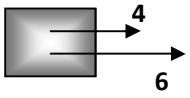
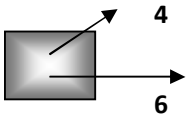
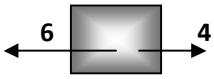
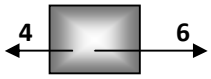
Chapter 5: FORCE AND MOTIN I

1. The figures below shows four situation in which forces act on a block that lies on a frictionless floor. In which figure the block has the **greatest acceleration**?

(a) 

(b) 

(c) 

(d) 

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2. A force of **0.2 N** acts on a mass of **100 g**, what is its **acceleration**?

(a) 2 x 10^{-2} m/s^2 (b) 2 x 10^{-6} m/s^2 (c) 2 x 10^{-3} m/s^2 (d) 2 m/s^2

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3. A man **pulls** a box of **mass 3 kgvertically upward** with a force of magnitude **40 N**. What is the **acceleration of the box**?

(a) $a = \dfrac{T - mg}{m}$ (b) $a = \dfrac{mg - T}{m}$ (c) $a = \dfrac{T + mg}{m}$ (d) $a = \dfrac{m}{T + mg}$

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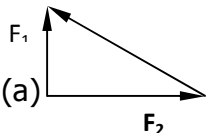
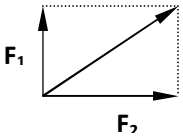
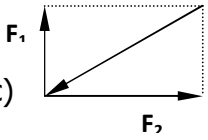
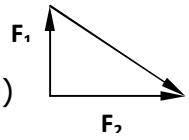
4. Which of the following figures correctly show the vector **addition of forces F_1 and F_2** ?

(a) 

(b) 

(c) 

(d) 

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5. If the **1 kg** body has an **acceleration of 2 m/s^2** at an angle of **20°** above the positive direction of the x-axis. What is the **net force** in unit vctor notation?

(a) $\vec{F} = 0.34\hat{i} + 0.94\hat{j}$ (b) $\vec{F} = 1.88\hat{i} + 0.68\hat{j}$ (c) $\vec{F} = 0.68\hat{i} + 1.88\hat{j}$ (d) $\vec{F} = 0.94\hat{i} + 0.34\hat{j}$

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6. Two forces act on a particle that moves with **constantvelocity** $\vec{v} = 3\hat{i} - 4\hat{j}$ **m/s**, one of the forces is $\vec{F}_1 = 2\hat{i} - 6\hat{j}$ **N**,what is the other force?

(a) $\vec{F}_2 = 2\hat{i} - 6\hat{j}$ (b) $\vec{F}_2 = 6\hat{i} - 10\hat{j}$ (c) $\vec{F}_2 = -2\hat{i} + 6\hat{j}$ (d) $\vec{F}_2 = -6\hat{i} + 10\hat{j}$

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7. A particle has a **weight of 22 N** at a point where **g = 9.8 m/s^2**, what are its **mass and weight** at a point where **g = 0** ?

(a) m = 2.2 kg, W = 0 (b) m = 0, W = 2.2 N (c) m = 0.45 kg, W = 0 (d) m = 0, W = 45 N

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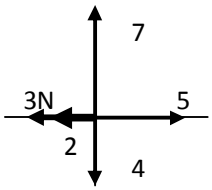
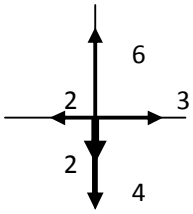
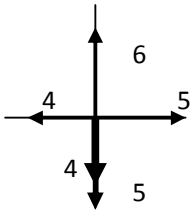
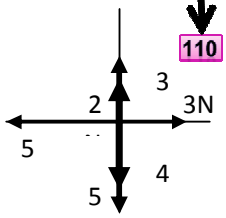
8. In which figure of the following the **y-component of the net force is zero**?

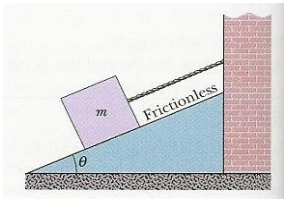
(a) 

(b) 

(c) 

(d) 

9. In the figure a cord holds stationary a block of mass **m = 8.5 kg** on a frictionless plane that is inclined at An angle **θ = 30°**, **the tension in the cord T** equals:



(a) 72.14 N (b) 83.3 N (c) 53.14 N (d) 41.65 N

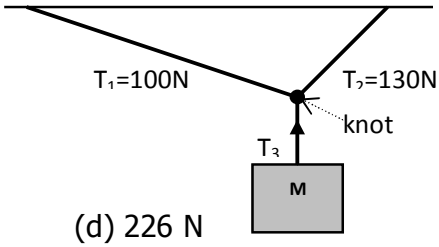
10. In question9, the **Normal forceN** acting on the block is:

(a) $N= F_g - mg\cos\theta$ (b) $N= F_g\cos\theta$ (c) $N= F_g+mg\cos\theta$ (d) $N= F_g$

11. In question9, if the cord is **cut** then the mass will slide with **acceleration equals**:

(a) $a = -4.9\ m/s^2$ (b) $a = -9.8\ m/s^2$ (c) $a = -8.5\ m/s^2$ (d) $a = -3.4\ m/s^2$

12. A block of mass **M= 20 kg** hangs from three cords by means of a knot, **(**the mass M does not move**)**, **what is the value of tensionT_3**?

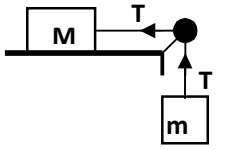


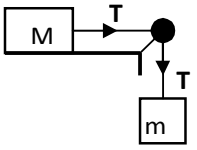
(a) 230 N (b) 196 N (c) 426 N (d) 226 N

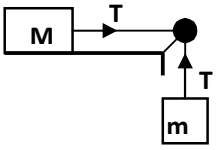
13. What is the net force acting on a body of a **mass of 48 kg** , when its **acceleration is 6 m/s^2** ?

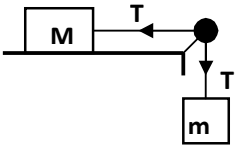
(a) 758 N (b) 182 N (c) 288 N (d) 470 N

14. Which figure of the following shows **the right direction of the tension T**? (the two masses are stationary).

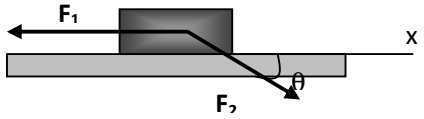
(a) 

(b) 

(c) 

(d) 

15. Two forces act on a block of mass **m= 0.5 kg** that Moves along the x-axis on a frictionless table, **F_1= 3 N** and **F_2= 1 N** directed at angle **θ=30°** as shown,
What is the acceleration of the block?



(a) – 4.3 m/s^2 (b) – 7.7 m/s^2 (c) - 5 m/s^2 (d) - 7 m/s^2

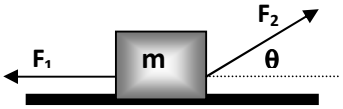
16. If **m_1= 2 kg** and **m_2= 4 kg** and the **same force is applied to both masses**, then the **ratio of their accelerations is**:

(a) $\frac{a_2}{a_1}=\frac{1}{2}$ (b) $\frac{a_2}{a_1}=2$ (c) $\frac{a_2}{a_1}=\frac{1}{4}$ (d) $\frac{a_2}{a_1}=4$

17. A force **F** applied to a body of mass **m_0** giving it an acceleration **a_0,** what is the mass of a body **x** if the same force is applied to it and accelerate it by **a_x** ?

(a) $m_x = m_0\frac{a_x}{a_0}$ (b) $m_x = m_0\frac{a_0}{a_x}$ (c) $m_x = \frac{a_x}{a_0}$ (d) $m_x = \frac{a_0}{a_x}$

18. In the figure, two forces acting on a box of mass **m** moving over a **frictionless** ice along the **x-axis** .
What is the **acceleration** of the box?



(a) $a_x=\frac{F_1+F_2\cos\theta}{m}$ (b) $a_x=\frac{F_2\cos\theta-F_1}{m}$ (c) $a_x=\frac{F_2\cos\theta}{m}$ (d) $a_x=\frac{F_1-F_2}{m}$

19. The magnitude of the **centripetal force** is

(a) $F=m\frac{v^2}{R^2}$ (b) $F=\frac{v^2}{R}$ (c) $F=m\frac{v}{R}$ (d) $F=m\frac{v^2}{R}$

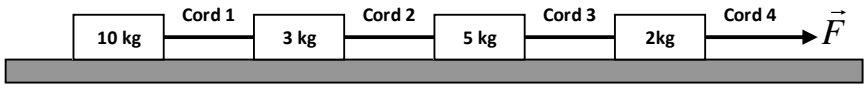
1. What is the **gravitational force** on a man of mass **m** when he is sitting in a car that accelerates at **a** ?

(a) F_g= m a (b) F_g= m (g – a) (c) F_g= m g (d) F_g= m (a – g)

20. Two forces act on a particle that moves with **constantvelocity** $\vec{v}=3\hat{i}-4\hat{j}$ **m/s**, one of the forces is $\vec{F}_1=2\hat{i}-6\hat{j}$ **N**,what is the other force?

(a) $\vec{F}_2=2\hat{i}-6\hat{j}$ (b) $\vec{F}_2=6\hat{i}-10\hat{j}$ (c) $\vec{F}_2=-2\hat{i}+6\hat{j}$ (d) $\vec{F}_2=-6\hat{i}+10\hat{j}$

21. The figure shows a train of four blocks being pulled across a frictionless floor by force $\vec{F}$, what **total mass is accelerated to the right byCord 2**?

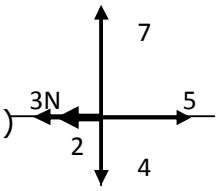


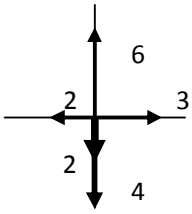
(a) 10 kg (b) 18 kg (c) 13 kg (d) 7 kg

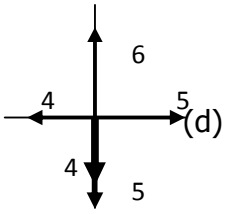
22. A particle has a **weight of 22 N** at a point where **g = 9.8 m/s^2**, what are its **mass and weight** at a point where **g = 0** ?

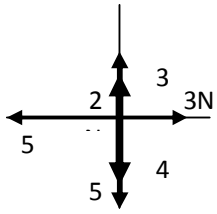
(a) m = 2.2 kg
W = 0
(b) m = 0
W = 2.2 N
(c) m = 0.45 kg
W = 0
(d) m = 0
W = 45 N

23. In which figure of the following the **y-component of the net force is zero**?

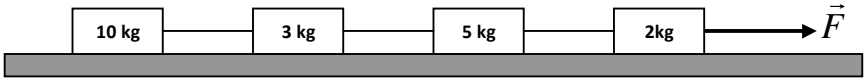
(a) 

(b) 

(c) 

(d) 

24. The figure shows a train of four blocks being pulled across a frictionless floor by force $\vec{F}$, what total mass is accelerated to the right by force $\vec{F}$?

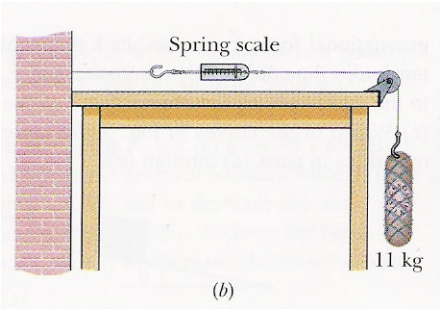


(a) 10 kg (b) 18 kg (c) 13 kg (d) 245 m/s

25. Three forces act on a particle that moves with **unchanging** velocity $\vec{v} = 2\hat{i} - 7\hat{j}$, two of the forces are $\vec{F}_1 = 2\hat{i} + 3\hat{j} - 2\hat{k}$ and $\vec{F}_2 = -5\hat{i} + 8\hat{j} - 2\hat{k}$. what is the **third force** ?

(a) $3\hat{i} - 11\hat{j} + 4\hat{k}$ (b) $7\hat{i} - 5\hat{j}$ (c) $-3\hat{i} + 11\hat{j} - 4\hat{k}$ (d) $-7\hat{i} + 5\hat{j}$

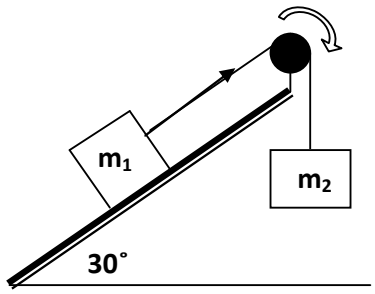
26. An **11 kg** object is supported by a cord that Runs around a pulley and to a scale. The opposite end of the scale is attached by a cord to a wall.
What is the reading on the scale?



(a) 11 N (b) 9.8 N (c) 107.8 N (d) 215.6 N

27. A block of mass $\mathbf{m_1=3.7\ kg}$ on frictionless inclined plane of angle **30°** is connected by a cord over a massless frictionless pulley to a second block of mass $\mathbf{m_2=2.3\ kg}$ hanging vertically **as shown**.

If the magnitude of the **acceleration** of each block is **0.735 m/s²**, what is the **tension in the cord** ?



(a) 36.3 N (b) 22.5 N (c) 20.8 N (d) 18.1 N

28. **In question 27**, what is the **normal force** acting on the block $\mathbf{m_1}$?

(a) $N=F_g - m_1g\cos\theta$ (b) $N=F_g\cos\theta$ (c) $N=F_g + m_1g\cos\theta$ (d) $N=F_g$

29. **In question 27**, if the cord is cut what is the **acceleration** of mass $\mathbf{m_2}$?

(a) a = - 4.9 m/s² (b)a = - 9.8 m/s² (c) a = -0.735 m/s² (d) a = zero

30. If the **1 kg** body has an **acceleration of 2 m/s²** at an angle of **20°** above the positive direction of the x-axis. What is the **net force** in unit vctor notation?

(a) $\vec{F}=0.34\hat{i}+0.94\hat{j}$ (b) $\vec{F}=1.88\hat{i}+0.68\hat{j}$ (c) $\vec{F}=0.68\hat{i}+1.88\hat{j}$ (d) $\vec{F}=0.94\hat{i}+0.34\hat{j}$