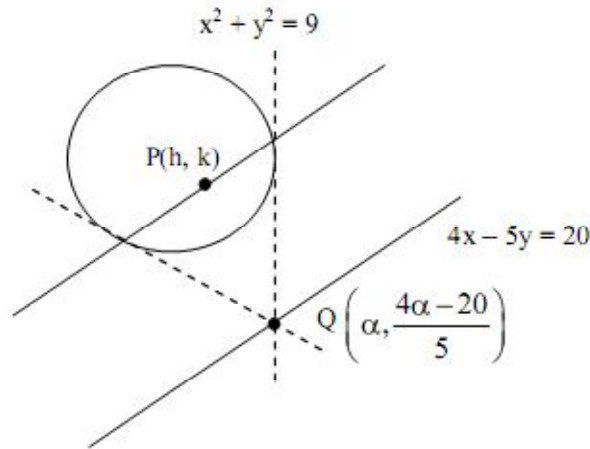
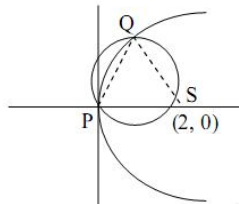


- Q4.** The locus of the mid-point of the chord of contact of tangents drawn from points lying on the straight line $4x - 5y = 20$ to the circle $x^2 + y^2 = 9$ is:



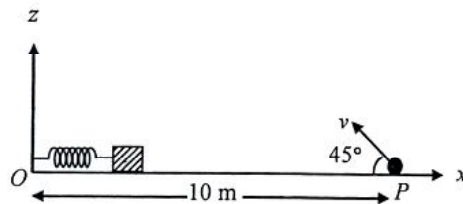
- (A) $20(x^2 + y^2) - 36x + 45y = 0$
 (B) $20(x^2 + y^2) + 36x - 45y = 0$
 (C) $36(x^2 + y^2) - 20x + 45y = 0$
 (D) $36(x^2 + y^2) - 20x - 45y = 0$
- Q5.** Let S be the focus of the parabola $y^2 = 8x$ and let PQ be the common chord of the circle $x^2 + y^2 - 2x - 4y = 0$ and the given parabola. The area of the triangle PQS is:



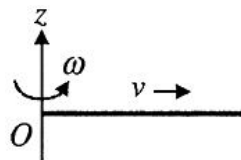
- (A) 1
 (B) 2
 (C) 3
 (D) 4

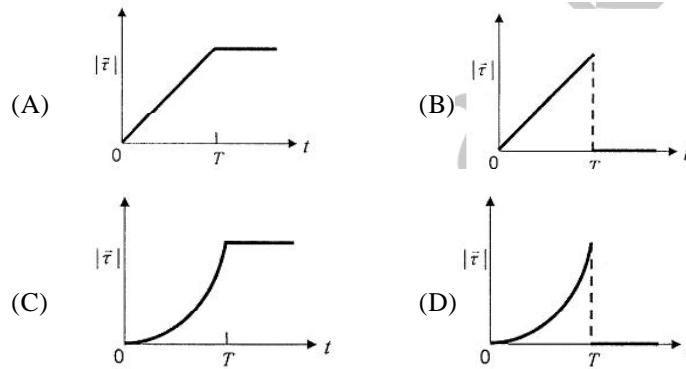
SAMPLE QUESTIONS PHYSICS

- Q1.** A small block is connected to one end of a massless spring of unstretched length 4.9 m. The other end of the spring (see the figure) is fixed. The system lies on a horizontal frictionless surface. The block is stretched by 0.2 m and released from rest at $t = 0$. It then executes simple harmonic motion with angular frequency $\omega = \frac{\pi}{3}$ rad/s. Simultaneously at $t = 0$, a small pebble is projected with speed v from point P at an angle of 45° as shown in the figure. Point P is at a horizontal distance of 10 m from O. If the pebble hits the block at $t = 1$ s, the value of v is (take $g = 10 \text{ m/s}^2$)



- (A) $\sqrt{50}$ m/s (B) $\sqrt{49}$ m/s
 (C) $\sqrt{48}$ m/s (D) $\sqrt{47}$ m/s
-
- Q2.** A thin uniform rod, pivoted at O, is rotating in the horizontal plane with constant angular speed ω , as shown in the figure. At time $t = 0$, a small insect starts from O and moves with constant speed v with respect to the rod towards the other end. It reaches the end of the rod at $t = T$ and stops. The angular speed of the system remains ω throughout. The magnitude of the torque τ on the system about O, as a function of time is best represented by which plot?

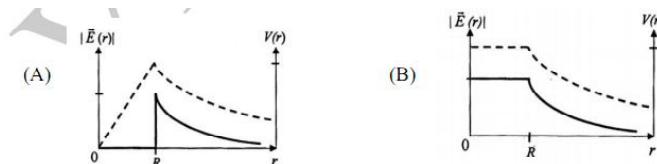




Q3. In the determination of Young's modulus $Y = \frac{MLg}{\pi d^2 l}$ by using Searle's method, a wire of length $L = 2$ m and diameter $d = 0.5$ mm is used. For a load $M = 2.5$ kg, an extension $l = 0.25$ mm in the length of the wire is observed. Quantities d and l are measured using a screw gauge and a micrometer, respectively. They have the same pitch of 0.5 mm. The number of divisions on their circular scale is 100 . The contributions to the maximum probable error of the Y measurement is:

- (A) Due to the errors in the measurements of d and l are the same.
- (B) Due to the error in the measurement of d is twice that due to the error in the measurement of l .
- (C) Due to the error in the measurement of l is twice that due to the error in the measurement of d .
- (D) Due to the error in the measurement of d is four times that due to the error in the measurement of l .

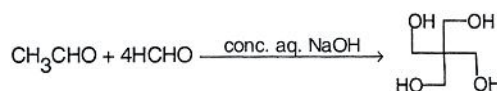
Q4. Consider a thin spherical shell of radius R with its centre at the origin, carrying uniform positive surface charge density. The variation of the magnitude of the electric field $|\vec{E}(r)|$ and the electric potential $V(r)$ with the distance r from the centre, is best represented by which graph?



Q2. Which ordering of compounds is according to the decreasing order of the oxidation state of nitrogen ?

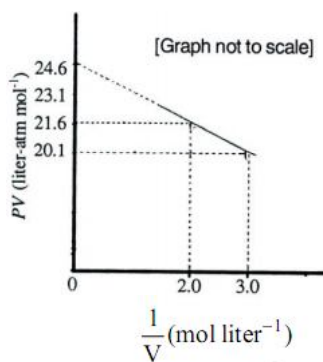
- (A) HNO_3 , NO , NH_4Cl , N_2
 (B) HNO_3 , NO , N_2 , NH_4Cl
 (C) HNO_3 , NH_4Cl , NO , N_2
 (D) NO , HNO_3 , NH_4Cl , N_2

Q3. The number of aldol reaction(s) that occurs in the given transformation is



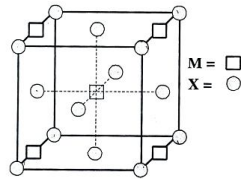
- (A) 1 (B) 2
 (C) 3 (4) 4

Q4. For one mole of a van der Waals gas when $b = 0$ and $T = 300 \text{ K}$, the PV vs. $1/V$ plot is shown below. The value of the van der Waals constant a ($\text{atm. liter}^2 \text{mol}^{-2}$) is :



- (A) 1 (B) 1.5
 (C) 2 (D) 2.5

Q5. A compound M_pX_q has cubic close packing (ccp) arrangement of X. Its unit cell structure is shown below. The empirical formula of the compound is



- (A) MX (B) MX_2
 (C) M_2X_2 (D) M_2X

SAMPLE QUESTIONS BIOLOGY

Q1. The bacteria helps in nitrogen fixation. The bacteria shown in the figure does not fix atmospheric nitrogen. Identify the bacteria.

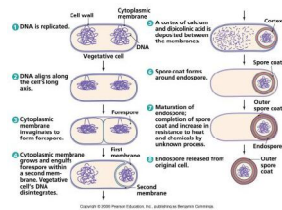


- (A) Rhizobium (B) E.coli
 (C) Azotobacter (D) Cyanobacteria

Q2. Which one of the following groups of bacteria is considered as the link between bacteria and virus?

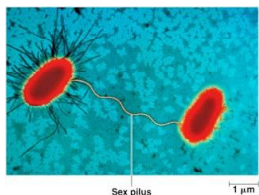
- (A) Mycoplasma (B) Spirochaetes
 (C) Actinomycetes (D) Vibrios

Q3. Endospore formation is a method to tide over unfavorable condition which is generally seen in?



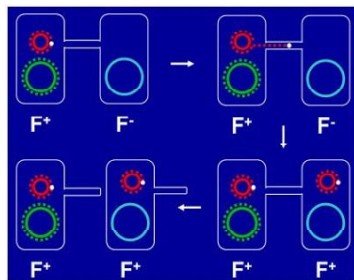
- (A) Gram positive bacteria (B) Gram negative bacteria
 (C) Both of above (D) Streptomyces

Q4. The unidirectional transformation of genetic material from a donor bacterium to recipient bacterium by cell to cell contact as shown in following figure is termed as :



- (A) Transformation (B) Conjugation
 (C) Recombination (D) Transduction

Q5. The conjugation between F⁺ and F⁻ as shown in following figure in cell results in the formation of :



- (A) Formation of two F⁻ cells
 (B) F⁻ cell becomes F⁺ cells
 (C) F⁻ cells remains F⁻ with little DNA from F⁺ cell
 (D) Remains same without any change

SAMPLE QUESTIONS MENTAL ABILITY

Q1. During a recent period of time, eleven days had some rain. A morning rain was always followed by a clear afternoon. An afternoon rain was always preceded by a clear morning. A total

of nine mornings and twelve afternoons were clear. How many days had no rain at all.

- (A) 5 days (B) 6 days
(C) 7 days (D) None of the above

Q2. If 'DWOS' is coded as 'EYQT', then 'GNEM' will be coded as _

- (A) NGPH (B) HPGN
(C) NGHP (D) NHGP

Q3. Pointing to a man, in a photograph, Aarti said, 'His mother's only daughter is my mother'. How is Aarti related to that man?

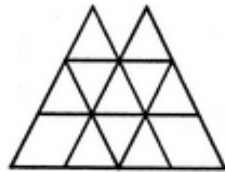
- (A) Nephew (B) Sister
(C) Wife (D) Niece

Q4. Find the missing number in the following series:

2215, 1225, 635 __, 5105, 3265

- (A) 2 (B) 5
(C) 4 (D) 3

Q5. Find the number of triangles in the following figure:



- (A) 16 (B) 18
(C) 14 (D) 15

SAMPLE QUESTIONS ENGLISH

Q1. In the following question 1st and 6th part of a sentence are in order. Re-arrange P, Q, R and S to make the correct sentence.

1. He has
P: while has in a reverie Q: found the book
R: at the bus-stop S: he lost

The proper sequence should be :

- (A) Q R S P (B) P R Q S
(C) Q S R P (D) P Q S R

Q2. In the following choose the grammatically correct sentence(s).

1. The boy, along with his two friends, skates in Griffith Park.
2. All of the homework assigned to the students is to be completed by next Tuesday.
3. Next to the tables in the classroom is the personal computers for which you are looking.
4. The competitive boy competed competitively in a competed competition.

- (A) 1 and 2 (B) 2 and 3
(C) 3 and 4 (D) 1 and 4

Q3. Find one word for many words:

1. One incapable of being tired.
2. One who hates women.
3. One who is fond of sensuous pleasure.
4. One who is quite like a woman.

- (A) 1- Intestate 2- Misogynist, 3- Epicure, 4-Effeminate
(B) 1- Indefatigable 2- Misogynist, 3- Epicure, 4-Valetudinarian
(C) 1- Indefatigable 2- Misogynist, 3- Epicure, 4-Polyglot
(D) 1- Indefatigable 2- Misogynist, 3- Epicure, 4-Effeminate

Q4. Write the synonyms of the word written in capital letters.

1. BENEVOLENCE
2. BREVITY
3. ASTOUNDING
4. SUBSTANTIAL

- (A) 1-bewilder, 2- concise, 3- fabulous, 4- real
(B) 1- kindness, 2- detail, 3- fabulous, 4- real
(C) 1- kindness, 2- concise, 3- fabulous, 4- unreal
(D) 1- kindness, 2- concise, 3- fabulous, 4- real

Q5. Find the antonyms of the words written in capital letters.

1. TREACHEROUS
2. MAGNANIMOUS
3. MONOTONOUS
4. GENIAL

- (A) 1-loyal, 2- vindictive, 3- exciting, 4- cheerless
(B) 1-cheater, 2- vindictive, 3- exciting, 4- cheerless

- (C) 1-loyal, 2- vindictive, 3- exciting, 4- cheerful
- (D) 1-loyal, 2- vindictive, 3- exciting, 4- difficult

SAMPLE QUESTIONS KNOWLEDGE

Q1. The term Auxiliary point system, upper cut and punch are associated with which one of the following games?

- (A) Football
- (B) Basketball
- (C) Boxing
- (D) Cricket

Q2. Which one of the following Veteran Bollywood actor has been chosen for the Dada Saheb Phalke Award, the country's highest cinema honour in the year 2013?

- (A) Dilip Kumar
- (B) Pran
- (C) Amitabh Bachchan
- (D) None of the above

Q3. The Supreme Court of India rejected the plea of Novartis, the Swiss drug maker, to patent the updated version of _____ drug called Glivec.

- (A) HIV AIDS
- (B) Diabetes
- (C) Cancer
- (D) None of the above

Q4. The honourable Supreme Court of India upheld Sanjay Dutt's conviction in the 1993 Mumbai blasts case and his sentence was reduced from _____ in jail.

- (A) Six to five years
- (B) Seven to five years
- (C) Four to three years
- (D) None of the above

