

$$\begin{aligned} & \xrightarrow{2} \bar{a} \\ & \xrightarrow{1} \bar{b} = \frac{1}{2}\bar{a} \end{aligned}$$

$$\begin{aligned} & \xrightarrow{3} \bar{a} \\ & \xrightarrow{1} \bar{b} = \frac{1}{3}\bar{a} \end{aligned}$$

$$\begin{aligned} & \xrightarrow{\pi} \bar{a} \\ & \xrightarrow{1} \bar{b} = \frac{1}{\pi}\bar{a} \end{aligned}$$

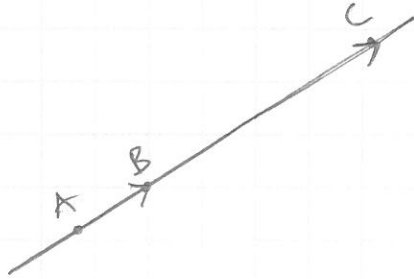
yleistetty

$$\begin{aligned} & \xrightarrow{\quad} \bar{a} \\ & \xrightarrow{1} \bar{a}^0 \end{aligned}$$

$$\bar{a}^0 = \frac{\bar{a}}{|\bar{a}|}$$

$\bar{a}$  in suunnainen yksikkövektori

20.18  $A = (2, -5)$ ,  $B = (7, 2)$ ,  $C = (87, 114)$



$$\begin{cases} \overline{AB} = 5\bar{i} + 7\bar{j} \\ \overline{AC} = 85\bar{i} + 119\bar{j} \end{cases}$$

$$\Rightarrow \overline{AC} = 17\overline{AB} \Rightarrow \overline{AB} \parallel \overline{AC}$$

$\Rightarrow A, B$  ja  $C$  ovat samalla suoralla  $\Rightarrow$  väite m.o.t

20.13  $\bar{u} = -12\bar{i} + 18\bar{j}$

a)  $\bar{v} = 14\bar{i} - 21\bar{j}$   
 $\bar{u} \parallel \bar{v} \Leftrightarrow \bar{u} = k\bar{v}$

$$\Leftrightarrow \frac{-12\bar{i} + 18\bar{j}}{\text{mää}} = k \frac{(14\bar{i} - 21\bar{j})}{\text{mää}} = \frac{14k\bar{i} - 21k\bar{j}}{\text{mää}}$$

$$\Rightarrow \begin{cases} -12 = 14k & \Leftrightarrow k = \frac{-12}{14} = -\frac{6}{7} \\ 18 = -21k & \Leftrightarrow k = \frac{18}{-21} = -\frac{6}{7} \end{cases}$$

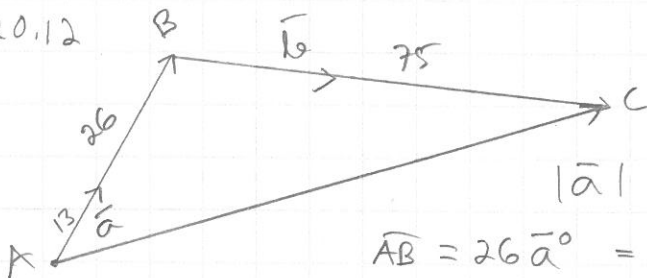
Siksi  $\bar{u} = -\frac{6}{7}\bar{v} \Rightarrow \bar{u} \parallel \bar{v}$

b)  $\bar{w} = -32\bar{i} + 58\bar{j}$   
 $\bar{u} \parallel \bar{w} \Leftrightarrow \bar{u} = k\bar{w}$

$$\Leftrightarrow \frac{-12\bar{i} + 18\bar{j}}{\text{mää}} = k \frac{(-32\bar{i} + 58\bar{j})}{\text{mää}} = \frac{-32k\bar{i} + 58k\bar{j}}{\text{mää}}$$

$$\Rightarrow \begin{cases} -12 = -32k & | :(-32) \Leftrightarrow k = \frac{3}{8} \\ 18 = 58k & | :58 \Leftrightarrow k = \frac{9}{29} \end{cases} \downarrow \Rightarrow \bar{u} \nparallel \bar{w}$$

20.12



$$A = (-5, 4), \bar{a} = 5\bar{i} - 12\bar{j}, \bar{b} = -24\bar{i} + 7\bar{j}$$

$$|\bar{a}| = \sqrt{5^2 + (-12)^2} = \sqrt{169} = 13$$

$$\overline{AB} = 26\bar{a}^0 = 26 \frac{\bar{a}}{|\bar{a}|} = 26 \frac{\bar{a}}{13} = 2\bar{a} = 2(5\bar{i} - 12\bar{j}) = 10\bar{i} - 24\bar{j}$$

$$|\bar{b}| = \sqrt{(-24)^2 + 7^2} = 25 \Rightarrow \overline{BC} = 3\bar{b} = -72\bar{i} + 21\bar{j}$$

$$\overline{AC} = \overline{AB} + \overline{BC} = (10\bar{i} - 24\bar{j}) + (-72\bar{i} + 21\bar{j}) = -62\bar{i} - 3\bar{j}$$

$$\Rightarrow C = (-5 - 62, 4 - 3) = (-67, 1)$$

20.14  $\bar{a} = (4t - 2)\bar{i} + 3t\bar{j}$   $\bar{b} = 3\bar{i} + 6t\bar{j}$

c)  $\bar{a} \parallel \bar{b} \Leftrightarrow \bar{a} = \lambda\bar{b}$

$$\Leftrightarrow \frac{(4t - 2)\bar{i} + 3t\bar{j}}{\text{mää}} = \lambda \frac{(3\bar{i} + 6t\bar{j})}{\text{mää}} = \frac{3\lambda\bar{i} + 6\lambda t\bar{j}}{\text{mää}}$$