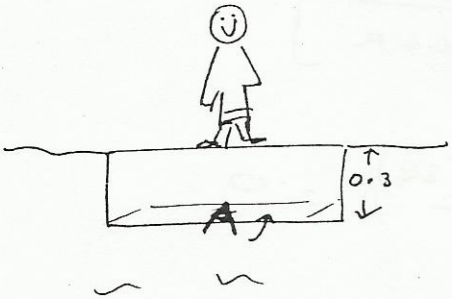
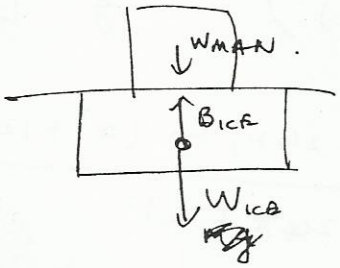
1997

1997

9. *(a)* What is the area of the underside of the smallest rectangular block of ice 30 cm thick that will support a man of mass 80 kg? The relative density of the ice is 0.917 and it is floating in sea-water of relative density 1.03.

9. Let A = the area of the block of ice.





$W_{MAN} + W_{ICE} = B_{ICE}$

Volume of ice $= 0.3A$

$W_{ICE} = Vsg = 0.3A\,(917)\,g = 275.1\,Ag$

$W_{MAN} = 80g$

B_{ICE} = Weight of water displaced $= Vsg$

$= (0.3A)(1030)\,g = 309\,Ag$

$W_{MAN} + W_{ICE} = B_{ICE}$

$80g + 275.1Ag = 309Ag$

$80 = 33.9A$

$A = 2.36\ m^2$.