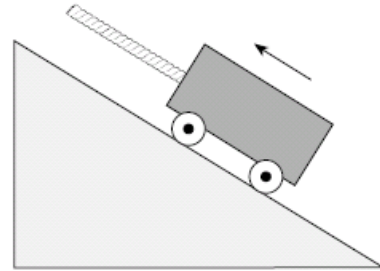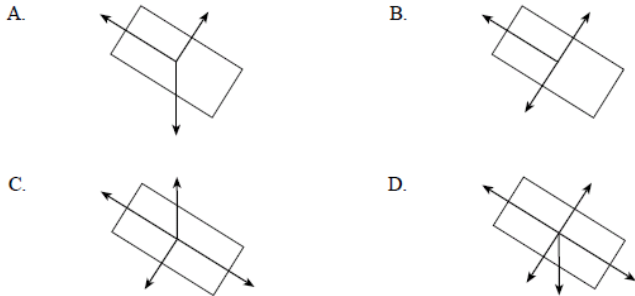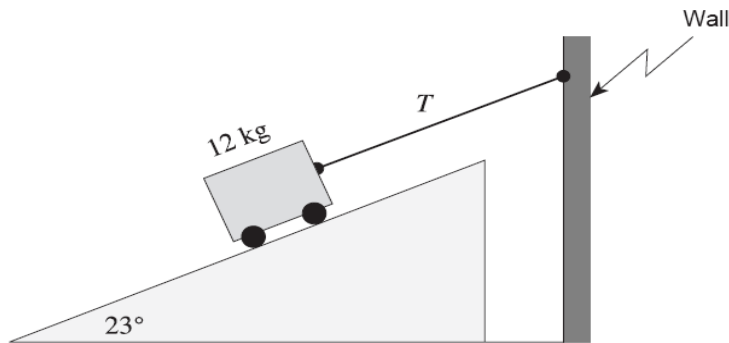# PHYSICS 12

NAME: _____

Incline Problems

Assignment

1. The diagram below shows a cart being pulled up a frictionless slope by a rope. Which of the following **best** represents the free body diagram for the cart?
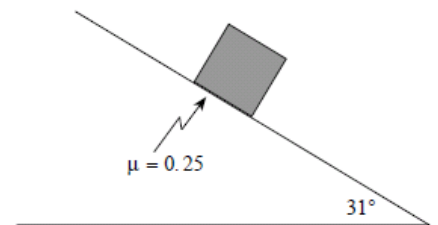
A.

B.

C.

D.

2. A 12 kg cart on a 23° frictionless incline is connected to a wall as shown.

Wall

T

12 kg

23°

What is the tension T in the cord?

3. An 87 kg block slides down a 31° slope as shown in the diagram below. The coefficient of friction between the block and the surface is 0.25. What is the acceleration of the block?
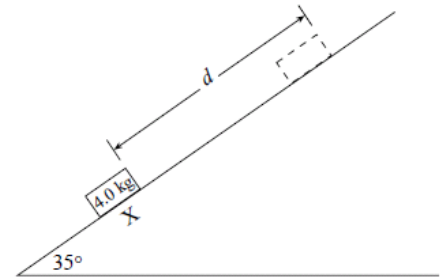
$\mu = 0.25$

31°

4. A 15 kg block has a constant acceleration of 2.2 m/s² down a 30° incline.
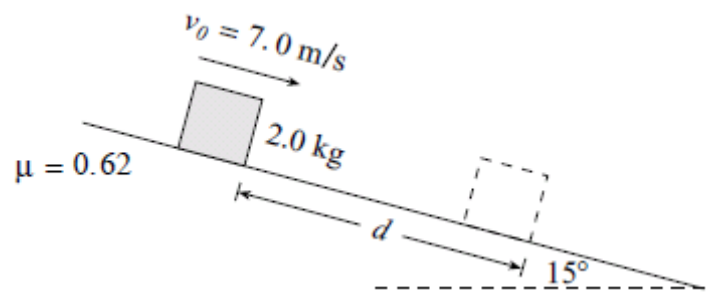
$m = 15$ kg

$a = 2.2$ m/s²

30°
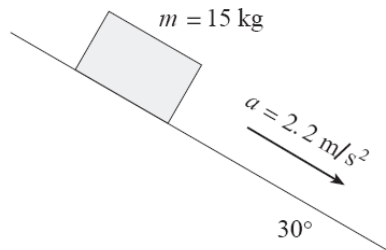
What is the magnitude of the friction force on the block?

5. A 4.0 kg block has a speed of 9.0 m/s at **X**. What is the maximum distance, *d*, travelled by the block? Ignore friction.

6. A 2.0 kg block is sliding down a 15° incline. The coefficient of friction is 0.62. At some position the block has a speed of 7.0 m/s. What distance *d* will this block move before coming to rest?

7. Two masses are connected by a light string which passes over a frictionless pulley as shown. The coefficient of friction between the 2.5 kg mass and the surface is 0.33.
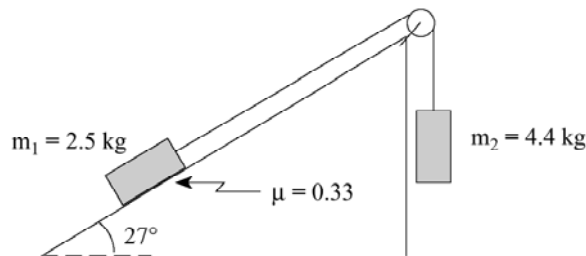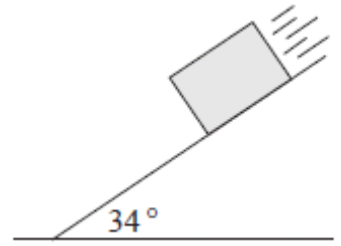

a) Find the acceleration of the system of masses. **(7 marks)**

b) Find the tension in the string

Enrichment

8. A 5.0 kg concrete block accelerates down a 34° slope at 4.2 m/s^2. Find the coefficient of friction between the block and the slope.

9. Three masses connected by a light string are arranged on frictionless surfaces, as shown in the diagram below. The strings pass over frictionless pulleys. Determine the direction and magnitude of the acceleration of m_1.

	DIRECTION OF m_1	ACCELERATION (m/s^2)
A.	up incline	0.20
B.	down incline	0.20
C.	up incline	0.43
D.	down incline	0.43

$m_3 = 8.0$ kg

$m_1 = 4.6$ kg

$m_2 = 2.4$ kg

25°

70°
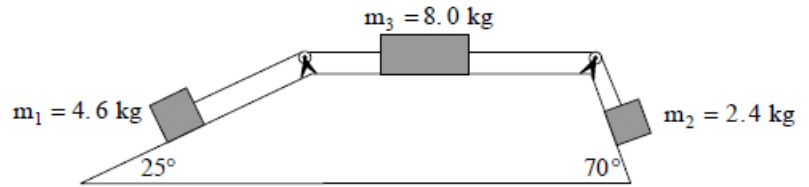
10. An 18 kg cart is connected to a 12 kg hanging block as shown. (Ignore friction.)

18 kg cart

35°

12 kg block
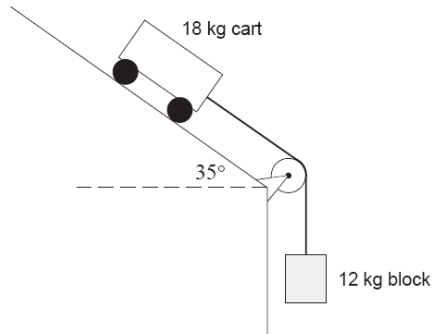
a) Draw and label a free body diagram for the 18 kg cart. **(2 marks)**

b) What is the magnitude of the acceleration of the cart? **(5 marks)**

Answers: 1. A, 2. 46 N, 3. 2.9 m/s^2, 4. 41 N, 5. 7.2 m, 6. 7.4 m, 7. 3.6m/s^2, 27.3 N, 8. 0.16, 9. A, 10. 7.3m/s^2