Quiz Questions — olympiad2026

Q1.

Quiz Multichoice Single Answer Questions

The number of solutions of the pair of equations $\begin{aligned} 2\sin^2\theta - \cos 2\theta &= 0, \\ 2\cos^2\theta - 3\sin\theta &= 0 \end{aligned}$ in the interval $[0, 2\pi]$ is

1. 0

2. 1

3. 2 **(correct)**

4. 4

Score: 4 **Negative Score:** 1

Q2.

Quiz Multichoice Single Answer Questions

Two straight lines are drawn such that each of them is tangent to both the circle $x^2 + y^2 = \frac{1}{2}$ and the parabola $y^2 = 4x$. These two lines intersect at a point Q. An ellipse is constructed with centre at the origin, major axis along the x-axis, and semi-major axis equal to $\sqrt{2}$. The semi-minor axis of the ellipse is OQ, where O is the origin. If e denotes the eccentricity of the ellipse, then the value of e^2 is:

1. $\frac{1}{2}$ **(correct)**

2. $\frac{2}{3}$

3. $\frac{3}{4}$

4. $\frac{5}{6}$

Score: 4 **Negative Score:** 1

Q3.

Quiz Multichoice Single Answer Questions

The sum of the first n terms of the series

$$\frac{1}{2}+\frac{3}{4}+\frac{7}{8}+\frac{15}{16}+\ldots$$

1. 2^n-n-1

2. $1-2^{-n}$

3. $n-1+2^{-n}$ **(correct)**

4. $1+2^n$

Score: 4 **Negative Score:** 1

Q4.

Quiz Multichoice Single Answer Questions

The equation of a circle is $\mathrm{Re}(z^2)+2(\mathrm{Im}(z))^2+2\,\mathrm{Re}(z)=0$, where $z=x+iy$. A line which passes through the center of the given circle and the vertex of the parabola $x^2-6x-y+13=0$, has y-intercept equal to

1. 2

2. $\frac{1}{2}$

3. 1 **(correct)**

4. 3

Score: 4 **Negative Score:** 1

Q5.

Quiz Multichoice Single Answer Questions

Consider the quadratic equation $(c-5)x^2-2cx+(c-4)=0, \quad c\neq 5$.
Let S be the set of all integral values of c for which one root of the equation lies in the interval $(0,2)$ and the other root lies in the interval $(2,3)$. Then, the number of elements in S is:

1. 11 **(correct)**

2. 10

3. 12

4. 13

Score: 4 **Negative Score:** 1

Q6.

Quiz Multichoice Single Answer Questions

If r, s, t are prime numbers and p, q are positive integers such that the least common multiple of p and q is $r^2s^4t^2$. Then the number of ordered pairs (p, q) is

1. 224

2. 225 **(correct)**

3. 252

4. 254

Score: 4 **Negative Score:** 1

Q7.

Quiz Multichoice Single Answer Questions

Let $f : [0, 2] \to \mathbb{R}$ be a twice differentiable function such that $f''(x) > 0$, for all $x \in (0, 2)$.
If $\phi(x) = f(x) + f(2 - x)$, then ϕ is

1. increasing on $(0, 1)$ and decreasing on $(1, 2)$

2. decreasing on $(0, 2)$

3. decreasing on $(0, 1)$ and increasing on $(1, 2)$ **(correct)**

4. increasing on $(0, 2)$

Score: 4 **Negative Score:** 1

Q8.

Quiz Multichoice Questions

Let $f : \mathbb{R} \to \mathbb{R}$, $g : \mathbb{R} \to \mathbb{R}$, and $h : \mathbb{R} \to \mathbb{R}$ be differentiable functions such that $f(x) = x^3 + 3x + 2$, $g(f(x)) = x$ and $h(g(g(x))) = x \quad \text{for all } x \in \mathbb{R}$. Then which of the following is/are true ?

1. $g'(2) = \frac{1}{15}$

2. $h'(1) = 666$ **(correct)**

3. $h(0) = 16$ **(correct)**

4. $h(g(3)) = 36$

Score: 4 **Negative Score:** 1

Q9.

Quiz Multichoice Questions

The probabilities that a student passes in Mathematics, Physics and Chemistry are m, p and c, respectively. The student has a 75% chance of passing in at least one, a 50% chance of passing in at least two and a 40% chance of passing in exactly two subjects. Then which of the following relations is/are true?

1. $m+p+c=\dfrac{19}{20}$

2. $m+p+c=\dfrac{27}{20}$ **(correct)**

3. $mpc=\dfrac{1}{10}$ **(correct)**

4. $mpc=\dfrac{1}{4}$

Score: 4 **Negative Score:** 1

Q10.

Quiz Multichoice Single Answer Questions

Let $P=[a_{ij}]$ be a 3×3 matrix and let $Q=[b_{ij}]$, where

$$b_{ij}=2^{\,i+j}a_{ij}, \qquad 1\le i,j\le 3.$$

If $\det(P)=2$, then $\det(Q)$ is:

1. 2^{10}

2. 2^{11}

3. 2^{12}

4. 2^{13} **(correct)**

Score: 4 **Negative Score:** 1

Q11.

Quiz Multichoice Single Answer Questions

Let $f : \mathbb{R} \to \mathbb{R}$ be a continuously differentiable function such that $f(2) = 6$ and $f'(2) = \frac{1}{48}$. If $\int_6^{f(x)} 4t^3\, dt = (x-2)\, g(x)$, then $\lim_{x\to 2} g(x)$ is equal to

1. 18 **(correct)**

2. 24

3. 12

4. 36

Score: 4 **Negative Score:** 1

Q12.

Quiz Multichoice Single Answer Questions

If the curves

$$y^2 = 6x \quad \text{and} \quad 9x^2 + by^2 = 16$$

intersect each other at right angles, then the value of b is

1. 6

2. $\frac{7}{2}$

3. 4

4. $\frac{9}{2}$ **(correct)**

Score: 4 **Negative Score:** 1

Q13.

Quiz Multichoice Single Answer Questions

Let $y(x)$ be the solution of the differential equation

$$(x \log x)\frac{dy}{dx} + y = 2x \log x, \quad x \geq 1.$$

Then the value of $y(e)$ is

1. e

2. 2 **(correct)**

3. 0

4. $2e$

Score: 4 **Negative Score:** 1

Q14.

Quiz Multichoice Single Answer Questions

The centres of those circles which touch the circle

$$x^2 + y^2 - 8x - 8y - 4 = 0,$$

externally and also touch the X-axis, lie on:

1. a circle

2. an ellipse which is not a circle

3. a hyperbola

4. a parabola **(correct)**

Score: 4 **Negative Score:** 1

Q15.

Quiz Multichoice Single Answer Questions

The equation of a common tangent to the curves $y^2 = 16x$ and $xy = -4$ is:

1. $x - y + 4 = 0$ **(correct)**

2. $x + y + 4 = 0$

3. $x - 2y + 16 = 0$

4. $2x - y + 2 = 0$

Score: 4 **Negative Score:** 1

Q16.

Quiz Multichoice Single Answer Questions

Let $\vec{a}, \vec{b}$, and $\vec{c}$ be three unit vectors such that

$$\vec{a} \times (\vec{b} \times \vec{c}) = \frac{\sqrt{3}}{2}(\vec{b} + \vec{c}).$$

If $\vec{b}$ is not parallel to $\vec{c}$, then the angle between $\vec{a}$ and $\vec{b}$ is

1. $\frac{3\pi}{4}$

2. $\frac{\pi}{2}$

3. $\frac{2\pi}{3}$

4. $\frac{5\pi}{6}$ **(correct)**

Score: 4 **Negative Score:** 1

Q17.

Quiz Multichoice Single Answer Questions

The equation of the plane passing through the point $(1, 1, 1)$ and perpendicular to the planes $2x + y - 2z = 5$ and $3x - 6y - 2z = 7$ is:

1. $14x + 2y - 15z = 1$

2. $-14x + 2y + 15z = 3$

3. $14x - 2y + 15z = 27$

4. $14x + 2y + 15z = 31$ **(correct)**

Score: 4 **Negative Score:** 1

Q18.

Quiz Multichoice Single Answer Questions

For a point P in the plane, let $d_1(P)$ and $d_2(P)$ be the distances of the point P from the lines $x - y = 0$ and $x + y = 0$, respectively. The area of the region R consisting of all points P lying in the first quadrant of the plane and satisfying

$$2 \leq d_1(P) + d_2(P) \leq 4$$

is

1. 4

2. 6 **(correct)**

3. 8

4. 10

Score: 4 **Negative Score:** 1