

Subiectul I

1. $18 - 6 : \underbrace{(1+2)}_3 = 18 - \underbrace{6 : 3}_2 = \underline{18 - 2 = 16}$

R: 16

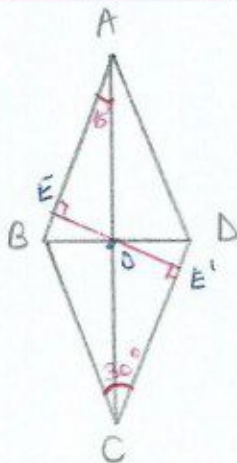
2. $\frac{a}{b} = \frac{1}{4} \Rightarrow 4 \cdot a = 1 \cdot b \Rightarrow 4a = b \Rightarrow \underline{4a - b = 0}$

R: 0

3. $2x - 1 \geq 3$
 $2x \geq 3 + 1$
 $2x \geq 4 \quad | : 2$
 $x \geq 2 \Rightarrow \underline{A = [2; +\infty)}$

R: $[2; +\infty)$

4.



$P_{ABCD} = 24 \text{ cm} \Rightarrow$
 $\Rightarrow l = 24 : 4 = 6 \text{ cm} \Rightarrow AB = 6 \text{ cm}.$
 $m(\angle BAD) = 30^\circ \Rightarrow m(\angle BAO) = 15^\circ$
 $\Rightarrow \boxed{OE = \frac{AB}{4}} = \frac{6}{4} = \frac{3}{2} \Rightarrow h = EE' = 2 \cdot \frac{3}{2} = 3 \text{ cm}.$
 $A_{ABCD} = l \cdot h = 6 \cdot 3 = 18 \text{ cm}^2$

R: 18

5.

R: 45°

$\angle(AB'; CC') = \angle(AB'; BB') = \angle AB'B$
 $CC' \parallel BB'$
 $m(\angle AB'B) = \frac{90^\circ}{2} = 45^\circ$

6.

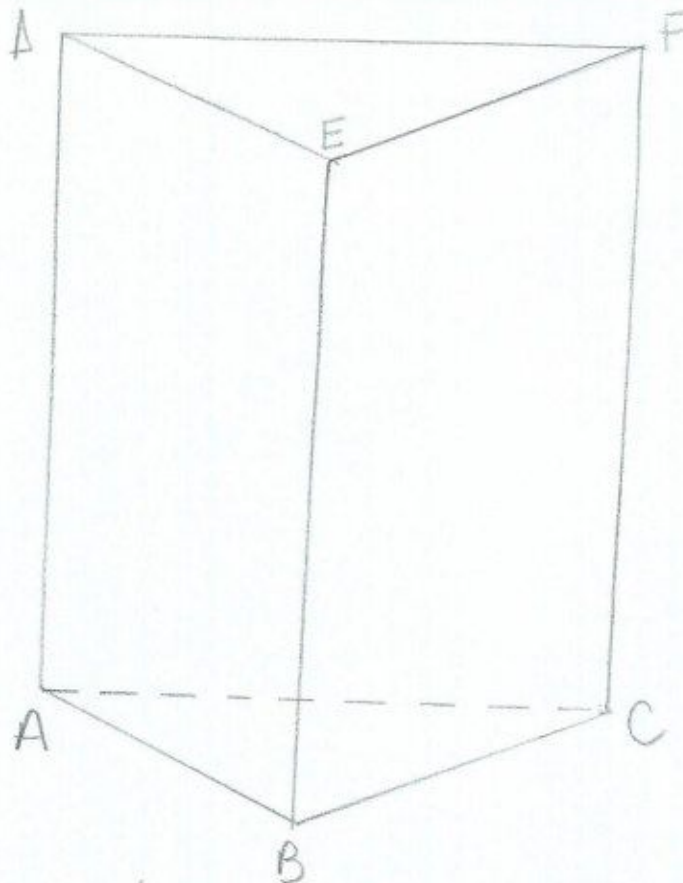
$M = \frac{1 \cdot 4 + 3 \cdot 5 + 4 \cdot 6 + 11 \cdot 7 + 7 \cdot 8 + 3 \cdot 9 + 1 \cdot 10}{1 + 3 + 4 + 11 + 7 + 3 + 1}$

$M = \frac{4 + 15 + 24 + 77 + 56 + 27 + 10}{30} = 7,1$

R: 7,1.

Subiectul II

1.



2.

$$x, y \in \mathbb{N}.$$

$$x + 4y = 30 \Rightarrow x = 30 - 4y$$

$$x = 2 \cdot (15 - 2y) \Rightarrow \underline{x \text{ număr par}}$$

$$\underline{x - \text{număr par} \text{ și } x - \text{număr prim} \Rightarrow x = 2}$$

$$x = 2$$

$$4y = 30 - x \Rightarrow$$

$$4y = 30 - 2$$

$$4y = 28$$

$$y = \frac{28}{4} = \frac{7}{1} \Rightarrow \underline{y = 7.}$$

Subiectul II

3. $x = \text{lungimea traseului}$

$$I \text{ zi} : 30\% \text{ din } x = \frac{30}{100} \cdot x = \frac{3x}{10}$$

$$a \text{ II-a zi} : \frac{2}{5} \cdot 70\% \text{ din } x = \frac{2}{5} \cdot \frac{70}{100} \cdot x = \frac{14x}{50}$$

$$a \text{ III-a zi} : 42 \text{ km}$$

$$\begin{aligned} x &= I \text{ zi} + a \text{ II-a zi} + a \text{ III-a zi} \\ \frac{50}{x} &= \frac{3x}{10} + \frac{14x}{50} + 42 \Rightarrow \frac{50x}{50} = \frac{15x}{50} + \frac{14x}{50} + \frac{2100}{50} \end{aligned}$$

$$50x = 15x + 14x + 2100$$

$$50x = 29x + 2100$$

$$50x - 29x = 2100$$

$$21x = 2100 / : 21 \Rightarrow x = 100 \text{ km}$$

4. a) $a = \sqrt{6} \cdot \left(\frac{3}{\sqrt{2}} + \frac{5}{\sqrt{3}} \right) - |5\sqrt{2} - 7|$

$$|5\sqrt{2} - 7| = 5\sqrt{2} - 7 \Rightarrow a = \frac{3\sqrt{6}}{\sqrt{2}} + \frac{5\sqrt{6}}{\sqrt{3}} - (5\sqrt{2} - 7)$$

$$a = 3\sqrt{3} + 5\sqrt{2} - 5\sqrt{2} + 7 \Rightarrow a = 3\sqrt{3} + 7$$

b) $b = \frac{3}{2-\sqrt{3}} + (\sqrt{2})^2 = \frac{3(2+\sqrt{3})}{2^2-(\sqrt{3})^2} + 2 = \frac{6+3\sqrt{3}}{4-3} + 2 = 6+3\sqrt{3}+2 = 8+3\sqrt{3}$

$$a = 7+3\sqrt{3}; \quad b = 8+3\sqrt{3}$$

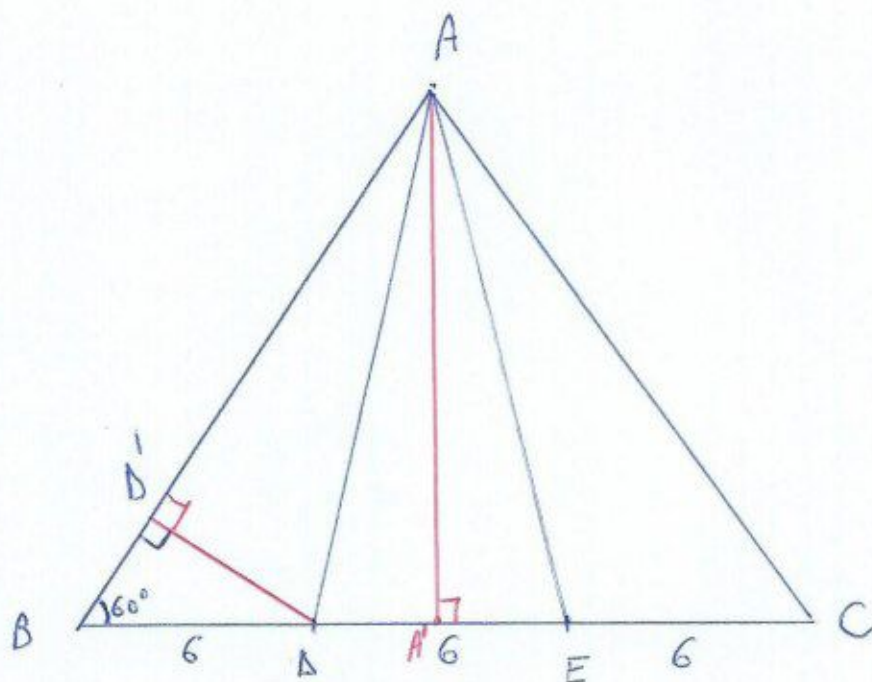
$$\begin{aligned} (a-b)^{2018} &= [7+3\sqrt{3} - (8+3\sqrt{3})]^{2018} = (7+3\sqrt{3} - 8 - 3\sqrt{3})^{2018} = (7-8)^{2018} \\ &= (-1)^{2018} = +1 \end{aligned}$$

5.
$$\begin{aligned} N &= (4x+3)^2 - 2(5x-3)(x+1) - 2x(3x+10) \\ N &= 16x^2 + 2 \cdot 4x \cdot 3 + 9 - 2(5x^2 + 5x - 3x - 3) - 2x \cdot 3x - 2x \cdot 10 \\ N &= 16x^2 + 24x + 9 - 10x^2 - 10x + 6x + 6 - 6x^2 - 20x \\ N &= 24x - 10x + 6x - 20x + 9 + 6 = 14x - 14x + 15 \\ N &= 15 \end{aligned}$$

$$N = 15 : 5 \Rightarrow N : 5$$

Subiectul III

1.



a) $BC = BD + DE + EC = 6 + 6 + 6 = 18 \text{ cm} \Rightarrow \underline{l = 18 \text{ cm}}$.

$P_{ABC} = 3 \cdot l = 3 \cdot 18 = 54 \text{ cm}$.

b) Fie $DD' \perp AB$

$d(D; AB) = DD'$.

$\triangle ABC$ echilateral $\Rightarrow m(\angle B) = 60^\circ$.

$\triangle BDD'$: $\sin \angle BDD' = \frac{\text{cateta opusa}}{\text{ipotenusa}} \Rightarrow \sin 60^\circ = \frac{DD'}{BD} \Rightarrow \frac{\sqrt{3}}{2} = \frac{DD'}{6} \Rightarrow$

$\Rightarrow DD' = \frac{6 \cdot \sqrt{3}}{2} \Rightarrow DD' = 3\sqrt{3} \text{ cm}$.

c) Fie $AA' \perp DE \Rightarrow S_{ADE} = \frac{B \cdot h}{2} = \frac{DE \cdot AA'}{2} \quad \left| \Rightarrow \right.$

$AA' = h_{\triangle ADE} = \frac{l\sqrt{3}}{2} = \frac{18\sqrt{3}}{2} = 9\sqrt{3} \text{ cm}$

$\Rightarrow S_{ADE} = \frac{DE \cdot AA'}{2} = \frac{6 \cdot 9\sqrt{3}}{2} = 27\sqrt{3} \text{ cm}^2$

$S_{ADE} = \frac{AD \cdot AE \cdot \sin \widehat{DAE}}{2} \quad (1)$

$\triangle ADA'$: $m(\angle A') = 90^\circ \Rightarrow AD^2 = \underbrace{DA'}_3^2 + \underbrace{AA'}_{9\sqrt{3}}^2 = 3^2 + (9\sqrt{3})^2 = 9 + 81 \cdot 3 = 252 \Rightarrow$

$\Rightarrow AD = \sqrt{252} = 6\sqrt{7} \text{ cm}$.

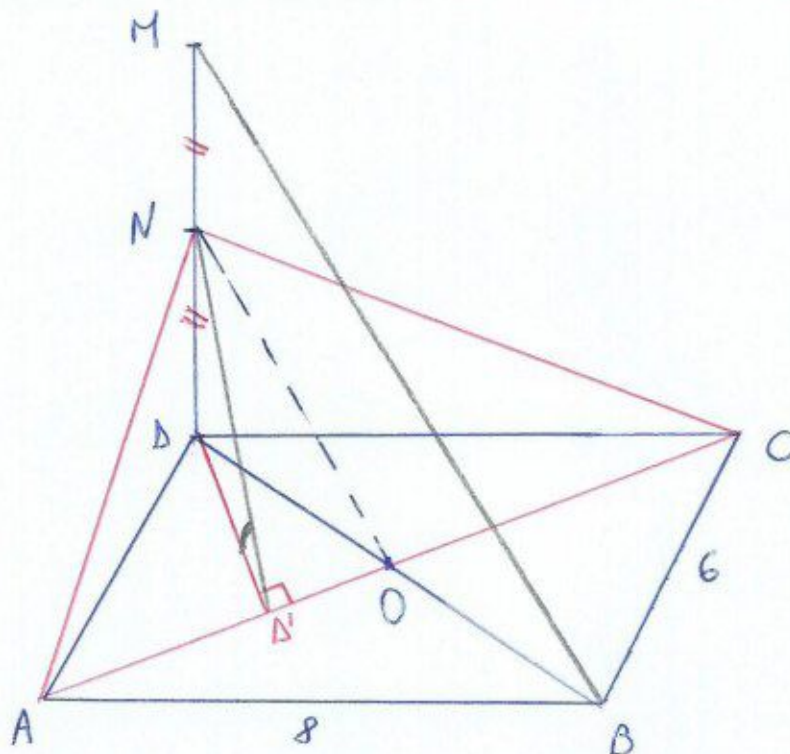
$(1) \Rightarrow 27\sqrt{3} = \frac{6\sqrt{7} \cdot 6\sqrt{7} \cdot \sin \widehat{DAE}}{2} \Rightarrow 54\sqrt{3} = 252 \cdot \sin \widehat{DAE} \Rightarrow \sin \widehat{DAE} = \frac{54\sqrt{3}}{252} = \frac{3\sqrt{3}}{14}$

$\Rightarrow \sin \widehat{DAE} = \frac{3\sqrt{3}}{14} \stackrel{12}{=} \frac{3\sqrt{3}}{14}$

$\frac{3\sqrt{3}}{14} < 0,4 \Leftrightarrow \frac{3\sqrt{3}}{14} < \frac{4}{10} \Leftrightarrow 30\sqrt{3} < 56 \quad | :2$
 $15\sqrt{3} < 28 \quad |^2$
 $15 \cdot 15 \cdot 3 < 28 \cdot 28 \quad (A)$
 $675 < 784$

Subiectul III

2.



a) $A_{ABCD} = L \cdot l = AB \cdot BC = 8 \cdot 6 = \underline{48 \text{ cm}^2}$

b) $BD \cap AC = \{O\}$

$\begin{matrix} O - \text{mijlocul lui } AB \\ N - \text{mijlocul lui } DM \end{matrix} \Rightarrow \underline{DN \text{ linie mijlocie}} \text{ in } \triangle DBM \Rightarrow \underline{DN \parallel BM}$

$\begin{matrix} BM \parallel ON \\ ON \subset (ACN) \end{matrix} \Rightarrow \underline{BM \parallel (ACN)}$

c) $\begin{matrix} DD' \perp AC \\ D' \in AC \\ ND \perp (ACD) \\ AC \subset (ACD) \end{matrix} \Rightarrow \underline{ND' \perp AC}$

$\begin{matrix} (ACD) \cap (ANC) = AC \\ DD' \perp AC \\ ND' \perp AC \end{matrix} \Rightarrow \angle((ACD); (ANC)) = \angle(DD'; ND') = \angle(DD'N)$
 $\Rightarrow \underline{m(\angle DD'N) = 60^\circ}$

$A_{AAC} = \frac{A_{\square}}{2} = 24 \text{ cm}^2$; $A_{ABC} = \frac{AC \cdot DD'}{2} \Rightarrow 24 = \frac{10 \cdot DD'}{2} \Rightarrow \underline{DD' = \frac{24}{5} \text{ cm}}$

$\triangle ABC: AC^2 = AB^2 + BC^2 = 8^2 + 6^2 = 64 + 36 = 100$
 $\Rightarrow AC = \sqrt{100} = 10 \text{ cm}$

$\tan \angle DD'N = \frac{\text{cateta opusa}}{\text{cateta alaturata}} \Rightarrow \tan 60^\circ = \frac{ND}{DD'} \Rightarrow \sqrt{3} = \frac{ND}{\frac{24}{5}} \Rightarrow \underline{ND = \frac{24}{5} \cdot \sqrt{3} = \frac{24\sqrt{3}}{5} \text{ cm}}$

$DM = 2 \cdot ND = 2 \cdot \frac{24\sqrt{3}}{5} \Rightarrow \underline{DM = \frac{48\sqrt{3}}{5} \text{ cm}}$