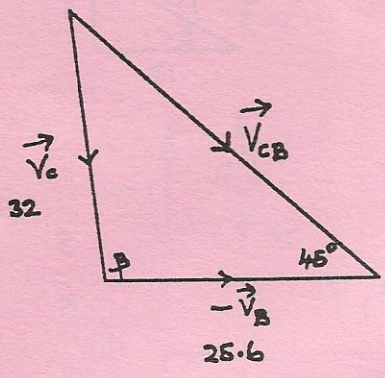
1996

2



(i) **Relative velocity diagram** 5

$$\frac{\sin(135-\beta)}{25.6} = \frac{\sin 45}{32} \qquad 5$$

$$\Rightarrow \quad 135-\beta = 34.45°$$

$$\Rightarrow \quad \beta = 100.55° \qquad 5 \quad 15$$

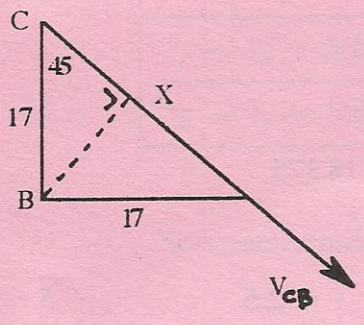
(ii) $$\frac{\vec{V}_{CB}}{\sin\beta} = \frac{32}{\sin 45} \qquad 5$$

$$\Rightarrow \quad \vec{V}_{CB} = 44.49 \text{ km/h} \qquad 5 \quad 10$$

(iii) shortest distance = |BX|

= 17 sin 45 5

= 12.02 km 5 10



(iv) time = $\frac{2\,|CX|}{V_{CB}}$ 5

= $\frac{2\,(17\cos 45)}{44.49}$ 5

= 0.54 hours 5 15

(i) $\vec{V}_{CB} = x\vec{i} - x\vec{j}$

$\vec{V}_{CB} = \vec{V}_C - \vec{V}_B$ 5

$x\vec{i} - x\vec{j} = \vec{V}_C + 25.6\vec{i}$

$\vec{V}_C = (x-25.6)\vec{i} - x\vec{j}$

$\Rightarrow \quad 32^2 = (x-25.6)^2 + x^2$

$\Rightarrow \quad x = 31.46$ 5

$\Rightarrow \quad \vec{V}_C = (31.46-25.6)\vec{i} - 31.46\vec{j}$

$\Rightarrow$ direction = 79.45° South of East 5 15

(ii) $\vec{V}_{CB} = 31.46\vec{i} - 31.46\vec{j}$ 5

$\Rightarrow \quad |\vec{V}_{CB}| = 44.49$ km/h 5 10