

Bank of questions 2025 Calculus

1	Find the slope of the tangent to the curve of the function f where $f(x) = x^2 - x + 1$ at the point $(-2, 7)$
2	Find the measure of the angle which the tangent to the curve $y = 2x^3 + 3x$ makes with the positive direction of X-axis at the point $(-1, 0)$.
3	Find the first derivative of the function $y = (3x^2 - 2x + 1)(x^4 - 5x^2 + 2)$ when $x = 0$
4	Find the slope of the tangent to the curve of the function $y = (2x + 5)(3x^2 - 1)$ at $x = -1$

5	<p>Find the first derivative of :</p> <p>a) $y = (x^5 - 3x)(5x - 9)$</p> <p>b) $y = (x^2 + 5)(x^2 - 3)$</p>
6	Find the slope of the tangent to the curve $y = x^2(5x - 1)$ at $x = 1$
7	Find the first derivative of the function $y = \frac{3x-2}{2x+3}$ when $x = 1$
8	Find the first derivative of the function $y = \frac{2x+3}{x-2}$ when $x = 3$
9	If $y = (x^3 + 3x^2 - 1)^7$ then, find $\frac{dy}{dx}$ at $x = 0$

10 If $y = z^3$, $z = 2x^2 - 3x + 1$ find $\frac{dy}{dx}$ at $x = 2$

11 If $y = z^2$, $z = x^2 + 1$, then find $\frac{dy}{dx}$ at $x = -1$

12 Find the first derivative of the function $y = \sin 4x$

13 Find the first derivative of the function $y = \cos (2x + 5)$

14 Find y' $y = \tan (3x + 2)$

15	Find the first derivative of the function $y = 2\cos x - \tan 5x$
16	find y' $y = \cos 2x + \sin 5x$
17	If $y = \cos x \cdot \sin x$, find $\frac{dy}{dx}$ at $x = \frac{\pi}{4}$
18	Find the equation of the tangent to the curve $y = x^2(5x - 1)$ at $x = 3$
19	Find the equation of the normal to the curve $y = 2x^3 - 4x^2$ at the point (2,0) which lies on the curve

20	Find the equation of the normal to the curve $y = (2x + 5)(3x^2 - 1)$ at $x = 0$.
21	Find: (a) $\int 5x \, dx$ (b) $\int (3x^2 - x + 1) \, dx$
22	Find: $\int (7x - 3)^8 \, dx$
23	Find 1. $\int x(x + 3) \, dx$ 2. $\int x^2(4x + 2) \, dx$ 3. $\int (x - 4)(x + 4) \, dx$
24	1. $\int \sin x \, dx =$ 2. $\int \cos x \, dx =$ 3. $\int \sec^2 x \, dx =$
25	Find the slope of the tangent to the curve of the function f where $f(x) = x^2 - x + 1$ at the point $(-2, 7)$

26	<p><i>Find</i></p> <ol style="list-style-type: none"> 1. $\int (7\sin x - 2\cos x) dx$ 2. $\int (\sin 2x - 5\cos x) dx$ 3. $\int (\sin x + \sec^2 x) dx$ 4. $\int \sin (7x + 3) dx$
27	<p>Prove that the tangent to the curve of the function $y=3x^2-5x$ at the point $(1, -2)$ makes an angle of measure 45° with the positive direction of X-axis</p>
28	<p>Find the slope of the tangent to the curve $y=x-\frac{2}{x}$ at $x=1$</p>

29	Find the points on the curve $y=x^3-4x+2$ at which the slope of the tangent = -1
30	Find the points on the curve $y=2x^3-x+3$ at which the slope of the tangent = 5
31	Find the first derivative of the function $y=(3x^2-2x+1)(x^4-5x^2+2)$ when $x=0$
32	Find the points on the curve $y=(x^2+5)(x-1)$ at which the slope of the tangent is equal to -2 .
33	Find the first derivative of the function $y=\frac{5x+11}{x+2}$ when $x=0$
34	If $y=(x^3+3x^2-1)^7$ then, find $\frac{dy}{dx}$ at $x=0$

35	If $y=z^2$, $z=2x^2-3x+1$ find $\frac{dy}{dx}$ at $x=2$
36	If $y=z^3+z$, $z=x^2-x$ then, find $\frac{dy}{dx}$ at $x=2$
37	Find the first derivative of the function $y=\sin 4x$
38	Find the first derivative of the function $y=\cos (2x+5)$
39	Find the first derivative of each of the following functions: 1. $y=\tan 2x$ 2. $y=\sin 2x+\sin 3x$ 3. $y=x\sin x-x^2$ 4. $y=\sin 2x+\cos 3x$ 5. $y=2x+\sin 2x$ at $x=0$ 6. $y=\cos 2x+\sin 5x$ 7. $y=\tan (3x+2)$

40 Find the equation of the tangent to the curve $y=2x^3-4x^2+3$ at the point (2,3) which lies on the curve.

41 Find the equation of the tangent to the curve $y=x^2(5x-1)$ at $x=3$

42 Find the equation of the normal to the curve $y=(2x+5)(3x^2-1)$ at $x=0$.

43 Find the equation of the normal to the curve $y=x^2(5x-1)$ at $x=1$

Dynamics

1	A body moved 12m due east then 5m due north. Calculate the distance and the displacement covered.
2	If the position vector r of a moving particle is given as a function of time (t) in terms of the fundamental unit vectors by the relation $r(t) = (3t+2)i + (4t-1)j$ then, find the magnitude of the displacement vector after 5 seconds.
3	A cyclist covered a distance of 40km on a straight road with velocity 20 km/hr then, covered 15km in the opposite direction with velocity 15 km/hr. Find the average velocity vector for the whole trip.
4	A particle moved 10m from a certain point due east, then returned back to the same point. Calculate the covered distance and the displacement.

5	A body starts its motion in a constant direction with velocity 12m/sec and uniform acceleration 7 m/sec^2 in the same direction of motion. Find the velocity of the body after 10 seconds from the starting motion.
6	A body moves in a straight line, changed its velocity from 72km/hr to 12m/sec in 10 seconds. Find the acceleration. can this body stop its motion?
7	A particle moves with an initial velocity 50 cm/sec and a uniform acceleration 8cm/sec^2 . Find the covered distance after 10 seconds from the starting point of its motion.
8	The velocity of a car is 25m/sec decreased at a constant rate till the car stopped after 10seconds. Calculate the acceleration of motion and the distance covered before coming to rest .

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| 9 | <p>A particle moves with an initial velocity 18km/hr and a uniform acceleration. After covering a distance of 300m its velocity becomes 126km/hr. Find:</p> <ul style="list-style-type: none">a) The acceleration of motion.b) The time needed to cover the distance.c) The distance covered during the first 5 seconds |
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10	A body fell from a window. Calculate its velocity after one minute.
11	A body is projected upward with velocity 49 m/sec. Calculate the time needed to reach maximum height.
12	A body is projected upward with velocity 24.5 m/sec. Calculate the maximum height.
13	A body fell from the top of a tower 122.5 m high. Calculate the time to reach the ground.
14	A body is projected upward with a velocity of 28 m/sec. Calculate the time needed to return to projection point.

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| 15 | A body is projected upward with a velocity of 28 m/sec. Calculate the maximum height. |
| 16 | A body fell from the top of a tower 122.5 m high. Calculate the velocity of reaching the ground. |

17	Two balls of masses 5.2kg, 0.25kg were put such that the distance between their centers equals 50cm. Calculate the gravitational force between them, knowing that the universal gravitational constant equals 6.67×10^{-11} newton.m ² / kg ² .
18	If the mass of the earth is 5.97×10^{24} kg and its radius is 6.34×10^6 km, and the mass of the moon is 7.37×10^{22} kg, and its radius is 1.74×10^6 km, find the ratio between the gravity on the moon surface to the gravity on the earth surface.

19	<p>The velocity of a particle increased uniformly from 10 m/sec to 20 m/sec</p> <p>After covering a distance of 150 m, find the time needed?</p>
20	<p>Calculate the distance covered by a body moving in a constant direction from rest with a uniform acceleration 5 m/sec^2 for 4 seconds.</p>
21	<p>A body projected upward with velocity 49 m/sec</p> <p>Calculate the time needed to reach the maximum height.</p>
22	<p>From a point 490 m high, a body fell to the ground, find:</p> <p>(a) The time needed to reach the ground.</p> <p>(b) the velocity after 5 seconds from the start.</p>
23	<p>A body is projected upward with velocity 28 m/sec, calculate the maximum height.</p>

24 A car moves with a velocity of 44m/sec then decreased its velocity at a constant rate till it became 22m/sec in 11seconds. Calculate the covered distance during this time.

25 A car moves with a velocity of 44m/sec then decreased its velocity at a constant rate till it became 22m/sec in 11seconds. Calculate the covered distance during this time.

26 Calculate the gravitational force between the Sun and Jupiter assuming that the mass of the Sun is 2×10^{30} kg and that of Jupiter is 1.89×10^{27} kg and the distance between their centers is 7.73×10^{11} m. ($G = 6.67 \times 10^{-11}$)

27	<p>A body moved 8 m due east then 6 m due north</p> <p>Then the distance = m.</p> <p>The displacement = m.</p>
28	<p>A body moves in a straight line, changed its velocity from 72km/hr to 12m/sec in 10 seconds. Find the acceleration.</p> <p>Can this body stop its motion?</p>
29	<p>A particle moves with an initial velocity 50 cm/sec and a uniform acceleration 8cm/sec² Find the covered distance after 10 seconds from the starting point of its motion.</p>
30	<p>A particle moves with an initial velocity 18km/hr and a uniform acceleration. After covering a distance of 300m its velocity becomes 126km/hr. Find:</p> <ol style="list-style-type: none"> The acceleration of motion. The time needed to cover the distance. The distance covered during the first 5 seconds.

31	A body is projected upward with velocity 49 m/sec. Calculate the time needed to reach maximum height.
32	A body is projected upward with velocity 24.5 m/sec. Calculate the maximum height.
33	From the top of a tower 80.5 m high a body was projected upward with velocity 8.4 m/sec. Find: a) The maximum height. b) Time to reach max. height.

test

FIRST QUESTION:

1. Find the measure of the angle which the tangent to the curve $y = 2x^3 + 3x$ makes with the positive direction of X-axis at the point $(-1, 0)$.
2. Find the slope of the tangent to the curve of the function $y = x^2(5x - 1)$ at $x = 1$.

SECOND QUESTION:

1. Find the first derivative of the function $y = \frac{2x+3}{x-2}$ when $x = 3$
2. If $y = z + 2$, $z = x^2 + 2x$ then, find $\frac{dy}{dx}$ at $x = 2$

THIRD QUESTION:

1. Find the first derivative of the function $y = x \sin x - x^2$
2. Find the equation of the tangent to the curve
 $y = 2x^3 - 4x^2 + 3$ at the point (2,3) which lies on the curve.

FOURTH QUESTION:

Find

1. $\int x^2 (4x + 2) dx$
2. $\int \cos (5 - 2x) dx$