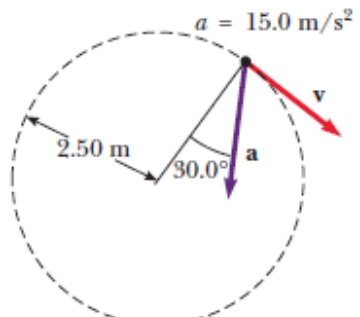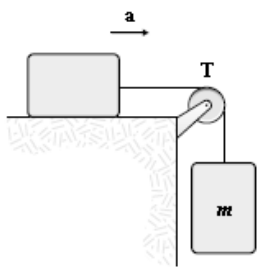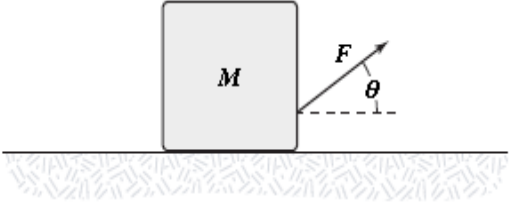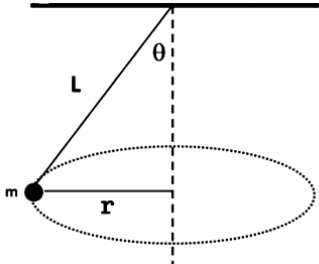| Q	Multiple choice questions
1	If the velocity *v* is related to acceleration *a* and distance *x* by the following expression: $v^2 = 2ax^p$. The power **p** that makes this equation dimensionally consistent is: A) 0 B) 1 C) -1 D) 2
2	In one-dimensional motion, if an object moves from one place to another and then back to its original place, its average speed: A) is positive. B) is negative. C) is Zero D) depends on the direction
3	A car is traveling at a constant speed of **20 m/s**. The driver of the car had to accelerate his speed by **3 m/s²** once he passed a hidden police trap (نقطة رصد للسرعات المخالفة). A police car starts from rest just as the speeder car passes it. What would be the acceleration of the police car to catch this speeder car in one minute? A) 4.4 m/s² B) 2.5 m/s² C) 5.2 m/s² D) 3.7 m/s²
4	A man wants to measure the depth of a well (عمق بئر) by using a small stone and a stopwatch, so he dropped the stone inside the well. His stopwatch measured **2.8** seconds when the stone clashed with the water surface. What is the depth of this well? A) 47.3 m B) 32.2 m C) 38.4 m D) 55 m
5	If $\vec{A} + \vec{B} = \vec{C}$ and their magnitudes are given by A + B = C, then the vectors $\vec{A}$ and $\vec{B}$ are oriented: A) perpendicular relative to one other B) parallel to each other (in the same direction) C) antiparallel to each other (in opposite directions) D) It is impossible to know from the given information
6	**If A = 3 i – 2 j and B = 2 i – j**. The magnitude of the vector **C = 2 A – B** is: A) 3.0 B) 7.4 C) 5.0 D) 6.1
7	A vector $\vec{A}$ has components A_x = **12 m** and A_y = **5 m**. The angle that vector $\vec{A}$ makes with the +x-axis is: A) 22.6° B) 12.6° C) 32.6° D) 2.6°
8	At *t = 0*, a particle leaves the origin with a velocity of *9 m/s* in the positive *y* direction and moves in the *xy* plane with a constant acceleration of *a = (2i –4j) m/s²*. At the instant the *x* coordinate of the particle is *16 m*, then the velocity of the particle is: A) (8i–7j) m/s B) (8i+7j) m/s C) (7i–8j) m/s D) (7i+8j) m/s

9	As a projectile thrown upward moves in its parabolic path, its horizontal velocity component: A) increase B) decrease C) increase and then decrease D) remain constant

10	A man was trapped on the top of a burning building (building A in the Figure). To avoid death, he decided to run and jump horizontally to a safe building (building B). The safe building was **6.5 m** horizontally away and **3 m** lower. The minimum initial speed that allows the man to survive and reach the other building safely is: A) 4.9 m/s B) 7.1 m/s C) 8.3 m/s D) 9.2 m/s

11	A car moves with a constant acceleration of **0.4 m/s²** parallel to the roadway. The car passes over a rise in the roadway such that the top of the rise is shaped like a circle of radius **500 m**. At the moment the car is at the top of the rise, its velocity vector is horizontal and has a magnitude of **6 m/s**. The magnitude of the total acceleration for the car at this instant is: A) 0.31 m/s² B) 0.41 m/s² C) 0.51 m/s² D) 0.22 m/s²

12	The figure represents the total acceleration of a particle moving clockwise in a circle of radius **2.5 m** at a certain instant of time. At this instant, the speed of the particle is: $a = 15.0\ m/s^2$ 2.50 m 30.0° A) 2.1 m/s B) 7.4 m/s C) 4.3 m/s D) 5.7 m/s

13	If the tension, **T**, is **15 N** and the magnitude of the acceleration, **a**, is **3 m/s²**, what is the mass, **m**, of the suspended object? (Assume that all surfaces and the pulley are frictionless) A) 1.3 kg B) 1.8 kg C) 2.2 kg D) 3.4 kg

14	At an instant when a **4 kg** object has an acceleration equal to **(5i + 3j) m/s²**, one of the two forces acting on the object is known to be **(12i + 22j) N**. The magnitude of the other force acting on the object is:
	A) (10**i** -8 **j**) N B) (8**i** -12 **j**) N C) (6**i** +9 **j**) N D) (8**i** -10 **j**) N

15	The apparent weight of a fish in an elevator is greatest when the elevator:
	A) accelerates upward B) moves upward at constant velocity C) moves downward at constant velocity D) accelerates downward

16	A 5 kg box is pulled by F=14 N with angle 35º on a rough horizontal surface with constant speed as shown in the Figure. The coefficient of kinetic friction between the box and the surface is:
	A) 0.44 B) 0.33 C) 0.38 D) 0.28

17	A **4 kg** block slides down a **53°** incline with acceleration $\frac{g}{2}$. What is the kinetic friction force on the block? (where $g = 9.8\ m/s$)?
	A) 4 N B) 43.2 N C) 11.7 N D) 50.9 N

18	On a frictionless banked curved road, which has a radius of **100 m** and a banking angle of **17°**. The maximum possible speed without slipping (بدون انزلاق) for a car moving on it is:
	A) 58.5 m/s B) 17.3 m/s C) 16.9 m/s D) 30.6 m/s

19	Consider the conical pendulum as shown in the Figure. If the speed of the circular motion of the mass **m** is **0.5 m/s** and θ = **25º**, the radius **r** is:
	A) 0.055 m B) 0.028 m C) 0.08 m D) 0.11 m

20	An object moves around a circle. If the radius is doubled keeping the speed the same, then the magnitude of the centripetal force must be:
	A) twice as great B) half as great C) four times as great D) one-fourth as great

The End