

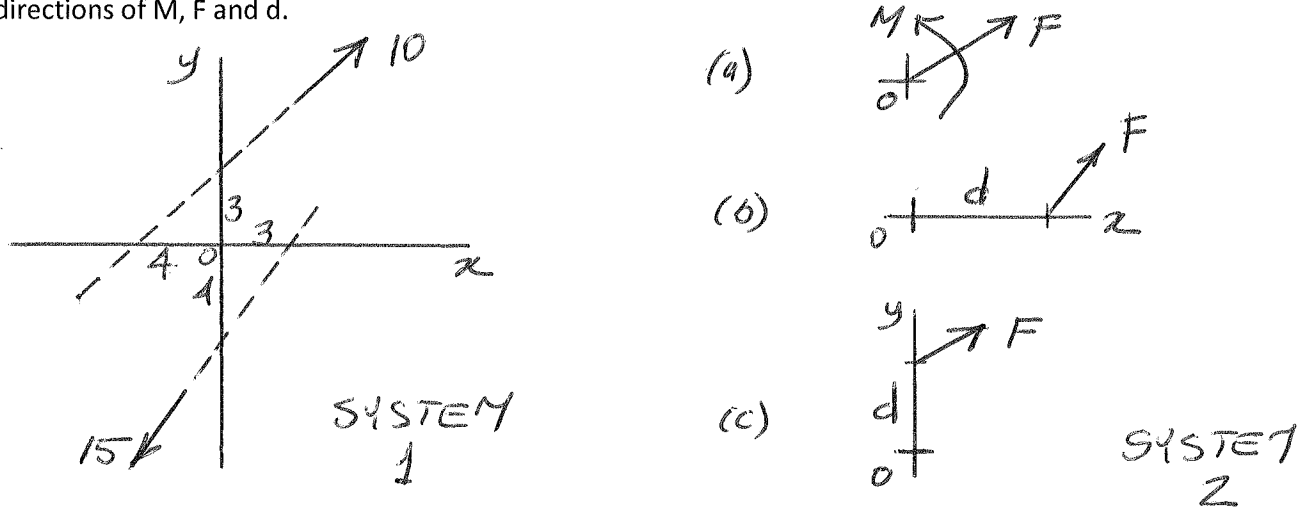
ALL the following apply in this test

Name:

- Points will be deducted for statics equations that are not supported by a proper FBD.
- Points will be deducted for answers that are not supported by proper calculations.

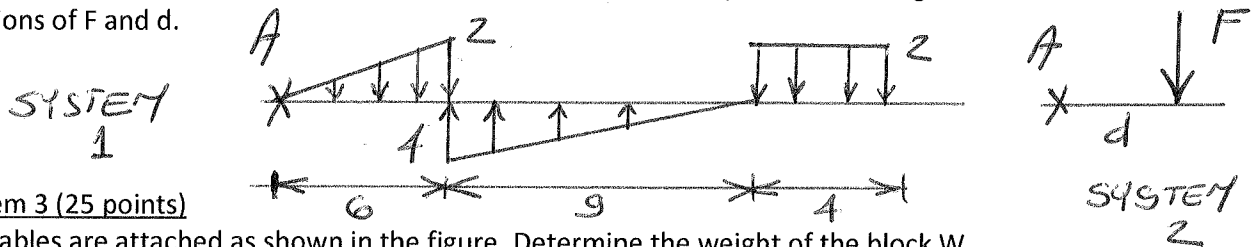
Problem 1 (25 points)

Consider System 1 which consists of two forces as shown. Replace System 1 by an equivalent System 2, solve each case separately. For case (a) determine F and M; for case (b) determine F and d; and for case (c) determine F and d. For each case draw the updated diagram for System 2 showing the values and directions of M, F and d.



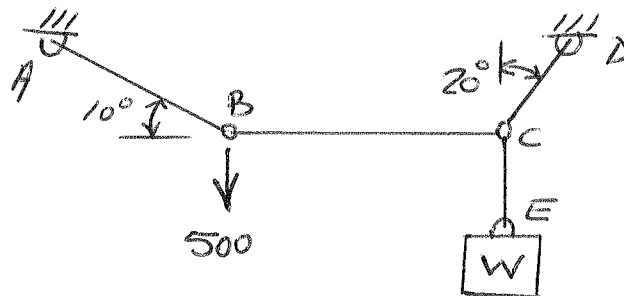
Problem 2 (25 points)

Consider System 1 which consists of three distributed loads as shown. Replace System 1 by an equivalent System 2. Determine F and d and draw the updated diagram for System 2 showing the values and directions of F and d.



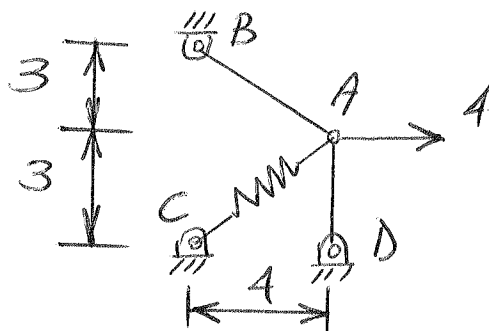
Problem 3 (25 points)

Four cables are attached as shown in the figure. Determine the weight of the block W.



Problem 4 (25 points)

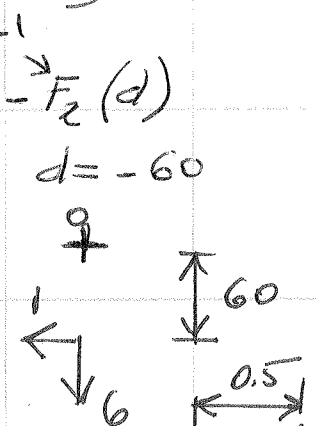
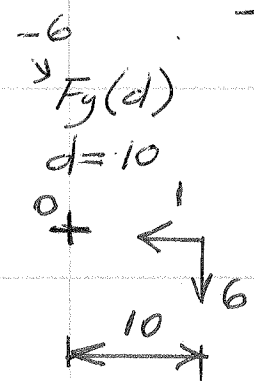
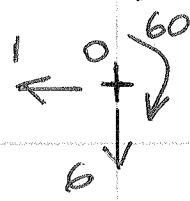
Consider two cables (AB and AD) and one spring (AC) as shown in the figure. Given that the spring constant $k_{AC} = 10$ and the original length $L_{AC}^0 = 5.2$. Determine the tension in cable AD.



TEST # 1
USE FOR ANSWERS

(1)	sys #1	(a)	sys #2	(b)	sys #3	(c)	sys #4
\rightarrow	$10 \times \frac{4}{5} - 15 \times \frac{3}{5} = -1$	F_x	F_x	F_x	F_x	F_x	F_x
\uparrow	$10 \times \frac{3}{5} - 15 \times \frac{4}{5} = -6$	F_y	F_y	F_y	F_y	F_y	F_y
\curvearrowright	$-10 \times \frac{4}{5}(3) - 15 \times \frac{3}{5}(4) = -60$	M	$F_y(d)$	$F_y(d)$	$F_y(d)$	$F_y(d)$	$F_y(d)$
			$d=10$	$d=10$	$d=-60$	$d=-60$	$d=-60$

UPDATED DIAGRAM



(2)	sys #1	sys #2	sys #4
\uparrow	$-6 + 18 - 8 = +4$	$-F$	$F = -4$
\curvearrowright	$-6(4) + 18(9) - 8(17) = 2$	$-F(d)$	$d = 0.5$

(3)	Equations	Diagram	Equations
\uparrow	$T_{AB} \sin 10 - 500 = 0$		$-T_{AC} + T_{CD} \sin 20 = 0$
	$T_{AB} = 2879.4$		2835.7
\rightarrow	$-T_{AB} \cos 10 + T_{BC} = 0$		$T_{BC} = 2835.7$
	$T_{BC} = 2835.7$		$T_{CD} \cos 20 - W = 0$
			$W = 7791$

(4)	Diagram	Equations
		$\rightarrow -T_{AB} \frac{4}{5} + 2 \frac{4}{5} + 4 = 0$
		$T_{AB} = 7$
		$\uparrow T_{AB} \frac{3}{5} + 2 \frac{3}{5} - T_{AD} = 0$
		$T_{AD} = 5.4$
	<p>SPRING</p> <p>$F_{AC} = k_{AC} \Delta L_{AC} = -2$</p> <p>$\uparrow$ 10 \uparrow (5-5.2)</p> <p>COMPRESSION</p>	