

Period 4 In-class quiz 21-1

The Earth has a radius of about 6000 km. At what altitude is the acceleration of gravity about 1/4 that of g (acceleration of gravity at the surface of the Earth = 9.8 m/s²)?

Full credit to all who answered

- A. 1000 km
- B. 3000 km
- ✓ C. 6000 km
- D. 8000 km
- E. 18,000 km

$$g = G \frac{M_E}{r^2}$$

$$M_E = 5.9736 \times 10^{24} \text{ kg}$$

$$G = 6.673 \times 10^{-11} \text{ N m}^2 / \text{kg}^2$$

At what altitude is the acceleration of gravity about 1/9 that of g (acceleration of gravity at the surface of the Earth = 9.8 m/s²)?

Full credit to all who answered

- A. 1000 km
- B. 3000 km
- C. 6000 km
- D. 8000 km
- ✓ E. 12,000 km

$$g = G \frac{M_E}{r^2}$$

$$M_E = 5.9736 \times 10^{24} \text{ kg}$$

$$G = 6.673 \times 10^{-11} \text{ N m}^2 / \text{kg}^2$$

Applications of Universal Gravitation

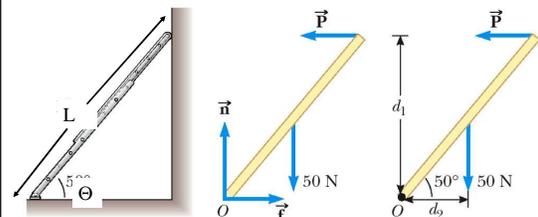
Gravitational force of uniform sphere on particle outside sphere same as force exerted if entire mass of the sphere concentrated at its center--Gauss' Law

- Acceleration due to gravity
- g will vary with altitude

$$g = G \frac{M_E}{r^2}$$

Altitude (km) ^a	g (m/s ²)
1 000	7.33
2 000	5.68
3 000	4.53
4 000	3.70
5 000	3.08
6 000	2.60
7 000	2.23
8 000	1.93
9 000	1.69
10 000	1.49
50 000	0.13

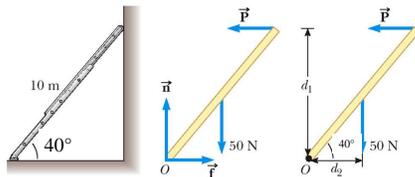
Example of a Free Body Diagram--Ladder



- free body diagram shows normal force and force of static friction acting on the ladder at the ground
- The last diagram shows the lever arms for the forces from axis of rotation at ground
- Pick axis and sum torques

Period 4 In-class quiz 21-2

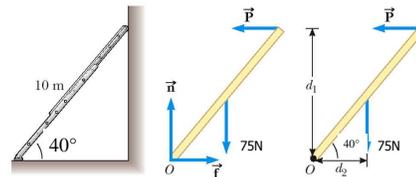
Find the force P of the wall on the top of the 10 meter ladder that weights 50 N



- A. 50 N
- B. 25N
- ✓ C. 30 N
- D. 21 N
- E. 45 N

Period 5 In-class quiz 21-2

Find the force P of the wall on the top of the 10 meter ladder that weights 75 N



- A. 50 N
- B. 25N
- C. 30 N
- D. 21 N
- ✓ E. 45 N