Which of the following situations satisfy both the first condition for equilibrium (net force $= 0$) and the second condition for equilibrium (net torque $= 0$)?

A. an automobile crankshaft turning at an increasing angular speed in the engine of a parked car

B. a seagull gliding at a constant angle below the horizontal and at a constant speed

C. a thrown baseball that does not rotate as it sails through the air

D. more than one of the above

E. none of the above
Which of the following situations satisfy *both* the first condition for equilibrium (net force = 0) and the second condition for equilibrium (net torque = 0)?

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E. none of the above
Q11.2

A rock is attached to the left end of a uniform meter stick that has the same mass as the rock. How far from the left end of the stick should the triangular object be placed so that the combination of meter stick and rock is in balance?

A. less than 0.25 m
B. 0.25 m
C. between 0.25 m and 0.50 m
D. 0.50 m
E. more than 0.50 m
A11.2

A rock is attached to the left end of a uniform meter stick that has the same mass as the rock. How far from the left end of the stick should the triangular object be placed so that the combination of meter stick and rock is in balance?

A. less than 0.25 m  
B. 0.25 m  
C. between 0.25 m and 0.50 m  
D. 0.50 m  
E. more than 0.50 m
Q11.3

A metal advertising sign (weight $w$) is suspended from the end of a massless rod of length $L$. The rod is supported at one end by a hinge at point $P$ and at the other end by a cable at an angle $\theta$ from the horizontal.

What is the tension in the cable?

A. $T = w \sin \theta$

B. $T = w \cos \theta$

C. $T = \frac{w}{\sin \theta}$

D. $T = \frac{w}{\cos \theta}$

E. none of the above
A11.3

A metal advertising sign (weight $w$) is suspended from the end of a massless rod of length $L$. The rod is supported at one end by a hinge at point $P$ and at the other end by a cable at an angle $\theta$ from the horizontal.

What is the tension in the cable?

A. $T = w \sin \theta$

B. $T = w \cos \theta$

C. $T = w/(\sin \theta)$

D. $T = w/(\cos \theta)$

E. none of the above
A11.4

A metal advertising sign (weight \( w \)) is suspended from the end of a massless rod of length \( L \). The rod is supported at one end by a hinge at point \( P \) and at the other end by a cable at an angle \( \theta \) from the horizontal.

Which of these forces is least?

A. the weight of the sign  
B. the tension in the cable  
C. the vertical force component exerted on the rod by hinge \( P \)  
D. two or more of these are tied for greatest
A11.4

A metal advertising sign (weight \( w \)) is suspended from the end of a massless rod of length \( L \). The rod is supported at one end by a hinge at point \( P \) and at the other end by a cable at an angle \( \theta \) from the horizontal.

Which of these forces is least?

A. the weight of the sign  
B. the tension in the cable  
C. the vertical force component exerted on the rod by hinge \( P \)  
D. two or more of these are tied for greatest

\[ \checkmark \]
Q11.5

Two rods are made of the same kind of steel and have the same diameter.

A force of magnitude $F$ is applied to the end of each rod. Compared to the rod of length $L$, the rod of length $2L$ has

A. more stress and more strain.

B. the same stress and more strain.

C. the same stress and less strain.

D. less stress and less strain.

E. the same stress and the same strain.
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A force of magnitude $F$ is applied to the end of each rod. Compared to the rod of length $L$, the rod of length $2L$ has

A. more stress and more strain.

B. the same stress and more strain.

C. the same stress and less strain.

D. less stress and less strain.

✓ E. the same stress and the same strain.
Q11.6

Two rods are made of the same kind of steel. The longer rod has a greater diameter.

A force of magnitude $F$ is applied to the end of each rod. Compared to the rod of length $L$, the rod of length $2L$ has

A. more stress and more strain.

B. the same stress and more strain.

C. the same stress and less strain.

D. less stress and less strain.

E. the same stress and the same strain.
A11.6

Two rods are made of the same kind of steel. The longer rod has a greater diameter.

A force of magnitude $F$ is applied to the end of each rod. Compared to the rod of length $L$, the rod of length $2L$ has

A. more stress and more strain.

B. the same stress and more strain.

C. the same stress and less strain.

D. less stress and less strain.

E. the same stress and the same strain.