

REAL NUMBERS WS 3

Class 10 - Mathematics

Section A

1. **Assertion (A):** 3 is a rational number. [1]

**Reason (R):** The square roots of all positive integers are irrationals.

- |   |   |
|---|---|
| a) Both A and R are true and R is the correct explanation of A. | b) Both A and R are true but R is not the correct explanation of A. |
| c) A is true but R is false.                                    | d) A is false but R is true.  |

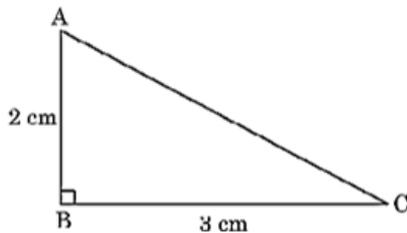
2. **Assertion (A):**  $\sqrt{a}$  is an irrational number, where a is a prime number. [1]

**Reason (R):** Square root of any prime number is an irrational number.

- |   |   |
|---|---|
| a) Both A and R are true and R is the correct explanation of A. | b) Both A and R are true but R is not the correct explanation of A. |
| c) A is true but R is false.                                    | d) A is false but R is true.  |

3. **Assertion (A):** The perimeter of  $\triangle ABC$  is a rational number. [1]

**Reason (R):** The sum of the squares of two rational numbers is always rational.



- |   |   |
|---|---|
| a) Both A and R are true and R is the correct explanation of A. | b) Both A and R are true but R is not the correct explanation of A. |
| c) A is true but R is false.                                    | d) A is false but R is true.  |

4. Is the number  $(3 - \sqrt{7})(3 + \sqrt{7})$  rational or irrational? [1]
5. Express 288 as the product of its prime factors. [1]
6. Prove  $7 - 2\sqrt{2}$  is irrational. [1]
7. Classify  $\sqrt{21}$  as rational or irrational. [1]
8. Is  $(1 + \sqrt{5}) - (4 + \sqrt{5})$  a rational number? [1]
9. Classify  $\sqrt[3]{3}$  as rational or irrational. [1]
10. Is  $-\sqrt{0.4}$  a rational number? [1]
11. Classify  $\pi$  as rational or irrational. [1]
12. Prove that  $3\sqrt{5}$  is irrational. [1]
13. Is 0.5918 a rational number? [1]
14. Classify 3.1416 as rational or irrational. [1]
15. Prove that  $\frac{2\sqrt{3}}{5}$  is irrational. [1]
16.  $\sqrt{7}$  is an irrational number. [1]

17. Is  $\frac{\sqrt{12}}{\sqrt{75}}$  a rational number? [1]
18. Is the product of two irrational numbers always irrational? Justify your answer. [1]

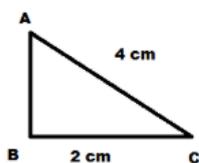
**Section B**

19. Prove that  $2 + \sqrt{5}$  is an irrational number. [3]
20. Prove that  $\frac{1}{\sqrt{2}}$  is irrational. [3]
21. Prove  $\frac{1}{2 + \sqrt{3}}$  is an irrational number. [3]
22. Prove that  $\sqrt{p} + \sqrt{q}$  is irrational, where p, q are primes. [3]
23. Show that  $2\sqrt{3}$  is irrational. [3]
24. Prove that  $3 + 2\sqrt{5}$  is irrational. [3]
25. Prove that  $15 + 17\sqrt{3}$  is an irrational number. [3]
26. Prove that  $(3 + \sqrt{2})$  is irrational. [3]
27. Prove that  $\sqrt{5} + \sqrt{3}$  is irrational. [3]
28. Prove that  $3 + 7\sqrt{2}$  is an irrational number, given that  $\sqrt{2}$  is an irrational number. [3]
29. Show that  $2 - \sqrt{3}$  is an irrational number. [3]
30. Show that  $\frac{\sqrt{2}}{3}$  is irrational. [3]
31. Prove that  $\sqrt{6}$  is irrational. [3]
32. Prove that  $5 - \sqrt{3}$  is an irrational number, given that  $\sqrt{3}$  is an irrational number. [3]
33. Show that  $(2 + \sqrt{3})$  is an irrational number. [3]
34. Prove that  $(3 - \sqrt{5})$  is irrational. [3]
35. Prove that  $(5 + 3\sqrt{2})$  is irrational. [3]
36. Prove that  $\sqrt{3}$  is an irrational number. [3]
37. Prove that  $3 + \sqrt{5}$  is an irrational number. [3]
38. Prove that  $\frac{1}{\sqrt{3}}$  is irrational. [3]
- HINT  $\frac{1}{\sqrt{3}} = \frac{1}{\sqrt{3}} \times \frac{\sqrt{3}}{\sqrt{3}} = \frac{1}{3} \cdot \sqrt{3}$
39. Show that  $3 + 5\sqrt{2}$  is an irrational number. [3]
40. Prove that  $(3 + 2\sqrt{5})^2$  is irrational. [3]
41. Prove that  $7\sqrt{5}$  is irrational. [3]
42. Prove that  $\sqrt{2}$  is an irrational number. [3]
43. Prove that the following are irrationals. [3]
- i.  $7\sqrt{5}$
- ii.  $6 + \sqrt{2}$
44. Show that  $\sqrt{6} + \sqrt{2}$  is irrational. [3]
45. Prove that  $6 + \sqrt{2}$  is irrational. [3]
46. Prove that  $\frac{2 + \sqrt{3}}{5}$  is an irrational number, given that  $\sqrt{3}$  is an irrational number. [3]
47. Prove that  $\sqrt{5}$  is an irrational number. [3]
48. Prove that  $\sqrt{5}$  is irrational. [3]
49. Prove that  $\sqrt{2} + \sqrt{5}$  is irrational. [3]
50. Show that  $5 - \sqrt{3}$  is irrational. [3]
51. Prove that  $4 - 5\sqrt{2}$  is an irrational number. [3]
52. Prove that  $7\sqrt{2}$  is an irrational number, given that  $\sqrt{2}$  is an irrational number. [3]
53. Prove that  $\sqrt{5} + \sqrt{3}$  is irrational. [3]

54. Show that  $3\sqrt{2}$  is an irrational number. [3]
55. Prove that  $3 + \sqrt{2}$  is an irrational number, given that  $\sqrt{2}$  is an irrational number. [3]

### Section C

56. If  $p, q$  are prime positive integers, prove that  $\sqrt{p} + \sqrt{q}$  is an irrational number. [5]
57. Prove that  $\sqrt[3]{6}$  is an irrational number. [5]
58. Prove that  $\sqrt{11}$  is irrational. [5]
59. Show that  $(4 + 3\sqrt{2})$  is irrational. [5]
60. Prove that  $7 - 2\sqrt{3}$  is an irrational number. [5]
61. Prove that for any prime positive integer  $\sqrt{p} + \sqrt{q}$  is an irrational number. [5]
62. Let  $a$  and  $b$  be positive integers. Show that  $\sqrt{2}$  always lies between  $\frac{a}{b}$  and  $\frac{a+2b}{a+b}$ . [5]
63. Show that  $(4 + 3\sqrt{2})$  is irrational number. [5]
64. Prove that  $\sqrt{5} + \sqrt{7}$  is irrational. [5]
65. Prove that  $\sqrt{2}$  is an irrational number. [5]
66. Prove that the area of  $\triangle ABC$  is irrational [5]



### Section D

67. **State True or False:** [7]
- (a) 4.795831523... is not an irrational number. [1]
- (b) The sum of two irrational numbers is an irrational number. (True/False) [1]
- (c)  $\pi$  is an irrational number. (true/False) [1]
- (d) There are infinite many integers between two integers. [1]
- (e) The product of a rational and an irrational is irrational. [1]
- (f)  $\sqrt{3} \times \sqrt{12}$  is an irrational number. [1]
- (g) Every whole number is an integer. [1]