Mathematical Reasoning

Question1

For all $n \in N$, if $n\left(n^2 + 3\right)$ is divisible by k, then the maximum value of k is

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Options:

A.

4

B.

6

C.

8

D.

2

Answer: D

Solution:

Given that $n\left(n^2 + 3\right)$ is divisible by k, for all $n \in N$

For $n = 1, 1\left(1^2 + 3\right) = 1.4 = 4$ is true, when k is 2 and 4 .

Let assume for $n = 2, 2\left(2^2 + 3\right) = 14$ is true for 2 but not 4 .

$\therefore$ Maximum value of k is 2 .

Question2

For what natural number $n \in N$, the inequality $2^n > n + 1$ is valid?

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Options:

A. $\forall n \in N$

B. $\forall n \geq 2$

C. $\forall 1 \leq n \leq 3$

D. $\forall n \in N - \{2, 3\}$

Answer: B

Solution:

Clearly, $2^n > n + 1$ is valid for, $\forall n \geq 2$.

Question3

$n \in N$ then, the statement $8n + 16 \leq 2^n$ is true for

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Options:

A. $n = 2$

B. $n = 3$

C. $n = 6$

D. $n = 5$

Answer: C

Solution:

$8n + 16 \leq 2^n, n \in N$

$\Rightarrow 8(n + 2) \leq 2^n$

$\Rightarrow n + 2 \leq 2^{n-3}$

Clearly, for $n = 6$

$6 + 2 \leq 2^{6-3}$ or $8 \leq 8$ is true.

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