Review 145

A CONVEX LENS HAS A FOCAL LENGTH F. AN OBJECT IS PLACED BETWEEN INFINITY AND 2F FROM THE LENS ON ITS AXIS. THE IMAGE FORMED IS LOCATED:

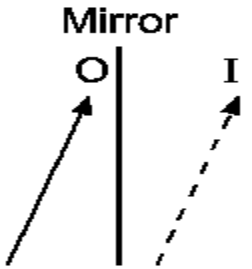
A. **at 2f.**

B. **between f and 2f.**

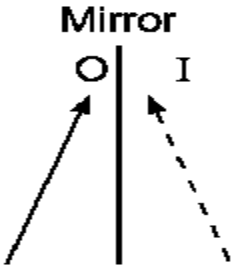
C. **at f.**

D. **between the lens and f.**

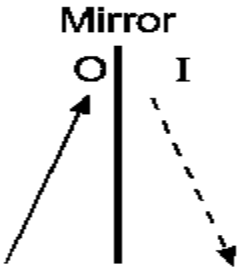
Which diagram best represents image I, which is formed by placing object O in front of a plane mirror?



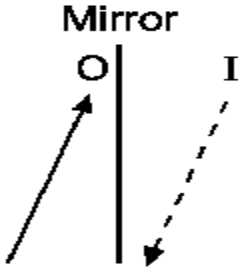
.A



.B

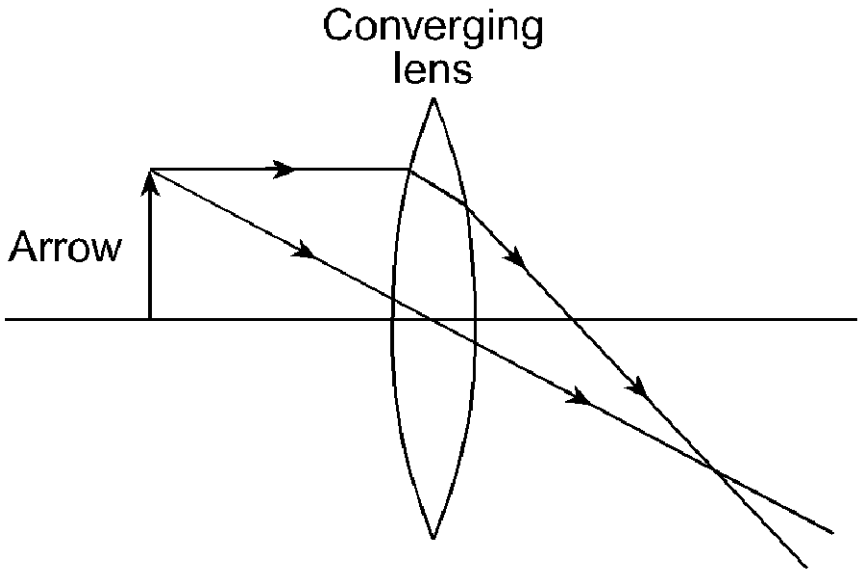


.C



.D

THE DIAGRAM BELOW SHOWS AN ARROW PLACED IN FRONT OF A CONVERGING LENS. THE LENS FORMS AN IMAGE OF THE ARROW THAT IS



A. **real and inverted**

B. **real and erect** ✓

C. **virtual and inverted**

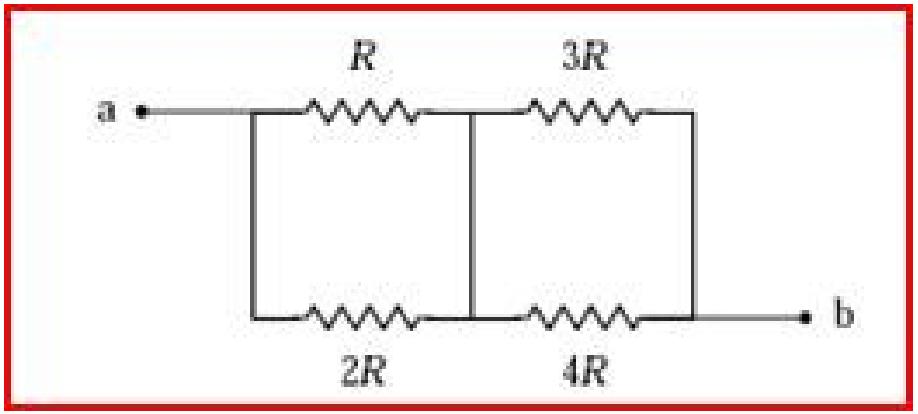
D. **virtual and erect**

A parallel-plate capacitor has a capacitance of C. If the area of the plates is doubled and the distance between the plates is halved, what is the new capacitance?

C/2
C/4
2C
 4C

10) In the figure . If R=11Ω, what is the equivalent resistance between points a and p? 1

A)26 Ω **B) 31 Ω** **C)4.6 Ω** **D) 36 Ω**



A tourist drops a rock from rest from a guard rail overlooking a valley. What is the velocity of the rock at 4.0 s? What is the displacement of the rock at 4.0 s?

Given: $v_i = 0$ m/s
$a = g = -9.80$ m/s^2
$t = 4.0$ s

Find: $v = ?$
$d = ?$

Soln: $v_2 = v_1 + at$
$v_2 = 0 + (-9.80 \text{ m/s}^2)(4.0 \text{ s})$
$\boxed{\mathbf{v_2 = -39.2 \text{ m/s}}}$

$d = v_1 t + \frac{1}{2} at^2$
$d = 0 + \frac{1}{2} (-9.80 \text{ m/s}^2)(4.0 \text{ s})^2$
$\boxed{\mathbf{d = -78.4 \text{ m}}}$

A man is standing on the edge of a 20.0 m high cliff. He throws a rock vertically with an initial velocity of 10.0 m/s.

a) How high does the rock go? (Remember that at its max height v = 0 m/s)

b) How long does it take to reach its max height?

Given: $v_i = 10$ m/s

$a = g = -9.80$ m/s^2

$h = 20.0$ m

Find: $d = ?$

$t = ?$

Soln: $v_2 = v_1 + at$

$0 = 10 + (-9.80 \text{ m/s}^2)(t)$

$\boxed{t = 1.02 \text{ s}}$

$d = v_1 t + \frac{1}{2} at^2$

$d = (10.0 \text{ m/s})(1.02\text{s}) + \frac{1}{2} (-9.80 \text{ m/s}^2)(1.02\text{s})^2$

$\boxed{d = 5.10 \text{ m}}$

Water flows through a pipe. The diameter of the pipe at point B is larger than at point A. Where is the speed of the water greater?

- ✔ a. Point A
- b. Point B
- c. Same at both A and B
- d. Cannot be determined from the information given.

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

(1) doubled

(2) halfed

 (3) quadrupled

(4) quartered

A golf ball of mass 0.045 kg is hit off the tee at a speed of 45 m/s. The golf club was in contact with the ball for 5.0×10^{-3} s.

(a) Find the impulse imparted to the golf ball.

$$\Delta p = (0.045 \text{ kg})(45 \text{ m/s}) - 0 = 2.0 \text{ kg m/s}$$

(b) Find the average force exerted on the ball by the golf club.

$$\Delta p = F\Delta t,\ 2.0 \text{ kg m/s} = F(0.0050 \text{ s}),\ F = 405 \text{ kg m/s}^2$$

A ball is thrown straight up into the air. If we do not ignore air resistance, the accel ll as it is traveling downward is

a. 9.8 m/s^2.
b. greater than 9.8 m/s^2.
c. less than 9.8 m/s^2.
d. zero.

If the mass of an object in free fall is doubled, its acceleration

a. doubles.
b. increases by a factor of four.
c. stays the same.
d. is cut in half.

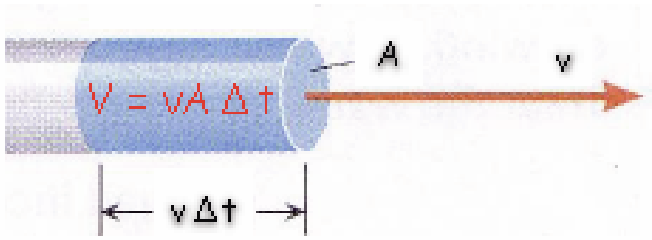
If a ball is dropped from rest, it will fall 5 m during the first second. How far will it fall during the first 2 s?

a. 10 m
b. 15 m
c. 20 m
d. 25 m

A golf ball is thrown vertically upward with a speed of 30 m/s. How long does it take to get to the top of its path?

a. 1 s
b. 2 s
c. 3 s
d. 4 s

Oil is flowing at a speed of 1.22 m/s through a pipeline with a radius of 0.305 m. How much oil flows in 1 day?



The volume rate of flow (volume per second) is $Q = vA$

$A = \pi r^2 = \pi \times 0.305^2 = 0.2923\ m^2$.

So, $Q = (1.22\ m/s)(0.2923\ m^2) = 0.3565\ m^3/s$.

In 24 hours, the flow is $3.08 \times 10^4\ m^3$.

The volume rate of flow in an artery supplying the brain is 3.6×10^{-6} m^3/s. If the radius of the artery is 5.2 mm, determine the average blood speed.

$$v = \frac{Q}{A} = \frac{3.6 \times 10^{-6}\ m^3/s}{\pi \times 0.0052^2} = 0.0424\ m/s$$

Find the average blood speed if a constriction reduces the radius of the artery by a factor of 3 (without reducing the flow rate).

v = Q/A, and r is reduced to r/3,

so the speed is increased by a factor of $3^2 = 9$.

So, $v = 9 \times 0.0424 = 0.381$ m/s

A converging glass lens ($n = 1.52$) has a focal length of 40.0 cm in air. Find its focal length when it is immersed in water, which has an index of refraction of 1.33.

$$\frac{1}{f_{\text{air}}} = (n - 1)\left(\frac{1}{R_1} - \frac{1}{R_2}\right)$$

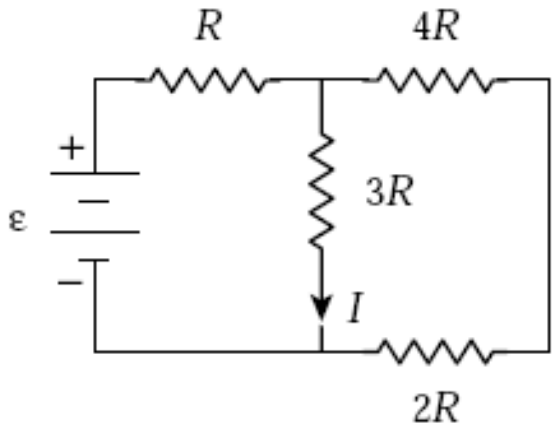
$$\frac{1}{f_{\text{water}}} = (n' - 1)\left(\frac{1}{R_1} - \frac{1}{R_2}\right)$$

where n' is the ratio of the index of refraction of glass to that of water: $n' = 1.52/1.33 = 1.14$. Dividing the first

$$\frac{f_{\text{water}}}{f_{\text{air}}} = \frac{n - 1}{n' - 1} = \frac{1.52 - 1}{1.14 - 1} = 3.71$$

$$f_{\text{water}} = 3.71 f_{\text{air}} = 3.71(40.0 \text{ cm}) = 148 \text{ cm}$$

In the figure shown, if $I = 0.20$ A and $\varepsilon = 18$ V, determine R.



a. 50 Ω
b. 8.0 Ω
c. 10 Ω
d. 20 Ω
e. 30 Ω