Higher Objective Questions : Unit 1

(1) If $f(x) = 4x^3 + 5$, what is the value of $f'(2)$?

A 22
B 26
C 37
D 48

(2) A sequence is defined by the recurrence relation $u_{n+1} = au_n + b$ and $u_0 = 4$.
Express u_2 in terms of a and b.

A $u_2 = 4a^2 + ab + b$

B $u_2 = 4 + 2b$

C $u_2 = 4a^2 + a^2b$

D $u_2 = 2a + b$

(3) The lines with the equations $ax - 2y + 5 = 0$ and $3x + y - 4 = 0$ are parallel.
What is the value of a?

A -6

B -2

C $-\frac{1}{3}$

D 3

(4) What is the minimum value of $4\cos\left(x - \frac{\pi}{3}\right) + 6$?

A 10
B 9
C 5
D 2

(5) P is the point $(a, -2)$ and Q is $(0, b)$.
M(1, 2) is the midpoint of PQ.
What are the values of a and b ?

	a	b
A	1	-6
B	1	6
C	2	-6
D	2	6

(6) $f(x) = 2x^2 - 4$ and $g(x) = 1 - x$ define functions on the set of real numbers.

What is the value of $f(g(2))$?

A 4
B 3
C 0
D -2

(7) A sequence is defined by the recurrence relation $u_{n+1} = \frac{1}{3}u_n - 7$ and $u_0 = -2$.
What is the limit of this sequence as $n \to \infty$?

A $-\frac{21}{2}$

B $-\frac{7}{3}$

C $-\frac{1}{18}$

D $-\frac{1}{24}$

(8) Triangle OPQ has vertices at O(0, 0), P(5, 3) and Q(1, −7).
OS is a median. What are the coordinates of S ?

A (−5, −2)
B (3, −5)
C (3, −2)
D (2, 5)

(9) The equation $ax + y + 4a = 0$ defines a set of straight lines for different values of a, where $a \neq 0$.
Here are two statements about this set of lines:
(1) All cut the x-axis at the same point
(2) They are parallel

Which of the following is true ?

A neither statement is correct
B only statement (1) is correct
C only statement (2) is correct
D both statements are correct

(10) The tangent to the curve with equation $y = 2x^2 - 1$ is drawn at the point where $x = 0$.

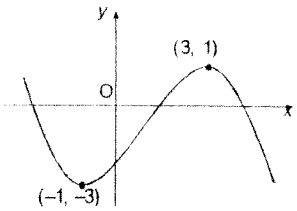
What is the gradient of this tangent ?

A −1
B 0
C 1
D 2

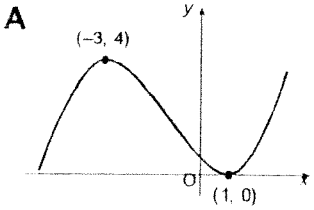
(11) The function f is defined by $f(x) = 4x^3 - x^4$, where x is a real number.
What is the rate of change of f with respect to x at $x = -1$?

A −6
B −5
C 5
D 16

(12) The diagram shows part of the graph of a function with equation $y = f(x)$.



Which of the following diagrams shows the graph with equation $y = f(3 - x)$?

A


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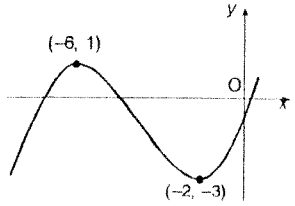

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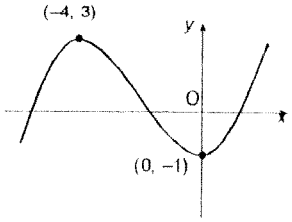

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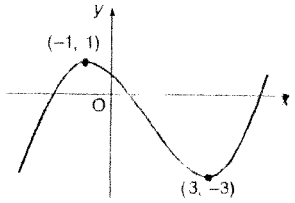
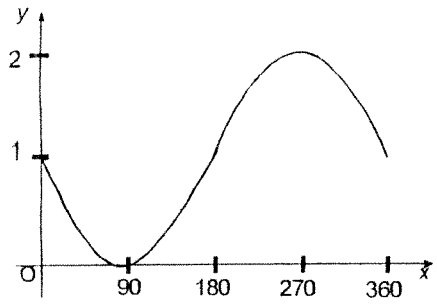


(13) The diagram shows the graph of a trigonometric funct. .



Which of the following could be the equation of the graph ?

A $y = 1 + \sin x^{\circ}$

B $y = 1 - \sin x^{\circ}$

C $y = 2 - \cos x^{\circ}$

D $y = 2\cos x^{\circ} - 1$

(15) A sequence is defined by the recurrence relation $u_{n+1} = 0 \cdot 5u_n + 2$ and $u_0 = 8$.
Here are two statements about this sequence:
(1) A limit exists for this sequence.
(2) No term in the sequence is greater than 8.

Which of the following is true ?

A neither statement is correct
B only statement (1) is correct
C only statement (2) is correct
D both statements are correct

(16) $f(x) = ax^2 - 2x - 5$ has a stationary value where $x = 3$.
What is the value of a ?

A -1

B 0

C $\frac{1}{3}$

D $\frac{11}{9}$

(17) A straight line passes through the points P(−5, −2) and Q(−2, −1).
What is the equation of the straight line which passes through P and is perpendicular to PQ ?

A $y + 2 = -3(x + 5)$

B $y - 2 = -\frac{3}{7}(x - 5)$

C $y - 1 = -\frac{3}{7}(x - 2)$

D $y - 1 = -\frac{1}{3}(x - 2)$

(18) The line joining the points (−2, −3) and (6, k) has gradient $\frac{2}{3}$.
What is the value of k ?

A $\frac{14}{3}$

B $\frac{7}{3}$

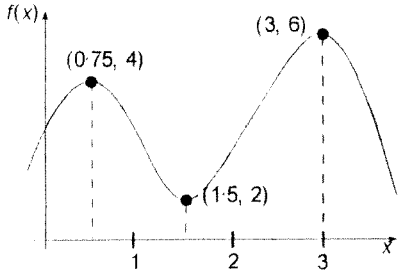
C $-\frac{1}{3}$

D -9

(19) The graph of $y = f(x)$ is shown with stationary points at $x = 0 \cdot 75$, $x = 1 \cdot 5$ and $x = 3$.

Here are two statements about $f'(x)$:

(1) $f'(1) < 0$
(2) $f'(2) < 0$



Which of the following is true?

A neither statement is correct
B only statement (1) is correct
C only statement (2) is correct
D both statements are correct

(20) If $f(x) = 6x^3 - 2x^{-\frac{1}{2}}$ find $f'(x)$.

A $18x^2 + x^{-\frac{3}{2}}$

B $2x^2 + 4x^{\frac{1}{2}}$

C $6x^2 - x^{-\frac{3}{2}}$

D $18x^2 + x^{\frac{1}{2}}$