Yleisesti $\bar{a} = x_1\bar{i} + y_1\bar{j}$

$\bar{b} = x_2\bar{i} + y_2\bar{j}$

$$\Rightarrow \boxed{\bar{a}\cdot\bar{b} = x_1x_2 + y_1y_2}$$ PISTETULO

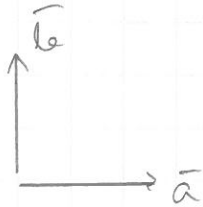
Huom. 1° $\bar{a}\cdot\bar{b}$ on luku, ei vektori

2° Pistetulossa pisteet ($\cdot$) on aina merkittävä näkyviin

3° Pistetulolle pätee "tavalliset" laskusäännöt (s. 212)

$\bar{a} = x\bar{i} + y\bar{j} \Rightarrow \bar{a}\cdot\bar{a} = xx + yy = x^2 + y^2 = |\bar{a}|^2$

$$\Rightarrow \boxed{\bar{a}\cdot\bar{a} = |\bar{a}|^2}$$



Olkoon $\bar{a}, \bar{b} \neq \bar{0}$

$$\boxed{\bar{a} \perp \bar{b} \iff \bar{a}\cdot\bar{b} = 0}$$ KOHTISUORUUSEHTO

21.2 a) $\bar{a} = 4\bar{i} - 6\bar{j}$, $\bar{b} = 3\bar{i} + 2\bar{j}$

$\bar{a}\cdot\bar{b} = 4\cdot 3 + (-6)\cdot 2 = 12 - 12 = 0 \Rightarrow \underline{\bar{a} \perp \bar{b}}$

b) $\bar{a} = 2\bar{i} - 3\bar{j}$, $\bar{b} = -8\bar{i} - 12\bar{j}$

$\bar{a}\cdot\bar{b} = 2\cdot(-8) + (-3)\cdot(-12) = -16 + 36 = 20 \neq 0 \Rightarrow \underline{\bar{a} \not\perp \bar{b}}$

21.4 $A = (1,2)$, $B = (t,6)$, $C = (3,t)$

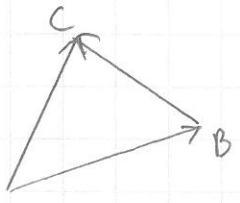
$\overline{AB} = (t-1)\bar{i} + 4\bar{j}$

$\overline{AC} = 2\bar{i} + (t-2)\bar{j}$

$\overline{AB} \perp \overline{AC} \iff \overline{AB}\cdot\overline{AC} = 0 \iff (t-1)2 + 4(t-2) = 0$

$\iff 2t - 2 + 4t - 8 = 0 \iff 6t = 10 \quad :6 \iff \underline{t = \frac{10}{6} = \frac{5}{3}}$

21.7 $A = (2,1)$, $B = (4,t)$, $C = (8,3)$



$\overline{AB} = 2\bar{i} + (t-1)\bar{j}$

$\overline{AC} = 6\bar{i} + 2\bar{j}$

$\overline{BC} = 4\bar{i} + (3-t)\bar{j}$

1° $\overline{AB} \perp \overline{AC} \iff \overline{AB}\cdot\overline{AC} = 2\cdot 6 + (t-1)2 = 0 \iff 12 + 2t - 2 = 0 \iff \underline{t = -5}$

2° $\overline{AB} \perp \overline{BC} \iff \overline{AB}\cdot\overline{BC} = 2\cdot 4 + (t-1)(3-t) = 0$

$\iff 8 + 3t - t^2 - 3 + t = 0 \iff -t^2 + 4t + 5 = 0 \iff \underline{t = \begin{cases} 5 \\ -1 \end{cases}}$

3° $\overline{AC} \perp \overline{BC} \iff \overline{AC}\cdot\overline{BC} = 6\cdot 4 + 2(3-t) = 0$

$\iff 24 + 6 - 2t = 0 \iff \underline{t = 15}$