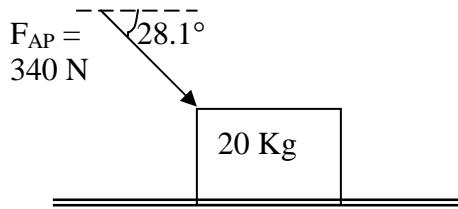**Physics Practice Test 2-2A   Work & Energy**

Use $g = \pm 10 \text{ m/s}^2$ where necessary

Problem I

An applied force of 340 N at 28.1° below the horizontal moves a 20 Kg box from rest. The coefficient of friction between box and level floor is $\mu = 0.4$. The applied force acts on the box for a distance of 5 m.

$F_{AP} =$ 28.1°
340 N

20 Kg

1. The work done by the applied force is ___ Joules.
   A) 800   B) 1200   C) 1500   D) 1700
2. The work done by gravity is ___ J.
   A) 0   B) 400   C) 1000   D) 1500
3. The work done by friction is -___J.
   A) 400   B) 580   C) 720   D) 1000
4. The net work done on the box over the total distance of 5 m is ___ Joules.
   A) 340   B) 780   C) 1120   D) 1460
5. The speed of the box at the end of the 5 meter displacement is ___ m/s.
   A) 5.8   B) 8.8   C) 10.6   D) 12.1

Problem II

A 30 Kg crate is placed at rest at the top of a 5 m long ramp that has been raised 36.9° above the horizontal. Let $\mu = 0.5$

36.9°
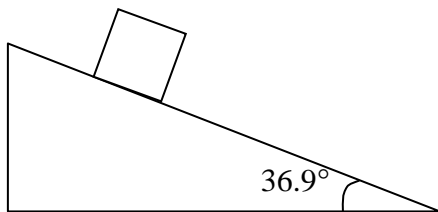
6. The work done by gravity moving the crate down the ramp is +____ Joules.
   A) 600   B) 900   C) 1200   D) 1500
7. The work done by friction is -___J.
   A) 600   B) 90   C) 1200   D) 1500

8. The work done by the normal force is ___J.
   A) 0   B) 300   C) 600   D) 900
9. The net work done on the crate by all forces moving the block from top to bottom is ___ Joules.
   A) 150 B) 300   C) 450   D) 600
10. The final speed of the crate at the bottom of the ramp is ___ m/s.
   A) 3.2   B) 4.5   C) 5.5   D) 6.3

Problem III

A 50 Kg cart and child start at the top of a frictionless roller coaster at a speed of 5 m/s. The cart is initially 6 m above the ground. The cart moves down a hill to the bottom of the ride before rising to a final height of 3 meters.

6 m

3m
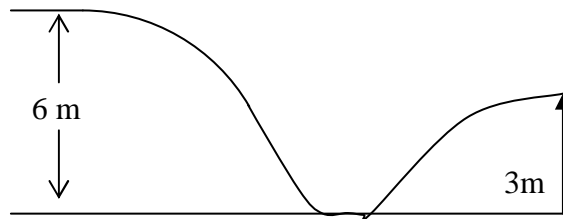
11. The initial potential energy of the cart is ___ Joules.
   A) 30   B) 300   C) 3000   D) 30000
12. The initial kinetic energy of the cart is __ Joules.
   A) 225   B) 625   C) 925   D) 1325
13. The total mechanical energy of the cart at the end of the ride is ___ Joules.
   A) 925   B) 3225   C) 3625   D) 31325
14. The speed of the cart at the lowest point is ___ m/s.
   A) 12   B) 14   C) 16   D) 18
15. The speed of the cart when it is 3 m above the lowest point is ___ m/s.
   A) 9.2   B) 11.2   C) 13.2   D) 15.2

Problem IV

A 6 Kg ball is tied to the end of a 2 m long cable. The other end of the cable is attached to a support. While the cable is held vertical the ball is given an initial speed of 10 m/s by means of a rapid impulse. Let h=0m be at the bottom of the swing.
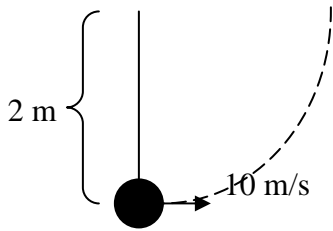
16. The initial total energy of ball is __J.
    A) 200 B) 300 C) 400 D) 500
17. The potential energy of the ball when it half-way up the circle is ___ Joules.
    A) 120 B) 180 C) 240 D) 300
18. The speed of the ball when the cable is horizontal is ___ m/s.
    A) 2.2 B) 4.4 C) 5.5 D) 7.7
19. The kinetic energy of the ball at the top of the circle is ___ Joules.
    A) 60 B) 120 C) 180 D) 240
20. The speed of the ball when it is directly above the starting point is ___ m/s.
    A) 0 B) 4.5 C) 6.3 D) 7.7

Problem V

A 2 Kg cat falls from rest from the top of a 9 m high tree. Due to the air resistance acting against the cat's fur the cat lands on its feet at a speed of 4 m/s.

21. The initial potential energy of the cat is ___ Joules.
    A) 90 B) 120 C) 150 D) 180
22. The final kinetic energy of the cat is ___ Joules.
    A) 8 B) 12 C) 16 D) 32

23. The work done by air resistance on the cat is -___ Joules.
    A) 132 B) 164 C) 196 D) 228
24. The average force of air resistance acting against the cat while falling is about ___ N up.
    A) 14 B) 16 C) 18 D) 20

Answers
1. C
2. A
3. C
4. B
5. B
6. B
7. A
8. A
9. B
10. B
11. C
12. B
13. C
14. A
15. A
16. B
17. A
18. D
19. A
20. B
21. D
22. C
23. B
24. C

A second practice test can be found on the following pages. Also, be sure to go back to the vertical centripetal forces problems from the previous practice test.

Physics Practice Test 2-2 B   **Work & Energy**
Use g = ± 10 m/s^2 where necessary

Problem I
An applied force of 260 N at 22.6°
above the horizontal moves a 20 Kg box
from rest. The coefficient of friction
between box and level floor is μ = 0.4.
The applied force acts on the box for a
distance of 6 m.

F_{AP} =
260 N

22.6°

20 Kg
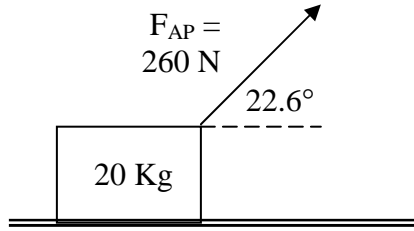
1. The work done by the applied force
    is ___ Joules.
    A) 880   B) 1220 C) 1440 D) 1560
2. The work done by gravity is ___ J.
    A) 0   B) 400   C) 1000   D) 1500
3. The work done by friction is -___J.
    A) 240   B) 480   C) 720   D) 960
4. The net work done on the box over
    the total distance of 6 m is ___
    Joules.
    A) 340   B) 780   C) 1200 D) 1460
5. The speed of the box at the end of
    the 6 meter displacement is ___ m/s.
    A) 5.8   B) 8.8   C) 11.0   D) 12.7

Problem II
A 30 Kg crate is moved from rest at the
bottom of a 5 m long ramp that is raised
36.9° above the horizontal. Let μ = 0.5.
The applied force is 500 N up the ramp.
 F_{AP} = 500 N

36.9°
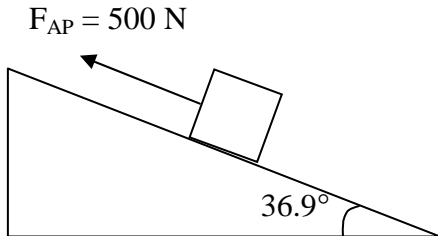
6. The work done by gravity moving
    the crate up the ramp is -___ Joules.
    A) 600   B) 900 C) 1200   D) 1500

7. The work done by friction is -___J.
    A) 600   B) 900   C) 1200   D) 1500
8. Work done by applied force is ___J.
    A) 1000 B) 1500 C) 2000   D) 2500
9. The net work done on the crate by all
    forces moving the block from top to
    bottom is ___ Joules.
    A) 600 B) 800   C) 1000 D) 1200
10. The final speed of the crate at the
    bottom of the ramp is ___ m/s.
    A) 6.3   B) 7.3   C) 8.2   D) 8.9

Problem III
A 50 Kg cart and child start at the
bottom of a frictionless roller coaster at a
speed of 13 m/s. The cart rolls up a 7 m
hill and back down to final height of 4m.

7 m

4m
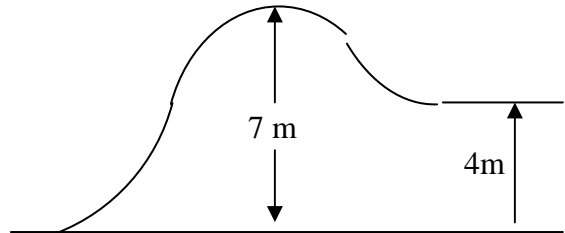
11. The initial total energy of the cart is
    ___ Joules.
    A) 2286 B) 2844   C) 3600 D) 4225
12. The highest potential energy of the
    cart is ___ Joules.
    A) 0   B) 1625   C) 2925   D) 3500
13. The kinetic energy of the cart at the
    top of the hill is ___ Joules.
    A) 725   B) 2225   C) 3500   D) 4225
14. The speed of the cart at the highest
    point is ___ m/s.
    A) 4.3   B) 5.4   C) 6.5   D) 7.6
15. The kinetic energy of the cart at 4 m
    above the ground is ___ Joules.
    A) 725   B) 2225   C) 3500   D) 4225
16. The speed of the cart when it is 4 m
    above the lowest point is ___ m/s.
   A) 6.2   B) 8.3   C) 9.4   D) 10.5

Problem IV
A 5 Kg ball is tied to a 1.6 m long string. The other end of the string is attached to a support. While the string is held vertical the ball is turned in a vertical circle. Let h=0 m be at the bottom of the swing. The ball passes through the top of the circle at a speed of 6 m/s.

6 m/s

1.6 m
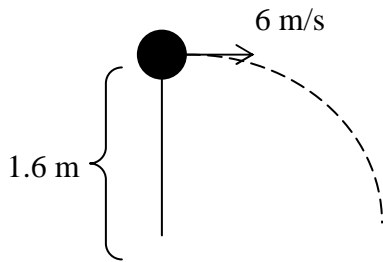
17. The initial total energy of ball is __J.
   A) 90   B) 160   C) 220   D) 250
18. The potential energy when the ball is at the midpoint of the circle is ___J.
   A) 40   B) 80   C) 120   D) 160
19. The speed of the ball when the string is horizontal is ___ m/s.
   A) 8.2   B) 9.4   C) 10.5   D) 11.7
20. The kinetic energy of the ball at the bottom of the circle is ___ Joules.
   A) 160   B) 190   C) 220   D) 250
21. The highest speed of the ball on the circular path is ___ m/s.
   A) 10   B) 12   C) 14   D) 16

Problem V
A 25 Kg child starts from rest at the top of a slide. Although the height of the slide is 2.4 m the actual length of the slide is 3.2 m. The child reaches the bottom of the slide with a speed of 4 m/s.

2.4 m   3.2 m
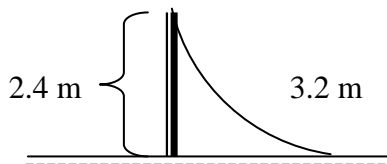
22. The initial potential energy of the child is ___ Joules.
   A) 300   B) 400   C) 500   D) 600
23. The final kinetic energy of the child is ___ Joules.
   A) 200   B) 300   C) 400   D) 500
24. The work done by friction during the slide is -___ Joules.
   A) 100   B) 200   C) 300   D) 400
25. The average force of friction acting against the sliding child is ___ N .
   A) 75   B) 100   C) 125   D) 150

Answers
   1. C
   2. A
   3. A
   4. C
   5. C
   6. B
   7. A
   8. D
   9. C
   10. C
   11. D
   12. D
   13. A
   14. B
   15. B
   16. C
   17. D
   18. B
   19. A
   20. D
   21. A
   22. D
   23. A
   24. B
   25. C