STUDY mate
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Chapter End Test

(2019-20)

Date : ___________
Duration : 45 Min.
Max. Marks : 25

Mathematics

Topic: Real Numbers

Class
X

Instructions:

- All questions are compulsory.
- Section A is comprised of 15 multiple choice questions carrying 1 mark each.
- Section B is comprised of 3 questions carrying 3, 3 and 4 marks respectively.
- Use of calculator is not permitted.
- Objectives of test paper. (i) To assess the conceptual understanding of students. (ii) To make them attempt subjective questions as required in CBSE Board Exam.

Section – A

1. Euclid's division lemma states that for positive integers a and b, there exist unique integers q and r such that $a = bq + r$, where r must satisfy:

(a) $1 < r < b$ (b) $0 < r < b$ (c) $0 \leq r < b$ (d) $0 < r \leq b$

2. The HCF of the smallest composite and the smallest prime number is

(a) 0 (b) 1 (c) 2 (d) 3

3. If two positive integers p and q can be expressed as $p = ab^2$ and $q = a^3b$, where a and b are prime numbers than LCM (p, q) is

(a) ab (b) a^3b^2 (c) a^2b^2 (d) a^3b^3

4. The least number that is divisible by all the numbers from 1 to 10 (both inclusive) is:

(a) 10 (b) 1000 (c) 504 (d) 2520

5. The decimal expansion of $\frac{14587}{1250}$ will terminate after:

(a) one decimal place. (b) two decimal places.
(c) three decimal places. (d) four decimal places.

6. The smallest number by which $\sqrt{27}$ should be multiplied so as to get a rational number is

(a) $\sqrt{27}$ (b) $3\sqrt{3}$ (c) $\sqrt{3}$ (d) 3

7. The LCM of two numbers is 1200. Which of the following can't be their HCF?

(a) 600 (b) 500 (c) 400 (d) 200

8. The LCM and HCF of two rational numbers are equal, then the numbers must be:

(a) Prime (b) Co-prime (c) Equal (d) Composite

9. Square of an odd positive integer is of the form:

(a) $8k + 1$ (b) $8k$ (c) $8k - 1$ (d) None of these

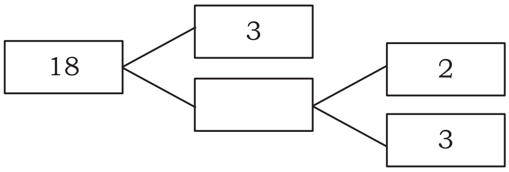
10. If the HCF of 65 and 117 is expressible as $65m - 117$, then the value of m is

(a) 4 (b) 2 (c) 1 (d) 3

11. $n^2 - 1$ is divisible by 8 if n is

(a) an integer (b) a natural number (c) an odd integer (d) an even integer

12. The missing number in the following factor tree is



(a) 2 (b) 6 (c) 3 (d) 9

13. If HCF (26, 169) = 13, then LCM (26, 169) =

(a) 26 (b) 52 (c) 338 (d) 19

14. For some positive integer q, every even integer is of the form

(a) q (b) 2q + 1 (c) 2q (d) q + 1

15. If 3 is the least prime factor of number a and 7 is the least prime factor of number b, then least prime factor of (a + b) is

(a) 2 (b) 10 (c) 3 (d) 5

Section – B

1. Explain why 7 × 11× 13 + 13 and 7 × 6 × 5 × 4 × 3 × 2 × 1 + 5 are composite numbers.

2. Show that $\sqrt{7}$ is an irrational number.

3. Show that square of any positive integer is of the form 3m or 3m + 1 for some positive integer m.

OR

Prove that if x and y are both odd positive integers, then $x^2 + y^2$ is even but not divisible by 4.

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Hints/Solutions to Chapter End Test

(2019-20)

Date : ________ Duration : 45 Min. Max. Marks : 25	Mathematics Topic: Real Numbers	Class X

Section – A

1.	(c)	**2.**	(c)	**3.**	(b)	**4.**	(d)
5.	(d)	**6.**	(c)	**7.**	(b)	**8.**	(c)
9.	(a)	**10.**	(b)	**11.**	(c)	**12.**	(b)
13.	(c)	**14.**	(c)	**15.**	(a)		

Section – B

1. $7 \times 11 \times 13 + 13$

$= 13 \times (7 \times 11 + 1)$

$= 13 \times 78$

$= 13 \times 13 \times 2 \times 3$

$= 13^2 \times 2 \times 3$, which is composite.

$7 \times 6 \times 5 \times 4 \times 3 \times 2 \times 1 + 5$

$= 5 \times (7 \times 6 \times 4 \times 3 \times 2 + 1)$

$= 5 \times 1009$, which is composite.

2. Let $\sqrt{7}$ be rational.

$\therefore \quad \sqrt{7} = \frac{a}{b}$, where a and b are coprime and $b \neq 0$.

$\Rightarrow (\sqrt{7})^2 = \left(\frac{a}{b}\right)^2$

$\Rightarrow 7 = \frac{a^2}{b^2}$

$\Rightarrow 7b^2 = a^2$

$\Rightarrow$ 7 divides a^2 ...[$\because$ 7 divides $7b^2$ and $7b^2 = a^2$]

$\Rightarrow$ 7 divides a ...(i)

$\Rightarrow a = 7c$, for some integer c.

$\Rightarrow a^2 = 49c^2$

$\Rightarrow 7b^2 = 49c^2$

$\Rightarrow b^2 = 7c^2$

$\Rightarrow$ 7 divides b^2 ...[$\because$ 7 divides $7c^2$ and $7c^2 = b^2$]

$\Rightarrow$ 7 divides b ...(ii)

From (i) and (ii), we obtain that 7 is a common factor of a and b both. But this contradicts the fact that a and b are coprime. This means our assumption is wrong. Hence, $\sqrt{7}$ is an irrational number.

3. Let a be any positive integer of the form 3q, 3q + 1 or 3q + 2, where q is some positive integer.

Case 1: $a = 3q$

$\Rightarrow a^2 = 9q^2 = 3(3q^2) = 3m$ ...[$m = 3q^2$]

Case 2: $a = 3q + 1$

$\Rightarrow a^2 = (3q + 1)^2 = 9q^2 + 6q + 1 = 3(3q^2 + 2q) + 1 = 3m + 1$ ...[$m = 3q^2 + 2q$]

Case 3: $a = 3q + 2$

$\Rightarrow a^2 = (3q + 2)^2 = 9q^2 + 12q + 4 = 3q^2 + 12q + 3 + 1$

$= 3(3q^2 + 4q + 1) + 1 = 3m + 1$ ...$[m = 3q^2 + 4q + 1]$

Hence, a is of the form 3m or 3m + 1 for some positive integer m.

OR

Let $x = 2m + 1$ and $y = 2n + 1$ for some integer m and n.

$\therefore$ $x^2 + y^2 = (2m + 1)^2 + (2n + 1)^2$

$= 4m^2 + 4m + 1 + 4n^2 + 4n + 1$

$= 4(m^2 + m + n^2 + n) + 2$

$= 4q + 2$ ...$[q = m^2 + m + n^2 + n]$

$\Rightarrow$ $x^2 + y^2$ is even and leaves remainder 2 when divided by 4.

Hence, $x^2 + y^2$ is even but not divisible by 4.

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