1	−3

$$-x + y + 2 = 0 \implies y = x - 2$$

x	$y = x - 2$
2	0
3	1
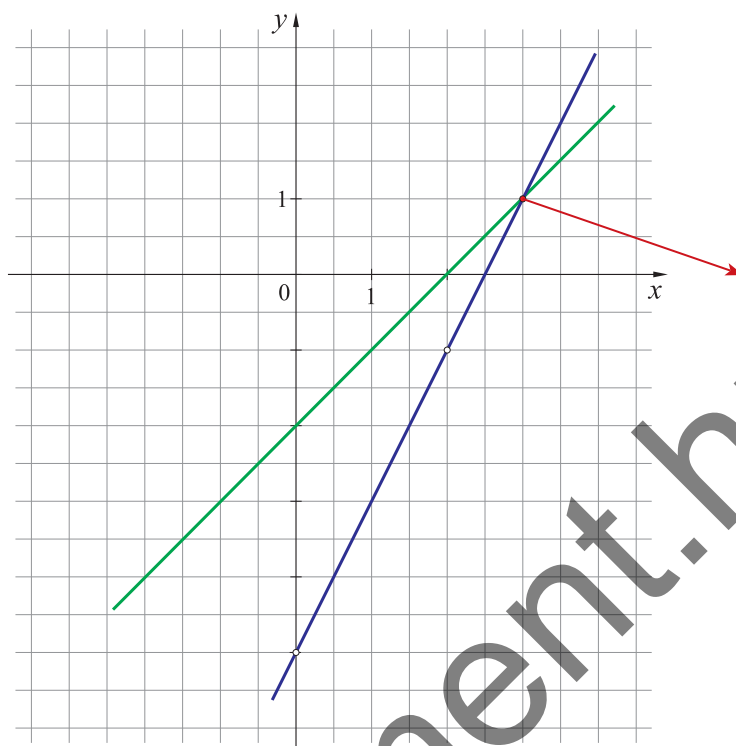
Uočavmo točku presjeka pravaca.

To je točka s koordinatama (3, 1).

Rješenje sustava je uređeni par (3, 1).

1. Da bismo došli do jednadžbe pravca, potrebno je odrediti još odsječak na y osi.

$$y = ax + b$$

$$a = 3 \qquad b = ?$$

Točka B pripada pravcu pa njezine koordinate zadovoljavaju jednadžbu tog pravca.

$$\begin{array}{cc} x & y \end{array}$$
$$B(2, -1)$$
$$y = 3x + b$$
$$-1 = 3 \cdot 2 + b \quad / - 6$$
$$-7 = b$$

Jednadžba pravca jest $y = 3x - 7$.

2.

x	$y = 3x - 4$	
0	$3 \cdot 0 - 4 = -4$	$\Rightarrow \ (0, -4)$
1	$3 \cdot 1 - 4 = -1$	$\Rightarrow \ (1, -1)$

3. $y = -2$.

4.
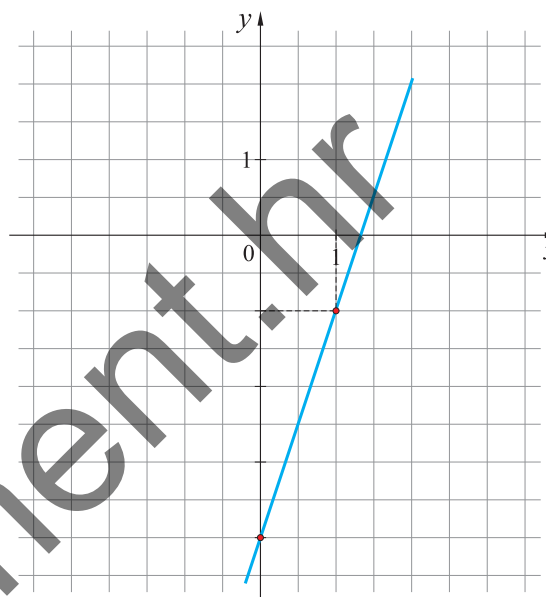
$$\begin{array}{cc} x & y \end{array} \qquad\qquad \begin{array}{cc} x & y \end{array}$$
$$C(4, -1) \qquad\qquad\quad D(3, 4)$$
$$y = ax + b \qquad\qquad y = ax + b$$
$$-1 = a \cdot 4 + b \qquad\quad 4 = a \cdot 3 + b$$

$$\begin{aligned} 4a + b &= -1 \\ 3a + b &= 4 \quad / \cdot (-1) \\ \hline 4a + b &= -1 \\ -3a - b &= -4 \end{aligned} \Bigg\} \ +$$

$$a = -5$$

$$4a + b = -1$$
$$4 \cdot (-5) + b = -1$$
$$-20 + b = -1 \quad / + 20$$
$$b = 19$$

Tražena jednadžba pravca je $y = -5x + 19$.

5.
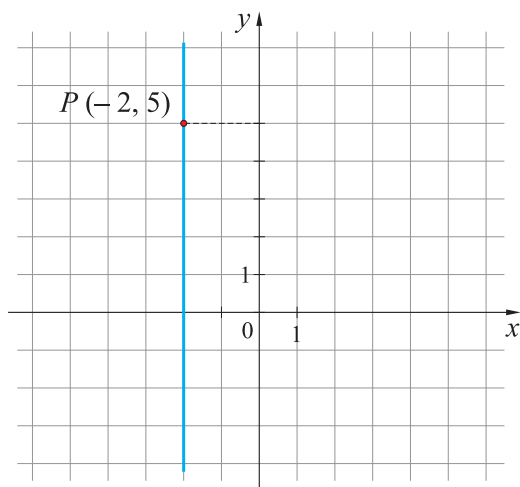
Jednadžba tog pravca je $x = -2$.

6.

$x = 3$
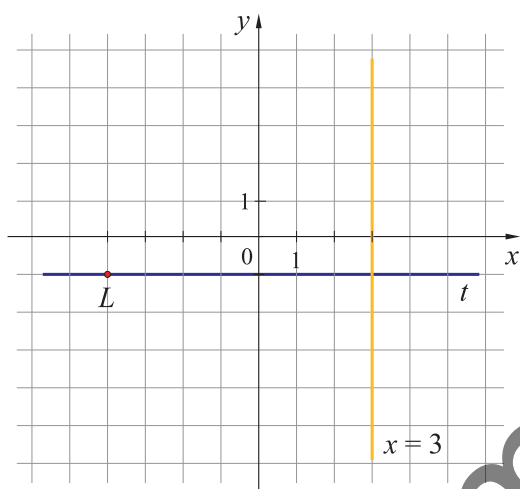
7.

$$b = -5$$

$$\begin{array}{cc} x & y \\ (6, & 3) \end{array}$$

$$y = ax + b$$

$$3 = a \cdot 6 - 5 \qquad / + 5$$

$$8 = 6a \qquad / : 6$$

$$a = \frac{8}{6}$$

$$a = \frac{4}{3}$$

Tražena jednadžba pravca glasi $y = \frac{4}{3}x - 5$.

8. Usporedni pravci imaju jednake koeficijente smjera. Dakle, $a = -1$.

Potrebno je odrediti još odsječak na osi y:

$$\begin{array}{cc} x & y \\ F(-5, & -2) \end{array}$$

$$y = ax + b$$

$$-2 = -1 \cdot (-5) + b$$

$$-2 = 5 + b \qquad / - 5$$

$$-7 = b \,.$$

Jednadžba pravca je $y = -x - 7$.

9. Potrebno je nacrtati pravce u koordinatnom sustavu u ravnini.

$$3x + 2y = 0 \implies 2y = -3x \implies y = -\frac{3}{2}x$$

x	$y = -\dfrac{3}{2}x$	
0	$-\dfrac{3}{2} \cdot 0 = 0$	$\implies (0, 0)$
2	$-\dfrac{3}{2} \cdot 2 = -3$	$\implies (2, -3)$

$$x + y + 2 = 0 \implies y = -x - 2$$

x	$y = x - 2$	
0	$-0 - 2 = -2$	$\implies (0, -2)$
1	$-1 - 2 = -3$	$\implies (1, -3)$
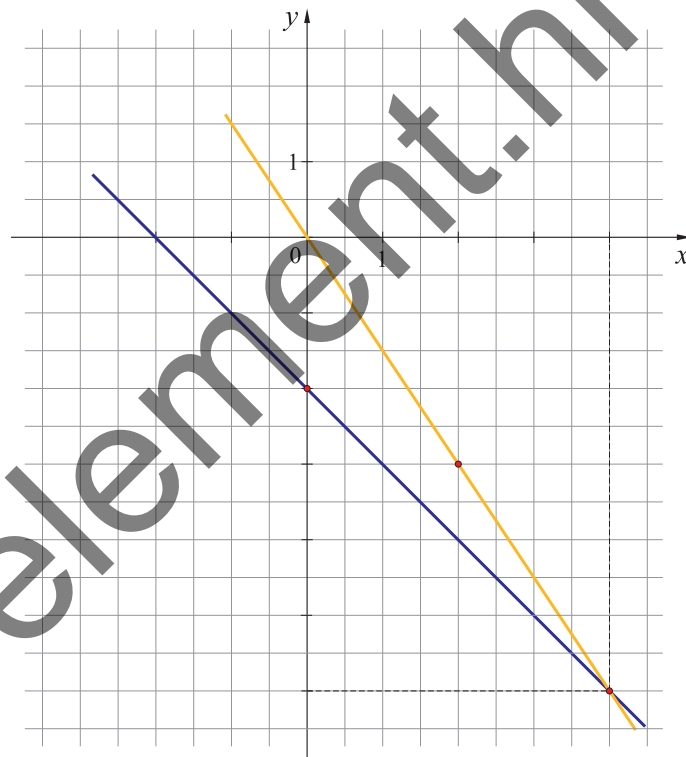
Rješenje sustava je uređeni par $(4, -6)$.

1. **a)** $2.3^2 = 2.3 \cdot 2.3 = 5.29$

     b) $\left(-3\dfrac{2}{5}\right)^2 = \left(-\dfrac{17}{5}\right)^2 = \dfrac{289}{25}$

     c) $3 \cdot (-4)^2 - (-7)^2 \cdot 3^2 = 3 \cdot 16 - 49 \cdot 9 = 48 - 441 = -393$

     d) $\dfrac{-4}{2^2} \cdot \dfrac{-1^2}{4} - 2^2 = \dfrac{-4}{4} \cdot \dfrac{-1}{4} - 4 = \dfrac{1}{4} - 4 = -3\dfrac{3}{4}.$

2. **a)** Brže rješavamo ako primjenjujemo jednakost $a^2 \cdot b^2 = (a \cdot b)^2$:

$$\left(\dfrac{3}{5}\right)^2 \cdot \left(\dfrac{20}{21}\right)^2 = \left(\dfrac{\overset{1}{\cancel{3}}}{\underset{1}{\cancel{5}}} \cdot \dfrac{\overset{4}{\cancel{20}}}{\underset{7}{\cancel{21}}}\right)^2 = \left(\dfrac{4}{7}\right)^2 = \dfrac{16}{49}.$$

     b) Vrijedi $a^2 : b^2 = (a : b)^2$.

$$\left(\dfrac{-26}{121}\right)^2 : \left(\dfrac{13}{11}\right)^2 = \left(\dfrac{-26}{121} : \dfrac{13}{11}\right)^2 = \left(\dfrac{\overset{2}{\cancel{-26}}}{\underset{11}{\cancel{121}}} \cdot \dfrac{\overset{1}{\cancel{11}}}{\underset{1}{\cancel{13}}}\right)^2 = \left(\dfrac{-2}{11}\right)^2 = \dfrac{4}{121}.$$

3. **a)** $(-9x^2) = 81x^2$

     b) $\left(\dfrac{3mnp}{25t}\right)^2 = \dfrac{9m^2n^2p^2}{625t^2}.$

4. **a)** $21 \underline{-9x} + \underbrace{7x^2} - \underbrace{8x^2} \underline{+ x} = 21 - 8x - x^2$ ili $-x^2 - 8x + 21$

     b) $3\overbrace{(2a + b)} - \overbrace{(a + 8)(1 - 4b)} = 6a + 3b - (a - 4ab + 8 - 32b) = \underbrace{6a} \underline{+ 3b} - \underbrace{a} + 4ab - 8 \underline{+ 32b}$

     $= 5a + 4ab + 35b - 8.$

5. Točna jednakost je **a)**.

$$(x - 5)^2 = (x - 5)(x - 5) = x^2 - 5x - 5x + 25 = x^2 - 10x + 25.$$

6. **a)** $81 = 3 \cdot 3 \cdot 3 \cdot 3 = 3^4$ **b)** $81 = 9 \cdot 9 = 9^2$ **c)** $81 = 81^1.$

7. **a)** $(-1)^{47} = \underbrace{(-1) \cdot (-1) \cdot (-1) \cdot \ldots \cdot (-1)}_{47 \text{ puta se javlja faktor } -1} = -1$ **b)** $\left(-\dfrac{3}{4}\right)^3 = \dfrac{-3}{4} \cdot \dfrac{-3}{4} \cdot \dfrac{-3}{4} = \dfrac{-27}{64}$

     c) $\left((-2)^3\right)^2 = (-2)^6 = 64$ **d)** $\left((10^2)^0\right)^3 = 10^0 = 1.$

8. **a)** $\underline{3x^7} - \underbrace{12x^3} \underline{+ x^7} - \underbrace{4x^3} = 4x^7 - 16x^3$

     b) $2.8xy^3 - 5x^3y + 2x^3y - 0.2xy^3 = 2.6xy^3 - 3x^3y.$

9. $2\underset{\sim}{a}\underset{\approx}{b^4}\underset{=}{c^2} \cdot (7\underset{\sim}{a^3}\underset{\approx}{b^7}\underset{=}{c^0}) = 14\,a^4b^{11}c^2$

$$14 \cdot 3^4 \cdot (-1)^{11} \cdot 2^2 = 14 \cdot 81 \cdot (-1) \cdot 4 = -4\,536.$$

10. $3m^6n^7p : (4m^2n^0p) = \dfrac{3}{4}m^4n^7$

$$\dfrac{3}{4}m^4n^7 = \dfrac{3}{4} \cdot 10^4 \cdot 0.1^7 = 0.75 \cdot 10\,000 \cdot 0.0000001 = 0.75 \cdot 0.001 = 0.00075.$$

21

1. a) $35^2 = 35 \cdot 35 = 1\,225$

    b) $1.7^2 = 2.89$

    c) $120^2 = 14\,400$

    d) $0.0007^2 = 0.00000049$

    e) $(-9)^3 = -9 \cdot (-9) \cdot (-9) = -729$

    f) $\left(-1\frac{2}{3}\right)^2 = \left(-\frac{5}{3}\right)^2 = \frac{25}{9}$

    g) $8^0 = 1$

    h) $\left(3^3\right)^2 = 3^6 = 729.$

2. a) $25^2 \cdot (0.16)^2 = (25 \cdot 0.16)^2 = 4^2 = 16$

    b) $\left(2\frac{1}{3}\right)^2 : \left(\frac{98}{27}\right)^2 = \left(\frac{7}{3} : \frac{98}{27}\right)^2 = \left(\frac{\overset{1}{\cancel{7}}}{\underset{1}{\cancel{3}}} \cdot \frac{\overset{9}{\cancel{27}}}{\underset{14}{\cancel{98}}}\right)^2 = \left(\frac{9}{14}\right)^2 = \frac{81}{196}.$

3. • $9a + (-11a) = -2a$

    $9a \cdot (-11a) = -99a^2$

    • $-3y + 1 - (y - 8) = -3y + 1 - y + 8 = -4y + 9$

    $(y - 8) \cdot (-4y + 9) = -4y^2 + 9y + 32y - 72 = -4y^2 + 41y - 72$

    • $24x^4 : \left(8x^2\right) = 3x^2$

    $3x^2 + 8x^2 = 11x^2$

prvi član	drugi član	zbroj članova	umnožak članova
$9a$	$-11a$	$-2a$	$-99a^2$
$y - 8$	$-4y + 9$	$-3y + 1$	$-4y^2 + 41y - 72$
$3x^2$	$8x^2$	$11x^2$	$24x^4$

4. $3m^2 - 5m(3 - m) + (m - 2)(3m + 4) = 3m^2 - 15m + 5m^2 + 3m^2 + 4m - 6m - 8$
    $= 11m^2 - 17m - 8.$

5. $256 = 16 \cdot 16$

    $4 \cdot 4 \qquad 4 \cdot 4$

    $2 \cdot 2 \quad 2 \cdot 2 \quad 2 \cdot 2 \quad 2 \cdot 2$

    a) $256 = 2^8$

    b) $256 = 4^4$

    c) $256 = 16^2.$

6. a) $3^3 - 2^4 = 3 \cdot 3 \cdot 3 - 2 \cdot 2 \cdot 2 \cdot 2 = 27 - 16 = 11$

    b) $\left(-\frac{1}{2}\right)^4 + 0.5^3 = \frac{1}{16} + \left(\frac{1}{2}\right)^3 = \frac{1}{16} + \frac{1}{8} = \frac{1}{16} + \frac{2}{16} = \frac{3}{16}$

    c) $8 \cdot 5^3 - 4 \cdot (-3)^5 = 8 \cdot 125 - 4 \cdot (-243) = 1\,000 + 972 = 1\,972.$

7. a) $9(ab)^7 + 11(ab)^7 - 40(ab)^7 = -20(ab)^7$

    b) $3^4 a^7 b \cdot 3^8 a^6 b^3 = 3^{12} a^{13} b^4$

    c) $7^9 x^3 y^5 z^{11} : (7^4 x^3 y^2 z) = 7^5 y^3 z^{10}.$

8.
$$(2x - 7)^2 - (3 + y)^2 = (2x - 7)(2x - 7) - (3 + y)(3 + y)$$
$$= 4x^2 - 14x - 14x + 49 - (9 + 3y + 3y + y^2)$$
$$= 4x^2 - 28x + 49 - 9 - 6y - y^2$$
$$= 4x^2 - 28x - y^2 - 6y + 40$$

$$4 \cdot 0.3^2 - 28 \cdot 0.3 - (-0.2)^2 - 6 \cdot (-0.2) + 40 = 4 \cdot 0.09 - 8.4 - 0.04 + 1.2 + 40$$
$$= 0.36 - 8.4 - 0.04 + 1.2 + 40$$
$$= 41.56 - 8.44 = 33.12.$$

9. Znanstveni zapis je zapis u obliku umnoška broja između 1 i 10 i potencije broja 10.

a	b	$a + b$	$a \cdot b$	a^3
$3 \cdot 10^7$	$4 \cdot 10^7$	$7 \cdot 10^7$	$12 \cdot 10^{14} = 1.2 \cdot 10^{15}$	$(3 \cdot 10^7)^3 = 27 \cdot 10^{21} = 2.7 \cdot 10^{22}$
$8 \cdot 10^3$	$7 \cdot 10^3$	$15 \cdot 10^3 = 1.5 \cdot 10^4$	$56 \cdot 10^6 = 5.6 \cdot 10^7$	$(8 \cdot 10^3)^3 = 512 \cdot 10^9 = 5.12 \cdot 10^{11}$

1. **a)** 9 **b)** 0.13 **c)** $\dfrac{7}{11}$.

2. $\left(-5\sqrt{14}\right)^2 = (-5)^2 \cdot \sqrt{14}^2 = 25 \cdot 14 = 350.$

3. **a)** $\sqrt{1\,600} + \sqrt{4} = 40 + 2 = 42$

    b) $\sqrt{0.36} - 2\sqrt{144} = 0.6 - 2 \cdot 12 = 0.6 - 24 = -23.4$

    c) $\dfrac{1}{5}\sqrt{64} - \dfrac{3}{10}\sqrt{400} = \dfrac{1}{5} \cdot 8 - \dfrac{3}{10}\cdot \overset{2}{20} = \dfrac{8}{5} - 6 = 1\dfrac{3}{5} - 6 = -4\dfrac{2}{5}$ ili $-\dfrac{22}{5}$ ili -4.4.

4. **a)** $\sqrt{49} < \sqrt{50} < \sqrt{64}$ **b)** $\sqrt{0.49} = 0.7$

      $7 < \sqrt{50} < 8$ $0.\,8 \boxed{>} \sqrt{0.49}$

        $\sqrt{50} \boxed{<} 8$

5. **a)** $\sqrt{17} - 4\sqrt{17} = \underline{1}\sqrt{17} - \underline{4}\sqrt{17} = (1-4)\sqrt{17} = -3\sqrt{17}$

    b) $3.8\sqrt{3} - 12\sqrt{3} = (3.8 - 12)\sqrt{3} = -8.2\sqrt{3}$

    c) $-\dfrac{1}{4}\sqrt{5} - \dfrac{1}{2}\sqrt{5} = \left(-\dfrac{1}{4} - \dfrac{1}{2}\right)\sqrt{5} = \left(-\dfrac{1}{4} - \dfrac{2}{4}\right)\sqrt{5} = -\dfrac{3}{4}\sqrt{5}$ ili $-0.75\sqrt{5}$.

6. $-\sqrt{5} - \left(\sqrt{7} + 3\sqrt{5}\right) - 4\sqrt{7} = \underline{\sqrt{5}} - \underline{\underline{\sqrt{7}}} - \underline{3\sqrt{5}} - \underline{\underline{4\sqrt{7}}} = -2\sqrt{5} - 5\sqrt{7}.$

7. **a)** Primijenimo tvrdnju vezanu za korijen umnoška $\sqrt{a\cdot b} = \sqrt{a}\cdot\sqrt{b}$, $a, b \geq 0$.

$$\sqrt{\dfrac{25}{144}\cdot\dfrac{196}{225}} = \sqrt{\dfrac{25}{144}}\cdot\sqrt{\dfrac{196}{225}} = \dfrac{\overset{1}{\cancel{5}}}{\underset{6}{\cancel{12}}}\cdot\dfrac{\overset{7}{\cancel{14}}}{\underset{3}{\cancel{15}}} = \dfrac{7}{18}$$

    b) Vrijedi $\sqrt{a} : \sqrt{b} = \sqrt{a : b}$, $a \geq 0$, $b > 0$.

      $\sqrt{98} : \sqrt{2} = \sqrt{98 : 2} = \sqrt{49} = 7$

    c) $\sqrt{3}\cdot\sqrt{48} = \sqrt{3\cdot 48} = \sqrt{144} = 12$.

8. **a)** $2\sqrt{5}\cdot\left(2 + 3\sqrt{2}\right) = 2\sqrt{5}\cdot 2 + 2\sqrt{5}\cdot 3\sqrt{2} = 4\sqrt{5} + 6\sqrt{10}$

    b) $\left(\sqrt{6} + 2\sqrt{11}\right)^2 = \left(\sqrt{6} + 2\sqrt{11}\right)\left(\sqrt{6} + 2\sqrt{11}\right) = 6 + 2\sqrt{66} + 2\sqrt{66} + 4\cdot 11$

          $= \underline{6} + 4\sqrt{66} + \underline{44} = 50 + 4\sqrt{66}$.

9. **a)** $28\sqrt{3} : \left(4\sqrt{3}\right) = \dfrac{\overset{7}{\cancel{28}}\,\cancel{\sqrt{3}}^{\,1}}{\underset{1}{\cancel{4}}\,\cancel{\sqrt{3}}_{\,1}} = 7$

    b) $8\sqrt{108} : \left(6\sqrt{3}\right) = \dfrac{\overset{4}{\cancel{8}}\,\sqrt{108}}{\underset{3}{\cancel{6}}\,\sqrt{3}} = \dfrac{4}{3}\sqrt{\dfrac{108}{3}} = \dfrac{4}{3}\sqrt{36} = \dfrac{4}{3}\cdot\overset{2}{\cancel{6}} = 8$.

10. **a)** $\sqrt{12} = \sqrt{4\cdot 3} = \sqrt{4}\cdot\sqrt{3} = 2\sqrt{3}$

     b) $\sqrt{125} = \sqrt{25\cdot 5} = \sqrt{25}\cdot\sqrt{5} = 5\sqrt{5}$.

11. $\sqrt{8} - 7\sqrt{32} + \sqrt{50} = \sqrt{4 \cdot 2} - 7\sqrt{16 \cdot 2} + \sqrt{25 \cdot 2}$

prvo djelomično
korjenujemo

$= 2\sqrt{2} - 7 \cdot 4\sqrt{2} + 5\sqrt{2}$

$= 2\sqrt{2} - 28\sqrt{2} + 5\sqrt{2}$

$= -21\sqrt{2}.$

12. a) $\dfrac{1}{\sqrt{15}} \cdot \dfrac{\sqrt{15}}{\sqrt{15}} = \dfrac{\sqrt{15}}{\sqrt{15}^2} = \dfrac{\sqrt{15}}{15}$

b) $\dfrac{12}{3\sqrt{10}} \cdot \dfrac{\sqrt{10}}{\sqrt{10}} = \dfrac{\overset{4}{\cancel{12}} \sqrt{10}}{\underset{1}{\cancel{3}} \sqrt{10}^2} = \dfrac{\overset{2}{\cancel{4}} \sqrt{10}}{\underset{5}{\cancel{10}}} = \dfrac{2\sqrt{10}}{5}.$

13. a) $x^2 = \dfrac{25}{36} \Big/ \sqrt{}$

$|x| = \dfrac{5}{6}$

$x_1 = \dfrac{5}{6}, \quad x_2 = -\dfrac{5}{6}$

b) $x^2 = 0.09 \Big/ \sqrt{}$

$|x| = 0.3$

$x_1 = 0.3, \quad x_2 = -0.3$

c) $\dfrac{9}{5} x^2 = 72 \Big/ \cdot \dfrac{5}{9}$

$x^2 = \overset{8}{\cancel{72}} \cdot \dfrac{5}{\underset{1}{\cancel{9}}}$

$x^2 = 40 \Big/ \sqrt{}$

$|x| = \sqrt{40} \qquad (40 = 4 \cdot 10)$

$|x| = 2\sqrt{10}$

$x_1 = 2\sqrt{10}, \quad x_2 = -2\sqrt{10}$

d) $4x^2 = 5 \Big/ : 4$

$x^2 = \dfrac{5}{4} \Big/ \sqrt{}$

$|x| = \sqrt{\dfrac{5}{4}} = \dfrac{\sqrt{5}}{\sqrt{4}} = \dfrac{\sqrt{5}}{2}$

$x_1 = \dfrac{\sqrt{5}}{2}, \quad x_2 = -\dfrac{\sqrt{5}}{2}.$

1. **a)** 19 **b)** 0.12 **c)** $\dfrac{1}{15}$.

2. $\left(-2\sqrt{19}\right)^2 = \left(-2\right)^2 \cdot \sqrt{19}^2 = 4 \cdot 19 = 76.$

3. **a)** $\sqrt{10\,000} + \sqrt{12\,100} = 100 + 110 = 210$

   b) $\sqrt{0.0016} - 2\sqrt{3.24} = 0.04 - 2 \cdot 1.8 = 0.04 - 3.6 = -3.56$

   c) $\dfrac{1}{2}\sqrt{900} - \dfrac{1}{3}\sqrt{289} = \dfrac{1}{\cancel{2}_1} \cdot \overset{15}{\cancel{30}} - \dfrac{1}{3} \cdot 17 = 15 - \dfrac{17}{3} = 15 - 5\dfrac{2}{3} = 9\dfrac{1}{3}$ ili $\dfrac{28}{3}$.

4. **a)** $\sqrt{81} < \sqrt{90} < \sqrt{100}$ **b)** $\sqrt{0.0064} = 0.08$

     $9 < \sqrt{90} < 10$ $0.08 \boxed{=} \sqrt{0.0064}.$

     $\sqrt{90} \boxed{<} 10$

5. **a)** $\sqrt{10} - 9\sqrt{10} = 1\sqrt{10} - 9\sqrt{10} = -8\sqrt{10}$

   b) $8.3\sqrt{14} - 12\sqrt{14} = \left(8.3 - 12\right)\sqrt{14} = -3.7\sqrt{14}$

   c) $\dfrac{5}{6}\sqrt{7} - 0.75\sqrt{7} = \dfrac{5}{6}\sqrt{7} - \dfrac{3}{4}\sqrt{7} = \dfrac{10}{12}\sqrt{7} - \dfrac{9}{12}\sqrt{7} = \dfrac{1}{12}\sqrt{7}$ ili $\dfrac{\sqrt{7}}{12}$.

6. $\sqrt{3} + \left(-\sqrt{5} - 2\sqrt{3}\right) - 0.7\sqrt{5} = \underline{\sqrt{3}} - \underline{\underline{\sqrt{5}}} - \underline{2\sqrt{3}} - \underline{\underline{0.7\sqrt{5}}} = -\sqrt{3} - 1.7\sqrt{5}.$

7. **a)** $\sqrt{\dfrac{16}{49} \cdot \dfrac{25}{81}} = \sqrt{\dfrac{16}{49}} \cdot \sqrt{\dfrac{25}{81}} = \dfrac{4}{7} \cdot \dfrac{5}{9} = \dfrac{20}{63}$

   b) $\sqrt{72} : \sqrt{2} = \sqrt{72 : 2} = \sqrt{36} = 6$

   c) $\sqrt{27} \cdot \sqrt{3} = \sqrt{27 \cdot 3} = \sqrt{81} = 9.$

8. **a)** $3\sqrt{5}\left(4 - 8\sqrt{2}\right) = 12\sqrt{5} - 24\sqrt{10}$

   b) $\left(2\sqrt{3} - \sqrt{14}\right)^2 = \left(2\sqrt{3} - \sqrt{14}\right)\left(2\sqrt{3} - \sqrt{14}\right) = 4\sqrt{3}^2 - 2\sqrt{42} - 2\sqrt{42} + \sqrt{14}^2$

       $= 4 \cdot 3 - 4\sqrt{42} + 14 = 12 - 4\sqrt{42} + 14 = 26 - 4\sqrt{42}.$

9. **a)** $42\sqrt{3} : \left(6\sqrt{3}\right) = \dfrac{\overset{7}{\cancel{42}}\,\cancel{\sqrt{3}}^{\,1}}{{}_1\cancel{6}\,\cancel{\sqrt{3}}_{\,1}} = 7$

   b) $30\sqrt{72} : \left(20\sqrt{2}\right) = \dfrac{\overset{3}{\cancel{30}}\,\sqrt{72}}{{}_2\cancel{20}\,\sqrt{2}} = \dfrac{3}{2}\sqrt{\dfrac{72}{2}} = \dfrac{3}{2}\sqrt{36} = \dfrac{3}{2} \cdot \overset{3}{\cancel{6}}_{\,1} = 9.$

10. **a)** $\sqrt{150} = \sqrt{25 \cdot 6} = 5\sqrt{6}$

   b) $\sqrt{84} = \sqrt{4 \cdot 21} = 2\sqrt{21}.$

11. $\sqrt{27} - 8\sqrt{12} + \sqrt{243} = \sqrt{9 \cdot 3} - 8\sqrt{4 \cdot 3} + \sqrt{81 \cdot 3} = 3\sqrt{3} - 8 \cdot 2\sqrt{3} + 9\sqrt{3}$

            $= 3\sqrt{3} - 16\sqrt{3} + 9\sqrt{3} = -4\sqrt{3}.$

12. a) $\dfrac{1}{\sqrt{6}} \cdot \dfrac{\sqrt{6}}{\sqrt{6}} = \dfrac{\sqrt{6}}{6}$

b) $\dfrac{21}{2\sqrt{7}} \cdot \dfrac{\sqrt{7}}{\sqrt{7}} = \dfrac{\overset{3}{21} \cdot \sqrt{7}}{2 \cdot \underset{1}{7}} = \dfrac{3\sqrt{7}}{2}.$

13. a) $x^2 = \dfrac{9}{4} \quad /^{\sqrt{\;}}$

$|x| = \dfrac{3}{2}$

$x_1 = \dfrac{3}{2}, \quad x_2 = -\dfrac{3}{2}$

b) $x^2 = 2.25 \quad /^{\sqrt{\;}}$

$|x| = 1.5$

$x_1 = 1.5, \quad x_2 = -1.5$

c) $\dfrac{9}{8}x^2 = 2 \quad /:\dfrac{9}{8}$

$x^2 = 2 \cdot \dfrac{8}{9}$

$x^2 = \dfrac{16}{9} \quad /^{\sqrt{\;}}$

$|x| = \dfrac{4}{3}$

$x_1 = \dfrac{4}{3}, \quad x_2 = -\dfrac{4}{3}$

d) $64x^2 - 49 = 0$

$64x^2 = 49 \quad /:64$

$x^2 = \dfrac{49}{64} \quad /^{\sqrt{\;}}$

$|x| = \dfrac{7}{8}$

$x_1 = \dfrac{7}{8}, \quad x_2 = -\dfrac{7}{8}.$

1. Uočimo da je a duljina hipotenuze, a $2b$ i $\frac{5}{4}c$ su duljine kateta. Vrijedi: $a^2 = (2b)^2 + \left(\frac{5}{4}c\right)^2$.

2. Nacrtan je kvadrat kojemu je zadana duljina dijagonale.
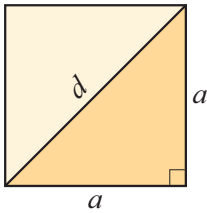
Uočimo pravokutni trokut.

$$d^2 = a^2 + a^2$$
$$d^2 = 2a^2$$
$$\boxed{d = a\sqrt{2}}$$

$$8 = a\sqrt{2} \quad / : \sqrt{2}$$
$$a = \frac{8}{\sqrt{2}}$$
$$a = \frac{8}{\sqrt{2}} \cdot \frac{\sqrt{2}}{\sqrt{2}}$$
$$a = \frac{8\sqrt{2}}{2}$$
$$\underline{a = 4\sqrt{2}} \text{ m.}$$

3.
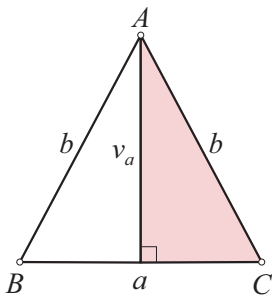
Vrijedi: $b^2 = v_a^2 + \left(\frac{a}{2}\right)^2$.

$b = 34$ mm

$\underline{a = 32 \text{ mm}}$

$v_a = ?$

$b^2 = v_a^2 + \left(\frac{a}{2}\right)^2$

$$34^2 = v_a^2 + \left(\frac{32}{2}\right)^2$$
$$1\,156 = v_a^2 + 16^2$$
$$1\,156 = v_a^2 + 256$$
$$v_a^2 = 1\,156 - 256$$
$$v_a^2 = 900 \quad /^{\sqrt{\ }}$$
$$\underline{v_a = 30 \text{ mm}}$$

4.
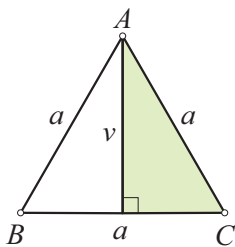
Vrijedi: $v = \dfrac{a\sqrt{3}}{2}$

$$P = \frac{a \cdot v}{2} \Rightarrow P = \frac{a^2\sqrt{3}}{4}.$$

$\underline{P = 36\sqrt{3} \text{ cm}^2}$

$a = ?$

$$P = \frac{a^2\sqrt{3}}{4}$$

$$36\sqrt{3} = \frac{a^2\sqrt{3}}{4} \quad / \cdot 4$$
$$144\sqrt{3} = a^2\sqrt{3} \quad / : \sqrt{3}$$
$$a^2 = 144 \quad /^{\sqrt{\ }}$$
$$\underline{a = 12 \text{ cm.}}$$

5.
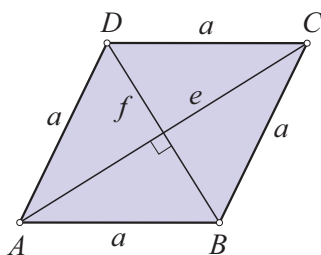
Vrijedi: $a^2 = \left(\dfrac{e}{2}\right)^2 + \left(\dfrac{f}{2}\right)^2$.

$e = 56$ dm

$\underline{a = 35 \text{ dm}}$

$f = ?$

$a^2 = \left(\dfrac{e}{2}\right)^2 + \left(\dfrac{f}{2}\right)^2$

$35^2 = \left(\dfrac{56}{2}\right)^2 + \left(\dfrac{f}{2}\right)^2$

$1\,225 = 28^2 + \left(\dfrac{f}{2}\right)^2$

$$1\,225 = 784 + \left(\frac{f}{2}\right)^2$$
$$\left(\frac{f}{2}\right)^2 = 1\,225 - 784$$
$$\left(\frac{f}{2}\right)^2 = 441 \quad /^{\sqrt{\ }}$$
$$\left(\frac{f}{2}\right) = 21 \quad / \cdot 2$$
$$\underline{f = 42 \text{ dm.}}$$

6.
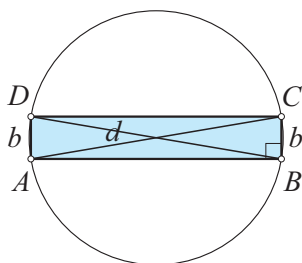
Vrijedi: $r = \dfrac{d}{2}$

$$d^2 = a^2 + b^2.$$

$o_o = 12\pi$ cm
$b = 2$ cm
―――――
$P = ?$

Prvo računamo duljinu dijagonale pravokutnika:

$o_o = 2r\pi$
$12\pi = 2r\pi \ / : \pi$
$2r = 12 \Rightarrow d = 12$ cm.

Potom računamo duljinu druge stranice pravokutnika:

$$d^2 = a^2 + b^2$$
$$12^2 = a^2 + 2^2$$
$$144 = a^2 + 4$$
$$a^2 = 140 \ /^{\sqrt{}}$$
$$a = \sqrt{140} = \sqrt{4 \cdot 35} = 2\sqrt{35} \text{ cm.}$$

Naposljetku računamo površinu pravokutnika:

$$P = a \cdot b$$
$$P = 2\sqrt{35} \cdot 2$$
$$P = 4\sqrt{35} \text{ cm}^2.$$

7.
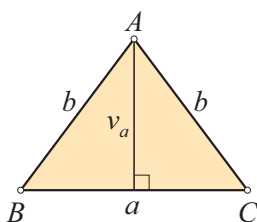
$P = 300$ m^2
$v_a = 20$ m
―――――
$o = ?$

Računamo duljinu osnovice:

$$P = \frac{a \cdot v_a}{2}$$
$$300 = \frac{a \cdot \overset{10}{20}}{\underset{1}{2}}$$
$$300 = 10\,a \ / : 10$$
$$a = 30 \text{ m.}$$

Potom računamo duljinu kraka:

$$b^2 = v_a^2 + \left(\frac{a}{2}\right)^2$$
$$b^2 = 20^2 + \left(\frac{30}{2}\right)^2$$
$$b^2 = 400 + 225$$
$$b^2 = 625 \ /^{\sqrt{}}$$
$$b = 25 \text{ m.}$$

Sada računamo opseg trokuta:

$o = a + 2b$
$o = 30 + 2 \cdot 25$
$o = 80$ m.

8.
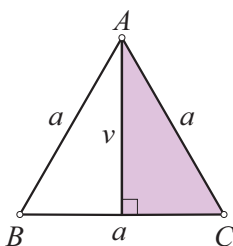
$v = 18$ mm
―――――
$o, P = ?$

Prvo računamo duljinu stranice tog trokuta.
Prema Pitagorinu poučku vrijedi:

$$v = \frac{a\sqrt{3}}{2}$$
$$18 = \frac{a\sqrt{3}}{2} \ / \cdot 2$$
$$a\sqrt{3} = 36 \ / : \sqrt{3}$$
$$a = \frac{36}{\sqrt{3}} \cdot \frac{\sqrt{3}}{\sqrt{3}} = \frac{\overset{12}{36}\sqrt{3}}{\underset{1}{3}} = 12\sqrt{3} \text{ mm.}$$

Tada računamo opseg i površinu tog trokuta:

$o = 3a$

$o = 3 \cdot 12\sqrt{3}$

$\underline{o = 36\sqrt{3} \text{ mm}}$

$P = \dfrac{a^2\sqrt{3}}{4}$

$P = \dfrac{\left(12\sqrt{3}\right)^2 \sqrt{3}}{4}$

$P = \dfrac{\overset{36}{\cancel{144}} \cdot 3 \cdot \sqrt{3}}{\cancel{4}_1} \Rightarrow \underline{P = 108\sqrt{3} \text{ mm}^2}.$

9. **a)** Dopunimo trokut do jednakostraničnog trokuta.
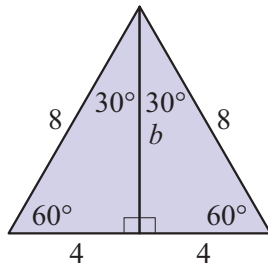
b je duljina visine jednakostraničnog trokuta:

$b = \dfrac{8\sqrt{3}}{2}$

$\underline{b = 4\sqrt{3}}.$

b) Nacrtani trokut je jednakokračni trokut.
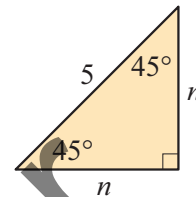
Vrijedi: $n^2 + n^2 = 5^2$

$2n^2 = 25 \quad / : 2$

$n^2 = \dfrac{25}{2}$

$n = \sqrt{\dfrac{25}{2}}$

$n = \dfrac{5}{\sqrt{2}} \cdot \dfrac{\sqrt{2}}{\sqrt{2}}$

$\underline{n = \dfrac{5\sqrt{2}}{2}}.$

1.   **a)** $a^2 = b^2 + c^2$ **b)** $t^2 = (2n)^2 + m^2$ **c)** $(3m)^2 = \left(\dfrac{2}{3}k\right)^2 + (5n)^2.$

2.
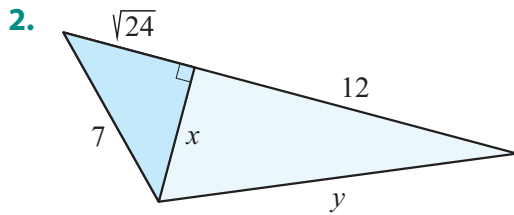
$$7^2 = x^2 + \sqrt{24}^2$$
$$49 = x^2 + 24$$
$$x^2 = 25$$
$$\underline{x = 5}$$

$$y^2 = 12^2 + x^2$$
$$y^2 = 12^2 + 5^2$$
$$y^2 = 144 + 25$$
$$y^2 = 169$$
$$\underline{y = 13.}$$

3.   **a)** $15^2 \neq 5^2 + 14^2$

    b) $6^2 = \sqrt{11}^2 + 5^2$ Trokut je pravokutan.

    c) $17^2 = 15^2 + 8^2$ Trokut je pravokutan.

    d) $10^2 \neq 9^2 + 4^2.$

4.
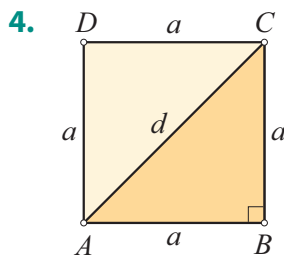
$$\dfrac{d = 20 \text{ cm}}{a = ?}$$
$$d = a\sqrt{2}$$
$$20 = a\sqrt{2} \ \ /:\sqrt{2}$$

$$a = \dfrac{20}{\sqrt{2}}$$
$$a = \dfrac{20}{\sqrt{2}} \cdot \dfrac{\sqrt{2}}{\sqrt{2}} = \dfrac{\overset{10}{\cancel{20}}\sqrt{2}}{\cancel{2}_1}$$
$$\underline{a = 10\sqrt{2} \text{ cm.}}$$

5.
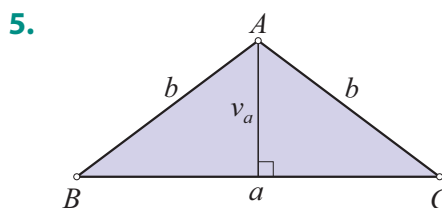
$$b = 30 \text{ mm}$$
$$\dfrac{v_a^2 = 18 \text{ mm}}{a = ?}$$
$$b^2 = v_a^2 + \left(\dfrac{a}{2}\right)^2$$
$$30^2 = 18^2 + \left(\dfrac{a}{2}\right)^2$$

$$\left(\dfrac{a}{2}\right)^2 = 30^2 - 18^2$$
$$\left(\dfrac{a}{2}\right)^2 = 900 - 324$$
$$\left(\dfrac{a}{2}\right)^2 = 576 \ \ /\sqrt{}$$
$$\dfrac{a}{2} = 24 \ \ /\cdot 2$$
$$\underline{a = 48 \text{ mm}}$$

6.
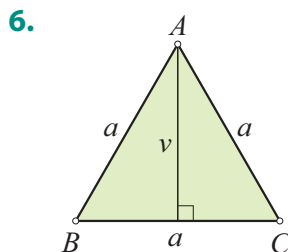
$$\dfrac{v = 15\sqrt{3} \text{ cm}}{a = ?}$$
$$v = \dfrac{a\sqrt{3}}{2}$$

$$15\sqrt{3} = \dfrac{a\sqrt{3}}{2} \ \ /\cdot 2$$
$$30\sqrt{3} = a\sqrt{3} \ \ /:\sqrt{3}$$
$$\underline{a = 30 \text{ cm.}}$$

7.
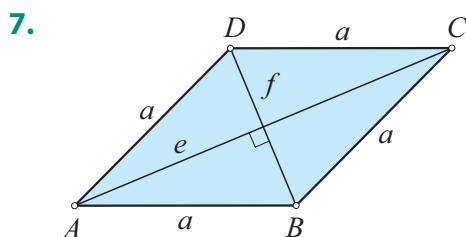
$$e = 48 \text{ dm}$$
$$\dfrac{a = 260 \text{ cm} = 26 \text{ dm}}{f = ?}$$
$$a^2 = \left(\dfrac{e}{2}\right)^2 + \left(\dfrac{f}{2}\right)^2$$
$$26^2 = \left(\dfrac{48}{2}\right)^2 + \left(\dfrac{f}{2}\right)^2$$

$$676 = 576 + \left(\dfrac{f}{2}\right)^2$$
$$\left(\dfrac{f}{2}\right)^2 = 676 - 576$$
$$\left(\dfrac{f}{2}\right)^2 = 100 \ \ /\sqrt{}$$
$$\dfrac{f}{2} = 10 \ \ /\cdot 2$$
$$\underline{f = 20 \text{ dm.}}$$

8.
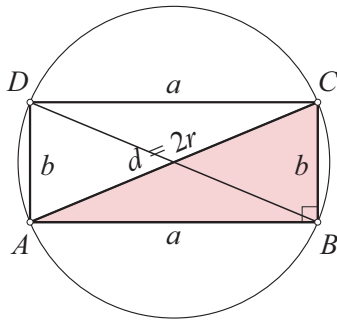
$P_o = 169\pi \ \text{m}^2$

$\underline{a = 24 \ \text{m}}$

$o = ?$

$P_o = r^2\pi$

$169\pi = r^2\pi \ / : \pi$

$r^2 = 169 \ /^{\sqrt{}}$

$r = 13 \ \text{m}$

$d = 2r = 26 \ \text{m}$

$a^2 + b^2 = d^2$

$24^2 + b^2 = 26^2$

$576 + b^2 = 676$

$b^2 = 676 - 576$

$b^2 = 100 \ /^{\sqrt{}}$

$b = 10 \ \text{m}$

$o = 2a + 2b$

$o = 2 \cdot 24 + 2 \cdot 10$

$o = 48 + 20$

$\underline{o = 68 \ \text{m.}}$

9.
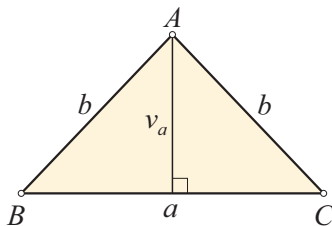
$o = 98 \ \text{cm}$

$\underline{a = 40 \ \text{cm}}$

$\overline{P = ?}$

Prvo računamo duljinu kraka:

$o = 98 \ \text{cm}$

$o = a + 2b$

$a + 2b = 98$

$40 + 2b = 98$

$2b = 98 - 40$

$2b = 58 \ / : 2$

$b = 29 \ \text{m.}$

Potom računamo duljinu visine na osnovicu:
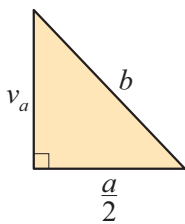
$v_a^2 + \left(\dfrac{a}{2}\right)^2 = b^2$

$v_a^2 + \left(\dfrac{40}{2}\right)^2 = 29^2$

$v_a^2 + 20^2 = 29^2$

$v_a^2 + 400 = 841$

$v_a^2 = 441 \ /^{\sqrt{}}$

$v_a = 21 \ \text{cm.}$

Na kraju računamo površinu trokuta:

$P = \dfrac{a \cdot v_a}{2}$

$P = \dfrac{\overset{20}{\cancel{40}} \cdot 21}{\underset{1}{\cancel{2}}}$

$\underline{P = 420 \ \text{cm}^2.}$

10.
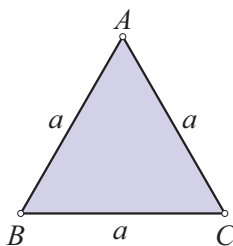
$\underline{P = 8\sqrt{3} \ \text{mm}^2}$

$v = ?$

Prvo računamo duljinu stranice tog trokuta:

$P = \dfrac{a^2\sqrt{3}}{4}$

$8\sqrt{3} = \dfrac{a^2\sqrt{3}}{4} \ / \cdot 4$

$32\sqrt{3} = a^2\sqrt{3} \ / : \sqrt{3}$

$a^2 = 32 \ /^{\sqrt{}}$

$a = \sqrt{32} = \sqrt{16 \cdot 2}$

$a = 4\sqrt{2} \ \text{mm.}$

Potom računamo duljinu visine jednakostraničnog trokuta:

$v = \dfrac{a\sqrt{3}}{2}$

$v = \dfrac{\overset{2}{\cancel{4}}\sqrt{2} \cdot \sqrt{3}}{\underset{1}{\cancel{2}}}$

$\underline{v = 2\sqrt{6} \ \text{mm.}}$

32

1. **a)** Skup racionalnih brojeva čine brojevi koji se mogu zapisati u obliku $\frac{a}{b}$, pri čemu je a cijeli broj, a b prirodni broj.

Npr. $\frac{3}{4}$, $2 = \frac{2}{1}$, $-1.8 = \frac{-18}{10}$ su primjeri racionalnih brojeva.

Skup iracionalnih brojeva čine svi brojevi koji u decimalnom zapisu imaju beskonačno decimala, a nemaju period. Ti se brojevi ne mogu zapisati kao razlomci oblika $\frac{a}{b}$ pri čemu je a cijeli, a b prirodni broj.

Stoga je presjek skupa racionalnih i skupa iracionalnih brojeva upravo prazan skup. Koristeći se skupovnim oznakama pišemo $\mathbf{Q} \cap \mathbf{I} = \varnothing$.

b) Svaki cijeli broj, npr. -2, možemo zapisati kao razlomak:

$$-2 = \frac{-2}{1}.$$

Dakle, svaki cijeli broj je ujedno i racionalni broj. $\mathbf{Q} \cup \mathbf{Z} = \mathbf{Q}$.

2. $\sqrt{3.61} = 1.9 = \frac{19}{10} \in \mathbf{Q}$.

3. **a)** $-\frac{10\,001}{1\,000} = -10.\underline{0}\underline{0}1 \longrightarrow$ konačni decimalni zapis

$\qquad$ 3 nule u $\qquad$ 3 decimalna
$\qquad$ dekadskoj $\qquad$ mjesta
$\qquad$ jedinici

b) $\frac{31}{8} = 31 : 8 = 3.875 \longrightarrow$ konačni decimalni zapis

$$\begin{array}{r} \underline{-24} \\ 70 \\ \underline{-64} \\ 60 \\ \underline{-56} \\ 40 \\ \underline{-40} \\ 0 \end{array}$$

c) $\frac{12}{7} = 12 : 7 = 1.\dot{7}14285\dot{5} \longrightarrow$ beskonačni periodični decimalni zapis

$$\begin{array}{r} \underline{-7} \\ 50 \\ \underline{-49} \\ 10 \\ \underline{-\ 7} \\ 30 \\ \underline{-28} \\ 20 \\ \underline{-14} \\ 60 \\ \underline{-56} \\ 40 \\ \underline{-35} \\ 5 \end{array}$$

d) $-\dfrac{12}{30} = -0.4$ $\longrightarrow$ konačni decimalni zapis

$\dfrac{12}{30} = \dfrac{2}{5}^{|\cdot 2} = \dfrac{4}{10} = 0.4$ ili $2 : 5 = 0.4.$
$\qquad\qquad\qquad\qquad\qquad\quad \underline{-0}$
$\qquad\qquad\qquad\qquad\qquad\quad\ \ 20$
$\qquad\qquad\qquad\qquad\qquad\ \underline{-\ 20}$
$\qquad\qquad\qquad\qquad\qquad\qquad\ 0$

4. **a)** $0.008 = -\dfrac{8}{1\,000}^{|:8} = \dfrac{1}{125}$ skraćujemo s brojem 8

3 decimalna mjesta   3 nule u dekadskoj jedinici

b) $-21.05 = -\dfrac{2\,105}{100} = -\dfrac{421}{20}.$

5. **a)** Zaokružujemo brojeve u podzadatcima **a)** i **b)** jer ti brojevi imaju beskonačni periodični zapis. Ti brojevi su racionalni.

6. **a)** $|x| = 3,\ x_1 = 3 \in \mathbf{N},\ x_2 = -3 \in \mathbf{Z}.$ **b)** $-24 = -72 + y$
$\qquad\qquad\qquad\qquad\qquad\qquad\qquad\qquad\qquad\quad \underset{+72}{}\ \underset{+72}{}$
$\qquad\qquad\qquad\qquad\qquad\qquad\qquad\qquad\qquad\ \ 48 = y$
$\qquad\qquad\qquad\qquad\qquad\qquad\qquad\qquad\qquad\ \ y = 48 \in \mathbf{N}$

c) $-3(x - 7) = 11x - 3$
$\quad -3x + 21 = 11x - 3$
$\qquad\ \underset{-21}{}\qquad \underset{-21}{}$
$\quad -3x = 11x - 24$
$\ \underset{-11x}{}\ \ \underset{-11x}{}$
$\ -14x = -24\quad /:(-14)$
$\qquad x = \dfrac{24}{14}$
$\qquad x = \dfrac{12}{7} \in \mathbf{Q}$

d) $m^2 + 0.01 = 1.7$
$\quad \underset{-0.01}{}\quad \underset{-0.01}{}$
$\qquad\ m^2 = 1.69\quad /^{\sqrt{\ }}$
$\quad m_1 = 1.3 \in \mathbf{Q},\ m_2 = -1.3 \in \mathbf{Q}$

e) $-1 = y - \dfrac{3 - 10y}{7}\quad /\cdot 7$
$\ -7 = 7y - (3 - 10y)$
$\ -7 = 7y - 3 + 10y$
$\ -7 = 17y - 3$
$\ \underset{+3}{}\qquad \underset{+3}{}$
$\ -4 = 17y\quad /:17$
$\quad y = -\dfrac{4}{17} \in \mathbf{Q}$

f) $x = 0.75 - \dfrac{1}{4} - \dfrac{5 - 2x}{6}$
$\quad x = 0.75 - 0.25 - \dfrac{5 - 2x}{6}$
$\quad x = 0.5 - \dfrac{5 - 2x}{6}\quad /\cdot 6$
$\ 6x = 3 - (5 - 2x)$
$\ 6x = 3 - 5 + 2x$
$\ 6x = -2 + 2x$
$\ \underset{-2x}{}\qquad \underset{-2x}{}$
$\ 4x = -2\quad /:4$
$\quad x = \dfrac{-2}{4}$
$\quad x = \dfrac{-1}{2} \in \mathbf{Q}.$

7. **a)** $0.24 \cdot 2.031 - 27 = 0.48744 - 27 = -26.51256 \in \mathbf{Q}$

b) $-15 - \dfrac{10}{7} : 4.2 = -15 - \dfrac{10}{7} : \dfrac{\overset{21}{\cancel{42}}}{\underset{5}{\cancel{10}}} = -15 - \dfrac{10}{7} : \dfrac{21}{5} = -15 - \dfrac{10}{7} \cdot \dfrac{5}{21} = -15 - \dfrac{50}{147} = -15\dfrac{50}{147} \in \mathbf{Q}.$

8. **a)** $\sqrt{3} \cdot \sqrt{3} = \left(\sqrt{3}\right)^2 = 3 \notin \mathbf{I}$

b) $\left(-3 - \sqrt{3}\right)^2 = \left(-3 - \sqrt{3}\right) \cdot \left(-3 - \sqrt{3}\right) = 9 + 3\sqrt{3} + 3\sqrt{3} + 3 = 12 + 6\sqrt{3} \in \mathbf{I}$

c) $\sqrt{2} + 3\sqrt{2} = 4\sqrt{2} \in \mathbf{I}$

d) $5\pi - \dfrac{1}{5}\pi = 4\dfrac{4}{5}\pi \in \mathbf{I}$

e) $\dfrac{1}{2}\sqrt{8} - \left(1 + \sqrt{2}\right) = \dfrac{1}{2}\sqrt{4 \cdot 2} - \left(1 + \sqrt{2}\right)$

$\qquad = \dfrac{1}{2} \cdot 2\sqrt{2} - 1 - \sqrt{2}$

$\qquad = \cancel{\sqrt{2}} - 1 - \cancel{\sqrt{2}}$

$\qquad = -1 \notin \mathbf{I}$

f) $5\sqrt{10} - \sqrt{250} = 5\sqrt{10} - \sqrt{25 \cdot 10} = 5\sqrt{10} - 5\sqrt{10} = 0 \notin \mathbf{I}.$

9. **a)** Prodajemo eure pa gledamo prodajni tečaj.

$$\cdot\,\mathbf{150} \left(\begin{array}{l} 1\,\text{€} = 1.1026\,\$ \\ 150\,\text{€} \approx 165.39\,\$ \end{array}\right) \cdot\,\mathbf{150}$$

Možemo dobiti 165.39 američkih dolara.

b)

$$\cdot\,\mathbf{150} \left(\begin{array}{l} 1\,\$ = \dfrac{1}{1.1060}\,\text{€} \\ 150\,\$ = \dfrac{150}{1.1060}\,\text{€} \end{array}\right) \cdot\,\mathbf{150}$$

$$150\,\$ \approx 135.62\,\text{€}$$

Možemo dobiti 135.62 eura.

10. Kamata ovisi o kamatnoj stopi koju određuje banka, o iznosu kredita i o vremenu vraćanja kredita.

11. **a)** Povoljnih elementarnih događaja je 11 od njih ukupno 25.

Tražena vjerojatnost je $\dfrac{11}{25}$.

b) Taj je događaj siguran i njegova vjerojatnost jednaka je broju 1.

c) Taj je događaj nemoguć te je tražena vjerojatnost jednaka broju 0.

1. **a)** $\mathbf{Q} \cup \mathbf{I} = \mathbf{R}$
   b) $\mathbf{N} \cap \mathbf{Z} = \mathbf{N}$.

2. $\sqrt{0.0289} = \sqrt{0.17^2} = 0.17 \in \mathbf{Q}$.

3. **a)** $\dfrac{27}{10\ 000} = 0.0027 \longrightarrow$ konačni decimalni zapis

   b) $-\dfrac{14}{9} = -1.\dot{5} \longrightarrow$ beskonačni periodični decimalni zapis

   $14 : 9 = 1.\dot{5}$
   50
   $\ 5$

   c) $-\dfrac{51}{12} = -4.25 \longrightarrow$ konačni decimalni zapis

   $51 : 12 = 4.25$
   30
   $\ 60$

   d) $\dfrac{19}{22} = 0.8\dot{6}\dot{3} \longrightarrow$ beskonačni periodični decimalni zapis

   $19 : 22 = 0.8\dot{6}\dot{3}$
   190
   $\ 140$
   $\ \ 080$
   $\ \ \ 14$

4. **a)** $-2.56 = -\dfrac{256}{100}^{|:4} = -\dfrac{64}{25}$

   b) $41.0071 = \dfrac{410\ 071}{10\ 000}$.

5. Zaokružujemo brojeve u podzadatcima **b)** i **d)**. Decimalni zapis tih brojeva je beskonačan i neperiodičan. Ti brojevi su iracionalni.

6. **a)** $|y| = 9$, $y_1 = 9 \in \mathbf{N}$, $y_2 = -9 \in \mathbf{Z}$.

   b) $-5(2x - 1) = 4$
   $-10x + 5 = 4$
   ${-5}\ \ {-5}$
   $-10x = -1 \quad / : (-10)$
   $x = \dfrac{1}{10} \in \mathbf{Q}$

   c) $x^2 - 1 = 5$
   ${+1}\ \ \ {+1}$
   $x^2 = 6 \quad /\sqrt{\ }$
   $x_1 = \sqrt{6} \in \mathbf{I}$, $x_2 = -\sqrt{6} \in \mathbf{I}$

   d) $-\dfrac{3 - x}{4} = \dfrac{2}{3}x \quad / \cdot 12$

   $-\overset{-3}{\cancel{12}} \cdot \dfrac{3 - x}{\cancel{4}_1} = \overset{4}{\cancel{12}} \cdot \dfrac{2}{\cancel{3}_1}x$

   $-3(3 - x) = 4 \cdot 2x$
   $-9 + 3x = 8x$
   ${-3x}\ \ {-3x}$
   $-9 = 5x \quad / : 5$
   $x = -\dfrac{9}{5} \in \mathbf{Q}$

e) $2 = \dfrac{1}{5} - 0.5 - \dfrac{5-2x}{4}$

$2 = 0.2 - 0.5 - \dfrac{5-2x}{4}$

$2 = -0.3 - \dfrac{5-2x}{4}$

$_{+0.3}_{+0.3}$

$2.3 = -\dfrac{5-2x}{4} \quad \Big/ \cdot 20$

$46 = -\overset{-5}{\cancel{20}} \cdot \dfrac{5-2x}{\underset{1}{\cancel{4}}}$

$46 = -25 + 10x$

$_{+25}_{+25}$

$71 = 10x \quad \Big/ : 10$

$x = 7.1 \in \mathbf{Q}.$

7. a) $5.31 \cdot 2.072 - 17 = 11.00232 - 17 = -5.99768 \in \mathbf{Q}$

b) $-18 - \dfrac{11}{6} : 4.4 = -18 - \dfrac{11}{6} : \dfrac{\overset{22}{\cancel{44}}}{\underset{5}{\cancel{10}}} = -18 - \dfrac{\overset{1}{\cancel{11}}}{6} \cdot \dfrac{5}{\underset{2}{\cancel{22}}} = -18 - \dfrac{5}{12} = -18\dfrac{5}{12} \in \mathbf{Q}.$

8. a) $\sqrt{5} \cdot \sqrt{5} = \left(\sqrt{5}\right)^2 = 5 \notin \mathbf{I}$

b) $\underbrace{\left(-2-\sqrt{2}\right)^2 = \left(2+\sqrt{2}\right)^2}_{\text{Vrijedi } (-a)^2 = a^2.} = \left(2+\sqrt{2}\right) \cdot \left(2+\sqrt{2}\right)$

$= 4 + 2\sqrt{2} + 2\sqrt{2} + \left(\sqrt{2}\right)^2$

$= 4 + 4\sqrt{2} + 2$

$= 6 + 4\sqrt{2} \in \mathbf{I}$

c) $\sqrt{3} + 2\sqrt{3} = 1\sqrt{3} + 2\sqrt{3} = 3\sqrt{3} \in \mathbf{I}$

d) $3\pi - \dfrac{1}{3}\pi = 2\dfrac{2}{3}\pi \in \mathbf{I}$

e) $\dfrac{1}{3}\sqrt{18} - \left(1+\sqrt{2}\right) = \dfrac{1}{3}\sqrt{9 \cdot 2} - 1 - \sqrt{2}$

$= \dfrac{1}{\underset{1}{\cancel{3}}} \cdot \overset{1}{\cancel{3}}\sqrt{2} - 1 - \sqrt{2}$

$= \cancel{\sqrt{2}} - 1 - \cancel{\sqrt{2}}$

$= -1 \notin \mathbf{I}$

f) $\sqrt{250} - \sqrt{90} = \sqrt{25 \cdot 10} - \sqrt{9 \cdot 10} = 5\sqrt{10} - 3\sqrt{10} = 2\sqrt{10} \in \mathbf{I}.$

9. a)

$\cdot 75 \Big(\begin{array}{c} 1 \text{ EUR} = 0.84333 \text{ GBP} \\ 75 \text{ EUR} \approx 63.25 \text{ GBP} \end{array} \Big) \cdot 75$

Možemo dobiti 63.25 britanskih funta.

b)

$\cdot 250 \Big(\begin{array}{c} 1 \text{ GBP} = \dfrac{1}{0.84587} \text{ EUR} \\ 250 \text{ GBP} = \dfrac{250}{0.84587} \text{ EUR} \end{array} \Big) \cdot 250$

$250 \text{ GBP} \approx 295.55 \text{ EUR}$

Možemo dobiti 295.55 eura.

10. $\dfrac{12\,013.72}{10\,000} = 1.201372 \approx 1.2$.

11. **a)** Dvoznamenkastih prirodnih brojeva je 90 (10, 11, 12... 98, 99).

Parnih je brojeva među njima 45. Tražena vjerojatnost je:
$$\frac{45}{90} = \frac{1}{2}.$$

b) Svi dvoznamenkasti prirodni brojevi su racionalni. Tražena vjerojatnost je:
$$\frac{90}{90} = 1.$$

c) Niti jedan dvoznamenkasti prirodni broj nije iracionalan. Tražena vjerojatnost je:
$$\frac{0}{90} = 0.$$

1. a)
$$x : 8 = 7 : 2$$

vanjski član   unutarnji članovi   vanjski član
razmjera   razmjera   razmjera

Umnožak vanjskih članova razmjera jednak je umnošku unutarnjih članova razmjera.

$$x : 8 = 7 : 2$$
$$2x = 56 \ / : 2$$
$$x = 28$$

b)
$$6 : 5 = 9 : (x - 2)$$
$$6 \, (x - 2) = 5 \cdot 9$$
$$6x - 12 = 45$$
$$ +12 \quad +12$$
$$6x = 57 \ / : 6$$
$$x = \frac{57}{6}$$
$$x = 9.5 \qquad \left(\text{ili } \frac{19}{2} \text{ ili } 9\frac{1}{2}\right).$$

2. Omjer sirupa i vode je   1 : 4.

$1 + 4 = 5$ dijelova

$12 : 5 = 2.4 \Rightarrow$ Svaki dio ima volumen 2.4 L.
20

Upotrijebio je 2.4 L sirupa.

3.
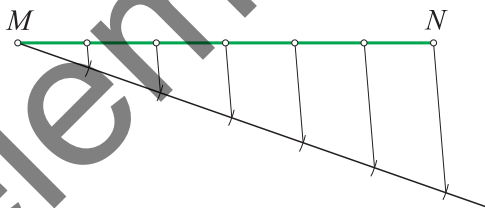
4. Dužinu dijelimo na $1 + 2 = 3$ jednaka dijela. Točka T nalazi se za jedan dio udaljena od točke C.
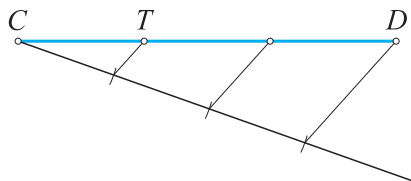
5. Usporedni pravci na krakovima kuta odsijecaju proporcionalne dužine.
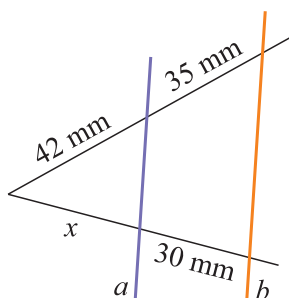
Vrijedi $42 : 35 = x : 30$

$$35x = 42 \cdot 30 \ / : 35$$
$$x = \frac{\overset{6}{\cancel{42}} \cdot \overset{6}{\cancel{30}}}{\underset{1}{\cancel{35}} \cancel{5}} \Rightarrow \quad x = 36 \text{ mm}.$$

6. Provjerimo vrijedi li

$$5 : 4 = 4 : 3.2.$$

$$5 \cdot 3.2 = 4 \cdot 4$$
$$16 = 16$$

Da, pravci c i d su usporedni.

7. Trokuti ABC i $A'B'C'$ su slični ako su im veličine odgovarajućih kutova <u>jednake</u> i ako su im <u>duljine</u> odgovarajućih <u>stranica</u> proporcionalne.

Za veličine kutova vrijedi <u>$\alpha = \alpha'$</u>, <u>$\beta = \beta'$</u> i <u>$\gamma = \gamma'$</u>, a za duljine stranica <u>$a : a' = b : b' = c : c'$</u>.

8. a) Izračunajmo veličinu preostalog kuta u prvom trokutu:

$$180° - (91° + 56°) = 180° - 147° = 33°.$$

Zaključujemo da su trokuti slični jer imaju dva kuta jednakih veličina. Slični su prema poučku K-K o sličnosti.

b)

vršni kutovi
(jednakih su veličina)
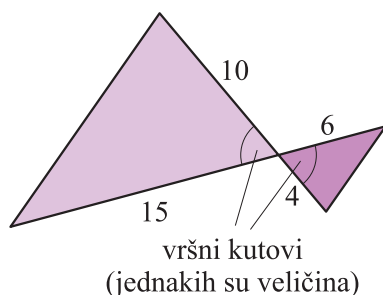
Provjerimo vrijedi li

$$10 : 4 = 15 : 6?$$

$$60 = 60. \qquad \text{Vrijedi.}$$

Trokuti su slični prema poučku S-K-S o sličnosti.

9.
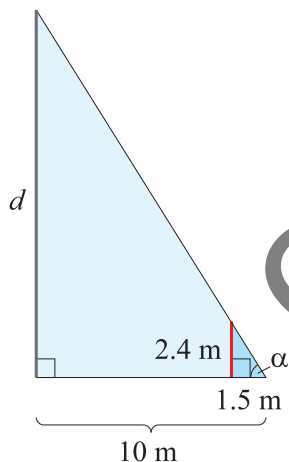
d – visina zgrade

Nacrtani trokuti su slični prema poučku K-K (90°, α). Stoga su duljine stranica nacrtanih trokuta proporcionalne, tj. vrijedi:

$$d : 2.4 = 10 : 1.5$$
$$1.5d = 2.4 \cdot 10 \quad / : 1.5$$
$$d = 24 : 1.5$$
$$\underline{d = 16}.$$

Zgrada je visine 16 m.

10. a) Kružnice se dodiruju izvana: $\left|S_1 S_2\right| > r_1 - r_2$.

    b) Kružnice se dodiruju iznutra: $\left|S_1 S_2\right| = r_1 - r_2$.

11.
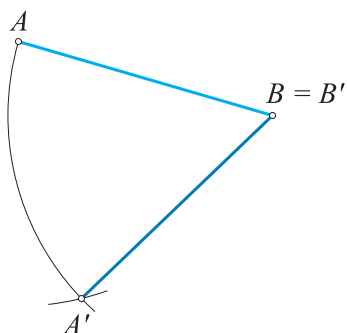
1. a)

$$4 : y = 5 : 6$$
$$5y = 24 \quad / : 5$$
$$y = 4.8$$

b)

$$(3 + x) : 2 = (x - 1) : 5$$
$$5 \cdot (3 + x) = 2 \cdot (x - 1)$$
$$15 + 5x = 2x - 2$$
$$ -2x \quad -2x$$
$$15 + 3x = -2$$
$$-15 -15$$
$$3x = -17 \quad / : 3$$
$$x = -\frac{17}{3}.$$

2.

$$M : L = 8 : 5$$
$$(12 + L) : L = 8 : 5$$
$$5 \cdot (12 + L) = 8L$$
$$60 + 5L = 8L$$
$$-5L -5L$$
$$60 = 3L \quad / : 3$$
$$L = 20$$

Luka ima 20 eura.

3. Dužinu duljine 8 cm dijelimo na tri jednaka dijela. Svaki dobiveni dio je duljine jedne stranice trokuta.

4. Dužinu dijelimo na $3 + 2 = 5$ jednakih dijelova.

A
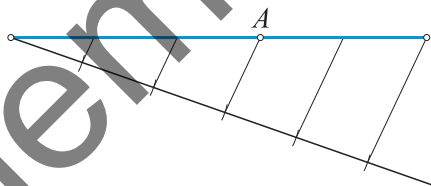
5. a) Prema Talesovu poučku vrijedi

$$8 : 3 = 9 : d$$
$$8d = 27 \quad / : 8$$
$$d = \frac{27}{8} = 3.375.$$

b)

21
20
18   *x*
d
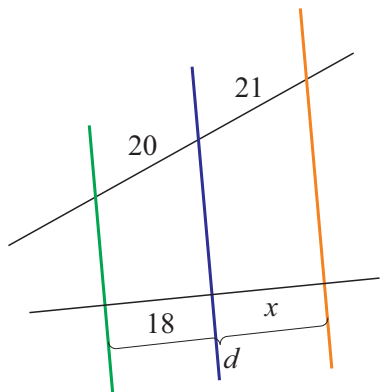
$$20 : 21 = 18 : x$$
$$20x = 21 \cdot 18 \quad / : 20$$
$$x = \frac{21 \cdot \overset{9}{\cancel{18}}}{\underset{10}{\cancel{20}}}$$
$$x = \frac{189}{10} = 18.9$$
$$d = 18 + x = 18 + 18.9 = 36.9.$$

6. Provjerimo vrijedi li $a : a' = b : b' = c : c'$.

$$a : a' = 6 : 10 = 3 : 5$$
$$b : b' = 9 : 15 = 3 : 5$$
$$c : c' = 12 : 20 = 3 : 5$$

Trokuti su slični prema poučki S-S-S o sličnosti. $\Delta ABC \sim \Delta A'B'C'$.

7. Računamo veličinu preostalog kuta trokuta ABC:

$$180° - (35° + 47°) = 180° - 82° = 98°.$$

Trokuti su slični te su im veličine odgovarajućih kutova jednake.
Tražena veličina kuta iznosi 98°.

8. Vrijedi

$$o : o' = 5 : 2$$
$$o : 42 = 5 : 2$$
$$2o = 42 \cdot 5$$
$$2o = 210 \quad / : 2$$
$$\underline{o = 105 \text{ cm}}.$$

9.
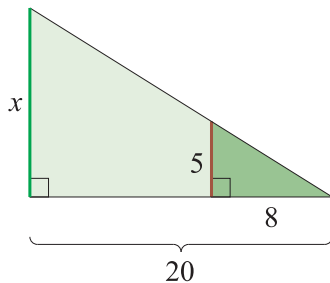
$$x : 20 = 5 : 8$$
$$8x = 100 \quad / : 8$$
$$\underline{x = 12.5 \text{ dm}}.$$

Grm je visine 1.25 m.

10. **a)** Nemaju zajedničkih točaka i jedna je izvan druge.
b) Sijeku se u dvjema točkama.
c) Dodiruju se iznutra (u jednoj točki).
d) Nemaju zajedničkih točaka i jedna se nalazi unutar druge.

11.
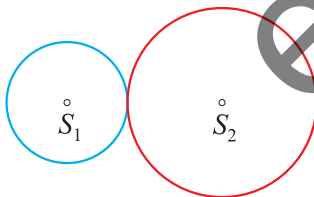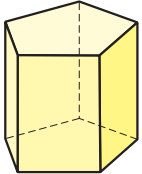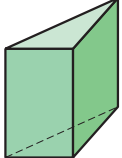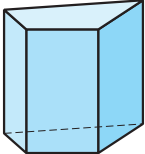
Kružnice se dodiruju izvana.

12.
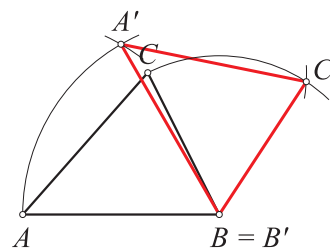
1.

crtež prizme	naziv prizme	broj vrhova prizme	broj bočnih strana prizme
	peterostrana prizma	10	5
	trostrana prizma	6	3
	četverostrana prizma	8	4

2. **a)** kocka **b)** kvadar **c)** pravilna trostrana prizma

3. **a)**
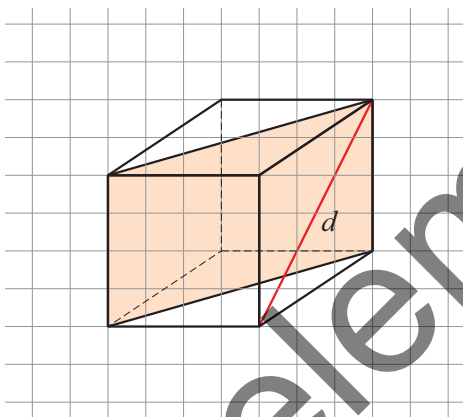
b) $D = 2$ cm

$a = ?$

$D = a\sqrt{3}$

$2 = a\sqrt{3} \quad / : \sqrt{3}$

$a = \dfrac{2}{\sqrt{3}} \cdot \dfrac{\sqrt{3}}{\sqrt{3}}$

$a = \dfrac{2\sqrt{3}}{3}$ cm.

4. **a)**
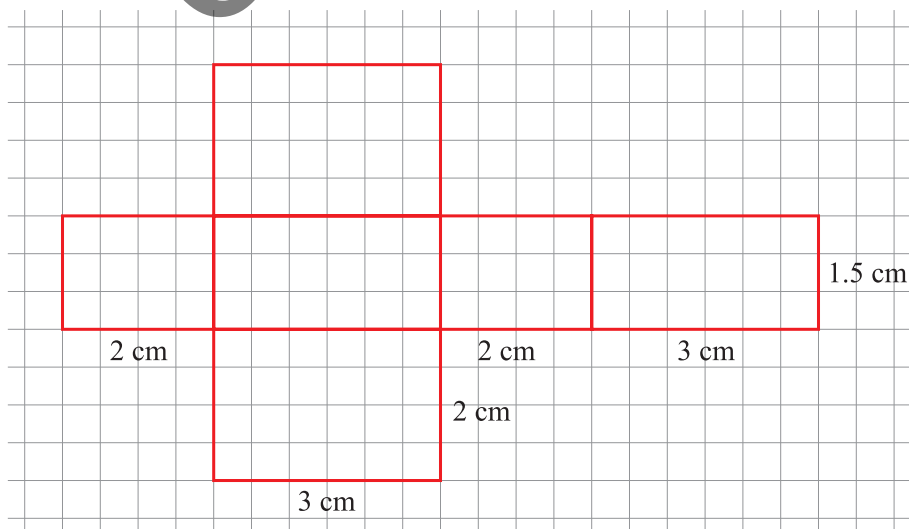
2 cm   2 cm   3 cm   1.5 cm

2 cm

3 cm

b) $a = 3$ cm

$b = 2$ cm

$c = 1.5$ cm

$O, V = ?$

$O = 2(ab + bc + ca)$ $V = abc$

$O = 2 \cdot (3 \cdot 2 + 2 \cdot 1.5 + 1.5 \cdot 3)$ $V = 3 \cdot 2 \cdot 1.5$

$O = 2 \cdot (6 + 3 + 4.5)$ $V = 9$ cm^3.

$O = 2 \cdot 13.5$

$O = 27$ cm^2

5.

$D = \sqrt{50}$ dm

$a = 5$ dm

$b = 4$ dm

$O = ?$
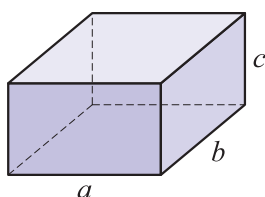
Prvo računamo duljinu preostalog brida kvadra:

$D^2 = a^2 + b^2 + c^2$

$\sqrt{50}^2 = 5^2 + 4^2 + c^2$

$50 = 25 + 16 + c^2$

$50 = 41 + c^2$

$-41 \quad -41$

$c^2 = 9 \quad /^{\sqrt{}}$

$c = 3$ dm.

Zatim računamo oplošje kvadra:

$O = 2(ab + bc + ca)$

$O = 2 \cdot (5 \cdot 4 + 4 \cdot 3 + 3 \cdot 5)$

$O = 2 \cdot (20 + 12 + 15)$

$O = 2 \cdot 47$

$O = 94$ dm^2.

6.
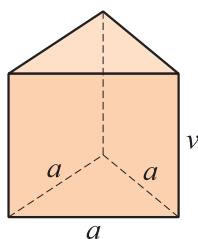
$B = 36\sqrt{3}$ m^2

$V = 108\sqrt{3}$ m^3

$a, v = ?$

$B = \dfrac{a^2\sqrt{3}}{4}$

$36\sqrt{3} = \dfrac{a^2\sqrt{3}}{4} \quad / \cdot 4$

$144\sqrt{3} = a^2\sqrt{3} \quad / : \sqrt{3}$

$a^2 = 144 \quad /^{\sqrt{}}$

$a = 12$ m

$V = B \cdot v$

$108\sqrt{3} = 36\sqrt{3} \cdot v \quad / : \sqrt{3}$

$108 = 36 \cdot v \quad / : 36$

$v = 3$ m.

7. a)
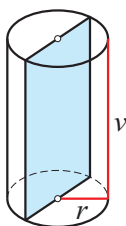
b) $r = 10$ mm $= 1$ cm

$v = 3$ cm

$P_{op} = ?, \ o_{op} = ?$

$P_{op} = 2r \cdot v$

$P_{op} = 2 \cdot 1 \cdot 3$

$P_{op} = 6$ cm^2

$o_{op} = 2 \cdot 2r + 2v$

$o_{op} = 4 \cdot 1 + 2 \cdot 3$

$o_{op} = 10$ cm.

8. **a)**
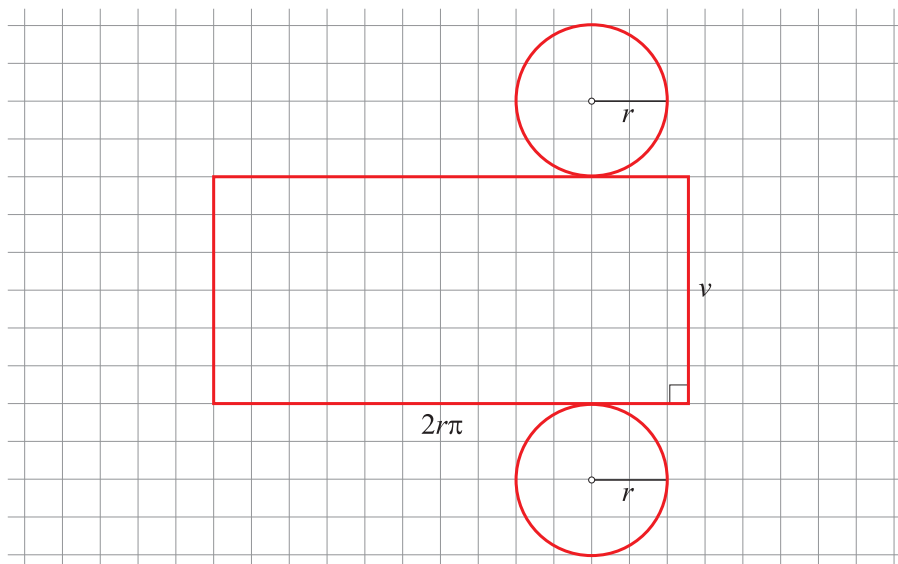
b) $r = 10$ mm $= 1$ cm
$v = 3$ cm

$O = ?$

$O = 2r^2\pi + 2r\pi \cdot v$ $\pi \approx 3.14$

$O = 2 \cdot 1 \cdot \pi + 2 \cdot 1 \cdot \pi \cdot 3$

$O = 8\pi \approx 25.12$ cm^2.

9.

$r = 8$ m $V = r^2\pi \cdot v$
$v = 6$ m $V = 8^2 \cdot \pi \cdot 6$
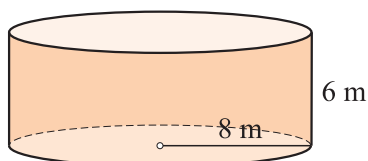
$V = ?$ $V = 64\pi \cdot 6$

$V = 384\pi \approx 1\,205.76$ m^3.

10.

v h (visina čaše)

r dno
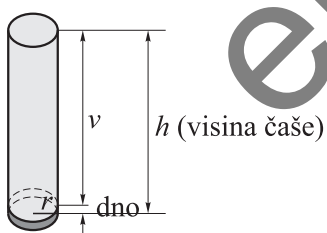
$B = 9\pi$ cm$^2 \approx 28.26$ cm^2

$V = 3$ dm$^3 = 300$ cm^3

$V = B \cdot v$

$300 = 28.26 \cdot v$ $/ : 28.26$

$v \approx 10.6$ cm $\Rightarrow$ $h = 10.6 + 0.5 = 11.1$ cm.

1. **a)** Šesterostrana prizma.

b)

c)
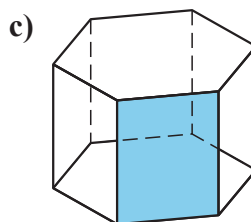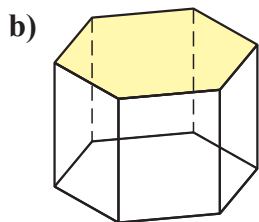
d) Dvije su baze i šest bočnih strana.

e) 12 je osnovnih i 6 bočnih bridova.

2.
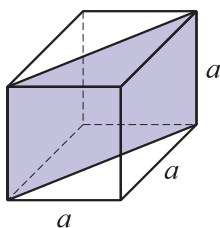
$$\frac{P_{dp} = 81\sqrt{2} \text{ dm}^2}{O = ?}$$

Prvo računamo duljinu brida kocke:

$P_{dp} = a^2\sqrt{2}$

$81\sqrt{2} = a^2\sqrt{2} \quad / :\sqrt{2}$

$\quad a^2 = 81$

$\quad\quad a = 9$ dm.

$O = 6a^2$

$O = 6 \cdot 9^2$

$O = 486$ dm^2.

3.
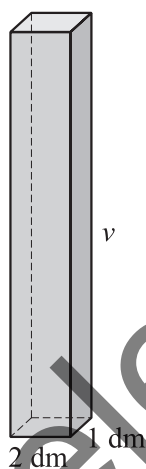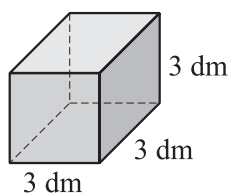
a) Volumeni dvaju tijela su isti.

$V = 3^3 = 27$ dm^3

$V = 2 \cdot 1 \cdot v$

$2 \cdot 1 \cdot v = 27$

$\quad\quad v = 13.5$ dm

b) $O_{kocke} = 6 \cdot 3^2$

$\quad\quad\quad = 54$ dm^2

$O_{kvadra} = 2 \cdot (2 \cdot 1 + 1 \cdot 13.5 + 13.5 \cdot 2)$

$\quad\quad\quad = 2 \cdot (2 + 13.5 + 27)$

$\quad\quad\quad = 2 \cdot 42.5$

$\quad\quad\quad = 85$ dm^2.

Oplošje kvadra veće je za 31 dm^2.

4. **a)**
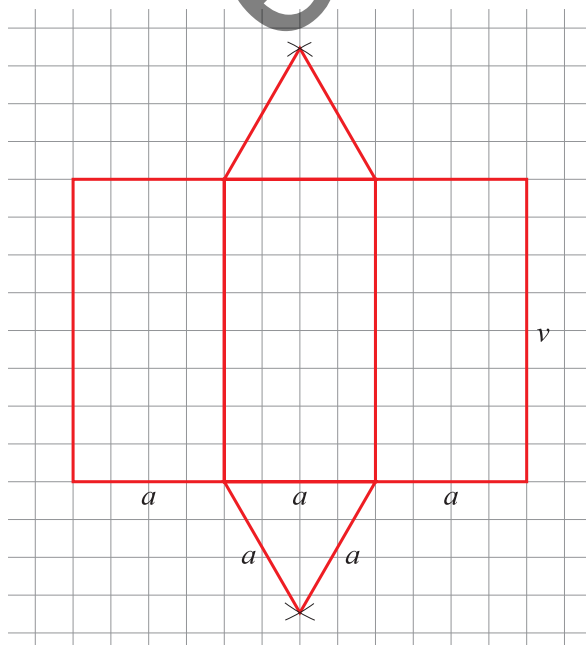
b) $a = 2$ cm

$\quad\;\; v = 4$ cm

$P = ?$

$P = 3 \cdot a \cdot v$

$P = 3 \cdot 2 \cdot 4$

$P = 24$ cm^2.

5.
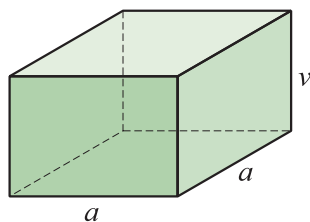
$V = 245$ cm^2

$v = 0.5$ dm $= 5$ cm

$O, D = ?$

Prvo računamo duljinu osnovnog brida:

$V = B \cdot v$

$245 = B \cdot 5 \quad / : 5$

$\underline{B = 49 \text{ cm}^2}$

$B = a^2$

$49 = a^2 \quad /^{\sqrt{}}$

$\underline{a = 7 \text{ cm.}}$

$O = 2 \cdot B + 4 \cdot av$

$O = 2 \cdot 49 + 4 \cdot 7 \cdot 5$

$O = 98 + 140$

$\underline{O = 238 \text{ cm}^2}$

$D = \sqrt{a^2 + a^2 + v^2}$

$D = \sqrt{49 + 49 + 25}$

$\underline{D = \sqrt{123} \text{ cm.}}$

6. a)
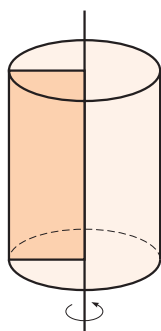
$r = 2$ cm

$v = 5$ cm

$O, V = ?$

$O = 2r^2\pi + 2r\pi \cdot v$

$O = 2 \cdot 2^2 \cdot \pi + 2 \cdot 2 \cdot \pi \cdot 5$

$\underline{O = 28\pi \text{ cm}^2}$

$V = r^2\pi \cdot v$

$V = 2^2 \cdot \pi \cdot 5$

$\underline{V = 20\pi \text{ cm}^3.}$

b)
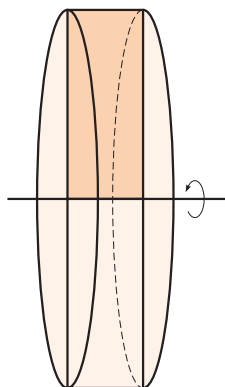
$r = 5$ cm

$v = 2$ cm

$O, V = ?$

$O = 2r^2\pi + 2r\pi \cdot v$

$O = 2 \cdot 5^2 \cdot \pi + 2 \cdot 5 \cdot \pi \cdot 2$

$\underline{O = 70\pi \text{ cm}^2}$

$V = r^2\pi \cdot v$

$V = 5^2 \cdot \pi \cdot v$

$\underline{V = 50\pi \text{ cm}^3.}$

7. b)
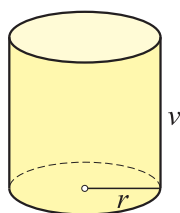
$v = 4$ m

$V = 16\pi$ m^3

$O = ?$

$O = 2r^2\pi + 2r\pi \cdot v$

Prvo računamo površinu baze valjka:

$V = B \cdot v$

$16\pi = B \cdot 4 \quad / : 4$

$\underline{B = 4\pi \text{ m}^2.}$

$B = r^2\pi$

$4\pi = r^2\pi \quad / : \pi$

$r^2 = 4 \quad /^{\sqrt{}}$

$\underline{r = 2 \text{ m.}}$

$O = 2\underbrace{r^2\pi}_{B} + 2r\pi \cdot v$

$O = 2 \cdot 4\pi + 2 \cdot 2 \cdot \pi \cdot 4$

$\underline{O = 24\pi \text{ m}^2.}$

8.
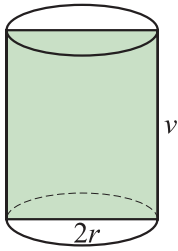
$2r : v = 4 : 5$

$\dfrac{P_{op} = 720 \text{ mm}^2}{V = ?}$

$P_{op} = 2r \cdot v$

$2r : v = 4 : 5 \implies 2r = 4k$
$ v = 5k$

$P_{op} = 4k \cdot 5k$
$P_{op} = 20k^2$
$720 = 20k^2$
$k^2 = 36 \implies k = 6$

$2r = 4 \cdot 6 = 24 \text{ mm} \implies r = 12 \text{ mm}$
$v = 5 \cdot 6 = 30 \text{ mm}$

$V = r^2\pi \cdot v$

$V = 12^2 \cdot \pi \cdot 30$

$V = 144\pi \cdot 30$

$\underline{V = 4\,320\pi \approx 13\,564.8 \text{ mm}^3.}$

9. a)
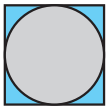
$361\pi = r^2\pi$
$r^2 = 361 \quad /^{\sqrt{}}$
$\underline{r = 19 \text{ cm}}$

$a = 2r$
$a = 2 \cdot 19$
$\underline{a = 38 \text{ cm}}$

$o = 4a$
$o = 4 \cdot 38$
$\underline{o = 152 \text{ cm}}$

b) V_1 – volumen kvadra $v = 100 \text{ cm}$

V_2 – volumen valjka

$V_1 = a^2 \cdot v$
$V_1 = 38^2 \cdot 100$
$V_1 = 1\,444 \cdot 100$
$V_1 = 144\,400 \text{ cm}^3$
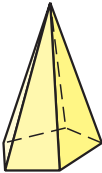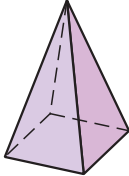
$V_2 = r^2\pi \cdot v$
$V_2 = 19^2 \cdot \pi \cdot 100$
$V_2 = 361 \cdot \pi \cdot 100$
$V_2 = 36\,100\pi \approx 113\,354 \text{ cm}^3$

$\underline{V_1 - V_2 = 31\,046 \text{ cm}^3.}$

1.

crtež piramide	naziv geometrijskog tijela	baza	ukupan broj strana geometrijskog tijela
	peterostrana piramida	peterokut	6
	trostrana piramida	trokut	4
	četverostrana piramida	četverokut	5

2. **a)**

2 cm

3 cm

2 cm

3 cm

b)

3 cm

v_1

2 cm

2 cm

Uočimo trokute.

3 cm

v_1

1 cm
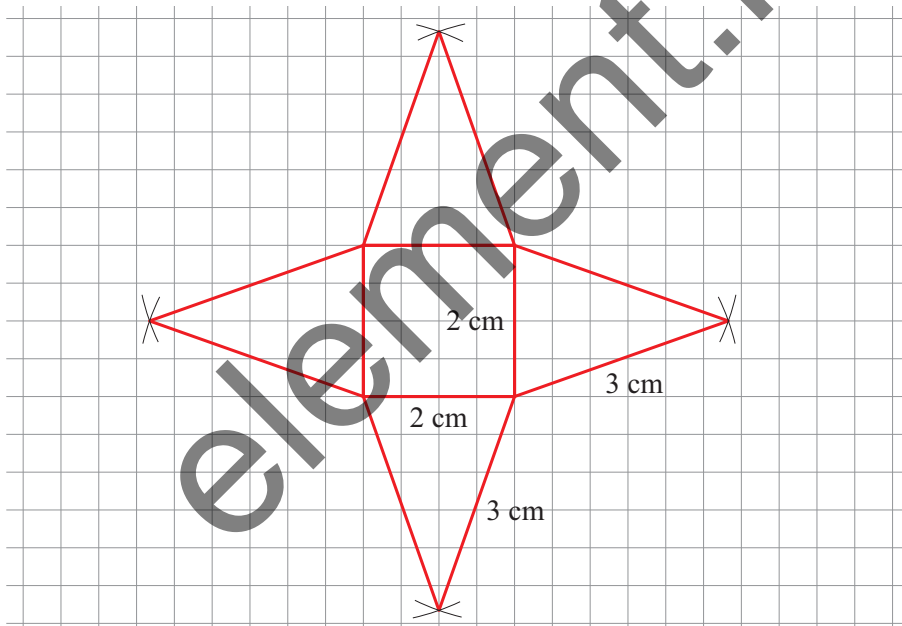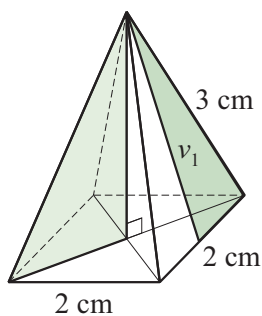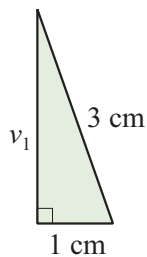
$$v_1 = \sqrt{3^2 - 1^2}$$
$$v_1 = \sqrt{8} = \sqrt{4 \cdot 2}$$
$$v_1 = 2\sqrt{2} \text{ cm}$$

3 cm

v

$\dfrac{d}{2}$

$$\frac{d}{2} = \frac{a\sqrt{2}}{2} = \frac{2\sqrt{2}}{2} = \sqrt{2}$$

$$v = \sqrt{3^2 - \sqrt{2}^2}$$
$$v = \sqrt{9 - 2}$$
$$v = \sqrt{7} \text{ cm}$$
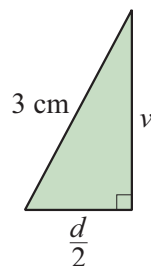
3.
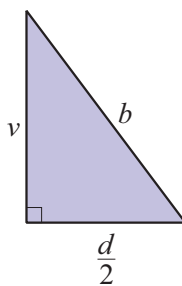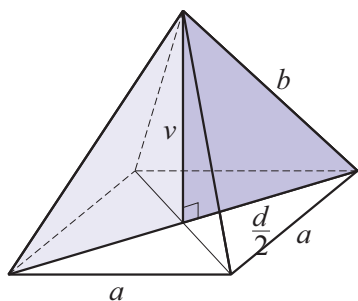
$d = 12$ dm

$b = 10$ dm

$P_{dp} = ?$

$b^2 = v^2 + \left(\dfrac{d}{2}\right)^2$

$10^2 = v^2 + 6^2$

$v^2 = 100 - 36$

$v = 8$ dm

$P_{dp} = \dfrac{d \cdot v}{2}$

$P_{dp} = \dfrac{12 \cdot \cancel{8}^{4}}{\cancel{2}_{1}}$
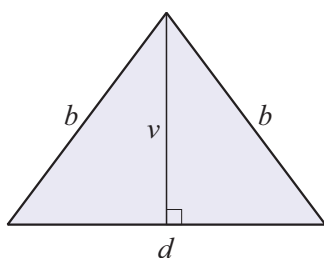
$P_{dp} = 48$ dm^2.

4.
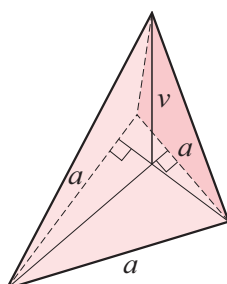
$a = 6$ cm

$v = 4$ cm

$V = ?$

$V = \dfrac{B \cdot v}{3}$

$B = \dfrac{a^2 \sqrt{3}}{4}$

$B = \dfrac{6^2 \sqrt{3}}{4}$

$B = \dfrac{36 \sqrt{3}}{4}$

$B = 9\sqrt{3}$ cm^2

$V = \dfrac{B \cdot v}{3}$

$V = \dfrac{\cancel{9}^{3} \sqrt{3} \cdot 4}{\cancel{3}_{1}}$

$V = 12\sqrt{3}$ cm^3.

5.
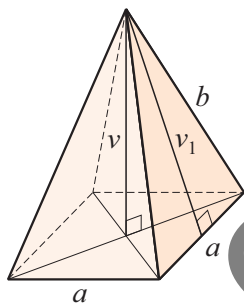
$V = 32$ mm^3

$v = 6$ mm

$O = ?$

Prvo računamo površinu baze, a potom duljinu osnovnog brida:

$V = \dfrac{B \cdot v}{3}$

$32 = \dfrac{B \cdot \cancel{6}^{2}}{\cancel{3}_{1}}$

$2B = 32 \quad / : 2$

$B = 16$

$a^2 = 16 \quad /^{\sqrt{\ }}$

$a = 4$ mm.

Za površinu bočne strane potrebno je izračunati duljinu visine pobočke.
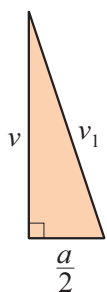
$v_1^2 = v^2 + \left(\dfrac{a}{2}\right)^2$

$v_1^2 = 6^2 + \left(\dfrac{4}{2}\right)^2$

$v_1^2 = 36 + 4$

$v_1 = \sqrt{40} = \sqrt{4 \cdot 10}$

$v_1 = 2\sqrt{10}$ mm

$O = B + P$

$P = \cancel{4} \cdot \dfrac{a v_1}{\cancel{2}_{1}}$

$P = 2 a v_1$

$P = 2 \cdot 4 \cdot 2\sqrt{10}$

$P = 16\sqrt{10}$ mm^2

$O = (16 + 16\sqrt{10})$ mm^2.

6. $v = 4$ m

$r = 1$ m

$s = ?$

$P_{op} = ?$

$o_{op} = ?$

$s^2 = v^2 + r^2$

$s^2 = 4^2 + 1^2$

$s^2 = 16 + 1$

$s^2 = 17$ $/^{\sqrt{}}$

$s = \sqrt{17}$ m
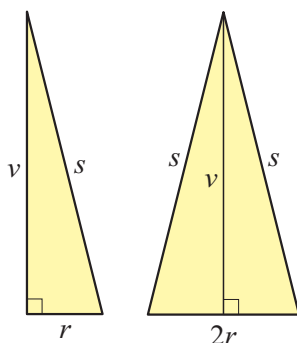
$P_{op} = \dfrac{2r \cdot v}{2}$

$P_{op} = r \cdot v$

$P_{op} = 1 \cdot 4$

$P_{op} = 4$ m^2

$o_{op} = 2r + 2s$

$o_{op} = 2 \cdot 1 + 2 \cdot \sqrt{17}$

$o_{op} = (2 + 2\sqrt{17})$ m.

7.   **a)** kruga i kružnog isječka

b)

$r = 8$ cm

$v = 15$ cm

$P = ?$

$P = \dfrac{\cancel{2}^1 r \pi s}{\cancel{2}_1}$
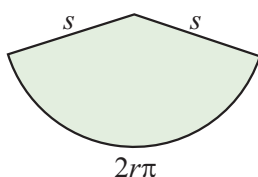
$P = r \pi s$

Prvo računamo duljinu izvodnice stošca:

$s^2 = r^2 + v^2$

$s^2 = 8^2 + 15^2$

$s^2 = 64 + 225$

$s^2 = 289$ $/^{\sqrt{}}$

$s = 17$ cm.

$P = r \pi s$

$P = 8 \cdot \pi \cdot 17$

$P = 136 \pi$ cm^2.

8.
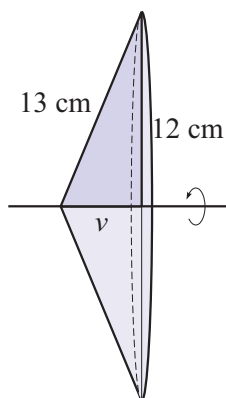
$r = 12$ cm

$s = 13$ cm

$O, V = ?$

$v^2 = 13^2 - 12^2$

$v^2 = 169 - 144$

$v^2 = 25$ $/^{\sqrt{}}$

$v = 5$ cm

$O = B + P$

$O = r^2 \pi + r \pi s$

$O = r \pi (r + s)$

$O = 12\pi (12 + 13)$

$O = 12\pi \cdot 25$

$O = 300\pi$ cm^2

$V = \dfrac{B \cdot v}{3}$

$V = \dfrac{r^2 \pi \cdot v}{3}$

$V = \dfrac{12^2 \pi \cdot 5}{3}$

$V = \dfrac{144\pi \cdot 5}{3}$

$V = 240\pi$ cm^3.

9.
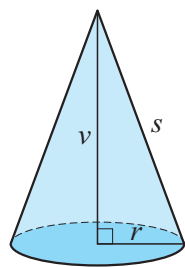
$V = 4\pi$ dm^3

$v = 30$ cm $= 3$ dm

$O = ?$

Prvo računamo površinu baze, a potom i duljinu polumjera baze:

$V = \dfrac{B \cdot v}{3}$

$4\pi = \dfrac{B \cdot \cancel{3}^1}{\cancel{3}_1}$

$B = 4\pi$

$r^2 \pi = 4\pi$ $/ : \pi$

$r^2 = 4$ $/^{\sqrt{}}$

$r = 2$ dm.

$v^2 + r^2 = s^2$

$3^2 + 2^2 = s^2$

$9 + 4 = s^2$

$s^2 = 13$ $/^{\sqrt{}}$

$s = \sqrt{13}$ dm

$O = B + P$

$O = 4\pi + r \pi s$

$O = (4\pi + 2\pi\sqrt{13})$ dm   ili $2\pi(2 + \sqrt{13})$ dm.

1. **a)** sedmerostrana piramida **b)** sedam je osnovnih i sedam bočnih bridova

c) jedna je baza i sedam pobočki **d)** vrh piramide

2. **a)**
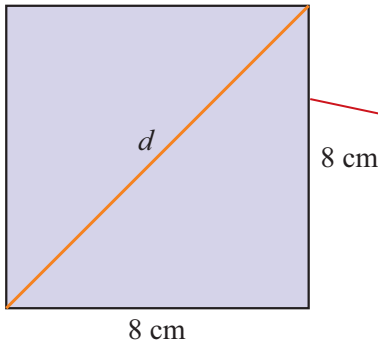
Baza piramide je kvadrat: $d = 8\sqrt{2}$ cm.
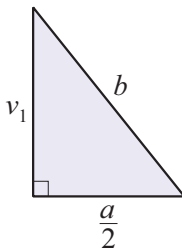
b)
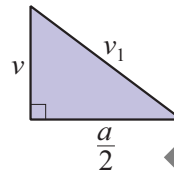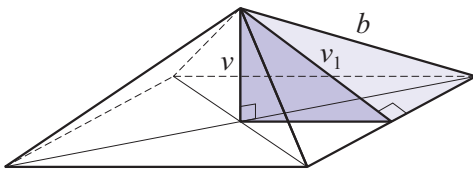
$$v_1^2 = v^2 + \left(\frac{a}{2}\right)^2$$
$$v_1^2 = 3^2 + 4^2$$
$$v_1^2 = 9 + 16$$
$$v_1^2 = 25$$
$$v_1 = 5 \text{ cm}$$
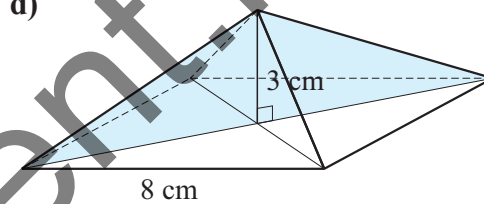
c)

$$b^2 = v_1^2 + \left(\frac{a}{2}\right)^2$$
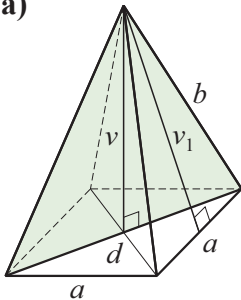$$b^2 = 5^2 + 4^2$$
$$b^2 = 25 + 16$$
$$b^2 = 41$$
$$b = \sqrt{41} \text{ cm.}$$

d)

3. **a)**

$P_{dp} = 9\sqrt{3} \text{ cm}^2$

$b = d$

$a = ?$

$v_1 = ?$

$$P_{dp} = \frac{d^2\sqrt{3}}{4}$$
$$9\sqrt{3} = \frac{d^2\sqrt{3}}{4} \quad \Big| \cdot \frac{4}{\sqrt{3}}$$
$$36 = d^2$$
$$d = 6 \text{ cm}$$

$$d = a\sqrt{2}$$
$$6 = a\sqrt{2} \quad /: \sqrt{2}$$
$$a = \frac{6}{\sqrt{2}}$$
$$a = \frac{6}{\sqrt{2}} \cdot \frac{\sqrt{2}}{\sqrt{2}}$$
$$a = \frac{\overset{3}{6}\sqrt{2}}{\underset{1}{2}}$$
$$a = 3\sqrt{2} \text{ cm.}$$

b) Proučimo trokut.
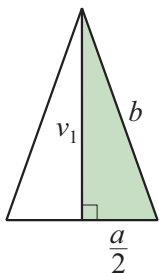
Znamo $b = d = 6$ cm

$\frac{a}{2} = 1.5\sqrt{2}$ cm.

Vrijedi $$v_1^2 = b^2 - \left(\frac{a}{2}\right)^2$$
$$v_1^2 = 6^2 - \left(1.5\sqrt{2}\right)^2$$
$$v_1^2 = 36 - 2.25 \cdot 2$$
$$v_1^2 = 36 - 4.5$$
$$v_1^2 = 31.5$$
$$v = \sqrt{31.5} \text{ cm.}$$

4.
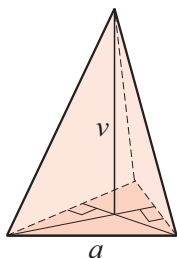
$V = 375\sqrt{3}$ m³

$\underline{v = 5 \text{ m}}$

$O_B = ?$

Prvo računamo površinu baze, a potom duljinu osnovnog brida:

$V = \dfrac{B \cdot v}{3}$

$375\sqrt{3} = \dfrac{B \cdot 5}{3} \quad \Big| \cdot \dfrac{3}{5}$

$B = \dfrac{\overset{75}{375\sqrt{3}} \cdot 3}{\underset{1}{\cancel{5}}}$

$\underline{B = 225\sqrt{3} \text{ m}^2}$

$B = \dfrac{a^2\sqrt{3}}{4}$

$225\sqrt{3} = \dfrac{a^2\sqrt{3}}{4} \quad \Big| \cdot \dfrac{4}{\sqrt{3}}$

$a^2 = 225 \cdot 4$

$a^2 = 900 \quad /^{\sqrt{\ }}$

$\underline{a = 30 \text{ m}}$

$o_B = 3a$

$\underline{o_B = 90 \text{ m.}}$

5.

$a + 2b = 16$ dm

$\underline{B = 36 \text{ dm}^2}$

$O, V = ?$

$B = a^2$
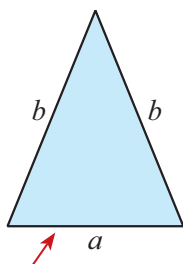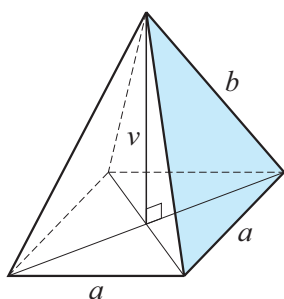
$36 = a^2 \quad /^{\sqrt{\ }}$

$\underline{a = 6 \text{ dm}}$

$a + 2b = 16$

$6 + 2b = 16$

$2b = 10 \quad / : 2$

$\underline{b = 5 \text{ dm.}}$

bočna strana piramide

Proučimo trokut.

Vrijedi $\quad d = a\sqrt{2}$

$\underline{d = 6\sqrt{2}.}$

Također je $\quad v^2 = b^2 - \left(\dfrac{d}{2}\right)^2$

$v^2 = 5^2 - \left(\dfrac{\overset{3}{6\sqrt{2}}}{\underset{1}{\cancel{2}}}\right)^2$

$v^2 = 25 - 18$

$v^2 = 7 \quad /^{\sqrt{\ }}$

$\underline{v = \sqrt{7} \text{ dm.}}$

$V = \dfrac{B \cdot v}{3}$

$V = \dfrac{\overset{12}{36\sqrt{7}}}{\underset{1}{\cancel{3}}}$

$\underline{V = 12\sqrt{7} \text{ dm}^3.}$

Za oplošje piramide potrebno je izračunati površinu jedne bočne strane, a potom i pobočja piramide.

$b = 5$ dm

$\dfrac{a}{2} = 3$ dm
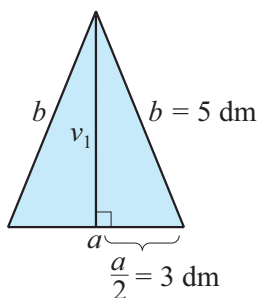
$v_1^2 = b^2 - \left(\dfrac{a}{2}\right)^2$

$v_1^2 = 5^2 - 3^2$

$v_1^2 = 25 - 9$

$v_1^2 = 16 \quad /^{\sqrt{\ }}$

$\underline{v = 4 \text{ dm}}$

Označimo li s P_1 površinu jedne pobočke, vrijedi:

$P_1 = \dfrac{a \cdot v_1}{2}$

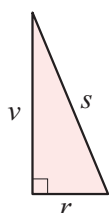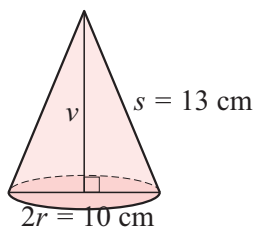$P_1 = \dfrac{\overset{2}{6} \cdot 4}{\underset{1}{\cancel{2}}}$

$\underline{P_1 = 12 \text{ dm}^2.}$

Tada je površina pobočja: $P = 4 \cdot P_1 = 4 \cdot 12 = 48$ dm².

$O = B + P \quad \Rightarrow \quad O = 36 + 48$

$\underline{O = 84 \text{ dm}^2.}$

6.

$s = 13$ cm

$\dfrac{2r = 10 \text{ cm} \Rightarrow r = 5 \text{ cm}}{P_{\text{op}} = ?}$

Vrijedi:

$v^2 = s^2 - r^2$

$v^2 = 13^2 - 5^2$
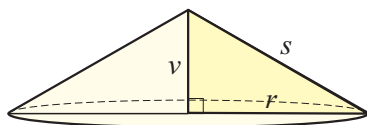
$v^2 = 169 - 25$

$v^2 = 144 \quad /^{\sqrt{}}$

$v = 12$ cm.

$P_{\text{op}} = \dfrac{\overset{1}{\cancel{2}} r \cdot v}{\underset{1}{\cancel{2}}} = r \cdot v$

$P_{\text{op}} = 5 \cdot 12$

$P_{\text{op}} = 60 \text{ cm}^2.$

7.

$r : v = 12 : 5 \Rightarrow r = 12k, \ v = 5k$

$\dfrac{s = 26 \text{ m}}{P = ?}$

$s^2 = r^2 + v^2$

$26^2 = (12k)^2 + (5k)^2$

$676 = 144k^2 + 25k^2$

$676 = 169k^2 \quad / : 169$

$k^2 = 4 \quad /^{\sqrt{}}$

$k = 2$

$r = 24$ m
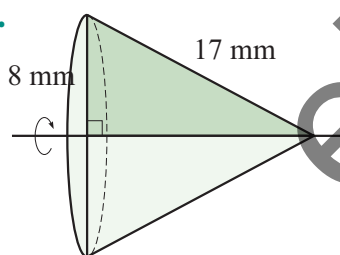
$P = r\pi s$

$P = 24\pi \cdot 26$

$P = 624\pi \text{ m}^2.$

8.

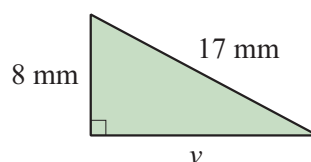17 mm

8 mm

$r = 8$ mm

$\dfrac{s = 17 \text{ mm}}{O, V = ?}$

$O = r\pi(r + s)$

$O = 8\pi(8 + 17)$

$O = 8\pi \cdot 25$

$O = 200\pi \text{ mm}^2$

Prvo računamo duljinu visine stošca kako bismo izračunali njegov volumen:

8 mm   17 mm

v

$v^2 = 17^2 - 8^2$

$v^2 = 289 - 64$

$v^2 = 225 \quad /^{\sqrt{}}$
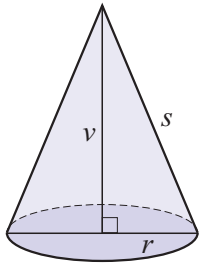
$v = 15$ mm.

$V = \dfrac{r^2 \pi \cdot v}{3}$

$V = \dfrac{8^2 \pi \cdot 15}{3}$

$V = \dfrac{64\pi \cdot \cancel{15}^{5}}{\cancel{3}_{1}}$

$V = 64\pi \cdot 5$

$V = 320\pi \text{ mm}^3.$

9.

$v = 10 \text{ cm} = 1 \text{ dm}$
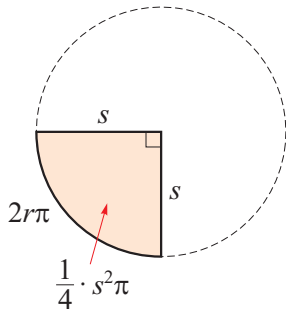
$\dfrac{V = 2 \text{ L} = 2 \text{ dm}^3}{B = ?}$

$V = \dfrac{B \cdot v}{3}$

$2 = \dfrac{B \cdot 1}{3} \quad \Big/ \cdot 3$

$\underline{B = 6 \text{ dm}^2.}$

10.

$s^2\pi = 4 \cdot 16\pi \quad / : \pi$

$s^2 = 4 \cdot 16 \quad /^{\sqrt{\ }}$

$s = 2 \cdot 4$

$\underline{s = 8 \text{ cm}}$

$2r\pi = \dfrac{1}{4} \cdot 2s\pi \quad / : 2\pi$
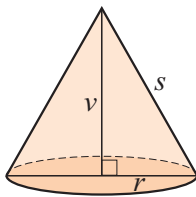
$r = \dfrac{1}{4}s$

$\underline{r = 2 \text{ cm}}$

$O = r\pi\,(r + s)$

$O = 2\pi\,(2 + 8)$

$O = 2\pi \cdot 10$

$O = 20\pi \text{ cm}^2$

Da bismo izračunali volumen stošca, potrebno je izračunati duljinu visine tog stošca:

$v^2 = s^2 - r^2$

$v^2 = 8^2 - 2^2$

$v^2 = 64 - 4$

$v^2 = 60 \quad /^{\sqrt{\ }}$

$v = \sqrt{60}$

$v = \sqrt{15 \cdot 4}$

$\underline{v = 2\sqrt{15}} \text{ cm}.$

$V = \dfrac{B \cdot v}{3}$

$V = \dfrac{r^2\pi v}{3}$

$V = \dfrac{2^2\pi \cdot 2\sqrt{15}}{3}$

$V = \dfrac{8\sqrt{15}}{3}\pi \text{ cm}^3.$

1.
$$2x - 5y = 4 \implies 2x = 4 + 5y \quad / : 2 \implies \boxed{x = 2 + 2.5y}$$
$$-2x + 3y = 2$$

$$-2(2 + 2.5y) + 3y = 2$$
$$-4 - 5y + 3y = 2$$
$$-4 - 2y = 2 \quad / + 4$$
$$-2y = 6 \quad / : (-2)$$
$$\underline{y = -3}$$

$$x = 2 + 2.5y$$
$$x = 2 + 2.5 \cdot (-3)$$
$$x = 2 - 7.5$$
$$\underline{x = -5.5}$$

Rješenje sustava uređeni je par $(-5.5, -3)$.

2. Prvo zapišimo sustav u standardnom zapisu.

$$3 - \frac{x}{5} = y - 2 \quad / \cdot 5$$
$$\underline{-(x - 3) - (2y + 1) = 4}$$

$$15 - x = 5y - 10 \quad / - 5y - 15$$
$$\underline{-x + 3 - 2y - 1 = 4}$$

$$-x - 5y = -25$$
$$\underline{-x - 2y + 2 = 4} \quad / - 2$$

$$-x - 5y = -25$$
$$\underline{-x - 2y = 2} \quad / \cdot (-1)$$

$$\left.\begin{array}{l} -x - 5y = -25 \\ x + 2y = -2 \end{array}\right\} +$$

$$-3y = -27 \quad / : (-3)$$
$$\underline{y = 9}$$

$$x + 2y = -2$$
$$x + 2 \cdot 9 = -2$$
$$x + 18 = -2 \quad / - 18$$
$$\underline{x = -20}$$

Rješenje sustava uređeni je par $(-20, 9)$.

3. a)

x	$y = 3x - 7$
1	$3 \cdot 1 - 7 = -4$
2	$3 \cdot 2 - 7 = -1$

Uvrštavamo točke s koordinatama $(1, -4)$ i $(2, -1)$.

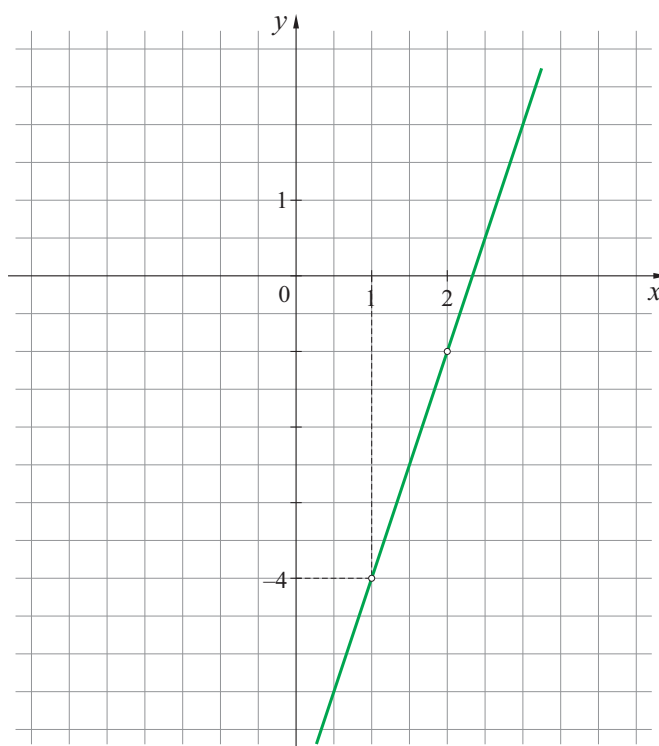**b)** Usporedni pravci imaju iste koeficijente smjera.

Tražimo jednadžbu oblika:

$$y = ax + b.$$

koeficijent smjera → odsječak na osi y

Tražena jednadžba glasi $y = 3x + 2$.

4. **a)** $25^2 \cdot (-40)^2 = \left(25 \cdot (-40)\right)^2 = (-1\,000)^2 = 1\,000\,000$

b) $\left(\dfrac{2}{3}\right)^2 : \left(\dfrac{18}{75}\right)^2 = \left(\dfrac{2}{3} : \dfrac{18}{75}\right)^2 = \left(\dfrac{\overset{1}{\cancel{2}}}{\cancel{3}} \cdot \dfrac{\overset{25}{\cancel{75}}}{\underset{9}{\cancel{18}}}\right)^2 = \left(\dfrac{25}{9}\right)^2 = \dfrac{625}{81}$

c) $(-2)^5 = -2 \cdot (-2) \cdot (-2) \cdot (-2) \cdot (-2) = -32$

d) $4^0 = 1$

e) $\left((-1)^5\right)^3 = (-1)^{15} = -1$

f) $\left(2^3\right)^2 = 2^{3 \cdot 2} = 2^6 = 64.$

5. $(3x + 7) \cdot (8 - x) = \underline{24x} - 3x^2 + 56 - \underline{7x} = -3x^2 + 17x + 56$

$-3 \cdot (0.5)^2 + 17 \cdot (0.5) + 56 = -3 \cdot 0.25 + 8.5 + 56 = -0.75 + 64.5 = 63.75.$

6. **a)** $\sqrt{225} = 15$ **b)** $\sqrt{\dfrac{64}{81}} = \dfrac{8}{9}$ **c)** $\sqrt{1\dfrac{9}{16}} = \sqrt{\dfrac{25}{16}} = \dfrac{5}{4}$ **d)** $\sqrt{0.000144} = 0.012.$

7. **a)** $5\sqrt{3} + \sqrt{3} = 6\sqrt{3}$ **b)** $17\sqrt{2} \cdot \sqrt{2} = 17 \cdot 2 = 34$ **c)** $\sqrt{2} \cdot \sqrt{18} = \sqrt{2 \cdot 18} = \sqrt{36} = 6$
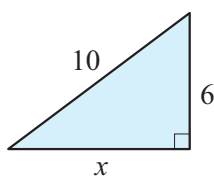
d) $\sqrt{75} : \sqrt{3} = \sqrt{75 : 3} = \sqrt{25} = 5.$

8. **a)** $\sqrt{150} = \sqrt{25 \cdot 6} = 5\sqrt{6}$ **b)** $\sqrt{800} = \sqrt{2 \cdot 400} = 20\sqrt{2}.$
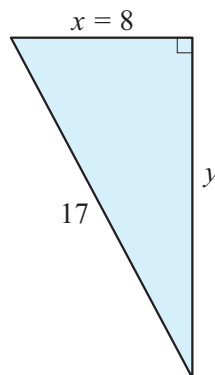
9. **a)** $x^2 = 9 \quad /\sqrt{\ }$

$|x| = 3$

$x_1 = 3, \ x_2 = -3$

b) $2x^2 - 200 = 0$

$2x^2 = 200 \quad / : 2$

$x^2 = 100 \quad /\sqrt{\ }$

$|x| = 10$

$x_1 = 10, \ x_2 = -10.$

10. Primjenjujemo Pitagorin poučak:

$x^2 = 10^2 - 6^2$
$x^2 = 100 - 36$
$x^2 = 64$
$x = 8$
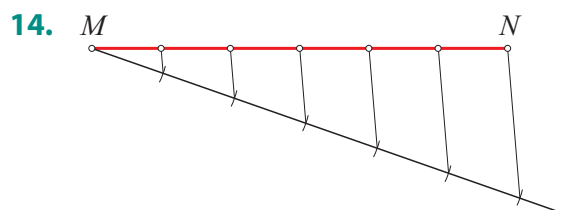
$y^2 = 17^2 - 8^2$
$y^2 = 289 - 64$
$y^2 = 225$
$y = 15.$

11. Iracionalni brojevi su $\sqrt{3}$ i $2.2345678910\ldots.$

12. $\mathbf{I} \cap \mathbf{Q} = \varnothing.$

13. Kako prodajemo eure, gledamo prodajni tečaj.

$$\cdot\,\mathbf{300} \left(\begin{array}{c} 1\,€ = 1.1179\,\$ \\ 300\,€ \approx 335.37\,\$ \end{array} \right) \cdot\,\mathbf{300}$$

Možemo dobiti 335.37 američkih dolara.

14.

15. Prema Talesovu poučku vrijedi:

$$y : 1 = 6 : 1.2 \implies 1.2y = 6 \quad / : 1.2 \implies \underline{y = 5}.$$

16.

$a = 3$ cm

$v = 2$ cm

$O, V = ?$
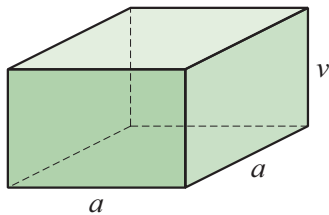
$O = 2B + P$	$V = B \cdot v$
$O = 2 \cdot a^2 + 4av$	$V = a^2 \cdot v$
$O = 2 \cdot 3^2 + 4 \cdot 3 \cdot 2$	$V = 3^2 \cdot 2$
$O = 18 + 24$	$V = 9 \cdot 2$
$\underline{O = 42 \text{ cm}^2}$	$\underline{V = 18 \text{ cm}^3}.$

17.
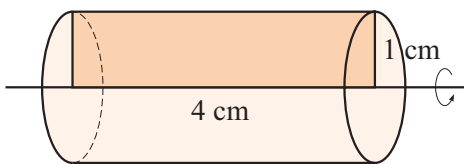
Dobiveno tijelo je valjak.

$r = 1$ cm

$v = 4$ cm

$V = B \cdot v$

$V = r^2 \pi \cdot v$

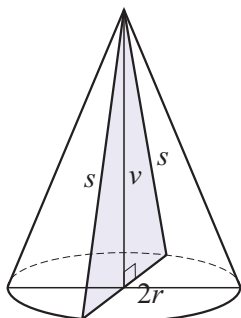$V = 1^2 \pi \cdot 4$

$\underline{V = 4\pi \text{ cm}^3}.$

18. a)

b)
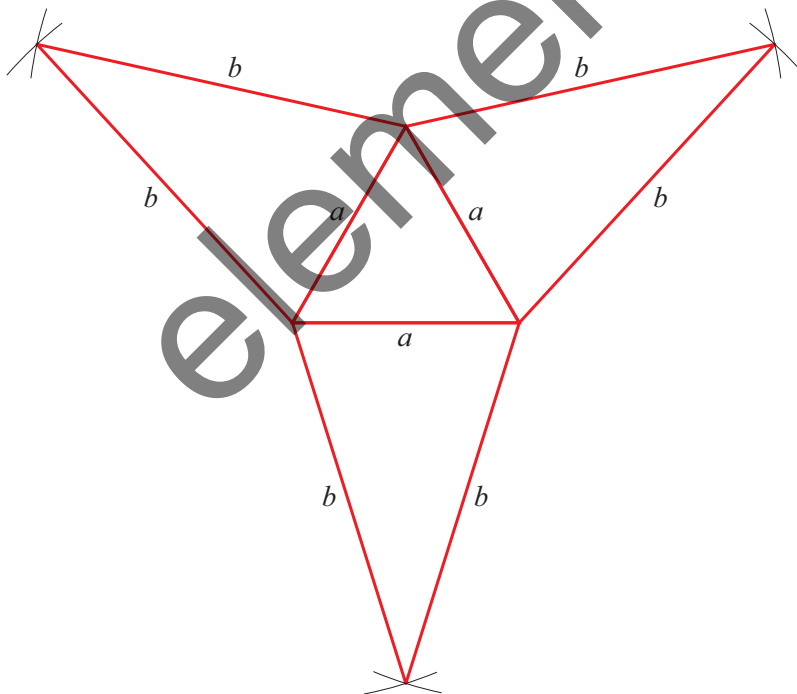
1. **a)**
$$2x + 3y = 7 \implies 2x = 7 - 3y \quad / : 2 \implies \boxed{x = 3.5 - 1.5y}$$
$$\underline{-7x - 10y = 5}$$

$$-7(3.5 - 1.5y) - 10y = 5$$
$$-24.5 + 10.5y - 10y = 5 \qquad\qquad x = 3.5 - 1.5y$$
$$-24.5 + 0.5y = 5 \quad / + 24.5 \qquad x = 3.5 - 1.5 \cdot 59$$
$$0.5y = 29.5 \quad / \cdot 2 \qquad x = 3.5 - 88.5$$
$$\underline{y = 59} \qquad\qquad \underline{x = -85}$$

Rješenje sustava uređeni je par $(-85, 59)$.

b)
$$2x + 3y = 7 \quad / \cdot 7 \qquad\qquad 2x + 3y = 7$$
$$\underline{-7x - 10y = 5} \quad / \cdot 2 \qquad 2x + 3 \cdot 59 = 7$$
$$\left.\begin{array}{l} \cancel{14}x + 21y = 49 \\ \underline{\cancel{-14}x - 20y = 10} \end{array}\right\} + \qquad 2x + 177 = 7 \quad / - 177$$
$$\underline{y = 59} \qquad\qquad 2x = -170 \quad / \cdot 2$$
$$\underline{x = -85}$$

Rješenje sustava uređeni je par $(-85, 59)$.

$$ \quad x \quad y$$
Provjera: $\qquad\qquad (-85, 59)$

$$2x + 3y = 7 \qquad\qquad -7x - 10y = 5$$
$$2 \cdot (-85) + 3 \cdot 59 = 7 \qquad -7 \cdot (-85) - 10 \cdot 59 = 5$$
$$-170 + 177 = 7 \qquad\qquad 595 - 590 = 5$$
$$7 = 7 \qquad\qquad 5 = 5.$$

Rješenje je točno.

2. Usporedni pravci imaju iste koeficijente smjera.

Zaključujemo da je -1 koeficijent smjera pravca p.

$$ x \quad y$$
Toćka $T(2, 3)$ pripada pravcu pa njezine koordinate zadovoljavaju jednadžbu pravca.

$$y = ax + b$$
$$\downarrow$$
$$-1$$

Vrijedi:
$$3 = -1 \cdot 2 + b$$
$$3 = -2 + b \quad / + 2$$
$$\underline{b = 5.}$$

Tražena jednadžba pravca je $y = -x + 5$.

3. **a)** $\left(\dfrac{5}{2}\right)^2 : \left(-2\dfrac{1}{7}\right)^2 = \left(\dfrac{5}{2}\right)^2 : \left(-\dfrac{15}{7}\right)^2 = \left(\dfrac{\cancel{5}}{2} \cdot \dfrac{-7}{\cancel{15}_{3}}\right)^2 = \left(\dfrac{-7}{6}\right)^2 = \dfrac{49}{36}$

b) $\left(5^0\right)^3 = 1^3 = 1$

c) $\left((-2)^3\right)^3 = (-2)^9 = -512.$
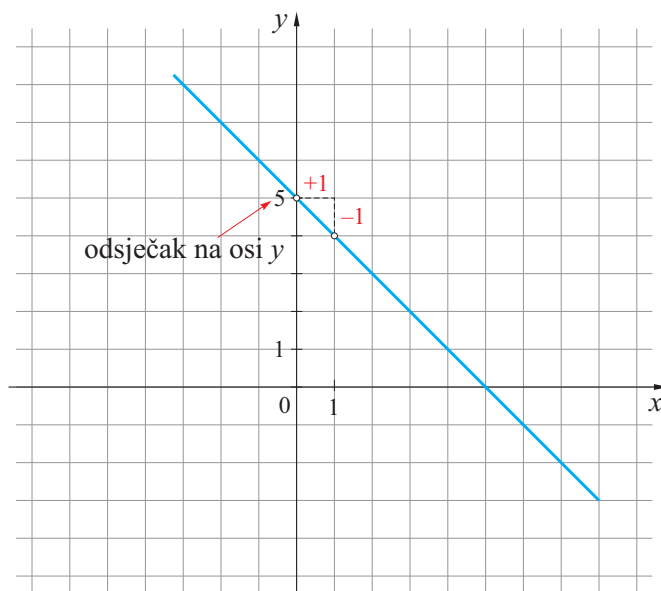
4. **a)** $3^8 \cdot 3^9 = 3^{17}$ **b)** $3^{12} : 3^7 = 3^5.$

5. **a)** $\sqrt{361} = 19$ **b)** $\sqrt{2\dfrac{14}{25}} = \sqrt{\dfrac{64}{25}} = \dfrac{8}{5}$ **c)** $\sqrt{90\ 000} = 300.$

6. **a)** $10\sqrt{5} - 8\sqrt{5} = 2\sqrt{5}$ **b)** $8\sqrt{11} \cdot \sqrt{11} = 8 \cdot 11 = 88$

   c) $\left(10\sqrt{20} + 4\sqrt{5}\right) : \left(2\sqrt{5}\right) = 5\sqrt{4} + 2 = 5 \cdot 2 + 2 = 12.$

7. **a)** $0.01x^2 = 1 \quad / : 0.01$ **b)** $(x-2)^2 = 1 \quad /^{\sqrt{\ }}$

   $\qquad\qquad x^2 = 1 : 0.01$ $\qquad\qquad\qquad |x - 2| = 1$

   $\qquad\qquad x^2 = 100 \quad /^{\sqrt{\ }}$ $\qquad\quad x - 2 = -1 \ / +2 \quad x - 2 = 1 \ / +2$

   $\qquad\qquad |x| = 10$ $\qquad\qquad\qquad x_1 = 1, \qquad\qquad x_2 = 3.$

   $\qquad x_1 = 10, \ x_2 = -10$

8. $\qquad x^2 = 7^2 - 3^2$

   $\qquad x^2 = 49 - 9$ $\qquad\qquad\qquad\qquad P = \dfrac{x \cdot 3}{2}$

   $\qquad x^2 = 40 \quad /^{\sqrt{\ }}$ $\qquad\qquad\qquad\qquad P = \dfrac{\overset{1}{2}\sqrt{10} \cdot 3}{\underset{1}{2}}$

   $\qquad x = \sqrt{40}$

   $\qquad x = \sqrt{4 \cdot 10}$ $\qquad\qquad\qquad\qquad P = 3\sqrt{10} \text{ m}^2.$

   $\qquad \underline{x = 2\sqrt{10} \text{ m}}$

9.
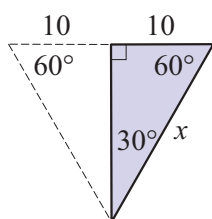
$x = 2 \cdot 10$
$\underline{x = 20}$
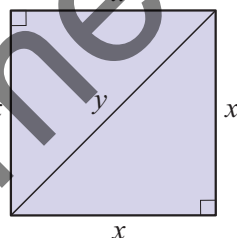
$\underline{y = x\sqrt{2} = 20\sqrt{2}.}$

10. **a)** $\dfrac{31}{6} = 31 : 6 = 5.1\dot{6} \longrightarrow$ beskonačni mješovito periodični decimalni zapis

   $\qquad\quad 10$
   $\qquad\quad\ \ 40$
   $\qquad\qquad 4$

   b) $\dfrac{4}{7} = 4 : 7 = 0.\dot{5}7142\dot{8} \longrightarrow$ beskonačni čisto periodični decimalni zapis

   $\qquad\quad 40$
   $\qquad\qquad 50$
   $\qquad\qquad\ \ 10$
   $\qquad\qquad\qquad 30$
   $\qquad\qquad\qquad\ \ 20$
   $\qquad\qquad\qquad\qquad 60$
   $\qquad\qquad\qquad\qquad\ \ 4$

   c) $\dfrac{153}{20} = 153 : 20 = 7.65 \longrightarrow$ konačni decimalni zapis.

   $\qquad\qquad 130$
   $\qquad\qquad\ \ 100$

11. **a)** $\mathbf{N} \cup \mathbf{Q} = \mathbf{Q}$ **b)** $\mathbf{Z} \cap \mathbf{Q} = \mathbf{Z}$ **c)** $\mathbf{I} \cap \mathbf{Z} = \varnothing$ **d)** $\mathbf{R} \cup \mathbf{N} = \mathbf{R}.$
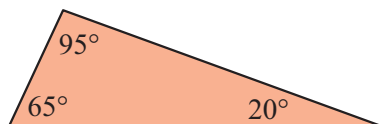
12. **a)** $\dfrac{1}{12}$ **b)** 0 **c)** $\dfrac{2}{12} = \dfrac{1}{6}.$

13.
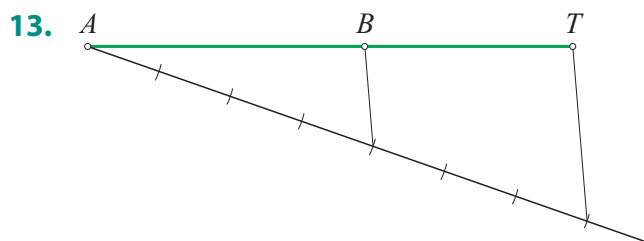
14. Da.

Zbroj veličina kutova u trokutu iznosi 180°.

$$180° - (65° + 25°) = 95°.$$

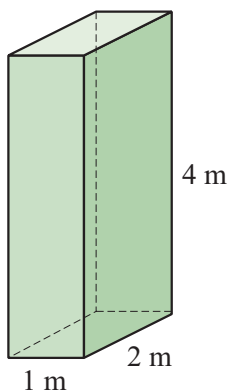Trokuti imaju odgovarajuće kutove jednakih veličina te su slični prema poučku K-K.

15. Vrijedi: $\dfrac{a}{a'} = \dfrac{b}{b'} = \dfrac{c}{c'} = k = 10$

$\dfrac{10}{a'} = 10 \implies a' = 1$ cm

$\dfrac{7}{b'} = 10 \implies b' = 0.7$ cm

$\dfrac{4}{c'} = 10 \implies c' = 0.4$ cm.

16.

$V = 1 \cdot 2 \cdot 4$

$V = 8$ m^3
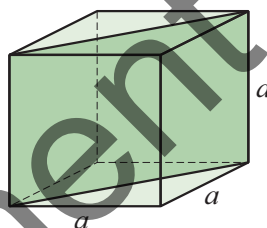
$V = a \cdot a \cdot a$

$V = a^3$

$8 = a^3 \implies a = 2$ m

$P_{dp} = a\sqrt{2} \cdot a$

$P_{dp} = 2\sqrt{2} \cdot 2 = 4\sqrt{2}$ m^2.

17.
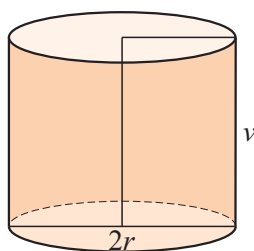
$B = 9\pi$ cm$^2 \implies r^2\pi = 9\pi$ cm$^2 \implies r = 3$ cm

$v = 5$ dm $= 50$ cm
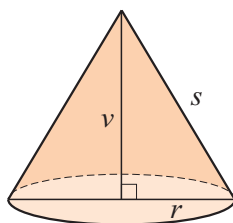
$O = ?$

$O = \underbrace{2r^2\pi}_{2B} + 2r\pi v$

$O = 18\pi + 2 \cdot 3\pi \cdot 50$

$O = 18\pi + 300\pi$

$O = 318\pi$ cm^2

$B = 9\pi$ cm^2

$v = 50$ cm

$V = \dfrac{B \cdot v}{3}$

$V = \dfrac{\overset{3}{9}\pi \cdot 50}{\underset{1}{3}}$

$V = 150\pi$ cm^3.

18.
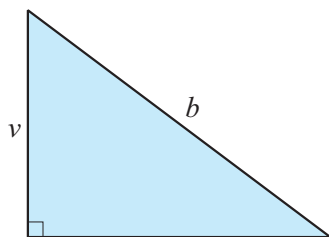
$$a = 4\sqrt{2} \text{ m}$$
$$v = 3\,k$$
$$b = 5\,k$$
$$\overline{\qquad\qquad\qquad}$$
$$V = ?$$
$$(3k)^2 + 4^2 = (5k)^2$$
$$9k^2 + 16 = 25k^2 \quad / - 9k^2$$
$$16 = 16k^2 \quad / : 16$$
$$k^2 = 1$$
$$\underline{k = 1}$$

$$\frac{a\sqrt{2}}{2} = \frac{4\sqrt{2} \cdot \sqrt{2}}{2} = 4$$

$$v = 3k \quad \Rightarrow \quad v = 3 \text{ m}$$
$$b = 5k \quad \Rightarrow \quad b = 5 \text{ m}$$
$$V = \frac{B \cdot v}{3}$$
$$V = \frac{a^2 \cdot v}{3}$$
$$V = \frac{\left(4\sqrt{2}\right)^2 \cdot \overset{1}{\cancel{3}}}{\cancel{3}_1}$$
$$V = 16 \cdot 2$$
$$\underline{V = 32 \text{ m}^2.}$$

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