

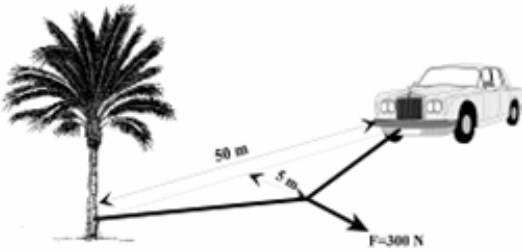


# بِسْمِ اللَّهِ الرَّحْمَنِ الرَّحِيمِ

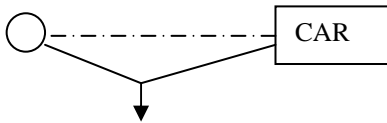
جامعة الملك سعود  
كلية العلوم  
قسم الفيزياء والفلك

## تمارين الفصل الخامس والسادس لقرر ١٠٣ فيز ( الفصل الدراسي د . عبدالله محمد الزبير

### السؤال الأول



( )  
50 m  
5 m  
300 N (



ANS:  $T=750 \text{ N}$ ,  $T\cos\theta=735 \text{ N}>F$

### السؤال الثاني

60 km/h

150 m

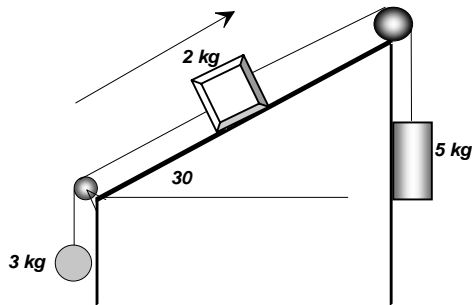
( )

( )

( )

ANS: (a)  $10.7^\circ$  (b) 0.19

### السؤال الثالث



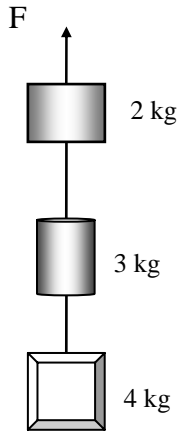
:

a

( )

( )

ANS: (1)  $0.98 \text{ m/s}^2$  (2)  $T_1=32.3 \text{ N}$ ,  $T_2=44.1 \text{ N}$



Ans:  $3.53 \text{ m/s}^2$

**السؤال الرابع**

4 kg 3 kg 2 kg

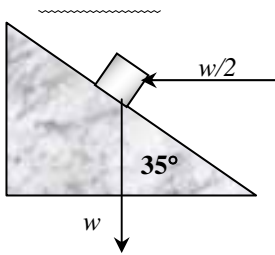
120 N

( )  $2.5 \text{ m/s}^2$   
 $2.5 \text{ m/s}^2$

( ) 90 N

ANS: (a) 7.32 kg (b) 90 N

**السؤال الخامس**



( )  $67 \text{ km/h}$   
 ( ) -:

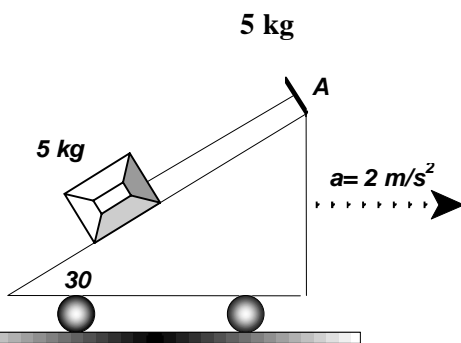
$35^\circ$

(Ans:  $1.61 \text{ m/s}^2$ )

ANS: (a)  $-0.854 \text{ m/s}^2$  (b) No ( $x=202.6 \text{ m}$ )

**السؤال السادس**

**السؤال السابع**



$2 \text{ m/s}^2$

$2 \text{ m/s}^2$

( )

( ) :

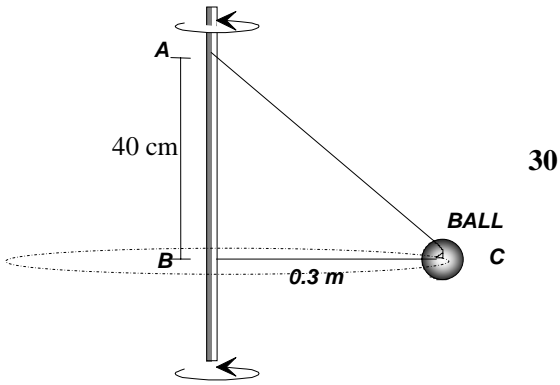
(

A

ANS; (a) 66.3 N (b) 18.3 N

**السؤال الثامن**

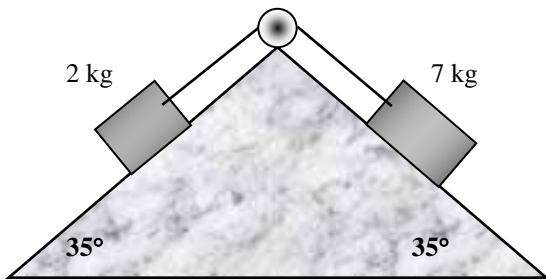
السؤال التاسع



80 cm ABC  
 100 g  
 40 cm  
 30  
 30  
 0.3 m BALL C  
 AB B A  
 BC  
 C ( ) ( ) cm

ANS; (a) 1.22 N (b) 2.42 m/s

السؤال العاشر



:

7 kg 2 kg  
 ( )  
 ( )

Ans: (1) 17.5 N (2) 3.1 m/s<sup>2</sup>

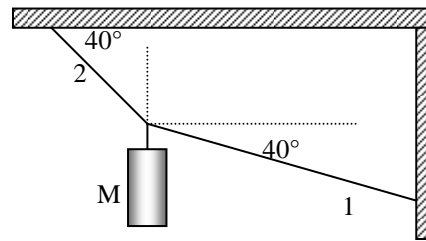




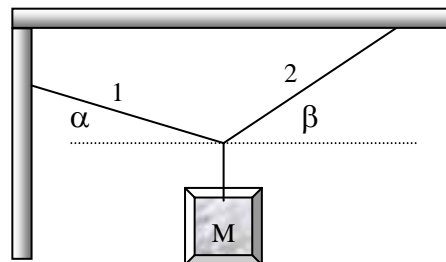
**WRITE YOUR ANSWER ON THE ATTACHED SHEET**

- A racecar moving with a constant speed of 60 m/s completes one lap around a circular track in 50 s. What is the magnitude of the acceleration of the racecar?  
 a.  $8.8 \text{ m/s}^2$       b.  $7.5 \text{ m/s}^2$       c.  $9.4 \text{ m/s}^2$       d.  $6.3 \text{ m/s}^2$       e.  $5.3 \text{ m/s}^2$
- A racecar travels 40 m/s around a banked ( $45^\circ$  with the horizontal) circular (radius = 200 m) track. What is the magnitude of the resultant force on the 80-kg driver of this car?  
 a. 0.68 kN      b. 0.64 kN      c. 0.72 kN      d. 0.76 kN      e. 0.52 kN
- A highway curve has a radius of 0.14 km and is unbaked. A car weighing 12 kN goes around the curve at a speed of 24 m/s without slipping. What is the magnitude of the horizontal force of the road on the car?  
 a. 12 kN      b. 17 kN      c. 13 kN      d. 5.0 kN      e. 49 kN

- If  $M = 1.1 \text{ kg}$ , what is the tension in string 1?  
 a. 54 N  
 b. 47 N  
 c. 40 N  
 d. 62 N  
 e. 57 N



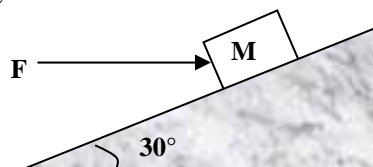
- If  $\alpha = 30^\circ$ ,  $\beta = 45^\circ$ , and  $M = 3.5 \text{ kg}$ , determine the tension in string 1.  
 a. 29 N  
 b. 25 N  
 c. 14 N  
 d. 18 N  
 e. 32 N



- If the only forces acting on a 2.0-kg mass are  $\vec{F}_1 = (3\hat{i} - 8\hat{j}) \text{ N}$  and  $\vec{F}_2 = (5\hat{i} + 3\hat{j}) \text{ N}$ , what is the magnitude of the acceleration of the particle?  
 a.  $1.5 \text{ m/s}^2$       b.  $6.5 \text{ m/s}^2$       c.  $4.7 \text{ m/s}^2$       d.  $9.4 \text{ m/s}^2$       e.  $7.2 \text{ m/s}^2$

- A block is pushed up a frictionless  $30^\circ$  incline by an applied force as shown. If  $F = 25 \text{ N}$  and  $M = 3.0 \text{ kg}$ , what is the magnitude of the resulting acceleration of the block?

- $2.3 \text{ m/s}^2$
- $4.6 \text{ m/s}^2$
- $3.5 \text{ m/s}^2$
- $2.9 \text{ m/s}^2$
- $5.1 \text{ m/s}^2$



8. A person weighing 0.80 kN rides in an elevator that has a downward acceleration of  $1.5 \text{ m/s}^2$ . What is the magnitude of the force of the elevator floor on the person?
- a. 0.68 kN      b. 0.80 kN      c. 0.92 kN      d. 0.12 kN      e. 0.34 kN

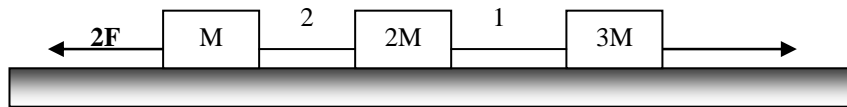
9. The horizontal surface on which the objects slide is frictionless. If  $M = 2.0 \text{ kg}$ , the tension in string 1 is 12 N. Determine F.

- a. 25 N  
b. 20 N  
c. 30 N  
d. 35 N  
e. 40 N



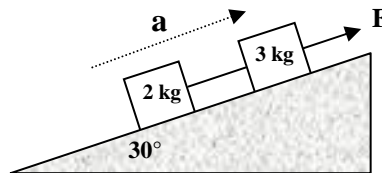
10. The horizontal surface on which the objects slide is frictionless. If  $F = 12 \text{ N}$ , what is the tension in string 1?

- a. 35 N  
b. 30 N  
c. 40 N  
d. 45 N  
e. 25 N



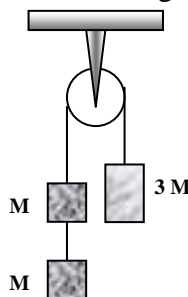
11. The surface of the inclined plane is frictionless. If  $a = 1.3 \text{ m/s}^2$ , what is F?

- a. 31 N  
b. 37 N  
c. 35 N  
d. 33 N  
e. 39 N



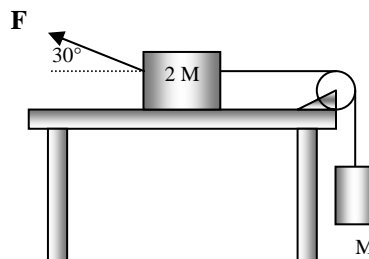
12. If  $M = 3.0 \text{ kg}$ , what is the tension in the string connecting the two objects of equal mass? Assume that all surfaces are frictionless.

- a. 35 N  
b. 39 N  
c. 42 N  
d. 46 N  
e. 17 N



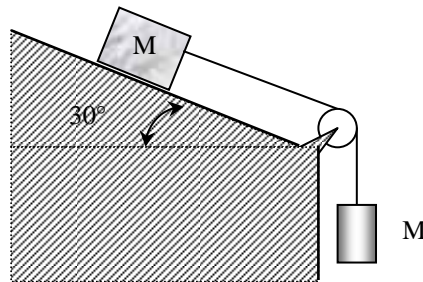
13. If  $F = 40 \text{ N}$  and  $M = 2.0 \text{ kg}$ , what is the magnitude of the acceleration of the suspended object? All surfaces are frictionless.

- a.  $1.2 \text{ m/s}^2$   
b.  $2.0 \text{ m/s}^2$   
c.  $1.5 \text{ m/s}^2$   
d.  $2.5 \text{ m/s}^2$   
e.  $5.6 \text{ m/s}^2$



14. If  $M = 2.2 \text{ kg}$ , what is the tension in the connecting string? All surfaces are frictionless.

- a. 6.4 N
- b. 5.9 N
- c. 5.4 N
- d. 6.9 N
- e. 8.3 N

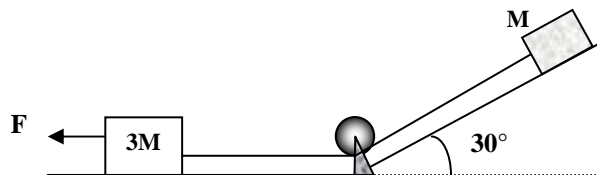


15. A 5.0-kg mass sits on the floor of an elevator that has a downward acceleration of  $1.0 \text{ m/s}^2$ . On top of the 5.0-kg mass is an object of unknown mass. The force of the elevator on the 5.0-kg mass is 80 N up. Determine the unknown mass.

- a. 3.3 kg
- b. 2.4 kg
- c. 1.6 kg
- d. 4.1 kg
- e. 5.0 kg

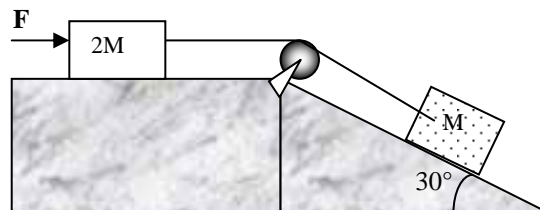
16. If  $F = 8.0 \text{ N}$  and  $M = 1.0 \text{ kg}$ , what is the tension in the connecting string? All surfaces are frictionless.

- a. 0.82 N
- b. 0.92 N
- c. 0.72 N
- d. 0.62 N
- e. 0.69 N



17. If  $F = 2.0 \text{ N}$  and  $M = 1.0 \text{ kg}$ , what is the tension in the connecting string? All surfaces are frictionless.

- a. 2.6 N
- b. 1.1 N
- c. 2.1 N
- d. 1.6 N
- e. 3.7 N

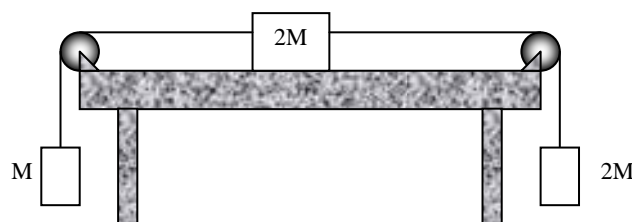


18. A block is released from rest on a  $27^\circ$  incline and moves 6.0 m during the next 2.0 s. What is the coefficient of kinetic friction between the block and the surface of the incline?

- a. 0.28
- b. 0.22
- c. 0.17
- d. 0.35
- e. 0.12

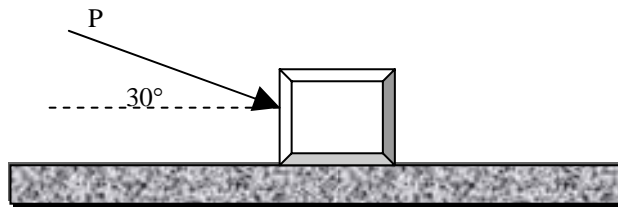
19. The three blocks shown are released from rest and are observed to move with accelerations that have a magnitude of  $1.5 \text{ m/s}^2$ . What is the magnitude of the friction force on the block that slides horizontally? Disregard any pulley mass or friction and let  $M = 2.0 \text{ kg}$ .

- a. 6.0 N
- b. 5.1 N
- c. 5.5 N
- d. 4.6 N
- e. 3.7 N



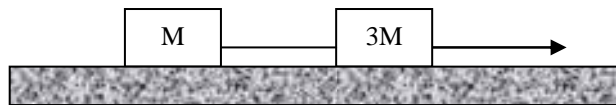
20. A 2.0-kg block slides on a rough horizontal surface. A force ( $P = 6.0 \text{ N}$ ) is applied to the block as shown. The magnitude of the block's acceleration is  $1.2 \text{ m/s}^2$ . What is the magnitude of the force of friction acting on the block?

- a. 2.0 N
- b. 1.4 N
- c. 1.6 N
- d. 2.8 N
- e. 3.4 N



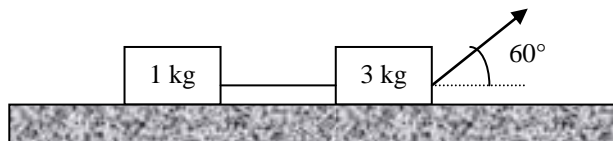
21. The coefficient of kinetic friction between the surface and the larger block is 0.20, and the coefficient of kinetic friction between the surface and the smaller block is 0.30. If  $F = 14 \text{ N}$  and  $M = 1.0 \text{ kg}$ , what is the magnitude of the acceleration of either block?

- a.  $2.0 \text{ m/s}^2$
- b.  $1.3 \text{ m/s}^2$
- c.  $1.5 \text{ m/s}^2$
- d.  $1.8 \text{ m/s}^2$
- e.  $3.5 \text{ m/s}^2$



22. Two blocks connected by a string are pulled across a horizontal surface by a force applied to one of the blocks, as shown. The coefficient of kinetic friction between the blocks and the surface is 0.25. If each block has an acceleration of  $2.0 \text{ m/s}^2$  to the right, what is the magnitude  $F$  of the applied force?

- a. 25 N
- b. 18 N
- c. 11 N
- d. 14 N
- e. 7.0 N



### CONCEPTUAL PROBLEMS

23. A Cessna aircraft has a lift-off speed of 120 km/h. What minimum constant acceleration does this require if the aircraft is to be airborne after a take-off run of 240 m? (ANS:  $2.32 \text{ m/s}^2$ )

24. A helicopter descends from a height of 600 m with uniform negative acceleration, reaching the ground at rest in 5.0 minutes. Determine the acceleration of the helicopter and its initial downward velocity. (ANS:  $-0.0133 \text{ m/s}^2$ ,  $4.0 \text{ m/s}$ )

25. A high-diver of mass 70-kg jumps off a board 10 meters above the water. If, 2 s after entering the water his downward motion is stopped, what average upward force did the water exert? (ANS:  $980 \text{ N}$ )



**KING SAUD UNIVERSITY**  
**PHYSICS & ASTRONOMY DEPARTMENT**  
**103-Phys (Dr. ABDALLAH M. AZZEER)**



**WRITE YOUR ANSWER ON THE ATTACHED SHEET**

..... :

**ANSWER SHEET**

|     |     |   |
|-----|-----|---|
| 1.  | 13. | 25.   |
| 2.  | 14. | 26.   |
| 3.  | 15. | 27.   |
| 4.  | 16. | 28.   |
| 5.  | 17. | 29.   |
| 6.  | 18. | 30.   |
| 7.  | 19. | 31.   |
| 8.  | 20. | 32.   |
| 9.  | 21. | 33. $2.32 \text{ m/s}^2$  |
| 10. | 22. | 34. $-0.0133 \text{ m/s}^2$<br>$4.0 \text{ m/s}$                      |
| 11. | 23. | 35. $980 \text{ N}$   |
| 12. | 24. | <i>The more problems you do, the more chance to get A<sup>+</sup></i> |