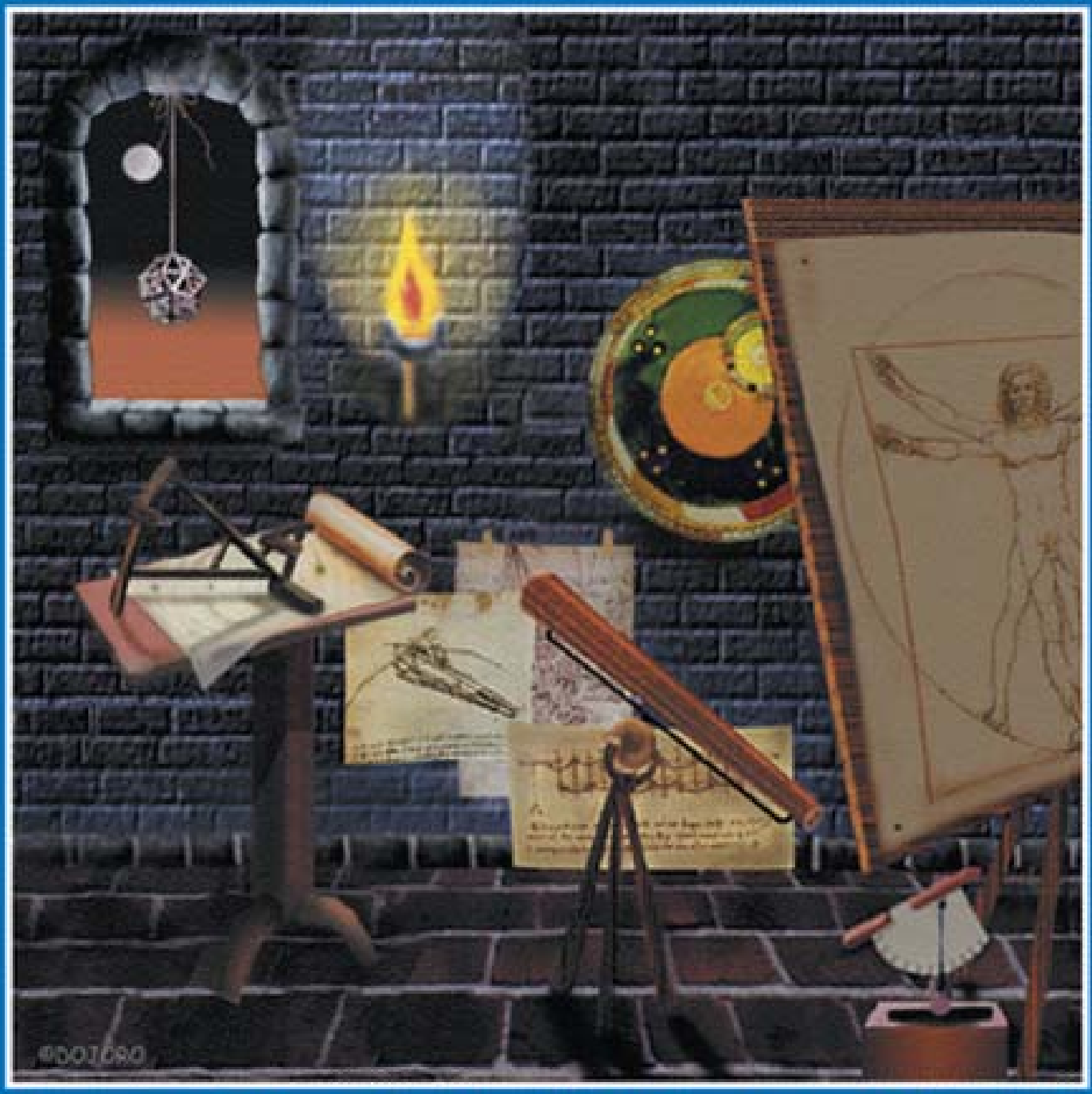
Wizard
Test Maker

PHYSICS



QUESTION CATALOGUE

eduware

Physics

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4053. A 4.0-kilogram rock and a 1.0-kilogram stone fall freely from rest from a height of 100 meters. After they fall for 2.0 seconds, the ratio of the rock's speed to the stone's speed is

(1) 1:1 (3) 2:1
(2) 1:2 (4) 4:1

3302. A rock dropped off a bridge takes 5 seconds to hit the water. Approximately what was the rock's velocity just before impact?

(1) 5 m/s **(3) 50 m/s**
(2) 2 m/s (4) 125 m/s

3240. An object dropped from rest will have a velocity of approximately 30. meters per second at the end of

(1) 1.0 s **(3) 3.0 s**
(2) 2.0 s (4) 4.0 s

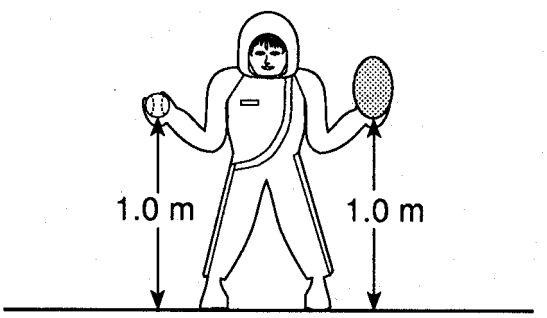
2665. An object starts from rest and falls freely. What is the velocity of the object at the end of 3.00 seconds?

(1) 9.81 m/s **(3) 29.4 m/s**
(2) 19.6 m/s (4) 88.2 m/s

2469. A 4.0-kilogram rock and a 1.0-kilogram stone fall freely from rest from a height of 100. meters. After they fall for 2.0 seconds, the ratio of the rock's speed to the stone's speed is

(1) 1:1 (3) 1:2
(2) 2:1 (4) 4:1

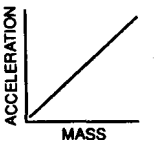
2011. As shown in the diagram below, an astronaut on the Moon is holding a baseball and a balloon. The astronaut releases both objects at the same time.



What does the astronaut observe?
[Note: The Moon has no atmosphere.]

(1) The baseball falls slower than the balloon.
(2) The baseball falls faster than the balloon.
(3) The baseball and balloon fall at the same rate.
(4) The baseball and balloon remain suspended and do not fall.

1853. Which graph best represents the relationship between mass and acceleration due to gravity for objects near the surface of the Earth? [Neglect air resistance.]

(1)


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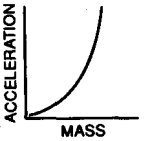

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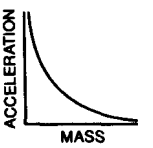

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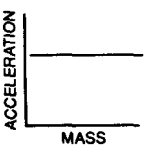
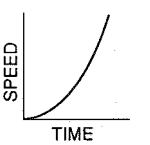


1621. Which graph best represents the motion of a freely falling body near the Earth's surface?

(1)


(3)


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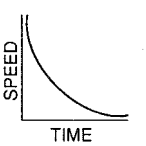

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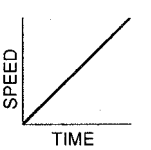

1401. A freely falling object near the Earth's surface travels downward at a constant

(1) acceleration of 1.00 m/s^2 (3) velocity of 1.00 m/s
(2) acceleration of 9.81 m/s^2 (4) velocity of 9.81 m/s

1068. Which is constant for a freely falling object?

(1) displacement (3) velocity
(2) speed **(4) acceleration**

700. As a body falls freely near the surface of the Earth, its acceleration

(1) decreases **(3) remains the same**
(2) increases

403. As an object falls freely near the surface of the Earth, its velocity

(1) decreases (3) remains the same
(2) increases

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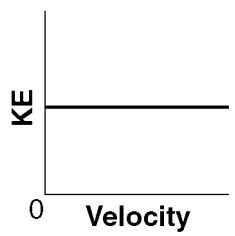
4528. A 45.0-kilogram boy is riding a 15.0-kilogram bicycle with a speed of 8.00 meters per second. What is the combined kinetic energy of the boy and the bicycle?

(1) 240. J (3) 1440 J
(2) 480. J **(4) 1920 J**

4455. If the speed of a car is doubled, the kinetic energy of the car is

(1) quadrupled (3) doubled
(2) quartered (4) halved

4412. Which graph best represents the relationship between the kinetic energy, *KE*, and the velocity of an object accelerating in a straight line?

(1)


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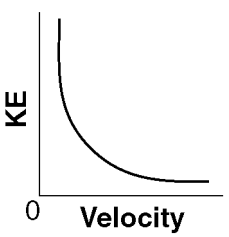

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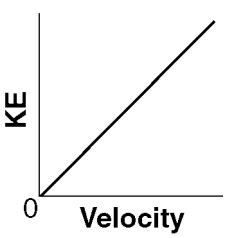

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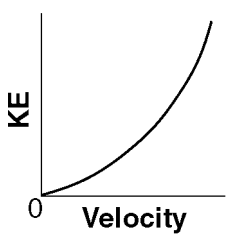


4247. A 1.0-kilogram rubber ball traveling east at 4.0 meters per second hits a wall and bounces back toward the west at 2.0 meters per second. Compared to the kinetic energy of the ball before it hits the wall, the kinetic energy of the ball after it bounces off the wall is

(1) one-fourth as great (3) the same
(2) one-half as great (4) four times as great

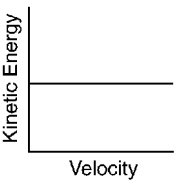
4183. An object moving at a constant speed of 25 meters per second possesses 450 joules of kinetic energy. What is the object's mass?

(1) 0.72 kg (3) 18 kg
(2) 1.4 kg (4) 36 kg

3839. A 3.0-kilogram mass is attached to a spring having a spring constant of 30. newtons per meter. The mass is pulled 0.20 meter from the spring's equilibrium position and released. What is the maximum kinetic energy achieved by the mass spring system?

(1) 2.4 J (3) 1.2 J
(2) 1.5 J **(4) 0.60 J**

4064. Which graph best represents the relationship between the kinetic energy of a moving object and its velocity?

(1)


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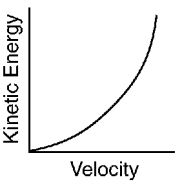

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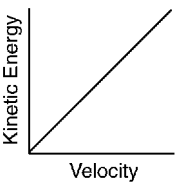

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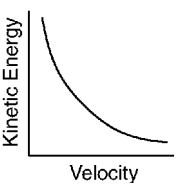


3589. The kinetic energy of a 980-kilogram race car traveling at 90. meters per second is approximately

(1) 4.4×10^4 J **(3) 4.0×10^6 J**
(2) 8.8×10^4 J (4) 7.9×10^6 J

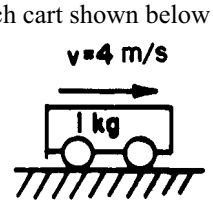
2883. A cart has a mass of 2.0 kilograms and moves at a constant speed of 4.0 meters per second. Its kinetic energy is

(1) 64 joules (3) 8.0 joules
(2) 16 joules (4) 4.0 joules

2776. A 60.-kilogram student running at 3.0 meters per second has a kinetic energy of

(1) 180 J (3) 540 J
(2) 270 J (4) 8100 J

2676. Which cart shown below has the greatest kinetic energy?

(1)


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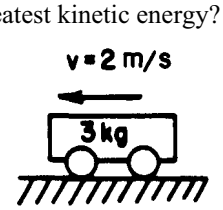

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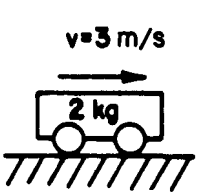

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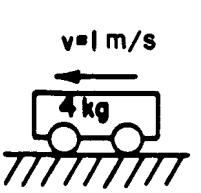

2484. A cart of mass *m* traveling at speed *v* has kinetic energy KE. If the mass of the cart is doubled and its speed is halved, the kinetic energy of the cart will be

(1) half as great (3) one-fourth as great
(2) twice as great (4) four times as great

4212.
Which graph best represents the relationship between the gravitational potential energy of a freely falling object and the object's height above the ground near the surface of Earth?

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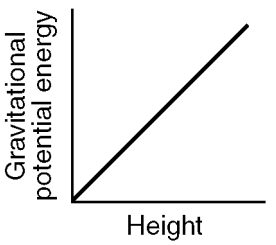

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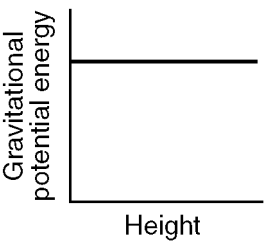
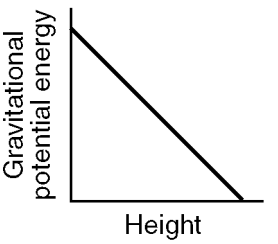


(3)


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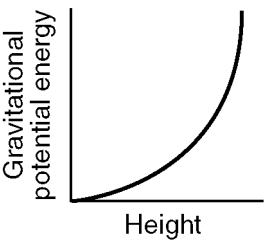
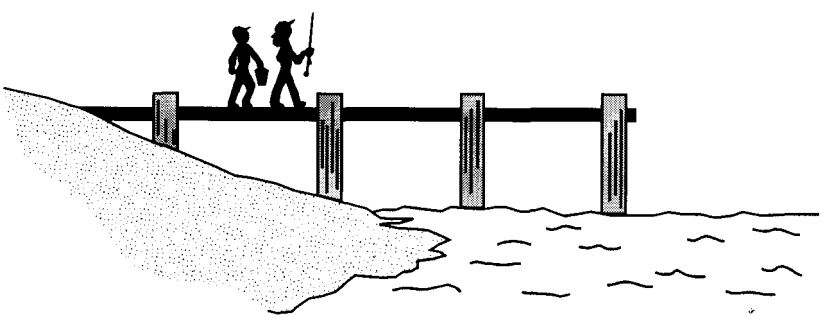


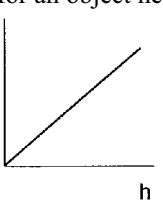
3712.
Two vacationers walk out on a horizontal pier as shown in the diagram below.



As they approach the end of the pier, their gravitational potential energy will
(1) decrease (2) increase **(3) remain the same**

4320. An object weighing 15 newtons is lifted from the ground to a height of 0.22 meter. The increase in the object's gravitational potential energy is approximately
(1) 310 J **(3) 3.3 J**
(2) 32 J (4) 0.34 J

3837. Which graph best represents the relationship between gravitational potential energy (PE) and height (*h*) above the ground for an object near the surface of Earth?

(1)


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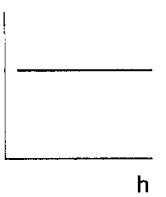

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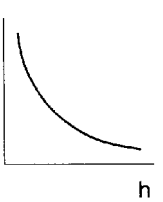

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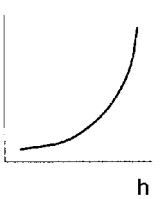

3457. A girl rides an escalator that moves her upward at constant speed. As the girl rises, how do her gravitational potential energy and kinetic energy change?
(1) Gravitational potential energy decreases and kinetic energy decreases.
(2) Gravitational potential energy decreases and kinetic energy remains the same.
(3) Gravitational potential energy increases and kinetic energy decreases.
(4) Gravitational potential energy increases and kinetic energy remains the same.

3156. A cart weighing 10 Newtons is pushed 10 meters on a level surface by a force of 5 Newtons. What is the increase in its potential energy?
(1) 1 joule (3) 100 joules
(2) 50 joules **(4) 0 joules**

1632. When a 5-kilogram mass is lifted from the ground to a height of 10 meters, the gravitational potential energy of the mass is increased by approximately
(1) 0.5 J (3) 50 J
(2) 2 J **(4) 500 J**

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4301.

Base your answer to the following question on the information given below.

Friction provides the centripetal force that allows a car to round a circular curve.

Find the minimum coefficient of friction needed between the tires and the road to allow a 1600-kilogram car to round a curve of radius 80. meters at a speed of 20. meters per second. [Show all work, including formulas and substitutions with units.]

Formulas: $F_f = \mu F_N$ $F_N = mg$ $F_c = \frac{mv^2}{r}$

Rearrangement: $\mu = \frac{v^2}{rg}$

Substitution: $\mu = \frac{(20.\ \text{m/s})^2}{(80.\ \text{m})(9.8\ \text{m/s}^2)}$

Answer: $\mu = 0.51$

or

$F_c = ma_c$ $a_c = \frac{v^2}{r}$

$F_c = \frac{mv^2}{r} = \frac{(1{,}600\ \text{kg})(20.\ \text{m/s})^2}{80.\ \text{m}} = 8.0 \times 10^3\ \text{N}$

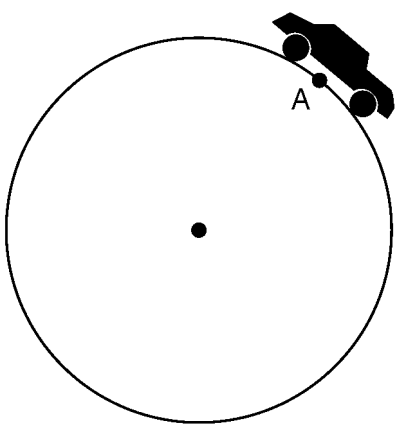
$F_N = mg = (1{,}600\ \text{kg})(9.81\ \text{m/s}^2) = 1.6 \times 10^4\ \text{N}$

$F_f = F_c$

$F_f = \mu F_N$ $\mu = \frac{F_f}{F_N} = \frac{8.0 \times 10^3\ \text{N}}{1.6 \times 10^4\ \text{N}} = 0.50$

Base your answers to questions **4562** through **4564** on the information below.

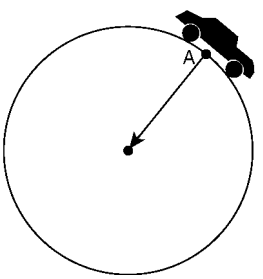
The combined mass of a race car and its driver is 600. kilograms. Traveling at constant speed, the car completes one lap around a circular track of radius 160 meters in 36 seconds.



4562. Calculate the speed of the car.

28 m/s or 27.9 m/s

4563. On the diagram *above*, draw an arrow to represent the direction of the net force acting on the car when it is in position *A*.



4564. Calculate the magnitude of the centripetal acceleration of the car.

a_c = 4.9 m/s^2