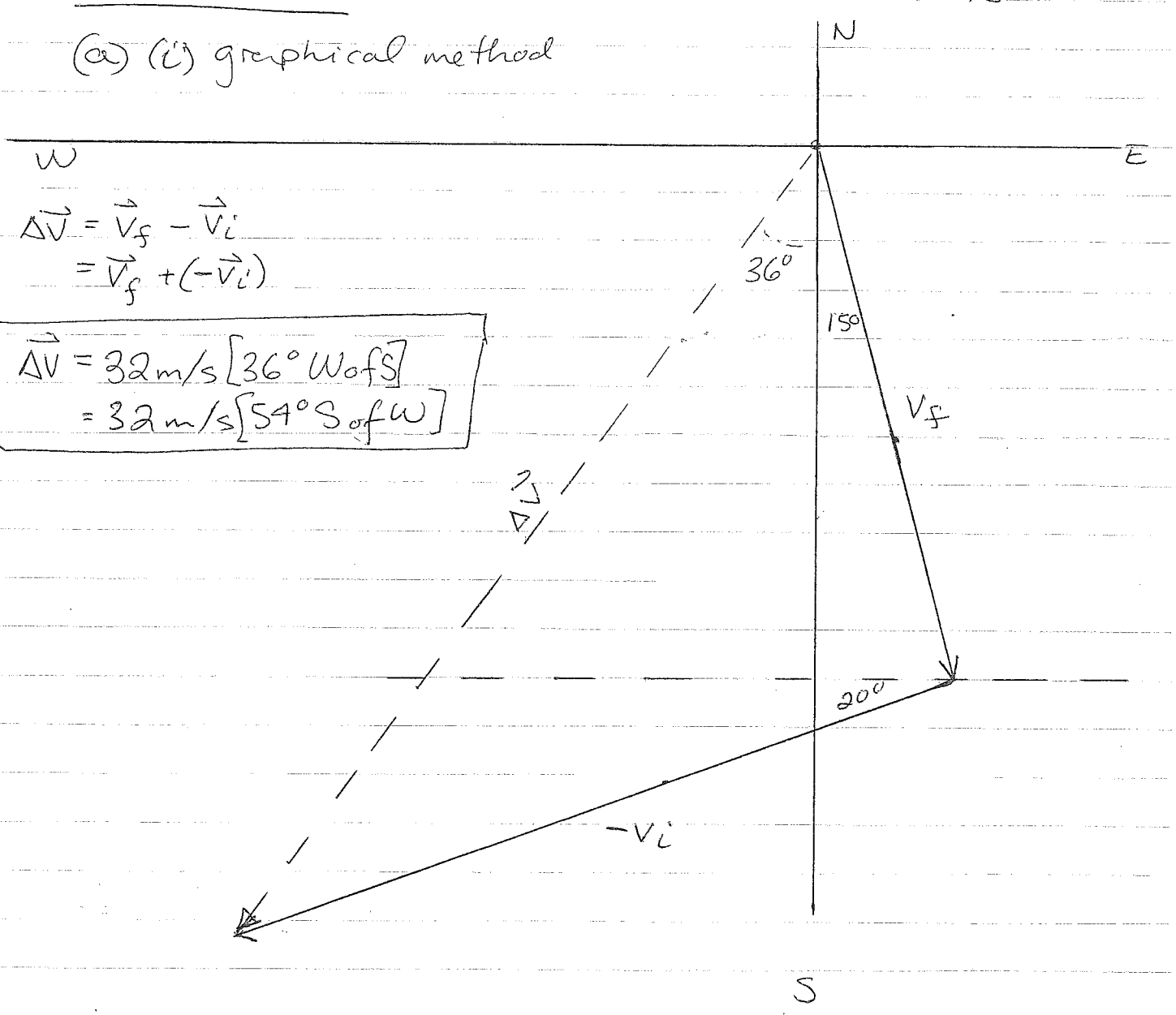
Solution:

scale: 1 cm : 2 m/s

(a) (i) graphical method

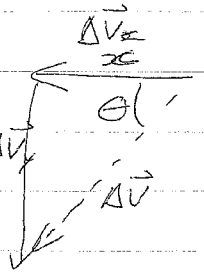


$$\Delta\vec{V} = \vec{V}_f - \vec{V}_i$$
$$= \vec{V}_f + (-\vec{V}_i)$$

$$\boxed{\Delta\vec{V} = 32\ m/s\ [36°\ W\ of\ S] \\ = 32\ m/s\ [54°\ S\ of\ W]}$$

(ii) analytical (component) method

Vectors	x	y
V_f	$18\sin 15°$	$-18\cos 15°$
$-V_i$	$-25\cos 20°$	$-25\sin 20°$
$\Delta\vec{V} = \vec{V_f} + (-V_i)$	-18.833357 m/s	-25.937 m/s



$$\Delta\vec{V} = \sqrt{\Delta V_x^2 + \Delta V_y^2} = \sqrt{(-18.83357)^2 + (-25.937)^2} = 32.1 \text{ m/s}$$

$$\theta = \tan^{-1}\left[\frac{\Delta V_y}{\Delta V_x}\right] = \tan^{-1}\left[\frac{-25.937}{-18.833357}\right] = 54.0°$$

$$\therefore \Delta\vec{V} = 32.1 \text{ m/s } [54.0° \text{ S of W}]$$
$$= 32.1 \text{ m/s } [36.0° \text{ W of S}]$$

(b) $$\vec{a} = \frac{\Delta\vec{V}}{\Delta t} = \frac{31.76236 \text{ m/s } [54.0° \text{ S of W}]}{20.0 \text{ s}}$$

$$\vec{a} = 1.59 \text{ m/s}^2 [54.0° \text{ S of W}]$$
$$= 1.59 \text{ m/s}^2 [36.0° \text{ W of S}]$$