

3(a)		Area	From AD	From AB
	$ABCD$	$4a^2$	a	a
	AED	a^2	$\frac{1}{3}a$	$\frac{2}{3}a$
	BCF	ah	$2a - \frac{1}{3}h$	$\frac{4}{3}a$
	Shape $BFDE$	$3a^2 - ah$	$\bar{x}$	$\bar{y}$
Taking moments about AD :				
$(3a^2 - ah)\bar{x} = 4a^2 \times a - a^2 \times \frac{1}{3}a - ah \times (2a - \frac{1}{3}h)$				
$\bar{x} = \frac{\frac{11}{3}a^3 - 2a^2h + \frac{1}{3}ah^2}{3a^2 - ah} = \frac{\frac{1}{3}a(h^2 - 6ah + 11a^2)}{a(3a - h)} = \frac{h^2 - 6ah + 11a^2}{3(3a - h)}$				
Taking moments about AB :				
$(3a^2 - ah)\bar{y} = 4a^2 \times a - a^2 \times \frac{2}{3}a - ah \times \frac{4}{3}a$				
$\bar{y} = \frac{2a(5a - 2h)}{3(3a - h)}$				

3(a)	Alternative method for question 3(a)			
		Area	From AD	From AB
	DEF	$a(2a - h)$	$\frac{1}{3}(3a - h)$	$\frac{4}{3}a$
	EBF	a^2	$\frac{1}{3}(5a - h)$	$\frac{2}{3}a$
	Shape $BFDE$	$3a^2 - ah$	$\bar{x}$	$\bar{y}$
	Taking moments about AD :			
	$(3a^2 - ah)\bar{x} = a(2a - h) \times \frac{1}{3}(3a - h) + a^2 \times \frac{1}{3}(5a - h)$			
	$\bar{x} = \frac{\frac{1}{3}a(6a^2 - 5ah + h^2 + 5a^2 - ah)}{3a^2 - ah} = \frac{\frac{1}{3}a(h^2 - 6ah + 11a^2)}{a(3a - h)} = \frac{h^2 - 6ah + 11a^2}{3(3a - h)}$			
	Taking moments about AB :			
	$(3a^2 - ah)\bar{y} = a(2a - h) \times \frac{4}{3}a + a^2 \times \frac{2}{3}a$			
	$\bar{y} = \frac{2a(5a - 2h)}{3(3a - h)}$			
3(b)	$\bar{x} \geq a$ meaning $h^2 - 3ah + 2a^2 \geq 0$			
	$[0 <] h \leq a, h = 2a.$			