

Question 1

A thallium source with a half-life of 3.7 years was certified at 10 kBq ten years ago. What is its activity now?

- A) 4.7 kBq
- B) 3.3 kBq
- C) 1.5 kBq
- D) 1.0 kBq

Answer: <https://biology-forums.com/index.php?topic=509501>

Question 2

In a resonating pipe that is open at one end and closed at the other end, there

- A) are displacement nodes at each end.
- B) are displacement antinodes at each end.
- C) is a displacement node at the open end and a displacement antinode at the closed end.
- D) is a displacement node at the closed end and a displacement antinode at the open end.

Answer: <https://biology-forums.com/index.php?topic=507084>

Question 3

A 3.0-kg and a 5.0-kg box rest side-by-side on a perfectly smooth, level floor. A horizontal force of 32 N is exerted on the 3.0-kg box pushing it against the 5.0-kg box, and, as a result, both boxes slide along the floor. How hard do the two boxes push against each other?

- A) 12 N
- B) 20 N
- C) 24 N
- D) 32 N
- E) 0 N

Answer: <https://biology-forums.com/index.php?topic=503506>

Question 4

At a certain instant, coil A is in a 10-T external magnetic field and coil B is in a 1-T external magnetic field. Both coils have the same area and are oriented at right angles to the field. Which coil will have a greater emf induced in it?

- A) coil A
- B) coil B
- C) It is impossible to know without more information about the fields.

Answer: <https://biology-forums.com/index.php?topic=506851>

Question 5

A fusion reaction releases energy because the binding energy of the resulting nucleus

- A) is greater than the binding energy of the original nuclei.
- B) is equal to the binding energy of the original nuclei.
- C) is less than the binding energy of the original nuclei.
- D) is released in the process.
- E) is absorbed in the process.

Answer: <https://biology-forums.com/index.php?topic=509236>

Question 6

A thermodynamic engine having the maximum possible efficiency has an efficiency of 25% when operating between two heat reservoirs. If the temperature of the cold reservoir is 300 K, what is the temperature of the hot reservoir?

- A) 350 K
- B) 375 K
- C) 400 K
- D) 450 K
- E) 500 K

Answer: <https://biology-forums.com/index.php?topic=506180>

Question 7

In a carnival ride, passengers stand with their backs against the wall of a cylinder. The cylinder is set into rotation and the floor is lowered away from the passengers, but they remain stuck against the wall of the cylinder. For a cylinder with a 2.0-m radius, what is the minimum speed that the passengers can have so they do not fall if the coefficient of static friction between the passengers and the wall is 0.25?

- A) 8.9 m/s
- B) 2.3 m/s

- C) 3.0 m/s
- D) 4.9 m/s
- E) It depends on the mass of the passengers.

Answer: <https://biology-forums.com/index.php?topic=503608>

Question 8

In a certain nuclear reactor, neutrons suddenly collide with deuterons, which have twice the mass of neutrons. In a head-on elastic collision with a stationary deuteron, what fraction of the initial kinetic energy of a neutron is transferred to the deuteron?

- A) 1/2
- B) 1/3
- C) 3/4
- D) 5/6
- E) 8/9

Answer: <https://biology-forums.com/index.php?topic=503951>

Question 9

A soap bubble film that is 106 nm thick and has an index of refraction of 1.42 results in constructive interference in the reflected light if this film is illuminated by a beam of light with a wavelength of 601 nm. What are the next three thicknesses of this film that will also result in constructive interference?

- A) 212 nm, 318 nm, 424 nm
- B) 53.0 nm, 35.3 nm, 26.5 nm
- C) 212 nm, 424 nm, 636 nm
- D) 67.0 nm, 42.4 nm, 22.3 nm
- E) 318 nm, 530 nm, 742 nm

Answer: <https://biology-forums.com/index.php?topic=507622>

Question 10

A proton moving with a velocity of 4.0×10^4 m/s along the +y-axis enters a magnetic field of 0.20 T directed towards the -x-axis. What is the magnitude of the magnetic force exerted on the proton? ($e = 1.60 \times 10^{-19}$ C)

- A) 8.0×10^{-15} N
- B) 3.9×10^{-15} N
- C) 2.6×10^{-15} N
- D) 0 N
- E) 1.3×10^{-15} N

Answer: <https://biology-forums.com/index.php?topic=506781>

Question 11

If the electric field exerts a 27 mN force on a point charge of $-30 \mu\text{C}$ at a certain location in the laboratory, what are the magnitude and direction of the field at that location?

Answer: <https://biology-forums.com/index.php?topic=506373>

Question 12

A refracting telescope has a magnification M . If the focal length of the objective lens is doubled and the eyepiece focal length is halved, what is the new magnification?

- A) $4M$
- B) $2M$
- C) $M/2$
- D) $M/4$
- E) M

Answer: <https://biology-forums.com/index.php?topic=507323>

Question 13

A flat circular coil has 250 identical loops of very thin wire. Each loop has an area of 0.12 m^2 and carries 15 mA of current. This coil is placed in a magnetic field of 0.050 T oriented at 30° to the plane of the loop. What is the magnitude of the magnetic moment of the coil?

Answer: <https://biology-forums.com/index.php?topic=506810>

Question 14

Enzo throws a rock horizontally with a speed of 12 m/s from a bridge. It falls for 2.28 s before reaching the water below. Ignore air. Just as the rock reaches the water, find

- (a) the horizontal component of its velocity.

(b) the speed with which it is moving.

Answer: <https://biology-forums.com/index.php?topic=503445>

Question 15

A proton that is initially at rest is accelerated through an electric potential difference of magnitude 500 V. What speed does the proton gain? ($e = 1.60 \times 10^{-19} \text{ C}$, $m_{\text{proton}} = 1.67 \times 10^{-27} \text{ kg}$)

A) $2.2 \times 10^5 \text{ m/s}$

B) $3.1 \times 10^5 \text{ m/s}$

C) $9.6 \times 10^5 \text{ m/s}$

D) $1.1 \times 10^5 \text{ m/s}$

Answer: <https://biology-forums.com/index.php?topic=506398>