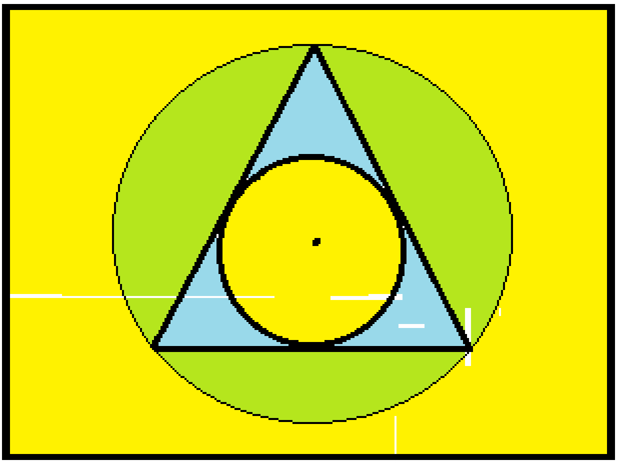
М.А.Пахирдинов

ҮЧ БУРЧТУК
ЖАНА

ТӨРТ БУРЧТУК



Жалал-Абад, 2013

КЫРГЫЗ РЕСПУБЛИКАСЫНЫН БИЛИМ БЕРҮҮ
ЖАНА ИЛИМ МИНИСТРЛИГИ

ЖАЛАЛ-АБАД МАМЛЕКЕТТИК УНИВЕРСИТЕТИ

М.А.Пахирдинов

ҮЧ БУРЧТУК
ЖАНА

ТӨРТ БУРЧТУК

Жалал-Абад, 2013

ББК 22.1
П.12
Жалал-Абад Мамлекеттик университетинин «Жогорку математика» кафедрасынын чогулушунда талкууланып сунушталган жана ЖАМУ нун усулдук кеңешинде бекитилген.

Рецензент: п.и.к., доц. Нарбаев М.

ҮЧ БУРЧТУК
ЖАНА

ТӨРТ БУРЧТУК

-Жалал-Абад: ЖАМУ, 2013. -145 бет.

«Үч бурчтук жана төрт бурчтук» темада жазылган окуу-

усулдук колдонмо математика жана физика адистигиндеги студенттерге, мектеп окуучуларына жана жаш окутуучуларга жакындан жардам көрсөтүүчү жардамчы окуу каражаттарынын бири катары арналып жазылды.

Колдонмо геометриянын планиметрия бӨлүмүнүн үч

бурчтуктар жана тӨрт бурчтуктар фигураларына таандык болгон

негизги түшүнүктөрдү, аныктамаларды, теоремаларды Өз ичине

камтыган. Колдонмодо мектеп курсунда геометрияны окутуунун сааттары жана анын программасы келтирилген. Ошондой эле түрдүү маселелердин чыгарылыштары, чыгаруу ыкмалары жана өз алдынча иштөө үчүн көнүгүүлөрдүн топтомдору берилди.

[illegible]

2. [illegible]

[illegible] (VII-IX [illegible])

[illegible]

[illegible], [illegible]

[illegible]:

-[illegible]

[illegible], [illegible]

7-[illegible]. [illegible]
([illegible] 2 [illegible], [illegible] 68 [illegible])

1) Y[illegible] (14 [illegible])
Y[illegible]. Y[illegible]

[illegible] [illegible]ү[illegible]ө[illegible]ө [illegible]ө[illegible]үү. Y[illegible] [illegible],

[illegible], [illegible]. [illegible]ң [illegible] ү[illegible] [illegible]. Y[illegible] [illegible]. [illegible] ү[illegible] [illegible].

2) Y[illegible] (10 [illegible])

Y[illegible]. Y[illegible]. Y[illegible]. [illegible] ү[illegible]. Y[illegible]. [illegible].
Y[illegible].

8-[illegible]. [illegible]
([illegible] 2 [illegible], [illegible] 68 [illegible])

1) [illegible]ө[illegible] (24 [illegible])

[illegible]. Y[illegible].

2) [illegible] (20 [illegible])

[illegible] Y[illegible] [illegible], [illegible], [illegible]. [illegible]. [illegible] Y[illegible] [illegible].

3) [illegible] (18 [illegible])

[illegible] Y[illegible]. Y[illegible].

9-[illegible]. [illegible]

([illegible] 2 [illegible], [illegible] 68 [illegible])

1) Y[illegible] (10 [illegible])

[illegible]. [illegible]. Y[illegible] [illegible].

[illegible] ө[illegible]ө [illegible]. Y[illegible]

[illegible].

[illegible] ү[illegible] [illegible]

ү[illegible] ө[illegible]үү[illegible]ө [illegible].

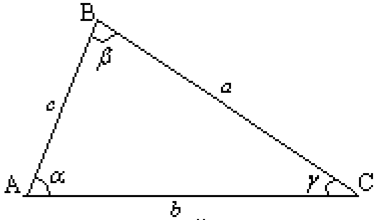
[illegible] ү[illegible] [illegible] [illegible]ң[illegible] [illegible].

Ү[illegible] [illegible]-[illegible] [illegible]. Ү[illegible] [illegible]. [illegible] ү[illegible] [illegible] ү[illegible]ү[illegible]ү [illegible] [illegible].[illegible]. [illegible]+[illegible]>[illegible], [illegible] ү[illegible] [illegible] $\angle A + \angle B + \angle C = 180^0$ [illegible].

Ү[illegible] [illegible] [illegible]ү[illegible]үү[illegible]ө [illegible]:

-[illegible]ң [illegible],
-[illegible],
-[illegible]ң [illegible]
-[illegible]ү[illegible]үү [illegible].

□□ □ □□□□□. □□□ □Y□ □□□□ □□□ □□□□□□□□ Y□ □□□□□ □□□□□ □□



1–чийме

Ө□□Ө□ □□□ □ □□□□ □ □□□□ □□□□ □□□□□□□□□□□ □□□□ □□□□□□□ □□□□□ □□□□□YY□Y Y□ □□□□□□□□ □□□ □□□□□□ □ □□□ ΔABC □□□□□ □□ □□□□□□□□□□ (1-□□□□□) .

Y□ □□□□□□□□□□:

-Y□ □□□□□□□ □,□,□,

-Y□ □□□ □ $AB = c$, $BC = a$, $AC = b$,

-Y□ □□□□□ $\angle A = \alpha$, $\angle B = \beta$, $\angle C = \gamma$ □□□□□□□ □□□□□□□□□□□

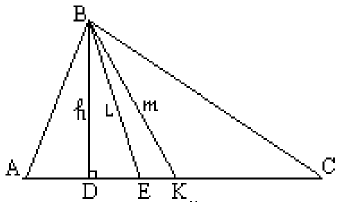
□□ □ □□□□□ Y□ □□□□□□□:

-Y□ □□□□□□□□□ □□ (h_a, h_b, h_c),

-Y□ □□□□□□□□□□ (m_a, m_b, m_c),

-Y□ □□□□□□□□□□□□□□ (l_a, l_b, l_c) □□.

□□ □ □□□□□. □□□ Y□ □□□□□□□□□□□ □ □□□□□□□□□ □□



2–чийме

□□□□□□ □Y□ Y□Y□□Ө□ □D □□□□□□□□□ □□□□□, □□□□ □□□□□□□□□ □□□ □□□□□. (2-□□□□□).

□D ⊥ □□, □ D=h.

[illegible]. [illegible] ү[illegible] [illegible] [illegible] [illegible] [illegible]

[illegible] [illegible]ң [illegible] [illegible]ү[illegible]ү[illegible]ү[illegible]ө[illegible] [illegible] [illegible],

[illegible] **[illegible]** [illegible]. (2-[illegible]).

$$BK = m, \quad AK = KC.$$

Ү[illegible] [illegible] [illegible] [illegible]
$\ell_{BK} = \frac{1}{2}\sqrt{2AB^2 + 2BC^2 - AC^2}$ [illegible] [illegible] [illegible]
[illegible] [illegible]. Ү[illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible]

[illegible] 2:1 [illegible] [illegible]ө[illegible]ү[illegible]ү[illegible]ө[illegible].

[illegible]. [illegible] ү[illegible] [illegible] [illegible] [illegible] $\angle$ [illegible]

[illegible] [illegible]ң [illegible] [illegible]ө[illegible]ө[illegible] [illegible] [illegible], [illegible]

[illegible] [illegible]. (2-[illegible]).

[illegible]= L, $\angle$ [illegible]= $\angle$ [illegible].

∠ [illegible]

[illegible]:
[illegible]
[illegible], [illegible]

[illegible].

$$\frac{AB}{BC} = \frac{AE}{EC}.$$

1. [illegible]

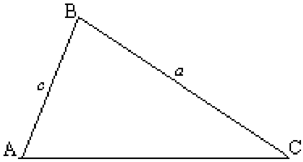
[illegible]

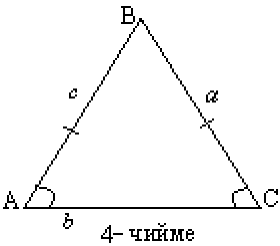
[illegible]:

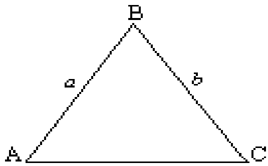
1) [illegible]: ($AB = c$, $BC = a$, $AC = b$).

[illegible]) [illegible] ΔABC ү[illegible] [illegible] [illegible] ≠ [illegible] ≠ [illegible] ≠ [illegible] ($a \neq b \neq c \neq a$) [illegible] [illegible]ү[illegible]үү [illegible], [illegible] ү[illegible] [illegible] **[illegible]ү[illegible]үү [illegible]** ү[illegible] [illegible] (3-[illegible]) .

[illegible]) [illegible] ү[illegible] [illegible] [illegible]=[illegible] ≠ [illegible] ($a \neq b$, $c = a$) [illegible], [illegible] ү[illegible] **[illegible]ң [illegible]** [illegible] (4-[illegible]).


3–чийме


4– чийме


5-чийме

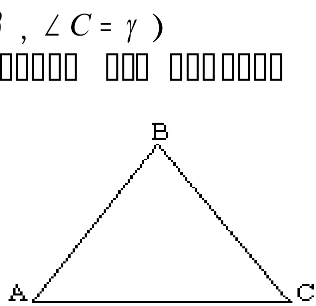
[illegible] ү[illegible] **[illegible]** [illegible], [illegible] ү[illegible]ү[illegible]ү [illegible] **[illegible]** [illegible]. [illegible], [illegible]=[illegible] [illegible], [illegible]-[illegible] [illegible].

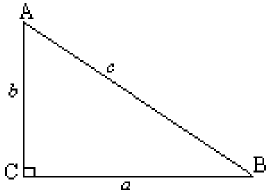
[illegible]) [illegible] ү[illegible] ү[illegible] [illegible]=[illegible]=[illegible] [illegible].[illegible]. ($a = b = c$) [illegible], [illegible] ү[illegible] **[illegible]ң [illegible]** ү[illegible] [illegible]. (5-[illegible])

2) [illegible]: ($\angle A = \alpha$, $\angle B = \beta$, $\angle C = \gamma$)

[illegible]) [illegible] ү[illegible] [illegible] [illegible]. [illegible].

($\angle$ [illegible]$<90^0$, $\angle B<90^0$, $\angle$ [illegible]$<90^0$), [illegible] ү[illegible] **[illegible]** ү[illegible] [illegible] (6-[illegible]). [illegible] ү[illegible] [illegible]


6-чийме


7–чийме

□□□□□□□□□ □□□□□□□□□□ □□□□□□□□, □□□□ ү□ □□□□□□□□□□□ □□□□□

□ө□ү□ү□□ө □□□□□ (9-□□□□□ - a).

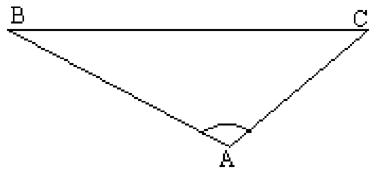
□) □□□□□□□ ү□ □□□□□□□□□□□ □□□□□□□:

$\angle$ □=90^0, $\angle$ □<90^0, $\angle$ □<90^0

□□□□□, □□□□ □□□ ү□ □□□□□□□□□ **□□□ □□□□□□□□** □□□ □□□□□□. (7-□□□□□) . □ □□□ □ $BC = a$, $AC = b$, −□□□□□□□□□□□□ **□□□□□**, $AB = c$ − **□□□ □□□□□□□□** □□□ □□□□□□.

□□ $\perp$ □□, ($a \perp b$).

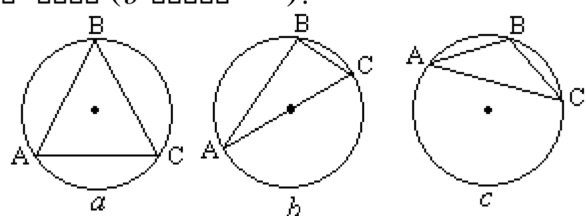
□□□ □□□□□□□ ү□ □□□□□□□□□□□ □□□□□□□□ □□□□□□□□□ □□□□□□□□□□ □□□□□□□, ү□ □□□□□□□□□□ □□□□□□□□□□□□□□□□□ □□ң □□□□□□□□□□ □ □□□□ (9-□□□□□ - b).



8-чийме

□) □□□□□□□ ү□ □□□□□□□□□□ □□□ □□□□□ ($\angle$ □) □□ң □.□. $\angle$ □>90^0, $\angle$ □<90^0, $\angle$ □<90^0 □□□□□, □□□□ □□□ ү□ □□□□□□□□□ **□□ң □□□□□□□□** □□□ □□□□□□. (8-□□□□□).

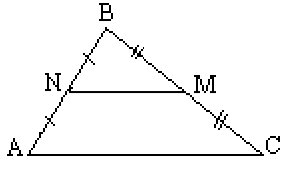
□□ң □□□□□□□ ү□ □□□□□□□□□□ □□□□□□□□ □□□□□□□□□ □□□□□□□□□□ □□□□□□□, □□□□ ү□ □□□□□□□□□□ □□□□□□ □ □□□ □□□□ □ □□□□ (9-□□□□□ - c).



9-чийме

Ү[illegible] Ү[illegible]:
[illegible]=[illegible]+[illegible]+[illegible] [illegible].

Ү[illegible] [illegible] Ү[illegible]



10-чийме

[illegible]Ө[illegible]Ө[illegible]Ү[illegible]Ө[illegible] [illegible]: Ү[illegible]

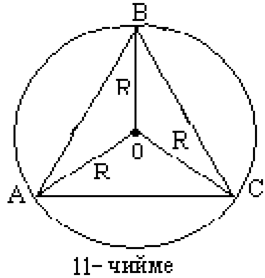
[illegible] (10-[illegible]).

Ү[illegible] Ү[illegible] Ө[illegible]ҮҮ[illegible]Ү **[illegible]**

Ү[illegible] [illegible], [illegible] **Ү[illegible]** [illegible] (11-[illegible]).

[illegible] Ү[illegible] [illegible], [illegible]. Ү[illegible], [illegible]

[illegible].



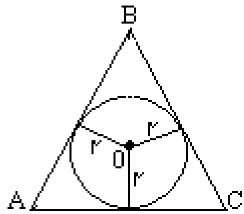
11-чийме

Ү[illegible]

$$R=\frac{abc}{4S_\Delta}=\frac{abc}{4\sqrt{p(p-a)(p-b)(p-c)}} \quad [illegible]$$

$$R=\frac{1}{2}\cdot\frac{a}{\sin\alpha}=\frac{1}{2}\cdot\frac{b}{\sin\beta}=\frac{1}{2}\cdot\frac{c}{\sin\gamma}$$

[illegible]. [illegible] a,b,c – ү[illegible] [illegible], $p=\frac{1}{2}(a+b+c)$ – ү[illegible] [illegible], S_Δ – ү[illegible] [illegible], α, β, γ –



12– чийме

[illegible] үү [illegible]ү[illegible]ө ү[illegible] [illegible] a, b, c [illegible] [illegible].

Ү[illegible] ү[illegible] [illegible] ө[illegible]ө[illegible]

[illegible] ү[illegible] [illegible], [illegible] ү[illegible] [illegible]. [illegible] ү[illegible] [illegible], [illegible]. [illegible] ү[illegible] [illegible]. Ү[illegible] [illegible]

$$r=\frac{S_\Delta}{p}=\sqrt{\frac{(p-a)(p-b)(p-c)}{p}}, \qquad \left(p=\frac{a+b+c}{2}\right)$$

□□□□□□ □□□□□□ □□□ □□□□□□ □ □□□□□ □□ (12-□□□□□).

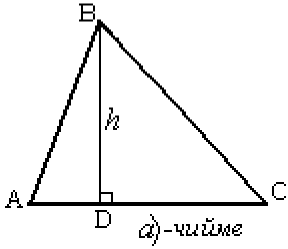
2. Ү□ □□□□□□□□□□□ □□□□□

<u>**□□ □ □□□□ □**</u>. Ү□ □□□ □□□□□□□□ ү□ □ □□□□□□ □□□□□□□□

□□□□□ □□□□□□□□ □□□□ □ ө□ү□ү □□□□ □□□□□ □□□ □□□□□□.

Ү□ □□□□□□□□□ □□□□□□ □□□□□□ □□ □□□ □□□□ □□□ □□□□□□ □□□ (□□□ □□□□□ □□□) □ □□:

<u>**□□ □ □□□□ □ 1**</u>. Ү□ □□□□□□□□□□ □□□□□ □□□□ □□□□□□ □□□□□ □□□□□□□□□□□



□ө□ө□□ү□□ү□ү□ү□ □ □□□□□□□

□□□□□□□ (a) -□□□□□).

$$s = \frac{1}{2} a \cdot h_a, \quad AB = a -$$ □□□□□□,

$BD = h_a -$ □□□□□□□□□.

<u>**□□ □ □□□□ □ 2.**</u> Ү□ □□□ □□□□□□□□ □□□□□ □□□□ □□□ □□□ □□□□

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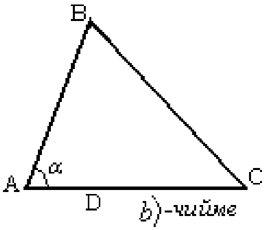
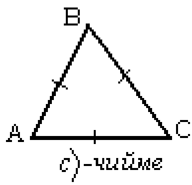
□.□. $s=\frac{1}{2}a\cdot b\cdot\sin\alpha$, $a=AB$, $AC=b$ – □ □□□□□□□, $\sin\alpha$ -□□ □□ □□□□□□□□ □□ □□□□□□□□ □ □□□ □□□□□ □□□□□□□ (b)-□□□□□□) .





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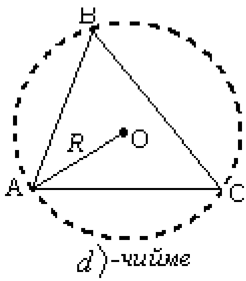

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□□□□□□□□ □.□. $s=\frac{\sqrt{3}}{4}a^2$, $AB=a$ – □□□ □ (c)-□□□□□□).

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□□□□□□□□ □.□.

$$s = \frac{abc}{4R}, \quad AB = a, \; BC = b, \quad AC = c -$$

□□ □□□□□□, $R = OA$ -□□□□□□□□ □□□□□□□ □□□ □□□□□□□□ □□□ □□□□□□□□□ (d) -□□□□□□) .

□□ □ □□□□□ □ 5. (□□□□□□□ □□□ □□□□□ □□□□□□□) □Ү□□ҮҮ □□ □□□□□ Ү□ □□□□□□□□□□□□ □□□□□□

$$s = \sqrt{p(p-a)(p-b)(p-c)}$$

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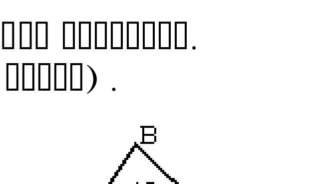
$AB = a$, $BC = b$, $AC = c -$ □□ □□□□□□) .

□□ □ □□□□□ □ 6. □Ү□□ҮҮ □□ □□□□□ Ү□ □□□□□□□□□□□□ □□□□□□ □□□□□ □□□□ □□□ □□□□□□□□□□□□ □□□□ □□□□□□ □□□□□□□□□ □□□□□□□□□□□ □□□□□□□□□□ □□□□□□□



е)-чийме

[illegible] [illegible] [illegible].[illegible]. $s = p \cdot r$ [illegible] p-[illegible] [illegible]

[illegible], r-[illegible] [illegible] [illegible] [illegible] [illegible] (e)-[illegible]).

2-§. [illegible]ң [illegible] ү[illegible] [illegible].

[illegible] 1. [illegible] ү[illegible] **[illegible]ң [illegible]** ү[illegible].

[illegible], [illegible] ү[illegible]ү[illegible]ү [illegible].

[illegible] 2. [illegible] ү[illegible] **[illegible]ң [illegible]** ү[illegible].

[illegible], [illegible] ү[illegible]ү[illegible]ү[illegible]ү [illegible].

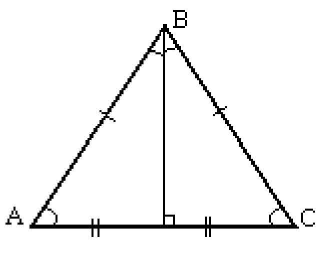
[illegible]. [illegible]ң [illegible] ү[illegible]

[illegible]ү[illegible]ү[illegible]ү[illegible]ө[illegible], [illegible], [illegible]

[illegible].

[illegible]өө. [illegible] –[illegible]

[illegible]ң [illegible] ү[illegible] [illegible] D –[illegible]



13-чийме

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□□□□□ $\angle ACD = \angle BCD$ □□□□□□□ □□□□□, □D – □□□□□□□□□□□ □□□□□. □□□□□□□ □□□ $\angle ADC = \angle BDC$ □ □□□ □□□□ □ □□□□□ □□□ □□□□ □□□□□□□ □□□□, □□□□ □□□, □□□□□ □D ү□ □□□□□□□□□□□ □□□□□□□□□□□ □□□□□ (13-□□□□□).

□D⊥ □□, □ D=D□, ∠ □□ D=∠ D□□,

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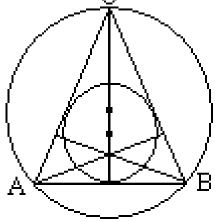
[illegible] ү[illegible] [illegible], [illegible] [illegible]ң [illegible] ү[illegible] [illegible].

[illegible] ү[illegible] [illegible], [illegible] [illegible]ң [illegible] ү[illegible] [illegible].

[illegible] ү[illegible] [illegible], [illegible] [illegible] ү[illegible] [illegible].

[illegible]ң [illegible] ү[illegible] [illegible], [illegible] [illegible], [illegible]ң [illegible] ү[illegible] [illegible] (14-[illegible]).



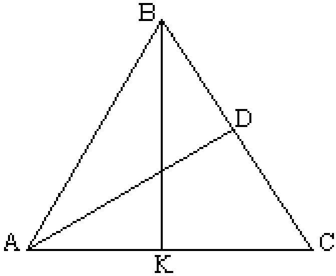
14-чийме

1-[illegible]. [illegible] [illegible]ң [illegible] ү[illegible] [illegible] $AC = 4\sqrt{2}\ см$, [illegible]

[illegible] [illegible]ү[illegible]ү[illegible]ү[illegible]ө[illegible]

[illegible] $AD = 5\ см$.

[illegible]ң [illegible] ү[illegible] [illegible] $AB = BC$ [illegible] (15-[illegible]).



15-чийме

[illegible]. [illegible]ң [illegible] ү[illegible] [illegible] ҮҮ, [illegible] $\ell_{AD} = \dfrac{1}{2}\sqrt{2a^2 + 2b^2 - c^2}$ [illegible] ҮҮ.

[illegible] $AB = BC = x$ [illegible], [illegible]:

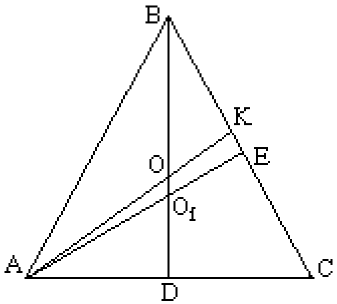
$$\ell^2_{AD} = \frac{1}{4}(2(4\sqrt{2})^2 + 2x^2 - x^2) = \frac{1}{4}(64 + x^2)$$

$$5^2 = \frac{1}{4}(64 + x^2), \quad 100 = 64 + x^2, \quad x = \pm 6 .$$

[illegible] 6 ([illegible]) [illegible].

[illegible]: $6\ см$.

2-[illegible]. [illegible] 20[illegible], [illegible] 24[illegible]. Y[illegible] OO_1 [illegible].



16-чийме

[illegible] D, [illegible] Y[illegible] [illegible]-[illegible]. Y[illegible] D [illegible] (16-[illegible]).

[illegible] Y[illegible] D [illegible], [illegible].

[illegible], $p = \dfrac{20 + 20 + 24}{2} = 32$, $p = 32$.

Y[illegible]:

$$s_{ABC} = \sqrt{p(p-a)(p-b)(p-c)} = \sqrt{32(32-20)(32-20)(32-24)} =$$

$$= \sqrt{32 \cdot 12 \cdot 12 \cdot 8} = \sqrt{16 \cdot 12^2 \cdot 4^2} = 4 \cdot 12 \cdot 4 = 192, \quad s_{ABC} = 192\ см^2 .$$

Y[illegible]:

$$r = OD = \frac{s}{p} = \frac{192}{32} = 6, \quad r = 6\,см.$$

□D□ Y□ □□□ □□□□□□□□□ □D □□□□□□□□□□□□ □□□□□□□□□□ □□□□□□:

$$BD = \sqrt{20^2 - 12^2} = \sqrt{256} = 16, \quad BD = 16\,см.$$

$BD = BO_1 + O_1D$, □□ □□□ □□□□□□□□□□ □□□□□□□□ □□□□□ □ $BO_1 = 2 \cdot DO_1$ □□□□□□□□□ □□□□ □□□□□, □□□□

$$16 = 2 \cdot DO_1 + DO_1, \; DO_1 = \frac{16}{3}\,см, \; BO_1 = 2 \cdot \frac{16}{3} = \frac{32}{3},$$

$$BO_1 = \frac{32}{3}\,\text{см}.$$

□□□□□, $OO_1 = DO - DO_1 = 6 - \frac{16}{3} = \frac{2}{3}, \; OO_1 = \frac{2}{3}\,см.$

□□□□□: $\frac{2}{3}\,см.$

3-□ □□□□□. □□□ □□ң □□□□□□□□□□ Y□ □□□□□□□□□□□ □□□□□□ □□□□ 10□□, □□□□□□ 16□□ □□ □□□□□□□. □□□ Y□ □□□□□□□□□□ □□□□□ □□□□ □□□□□□□ □□□□□□□□ □□□□□□□□□□□ □□□□□□□□□□□ □□□□ □□□□□□□□ □□□□□□□□□□□□□ □□□□□□□□□□ □□□□□□□□ □□□ □□□□.

□□□□□ □□□□□.

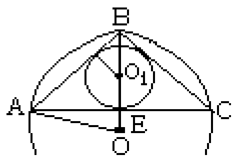
$$p = \frac{10 + 10 + 16}{2} = 18, \quad s = \sqrt{18 \cdot 18 \cdot 8 \cdot 8 \cdot 2} = 48, \quad s = 48\,см^2.$$

$$R = \frac{abc}{4s} = \frac{10 \cdot 10 \cdot 16}{4 \cdot 48} = \frac{25}{3}, \quad R = 8\frac{1}{3}\,см.$$

$$r = \frac{s}{p} = \frac{48}{18} = 2\frac{2}{3}, \quad r = 2\frac{2}{3}\,см.$$

$$BE = \sqrt{100 - 64} = 6, \quad BE = 6\,см.$$

ΔAOE Y□ □□□□□□□□□□□ (17-□□□□□)



17-чийме

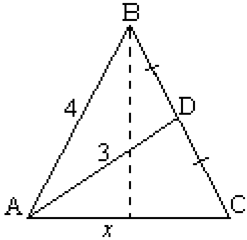
$$OE = \sqrt{AO^2 - AE^2} = \sqrt{\frac{625}{9} - 64} = 2\frac{1}{3}, \quad OE = 2\frac{1}{3}\ см.$$

$O_1E = r = 2\frac{2}{3}$, □□□□□□□, □□□□□ □□□□ □□□□ □□□□□□□□ □□□□ □□□□ □□□□□□□□□ □□□ □Ү□ □□□□□□□□ □□□ □ □□□□□□□□ □□□□□ □□□□□□, □□□□ □

$$|OO_1| = O_1E + EO = r + OE = 2\frac{2}{3} + 2\frac{1}{3} = 5, \quad |OO_1| = 5\ см.$$

□□□□□□. $R = \frac{25}{3}\ см$, $r = 2\frac{2}{3}\ см$, $|OO_1| = 5\ см$.

4-□ □□□□□□. □□□□ □□ң □□□□□□□□ □□□□ Ү□ □□□□□□□□□□□□□ □□□□□□□□ □□□□ □ 4□□. □□□□□ □□□□□□□□ □ □□□□□□ □□□□ □□□□□□ 3□□ □□□□□□□□ □ □□□□□□□



18-чийме

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$$\ell^2 = AD^2 = \frac{1}{4}(2\cdot 4^2 + 2x^2 - 4^2) = 3^2$$

$$32 + 2x^2 - 16 = 36, \quad 2x^2 = 20, \quad x = \sqrt{10}.$$

□□□□□□: $AC = \sqrt{10}$ □□.

[illegible] өө[illegible]ө [illegible]ө[illegible]ү[illegible]үү[illegible]ө[illegible]

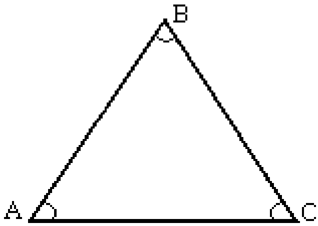
1. [illegible]ң [illegible] ү[illegible] [illegible] [illegible] ү[illegible]ү[illegible]ү[illegible]ө[illegible] [illegible] 26 [illegible] 10 [illegible] [illegible]ө[illegible]ө[illegible]. Ү[illegible] [illegible]. [illegible] [illegible]. 39[illegible], 30[illegible].

2. [illegible]ң [illegible] ү[illegible] [illegible] 24 [illegible], [illegible] 20 [illegible]. [illegible] [illegible]. [illegible] . 6[illegible].

3. [illegible]ң [illegible] ү[illegible] [illegible] 30[illegible], [illegible] 39[illegible] [illegible]. [illegible] ү[illegible] [illegible]. [illegible]: 10[illegible] [illegible] $21\frac{1}{8}$ [illegible].

4. [illegible]ң [illegible] ү[illegible] [illegible] 24[illegible], [illegible] 13[illegible] [illegible]. Ү[illegible] [illegible]. [illegible]: $275{,}61\pi$ [illegible]. [illegible].

3-§. [illegible]ң [illegible] ү[illegible] [illegible].



19-чийме

[illegible] 1. [illegible] ө[illegible] [illegible] ү[illegible], [illegible]ң [illegible] ү[illegible] [illegible].

[illegible] 2. [illegible] ө[illegible] [illegible] ү[illegible] [illegible], [illegible]ң [illegible] ү[illegible] [illegible] (19-[illegible]).

[illegible]ң [illegible] ү[illegible] [illegible]ң [illegible] ү[illegible] [illegible]: [illegible], [illegible], [illegible]ң [illegible] ү[illegible] [illegible].

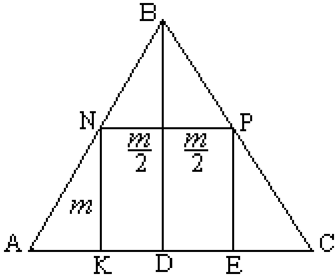
[illegible]ң [illegible] ү[illegible] [illegible].

1-[illegible]. [illegible] Ү[illegible] [illegible] m [illegible]. Ү[illegible] [illegible].

[illegible]. $KNPE$ – *квадрат*. [illegible] D [illegible], [illegible], [illegible], [illegible]

$$AD = DC = AN = NB = BP = PC = \frac{a}{2}.$$

Ү[illegible] [illegible] D [illegible]



20-чийме

ө[illegible] 4 [illegible]ө[illegible]ү[illegible]ө

[illegible]ө[illegible]ө[illegible].

[illegible] ү[illegible] a [illegible] m [illegible], [illegible]

$DE = \dfrac{m}{2} = \dfrac{a}{4}$, [illegible] (20-[illegible]).

[illegible], [illegible] D[illegible] ү[illegible] [illegible]ө[illegible]ө[illegible]ү[illegible]ө[illegible]ө [illegible]:

$$DB^2 = BC^2 - DC^2, \quad DB^2 = a^2 - \frac{1}{4}a^2, \qquad DB = \frac{\sqrt{3}}{2}a.$$

$$EC = \frac{a}{2} - \frac{m}{2} = \frac{a-m}{2}, \quad EC = \frac{a-m}{2}.$$

[illegible] ΔBDC [illegible] ΔPEC [illegible]

[illegible]

[illegible]:

$$\frac{BD}{PE} = \frac{DC}{EC}.$$

[illegible]:

$$\frac{\frac{\sqrt{3}}{2}a}{m} = \frac{\frac{1}{2}a}{\frac{a-m}{2}}, \quad \frac{\sqrt{3}a}{2m} = \frac{a}{a-m}, \quad \sqrt{3}a(a-m) = 2ma,$$

$$\sqrt{3}a - \sqrt{3}m = 2m, \quad a = \frac{2m + \sqrt{3}m}{\sqrt{3}} = \frac{2\sqrt{3}m + 3m}{3},$$

[illegible]. $\frac{2\sqrt{3}m + 3m}{3}$.

2-[illegible]. [illegible] a [illegible]
[illegible]

[illegible] [illegible] [illegible]. [illegible] [illegible] [illegible] [illegible].

[illegible] [illegible]. [illegible] [illegible] [illegible] Y[illegible] [illegible] [illegible]

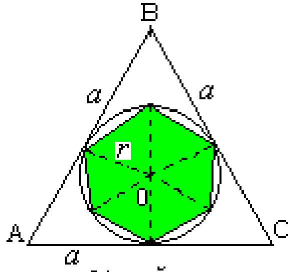
$s = \frac{\sqrt{3}}{4}a^2$ [illegible] [illegible] (21-[illegible]) .

Y[illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible]

$r = \frac{s}{p}$ [illegible] [illegible] [illegible] [illegible] [illegible]:

$$r = \frac{s}{p} = \frac{\frac{\sqrt{3}}{4}a^2}{\frac{3a}{2}} = \frac{\sqrt{3}}{6}a\ ,$$

$$r = \frac{\sqrt{3}}{6}a\ .$$



21-чийме

[illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] Y[illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible], [illegible] Y[illegible] [illegible] [illegible]

[illegible] [illegible] [illegible] [illegible] [illegible] [illegible], Ө[illegible]

[illegible] [illegible] 6 ([illegible]) [illegible] Y[illegible] [illegible] [illegible]. [illegible], [illegible] [illegible] [illegible] [illegible] Y[illegible] [illegible] [illegible] [illegible], [illegible] [illegible] [illegible] [illegible] [illegible] YY [illegible].

$$S_6 = 6 \cdot S_\Delta = 6 \cdot \frac{\sqrt{3}}{4} \cdot \left(\frac{\sqrt{3}}{6}a\right)^2 = \frac{9\sqrt{3}}{72}a^2 = \frac{\sqrt{3}}{8}a^2$$

$$S_6 = \frac{\sqrt{3}}{8}a^2 .$$

□□□□□. $S_6 = \dfrac{\sqrt{3}}{8}a^2 .$

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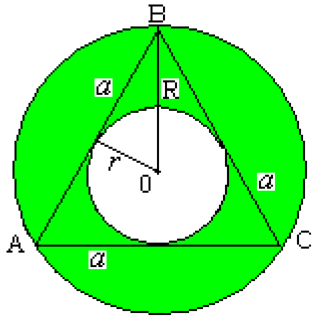

22-чийме

□□□□□□□ $R = \dfrac{abc}{4s} = \dfrac{a^3}{4\cdot\frac{\sqrt{3}}{4}a^2} = \dfrac{a}{\sqrt{3}}$.

□□ң □□□□□□□□□□ □□□□□

$$S_ч = \pi R^2 = \pi\left(\frac{a}{\sqrt{3}}\right)^2 = \frac{1}{3}\pi a^2 .$$

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$$r = \frac{s}{p} = \frac{\frac{\sqrt{3}}{4}a^2}{\frac{3a}{2}} = \frac{2\sqrt{3}a^2}{4\cdot 3a} = \frac{\sqrt{3}}{6}a .$$

□□□□□□ □□□□□□□□□□ □□□□□

$$S_к = \pi r^2 = \pi\frac{3}{36}a^2 = \frac{1}{12}\pi a^2 .$$

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$$S = Sч - Sк = \frac{1}{3}\pi a^2 - \frac{1}{12}\pi a^2 = \frac{1}{3}a^2\left(1 - \frac{1}{4}\right) = \frac{1}{4}\pi a^2 .$$

$$S = \frac{1}{4}\pi\ a^2 .$$

□□□□□. $\frac{1}{4}\pi\ a^2$.

4-□ □□□□□. Ү□ □□□ □□□□□□□□□ □□□□□□□□□ a, b, c □□ □□□□□□ □□□□□□□ □□□ □□□□□□□□ □□□□□□□□□ □□□□□□□□□□□ □□□□□□□ □□□□□□ □.

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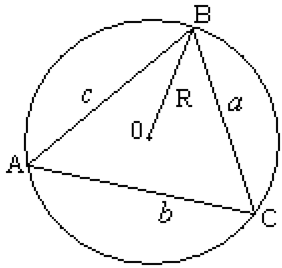

23–чийме

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$$R = \frac{abc}{4s} .$$

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$$S = \pi\left(\frac{abc}{4s}\right)^2 = \pi\ \frac{a^2b^2c^2}{16s^2} .$$

□□□□□: $\pi\ \frac{a^2b^2c^2}{16s^2}$.

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[illegible]. [illegible]: 2:1.

2. [illegible] ү[illegible] a [illegible]. [illegible]: $\frac{2a^2}{3}$.

3. [illegible] ү[illegible] a [illegible]. [illegible]: $a^2(4\pi - 3\sqrt{3})/36$.

4. [illegible]ң [illegible] ү[illegible]. [illegible] ү[illegible]

ө[illegible]үү[illegible]ү ү[illegible] ү[illegible]ү[illegible]ү[illegible]ө[illegible]. [illegible]

[illegible] r [illegible], [illegible] ү[illegible]. [illegible]: $6r\sqrt{3}$.

4-§. [illegible] ү[illegible].

[illegible] 1. [illegible] 90^0 [illegible] ү[illegible] **[illegible]** ү[illegible].

[illegible] 2. [illegible] ү[illegible] **[illegible]** ү[illegible].

Ү[illegible] **[illegible]**, [illegible] **[illegible]** [illegible] (24-[illegible]).

Ү[illegible], [illegible].

□□□ □□□□□□□ Y□ □□□□□□□□□□□ □□□ □□□□□□□□□ □□□□
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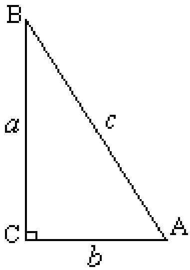
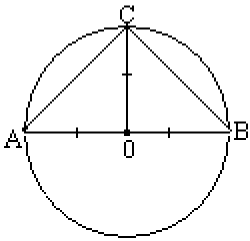
(25-□□□□□) .



24-чийме



25 –чийме

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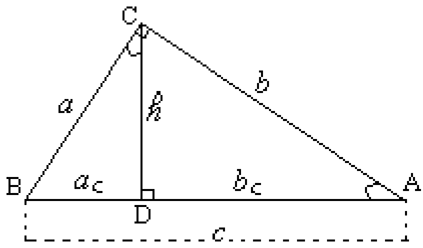

26–чийме

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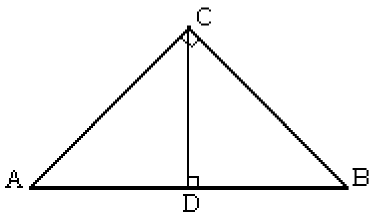
[illegible] Ү [illegible] ҮҮ [illegible] Ө [illegible] [illegible] [illegible] [illegible]

[illegible] (26 *чийме*).

$$1)\ h^2 = a_c b_c; \qquad 2)\ a^2 = c a_c; \qquad 3)\ b^2 = c b_c.$$

1. [illegible]

[illegible] ([illegible] [illegible] [illegible]). [illegible] [illegible] Ү [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible].



27-чийме

[illegible] [illegible] өө. [illegible] –[illegible] [illegible]

[illegible] [illegible] [illegible] [illegible] [illegible] [illegible] Ү [illegible] [illegible] (27-[illegible]).

[illegible] [illegible] [illegible] [illegible] [illegible] [illegible]

$\cos A = \dfrac{AD}{AC} = \dfrac{AC}{AB}$. [illegible] [illegible] $AB \cdot AD = AC^2$. [illegible] [illegible]

$\cos B = \dfrac{BD}{BC} = \dfrac{BC}{AB}$. [illegible] [illegible] $AB \cdot BD = BC^2$. [illegible] [illegible]

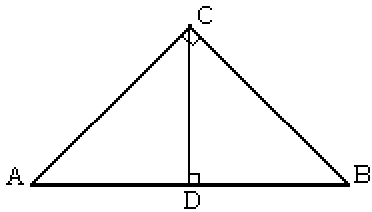
[illegible] ү[illegible]ө[illegible]ө [illegible] $AD + DB = AB$

[illegible] ө[illegible]ө[illegible]ү[illegible]ү [illegible]:

$$AC^2 + BC^2 = AB(AD + DB) = AB^2$$

$$AC^2 + BC^2 = AB^2.$$

1-[illegible]. [illegible] ү[illegible] [illegible]. [illegible]



28-чийме

[illegible] $1:2$ [illegible]

[illegible]ө[illegible]ө[illegible], [illegible] m [illegible]

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$\angle ABE = 60^0$ □□□□ $\angle EBC = 30^0$ □□□□□□ □□□ □□□□□□ □ϴ□ϴ□.

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□□□□□, $BE = AE = EC = m$ □□□□□.

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$$AC^2 = AB^2 + BC^2, \quad BC^2 = AC^2 - AB^2,$$
$$BC = \sqrt{(2m)^2 - m^2} = \sqrt{3m^2} = \sqrt{3}m, \quad BC = \sqrt{3}m.$$

□□□□□. $\sqrt{3}m$, $2m$, m.

2-□ □□□□□□. □□□□ □□□□ □□□□□□□□□ ү□ □□□□□□□□□□□□ □□□□□□ □□□□□□□ □□□□□□□□□. □□□□□□□ □□□□□□□□□□□□□□ 24 □□ □ □□□□ 36 □□

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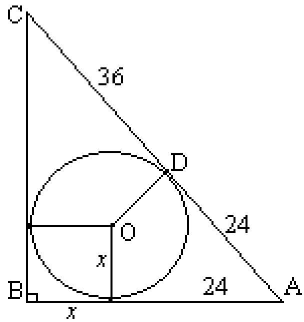

29-чиӥме

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[illegible] ө[illegible] [illegible] [illegible] [illegible]

[illegible] [illegible] (29-[illegible]).
[illegible] [illegible] [illegible] [illegible]

$$(24+x)^2+(36+x)^2=60^2$$

$$576+48x+x^2+1296+72x+x^2=3600$$

$$2x^2+120x-1728=0$$

$$x^2+60x-864=0$$

$$x_1=12,\quad x_2=-72$$

[illegible], $AB=36\ см$, $BC=48\ см$.

[illegible]. 36 [illegible], 48 [illegible].

3-[illegible]. [illegible] [illegible] [illegible] ү[illegible] [illegible] [illegible] [illegible]

[illegible] [illegible]ү[illegible]ү[illegible]ү[illegible]ө[illegible] [illegible] m [illegible] [illegible],

[illegible] [illegible] 1:2 [illegible] [illegible]ө[illegible]ө[illegible]. Ү[illegible] [illegible]

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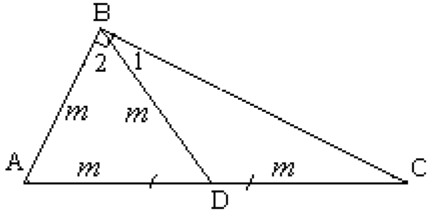

30-чийме

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□□□ □ □□ □□ □□□□□ □ $\frac{\alpha}{\beta}=\frac{1}{2}$ □□□□□. □□□ □□□ $\beta=2\alpha$ □□□□□□

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$$AB=BD=AD=DC=m.$$

□□□□ □□ $AC=2m$ □□□□□.
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$$BC^2=AC^2-AB^2=(2m)^2-m^2=3m^2,$$

$$BC^2=3m^2, \quad BC=\sqrt{3}m.$$

□□□□□: m; $2m$; $\sqrt{3}m$.

4-□ □□□□□□. □□□ □□□ □□□□□□□□ ү□ □□□□□□□□ □□□□□□ □□□□□
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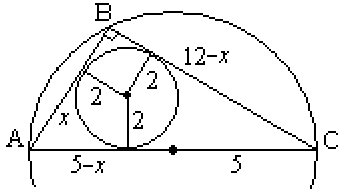

31-чийме

$$10^2 = (x+2)^2 + (12-x)^2$$

$$100 = x^2 + 4x + 4 + 144 - 24x + x^2$$

$$x^2 - 10x + 24 = 0$$

$$x_{1,2} = \frac{10 \pm \sqrt{100-96}}{2} = \frac{10 \pm 2}{2}$$

$$x_1 = 6, \quad x_2 = 4.$$

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3. □□□ □□□□□□ 60^0 □□□□□□ □□□ □□□□□□□□ ү□ □□□□□□□□□□
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$9\,см,\ 18\,см,\ 9\sqrt{3}\,см$.

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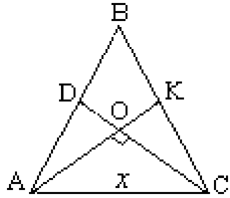
<u>□□ □ □□□□□</u> 1. □□ □□□□□ □□□□-□□□□□□ □□□□□□□ □□□□□□□□ ү□ □□□□□□□ □ү□□үү □□ □□□□ ү□ □□□□□□□ □□□ □□□□□□.

<u>□□ □ □□□□□</u> 2. □□ □□□□□□ □□□□-□□□□□□ □□□□□□□ □□□□□□□□ ү□ □□□□□□□ □ү□□үү □□ □□□□ ү□ □□□□□□□ □□□ □□□□□□.



32-чийме

1-□ □□□□□. ΔABC ү□ □□□□□□□□□□ $AB = a$, $BC = b$ □□ □□□□□□□. □□□ □ □□□□□□□ □ү□□ү□ү□□ө□ □□□□□□□□□ ө□ □□□ □□□□□□□□□□□□ □ □.□. $AK \perp DC$. □□ □□□□□□□ □□□□□□□□□□□□□ □□□□□□ □.

□□□□□ □□□□□. □ □□□□ $AC = x$ □□□□□□ □ □□□□□□□□ □□□□□, □□□□□ □□□□□ □□ □ □□□ D□ □□□□□□□□□ □□□□□ □□□□□□□□□□□□ □ □□□□ □□□ □□□ (32-□□□□□) :

$$AK^2 = \frac{1}{4}(2x^2 + 2a^2 - b^2)$$

$$DC^2 = \frac{1}{4}(2x^2 + 2b^2 - a^2)$$

$$AO = \frac{2}{3}\cdot\frac{1}{2}\sqrt{2x^2 + 2a^2 - b^2} = \frac{1}{3}\sqrt{2x^2 + 2a^2 - b^2},$$

$$CO=\frac{2}{3}\cdot\frac{1}{2}\sqrt{2x^2+2b^2-a^2}=\frac{1}{3}\sqrt{2x^2+2b^2-a^2}.$$

[illegible] Y[illegible] [illegible]:

$$AC=\sqrt{AO^2+CO^2}=\sqrt{\frac{1}{9}(2x^2+2a^2-b^2)+\frac{1}{9}(2x^2+2b^2-a^2)}=$$

$$=\sqrt{\frac{1}{9}(4x^2+a^2+b^2)}=\frac{1}{3}\sqrt{4x^2+a^2+b^2}.$$

$$x^2=AC^2=\frac{1}{9}(4x^2+a^2+b^2),\quad 5x^2=a^2+b^2,$$

$$x=\sqrt{\frac{a^2+b^2}{5}}.$$

[illegible], $AC=\sqrt{\dfrac{a^2+b^2}{5}}$.

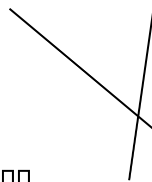
2-[illegible]. Y[illegible] $h_1,\ h_2,\ h_3$ Y[illegible] Y[illegible].

[illegible]: [illegible] Y[illegible]. [illegible]

$BC=a \qquad c\perp h_1$

$AC=b \qquad b\perp h_2$

$AB=c \qquad a\perp h_3$



[illegible].

[illegible] YY[illegible] Y[illegible] $S=\sqrt{p(p-a)(p-b)(p-c)}$ (1)

[illegible]. $p=\dfrac{a+b+c}{2}$ -[illegible].

[illegible] Y[illegible]:

$$S=\frac{a\cdot h_3}{2} \quad (2) \qquad S=\frac{b\cdot h_2}{2} \quad (3) \qquad S=\frac{c\cdot h_1}{2} \quad (4)$$

[illegible] Ү[illegible]:

$$a=\frac{2S}{h_3} \quad (5) \qquad b=\frac{2S}{h_2} \quad (6) \qquad c=\frac{2S}{h_1} \quad (7)$$

[illegible] p, $p-a$, $p-b$, $p-c$ [illegible]:

$$p=\frac{1}{2}(a+b+c)=\frac{1}{2}\left(\frac{2S}{h_1}+\frac{2S}{h_2}+\frac{2S}{h_3}\right)=S\left(\frac{1}{h_1}+\frac{1}{h_2}+\frac{1}{h_3}\right)$$

$$p=S\left(\frac{1}{h_1}+\frac{1}{h_2}+\frac{1}{h_3}\right).$$

[illegible] $p-a$ [illegible]:

$$p-a=S\left(\frac{1}{h_1}+\frac{1}{h_2}+\frac{1}{h_3}\right)-\frac{2S}{h_3}=S\left(\frac{1}{h_1}+\frac{1}{h_2}+\frac{1}{h_3}-\frac{2}{h_3}\right)=$$

$$=S\left(-\frac{1}{h_3}+\frac{1}{h_2}+\frac{1}{h_1}\right).$$

[illegible], $p-a=S\left(-\frac{1}{h_3}+\frac{1}{h_2}+\frac{1}{h_1}\right)$.

[illegible] $p-b$ [illegible]:

$$p-b=S\left(\frac{1}{h_1}+\frac{1}{h_2}+\frac{1}{h_3}\right)-\frac{2S}{h_2}=S\left(\frac{1}{h_1}+\frac{1}{h_2}+\frac{1}{h_3}-\frac{2}{h_2}\right)=$$

$$=S\left(\frac{1}{h_1}-\frac{1}{h_2}+\frac{1}{h_3}\right).$$

[illegible], $p-b=S\left(\frac{1}{h_1}-\frac{1}{h_2}+\frac{1}{h_3}\right)$.

[illegible] $p-c$ [illegible]:

$$p - c = S\left(\frac{1}{h_1} + \frac{1}{h_2} + \frac{1}{h_3}\right) - \frac{2S}{h_1} = S\left(\frac{1}{h_1} + \frac{1}{h_2} + \frac{1}{h_3} - \frac{2}{h_1}\right) =$$

$$= S\left(-\frac{1}{h_1} + \frac{1}{h_2} + \frac{1}{h_3}\right)$$

$$p - c = S\left(-\frac{1}{h_1} + \frac{1}{h_2} + \frac{1}{h_3}\right).$$

[illegible] (1) [illegible]

[illegible] (8):

$$S = \sqrt{S\left(\frac{1}{h_1} + \frac{1}{h_2} + \frac{1}{h_3}\right) \cdot S\left(-\frac{1}{h_3} + \frac{1}{h_2} + \frac{1}{h_1}\right)} \cdot$$

$$\cdot \sqrt{S\left(\frac{1}{h_1} - \frac{1}{h_2} + \frac{1}{h_3}\right) \cdot S\left(-\frac{1}{h_1} + \frac{1}{h_2} + \frac{1}{h_3}\right)} =$$

$$S = S^2 \sqrt{\left(\frac{1}{h_1} + \frac{1}{h_2} + \frac{1}{h_3}\right) \cdot \left(-\frac{1}{h_3} + \frac{1}{h_2} + \frac{1}{h_1}\right)} \cdot$$

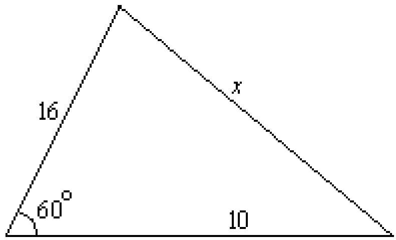
$$\cdot \sqrt{\left(\frac{1}{h_1} - \frac{1}{h_2} + \frac{1}{h_3}\right) \cdot \left(-\frac{1}{h_1} + \frac{1}{h_2} + \frac{1}{h_3}\right)}.$$

$$S = \frac{1}{\left(\frac{1}{h_1} + \frac{1}{h_2} + \frac{1}{h_3}\right)\left(-\frac{1}{h_1} + \frac{1}{h_2} + \frac{1}{h_3}\right)\left(\frac{1}{h_1} - \frac{1}{h_2} + \frac{1}{h_3}\right)\left(\frac{1}{h_1} + \frac{1}{h_2} - \frac{1}{h_3}\right)}$$

[illegible], [illegible] h_1, h_2, h_3 [illegible], [illegible] (8) [illegible].

□□□□□: (8) □□□ □□□□.

3-□ □□□□□. □□□□ □□ ү□ □□□ □□□□□□□ 60^0 □□ □□□□□□□ □□□□□□ □□□□□□□ □ □□□□□ □ □□□□□ □□ □□□□□ 10 □□ □□□□ 16 □□ □□ □□□□□□□ □□□□□, □□□□ 60^0 □□□ □□□□□□□ □□□□□□□□□ □□□ □□□ □□□□□ □□□ □□□□.



33-чийме

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□□□□□,

$$x^2 = 16^2 + 10^2 - 2\cdot 16\cdot 10\cdot \cos 60^0 =$$
$$= 256 + 100 - 320\cdot 0{,}5 = 356 - 160 = 196$$
$$x^2 = 196,\ x = \pm\sqrt{196} = \pm 14,\ x = 14 \text{ □□}.$$

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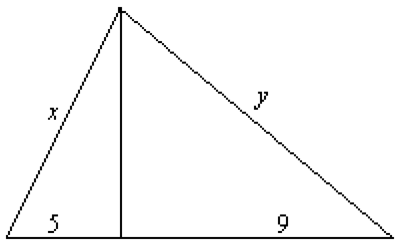
4-□ □□□□□. □□□□ □□ ү□ □□□□□□□□□ □□□ □□□□□□□ □□□□□□□□□ □□□□□□ 2 □□ □□ □□□□□□□ □□□□□, □□ □□ □□□□□□□ ү□ү□□ү □□ □□□



34-чийме

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[illegible] [illegible] [illegible] [illegible]

[illegible], [illegible] [illegible] [illegible] [illegible],

[illegible] [illegible] [illegible] [illegible] [illegible] [illegible]

[illegible]:

$$\begin{cases} x - y = 2 \\ x^2 - 25 = y^2 - 81 \end{cases} \Rightarrow \begin{cases} x = 2 + y \\ (2 + y)^2 = y^2 - 81 \end{cases} \Rightarrow \begin{cases} x = 2 + y \\ y^2 + 4y + 4 = y^2 - 81 \end{cases} \Rightarrow$$

$$\begin{cases} x = 2 + y \\ 4y = 52 \end{cases} \Rightarrow \begin{cases} x = 2 + y \\ y = 13 \end{cases} \Rightarrow \begin{cases} x = 15 \\ y = 13 \end{cases}$$

[illegible]: 13[illegible] [illegible] [illegible] 15[illegible].

[illegible]

1. [illegible] [illegible].
   1) 29 [illegible], 25 [illegible], 6 [illegible]. 2) 10 [illegible], 12 [illegible], 18 [illegible].
   3) 39 [illegible], 25 [illegible], 56 [illegible]. 4) 5 [illegible], 4 [illegible], $\sqrt{17}$ [illegible].

□□□□□. 60□□ ^{2}, $40\sqrt{2}$ □□^{2}, 420□□^{2}, 8□□^{2}.

2. Y□ □□□□□□□□□□□ □□ □□□□□ 11 □□ , 7 □□, 12 □ □ □□
□□□□□□□□. Y□ □□□□□□□□□□□ □□ □□□□□□□□□ □□□□□□ □.

3. Y□ □□□□□□□□□□□ □□□□□□□□□ 42 □□, □ □ □□□ □□□□ □□□□□□

20 □□ □□ □□□□□□□. □□ □□□□□□□ □Y□ Y□Y□□θ□ □ □□□□□ □□□□

□□□□□□□□ 5 □□ □□□□□, □□□□ Y□ □□□□□□□□□□□ □□□□□□
□ □□□□□□ □□ □□□□□□□ □□□□□□ □. □□□□□. 9□□, 13□□ .

4. Y□ □□□□□□□□□□□ □□□ □□□□ 14 □ □ □□□ □ 22 □□ □□

□□□□□□□□. Y□Y□□Y □□□□□ □ □Y□□Y□Y□□θ□ □ □□□□□ □ 5 □□

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1. Y□ □□□□□□□□□□□ □□□□□□□□ □□ □ □□□ □ □□□

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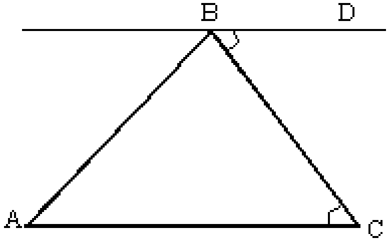
[illegible] өө. [illegible]) [illegible] –[illegible] Ү[illegible] [illegible].

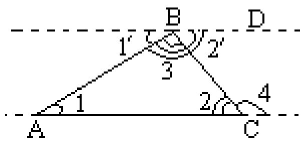
Ү[illegible] [illegible] Ү[illegible] Ү[illegible]Ү[illegible]Ү[illegible] D [illegible]. D [illegible] ҮҮ[illegible]Ү [illegible] Ү[illegible] [illegible] (35-[illegible]). $\angle DBC$ [illegible] $\angle ACB$ [illegible]



35-чийме

[illegible] ө[illegible]ҮҮ[illegible]Ү [illegible] D [illegible] Ү[illegible]

[illegible] Ү[illegible]Ү[illegible]ө[illegible] [illegible]



36-чийме

[illegible]. [illegible] Ү[illegible] [illegible] $\angle ABD$ [illegible]. [illegible] D [illegible]

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$\angle 1 = \angle 1'$ □□□□ $\angle 2 = \angle 2'$

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[illegible],

[illegible]:

[illegible]

$$\angle C_{тыш} = \angle A + \angle B .$$

1-[illegible]. [illegible] R [illegible] 15^0 [illegible] 60^0 [illegible]. [illegible].

[illegible]. [illegible] 105^0 [illegible]. [illegible].

$$\frac{a}{\sin 15^0} = \frac{b}{\sin 60^0} = \frac{c}{\sin 105^0} = 2R .$$

[illegible]) $\frac{b}{\sin 60^0} = 2R$, $\quad b = \frac{\sqrt{3}}{2} \cdot 2R = \sqrt{3}R$, $\quad b = \sqrt{3}R$.

[illegible]) $\frac{a}{\sin 15^0} = 2R$, $\quad \frac{a}{\sin(45^0 - 30^0)} = 2R$, $\quad a = \frac{R(\sqrt{6} - \sqrt{2})}{2}$,

[illegible]) $\frac{c}{\sin 105^0} = 2R$, $\quad \frac{c}{\sin(45^0 + 60^0)} = 2R$, $\quad c = \frac{R(\sqrt{6} + \sqrt{2})}{2}$,

$$s = \frac{1}{2} ab \sin\alpha = \frac{1}{2} \cdot \frac{R(\sqrt{6} - \sqrt{2})}{2} \cdot \frac{R(\sqrt{6} + \sqrt{2})}{2} \cdot \sin 60^0 =$$

$$= \frac{R^2\sqrt{3}}{4} .$$

[illegible]. $\dfrac{R^2\sqrt{3}}{4}$.

2-[illegible] [illegible]. [illegible] 3 [illegible] 30^0 [illegible] ң [illegible] ү [illegible]. ү [illegible].

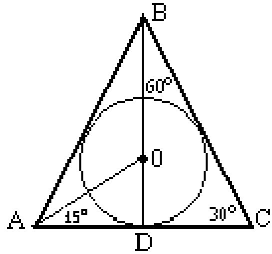
[illegible]. ү [illegible] ң [illegible] $\angle B = 102^0$ [illegible] (37-[illegible]). [illegible].

[illegible], $\angle OAD = 15^0$ [illegible] $\angle AOD = 75^0$.

[illegible] D ү [illegible],

[illegible] ө ө ү ү [illegible]:

$$\frac{3}{\sin 15^0} = \frac{AD}{\sin 75^0} = \frac{AO}{\sin 90^0} = 2R$$



37-чийме

[illegible],

1) $\dfrac{AO}{\sin 90^0} = 2R$, $AO = 2R$,

2) $\dfrac{AD}{\sin 75^0} = 2R$,

$$\frac{AD}{\sin(45^0 + 30^{0)}} = \frac{4AD}{\sqrt{6}+\sqrt{2}} = AD(\sqrt{6}-\sqrt{2}).$$

3) $\dfrac{3}{\sin 15^0} = 2R$, $\dfrac{3}{\sin(45^0 - 30^{0)}} = \dfrac{4\cdot 3}{\sqrt{6}-\sqrt{2}} = 3(\sqrt{6}+\sqrt{2})$.

2) [illegible] 3) [illegible]

$$AD(\sqrt{6}-\sqrt{2}) = 3(\sqrt{6}+\sqrt{2})$$ [illegible].

□□□□ □□, $AD = 6 + 3\sqrt{3}$ □□□□□ □□□□□. □□=□ D+D□ □□□□□□□□ □□□□ □□□□□, □□□□ $AC = 12 + 6\sqrt{3}$ □□□□□.

1) $\frac{AC}{\sin 120^0} = 2R$, $\frac{12+6\sqrt{3}}{\frac{\sqrt{3}}{2}} = 2R$, $R = 6 + 4\sqrt{3}$.

2) $\frac{BC}{\sin 30^0} = 2R$, $2BC = 2\cdot(6+4\sqrt{3})$, $BC = 6 + 4\sqrt{3}$.

□□□□□. $6 + 4\sqrt{3}$; $12 + 6\sqrt{3}$.

3-□ □□□□□. □□□□ □□ ү□ □□□□□□□□□ 60^0 □□□ □□□□□□□ □ □□□□□ □□□□□□ □□□□□□ 10□□ □ □□□ 16□□ □□□□□□□ □□□□□, □□□□ 60^0 □□□ □□□□□□□ □□□□□□□□□□ □□□□□□ □ □□□□□ □□□□□□□□□ □□□□ □ □□□□□ □□□□ □□□□□□□□□ □□ ң□□□□□ □□□□□□□.

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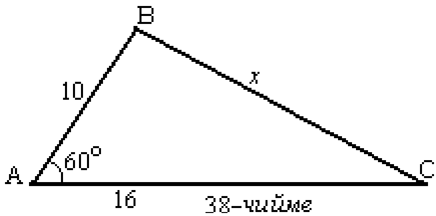

$$x^2 = 16^2 + 10^2 - 2\cdot 16\cdot 10\cos 60^0$$

$$x^2 = 256 + 100 - 320\cdot 0{,}5 = 196$$

$x = 14$. □□□□ □, ү□ □□□□□□□□□ □□ □□□□□□□ □□□□□□□□□ 14□□. (38-□□□□□)

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$$\frac{14}{\sin 60^0} = \frac{10}{\sin C} = \frac{16}{\sin B}$$

$$\frac{14}{\sin 60^0} = \frac{10}{\sin C};\quad 14\sin C = 10\cdot\sin 60^0;\quad 7\sin C = 5\cdot\frac{\sqrt{3}}{2};$$

$$\sin C = \frac{5\sqrt{3}}{14}; \quad \angle C = \arcsin\frac{5\sqrt{3}}{14}.$$

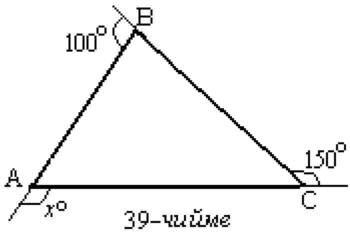
$$\frac{14}{\sin 60^0} = \frac{16}{\sin B}; \quad 14\sin B = 16\cdot\sin 60^0; \quad 7\sin B = 8\cdot\frac{\sqrt{3}}{2};$$

$$\sin B = \frac{4\sqrt{3}}{7}; \quad \angle B = \arcsin\frac{4\sqrt{3}}{7}.$$

□□□□□. 14□□, $\angle C = \arcsin\frac{5\sqrt{3}}{14}$, $\angle B = \arcsin\frac{4\sqrt{3}}{7}$.

4-□ □□□□□. Y□ □□□□□□□□□□ □□□ □□□□□ □□□□□ 100^0□□ □□□ □ 150^0□□ □□□□□□□. Y□Y□□Y □□□□□ □□□□□□ □ □□□ □□□□□□ □□□□ □□ □□□□□□□□□ □□ң□□□□ □□□□□□ □.

□□□□□ □□□□□. Y□ □□□□□□□□□□ □□□□ □ □□□□□ 30^0□□ □□□□□□□ □□□□□, □□ □□□ □□□□ □ □□□□□ 80^0□□ □□□□□□□ (39-□□□□□). □□□□ □, Y□ □□□□□□□□□□ □□□□ □ □□□□□ 70^0□□ □□□□□□□ □□□□□. □□□ □ □ □□ □□□□□□ □□□□□ □□□□□ 110^0 □□□□□.



□□□□□. $\angle A_{тыш} = 110^0$, $\angle A = 70^0$, $\angle B = 80^0$, $\angle C = 30^0$.

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□□□□□. $m(\sqrt{5}+1)/2$, m, 36^0.

3. □□ң □□□□□□□□ □□ү□ □□□□□□□□□□□ □□□□□□□□□□□□ □□□□□ 36^0 □□□□□□□, □□ □□□ □□□□□□□□□□ □□□□□□□ □□□□□□□□□□□□□□□□□ □□□□□□□□ $\sqrt{20}$ □□□□□□□. Ү□ □□□□□□□□□□ □ □□□□□□□□□□ □□□□□□□□□ □ □□□ □□□□□□ □□□□□□ □.

□□□□□. $2\sqrt{5}, 5+\sqrt{5}$, 72^0, 72^0.

4. □□□ □□□□ □□□□□□□□ a □□□□□□ □□ң □□□□□□ ү□ □□□□□□□□□□ □□□□□□□□□□ □□ □□□ □□□□□ □□□□□□□ □□□

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□□□□□. $\dfrac{a^2\sqrt{6}(2-\sqrt{3})}{12\sqrt{2+\sqrt{3}}}$.

2. Y□ □□□□□□□□□□ □ □□□□□□ □ □□□□ □□□□□□□□ □□ □ □□□□□ □□□□□ □□□□ □□ □□

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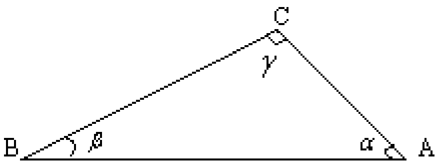
□□ □□□□ □. □□□ Y□ □□□ □□□□□□□□ □□□□□□□ □□□ □ □□□□□□ □□□□ □□□ □□+□□ $(a+b)$ □□ □ □□□□ Y□Y□□Y □□ (c) □□□ □□□□ □□ң □□□□□. □□+□ C>□□, $(a+b>c)$ (32-□□□ □□).

□□ □□□□ □. □□□□□□ □□□□□ □□□ Y□ □□□ □□□□□□□□□ □,□,□ □□ □□ □□□□□□□□□□ □□□□ □□□ 180^0□□ □□□□□□□ □.□.

$\angle A+\angle B+\angle C=180^0$ □□ $\alpha+\beta+\gamma=180^0$. (32-□□□□□).

<u>□□ □ □□□□ □</u>. Y□ □□□□□□□□□□ $\angle BCD$ **□□ □□□□ □□□□□** □□□, □□ □□□□ □□□□□ □ □□□□□ □□□□ □□□□□□□□ □□□□ □□□ □□□□□□□ □□□□□□□□□□ □□□□□□□ □□□□□□ □□□□ □□□□□□ □.□. $\angle BCD=\angle CAB+\angle ABC$, $(\angle BCD=\alpha+\beta)$ (33- □□□□□).



32-чийме

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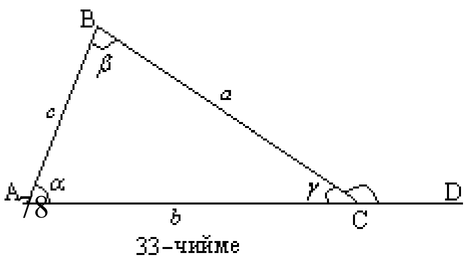

33-чийме

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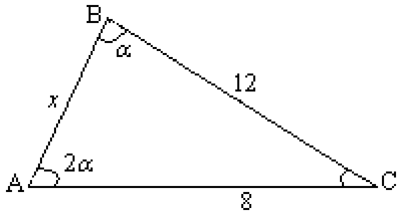
1-□ □□□□□. ΔABC ү□ □□□□□□□□□□□ □□□ □□□□□□□ □□□□□□□□□ $12\,см$ □□□□ $8\,см$ □□ □□□□□□□. □ □□□□□□□□ □□ □□□□ □□□□□□□□□□□ □□□ □□□ □□ң. Ү□ □□□□□□□□□□□ ү□ү□□ү □□□□□□□ □□□□□□□□□ □□□□□□ □ (34-□□□□□).



34-чийме

□□□□□ □□□□□. Ү□ □□□□□□□□□ $AB = x$, $BC = 12$, $AC = 8$,

$\angle B = \alpha$, $\angle A = 2\alpha$ □□□□□□өө□ө□ү□ □ ү□□ү□ө□ү.

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$$\frac{\sin\alpha}{8} = \frac{\sin 2\alpha}{12}, \quad 12\sin\alpha = 16\sin\alpha\cos\alpha, \quad 3 = 4\cos\alpha,$$

$$\cos\alpha = \frac{3}{4}.$$

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$$8^2 = 12^2 + x^2 - 2\cdot 12x\cos\alpha$$

$$64 = 144 + x^2 - 24x\cdot\frac{3}{4}$$

$$x^2 - 18x + 80 = 0$$

$$x_1 = 10, \quad x_2 = 8.$$

□□□□□□. 10□□ .

2-□ □□□□□□. ΔABC Y□ □□□□□□□□□□□□ □ □D □ □□□□ □□

□□□□□□□□□□□□ □ □ Y□□Y□Y□□Ө□. □□□□ □□ $|AD| = 5$, $D\hat{A}C = \frac{\pi}{8}$,

$A\hat{C}E = \frac{\pi}{4}$ □□□□□□□□□ □□□□□□□YY

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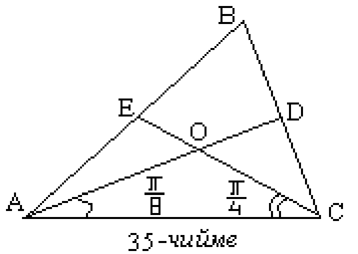

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1) [illegible] 2:1 [illegible]

[illegible] ([illegible]).

2) ΔAOC [illegible] ΔABC [illegible] $\frac{1}{3}$ [illegible].

[illegible] ΔABC [illegible], ΔAOC [illegible]. [illegible] ΔAOC [illegible] 1) [illegible]. $|AO| = \frac{2}{3} \cdot 5 = \frac{10}{3}$. ΔAOC [illegible],

$$\frac{|CO|}{\sin D\hat{A}C} = \frac{|AO|}{\sin A\hat{C}E} \quad \Rightarrow \quad \frac{|CO|}{\sin\frac{\pi}{8}} = \frac{\frac{10}{3}}{\sin\frac{\pi}{4}} \quad \Rightarrow$$

$$\Rightarrow \quad |CO| = \frac{10}{3} \cdot \frac{\sin\frac{\pi}{8}}{\sin\frac{\pi}{4}}$$

Y[illegible] [illegible] [illegible] [illegible] π

[illegible] [illegible] [illegible], [illegible] $\hat{AOC} = \frac{5\pi}{8}$. Y[illegible] [illegible]

[illegible] [illegible] $s = \frac{1}{2} ab \sin\gamma$ [illegible] [illegible] [illegible]

[illegible]θ[illegible]θ[illegible]γ[illegible]γ [illegible]:

$$S_{\Delta AOC} = \frac{1}{2}|AO| \cdot |CO| \cdot \sin \hat{AOC} = \frac{1}{2} \cdot \frac{10}{3} \cdot \frac{10}{3} \cdot \frac{\sin\frac{\pi}{8}}{\sin\frac{\pi}{4}} \cdot \sin\frac{5\pi}{8} =$$

$$= \frac{50}{9} \cdot \frac{\sin\frac{\pi}{8}}{\sin\frac{\pi}{4}} \cdot \sin\left(\frac{\pi}{2} + \frac{\pi}{8}\right) = \frac{50}{9} \cdot \frac{\sin\frac{\pi}{8}\cos\frac{\pi}{8}}{\sin\frac{\pi}{4}} =$$

$$= \frac{25}{9} \cdot \frac{2\sin\frac{\pi}{8}\cos\frac{\pi}{8}}{\sin\frac{\pi}{4}} = \frac{25}{9}.$$

[illegible] [illegible] 2) [illegible] [illegible]

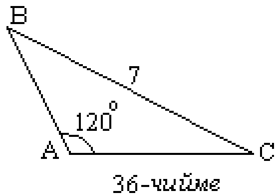
$$S_{\Delta ABC} = 3S_{\Delta AOC} = \frac{25}{3}.$$

[illegible]. $\frac{25}{3}$.

3-[illegible]. [illegible] 120^0 [illegible] ү[illegible] [illegible]

[illegible] ү[illegible]ө[illegible]. [illegible] [illegible]ң [illegible]ң

[illegible] 7[illegible] [illegible],[illegible] [illegible] [illegible] [illegible]
[illegible].
[illegible]. [illegible]
[illegible] ү[illegible] [illegible]
[illegible]



[illegible]ү[illegible]ү[illegible] ө[illegible]. [illegible], [illegible]-[illegible]

[illegible]. [illegible] [illegible]=7[illegible], [illegible]=(7- [illegible])[illegible] [illegible] [illegible]=(7- 2[illegible])[illegible] [illegible] (36-[illegible]). [illegible], [illegible]

[illegible]ө[illegible]ө[illegible]ү[illegible]ү [illegible]:

$$7^2 = (7-2x)^2 + (7-x)^2 - 2(7-2x)(7-x)\cos 120^0,$$

[illegible] $\cos 120^0 = \cos(90^0 + 30^0) = -\sin 30^0 = -0,5$

$$49 = 49 - 28x + 4x^2 + 49 - 14x + x^2 + 49 - 14x - 7x + 2x^2$$

$$x^2 - 9x + 14 = 0, \quad x_1 = 7, \quad x_2 = 2.$$

□□□□ □□□ $x_1 = 7$ □□□□□□□□□□ □□□□□□ □□□□□□□□□□□□□ □□□□.
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□□ң □□□□□□□□□□ □□□□□ □□ □□□.

□□□□□. $7см$, $5см$, $3см$.

4-□ □□□□□. Y□ □□□□□□□□□□□ □□□□□□ 12□□, □□□□□□□□□□□ □□□□□□□□□□□ □□□□ 120^0 □□ □□□□□□□□ □□□ □ □□□ □□□□□ □□□□□□ □□□□□□□□□ 28□□. Y□Y□□Y □□□□□□ □□□□□□□□□□ □□□□□□ □ (37-□□□□□).

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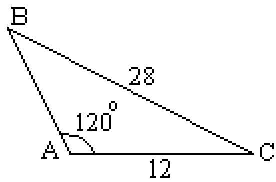
$$\frac{28}{\sin 120^0} = \frac{12}{\sin(60^0 - \beta)}.$$



37-чийме

$$\sin 120^0 = \sin(90^0 + 30^0) = \cos 30^0 = \frac{\sqrt{3}}{2}$$

.

$$\frac{28}{\frac{\sqrt{3}}{2}} = \frac{12}{\sin(60^0 - \beta)};$$

$$\sin(60^0 - \beta) = \frac{3\sqrt{3}}{14};$$

$$\beta = 60^0 - \arcsin\frac{3\sqrt{3}}{14};$$

$$\frac{56}{\sqrt{3}} = \frac{x}{\sin(60^0 - \arcsin\frac{3\sqrt{3}}{14})};$$

$$x = \frac{56\sin(60^0 - \arcsin\frac{3\sqrt{3}}{14})}{\sqrt{3}} = 20;$$

□□□□□. 20□□.

[illegible] өө[illegible]ө [illegible]ө[illegible]ү[illegible]үү[illegible]ө[illegible]

1. [illegible] ө[illegible]ү[illegible], [illegible]ң [illegible], [illegible] 12[illegible], 15[illegible] [illegible] 18[illegible] [illegible] ү[illegible] [illegible]. [illegible] [illegible]ө[illegible]ө[illegible] [illegible]ң [illegible] [illegible]ө[illegible]ү[illegible]ө[illegible]ү[illegible]ү[illegible] [illegible]. [illegible]: 8[illegible], 10[illegible].

2. [illegible] 16[illegible] [illegible] 15[illegible] [illegible]. [illegible] 200[illegible] [illegible] ү[illegible] [illegible]. [illegible] : $1700\,см^2$.

3. [illegible] R [illegible] 15^0 [illegible] 60^0 [illegible] ү[illegible] [illegible]. Ү[illegible] [illegible]. [illegible]: $\frac{\sqrt{3}}{4}R^2$.

4. □ □□□□□□□□□ □□□□□□□□ 13□□, 14□□ □□□□ 15□□ □□□□□□ Y□ □□□□□□□□□□ □□□□□ □□□□ □□□□□□ □□□□□□□□□□□□ □□□□□□□□□□□ □ □□□□□□ □□□□□□□. □□□□□: $\left(\frac{65}{32}\right)^2$.

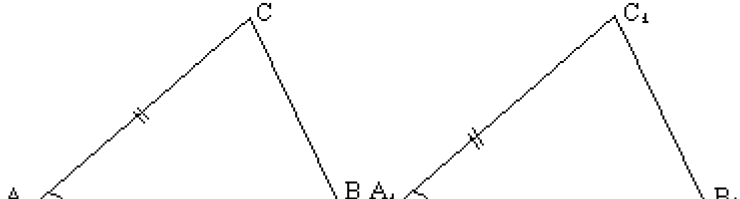
3. Y□ □□□□□□□□□□□□□ □ □□□□□□□□□□ □ □□□□□□□□□.

Y□ □□□□□□□□□□□□□□ □□□□□□□□ □□□□□□□ □□□□□ □Y□ Y□Y□ □□□. Y□ □□□□□□□□□□□ □□□□□□ □□□□□□□□□ □□□□□□□ □□□□□□□.

□□□□□□□ **1.** □□□□□□ □□□□□□□ Y□ □□□□□□□□□□ □□□ □□□□ □□□□ □□□□□□□ □□□□□□□□□ □□□□□, □□□□□□ Y□ □□□□□□□□□□ □□□□□□YY □□□ □□□□□□ □□□□ □□□□□□□ □□□□□□□□□ □□□□□□□ □□□□□□□ □□□□□ □.□. □□=$□_1□_1$, □□=$□_1□_1$, ∠ □□□= ∠ $□_1□_1□_1$ □□□□□, □□□□ □□□ □ □□□ $□_1□_1□_1$ □□□ Y□ □□□□□□□ □□□□□□□ □□□ □□□□□ (38-□□□□□).

□□□□□□ θθ. □□□ □□□□ $□_1□_1□_1$ Y□ □□□□□□□□□□□□□

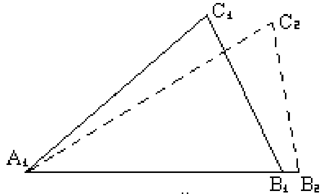
$\angle A = \angle A_1$, □□=$□_1□_1$, □□=$□_1□_1$ □□□□□□ (30 □□□□□).



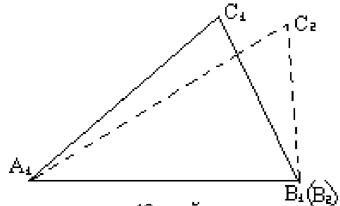
38-чийме

□□□□ $\Delta ABC = \Delta A_1B_1C_1$ □□□□□□□□□ □□□□□□□□□□.

$A_1B_2C_2$ -□□□ B_2 □□□□□□ □$_1$□$_1$ □□□□□□□□□□ □□□□□□ □□□□ C_2 □□□□□□ □$_1$□$_1$ □Y□ □□□□□□□ □ □□□□□□ C_1 □□□□□□ □□□□□□ □□□□ □□□ □□□□□ □□□□□□□□□□□□ □□□ Y□ □□□□□□□□□ □□□□□□□ □□□□□□ Y□ □□□□□□□ □□□□□□ □□□□□ (39- □□□□□□) .

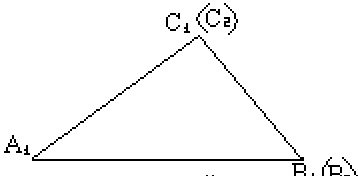


39-чийме

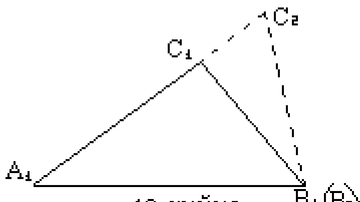


40-чийме

□$_1$□$_1$= □$_1$□$_2$ □□□□□□□□□□□□ B_2 □□□□□□ □□□□□ B_1 □□□□□□ □□□ □□□□□ (40-□□□□□) . $\angle B_1A_1C_1 = \angle B_2A_1C_2$ □□□□□□□□□□□□ A_1C_2 □□□□□□□ □□□□□ □$_1$□$_1$ □□□□□□□ □□□ □□□□□ (41-□□□□□). $A_1C_1 = A_1C_2$ □□□□□□□□□□□□ C_2 □□□□□□ □□□□□ C_1 □□□□□□ □□□ □□□□□ (42-□□□□□). □□□□□□□, $A_1B_1C_1$ Y□ □□□□□□□□□ □□□□□ $A_1B_2C_2$ Y□ □□□□□□□□ □□□ □□□□□, □□□□□, ΔABC Y□ □□□□□□□□□□ □□□□□□□ □□□□□.

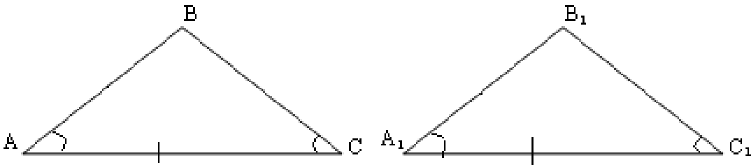


41-чийме



42-чийме

□□□□□□□□ 2. □□□□□□ □□□□□□□ Y□ □□□□□□□□□□ □□□□ □□□□ □□□ □□□□□□ □□□□□□ □□□ □□□□□, □□□□□□ Y□ □□□□□□□□□ □□□□□□YY □□□□□ □ □□□□ □□□□□□ □□□□□□ □□□ □□□□□□□ □□□□□□□ □□□□□, □□□□ □□□ □□□□ □$_1$□$_1$□$_1$ Y□ □□□□□□□□□□□ □□□□□□□ □□□□□□□. □□=□$_1$□$_1$, $\angle$ □= $\angle$ □$_1$, $\angle$ □= $\angle$ □$_1$ (43-□□□□□).



43-чийме

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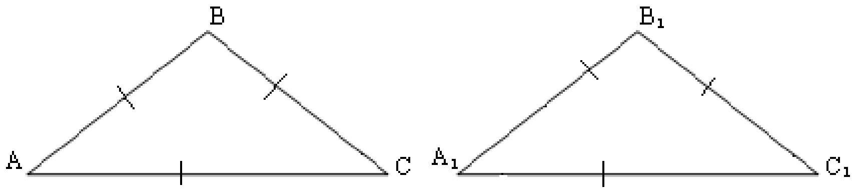
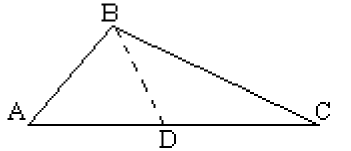


44–чийме



45-чийме

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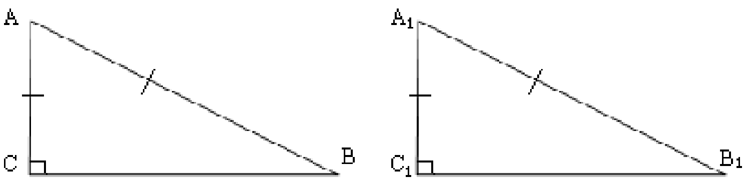

46-чийме

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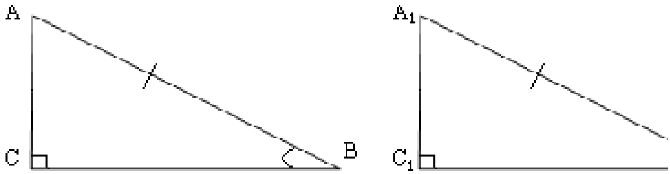

47–чийме

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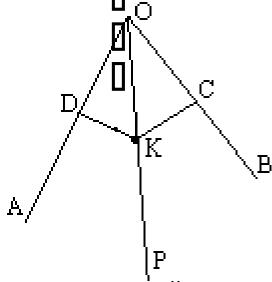

49–чийме

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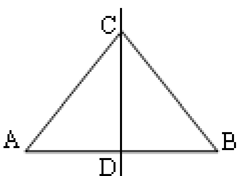

48–чийме

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2:1

1.

a, b, c

m_a, m_b, m_c,

$$m_a = \frac{1}{2}\sqrt{2(b^2 + c^2) - a^2}$$

$$m_b = \frac{1}{2}\sqrt{2(a^2 + c^2) - b^2}$$

$$m_c = \frac{1}{2}\sqrt{2(a^2 + b^2) - c^2}$$

1)

2) 2:1

3)

[illegible] θ[illegible]θ[illegible].

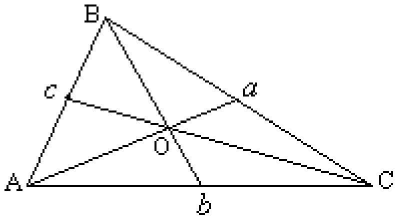
4) [illegible], N[illegible], [illegible] L – [illegible] ү[illegible] [illegible]. [illegible]

[illegible]. [illegible], [illegible] ү[illegible] [illegible] θ[illegible]

[illegible] ү[illegible]

[illegible] $\frac{1}{3}$ [illegible]θ[illegible]ү[illegible]ү[illegible]θ [illegible].

1-[illegible]. Ү[illegible] [illegible].



50-чийме

[illegible]. Ү[illegible] [illegible] a, b, c [illegible] (50-[illegible]).

[illegible]: [illegible] $a^2 + b^2 + c^2$,

[illegible]:

$$m^2{}_a = \frac{1}{4}(2a^2 + 2c^2 - b^2)$$

$$m^2{}_a = \frac{1}{4}(2a^2 + 2b^2 - c^2)$$

$m^2{}_a = \frac{1}{4}(2b^2 + 2c^2 - a^2)$ □□□□□.

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$$m^2{}_a + m^2{}_b + m^2{}_c = \frac{1}{4}(2a^2 + 2c^2 - b^2 + 2a^2 + 2b^2 - c^2 +$$

$$+ 2b^2 + 2c^2 - a^2) = \frac{1}{4}(3a^2 + 3b^2 + 3c^2) = \frac{3}{4}(a^2 + b^2 + c^2) \cdot$$

□□□ $\frac{m^2{}_a + m^2{}_b + m^2{}_c}{a^2 + b^2 + c^2}$ □□□□□□□ □□□□□□□□:

$$\frac{\frac{3}{4}(a^2 + b^2 + c^2)}{a^2 + b^2 + c^2} = \frac{3}{4}.$$

□□□□□. $\frac{3}{4}$.

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□□□□□□ (51-□□□□□):

1) $m^2{}_a = \frac{1}{4}(2 \cdot 11^2 + 2 \cdot 12^2 - 7^2) = \frac{1}{4}(242 + 288 - 49) = \frac{481}{4}.$

$$m^2{}_a = \frac{481}{4}, \quad m_a = \sqrt{\frac{481}{4}} = \frac{1}{2}\sqrt{481},$$

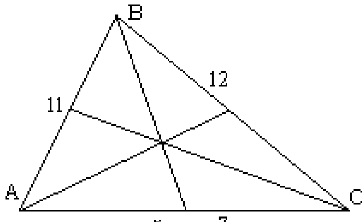
$$2)\quad m^2{}_b = \frac{1}{4}(2\cdot 11^2 + 2\cdot 7^2 - 12^2) = \frac{1}{4}(242 + 98 - 144) = 49.$$

$$m^2{}_b = 49, \quad m_b = \sqrt{49} = 7,$$

$$3)\quad m^2{}_c = \frac{1}{4}(2\cdot 7^2 + 2\cdot 12^2 - 11^2) = \frac{1}{4}(98 + 288 - 121) = \frac{265}{4}.$$

$$m^2{}_c = \frac{265}{4},$$

$$m_c = \sqrt{\frac{265}{4}} = \frac{1}{2}\sqrt{265}.$$



51-чийме

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$$m_a^{\ 2} + m_b^{\ 2} + m_c^{\ 2} = \frac{3}{4}(a^2 + b^2 + c^2)$$

3-□ □□□□□□: □□ □□□□□□□□□□□ m_a, m_b, m_c □□ □□□□□□□ □□□
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□□$_1$ =□$_1$□, □ □$_1$=m_1
□□$_1$ =□$_1$□, □□$_1$=m_2
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□□= a, □□= b, □□= c

Y□ □□□□□□□□□□ □ □□□□□ □□□□□□ □□ □□ □□□□□ □□□□□

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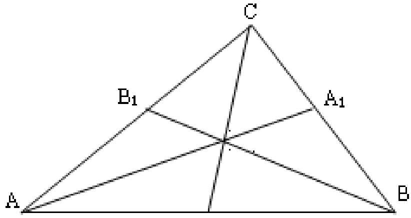
$$m_a^{\ 2} = \frac{b^2 + c^2}{2} - \frac{a^2}{4}$$

$$m_b^{\ 2} = \frac{a^2 + c^2}{2} - \frac{b^2}{4}$$



52–чийме

$$m_c{}^2 = \frac{à^2 + b^2}{2} - \frac{c^2}{4}$$

$$\begin{cases} 2b^2 + 2c^2 - a^2 = 4m_a{}^2 \\ 2a^2 + 2c^2 - b^2 = 4m_b{}^2 \quad \Rightarrow \; b^2 = 2a^2 + 2c^2 - 4m_b{}^2 \\ 2a^2 + 2b^2 - c^2 = 4m_c{}^2 \end{cases}$$

$$\begin{cases} 4a^2 + 4c^2 + 2c^2 - 8m_b{}^2 - a^2 = 4m_a{}^2 \\ 2a^2 + 4a^2 - 8m_b{}^2 + 4c^2 - c^2 = 4m_c{}^2 \end{cases}$$

$$\begin{cases} 3a^2 + 6c^2 = 4m_a{}^2 + 8m_b{}^2 \quad \Rightarrow \; 3a^2 = 4m_a{}^2 + 8m_b{}^2 - 6c^2 \\ 6a^2 + 3c^2 = 4m_c{}^2 + 8m_b{}^2 \end{cases}$$

$$3a^2 + 8m_c{}^2 + 16m_b{}^2 - 12a^2 = 4m_a{}^2 + 8m_b{}^2 - 9a^2$$

$$4m_a{}^2 - 8m_b{}^2 - 8m_c{}^2 = -9a^2$$

$$a^2 = \frac{8}{9}m_b{}^2 + \frac{8}{9}m_c{}^2 - \frac{4}{9}m_a{}^2$$

$$a = \frac{2}{3}\sqrt{2m_b{}^2 + 2m_c{}^2 - m_a{}^2} \qquad (1)$$

$$\begin{cases} 2a^2 + 2b^2 - c^2 = 4m_c{}^2 \Rightarrow \; c^2 = 2a^2 + 2b^2 - 4m_c{}^2 \\ 2b^2 + 2c^2 - a^2 = 4m_a{}^2 \\ 2a^2 + 2c^2 - b^2 = 4m_b{}^2 \end{cases}$$

$$\begin{cases} 2b^2 + 4a^2 + 4b^2 - 8m_c{}^2 - a^2 = 4m_a{}^2 \\ 2a^2 + 4a^2 + 4b^2 - 8m_c{}^2 - b^2 = 4m_b{}^2 \end{cases}$$

$$\begin{cases} 6b^2 + 3a^2 = 4m_a{}^2 + 8m_c{}^2 \Rightarrow\ 3a^2 = 4m_a{}^2 + 8m_c{}^2 - 6b^2 \\ 6a^2 + 3b^2 = 4m_b{}^2 + 8m_c{}^2 \end{cases}$$

$$8m_a{}^2 + 16m_c{}^2 - 12b^2 + 3b^2 = 4m_b{}^2 + 8m_c{}^2$$

$$-9b^2 = -8m_a{}^2 + 4m_b{}^2 + 8m_c{}^2$$

$$b^2 = \frac{8}{9}m_a{}^2 - \frac{4}{9}m_b{}^2 + \frac{8}{9}m_c{}^2$$

$$b^2 = \frac{4}{9}\left(2m_a{}^2 - m_b{}^2 + 2m_c{}^2\right)$$

$$b = \frac{2}{3}\sqrt{2m_a{}^2 + 2m_c{}^2 - m_b{}^2} \qquad (2)$$

$$\begin{cases} 2a^2 + 2b^2 - c^2 = 4m_c{}^2 \\ 2b^2 + 2c^2 - a^2 = 4m_a{}^2 \quad \Rightarrow\ a^2 = 2b^2 + 2c^2 - 4m_a{}^2 \\ 2a^2 + 2c^2 - b^2 = 4m_b{}^2 \end{cases}$$

$$\begin{cases} 4b^2 + 4c^2 - 8m_a{}^2 + 2b^2 - c^2 = 4m_c{}^2 \\ 4b^2 + 4c^2 - 8m_a{}^2 + 2c^2 - b^2 = 4m_b{}^2 \end{cases}$$

$$\begin{cases} 6b^2 + 3c^2 = 4m_c{}^2 + 8m_a{}^2 \\ 3b^2 + 6c^2 = 4m_b{}^2 + 8m_a{}^2 \Rightarrow\ 3b^2 = 4m_b{}^2 + 8m_a{}^2 - 6c^2 \end{cases}$$

$$8m_b{}^2 + 16m_a{}^2 - 12_c{}^2 + 3c^2 = 4m_c{}^2 + 8m_a{}^2$$

$$-9c^2 = -8m_a{}^2 - 8m_b{}^2 + 4m_c{}^2$$

$$c^2 = \frac{8}{9}m_a{}^2 + \frac{8}{9}m_b{}^2 - \frac{4}{9}m_c{}^2$$

$$c^2 = \frac{4}{9}\left(2m_a{}^2 + 2m_b{}^2 - m_c{}^2\right)$$

$$c = \frac{2}{3}\sqrt{2m_a{}^2 + 2m_b{}^2 - m_c{}^2} \qquad (3)$$

[illegible] (1), (2), (3) [illegible].

4-[illegible]: [illegible] m_a, m_b, m_c [illegible] $m_a{}^2 + m_b{}^2 = 5m_c{}^2$ [illegible], [illegible].

[illegible]:

[illegible] a [illegible] m_a, b

[illegible] m_b, c [illegible]

[illegible] m_c [illegible], [illegible]

[illegible] Υ[illegible] [illegible] [illegible] [illegible]

[illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] Θ[illegible] Θ[illegible] Θ[illegible]Υ[illegible]Θ:

$$a = \frac{2}{3}\sqrt{2m_b^{\ 2} + 2m_c^{\ 2} - m_a^{\ 2}}$$

$$b = \frac{2}{3}\sqrt{2m_a^{\ 2} + 2m_c^{\ 2} - m_b^{\ 2}}$$

$$c = \frac{2}{3}\sqrt{2m_a^{\ 2} + 2m_b^{\ 2} - m_c^{\ 2}}$$

[illegible] [illegible] Υ[illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible].

$$c^2 = a^2 + b^2 \qquad (1)$$

(2) [illegible] [illegible] (1) [illegible] [illegible] [illegible] [illegible], [illegible] [illegible]

$$\frac{4}{9}\left(2m_a^{\ 2} + 2m_b^{\ 2} - m_c^{\ 2}\right) = \frac{4}{9}\left(2m_c^{\ 2} + 2m_a^{\ 2} - m_b^{\ 2}\right) +$$

$$+ \frac{4}{9}\left(2m_b^{\ 2} + 2m_c^{\ 2} - m_a^{\ 2}\right).$$

$$2m_a^{\ 2} + 2m_b^{\ 2} - m_c^{\ 2} = 2m_c^{\ 2} + 2m_a^{\ 2} - m_b^{\ 2} +$$

$$+ 2m_b^{\ 2} + 2m_c^{\ 2} - m_a^{\ 2}$$

$$m_a^{\ 2} + m_b^{\ 2} = 5m_c^{\ 2} \qquad (2)$$

[illegible] [illegible] [illegible] [illegible]Υ[illegible] [illegible] [illegible] [illegible] m_a, m_b, m_c [illegible], [illegible] $m_a^{\ 2} + m_b^{\ 2} = 5m_c^{\ 2}$ [illegible] [illegible] [illegible] [illegible].

[illegible]: [illegible] m_a, m_b, m_c [illegible], [illegible]

[illegible].

$$S=\frac{1}{3}\sqrt{(m_a+m_b+m_c)(m_a+m_b-m_c)(m_a-m_b+m_c)(-m_a+m_b+m_c)}$$

[illegible]

1. [illegible] 24[illegible], [illegible]

[illegible] 14[illegible] [illegible], [illegible] 8[illegible] [illegible], [illegible]. [illegible]. [illegible]=60[illegible], $S=48\sqrt{10}$ [illegible]^2.

2. [illegible] 9[illegible] [illegible] 12[illegible] [illegible]. [illegible] [illegible]. [illegible]: 1[illegible].

3. Y[illegible] [illegible] [illegible] [illegible] [illegible] [illegible], [illegible] [illegible]

[illegible] 3:1 [illegible] [illegible] [illegible] [illegible] [illegible] [illegible].

[illegible] [illegible] [illegible] [illegible] [illegible] Y[illegible] [illegible] [illegible] [illegible] Y[illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible]. [illegible]: 64 [illegible].

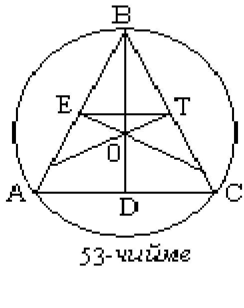
4. [illegible] [illegible] Y[illegible] [illegible] [illegible] [illegible] $\sqrt{52}$ [illegible] $\sqrt{73}$ [illegible]. Y[illegible] [illegible] [illegible] [illegible] [illegible] [illegible]. [illegible]: 10.

2. Y[illegible] [illegible] [illegible].

Y[illegible] [illegible] [illegible] [illegible], [illegible] [illegible] [illegible] [illegible]-[illegible] [illegible] [illegible] [illegible] [illegible]

[illegible] [illegible] [illegible] [illegible].

Y[illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible], [illegible] Y[illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] (53-[illegible]).



53-чийме

[illegible] [illegible] [illegible], [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible], [illegible] [illegible] D [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible]

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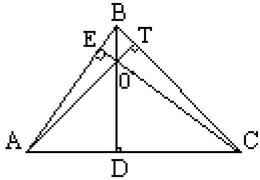

54-чийме

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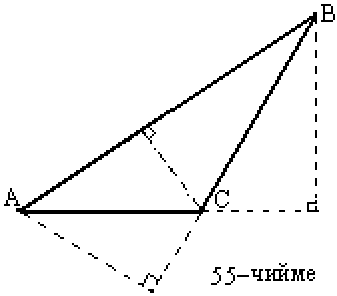

55–чийме

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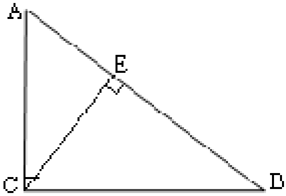

56-чийме

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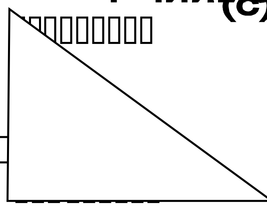

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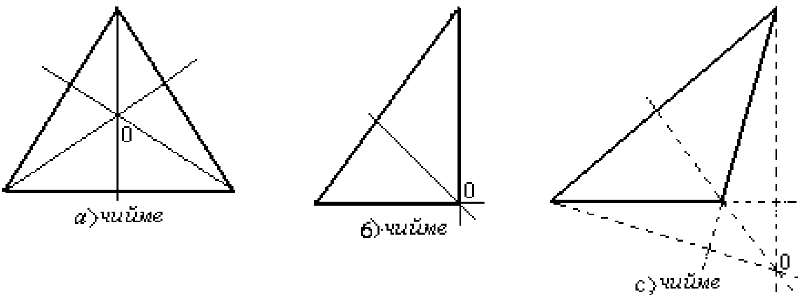

а) чийме б) чийме с) чийме

Y□ □□□□□□□□□□ a, b, c □□□□□□□□□ □Y□Y□Y□□Θ□

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□□□□□□□□□□ □Θ□Θ□□Y □□□□□□ □□□□ □□□□□□ □ □□□□□□□□□.

$$h_a = \frac{2}{a}\sqrt{p(p-a)(p-b)(p-c)} \qquad (1)$$

$$h_b = \frac{2}{b}\sqrt{p(p-a)(p-b)(p-c)} \qquad (2)$$

$$h_c = \frac{2}{c}\sqrt{p(p-a)(p-b)(p-c)} \qquad (3)$$

□□□□ □ $p = \dfrac{a+b+c}{2}$ Y□ □□□□□□□□□□□ □□□□□ □□□□□□□□□.

h_a, h_b, h_c □□□□□□□□□□□ □□□□□ Y□ □□□□□□□□□ □□□□□ □□□□

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r_b, r_c □□□ □□□□□□ □□□□ □ □□□□□□□ □ ө□ө□□ө□ү□ө □□□□□:

$$\frac{1}{r_a} = \frac{1}{h_a} + \frac{1}{h_b} + \frac{1}{h_c} \qquad (4)$$

$$\frac{1}{r_a} = -\frac{1}{h_a} + \frac{1}{h_b} + \frac{1}{h_c} \qquad (5)$$

$$\frac{1}{r_b} = \frac{1}{h_a} - \frac{1}{h_b} + \frac{1}{h_c} \qquad (6)$$

$$\frac{1}{r_c} = \frac{1}{h_a} + \frac{1}{h_b} - \frac{1}{h_c} \qquad (7)$$

$$h_a = \frac{2r_b\, r_{\tilde{n}}}{r_b + r_{\tilde{n}}} \qquad (8)$$

$$h_b = \frac{2r_{\grave{a}} r_{\tilde{n}}}{r_{\grave{a}} + r_{\tilde{n}}} \qquad (9)$$

$$h_c = \frac{2r_a r_b}{r_a + r_b} \qquad (10)$$

$$h_a = \frac{r_a\left(b + c - a\right)}{a} \qquad (11)$$

$$h_b = \frac{r_b\left(a + c - b\right)}{b} \qquad (12)$$

$$h_c = \frac{r_c\left(b + a - c\right)}{c} \qquad (13)$$

1-[illegible]. [illegible] Y[illegible] [illegible] h_1, h_2, h_3 [illegible] $\left(\frac{h_c}{h_a}\right)^2 + \left(\frac{h_c}{h_b}\right)^2 = 1$ [illegible], [illegible] Y[illegible] [illegible].

[illegible]:

$$S = \frac{1}{2} a h_a \qquad (1) \qquad\qquad a = \frac{2S}{h_a} \qquad (4)$$

$$S = \frac{1}{2} b h_b \qquad (2) \qquad\qquad b = \frac{2S}{h_b} \qquad (5)$$

$$S = \frac{1}{2} c h_c \qquad (3) \qquad\qquad c = \frac{2S}{h_c} \qquad (6)$$

[illegible] Y[illegible] [illegible].

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

[illegible] a, b, c [illegible].[illegible]. (4), (5), (6) [illegible]:

$$\frac{4S^2}{h_c^{\,2}} = \frac{4S^2}{h_b^{\,2}} + \frac{4S^2}{h_a^{\,2}}$$

$$\frac{1}{h_c^{\,2}} = \frac{1}{h_b^{\,2}} + \frac{1}{h_a^{\,2}} \qquad / \cdot h_c^{\,2}$$

$$\left(\frac{h_c}{h_a}\right)^2 + \left(\frac{h_c}{h_b}\right)^2 = 1$$

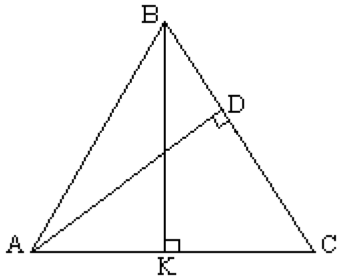
[illegible] ү[illegible] [illegible] h_a, h_b, h_c

[illegible], [illegible] [illegible]ө[illegible]ө[illegible]ө[illegible]ү[illegible]ө[illegible] [illegible]:

$$\left(\frac{h_c}{h_a}\right)^2 + \left(\frac{h_c}{h_b}\right)^2 = 1$$

[illegible] ү[illegible] [illegible] ү[illegible] h_1, h_2, h_3 [illegible] [illegible] ү[illegible] [illegible]ү[illegible]үү [illegible], [illegible] (8) [illegible] [illegible]ү[illegible]ү[illegible]үү[illegible]ү ү[illegible] [illegible] (5), (6), (7) [illegible] [illegible]үү[illegible]ү ү[illegible] [illegible] ү[illegible] a, b, c [illegible]ң, ү[illegible] [illegible] ү[illegible] [illegible]ү[illegible]үү[illegible]ү [illegible]

[illegible] [illegible].[illegible]. [illegible]ү[illegible]ө [illegible].



57-чийме

2-[illegible]. [illegible] [illegible]ң [illegible] ү[illegible] [illegible] [illegible] =5 [illegible]

[illegible]D=6 [illegible] [illegible]ү[illegible]ү[illegible]ү[illegible]ө[illegible]. Ү[illegible]

[illegible] [illegible] =[illegible] [illegible].

[illegible] . Ү[illegible] $AB = x$ [illegible] (57-[illegible]).

[illegible] ΔAKB [illegible] ΔADC ү[illegible]

[illegible] $\frac{AB}{AC} = \frac{BK}{AD}$ [illegible].

[illegible], [illegible] $\frac{x}{2AK} = \frac{5}{6}$ [illegible].

[illegible] $x = \frac{5}{3}AK$.

ΔAKB ү[illegible]

[illegible] ө[illegible]ө[illegible]ү[illegible]ү [illegible]:

$$AB^2 = AK^2 + BK^2, \quad x^2 = AK^2 + 25, \quad (\frac{5}{3}AK)^2 = AK^2 + 25,$$

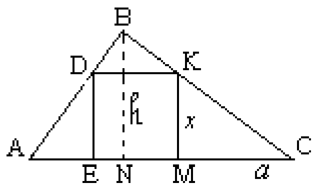
[illegible], $AK = \frac{15}{4}$ [illegible]. [illegible] ң [illegible] ү[illegible] [illegible], [illegible] $AC = 7{,}5\ см$.

[illegible] ΔAKB [illegible] ү[illegible] [illegible].

$$AB = \sqrt{25 + \frac{225}{16}} = \frac{25}{4} = 6{,}25, \quad AB = 6{,}25\ см$$

[illegible]. $AC = 7{,}5\ см$, [illegible] $AB = 6{,}25\ см$.

3-[illegible]. [illegible] a, [illegible] h [illegible] ү[illegible], [illegible]



58-чийме

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□□□□□):

$$\frac{a}{x}=\frac{h}{h-x}, \qquad a(h-x)=xh, \qquad ah-ax=xh,$$

$$x(h+a)=ah, \quad x=\frac{ah}{a+h}.$$

□□□□□: $\frac{ah}{a+h}$.

4-□ □□□□□. Y□ □□□ □□□□□□□ □□□□□□ □□ □□□□□ 30□□ □ □□□ 25□□. □□ □□□□□□□. □□□□□□ 11□□ □□□□□□ □□□□□ □

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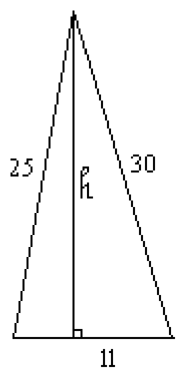
$$p=\frac{a+b+c}{2}=\frac{30+25+11}{2}=33, \quad p=33.$$



59-чийме

$$s = \sqrt{33(33-30)(33-25)(33-11)} = \sqrt{33\cdot 3\cdot 8\cdot 22} = 132,$$

$s = 132см^2$.

[illegible] ү [illegible], [illegible] h [illegible] 59-[illegible]. [illegible] ү [illegible]

[illegible] $s = \frac{1}{2}ah_a$

[illegible]:

$$132 = \frac{1}{2}\cdot 11\cdot h, \quad 132\cdot 2 = 11h, \quad h = 24.$$

[illegible]: $24см$.

[illegible]

1. [illegible] ү [illegible]

[illegible] 7[illegible] 16[illegible]

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2. □□ □□□□□□□□□ □□□□□□□□□□ 10□□, 17□□, 21□□ □□□□□□□ Ү□ □□□□□□□□□□ □□□□□□□□□□ 24□□ □□□□□□ □□□ □□□□□□□□ □□□□□ □□□□□□□□□. □□□ □□□□□□□□□□□ □□□ □□□□ Ү□ □□□□□□□□□□□ □□ң □□□□□□□ □□□□□. □□□ □□□□□□□□□□ □□ □□□□□□□ □□□□□□□.

□□□□□: $\frac{84}{13}$ □□, $\frac{72}{13}$ □□.

3. □□□ □□□□□□□ Ү□ □□□□□□□□□□ □□□□□□□□□□□□□□□

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4. Ү□ □□□□□□□□□□□ □□□□□□□□□□□□□□□ 12□□, 15□□ □ □□□ 20□□ □□ □□□□□□□□ □□□□□□, □□□□ □□ □□□ □□□□□□□□ Ү□ □□□□□□□□ □□□□□□□□□ □□ □□□□□□□□□□.

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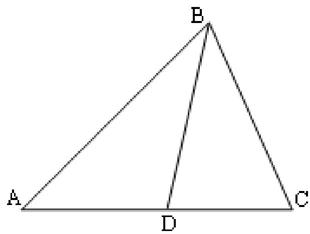
[illegible]Ө[illegible]Ү[illegible], [illegible]-[illegible] [illegible] Ү[illegible]Ү[illegible]Ү[illegible]Ө[illegible] [illegible]

[illegible].

[illegible].

1) Ү[illegible] [illegible] Ү[illegible] [illegible] Ү[illegible] [illegible].
2) Ү[illegible] [illegible].
3) Ү[illegible] [illegible], [illegible]



60-чийме

[illegible]Ү[illegible] Ө[illegible] [illegible]

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$$\frac{AD}{DC} = \frac{AB}{BC}.$$

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$$r = \frac{s}{p} = \frac{s}{AB + BC + AC}$$

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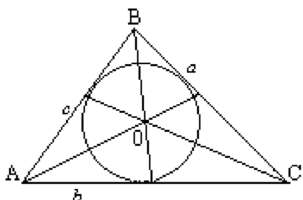
□□□□□□□ үү □ү□□ө L_a, L_b, L_c □□□



61-чийме

[illegible], [illegible] [illegible] [illegible]Ө[illegible]Ө[illegible]Ү

[illegible] [illegible] [illegible] [illegible] [illegible] [illegible] (61-[illegible]).

$$L_a = \frac{2}{b+c}\sqrt{bcp(p-a)}\,, \qquad L_b = \frac{2}{a+c}\sqrt{acp(p-b)}\,,$$

$$L_c = \frac{2}{a+b}\sqrt{abp(p-c)}$$

[illegible] [illegible] p -[illegible] [illegible] [illegible].

[illegible] [illegible] Ү[illegible] [illegible] [illegible] [illegible]ҮҮ

[illegible]Ү[illegible]Ө [illegible] [illegible] [illegible] [illegible] [illegible].

[illegible] [illegible] Ү[illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible].

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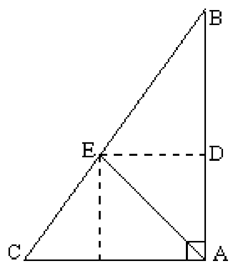

62-чийме

[illegible] Ө[illegible]ҮҮ[illegible]Ү [illegible], [illegible] [illegible]

[illegible] [illegible] [illegible] [illegible] [illegible].

1-□ □□□□□□. □□□ □□□ □□□ □□□□ Y□ □□□□□□□□□□□□ □□□□□□ □□□□□□□ □□□□□□□□ . □□□ □□□□□□□ □□□□□□□□□□□□□ □ □□□□□□ □□□□□ □ □□□□□□□□□□□□□ 30□□ □□□ □ 40□□ □□□□□□

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$AC = x$, $AB = y$ □□□□□ □□ □□□□□□□□ □□□□ □. □□ □□□□□□□□□□ □□□□□□□□□□□□□. □□□□□ □□□□□□□□□□□□□□□□ □□□□□□□□ □□□□□□□

$\frac{x}{y} = \frac{30}{40}$ □□□□□□ (62- □□□□□) .

□□□□ □□ $x = \frac{3}{4}y$ (1).

□□□ □□□ Y□ □□□ □□□□□□□□ □□□□□□□ □□□ □□□□□□ □□□□ □□□□□□□□□□□, □□□ □ $x^2 + y^2 = 70^2$.

□□□□□,
$$\begin{cases} x^2 + y^2 = 70^2 \\ x = \frac{3}{4}y \end{cases} \Rightarrow \left(\frac{3}{4}y\right)^2 + y^2 = 4900,\ y = 56$$

$x = \frac{3}{4}\cdot 56 = 42$, $x = 42$.

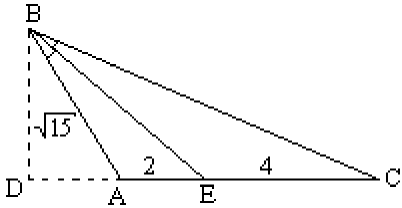
□□□□□. 42□□, 56□□.

2-□ □□□□□□. □□□ Y□ □□□ □□□□□□□□□ □□□ □□□ □□□ □□□□□□□ □□□□ □□□□ $\sqrt{15}$ □□ □□□□□□ □□□□□□□□ □ □□□ □□□□□□□□□□□□

[illegible]. [illegible]-[illegible]

[illegible] 4[illegible] 2[illegible]. [illegible]

[illegible].
[illegible].



63-чийме

[illegible]: $AB = x$, $BC = y$, $ED = t$. [illegible] $AE = 4$, $ED = 2$. [illegible] (63-[illegible]):

$$\frac{AB}{BC} = \frac{x}{y} = \frac{4}{2} = 2,\ \ x = 2y.$$

ΔBDA [illegible].

$$\begin{cases} y^2 = (2-t)^2 + (\sqrt{15})^2 \\ x^2 = (4+t)^2 + (\sqrt{15})^2 \end{cases} \quad \begin{cases} y^2 = 4 - 4t + t^2 + 15 \\ (2y)^2 = (4+t)^2 + (\sqrt{15})^2 \end{cases} \Rightarrow$$

$$\Rightarrow \begin{cases} y^2 = 19 - 4t + t^2 \\ 4y^2 = 31 + 8t + t^2 \end{cases} \Rightarrow \begin{cases} 4y^2 = 76 - 16t + 4t^2 \\ 4y^2 = 31 + 8t + t^2 \end{cases} \Rightarrow$$

$$31 + 8t + t^2 = 76 - 16t + 4t^2,$$

$$3t^2 - 24t + 45 = 0$$

$$t_1 = 3, \quad t_2 = 5.$$

□□□□□□□□□□ □□□□□□□ $t_1 = 3$ □□□ □□□□□□□□□ □□□.

$$y^2 = 19 - 4 \cdot 3 + 3^2,$$

$$y^2 = 19 - 12 + 9 = 16,$$

$$y_{1,2} = \pm 4.$$

$$y = 4, \quad x = 2 \cdot 4 = 8, \quad x = 8$$

□□□□□. $AB = 8см$, $BC = 4см$, $AC = 6см$.

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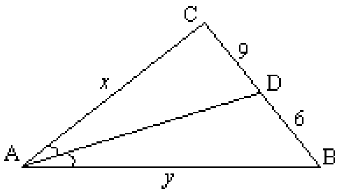

64-чийме

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$$P = AB + BC + CA = 45\,мм \quad (1)$$

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$$\frac{AB}{AC} = \frac{BD}{DC} \quad □.□. \quad \frac{x}{y} = \frac{6}{9}.$$

(2)

(1)- [illegible] (2)- [illegible] Y [illegible]

[illegible]:

$$\begin{cases} 15 + x + y = 45 \\ \dfrac{x}{y} = \dfrac{6}{9} \end{cases} \Rightarrow \begin{cases} x + y = 30 \\ x = \dfrac{2}{3} y \end{cases} \Rightarrow \begin{cases} \dfrac{2}{3} y + y = 30 \\ x = \dfrac{2}{3} y \end{cases}$$

$$\begin{cases} 5y = 90 \\ x = \dfrac{2}{3} y \end{cases} \Rightarrow \begin{cases} y = 18 \\ x = 12 \end{cases}.$$

$AB = 12$ [illegible], $AC = 18$ [illegible], $BC = 15$ [illegible].

[illegible], [illegible] Y [illegible] Y [illegible] YY [illegible]. [illegible] Y [illegible] Y [illegible] [illegible]:

$$s = \sqrt{p(p-a)(p-b)(p-c)}, \quad p = \frac{1}{2}(a+b+c).$$

$$p = \frac{1}{2}(12 + 18 + 15) = \frac{45}{2}.$$

$$s = \sqrt{\frac{45}{2}\left(\frac{45}{2} - 12\right)\left(\frac{45}{2} - 15\right)\left(\frac{45}{2} - 18\right)} = \sqrt{\frac{45}{2} \cdot \frac{21}{2} \cdot \frac{15}{2} \cdot \frac{9}{2}} = \frac{135}{4}\sqrt{7}.$$

Y [illegible]

$$R = \frac{abc}{4s} = \frac{12 \cdot 15 \cdot 18}{4 \cdot \dfrac{135}{4}\sqrt{7}} = \frac{3 \cdot 4 \cdot 3 \cdot 5 \cdot 2 \cdot 9}{3^3 \cdot 5 \cdot \sqrt{7}} = \frac{24}{\sqrt{7}} = \frac{24\sqrt{7}}{7}$$

$$R = \frac{24\sqrt{7}}{7}$$ [illegible].

$$r = \frac{s}{p} = \frac{\frac{135}{4}\sqrt{7}}{\frac{45}{2}} = \frac{135 \cdot 2\sqrt{7}}{4 \cdot 45} = \frac{3\sqrt{7}}{2}, \quad r = \frac{3\sqrt{7}}{2} □.$$

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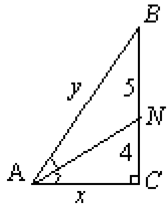

65-чийме

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$$\frac{x}{y} = \frac{4}{5}, \qquad x = \frac{4}{5}y.$$

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$$y^2 = x^2 + 9^2,$$

$$y^2 = (\frac{4}{5}y)^2 + 81, \quad y^2 = \frac{16}{25}y^2 + 81, \quad \frac{9}{25}y^2 = 81,$$

$$y^2 = 225, \quad y = 15, \quad x = \frac{4}{5} \cdot 15 = 12.$$

$$s = \frac{1}{2} \cdot 12 \cdot 9 = 54.$$

□□□□□: $54 см^2$.

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1. □□□□□□□□ a □□□□ b □□□□□□ □□□ □□□□□□□ ү□ □□□□□□□□□□□□ □□□□□□□□□□□□□□□□□ □□□□□□□. □□□ □□: $\frac{ab\sqrt{2}}{a+b}$.

2. □□□ □□ □□□□□ ү□ □□□□□□□□□□ □□ □□□□□□□ 18□□ □□□ □ 24□□ □□ □□□□□□. □ □□ □□□ □□□□ □□□□□□□□□□□□□□□□□□□ □□□□ □□□. □□□□□. $9\sqrt{5}$ □□, $8\sqrt{10}$ □□.

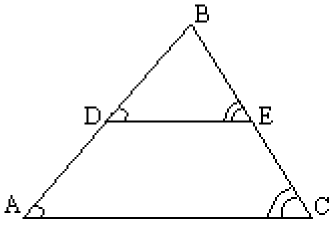
3. □□ң □□□□□□□□□ ү□ □□□□□□□□□□ □□□□□□ □ □□□ 20□□, □□ □□□ □□□□□□ 5□□ □□ □□□□□□□. Ү□ □□□□□□□□□□□ □□□□□□□□□□ □□□□□□□□□□□□□□□□□□ □□□□□□□. □□□□ □: $6 см$.

4. $|AB| = c$, $|AC| = b$, $B\hat{A}C = \alpha$ □□□□□, □□□□ □□□ ү□ □□□□□□□□□□□□ □□□ □□□□□□□□ □□□□□□□□□□□□□□□□□□□ □□□□□□ □. □□□□□. $\frac{2bc\cos\frac{\alpha}{2}}{b+c}$.

4. Ү□ □□□□□□□□□□ □□□□ □□□ □ □□.

<u>□□ □ □□□□ □</u> 1. □□□□□□ □D=D□ □□□ □ □□=□□ □□□□□, □□□□ D□ □□□□□□□□□ □□□ ү□ □□□□□□□□□□□ **□□□□ □□ □□ □□** □□□ □□□□□□. (66-□□□□□).

<u>□□ □ □□□□ □</u> 2. □□□ ү□ □□□□□□□□□□□ □□ □ □□□ □□ □□ □□□□□□ □□ □□ң □□□□□□□□□ □□□□□□□□ □□□ □□□□□□□, ү□ □□□□□□□□□□□ □□□□ □□□□□□ □□□ □□□□□□.



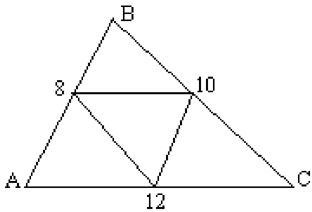
66-чийме

□□ □□□ □□ □. Y□ □□□□□□□□□□□ □□□□ □□□□□□ □□□□ □□□□□□□□ □□□□□□□□□ □□□□□ □□ □□ □ □□□ □□□□ □ □□□□□□ $DE \parallel AC$,

$$DE = \frac{1}{2} AC .$$

Y□ □□□□□□□□□□□ □□□□ □□□□□□ □□□□□□□□ Y□ □□□□□□□□□ □□□□□ □□□□□□ Y□ □□□□□□□□□□ □□□□□ □.□. □□□ Y□ □□□□□□□□ D□□ Y□ □□□□□□□□□□□ □□□□□ □□□□□.

1-□ □□□□□. Y□ □□□□□□□□□□ □□ □□□□□ 8□□, 10□□ □ □□□ 12□□ □□ □□□□□□□. □□□ □□□□ □ □□□□□□□□ Y□ □□□□□□□□□□ □□ □□□□□□ □□ □□□□□□□□□□ □ □□□□□□ Y□ □□□□□□□□□□ □□ □□□□□□ □□□□□□□.



67-чийме

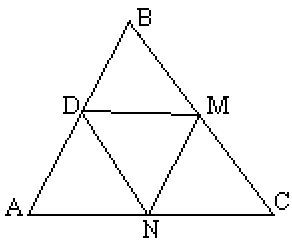
□□□□□ □□□□□. □□□ Y□ □□□□□□□□□□□ □□□□□□□□□ $P = 30$. □ □ □□□ □□□ Y□ □□□□□□□□□□□ □□ □□□□□□ □□ □□ң □□□□□□□□□□ □□□□□□□□□□□ Y□ □□□□□□□□□□ □□ □□□□□ □□□□□□□□ Y□ □□□□□□□□□□ □□□□□□YY □□ □□□□□□□□□ □□ □□□□□ □ □□□□□□□□ □□□□□□□ (67- □□□□□).

□□□□ □□□ □□□□□□□□ □ 4□□, 5□□ □ □□□ 6□□ □□ □□□□□□□ □□□□□. □□□□□, □□□□ □□□□□□□□□ □□□□□□□□ Y□ □□□□□□□□□□ □□□□□□□□□□□□ □ □□□ □□□□ □□ □□□□□:

$$P = \frac{1}{2}(8 + 10 + 12) = 15 , \quad P = 15 см .$$

□□□□□: 4□□, 5□□ □ □□□ 6□□.

2-□ □□□□□. Y□ □□□□□□□□□□ □□□□□□□□□ 12□□ □□ □□□□□□□, □□ □□□□□□ □□ □□□□□□□□ □□□□□□□□□□ □□□□□ □□□□□□□□□□□ □□. □□ □□□□□ Y□ □□□□□□□□□ □□□□□□□ □□□ □□□ □□□□□□□.



68-чийме

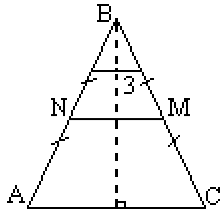
□□□□□ □□□□□. □□□□□□□□□ □□□□□ □□□□□ □ □□□ Ү□ □□□□□□□□□□□ $P = 12см$ (68-□□□□□).

□□□□□□ □□ □□□ Ү□ □□□ □□□□□□□□□ □□□□□□□□ □□□□□□ Ү□ □□□□□□□□□□□ □□ □□□□□:

$$DM = \frac{1}{2}AC\ , \quad MN = \frac{1}{2}AB\ , \quad DN = \frac{1}{2}BC$$

□□ □□□□□□□. □ □□ □□□ Ү□ □□□ □□□□□□□□□ □□□□□□□□□ $P = 12см$. □□□□□□□□□□□.

$P = \frac{1}{2}(AB + AC + BC) = \frac{1}{2} \cdot 12 = 6$. □□□□ □, □□□□□ҮҮ□Ү Ү□ □□□□□□□□□□ □□□□□□□□□□ 6□□ □□ □□□□□.



69-чизма

□□□□□: 6□□ .

3-□ □□□□□. □□□□□□□□ □□□□□□□□□□ □□□□□□ □□ң □□□□□□□□ □□ Ү□ □□□□□□□□□□□ □□□□ □□□□□□ 3□□ □□ □□□□□□□. □□□□ □□ □□□□□ □□□□□□□□□ 16□□ □□ □□□□□□□ □□□□□, □□□□ □□ Ү□ □□□□□□□□□□ □□ □□□□□□ □□□ □□□□.

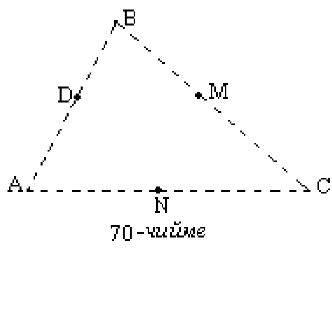
□□□□□ □□□□□. □ □□□ □□□□□□□□ □□□□□□ □□ □□□ □ □□ □□ □□□□□□ □□ □□□□□□□□□ N □ □□□ M □□□□□ □□□□□□□□□□ (69-□□□□□) . □□ □□ $BN = x$ □□□□□, □□□□

$$x + x + 6 = 16\ , \quad 2x = 10\ , \quad x = 5\ .$$

NM □□□□□□□□□ □□□ Ү□ □□□ □□□□□□□□□ □□□□ □□□□□□ □□□□□□□□ □□□□ □□ 6□□ □□ □□□□□□□□ □□□□□.

□□□□□, □□□□□ҮҮ□Ү NBM Ү□ □□□ □□□□□□□□□ □□ □□□□□ 5□□, 5□□ □□□□ 6□□ □□□□ .

□□□□□: 5□□, 5□□, 6□□ .



70-чизма

4-□ □□□□□. □□□ □□□ □ □□□□□□□□□□ □□□□□□□□ □□□□□□□ Ү□ □□□ □□□□□□□ □□□□□□ □Ү□ҮҮ □□□□□?

[illegible]. [illegible] D,M,N [illegible] (70-[illegible]).

1-[illegible].

[illegible].

2-[illegible].

[illegible].

[illegible]

1. [illegible] 10[illegible]. [illegible] 7

$\left(1\frac{3}{7}, 2\frac{6}{7}, 4\frac{2}{7}, 5\frac{5}{7}, 7\frac{1}{7}, 8\frac{4}{7}\right)$

2. a D. F DC F DE.

D

$\frac{5}{8}$, MF

$\left(\frac{a\sqrt{17}}{12}\right)$.

3. BQ=CP Q. Q

[illegible].

[illegible]. Ү[illegible], [illegible].

4. [illegible] a [illegible] [illegible]. $a^2(3+\sqrt{3})$.

7-§. Ү[illegible].

[illegible] 1. [illegible], [illegible]

[illegible]

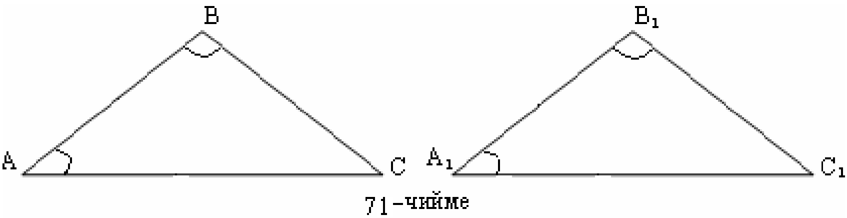
[illegible], [illegible] (71-[illegible]).

[illegible]

$$\angle A = \angle A_1,\ \angle B = \angle B_1$$

[illegible], [illegible]

$$\Delta ABC \backsim \Delta A_1B_1C_1$$ [illegible].



71-чийме

□□□□□□□ ӨӨ. ΔABC □□□□ $\Delta A_1B_1C_1$ ү□ □□□ □□□□□□□□□□□ □□

$\angle A = \angle A_1$, $\angle B = \angle B_1$ □□□□□□□ □□□□□□. □□□□ □□□□□ □□□□□□□□□ □□□□□□□□□□□□□□ $\frac{AB}{A_1B_1} = k$, $\Delta A_1B_1C_1$ ү□

□□□□□□□□□□□ □□□□□□□□□□□□□□ □□□□□□ Ө□□Ө□□Ө□ү□. □ □□□□□□

ΔABC ү□ □□□□□□□□□□□□□ □□□□□□□□□ □□□□□□□ □□□ □□□□□ □□ □□□ □□□ □□ $\Delta A_2B_2C_2$ ү□ □□□□□□□□□□□ □□□ □□□ (71-□□□□□□).

□□□□□□ Ө□□Ө□□үү □□□ □□□□□□□ □□□□□□□□□□□□□□□□□□□□□ $\angle A_1 = \angle A_2$,

$\angle B_1 = \angle B_2$ □□□□□□. □□□ □□□ $A_2B_2 = k \cdot A_1B_1 = AB$. □□ □□ □□□□□ ΔABC □ □□□ $\Delta A_2B_2C_2$ ү□ □□□□□□□□□□□□□ □ □□□□□□□ □□□□□□□□ □□□□□□□(□□□ □□□□ □ □□□ □□□ □□□□□□үү □□□□ □ □□□□□□□) □□□□□□□□ □□□ □□□□.
$\Delta A_1B_1C_1$ □ □□□ $\Delta A_2B_2C_2$ ү□ □□□ □□□□□□□□□□□ □□□□□□□□□□□□□□□□□, □□□□□□ □□□□ □□□□□□, □□ □□□ $\Delta A_2B_2C_2$ □□□□ ΔABC ү□ □□□□□□□□□□□□□ □□□□□□□□□, □□□□□□, □□□□□□.
□□□□□□□ □ $\Delta A_1B_1C_1$ □ □□□ ΔABC ү□ □□□□□□□□□□□□□□□ □ □□□□□□.
□.□.□.

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$\angle C = \angle C_1$ □□□□ $AC = k \cdot A_1C_1$, $BC = k \cdot B_1C_1$ □□□□□□. $\Delta ABC \sim \Delta A_1B_1C_1$ □□□□□□□□□ □□□□□□□□□□□ (72-□□□□□). □□□□□□□□ □□□□□□□□□□□□ k □□□□□□ □$_1$□$_1$□$_1$ ϒ□

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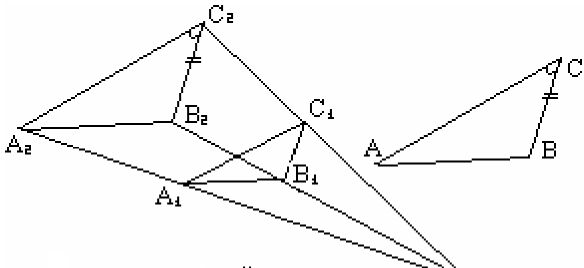
□□□□□□□□□□ □□□□ $\angle C_2 = \angle C_1$ □□□□□. □□□□ □□□□ □□□ □ □□□

[illegible]$_2$[illegible]$_2$[illegible]$_2$ ү[illegible] [illegible] $\angle C = \angle C_2$ [illegible]
$A_2C_2 = k \cdot A_1C_1 = AC$, $B_2C_2 = k \cdot B_1C_1 = BC$.

[illegible], [illegible] [illegible]$_2$[illegible]$_2$[illegible]$_2$ ү[illegible] [illegible]. [illegible]$_2$[illegible]$_2$[illegible]$_2$ ү[illegible]



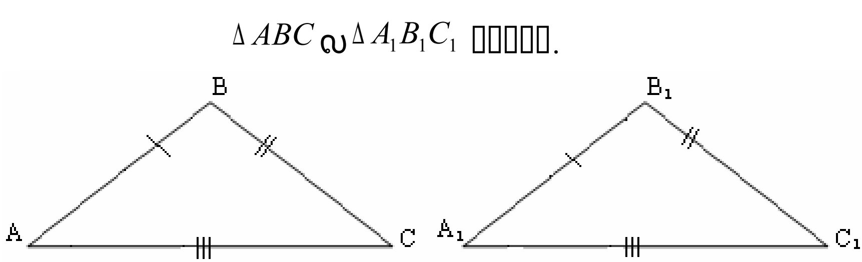
72-чийме

[illegible], [illegible] [illegible]$_2$[illegible]$_2$[illegible]$_2$ [illegible] ү[illegible] [illegible]$_1$[illegible]$_1$[illegible]$_1$ [illegible] ү[illegible] [illegible].

[illegible] 3. [illegible] ү[illegible] ү[illegible], [illegible] ү[illegible] ү[illegible], [illegible] ү[illegible] [illegible] (73-[illegible]).

[illegible] $\dfrac{AB}{A_1B_1}$, $\dfrac{BC}{B_1C_1}$, $\dfrac{AC}{A_1C_1}$ [illegible], [illegible]

$\Delta ABC \backsim \Delta A_1B_1C_1$ [illegible].



73-чийме

1-[illegible]. [illegible] ү[illegible] [illegible]

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□□=20□□ □ □□□ D□=15□□ □□□□□, □□□□ □ D □□ □□□□ □□□.

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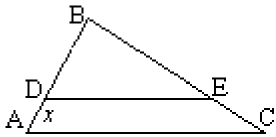

74-чийме

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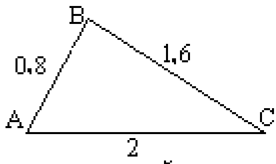
$$\frac{AC}{DE} = \frac{AB}{DB} \quad □.□. \quad \frac{20}{15} = \frac{16}{16 - x},$$

$$\frac{4}{3} = \frac{16}{16 - x}, \quad 64 - 4x = 48, \quad x = 4.$$

□□□□□, AD=4□□.

□□□□□: 4□□ .

2-□ □□□□□. Ү□ □□□ □□□□□□□□ □ □□□□□□ 0,8□□, 1,6□□ □□□ □ 2□□ □□ □□□□□□□. □□□□□□□□□ 5,5□□ □□□□□□□ □□□□□□ ү□ □□□□□□□□□ □□□□□ ү□ □□□ □□□□□□□□ □□ □□□□□□ □□□ □□□□.



75-чийме

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$\frac{y}{}, \frac{z}{}$ □□□ □□□□ □□□□□□□□□, □□□□ □ө□ ө□□ү□ү □□□□□□ (75-

□□□□□):

$$\frac{x}{0,8}=\frac{y}{1,6}=\frac{z}{2}=k, \quad x=0,8k, \quad y=1,6k, \quad z=2k.$$

$$0,8k+1,6k+2k=5,5, \quad 4,4\mathrm{k}=5,5, \quad \mathrm{k}=\frac{5}{4}.$$

$$x=0,8\cdot\frac{5}{4}=1, \quad x=1,$$

$$y=1,6\cdot\frac{5}{4}=2, \quad y=2,$$

$$z=2\cdot\frac{5}{4}=2,5, \quad z=2,5.$$

□□□□□: 1□□ , 2□□, 2,5□□.

3-□ □□□□□. □□□ □□□□□□□ ү□ □□□□□□□□□ □□□□□□□□□□□ 25□□ □□, □□ □□□ □□□ □□□□□□ 10□□ □□ □□□□□□□. □□□□□□ □□□□□□□□□ □□□□□□□□□□□ □□□□□□ □□□□□□□□□□ □□□□□□□ .

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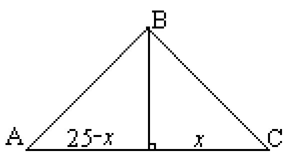

76-чиўме

$$25^2=10^2+BC^2, \quad BC=5\sqrt{21}.$$

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□□□□□□, $\frac{AC}{BC}=\frac{BC}{EC}$ □□□□□□.

$$\frac{25}{5\sqrt{21}}=\frac{5\sqrt{21}}{x},\quad 25x=5\sqrt{21}\cdot 5\sqrt{21},\quad x=21.$$

□□□□□□. $21\ см$.

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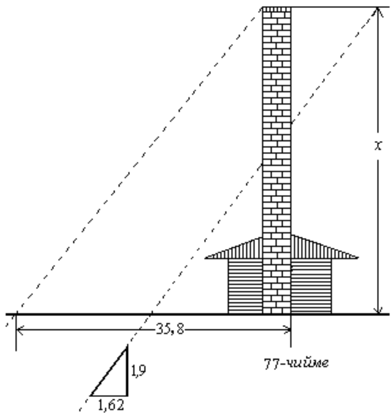

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$$\frac{x}{1{,}9}=\frac{35{,}8}{1{,}62};\quad 1{,}62x=1{,}9\cdot 35{,}8;\quad x=\frac{35{,}8\cdot 1{,}9}{1{,}62}\approx 42,\quad x\approx 42.$$

□□□□□: $x\approx 42$.

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1. □□□ Y□ □□□□□□□□□□□ □□□□□ □□□□ □□□□□□□□. □□□□□□ □□=□ □ □□□ □□= a □□□□□, □□□□ □□□□□□□ □□□□□ □□□□□□□.

□□□□□. $x=\dfrac{ac}{a+c}$.

2. Y□ □□□□□□□□□□□ □□□□□□□□□□ 10□□, □□ □□□ □□□□□ 3□□^{2} □□□□□□□. □□□□□ 12□□^{2} □□□□□ □□□ □□□□□ Y□ □□□□□□□□□□□ □□□□□□□□□□ □□□□□□□ . □□□□□. 20□□.

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4. □□□ □□□□□□□□□ □□□□□□□□□ □□□□□□□□ □□□□□□□ □□ң □□□□□□□□□□□ ү□ □□□□□□□□□□□ □□□□□□ □□□□□□□□□ □□□□□□□□□□□□□□□.

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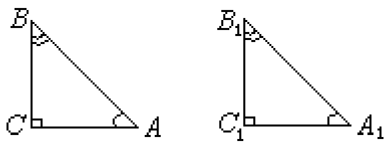
1. □□□ □□□ □□□ □□□□□□ □□ □□□□□□□ □□□ □□□ □ □□□□□□ ү□ □□□□□□□□□□□ □□□□□□ □□□□□□□□ (78-□□□□□□).

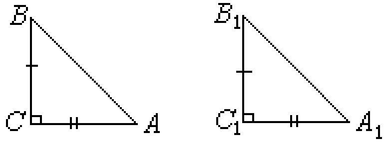
$$\angle A = \angle A_1, \ \angle B = \angle B_1$$



78–чийме

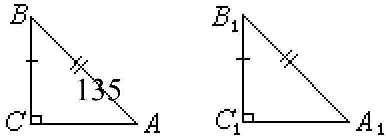
2. □□□□□□□□□□ □□□□□□□□□□□□□ □□□□□□□ □□□ □□□ □□ □□□□□□ ү□ □□□□□□□□□□□ □□□□□□ □□□□□□□□ (79-□□□□□□).

$$\frac{BC}{B_1C_1} = \frac{AC}{A_1C_1}$$



79–чийме

3. □□□□□□□□□□ □□□ □ □□□□□□□□□□□□□□□□ □□□□□□□□□□□□□ □□□□□□□ □□□ □□□ □□ □□□□□□ ү□ □□□□□□□□□□□ □□□□□□ □□□□□□□□ (80-□□□□□□).



80–чийме

$$\frac{BC}{B_1C_1} = \frac{AB}{A_1B_1}$$

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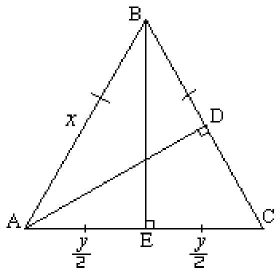

81-чийме

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□□□□□, $\frac{BE}{AD}=\frac{AB}{AC}$; $\frac{10}{12}=\frac{x}{y}$; $x=\frac{5}{6}y$. (□)

ΔABE □□□ □□□□□□□ Y□ □□□□□□□□ □□□ □□□□□□□

□□□□□□□□□□ □□□□□□□□□, □□□ □ □Ө□ Ө□□Y□Y □□□□□:

$$x^2 = 10^2 + \left(\frac{1}{2}y\right)^2 \qquad (□)$$

□□□ (□) □□□ □ (□) □□□□□□□□ □□□□□□□□ □Ө□ Ө□□Y□Y

□□□□□:

$$\left(\frac{5}{6}y\right)^2 = 10^2 + \left(\frac{1}{2}y\right)^2, \qquad \frac{25}{36}y^2 = 100 + \frac{1}{4}y^2,$$

$$16y^2 = 3600, \quad y = 15, \quad x = 12{,}5,$$

□□□□□, □□=12,5 □□.

□□□□□ YY□Y □□□□

$$s = \frac{1}{2}\cdot 15\cdot 10 = 75,$$

□□□□□. 75 (□□ ^{2}).

2-□ □□□□□. ABCD –□□□ □ □□□□□□. □□=4□□ □□□□ $\angle BCD = 60^0$ □□□□□□. □□ □□ □□□ □□□□□ □□□□□□ □□ □□□□□□

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ѳ□ѳ□. □□□□□□ MR=2□□ □□□□□, □□□□ □□= RD

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□□□□□ □□□□□. □□□□ □ ΔAOD □□□□ ΔAKR ү□
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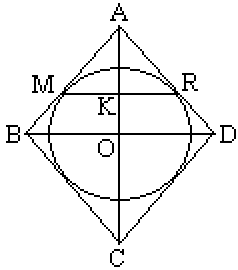

82-чийме

1) $OD = \frac{1}{2} AD = 2см$,

2) □□=□ R=1 □□,

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$$\frac{AD}{AR} = \frac{OD}{KR}$$

□.□. $\frac{4}{4-x} = \frac{2}{1}$, $x = 2$.

□□□□□, $MB = RD = 2\,см$.

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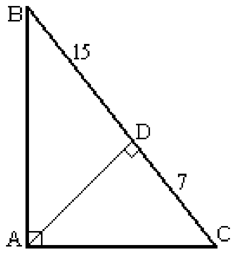

83-чийме

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1-□ □□□. □□□□ □ ΔABC □□□□ ΔADC □□□ □□□ □□□□ ү□ □□□□□□□□□□□ □□□□□ 83-□□□□□□.

□□□□□, $\dfrac{BC}{AC} = \dfrac{AC}{DC}$ □□□□□.

$$\frac{22}{AC} = \frac{AC}{7}\ ;\ \ AC^2 = 22\cdot 7\ ;\ \ AC = \sqrt{154}\ .$$

□□□□□□□ □□□ ΔABC □ □□□ ΔADB □□□ □□□ □□□□ ү□ □□□□□□□□□□□ □□ □□□□□.

□□□□□, $\dfrac{BC}{AB} = \dfrac{AB}{BD}$ □□□□□.

$$\frac{22}{AB} = \frac{AB}{15}; \quad AB^2 = 22 \cdot 15; \quad AB = \sqrt{330}\ □□.$$

2-□ □□□. □□□ □□□□□□□ Ү□ □□□□□□□□□□□ □□□ □□□□□□□□□

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□□□□□□, $AD^2 = DC^2 \cdot BD^2$ □.□. $AD^2 = 7^2 \cdot 15^2$, $AD = 105$.

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□□□□□□, $AC^2 = BC \cdot DC$ □.□. $AC^2 = 22 \cdot 7$, $AC = \sqrt{154}$ □□,

□□□□□ $AB^2 = BC \cdot BD$ □.□. $AB^2 = 22 \cdot 15$, $AB = \sqrt{330}$ □□,

4-□ □□□□□□. ΔABC □□ң □□□□□□□□□□□ □□□ □□□□□□□□□□□□□□ □□□□□ □□□□□ 5 □□ □□□□□ 6 □□ □□ □□□□□□□□. Ү□ □□□□□□□□□□□ □□ □□□□□□□ □□ □□□□□□□□□□□ □□□□□□□□.

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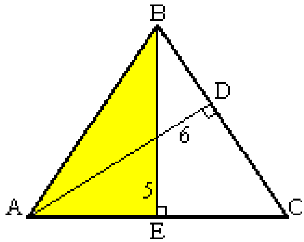

84-чийме

□□□□□, $\dfrac{AB}{AC} = \dfrac{BE}{AD}$ □□□□□

$$\frac{AB}{2AE} = \frac{5}{6}; \quad AB = \frac{10AE}{6};$$

ΔAEB □□□ □□□□□□□ ү□ □□□□□□□□□□ □□□□□□□□ □□ □□□□□□□□□□ □□□□□□□□□□:

$$AB^2 = AE^2 + BE^2, \quad AB^2 = AE^2 + 25;$$

$$\left(\frac{5AE}{3}\right)^2 = AE^2 + 25; \quad 25AE^2 = 9AE^2 + 225; \quad AE = \frac{15}{4},$$

□□□□□, $AC = 7{,}5\,см$. □ □□□□□ $AB = \sqrt{\dfrac{225}{16} + 25} = 6{,}25\,см$,

$$AB = 6{,}25\,см$$

□□□□□. $7{,}5\,см$, $6{,}25\,см$.

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□□□□□. m, $m\sqrt{3}$, $2m$.

2. □□□ □□□□□□□ Y□ □□□□□□□□□□ □□□□□□□□□□□□□□

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□□□□□. 60^0, 30^0.

3. □□□□□□□□□□□ □□□□□□ □□□□□□ □□□ □□□□□, □□□□□□□□□□□□

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□□□□□. 42□□, 56□□.

4. □□□ □□□□□□□ ү□ □□□□□□□□□□□ □□□ □□□□□□ 10□□, □□□ □□□□□ □□□□□□□□ □□□□□□□□□□ □□□□□□□ 3□□ □□□□□, □□□□ □□□ □□□□□□□ □□□□□□□□ □□□□□□□□□ □ □□□□□□□ □□□□□□□.

□□□□□. $\frac{29}{4} см$.

9-§. Ү□ □□□□□□□□□□□□ □ □□□□□□□□□ □ □□□□□ □□□.

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$$\angle A + \angle B + \angle C = 180^0$$

$$\angle A + \angle B = 90^0$$

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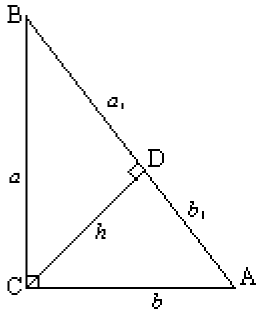
[illegible]. [illegible] γ[illegible] [illegible]



85-чийме

[illegible] – [illegible], [illegible] – [illegible]

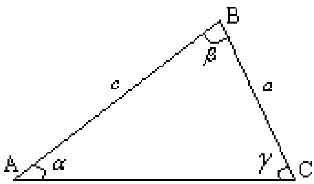
[illegible]. (85-[illegible]).

$$h^2 = a_1 b_1, \quad a^2 = c a_1, \quad b^2 = c b_1$$

[illegible] ([illegible]). [illegible] γ[illegible] [illegible] (85-[illegible]) .

$$AB^2 = BC^2 + AC^2 \quad [illegible] \quad c^2 = a^2 + b^2$$

[illegible]. γ[illegible] [illegible]



86-чийме

[illegible] θ[illegible]θ[illegible]γ[illegible]γ[illegible]γ[illegible]θ

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$$a^2 = b^2 + c^2 - 2bc \cdot \cos\alpha$$
$$b^2 = a^2 + c^2 - 2ac \cdot \cos\beta$$
$$c^2 = a^2 + b^2 - 2ab \cdot \cos\gamma$$

1-□ □□□□□□. □□□ □□□□□□□□ ү□ □□□□□□□□□□□ □□□ □□□□□□□□□

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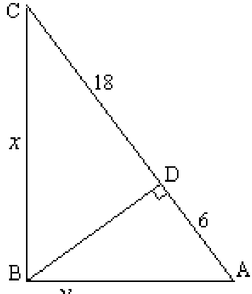
□□□□□□ □□□□□□. □□□□□□□□□□□ $c = 6 + 18 = 24$ □□□□□□□. □□□□□ □□□□□□□□□□ □□□□□□□□□□ □ □□□ □□□□□□□□□



87-чийме

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□□ □□□□□ □□ (87-□□□ □□).

□□□□□, $a = \sqrt{6 \cdot 24} = 12$,

$$b = \sqrt{18 \cdot 24} = 12\sqrt{3}.$$

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$$S = \frac{1}{2}ab = \frac{1}{2} \cdot 12 \cdot 12\sqrt{3} = 72\sqrt{3},$$

□□□□□. $S = 72\sqrt{3}\ см^2$.

2-□ □□□□□. Ү□ □□□ □□□□□□□□ □ □□□□□□ 8□□, 10□□ □□□ □ 13□□. □□□ ү□ □□□ □□□□ □□□ □□□□□□□□□, □□□ □□□□□□□□□ □□ □□ң □□□□□□□□□?

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$$13^2 = 8^2 + 10^2; \quad 169 > 64 + 100;$$

□□□□□, $169 > 164$. □ □□ □□□□□ү□ □□□□□□□□□□ □□ң □□□□□ □□ □□□□□□□□ □□□□□□ □□□ □ □□□□□□ □□□□□ □□□□□□□□□□ □□□□ □□□□□□ □□ң □□□□ □.□. ү□ □□□□□□□ □□□□ □□□□□□□ □□□□ □.□. □□ң □□□□□□□ □□□□□□□□□ □□□□□□□□.

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3-□ □□□□□. □ □□□□□□ 12 □□□ □ 8 □□ □□□ □□ң □□□□□ 135^0 □□□□□□ □□□□□□□□□□□□□ □□ □□ □□□□□□□□□□ □□□□□ □□□□ □□ □□□□□□ □□□□ □□□.

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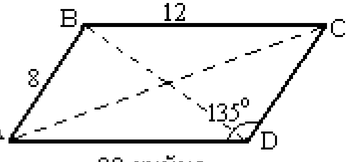


88-чийме

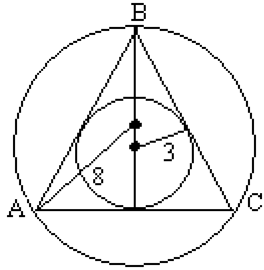
□□□□□□□□□ □□□□□□ҮҮ □Ү□□Ө 12

□□□□ 8 □□ □□□□□ □□□□□ □□ □□□Ү□ □□□□□□□□□□ □ □□□□□□ □□□□□ □□□□□□□□□ 88-□□□□□.
□□□□□□□□□□□ □□□□ □□□□ 135^0 □□□ □□□□, □□□□□□□□ 45^0 □□□□□□ □□ □□□□□□□ □ □□□□.

□□□□ □□: $d_{12}^2 = 144 + 64 \mp 2 \cdot 12 \cdot 8 \frac{\sqrt{2}}{2} = 208 \mp 96\sqrt{2}$.

□□□□□□ □□□□□□□□□ $d_1 \approx 8,5$, □□ң □□□□□□□□□ $d_2 \approx 18,5$.

4-□ □□□□□. □□ң □□□□□□□ □□ Ү□ □□□□□□□□□ □□□□□ □ □□□ □□ □□□□□ □□□□□□□□ □□□□□□□ □□□□□ □□□□□□□□□



89-чийме

□□□□□□ҮҮ □Ү□□Ө $r = 3$ □□□□ $R = 8$

□□□□□, □□□□ □□□□ □ □□□□□□□□□ □□□□□□ □□□□□□ □□□□□□□ (89-□□□□□) .

[illegible]:

$$r = \frac{S}{p}, \qquad R = \frac{abc}{4S}. \qquad (1)$$

[illegible] m, [illegible] n [illegible]

$$S = \frac{1}{2} n \sqrt{m^2 - \frac{n^2}{4}}$$

[illegible].

[illegible] $p = m + \frac{n}{2}$, $abc = m^2 n$ [illegible] (1)

[illegible]:

$$r = \frac{n\sqrt{4m^2 - n^2}}{2(2m+n)}, \qquad R = \frac{m^2}{\sqrt{4m^2 - n^2}},$$

$$\frac{r}{R} = \frac{\dfrac{n\sqrt{4m^2 - n^2}}{2(2m+n)}}{\dfrac{m^2}{\sqrt{4m^2 - n^2}}} = \frac{n(4m^2 - n^2)}{2m^2(2m+n)} = \frac{n(2m-n)}{2m^2} = \frac{n}{m} - \frac{1}{2}\left(\frac{n}{m}\right)^2,$$

[illegible]. $\frac{r}{R} = \frac{n}{m} - \frac{1}{2}\left(\frac{n}{m}\right)^2$,

$$\left(\frac{n}{m}\right)^2 - 2\frac{n}{m} + 2\frac{r}{R} = 0,$$

[illegible]:

$$\frac{n}{m} = 1 \pm \sqrt{1 - \frac{2r}{R}} = 1 \pm \sqrt{1 - \frac{2 \cdot 3}{8}} = 1 \pm \frac{1}{2},$$

$$n_1 = \frac{3}{2} m_1, \qquad n_2 = \frac{1}{2} m_2.$$

[illegible] r [illegible] R [illegible]

$\frac{3m}{2}$ [illegible] $\frac{m}{2}$ [illegible]:

[illegible]: 1) $m_1 = 4\sqrt{7}$, $n_1 = 6\sqrt{7}$,

2) $m_2 = 4\sqrt{15}$, $n_2 = 2\sqrt{15}$.

[illegible]

1. [illegible]

[illegible] 24[illegible], 28[illegible] [illegible]

56[illegible] [illegible]. [illegible]: 26[illegible], 30[illegible].

2. [illegible] 2:3 [illegible].

[illegible]. $\sqrt{3/5}$

3. [illegible] $a = 10$, $c = 6$ [illegible] $m_b = 7$. [illegible].

[illegible]. $\sqrt{76}$.

4. [illegible] $b = 5$, $c = 5$ [illegible] $\alpha = 30^0$ [illegible].

[illegible]. $\sqrt{41 - 20\sqrt{3}}$; $\dfrac{10}{9 + \sqrt{41 - 20\sqrt{3}}}$.

1. [illegible]

[illegible]

[illegible],

$$\frac{a}{\sin A} = \frac{b}{\sin B} = \frac{c}{\sin C} = 2R \, .$$

[illegible]. Y[illegible]

$s = \frac{1}{2} b \cdot c \sin A$ [illegible], [illegible]

$$\sin A = \frac{2s}{bc}, \text{ [illegible] } \frac{a}{\sin A} = \frac{a}{\frac{2s}{bc}} = \frac{abc}{2s} \qquad (1)$$

[illegible] $a, b, c -$ [illegible], $s -$ [illegible]. [illegible], [illegible]. [illegible]:

$$\frac{b}{\sin B} = \frac{abc}{2s} \qquad (2)$$

$$\frac{c}{\sin C} = \frac{abc}{2s} \qquad (3)$$

[illegible] (1), (2) [illegible] (3) [illegible]

[illegible]:

$$\frac{a}{\sin A} = \frac{b}{\sin B} = \frac{c}{\sin C}.$$

[illegible] (598-660-[illegible]) [illegible]. [illegible]

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$$\frac{a}{\sin\alpha} = \frac{b}{\sin\beta} = \frac{c}{\sin\gamma}$$

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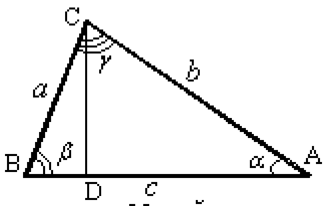
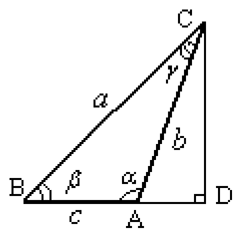


90-чийме



91-чийме

□ □□□□□□□□□□ CD □□□□□□□□□□ □Y□ Y□ө□Y□. □□ D □□□ □□□□□□□□ Y□ □□□□□□□□□□□□□, □□□□□□□ α □□□□□□□ □□□ □□□□□□, □□□□ □

$$CD = b\sin\alpha$$

[illegible]. [illegible] α [illegible], [illegible]

$$CD = b\sin(180^0 - \alpha) = b\sin\alpha$$

[illegible]. [illegible] D [illegible]

$$CD = b\sin\beta$$ [illegible].

[illegible]

$$a\sin\beta = b\sin\alpha$$ [illegible].

[illegible]

$$\frac{a}{\sin\alpha} = \frac{b}{\sin\beta}.$$

[illegible]

[illegible]:

$$\frac{b}{\sin\beta} = \frac{c}{\sin\gamma}.$$

[illegible]

[illegible].

1-[illegible]. [illegible] $\angle A$, $\angle B$ [illegible] a [illegible].

[illegible]: [illegible] a [illegible] $\angle A$, $\angle B$ [illegible]. [illegible] $\angle C - ?$, $b - ?$, $c - ?$.

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1) $\angle C = 180^0 - (\angle A + \angle B)$.

2) $b = ?$ □□□□□□□□ □□□□□□□□□□□ □□□□□□□□□□□:

$$\frac{a}{\sin A} = \frac{b}{\sin B}, \qquad b = \frac{a\sin B}{\sin A}$$

3) $c = ?$ $\qquad \dfrac{a}{\sin A} = \dfrac{c}{\sin C}, \qquad c = \dfrac{a\sin C}{\sin A}$

2-□ □□□□□. Y□ □□□□□□□□□□ □□□ □ □□□ 5□□, □□□ □□□□□□□□ □□□□ 30^0 □□ □□□ □□□□□□□□ 45^0 □□ □□□□□□□ □□□□□, Y□Y□□Y □□□□□□ □ □□□ □□□□□□ □□□ □ □□□□□□ □□□□□□□□□□□□ □□□□□□ □.

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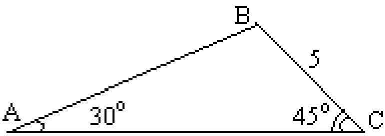

92-чийме

$$\frac{5}{\sin 30^0} = \frac{AB}{\sin 45^0} = \frac{AC}{\sin\beta} .$$

1) □□□□ □□,

$$\frac{5}{\sin 30^0} = \frac{AB}{\sin 45^0}; \qquad \frac{5}{\frac{1}{2}} = \frac{AB}{\frac{\sqrt{2}}{2}}; \qquad \frac{10}{1} = \frac{2AB}{\sqrt{2}};$$

$2AB = 10\sqrt{2}$;

$AB = 5\sqrt{2}$.

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2) $\beta = 180^0 - (30^0 + 45^0) = 105^0$, □.□. $\beta = 105^0$.

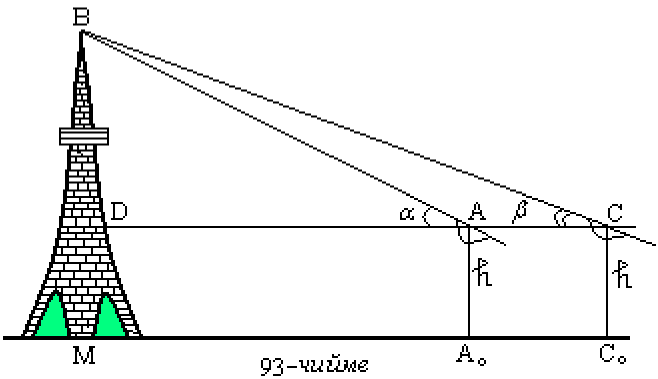
$$\sin 105^0 = \sin(90^0 + 15^0) = \cos 15^0 = \cos(45^0 - 30^0) =$$

$$= \frac{\sqrt{2}}{2}\cdot\frac{\sqrt{3}}{2} + \frac{\sqrt{2}}{2}\cdot\frac{1}{2} = \frac{\sqrt{6}}{4} + \frac{\sqrt{2}}{4} .$$

3) $\dfrac{5}{\sin 30^0} = \dfrac{AC}{\dfrac{\sqrt{6}}{4} + \dfrac{\sqrt{2}}{4}}$; $5 \cdot (\dfrac{\sqrt{6}}{4} + \dfrac{\sqrt{2}}{4}) = \dfrac{1}{2} \cdot AC$;

$10 \cdot (\dfrac{\sqrt{6}}{4} + \dfrac{\sqrt{2}}{4}) = AC$.

3-



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[illegible]

[illegible]

[illegible]:

[illegible] . [illegible] A_0 [illegible] C_0 [illegible]. A_0 [illegible] C_0 [illegible], [illegible] $|A_0C_0| = b$. [illegible] $\angle BAD = \alpha$ [illegible] $\angle BCD = \beta$ [illegible]. [illegible] $A \in (CD)$, $\left((CD) \parallel (A_0C_0)\right)$. [illegible]:

$$|AB| = \frac{|AC|\sin\beta}{\sin\hat{B}} = \frac{b\cdot\sin\beta}{\sin(\alpha-\beta)}.$$

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$$|BD| = |AB|\sin\alpha \,.$$

□□□□ □□,

$$|BD| = \frac{b\sin\alpha \cdot \sin\beta}{\sin(\alpha - \beta)} \,.$$

□□ □□□ $|BM| = |BD| + h$, □□□□□□ □□□□ □□□□□, □□□□

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$$|BM| = \frac{b\sin\alpha \cdot \sin\beta}{\sin(\alpha - \beta)} + h \,.$$

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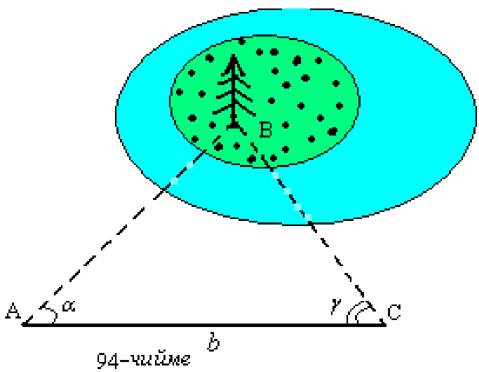

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□□□□□ □ □□□ A_1C_1 □□□□□□□□□□□ □ □□□ $\angle A_1 \cong \angle A$,

$\angle C_1 \cong \angle C$ □□□□□ □□□□□□. □□□□□□□ ΔABC Ү□
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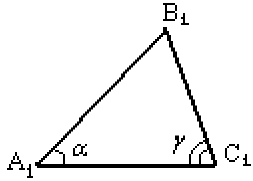

□□□□□□□□□□□, $|AB| : |A_1B_1| = |AC| : |A_1C_1|$.

□□ □ □□□□□□□□□□□□□□ $|AB| = \dfrac{|AC| \cdot |A_1B_1|}{|A_1C_1|}$ □□□□□□□□.

[illegible]

[illegible] Y Y [illegible] ϴ [illegible]. [illegible] $|AC| = b$, [illegible]

$\angle BAC = \alpha$, $\angle BCA = \gamma$ [illegible]. [illegible]

$$|AB| = \frac{|AC| \cdot \sin\gamma}{\sin \hat{B}} = \frac{b \cdot \sin\gamma}{\sin(180^0 - (\alpha + \gamma))} = \frac{b \cdot \sin\gamma}{\sin(\alpha + \gamma)}.$$

2. [illegible]

Y [illegible], [illegible] –[illegible] [illegible]-[illegible] (973-1048) [illegible].

Y [illegible] YY [illegible]

$$a^2 = b^2 + c^2 - 2b \cdot c \cdot \cos A$$

[illegible]:

$$\cos A = \frac{b^2 + c^2 - a^2}{2bc}.$$

[illegible]. Y [illegible], [illegible]

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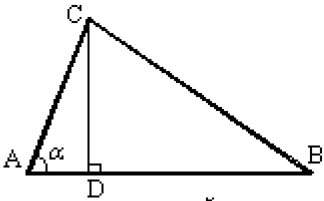
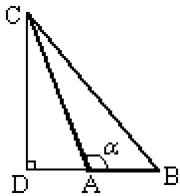


95-чийме



96-чийме

$BC^2 = AB^2 + AC^2 - 2AB \cdot AC \cdot \cos A$

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$\overline{BC} = \overline{AC} - \overline{AB}$ [illegible]. [illegible]

[illegible] ү [illegible] ө [illegible] ө ө ү [illegible]

ө ө ү ү [illegible]:

$$\overline{BC}^2 = (\overline{AC} - \overline{AB})^2 = \overline{AC}^2 + \overline{AB}^2 - 2 \cdot \overline{AB} \cdot \overline{AC}$$

$$\overline{BC}^2 = \overline{AC}^2 + \overline{AB}^2 - 2 \cdot \overline{AB} \cdot \overline{AC} \cdot$$

[illegible]

$$BC^2 = AB^2 + AC^2 - 2AB \cdot AC \cdot \cos A.$$

1-[illegible]. Ү [illegible] $a = 10$ [illegible], $b = 8$ [illegible] 60^0 [illegible]. [illegible] ү ү ү [illegible].

[illegible]. 1) [illegible] ү [illegible] ү ү ү [illegible]:

$$c^2 = a^2 + b^2 - 2a \cdot b \cdot \cos\alpha$$

$$c^2 = 8^2 + 10^2 - 2 \cdot 8 \cdot 10 \cdot \cos 60^0 = 64 + 100 - 80 = 84$$

$$c = 2\sqrt{21}$$ [illegible].

2) [illegible] ү [illegible]:

$$\frac{10}{\sin\alpha} = \frac{8}{\sin 60^0} = \frac{2\sqrt{21}}{\sin\gamma};$$

$$\frac{10}{\sin\alpha} = \frac{8}{\frac{\sqrt{3}}{2}}; \qquad \sin\alpha = \frac{5\sqrt{3}}{8}; \qquad \alpha = \arcsin\frac{5\sqrt{3}}{8}.$$

$$\frac{8}{\frac{\sqrt{3}}{2}} = \frac{2\sqrt{21}}{\sin\gamma}; \qquad \sin\gamma = \frac{3\sqrt{7}}{4}; \qquad \gamma = \arcsin\frac{3\sqrt{7}}{4}.$$

2-□ □□□□□. □ □□□□□□□ a, b □□□□ □□□□ □□□□ □□□□□□□□□□□ □ $\angle C$ □□□□□□ □□□□□□□ ү□ □□□□□□□□□□ □□□□□□□□.

□□□□□□□□: ү□ □□□□□□□□□□□□ a, b □□□□□□□□ □□□□□ $\angle C$ - □□□□□□, □□□□□□ □□□□□□ $\angle A$, $\angle B$ -?, c – ?.

□□□□□□ □□□□□□. 1) $c = ?$. □□□□□□□□□□□ □□□□□□□□□□□□□□ $c^2 = a^2 + b^2 - 2ab\cos C$ □□□□□ □□□□□□□□□□ □□□□□□□□□□□□

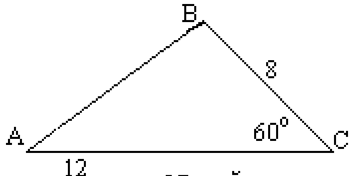
□ө□ ө□□ү□ү □□□□□□□:

$$c = \sqrt{a^2 + b^2 - 2ab\cos C}$$

2) $\angle A = ?$ □□□□□□□□□□□□ □□□□□□□□□□□□□□□□ □□□□□□□
$$a^2 = b^2 + c^2 - 2bc\cos A,$$ □□□□ □□□□ □□□□

$$\cos A = \frac{b^2 + c^2 - a^2}{2bc}$$ □ □□□□ $$\angle A = \arccos\frac{b^2 + c^2 - a^2}{2bc}$$

Ү□ □□□□□□□□□□□□□ □□□□□ □□□□□□□□□□□□□□□ □□□□□□□□□□□ □□□□□□□□□□□, □□□□□ ү□ү□□ү □□□□□□□□ □□□□□ □□□□□□□:



97-чийме

3) $\angle B = ?$

$\angle B = 180^0 - (\angle A + \angle C)$.

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[illegible].

1) Y[illegible] Y[illegible]Y[illegible]Y [illegible] YY [illegible]:

$$AB^2 = 12^2 + 8^2 - 2 \cdot 12 \cdot 8 \cdot \cos 60^0 =$$

$$= 144 + 64 - 96 = 112\,, \quad AB = 4\sqrt{7}\,.$$

2) [illegible]:

$$\frac{12}{\sin\beta} = \frac{8}{\sin\alpha} = \frac{4\sqrt{7}}{\sin 60^0}\,.$$

[illegible] $\dfrac{8}{\sin\alpha} = \dfrac{4\sqrt{7}}{\sin 60^0}$; $\quad \dfrac{8}{\sin\alpha} = \dfrac{4\sqrt{7}}{\frac{\sqrt{3}}{2}}$; $\quad \dfrac{8}{\sin\alpha} = \dfrac{8\sqrt{7}}{\sqrt{3}}$;

$$8\sqrt{3} = 8\sqrt{7}\sin\alpha\;; \quad \sin\alpha = \frac{\sqrt{3}}{\sqrt{7}}\;; \quad \alpha = \arcsin\sqrt{\frac{3}{7}}\,.$$

3) $\dfrac{12}{\sin\beta} = \dfrac{4\sqrt{7}}{\sin 60^0}$; $\quad \dfrac{12}{\sin\beta} = \dfrac{8\sqrt{7}}{\sqrt{3}}$; $\quad \sin\beta = \dfrac{12\sqrt{3}}{8\sqrt{7}}$

;

$$\sin\beta = \frac{3}{2}\sqrt{\frac{3}{7}}\;; \quad \beta = \arcsin\frac{3}{2}\sqrt{\frac{3}{7}}\,.$$

Y[illegible]

1. [illegible] Y[illegible] [illegible] Y[illegible] [illegible]

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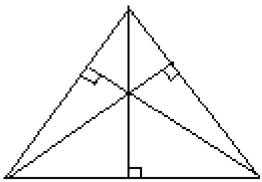
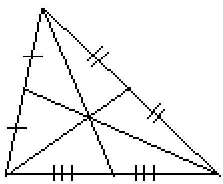
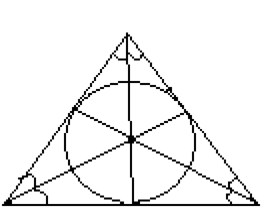


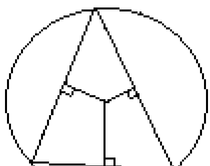
98 a-чизма



98 b-чизма



98 г-чизма



98 д-чизма

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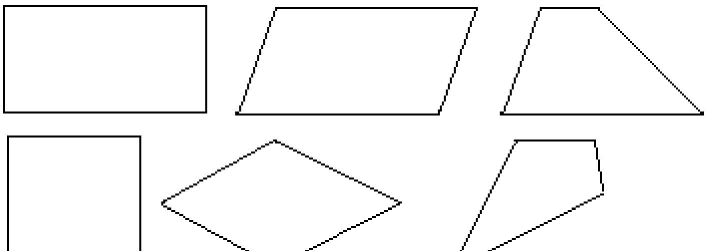

1-чийме

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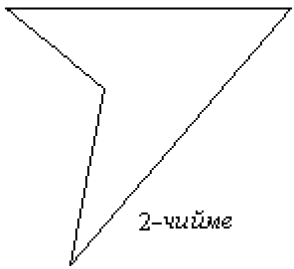

2-чийме

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[illegible] -

[illegible]. [illegible] [illegible]. [illegible]:

-4 [illegible]: [illegible], [illegible], [illegible] D, D[illegible];

-4 [illegible]: $\angle A$, $\angle B$, $\angle C$, $\angle D$;

-2 [illegible]: [illegible] D, [illegible];

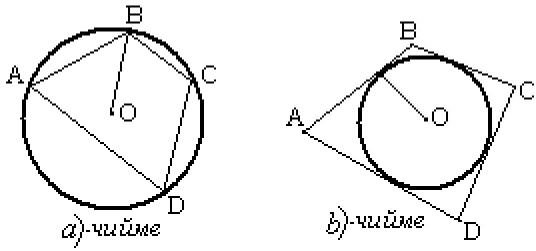
- S [illegible];

-[illegible] 360^0 [illegible].

[illegible]

[illegible], [illegible]

[illegible]



a)-чийме b)-чийме

[illegible]

$\angle A + \angle C = \angle B + \angle D = 180^0$ [illegible]

$$|AC| \cdot |BD| = |AB| \cdot |CD| + |AD| \cdot |BC| .$$

[illegible]

[illegible], [illegible]

[illegible], [illegible]

[illegible].

[illegible]

[illegible] $|AB| + |DC| = |BC| + |AD|$ [illegible]

[illegible] γγ. [illegible]

[illegible] (b) – [illegible]) .

[illegible].

[illegible].

[illegible]:

1) [illegible].

2) [illegible].

1. [illegible]

D

DC, D -

$\angle A = \angle BAD = \angle DAB$, $\angle B = \angle ABC = \angle CBA$,

$\angle C = \angle BCD = \angle DCB$ □□□□ $\angle D = \angle ADC = \angle CDA$ □□□□□□□

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$$S = \sqrt{(p-a)(p-b)(p-c)(p-d)}$$

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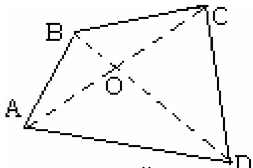

3-чийме

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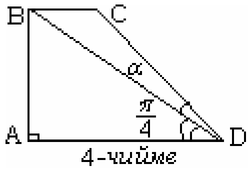
[illegible] $\frac{\pi}{4}$, [illegible] $BC = 1$, $BD = 5$. [illegible]

[illegible].

[illegible]. $\angle BDC = \alpha$ [illegible].



[illegible] 360^0 [illegible]ҮҮ

[illegible] $\angle C = \frac{3\pi}{4}$ (4-[illegible]).

ΔBDC ү[illegible] α [illegible]:

$$\frac{BC}{\sin\alpha} = \frac{BD}{\sin C} \Rightarrow \frac{1}{\sin\alpha} = \frac{5}{\frac{\sqrt{2}}{2}} \Rightarrow \alpha = \arcsin\frac{\sqrt{2}}{10}.$$

ΔBDC ү[illegible]: $\angle DBC = \frac{\pi}{4} - \arcsin\frac{\sqrt{2}}{10}$,

ΔABD ү[illegible]: $\angle ADB = \frac{\pi}{4} - \arcsin\frac{\sqrt{2}}{10}$,

$\angle ADB$ □□□ □□□□□□□ ү□ □□□□□□□□□□□ □ө□ө□□ү□ү □□□□□□:

$$AD = 5\cos\left(\frac{\pi}{4} - \arcsin\frac{\sqrt{2}}{10}\right) =$$

$$= 5\left[\cos\frac{\pi}{4}\cos\left(\arcsin\frac{\sqrt{2}}{10}\right) + \sin\frac{\pi}{4}\sin\left(\arcsin\frac{\sqrt{2}}{10}\right)\right] =$$

$$= 5\left[\frac{\sqrt{2}}{2}\sqrt{\frac{98}{100}} + \frac{\sqrt{2}}{2}\cdot\frac{\sqrt{2}}{10}\right] = 4.$$

$$AB = \sqrt{BD^2 - AD^2} = \sqrt{5^2 - 4^2} = 3.$$

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□□□□□□□□ □□□□□□□□. AD □□□□ BC –□□□□ □□□□□□□□□, □□ – □□□□□□□□□.

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$$S_{mp} = \frac{BC + AD}{2}\cdot AB = \frac{1+4}{2}\cdot 3 = 7{,}5$$

□□□□□: $S_{mp} = 7{,}5$.

2. □□ □ □□□□□□□.

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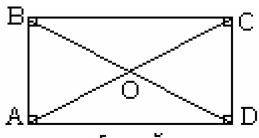

5-чийме

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$\angle A = \angle BAD = \angle DAB$, $\angle B = \angle ABC = \angle CBA$,
$\angle C = \angle BCD = \angle DCB$ □ □□□□ $\angle D = \angle ADC = \angle CDA$ □□□□
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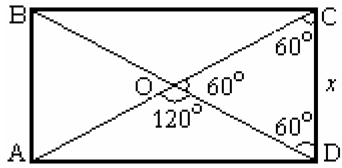
$S = a \cdot b$, $a = AD$ □□□□□□, $b = AB$ – □□□□□□□ (3-□□□□□□).

1-□ □□□□□ □. □□□ □□□□□□□□□□□ □□□□□□ $9см^2$ □□□□□□□□. □□□□ □□□□□□□□□ □□□□□ □□□□□ □□ □□□□□□ □□□□□□ □□□□□□□□□□□□ □□□□□□□ □□ҥ□□□□ 120^0 □□□□□□□□. □□ □ □□□□□□□□□□□□ □□ □□□□□□□□□ □□□□□□□□□ □□□□□□□□.



6-чийме

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$$y^2 = x^2 + x^2 - 2xy\cos 120^0.$$

$$y^2 = 2x^2 + 2xy \cdot \frac{1}{2}, \qquad y^2 = 3x^2.$$

□□□□□□, $y = \dfrac{9}{x}$ □□□□□□, □□□□ $\dfrac{81}{x^2} = 3x^2$, $x^4 = 27$, $x = \sqrt[4]{27}$.

$y^2 = 3 \cdot \left(\sqrt[4]{27}\right)^2$, $y = 3 \cdot \sqrt[4]{27}$.

□□□□□□: $x = \sqrt[4]{27}$ □□; $y = 3 \cdot \sqrt[4]{27}$ □□.

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$$2xy = \pi R^2 \qquad (1)$$

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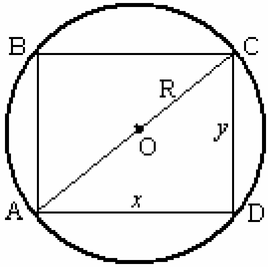

7-чийме

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$$x^2 + y^2 = (2R)^2,$$

$$x^2 + y^2 = 4R^2 \qquad (2)$$

□□□□ □□ (1) □□□□□ (2) □□□□□□□□□ □□□□□□ □Ү□Ө□Ө□

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$$(x+y)^2=(4+\pi)R^2$$
$$x+y=\pm R\sqrt{4+\pi}\,,$$
$$x=\pm R\sqrt{4+\pi}-y\,,$$
$$x=R\sqrt{4+\pi}-y \qquad (3)$$

[illegible]. [illegible] [illegible] (3) [illegible] [illegible] (1) [illegible] [illegible]ѳ[illegible]ѳ[illegible]ү[illegible]ү

[illegible] [illegible]:

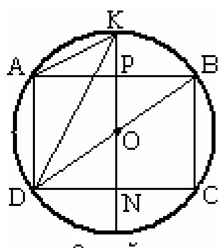
$$2y\left(R\sqrt{4+\pi}-y\right)=\pi R^2$$
$$2y^2-2R\sqrt{4+\pi}\,y+\pi R^2=0\,,$$
$$y_{1,2}=\frac{2R\sqrt{4+\pi}\pm\sqrt{4R^2(4+\pi)-8\pi R^2}}{4}=\frac{R\sqrt{4+\pi}\pm R\sqrt{4-\pi}}{2}.$$
$$y_{1,2}=\frac{R}{2}(\sqrt{4+\pi}\pm\sqrt{4-\pi}). \qquad (4)$$

[illegible] (4) [illegible] [illegible] (3) [illegible] [illegible].

$$x=R\sqrt{4+\pi}-\frac{R}{2}(\sqrt{4+\pi}\pm\sqrt{4-\pi})=$$
$$x=\frac{R}{2}(\sqrt{4+\pi}\pm\sqrt{4-\pi})\,.$$

[illegible]: $\frac{R}{2}(\sqrt{4+\pi}\pm\sqrt{4-\pi})\,.$

3-[illegible] [illegible]. [illegible] [illegible] [illegible] [illegible] 24[illegible] [illegible] 7[illegible] [illegible] [illegible] [illegible] [illegible] [illegible]. [illegible]



8-чизма

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$$BD = \sqrt{24^2 + 7^2} = \sqrt{625} = 25,$$

$BD = 25$ □□.

□□□□□,

$R = 12{,}5$ □□. $OP = 3{,}5$ □□. $KP = 12{,}5 - 3{,}5 = 9$, $KP = 9$ □□.

ΔAPK: $AK = \sqrt{12^2 + 9^2} = \sqrt{225} = 15$, $AK = 15$ □□.

ΔKND: $DK = \sqrt{16^2 + 12^2} = \sqrt{400} = 20$, $DK = 20$ □□.

□□□□□: 15□□, 20□□.

4-□ □□□□□. □□ □ □ □□□□□□ □□□□□ □□□ $\sqrt{2}$ □□ □□□□□□ □□□
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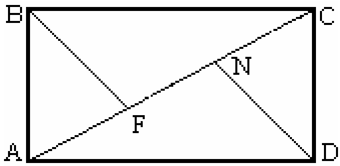
[illegible] [illegible] [illegible]Ө[illegible]Ү[illegible]Ө[illegible] (9-[illegible]). [illegible]

[illegible] [illegible] [illegible] [illegible] [illegible] [illegible].
[illegible] [illegible]. [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] y [illegible], [illegible] [illegible] [illegible]



9-чизма

[illegible]Ө[illegible]Ү[illegible]Ө[illegible]Ү[illegible] x [illegible] [illegible]

[illegible]. [illegible] ΔAFB [illegible] [illegible]Ү[illegible] [illegible]

$$BF = y^2 - x^2, \qquad (1)$$

[illegible] ΔBFC [illegible] [illegible]Ү[illegible] [illegible]

$$BF = 2 - 4x^2, \qquad (2)$$

[illegible]. [illegible] (1) [illegible] (2) [illegible] [illegible]

$$y^2 - x^2 = 2 - 4x^2, \quad x^2 = \frac{2 - y^2}{3} \qquad (3)$$

[illegible].
[illegible] ΔADC [illegible] [illegible]Ү[illegible] [illegible]

$$(3x)^2 = (\sqrt{2})^2 + y^2$$

$$9x^2 = 2 + y^2$$

$$x^2 = \frac{2}{9} + \frac{y^2}{9} \qquad (4)$$

(3) [illegible] (4) [illegible]

[illegible]:

$$\frac{2-y^2}{3}=\frac{2}{9}+\frac{y^2}{9}, \qquad 6-3y^2=2+y^2, \qquad y=1.$$

[illegible]: 1[illegible] .

[illegible]

1. [illegible] R=2 [illegible]. [illegible]. [illegible] . $(\sqrt{4+\pi}\pm\sqrt{4-\pi})$.

2. [illegible] 2[illegible] 4[illegible] [illegible]. [illegible]

[illegible]. [illegible]

[illegible]. [illegible]: $2,2 м^2$, $4 м^2$.

3. [illegible]

[illegible]. [illegible]

[illegible] 10[illegible], [illegible]. [illegible]: 60[illegible].

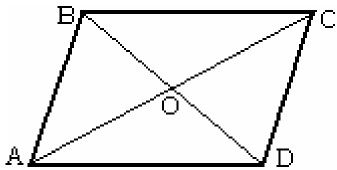
4. [illegible], [illegible] 4[illegible]. [illegible] 56[illegible]. [illegible]. [illegible]: 10[illegible] 18[illegible].

3. [illegible].

[illegible] 3. [illegible]

[illegible]

[illegible] (10-[illegible]).



10-чизма

[illegible] D [illegible].

[illegible]= DC, $AB \parallel DC$,

[illegible]=[illegible] D, $BC \parallel AD$

- [illegible].

$\angle A = \angle BAD = \angle DAB$, $\angle B = \angle ABC = \angle CBA$,

$\angle C = \angle BCD = \angle DCB$ [illegible] $\angle D = \angle ADC = \angle CDA$

[illegible].

[illegible]-[illegible].

[illegible] D –[illegible] ([illegible]=[illegible], [illegible]=[illegible] D).

[illegible] - [illegible].

[illegible]:

1) [illegible]-[illegible],
2) [illegible]-[illegible],
3) [illegible] 2d [illegible],

4)

5)

1) $S = a \cdot h_a$, a – ..., h_a – ...

2) $S = a\cdot b\cdot \sin\beta$, a,b – □ □□□□□□, β – □ □□□□□□□□□□ □□□□□□□ □□□ □□ □□□.

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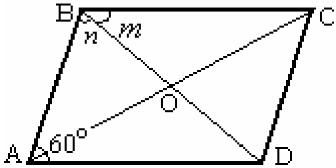

11-чийме

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$\angle A = 60^0$ □□□□□□ (11-□□□□□) . □□□□□□□□ □ө□□ө□ □□□□□□ n

□□□□ m □□□ □□□□ □□□□□□□□□□. □□□ □ $\dfrac{n}{m} = \dfrac{1}{3}$, $n = \dfrac{1}{3}m$

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$$n + m = 120^0 .\quad m = 120^0 - n ,\quad n = \frac{1}{3}(120^0 - n) = 40^0 - \frac{1}{3}n ,$$

$$n = 30^0 ,\quad m = 90^0 .\quad 2a + 2b = 90 ,\quad a = 45 - b .$$

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$$AB^2 = BD^2 + AD^2 ,\quad a^2 = BD^2 + b^2 ,\quad BD^2 = b^2 - a^2 ,$$

$$BD^2 = b^2 - (45 - b)^2 = -2025 + 90b .$$

$$BD^2 = -2025 + 90b ,$$

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$$AC^2 = AD^2 + DC^2 - 2AD \cdot DC \cdot \cos 120^0 = a^2 + b^2 - 2ab \cdot (-\frac{1}{2}) =$$
$$= a^2 + b^2 + ab.$$

$$AC^2 = a^2 + b^2 + ab.$$

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$$AC^2 + BD^2 = 2(AB^2 + BC^2)$$
$$a^2 + b^2 + ab - 2025 + 90b = 2(a^2 + b^2)$$
$$-a^2 - b^2 + ab - 2025 + 90b = 0$$

□□□ $a = 45 - b$ □□□□□□□□□ □□□□ □□□□□, □□□□

$$(45-b)^2 + b^2 - b(45-b) + 2025 - 90b = 0$$

$$b^2 - 75b + 1350 = 0 \quad b_1 = 45, \quad b = 30, \quad a_1 = 0, \quad a = 15$$

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□□□□□. 30□□; 15□□.

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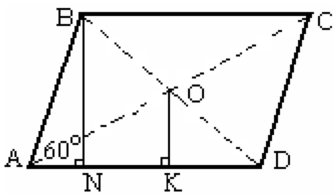

12-чийме

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$$KD^2 = OD^2 - OK^2,$$

$$KD = \sqrt{\left(\sqrt{31}\right)^2 - \left(\frac{\sqrt{75}}{2}\right)^2} = \sqrt{31 - \frac{75}{4}} = 3{,}5, \quad KD = 3{,}5 \text{ □□}.$$

$$AB = x, \quad BC = y$$

$$\angle ABN = 30^0, \quad \text{□□□□□} \quad AN = \frac{1}{2}x,$$

$$\Delta ANB: \quad AB^2 = AN^2 + BN^2, \quad x^2 = \frac{1}{4}x^2 + \left(\sqrt{75}\right)^2,$$

$$\frac{3}{4}x^2 = 75, \quad x = 10. \quad NK = 3{,}5 \text{ □□}.$$

□□□□□, $AD = 12$ □□, $y = 12$ □□.

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$$2x^2 + 2y^2 = d_1^{\,2} + d_2^{\,2}$$

$$2 \cdot 100 + 2 \cdot 144 = 124 + d_1^{\,2}$$

$d_1 = 2\sqrt{91}$ □□.

□□□□□: 10□□, 12□□, $2\sqrt{91}$ □□.

3-□ □□□□□. □□ □□□□□□□□□□□ □□ □□ □□□□□□□□□ □□ □□□□□□□□□

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□□□□□□□□ □□□□□ ΔAOB □ □□□ ΔCOB □□□ □□□□□□□ ү□

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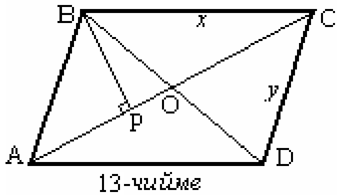
$$AB^2 - AO^2 = BC^2 - OC^2,$$



13-чизма

$$x^2 - 36 = (x+7)^2 - 225,$$
$$14x = 140, \quad x = 10.$$

[illegible], [illegible] ҮҮ [illegible]Ү[illegible]Ө

$10\,см$ [illegible] $17\,см$ [illegible].
[illegible]:

$$2a^2 + 2b^2 = d_1^2 + d_2^2,$$
$$10^2 + 17^2 = 21^2 + d_2^2, \quad 200 + 578 = 441 + d_2^2, \quad d_2^2 = 337,$$
$$d_2 = \sqrt{337} \text{ [illegible]}$$

[illegible]: 10[illegible], 17[illegible], 21[illegible], $\sqrt{337}$ [illegible].

4-[illegible] [illegible]. [illegible] 30[illegible] [illegible] 3,2[illegible] [illegible] 8,8[illegible] [illegible]

[illegible] [illegible]Ө[illegible]Ө[illegible]. [illegible]

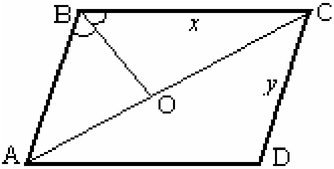
[illegible].

[illegible]. [illegible] (14-[illegible])

$$2x + 2y = 30,$$
$$x + y = 15 \qquad (1)$$

[illegible]:

$$\frac{y}{x} = \frac{8{,}8}{3{,}2}, \qquad (2)$$



14-чийме

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$3{,}2y = 48 - 8{,}8y$, $y = 4$ □□, $x = 11$ □□.

□□□□□: 4□□, 11□□ .

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□□□ □□: $S=\frac{1}{2}(a-b)^2\sin\beta$.

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3. □□□ D □□□□□□□□□□□□□□□ □□□□□ □□ □□□□□ $AB=2$ □□□□
$BC=3$, □□ □□□ □□□□□□□□□□□□□ □□□□ 70^0 □□ □□□□□□□□
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□□□□ □: □□= BD=1,1□, AD=0,8□.

4. □□ □ □.

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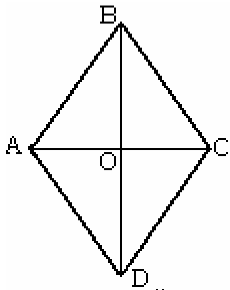

15-чийме

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□□=□ C=□ D=D□, $AB\parallel DC$, $BC\parallel AD$ - □□□□ □□□ □ □□□□□□.

$\angle A = \angle BAD = \angle DAB$, $\angle B = \angle ABC = \angle CBA$,

$\angle C = \angle BCD = \angle DCB$ □□□□ $\angle D = \angle ADC = \angle CDA$ □□□ □□□□□ □□□□□□□□□.

$AC \perp BD$ – [illegible] ([illegible]=[illegible], [illegible]=[illegible] D).
[illegible] - [illegible].

[illegible] -[illegible] θ[illegible]θ[illegible]θ [illegible] [illegible]γ[illegible]γ

[illegible]

θ[illegible]γ[illegible]θ [illegible].

[illegible] θ[illegible]γ[illegible]θ [illegible]:

1) [illegible] θ[illegible] [illegible];

2) [illegible] [illegible].

[illegible]

[illegible].

1) $S = a \cdot h_a$, a – [illegible], h_a – [illegible].

[illegible]

[illegible].

2) $S = \frac{1}{2} d_1 \cdot d_2$, d_1, d_2 – [illegible].

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□□□□□ □□□□□. □□□□ □□□ □□□□ $n+m$ □□□□□□□ (16-□□□□□). □□□□□ □□□□□□ AEC □□□□ DEC □□□ □□□□□□□ ү□ □□□□□□□□□□□□□□□□ □□□□ □□□□□□□□□□ □□□□□□:

$$EC = h = \sqrt{(n+m)^2 - n^2} = \sqrt{m(2n+m)}, \quad EC = \sqrt{m(2n+m)}$$

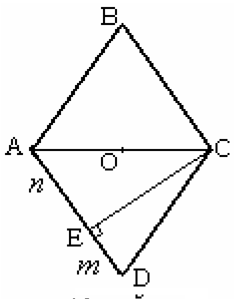
$$AC = \sqrt{\left(\sqrt{m(2n+m)}\right)^2 + m^2} = \sqrt{2m(m+n)}, \quad AC = \sqrt{2m(m+n)}$$

$$BO = \sqrt{(m+n)^2 - \left(\frac{1}{2}\sqrt{2m(m+n)}\right)^2} = \frac{1}{2}\sqrt{4(m+n)^2 - 2m(m+n)} =$$

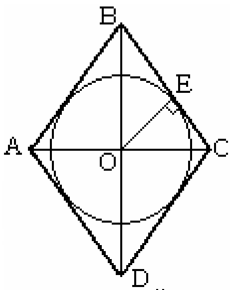
$$= \frac{1}{2}\sqrt{4m^2 + 8mn + 4n^2 - 2m^2 - 2mn} = \frac{1}{2}\sqrt{2m^2 6mn + 4n^2},$$

$$BO = \frac{1}{2}\sqrt{2m^2 6mn + 4n^2}. \quad BD = \sqrt{2m^2 6mn + 4n^2}.$$

□□□□□: $AC = \sqrt{2m(m+n)}$, $BD = \sqrt{2m^2 6mn + 4n^2}$.



16-чийме



17-чийме

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□□□ □□□ □□□□□□ ү□ □□□□□□□□□□□□□ $\angle B = 30^0$, $\angle C = 60^0$
□□□□□□□□□ □□□□□□үү □□□□□. □□□□□, $OC = \frac{1}{2}BC = \frac{1}{2}a$,

$$BO = \frac{\sqrt{3}}{2}a.$$

□□□□ □□, $\frac{OE}{EC} = \frac{BE}{OE}$, $OE^2 = EC \cdot BE$ □□□□□.

$$EC = \frac{1}{2}OC = \frac{1}{2}\cdot\frac{1}{2}a = \frac{1}{4}a.$$

$$BE = a - \frac{1}{4}a = \frac{3}{4}a.$$

□□□□□, $OE^2 = EC \cdot BE = \frac{1}{4}a \cdot \frac{3}{4}a = \frac{3}{16}a^2$.

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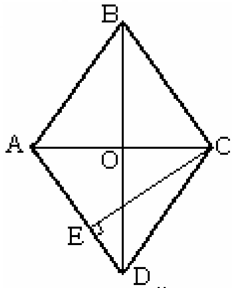
$$4 = \frac{3}{16}a^2, \quad a = \frac{8\sqrt{3}}{3}.$$

□□□□□: $AB = \frac{8\sqrt{3}}{3}$.

3-□ □□□□□. □□□ □□ □□ □□ □□□□□□□□□ □□□□□ □□□□ □□□ m, □□ □□□ □□□□ □□□□□ S □□□□□□□. □□□□ □□□ □□□ □□□□ □□□□ □□□□□ □□□□□□ □.



18-чийме

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$$\begin{cases} d_1 + d_2 = m \\ \frac{1}{2}(d_1 \cdot d_2) = S \end{cases} \Rightarrow \begin{cases} d_1 + d_2 = m \\ d_1 \cdot d_2 = 2S \end{cases} \Rightarrow \begin{cases} d_1 = m - d_2 \\ d_2 \cdot (m - d_2) = 2S \end{cases}$$

$$d_2^{\,2} - md_2 + 2S = 0,$$

$$(d_2)_{1,2} = \frac{m \pm \sqrt{m^2 - 8S}}{2},$$

$$\left(d_2\right)_1 = \frac{m+\sqrt{m^2-8S}}{2}, \quad \left(d_2\right)_2 = \frac{m-\sqrt{m^2-8S}}{2}.$$

$$\left(d_1\right)_1 = \frac{m-\sqrt{m^2-8S}}{2}, \quad \left(d_1\right)_2 = \frac{m+\sqrt{m^2-8S}}{2}.$$

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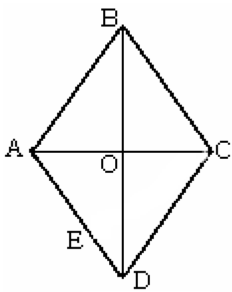
$$4AB^2 = d_1{}^2 + d_2{}^2 = \left(\frac{m-\sqrt{m^2-8S}}{2}\right)^2 + \left(\frac{m+\sqrt{m^2-8S}}{2}\right)^2 =$$

$$= m^2 - 4S.$$

$$4AB^2 = m^2 - 4S, \quad AB^2 = \frac{1}{4}(m^2-4S), \quad AB = \frac{1}{2}\sqrt{m^2-4S}.$$

□□□□□ : $AB = \frac{1}{2}\sqrt{m^2-4S}$.

4-□ □□□□□. □□□□□ S □□□□□□ □□□ □□□□ □□□□□□□□ □□□□ $m:n$ □□□□□□□□□. □□□□ □□□ □ □□□□ □□□□□□ □. □□□□□ □□□□□.



19-чизма

□□□□ □□□ □□□□□ $S = \frac{1}{2}d_1 d_2$ □□□□□□ □□□ □□□□□ □□□□□□□. □□□□□□□□□ □□□□□ □□□□□□ $\frac{d_1}{d_2} = \frac{m}{n}$ □□□□□ (19-□□□□□).

□□□□□, $d_1 = \frac{m}{n}d_2$, $S = \frac{1}{2}\frac{m}{n}d_2{}^2$, $d_2{}^2 = \frac{2Sn}{m}$, $d_2 = \sqrt{\frac{2Sn}{m}}$,

$$d_1 = \frac{m}{n}\cdot\sqrt{\frac{2Sn}{m}}.$$

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$$4a^2 = d_1{}^2 + d_2{}^2$$

$$4a^2 = \left(\sqrt{\frac{2Sn}{m}}\right)^2 + \left(\frac{m}{n}\sqrt{\frac{2Sn}{m}}\right)^2 = \frac{2Sn}{m} + \frac{m^2}{n^2}\cdot\frac{2Sn}{m} =$$

$$= \frac{2Sn}{m} + \frac{2Sm}{n} = \frac{2S(n^2 + m^2)}{mn}.$$

$$4a^2 = \frac{2S(n^2 + m^2)}{mn}, \quad a^2 = \frac{S(n^2 + m^2)}{2mn}, \quad AB = \sqrt{\frac{S(n^2 + m^2)}{2mn}}.$$

[illegible]. $AB = \sqrt{\frac{S(n^2 + m^2)}{2mn}}$.

[illegible]

1. [illegible]

[illegible], [illegible]

[illegible].

2. [illegible] $2p$, [illegible] $m:n$ [illegible]. [illegible].
[illegible]: $0,5mnp^2/(m^2 + n^2)$.

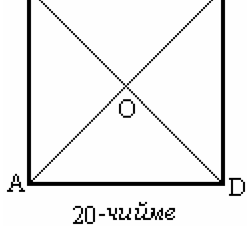
3. [illegible] 30^0 [illegible]. [illegible] Q [illegible]. [illegible].
[illegible]: $\frac{8Q}{\pi}$.
4. [illegible] 12[illegible], [illegible] 15[illegible]. [illegible].
[illegible]: $150\,см^2$.

5. [illegible].

[illegible] 1. [illegible] ө[illegible] [illegible].

[illegible] 2. [illegible] ө[illegible] [illegible].

[illegible] 3. [illegible] ө[illegible] [illegible].



20-чийме

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□□=□ C=□ D=D□ , $AB \parallel DC$, $BC \parallel AD$ - □□□□□□□□□□ □□ □□□□□ .

$\angle A = \angle BAD = \angle DAB$, $\angle B = \angle ABC = \angle CBA$,

$\angle C = \angle BCD = \angle DCB$ □□□□ $\angle D = \angle ADC = \angle CDA$

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$AC \perp BD -$ □□□□□ □□□□□ □□ □□□□□□□□□ □□

(□□=□□= □□=□ D).

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$$S = a^2$$

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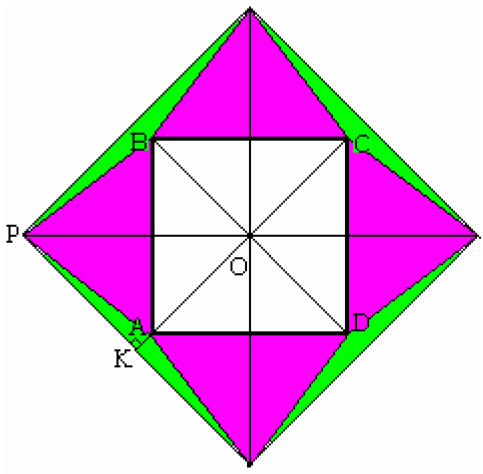

21-чийме

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[illegible] [illegible] $P_{кв} = 4a$ [illegible]. [illegible] [illegible] [illegible] Ү[illegible] [illegible] $\angle P = 15^0$, $\angle A = 75^0$ [illegible] [illegible]

[illegible] [illegible]Ө[illegible]Ү[illegible]Ү[illegible] [illegible]. [illegible] [illegible] $PK = a\sin 75^0$,

$AK = a\sin 15^0$ [illegible]. [illegible] [illegible] [illegible] [illegible]Ө[illegible]

[illegible] [illegible] $P = 8a\sin 75^0$.

$$\sin 75^0 = \sin(45^0 + 30^0) = \sin 45^0 \cos 30^0 + \cos 45^0 \sin 30^0 =$$

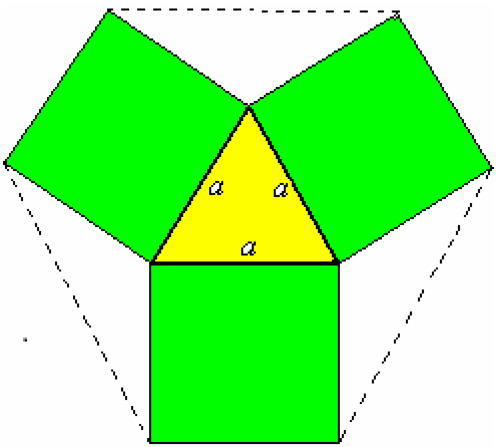
$$= \frac{\sqrt{2}}{2}\left(\frac{\sqrt{3}}{2} + \frac{1}{2}\right) = \frac{\sqrt{6} + \sqrt{2}}{4}.$$

[illegible],

$$\frac{P_ч}{P_{кв}} = \frac{8a\left(\frac{\sqrt{6} + \sqrt{2}}{4}\right)}{4a} = \frac{\sqrt{6} + \sqrt{2}}{2}$$

[illegible]: $\frac{\sqrt{6} + \sqrt{2}}{2}$.

2-[illegible] [illegible]. [illegible]Ң [illegible] [illegible] Ү[illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible]. [illegible] [illegible] [illegible] [illegible] [illegible].



22-чийме

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$S_\Delta = \frac{\sqrt{3}}{4}a^2$ □□□□□□□□ (22-□□□□□).

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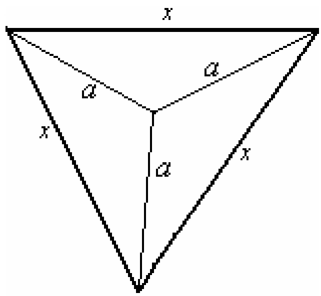
$$S_{кв} = a^2, \qquad R = a,$$

$$R = \frac{abc}{4S}, \qquad a = \frac{x^3}{4\cdot\frac{\sqrt{3}}{4}x^2},$$

$a = \frac{x}{\sqrt{3}}, \quad x = \sqrt{3}a$ □□□□□.



23-чийме

□□□□□ (23-□□□□□),

$$3\cdot S_{KAP} = 3\cdot\frac{\sqrt{3}}{4}a^2 .$$

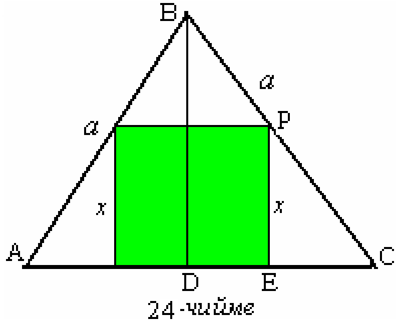
□□□ □ $S_6 = S_\Delta + 3S_{кв} + 3S_\Delta = \frac{\sqrt{3}}{4}a^2 + 3a^2 + 3\frac{\sqrt{3}}{4}a^2 =$

$$= \left(\frac{\sqrt{3} + 12 + 3\sqrt{3}}{4}\right)\cdot a^2 = (\sqrt{3} + 3)a^2 .$$

□□□□□: $(\sqrt{3} + 3)a^2$.

3-□ □□□□□. □ □□□□□□ □□□□□□□□□ a □□□□□□ □□ң □□ □□□□ ү□ □□□□□□□□□ □□□□□ □□□□□□ □□ □□□□□□□□□□ □□□□□□ □□□□□□ □.

[illegible] [illegible]. [illegible] D [illegible] [illegible] [illegible] ү [illegible] [illegible] [illegible] (24-[illegible]).



$$BD^2 = BC^2 - DC^2$$

$$h = BD = \sqrt{a^2 - \frac{a^2}{4}} = \frac{\sqrt{3}}{2}a^2$$

[illegible] [illegible] x [illegible], [illegible] ΔBDC [illegible] ΔECP ү [illegible]

[illegible]. [illegible] [illegible] өө ү ү [illegible]:

$$\frac{BD}{PE} = \frac{DC}{EC}, \qquad \frac{\frac{\sqrt{3}}{2}a}{x} = \frac{\frac{1}{2}a}{\frac{a-x}{2}}, \qquad \frac{\sqrt{3}a}{2x} = \frac{a}{a-x},$$

$$2ax = \sqrt{3}a^2 - \sqrt{3}ax, \qquad x = \sqrt{3}a(2-\sqrt{3}).$$

[illegible]

$$S_{кв} = x^2 = \left(\sqrt{3}a(2-\sqrt{3})\right)^2 = 3a^2(7-4\sqrt{3}).$$

[illegible]: $S_{кв} = 3a^2(7-4\sqrt{3})$.

4-[illegible]. [illegible] a

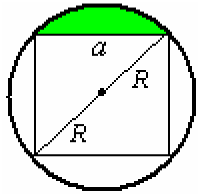
[illegible]. [illegible] өү ө [illegible]

[illegible] [illegible] [illegible].
[illegible] [illegible]. [illegible] [illegible] [illegible] $S = a^2$ [illegible].
[illegible] [illegible] [illegible] [illegible] [illegible] (25-[illegible]).

[illegible], $a^2 + a^2 = (2R)^2$, $a^2 = 2R^2$,

$$R = \frac{\sqrt{2}}{2}a.\quad S_{тег} = \pi R^2 = \pi\left(\frac{\sqrt{2}}{2}a\right)^2 = \frac{\pi}{2}a^2,$$

$$S_{тег} = \frac{\pi}{2}a^2.$$



25-чийме

[illegible] [illegible], [illegible] [illegible] [illegible]

$$S = \frac{1}{4}(S_{тег} - S_{кв}) = \frac{1}{4}\left(\frac{\pi}{2}a^2 - a^2\right) = \frac{1}{8}a^2(\pi - 2)$$

[illegible]: $S = \frac{1}{8}a^2(\pi - 2)$

[illegible]

1. [illegible] R [illegible] [illegible]. [illegible] [illegible]. [illegible]: $1{,}6R\sqrt{2}$.

2. [illegible] 60^0 [illegible]

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□□□□□: $\frac{4}{(\sqrt{3}+1)^2}$.

3. □□□□□□□ □ □□□□□ □□□□□□□□ □□□□□ ʏ□ □□□□□□□□□□ □□ □□ a □□ □□□□□□□. □□□□ □□□ □□□□□ □□□ □□□□□ □□□□□□ □□ □□□□□□□□□□□ □□□□□□ □□□□□□□.

□□□□□: $\frac{2a^2}{3}$.

4. □□ □ □□□ □□□□□□□□ □□□□□ □□□□□□□□ □□□□□ □□□□□, □□□□□ ʏ□ □□□ □□□□□□□□ □□□ □ □□□□□ □□□□ □□□□□□□□□□ □□□□□□□□□□□ □ □□□□□□ □□□□□□□ .

□□□□□: $8:3\sqrt{3}:6\sqrt{3}$.

6. □□ □□□□□□.

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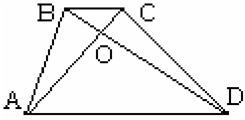

26-чийме

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□□, □ C, □ D, D□, $BC \parallel AD$ - □□□□□□□□□□ □ □□□□□□.

$\angle A = \angle BAD = \angle DAB$, $\angle B = \angle ABC = \angle CBA$,

$\angle C = \angle BCD = \angle DCB$ □ □□□ $\angle D = \angle ADC = \angle CDA$

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$AC, BD -$ □□□□□□□□□□□ □□ □□□□□□□□□□□

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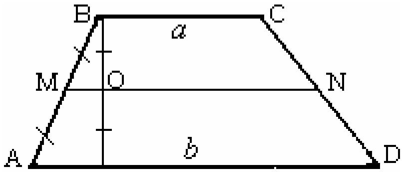

27-чийме

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1) □ □□□□□□□□□□ □□□□ □□□□□□ □□□□□□□□□□□ □□□□□□□□□ □□□□□, □□□□□□ □□□ □□□□□□□□ □ □□□ □□□□ □ □□□□□□ □. □.

$$MN = m = \frac{BC + AD}{2} = \frac{a + b}{2}, \; AD \parallel BC \parallel MN.$$

2) [illegible]

[illegible] $BO = OK$ (27-[illegible]).

[illegible]

[illegible]

$$S = \frac{a + b}{2} h,$$ [illegible] a, b – [illegible], h – [illegible].

[illegible]

[illegible]

$$S = m \cdot h,$$ [illegible] m – [illegible], h – [illegible].

6.1. [illegible]

[illegible]

1-□ □□□□□□. □□□□□□□□□□□□ □ 7□□, 8□□ □□□ □ □□□□□□□□□□ 3□□, 6□□ □□□□□□□ □□□□□□□□□□□□ □□□□□□□ □□□□□□□□.

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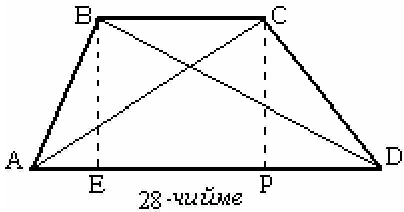

$$BE^2 = 8^2 - (3+y)^2,$$
$$BE^2 = 7^2 - (3+x)^2$$

□□□□ □□,

$$8^2 - (3+y)^2 = 7^2 - (3+x)^2,$$
$$64 - (9+6y+y^2) = 49 - (9+6x+x^2)$$
$$64 - 9 - 6y - y^2 = 49 - 9 - 6x - x^2$$
$$18y = 42, \quad y = \frac{7}{3}, \quad x = \frac{2}{7}.$$
$$BE^2 = 8^2 - (3+\frac{7}{3})^2 = 64 - \frac{256}{9} = \frac{320}{9}. \quad BE = \frac{8\sqrt{5}}{3}.$$

□□□□□, $S = \frac{3+6}{2}\cdot\frac{8\sqrt{5}}{3} = 12\sqrt{5}$

□□□□□: $S = 12\sqrt{5}см^2$.

2-□ □□□□□□. □□□ D □□□□□□□□□□□□□□□ □□□□□□□□□□ □D=24□□, □□=8□□, □□□□□□□□□□ □□□□ □□=13□□, $BD = 5\sqrt{17}\ см$. □□□□□□ □□□□□□□ □□□□□□□ □□□□□□□□.

□□□□□ □□□□□. □□□□□□ $AE = x$, □□□ □□□□□□□□□□, ΔANC □□□□ ΔDEB □□□ □□□□□□□ Ү□

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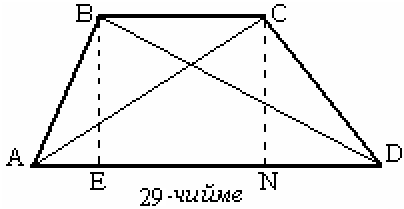

□□□□□□: (29-□□□□□)

$$CN^2 = 13^2 - (8 + x)^2$$

$$BE^2 = (5\sqrt{17})^2 - (24 - x)^2$$

$$BE = CN = h$$

□□□□□□□□□ □□□□□□□□□, □□□ □

$$64x = 256, \quad x = 4.$$

□□□□□ □□□□□.

$$CN^2 = 13^2 - (8 + 4)^2 = 25, \quad CN = 5.$$

□□□□□,

$$S = \frac{8 + 24}{2} \cdot 5 = 80.$$

□□□□□: $80\ см^2$.

3-□ □□□□□. □□□□□□□□□□□ □□□□□□□□□ a □ □□□ b □□□□□□□. □□ң □□□□□□□□□□□ □□□□□□□□ 30^0 □□□□ 45^0 □□□□□□□. □□□□□□□□□□□ □□□□□□ □□□□□□□.

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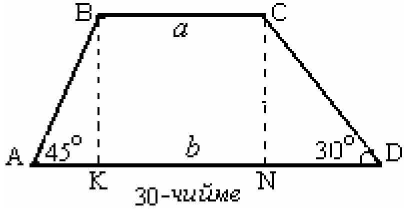
□□□□□□□ □□□□□□□□□ (30-□□□□□). □□□□ $CN = \frac{x}{2}$ □□□□□. □□ □□□ $ND = b - a - \frac{x}{2}$ □□□□□□□. ΔAKN-□□□ □□□□□□



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$$x^2 = \frac{x^2}{4} + (b - a - \frac{x}{2})^2, \quad x^2 - \frac{x^2}{4} - (b - a - \frac{x}{2})^2 = 0,$$

$$x^2 + 2(b - a)x - 2(b - a)^2 = 0, \quad x_{1,2} = a - b \pm (b - a)\sqrt{3},$$

$$x_1 = (a - b)(1 - \sqrt{3}), \qquad x_2 = (a - b)(1 + \sqrt{3})$$ -□ □□□□□□□□□ □□□□□□ □□□□□□□□□□□□ □□□□□. □□ □□ □□□□□□□□□□□□ □□□□□□□□□ $H = CN = \frac{1}{2}(a - b)(1 - \sqrt{3})$ □□□□□.

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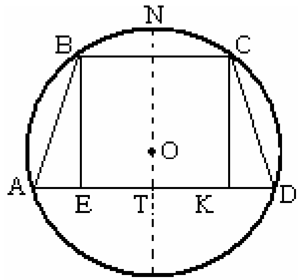

31-чийме

$$S = \frac{a+b}{2} \cdot \frac{a-b}{2}(1 - \sqrt{3}) = \frac{a^2 - b^2}{4}(1 - \sqrt{3})$$

□□□□□: $\frac{a^2 - b^2}{4}(1 - \sqrt{3})$

4-□ □□□□□. □□ □□□□□ R □□□□□□ □□□□□□□□ □ө□ө□□Ү □□□□□□

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[illegible] x [illegible], [illegible] $2x$ [illegible]. [illegible] (31-[illegible]). [illegible]

$$AE = KD = ET = TK = \frac{1}{2}x \quad \text{[illegible].}$$

ΔOTD [illegible] $OT = \sqrt{R^2 - x^2}$, [illegible] ΔONC [illegible] $ON = \sqrt{R^2 - \frac{1}{4}x^2}$, [illegible] $ON + OT = h$.

$$h^2 = x^2 - \frac{x^2}{4} = \frac{3}{4}x^2, \quad h^2 = \frac{3}{4}x^2, \quad h = \frac{\sqrt{3}}{2}x.$$

[illegible],

$$\frac{\sqrt{3}}{2}x = \sqrt{R^2 - x^2} + \sqrt{R^2 - \frac{1}{4}x^2},$$

$$\sqrt{3}x = 2\sqrt{R^2 - x^2} + \sqrt{4R^2 - x^2},$$

$$3x^2 = 4(R^2 - x^2) + 4R^2 - x^2 + 4\sqrt{R^2 - x^2}\sqrt{4R^2 - x^2},$$

$$3x^2 = 4R^2 - 4x^2 + 4R^2 - x^2 + 4\sqrt{4R^4 - R^2x^2 - 4R^2x^2 + x^4},$$

$$8x^2 - 8R^2 = 4\sqrt{4R^4 - 5R^2x^2 + x^4},$$

$$2x^2 - 2R^2 = \sqrt{4R^4 - 5R^2x^2 + x^4},$$

$$4x^4 - 8x^2R^2 + 4R^4 = 4R^4 - 5R^2x^2 + x^4$$

$$3x^4 - 3x^2R^2 = 0$$

$$3x^2(x^2 - R^2) = 0, \quad x_{1,2} = 0, \quad x^2 - R^2 = 0, \quad x = R$$

$$S = \frac{x + 2x}{2} \cdot \frac{\sqrt{3}}{2}x = \frac{3x}{2} \cdot \frac{\sqrt{3}}{2}x = \frac{3\sqrt{3}}{4}x^2,$$

$$S = \frac{3\sqrt{3}}{4}x^2.$$

□□□□□ □□ $x = R$ □□□□□□□□□ □□□□ □□□□□, □□□□ □ө□ө□□ү□ө

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$$S = \frac{3\sqrt{3}}{4}R^2.$$

□□□□□□: $\frac{3\sqrt{3}}{4}R^2$.

□ □□□□ □□□ □□ □өө□ө □ө□ү□үү□ө□

1. □□ □□□□□□□□□□ □□□□□□□□□□□□ □□□□□□ □□□□□ a □□□□ b □□□□□□□. □□ң □□□□□□□□ □□□□□□□ □□□ □□□□□ $\frac{\pi}{6}$ □□□□ $\frac{\pi}{4}$ □□□□□□□. □□□□□□□□□□□ □□□□□□ □□□□ □□□.

[illegible]: $\frac{1}{4}(a^2 - b^2)(\sqrt{3} - 1)$.

2. [illegible] $594м^2$, [illegible] $22м$, [illegible] $6м$ [illegible].

[illegible]: $24м$, $30м$.

3. [illegible] ү[illegible] [illegible]ө[illegible]ү[illegible]ө

[illegible]ө[illegible]ү[illegible]ө[illegible] [illegible] [illegible]ө[illegible]үү [illegible],

[illegible] [illegible]ү[illegible]ү[illegible]ү[illegible]ө[illegible].

[illegible] 2[illegible] [illegible] 5[illegible] [illegible], [illegible].

[illegible]: 3 [illegible] 5[illegible].

4. [illegible] 2:3 [illegible], [illegible] 5[illegible], [illegible].

[illegible]: 4 [illegible] 6[illegible].

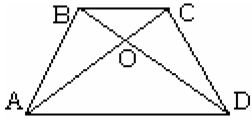
6.2. [illegible]ң [illegible]

[illegible] 1. [illegible] **[illegible]ң [illegible]** [illegible] (32-[illegible]).

[illegible] 2. [illegible] ө[illegible] [illegible]

[illegible] **[illegible]ң [illegible]** [illegible].

[illegible] 3. [illegible] ө[illegible] [illegible]



32-чийме

[illegible] **[illegible]ң [illegible]** [illegible].

1-[illegible]. [illegible]ң [illegible] a [illegible] b [illegible], [illegible] c, [illegible] d [illegible]. $d^2 = c^2 + ab$ [illegible].

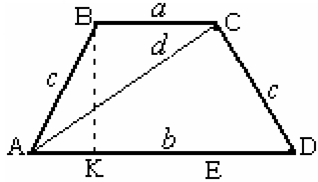
[illegible] өө: [illegible]D [illegible]ң [illegible]

[illegible] CED [illegible] Y[illegible] [illegible] (33- [illegible]):

$$h^2 = c^2 - \left(\frac{b-a}{2}\right)^2$$

[illegible]:

$$d^2 = h^2 + \left(a + \frac{b-a}{2}\right)^2,$$



33-чийме

$$d^2 = c^2 - \frac{(b-a)^2}{4} + a^2 + a(b-a) + \frac{(b-a)^2}{4}$$

$$d^2 = c^2 + a^2 + ab - a^2$$

[illegible]: $d^2 = c^2 + ab$ [illegible].

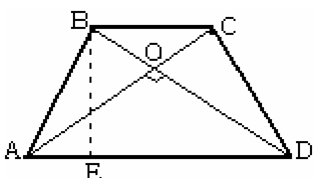
2-[illegible]. [illegible] 24[illegible]

[illegible] 40[illegible] [illegible]. [illegible] ө[illegible]

[illegible].

[illegible]. [illegible] ө[illegible] ү[illegible] ү[illegible]

[illegible] ΔAOD [illegible] ΔBOC [illegible] ү[illegible] [illegible] ү[illegible] [illegible] (34-[illegible]).



34-чийме

[illegible] [illegible] [illegible] [illegible] x

[illegible] y [illegible]ӨҮ[illegible]Ө[illegible]Ө [illegible]ӨҮ[illegible]Ү Ө[illegible] [illegible], [illegible]

[illegible] [illegible] [illegible] [illegible] :

$$x^2 + x^2 = 40^2, \quad 2x^2 = 1600, \quad x^2 = 800, \quad x = 20\sqrt{2}.$$

$$y^2 + y^2 = 24^2, \quad 2y^2 = 576, \quad y^2 = 288, \quad y = 12\sqrt{2}.$$

[illegible], $BD = 32\sqrt{2}$ [illegible].

$$AE = \frac{AD - BC}{2} = \frac{40 - 24}{2} = 8, \quad AE = 8 \text{ [illegible]}.$$

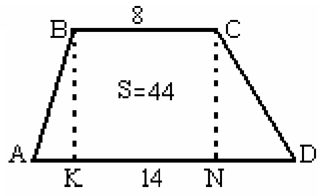
$$ED = 24 + 8 = 32, \quad ED = 32 \text{ [illegible]}.$$

$$\Delta BED: \quad h = BE = \sqrt{\left(32\sqrt{2}\right)^2 - 32^2} = 32, \quad BE = 32 \text{ [illegible]}.$$

$$S_{тр} = \frac{1}{2}(24 + 40)32 = 1024,$$

[illegible]. $1024\, см^2$.

3-[illegible] [illegible]. [illegible]ң [illegible] [illegible] [illegible] 8[illegible] [illegible] 14[illegible], [illegible] [illegible] [illegible] $44 см^2$ [illegible], [illegible] [illegible] [illegible] [illegible] [illegible] [illegible].



35-чийме

[illegible] [illegible]. [illegible] [illegible] [illegible] [illegible] [illegible]. [illegible] ҮҮ[illegible] [illegible] [illegible]

[illegible] [illegible]ң [illegible]

[illegible]ү[illegible] ү[illegible]ө[illegible]ү[illegible] (35-[illegible]).

[illegible] ΔAKB [illegible] ү[illegible] [illegible]

$$AK=\frac{AD-BC}{2}=3,\quad AK=3см.$$

[illegible] :

$$S=\frac{BC+AD}{2}\cdot BE,\quad 44=\frac{8+14}{2}\cdot h,\quad h=4см.$$

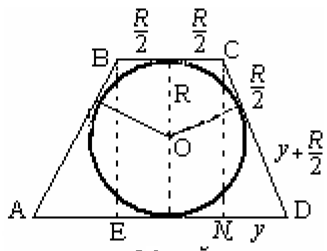
[illegible] :

$$AB=\sqrt{3^2+4^2}=5,\quad AB=5см$$

[illegible]. 5[illegible] .

4-[illegible] [illegible]. [illegible] 2 [illegible] [illegible]ң [illegible] R [illegible]. [illegible] [illegible].

[illegible]. [illegible] $BC=R$, $h=CN=2R$



36-чийме

[illegible] ө[illegible]ү[illegible]ү[illegible] [illegible] (36-

[illegible]). [illegible] $ND = y$ [illegible], [illegible] ΔCND [illegible]

[illegible]:

$$(2R)^2 + y^2 = (R + y)^2,$$
$$4R^2 + y^2 = R_2 + 2Ry + y^2,$$
$$y = 1,5R.$$

[illegible] = EN [illegible] D=R+3R=4R [illegible].

$$S_{тр} = \frac{BC + AD}{2}CN = \frac{R + 4R}{2}2R = 5R^2$$

[illegible]: $S_{тр} = 5R^2$.

[illegible]

1. [illegible] 20 [illegible] 12 [illegible].

[illegible]: ($8\sqrt{5}$, $4\sqrt{5}$).

2. [illegible] $a = 21 см$, $b = 9 см$, [illegible] $h = 8 см$ [illegible].

[illegible]: 10,625 [illegible].

3. □□□□□□□□□ 15□□ □□□□□□□ □□□□□□□□□ □□□□□□□ □ □□□□□□□ □□□□□□□□□ 17□□ □□□□□□□ □□ң □□□□□□□□□□ □□□□□□□□□ □□□□□□□□ □□□□□□□□□. □□ □□□□□□□□□□□ □□□□□□□□□□□□□ □□□□□□□□□□□□ □□□□□□□ □.

□□□□□□: 9□□, 25□□.

4. □□ң □□□□□□□□□□ □□□□□□□□□□□□ □□□□□□□ □□ □□□□□□□□□ □□□□□□□□□ □□□□ □□□□□ □□□□□□□ □□□□□□□□□□□. □□□□□□□□ □□□□□ □□□□□□ $12см^2$, □□ □□□□ □□□□□□□□□□ 2□□ □□□□□□, □□□□□ □□□□□□□□□□□□ □□□□□□□ □ □□□□□□□□□□ □□□□□□□□□□□□□□ □□□□□□□ □.

□□□□□□: $4{,}8$, $2\sqrt{2}$, $2\sqrt{2}$ □□.

6.3. □□ □ □□□□□□□□ □□□□□□□□□

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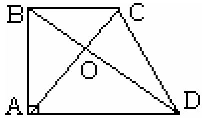

37-чийме

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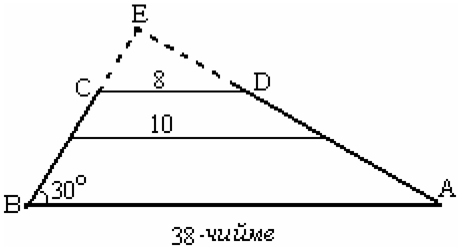

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$$\frac{AB+DC}{2}=KP,\qquad \frac{AB+8}{2}=10,\qquad AB=12\ □□.$$

□□□□□ □□□□□ □ ΔAEB □□□ □□□ □□□□ ү□ □□□□□□□□□□□ 30^0 □□□ □□□□ □□□□□□□□□ □□□ □ □□ □□□□□□□□□□□□ □□ □□□□□ □ □□□□□□□ □□□□□. □□□□□ □□=6□□.

□□□□□□□ □□□ ΔDEC □□□ □□□ □□□□ ү□ □□□ □□□□□□□□□ 30^0 □□□ □□□□ □□□□□□□□□ □□□ □ □□ □□□□□□□□□□□□ □□ □□□□□ □ □□□□□□□ □□□□□. □□□□□ □□=4□□ □□□□□□□ □□□□□. □□ □□ □□=2□□ □□□□□□□□ □□□□ □□□□□.

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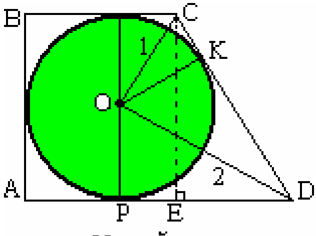
$$h^2 = 1 - x^2, \qquad h^2 = 4 - y^2,$$

$$1 - x^2 = 4 - y^2, \quad y^2 - x^2 = 3.$$

(1)



39-чийме

□□□□ CED ү□ □□□□□□□□□□□□ $CE^2 = CD^2 - ED^2$ □□□□□□□.

□□□□□ □□□□ □□□□□□□□□ □

$$(2h)^2 = (x + y)^2 - (y - x)^2,$$

$$4h^2 = 4xy, \quad h^2 = xy, \quad 1 - x^2 = xy, \quad y = \frac{1 - x^2}{x} \qquad (2)$$

(1) □□□□□□ (2)- □□□□□□□□□□ □□□□□□ □□□□ □ө□ ө□□ү□ү □□□□□□□:

$$\left(\frac{1 - x^2}{x}\right)^2 - x^2 = 3, \quad 5x^2 = 1, \qquad x = \frac{\sqrt{5}}{5}.$$

$$y = \frac{1 - \frac{1}{5}}{\frac{\sqrt{5}}{5}} = \frac{4\sqrt{5}}{5}, \qquad y = \frac{4\sqrt{5}}{5}. \quad CE = \frac{4\sqrt{5}}{5}.$$

$$S = \frac{BC + AD}{2} \cdot CE = \frac{\frac{\sqrt{5}}{5} + \frac{2\sqrt{5}}{5} + \frac{2\sqrt{5}}{5} + \frac{4\sqrt{5}}{5}}{2} \cdot \frac{4\sqrt{5}}{5} =$$

$$= \frac{18 \cdot 5}{25} = 3{,}6$$

□□□□□□: $3{,}6\ см^2$

3-[illegible]. [illegible] $\frac{4r}{3}$ [illegible] r [illegible].

[illegible]. [illegible] $2r$ (40-[illegible]). [illegible]=[illegible].

$$PC = KE = BC - r = \frac{1}{3}r$$

$$\Delta CED: \ CD^2 = CE^2 + ED^2$$

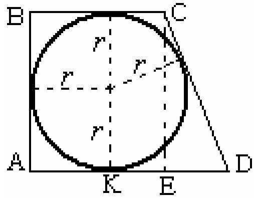
$$(\frac{2}{3}r + x)^2 = (2r)^2 + x^2,$$

$$\frac{4}{9}r^2 + \frac{4}{3}rx + x^2 = 4r^2 + x^2,$$

$$x = \frac{8r}{3}.$$

$$AD = r + \frac{1}{3}r + \frac{8r}{3} = 4r, \quad AD = 4r.$$

$$CD = \frac{1}{3}r + \frac{1}{3}r + \frac{8r}{3} = \frac{10}{3}r, \quad CD = \frac{10}{3}r.$$



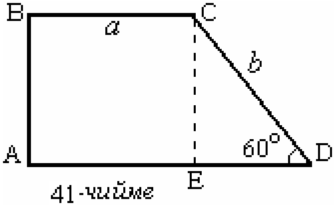
40-чийме

[illegible]: $2r$, $4r$, $\frac{10}{3}r$.

4-[illegible]. [illegible] 60^0, [illegible] a, [illegible] b [illegible].

[illegible].

[illegible] (41-[illegible]).



41-чийме

□□□ □ ED □□□□□□□□□ □□□□□□□□□□□□□ □□ □□□□□ □ □.□. $\frac{1}{2}b$

□□□□□□□ □□□□□. □□□□□, □□ң □□□□□□□□□ □□□□□□□□ $a+\frac{1}{2}b$ □□

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$$h=\sqrt{b^2-\frac{1}{4}b^2}=\frac{\sqrt{3}}{2}b$$

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$$S=\frac{a+a+\frac{1}{2}b}{2}\cdot\frac{\sqrt{3}}{2}b=\frac{2a+\frac{1}{2}b}{2}\cdot\frac{\sqrt{3}}{2}b=\frac{\sqrt{3}}{8}(4a+b)$$

□□□□□: $S=\frac{\sqrt{3}}{8}(4a+b)$.

□ □□□□ □□□ □□ □өө□ө □ө□ү□үү□ө□

1. (2.24) $ABCD$ [illegible] A [illegible] D

[illegible]. [illegible] CD [illegible] θ [illegible].

[illegible]=1, $CD = 4$, $AD = 5$ [illegible].
$\angle CMD = 2\angle BMA$ [illegible] AD [illegible]

[illegible]. [illegible] AD [illegible] θ [illegible] θ [illegible].

[illegible]: 2[illegible] .

2. [illegible] 3[illegible] 9[illegible]. [illegible].

[illegible]: $\frac{3}{\sqrt{10}}$ [illegible], $\frac{36}{\sqrt{10}}$ [illegible], $\frac{12}{\sqrt{10}}$ [illegible], $\frac{18}{\sqrt{10}}$ [illegible].

3. [illegible] 8[illegible] 4[illegible]. [illegible]. [illegible]: $\frac{18\sqrt{5}}{5}$ [illegible].

4. [illegible] a [illegible] b [illegible].
[illegible].

[illegible]: $r = \dfrac{ab}{a + b}$.

[illegible]

1. [illegible] “[illegible]” 1976.
2. [illegible] “[illegible]” 1980.
3. [illegible] ([illegible] γ[illegible]) [illegible]. « [illegible]» 1985.
4. [illegible]. «[illegible] γ[illegible]» 1989.
5. [illegible]. “[illegible]” 1983.
6. «[illegible]» [illegible]-1991.
7. [illegible]. “[illegible]” 1972.
8. «[illegible]» [illegible]-1991.
9. [illegible] γ[illegible].. «[illegible]» 1985.
10. [illegible]. «[illegible]» 9-11 [illegible].

[illegible] ө[illegible]. 102.

11. [illegible] «[illegible]» 7-11 [illegible]. «[illegible]» 1993.
12. [illegible]. “[illegible]” 1988.

13. □. □.□□□ □□□□, □.□ .□□□ □. □□□□□□□□□□□□□ □□□□□ □□□□□. □. «□□□□□□ Y□□□□» 1966.
14. □.□. □□□□□□□. □□□□□□□□□□□ □□ □ □□□□□□□□□□. □□□ . □. “□□ □□□” 1983.

[illegible]

1. [illegible]: [illegible], [illegible], [illegible], [illegible].

2. [illegible]: [illegible], [illegible], [illegible], [illegible], [illegible], …

3. [illegible]: [illegible]^2, [illegible]^2, [illegible]^2, [illegible]^2, [illegible]^2, [illegible], [illegible], …

4. □ ϴ□ϴ□□ ɣ □□□ϴϴ □□□□ □□□□□□: □□^{3}, □□^{3}, □□^{3}, □^{3}, □□^{3},

□□□□, …

5. □□□□□□□□□ □□□ ϴϴ □□□□□□□□□□□: □□□, □□, □□, □□□□□□□□,

□□□□□, …

6. □□□□□□□□□ □□□ ϴϴ □□□□□□□□□□□: □□□, □ □□, □□□□, □ɣ□,

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[illegible]

2-□ϴ□Y□. □ϴ□□ □□□□□□□□□□□□

Пахирдинов Махмутжан Абдугапарович

ҮЧ БУРЧТУК
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Корректору: доц. Ж.М. Куваков
Тех. редактору: А.М.Махмуджанов

Терүүгө берилди. 05.01.2013
Басууга уруксат берилди. 25.01.2013
Форматы 60х84, 1/16. Көлөмү 8,5 б.т.
Офсет, печать
Нускасы 300 даана

Жалал-Абад шаары. Токтогул көчөсү 20/3.
Жеке басмакана