

3	For attempt to resolve in any direction to form an equation or expression
	Vertically: $(Y =) \pm(45 + 28 \sin 35 - 72 \sin 50 - 35 \sin 60)$
	Horizontally: $(X =) \pm(28 \cos 35 + 72 \cos 50 - 35 \cos 60)$
	$R = \sqrt{(\text{their } 24.4059 \dots)^2 + (\text{their } 51.7169 \dots)^2}$
3	$\theta = \tan^{-1} \left(\frac{\text{their } 24.4059 \dots}{\text{their } 51.7169 \dots} \right) [= \tan^{-1} 0.4719 \dots]$
	OR $\alpha = \tan^{-1} \left(\frac{\text{their } 51.7169 \dots}{\text{their } 24.4059 \dots} \right) [= \tan^{-1} 2.1190 \dots]$
	$R = 57.2 \text{ N}$ Direction is 25.3° below the positive x -direction or bearing 115°

7(a)	For attempt to resolve in any direction to form an expression or equation
	$[X =] \pm(30 \cos 30 + 15 \cos 45 - 20 \cos 20)$ OR $[S \cos \alpha =] \pm(30 \cos 30 + 15 \cos 45 - 20 \cos 20)$
	$[Y =] \pm(25 + 15 \sin 45 - 20 \sin 20 - 30 \sin 30)$ OR $[S \sin \alpha =] \pm(25 + 15 \sin 45 - 20 \sin 20 - 30 \sin 30)$
	$S = \sqrt{(\text{their } 17.7935 \dots)^2 + (\text{their } 13.76661 \dots)^2}$ OR $S = \frac{\text{their } 17.7935 \dots}{\cos(\text{their } 37.7278 \dots)}$ OR $S = \frac{\text{their } 13.76661 \dots}{\sin(\text{their } 37.7278 \dots)}$
	$\alpha = \tan^{-1} \left(\frac{\text{their } 13.7661 \dots}{\text{their } 17.7935 \dots} \right)$ OR $\alpha = \cos^{-1} \left(\frac{\text{their } 17.7935 \dots}{\text{their } 22.4970 \dots} \right)$ OR $\alpha = \sin^{-1} \left(\frac{\text{their } 13.7661 \dots}{\text{their } 22.4970 \dots} \right)$
	$[S =] 22.5 \quad [\alpha =] 37.7$

7(b)	$(\text{their } 17.7935\dots) - F = 0.6a$ OR $30\cos 30 + 15\cos 45 - 20\cos 20 - F = 0.6a$
	OR $(\text{their } S)\cos(\text{their } \alpha) - F = 0.6a$ [17.8025 - $F = 0.6a$]
	$2 = 0 + \frac{1}{2}a \times 3^2 \left[a = \frac{4}{9} \right]$
	$R = \text{their}(13.7661\dots) + 0.6g$ [= 19.7661...] OR $R = 25 + 15\sin 45 - 20\sin 20 - 30\sin 30 + 0.6g$
	OR $R = (\text{their } S)\sin(\text{their } \alpha) + 0.6g$ [$R = 13.759 + 0.6g$]
	$(\text{their } 17.7935)\dots - \mu \times 19.7661 = 0.6 \times \left(\text{their } \frac{4}{9} \right)$
	$\mu = 0.887$

7(b)	Alternative scheme for using energy
	$\frac{1}{2} \times 0.6 \times v^2 = (\text{their } 17.7935) \times 2 - F \times 2$
	OR $\frac{1}{2} \times 0.6 \times v^2 = (30\cos 30 + 15\cos 45 - 20\cos 20) \times 2 - F \times 2$
	OR $\frac{1}{2} \times 0.6 \times v^2 = (\text{their } S)\cos(\text{their } \alpha) \times 2 - F \times 2$
	$2 = \frac{1}{2}(0 + v) \times 3 \left[v = \frac{4}{3} \right]$
	$R = \text{their}(13.7661\dots) + 0.6g$ [= 19.7661...] OR $R = 25 + 15\sin 45 - 20\sin 20 - 30\sin 30 + 0.6g$
	OR $R = (\text{their } S)\sin(\text{their } \alpha) + 0.6g$ [$R = 13.759 + 0.6g$]
	$\frac{1}{2} \times 0.6 \times \left(\text{their } \frac{4}{3} \right)^2 = (\text{their } 17.7935) \times 2 - 19.7661 \times \mu \times 2$
	$\mu = 0.887$

2	$P + 5\sin 60 - 10\sin 30 = 0$
	$P = 5 - 5\frac{\sqrt{3}}{2}$ or 0.670 [0.66987...]
	$Q = \pm(10\cos 30 - 5\cos 60)$
	$Q = 10\frac{\sqrt{3}}{2} - \frac{5}{2}$ or 6.16 [6.16025...]