ALEXANDER ROAD HIGH SCHOOL

March 2021 | **PHYSICAL SCIENCES CONTROL TEST** | 50 MINUTES

JA | **GRADE 11 MEMO** | TOTAL = 50

QUESTION 1:

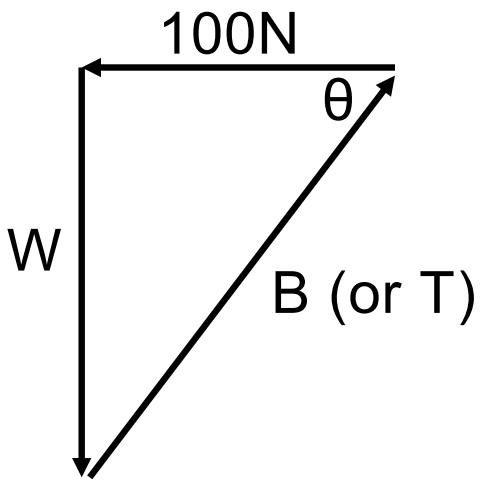
1.1 B ✓✓

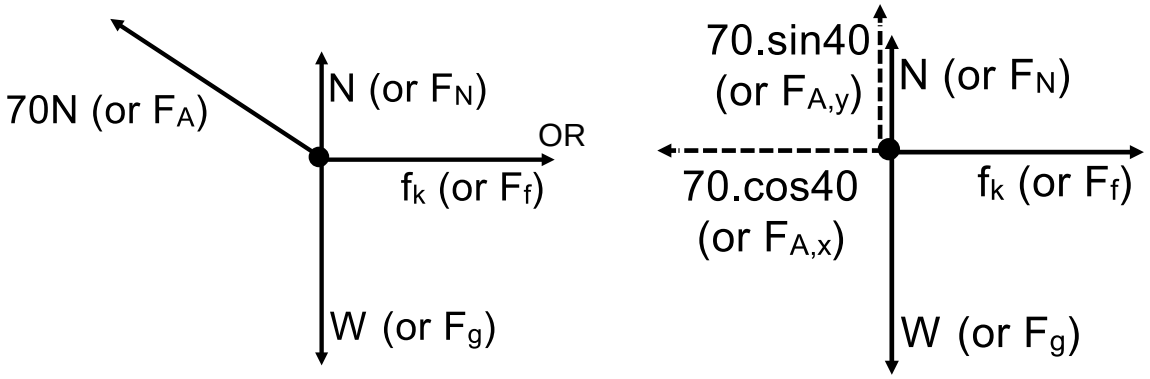
1.2 D ✓✓

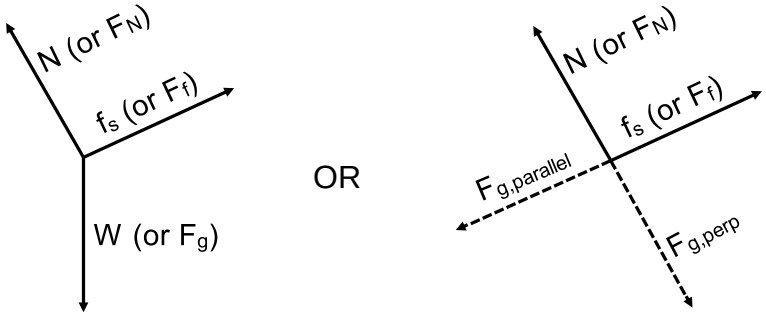
1.3 A ✓✓

1.4 C ✓✓

TOTAL SECTION A = [8]

2.1	A single vector having the same effect as two or more vectors together. ✓✓ (2 or 0)
2.2	✓ 100N (direction & label) ✓ W (direction & label) ✓ B (direction & label) ✓ θ 
2.3	$W = mg$ ✓ $= (25)(9{,}8)$ ✓ $= 245\ N$ downwards ✓ (MUST INCLUDE DIRECTION)
2.4	$B^2 = (100)^2 + (245)^2$ ✓ $B = 264{,}62\ N$ ✓
2.5	$\tan(\theta) = \frac{245}{100}$ ✓ $\theta = \tan^{-1}\left(\frac{245}{100}\right) = 67{,}80°$ ✓
2.6	$B_x = 100\ N$ ✓ (to the right) $B = \frac{100}{\cos(60°)}$ ü $= 200\ N$ $F_g = \sqrt{(200)^2 - (100)^2} = 173{,}205\ldots\ N$ ✓ $m = \frac{173{,}205\ldots}{9{,}8} = 17{,}67\ kg$ ✓

3.1	A body will remain in its state of rest or motion at constant velocity unless a non-zero net force acts on it. ✓✓ (2 or 0)
3.2	✓ F_A ✓ F_g ✓ f_k ✓ N 
3.3	$F_{net,y} = 0$ $N + F_{A,x} - F_g = 0$ ✓(mark is for summing the forces correctly and making = 0) $N + 70.\sin 40° - (10)(9{,}8) = 0$ ✓(mark is for calculating the y-component AND the weight correctly) $N = 53\ N$ ✓
3.4	$F_{A,x} = 70.\cos(40°)$ ✓ $F_{net,x} = 0$ $f_k - F_{A,x} = 0$ $f_k = F_{A,x} = 70.\cos 40° = 53{,}62\ldots$ ü $\mu_k = \frac{f_k}{N}$ ü(NO mark if no substitution into formula) $\mu_k = \frac{53{,}62\ldots}{53} = 1{,}01$ ü

4.1	The force that opposes the tendency of motion of a stationary object (relative to a surface). ✓✓ (2 or 0)
4.2	✓ F_g ✓ f_s ✓ N 
4.3	$\mu_s = \frac{f_{s,max}}{N}$ ü(NO mark if no substitution into formula) $\mu_s = \frac{F_{g\parallel}}{F_{g\perp}}$ ü(mark for recognising $f_{s,max}=F_{g\parallel}$) ü(mark for recognising $N=F_{g\perp}$) $= \frac{(65)(9{,}8)(\sin\theta)}{(65)(9{,}8)(\cos\theta)}$ $0{,}6 = \tan\theta$ ü $\theta = 30{,}96°$ ü
4.4	REMAIN THE SAME. ✓ The coefficient of static friction is constant for any pair of surfaces. ✓