**2-D Dynamics Work Sheet: An Excellent Source of Good Times!**

 2.0kg

5.0kg

1. Two masses of 2.0 kg and 5.0 kg are suspended

by a massless cord over a frictionless pulley as shown.

What are the magnitude and direction of acceleration

for the 2.0 kg mass?

2. Two blocks are pulled across a *frictionless* surface by a 240 N force, as shown in the diagram below.

string

60.0 kg

 20.0 kg

240 N

If the bocks are accelerating at 3.00 m/s2, what is the tension in the string between the two blocks?

A. 60.0 N B. 120 N C. 180 N D. 240 N

3. The diagram below shows two forces vectors F1 and F2 acting on an object at point P.

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What is the magnitude of the resultant force?

A. 3.0 N B. 4.5 N C. 7.0 N D 14.3 N

4. An 84 kg sled slides down an icy slope inclined at 280 to the horizontal. If the force of friction between the sled and the ice is 180 N, what is the coefficient of friction?

A. 0.22 B. 0.25 C. 0.47 D. 0.53

 m1

15 kg

 m2

 12kg

5. From the diagram in the right…

a) What is the magnitude of the acceleration of the object m1? μ=0

b) What is the tension in the connection string?

6. Two blocks are connected by a string over a frictionless pulley as shown in the diagram below.

If this system of masses is at rest, in what direction does the friction force act on the 20 kg block?

25o

20kg

10kg

A. B.

C. D.

7. As shown in the diagram below, a block on an inclined plane is at rest due to friction.

 block **( DIAGRAMS NOT DRAWN TO SCALE)**

Which one of the following best shows the forces on the block?

A. B. C. D.

8. A 5 500 kg helicopter is travelling in level flight (not moving upward or downward).

 ***F***

![MC900351756[1]]()

 25o

a. What is the force ***F*** provided by the rotor?

A. 4.9 x 104 N B. 5.4 x 104 N C. 5.9 x 104 N D. 1.2 x 104 N

b. What is the acceleration of the helicopter?

9. A 15 kg block has a constant acceleration of 2.2 m/s2 down a 30o incline.

 m=15kg

 a = 2.2 m/s2

 30o

What is the magnitude of the friction force on the block?

A. 33 N B. 41 N C. 74 N D. 130 N

10. Force ***F*** gives mass m1 an acceleration of 4.0 m/s2. the same force ***F*** gives mass m2 an acceleration of 2.0 m/s2. What acceleration would force ***F*** give to the two masses m1 and m2 if they were glued together?

A. 1.0 m/s2 B. 1.3 m/s2 C. 3.0 m/s2 D. 6.0 m/s2

11. The 4.0 kg block shown accelerates across a *frictionless* horizontal table at 1.5 m/s2.

 a = 1.5 m/s2 m2 = 4.0 kg

 m1

Find the mass of object m1.

A. 0.61 kg B. 0.72 kg C. 6.0 kg D. 26 kg

12. Three blocks have masses of 1.0 kg, 7.0 kg, and 5.0 kg as shown. The horizontal surface is *frictionless*.

 What is the acceleration of the system?

7.0 kg

 A. 3.0 m/s2

 B. 3.8 m/s2

 C. 6.5 m/s2

 1.0 kg 5.0 kg D. 7.8 m/s2

 E. 8.2m/s2

13. A 75 kg Olympic skier takes 20s to reach a speed of 25m/s from rest while descending a uniform 16o slope.



 16o

What is the coefficient of friction between the skis and the slope surfaces?

14. Two masses are connected by a light string over a frictionless massless pulley. There is a coefficient of friction of 0.27 between mass m1 and the horizontal surface.

 m1=2.0kg

 µ = 0.27

 m2=4.0kg

a) Draw and label a free body diagram showing the forces action on mass m1.

b) What is the acceleration of mass m2?

15. A hanging 3.0 kg mass in attached to an 8.0 kg block on a ramp inclined at 30o to the horizontal. The coefficient of friction between the 8.0 kg block and the ramp is 0.26 and the pulley is frictionless.

 8.0 kg

 30o

 3.0kg

What is the acceleration of the 8.0 kg block down this ramp?

16. A 12.5kg block is pushed at a constant speed up a frictionless 28o incline by a horizontally applied force F.

 **F**

 28o

a) Draw a free body diagram for the block in the space below and label the forces.

b) What horizontal force F is required in order to maintain the block at constant speed?

c) What is the normal force exerted by the ramp on the block?

17.

A 12 000kg truck is driving down a hill angled at 15.0o. A crate with a mass of 785kg is resting (not strapped down) on the back of the truck. If the coefficient of friction between the crate and the truck is 0.600:

 a. What is the maximum braking acceleration the truck can have without the crate sliding?

 b. What is the minimum stopping distance from 60.0km/h?

18. Find the tension in each string.

71o

146o

string 1

string 2

14kg