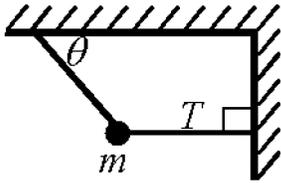


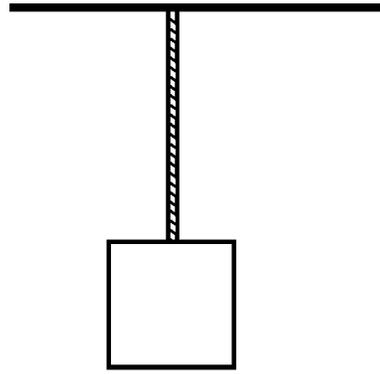
1.



Two massless strings of equal length are used to suspend a ball as shown above. If the tension in the first string is  $T$ , what is the tension in the second string?

- 1)  $T \sin \theta$
  - 2)  $T \cos \theta$
  - 3)  $\frac{T}{\cos \theta}$
  - 4)  $mg - T$
  - 5)  $mg - T \sin \theta$
2. A box of mass 50 kg is held by two identical, vertical, and massless ropes. What is the tension in each string?
- 1) 50 N
  - 2) 250 N
  - 3) 500 N
  - 4) 300 N
  - 5) 100 N

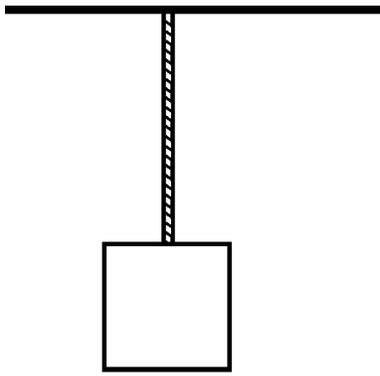
3.



A uniform rope of weighing 30 N hangs from a ceiling as shown above. A box of weight 50 N hangs from the rope. What is the tension in the rope?

- 1) 50 N throughout the rope.
- 2) 65 N throughout the rope.
- 3) 80 N throughout the rope.
- 4) It varies from 50 N at the bottom of the rope to 80 N at the top.
- 5) It varies from 80 N at the bottom of the rope to 50 N at the top.

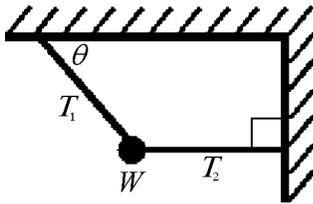
4.



A uniform rope of weight 60 N hangs from a ceiling as shown above. A box of weight 90 N hangs from the rope. What is the ratio of the tension at the top of the rope to the tension at the bottom?

- 1)  $\frac{2}{5}$
- 2)  $\frac{2}{3}$
- 3) 1
- 4)  $\frac{3}{2}$
- 5)  $\frac{5}{3}$

Base your answers to questions 5 and 6 on the diagram below which shows an object of weight  $W$  is suspended from two massless strings.



5. The tension in string  $T_1$  is

- 1)  $W$
- 2)  $W \sin \theta$
- 3)  $\frac{W}{\sin \theta}$
- 4)  $W \cos \theta$
- 5)  $\frac{W}{\cos \theta}$

6. The tension in string  $T_2$  is

- 1)  $W \cos \theta$
- 2)  $\frac{W}{\cos \theta}$
- 3)  $\frac{W}{\tan \theta}$
- 4)  $W \tan \theta$
- 5)  $W \sin \theta$

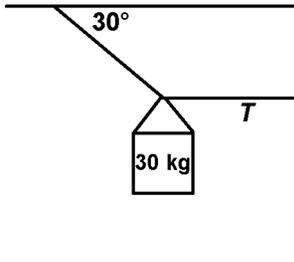
7. A uniform rope of weight 50 N hangs from a ceiling. A box hangs from the bottom of the rope. The ratio of tension at the top of the rope to the tension at the bottom is 3:1. What is the mass of the box?

- 1) 100 kg
- 2) 50 kg
- 3) 20 kg
- 4) 10 kg
- 5) 2.5 kg

8. A ball of mass  $m$  hangs vertically from a massless string experiencing a tension  $T$ . What force is required to pull the ball out to an angle  $\theta$  from the vertical?

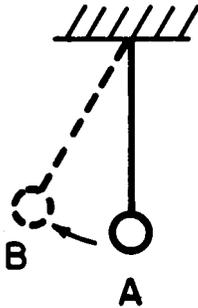
- 1)  $mg \sin \theta$
- 2)  $mg \cos \theta$
- 3)  $mg \tan \theta$
- 4)  $2mg \tan \theta$
- 5)  $mg/\cos \theta$

9. Base your answer to the following question on the diagram below.



Assuming the strings are massless, what is the tension  $T$ ?

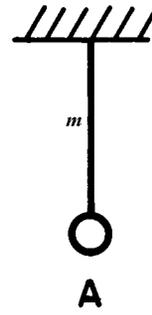
- 1) 175 N
  - 2) 300 N
  - 3) 450 N
  - 4) 520 N
  - 5) 600 N
10. Base your answer to the following question on the diagram below.



At what point during the pendulum's motion is the tension in the string the greatest if  $B$  is the maximum displacement of the pendulum? (Note: the maximum angular displacement is less than  $\pi/3$ .)

- 1) at point  $A$
- 2) at point  $B$
- 3) between point  $A$  and point  $B$
- 4) the tension is always the same
- 5) not enough information is given

11. Base your answer to the following question on the diagram below.



A pendulum consists of a bob of mass  $A$  hanging from a string of non-zero mass  $m$ . Its maximum displacement is  $\pi/4$ . What is true of the tension in the string?

- 1) It is greatest at the top.
- 2) It is greatest at the bottom.
- 3) It is uniform throughout.
- 4) It does not vary when the pendulum is put in motion.
- 5) It is greatest when the pendulum is at its maximum amplitude.

**Answer Key**  
**Two Dimensional Motion with Calculus [Mar 28, 2011]**

1.   3  

2.   2  

3.   4  

4.   5  

5.   3  

6.   3  

7.   5  

8.   3  

9.   4  

10.   1  

11.   1  

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Name \_\_\_\_\_

Class \_\_\_\_\_

Date \_\_\_\_\_

1. \_\_\_\_\_

2. \_\_\_\_\_

3. \_\_\_\_\_

4. \_\_\_\_\_

5. \_\_\_\_\_

6. \_\_\_\_\_

7. \_\_\_\_\_

8. \_\_\_\_\_

9. \_\_\_\_\_

10. \_\_\_\_\_

11. \_\_\_\_\_