Assertion and Reason Questions on The World of Numbers for Class 9

Directions: In each question below, a statement of Assertion (A) is followed by a statement of Reason (R). Choose the correct option:
(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.

Q.1
Assertion (A): Every integer is a rational number. For example, −7 is a rational number.
Reason (R): Every integer m can be expressed in the form m/1, where the denominator is 1 (a non-zero integer).
Answer: (a) Both A and R are true; R is the correct explanation of A
Explanation: Since any integer m can be written as m/1, every integer satisfies this definition perfectly. R directly explains why A is true. Hence,(a).

Q.2
Assertion (A): $\sqrt{2}$ is an irrational number.
Reason (R): A number is called irrational if it cannot be written in the form p/q, where p and q are integers and $q \neq 0$.
Answer: (a) Both A and R are true; R is the correct explanation of A
Explanation: $\sqrt{2} = 1.41421356\ldots$ is a non-terminating, non-recurring decimal. It cannot be expressed as p/q. The Reason states the very definition of irrationality. R explains A directly so option (a).

Q.3
Assertion (A): $\sqrt{5}$ is an irrational number.
Reason (R): The square roots of ALL positive integers are irrational numbers.
Answer: (c) A is true; R is false
Explanation: A is correct,$\sqrt{5} \approx 2.2360\ldots$ is irrational. However, R is a false generalisation. $\sqrt{4} = 2$, $\sqrt{9} = 3$, $\sqrt{16} = 4$ are all square roots of positive integers that are perfectly rational. Only square roots of non-perfect-square integers are irrational.

Q.4

Assertion (A): 0.271 is a terminating decimal and can be expressed as 271/1000, which is of the form p/q where $q \neq 0$.
Reason (R): A terminating OR non-terminating decimal expansion can be expressed as a rational number.
Answer: (c) A is true; R is false
Explanation: A is correct. 0.271 = 271/1000, is a valid rational. But R is false because it says ANY non-terminating decimal is rational. In reality, only non-terminating recurring decimals are rational.
Q.5
Assertion (A): A rational number between 1/3 and 1/2 is 5/12.
Reason (R): There is exactly ONE rational number lying between any two rational numbers.
Answer: (c) A is true; R is false
Explanation: A is correct: (1/3 + 1/2)/2 = (2/6 + 3/6)/2 = (5/6)/2 = 5/12, which lies between 1/3 and 1/2. R, however, is false as there are infinitely many rational numbers between any two rational numbers. Hence (c).
Q.6
Assertion (A): $2 + \sqrt{6}$ is an irrational number.
Reason (R): The sum of a rational number and an irrational number is always an irrational number.
Answer: (a) Both A and R are true; R is the correct explanation of A
Explanation: 2 is rational and $\sqrt{6}$ is irrational. Their sum $2 + \sqrt{6}$ is irrational. R states this exact rule, making it the correct explanation of A. Option (a).
Q.7
Assertion (A): The sum of $(3 + \sqrt{5})$ and $(4 - \sqrt{5})$ is an irrational number.
Reason (R): The sum of two irrational numbers is always an irrational number.
Answer: (d) A is false; R is false
Explanation: $(3 + \sqrt{5}) + (4 - \sqrt{5}) = 7$, which is perfectly rational. So A is false. R is also false as two irrationals can always be paired so their sum is rational. Both statements fail. Hence (d)
Q.8
Assertion (A): $5 - \sqrt{2} = 5 - 1.414\ldots = 3.585\ldots$ is an irrational number.
Reason (R): The difference of a rational number and an irrational number is an irrational number.
Answer: (a) Both A and R are true; R is the correct explanation of A

Explanation: 5 is rational, √2 is irrational. Their difference is 3.5857…, a non-terminating non-recurring decimal, hence irrational. R gives the general rule that rational minus irrational = irrational, which directly explains A. Option (a).

Q.9

Assertion (A): 7{8} ÷ 7{4} = 7{4}

Reason (R): For any real number a > 0 and rational numbers p, q: a^{p} ÷ a^{q} = a^{(p − q)}.

Answer: (a) Both A and R are true; R is the correct explanation of A

Explanation: 7{8} ÷ 7{4} = 7^{(8−4)} = 7{4}. Assertion is correct. R states the exact law of exponents (division rule) that justifies this calculation. R explains A. Option (a).

Q.10

Assertion (A): 11{3} × 11{4} = 11{12}

Reason (R): For any real number a > 0 and rational numbers p, q: a^{p} × a^{q} = a^{(p + q)}.

Answer: (d) A is false; R is true

Explanation: By the law in R: $11^3 \times 11^4$ = 11^{(3+4)} = 11^7, not 11^{12}. The student has incorrectly multiplied the exponents (which applies to power of a power, not product of same base). R is the correct law, making A false. Option (d).

Q.11

Assertion (A): The rationalising factor of (3 + 2√5) is (3 − 2√5).

Reason (R): If the product of two irrational numbers is rational, each one is called the rationalising factor of the other.

Answer: (a) Both A and R are true; R is the correct explanation of A

Explanation: (3 + 2√5)(3 − 2√5) = 9 − 4×5 = 9 − 20 = −11, which is rational. So each is the rationalising factor of the other. R is the definition of rationalising factor, and A correctly applies it. Option (a).

Q.12

Assertion (A): √2, √3, and √5 are examples of irrational numbers.

Reason (R): An irrational number CAN be expressed in the form p/q where p and q are integers and q ≠ 0.

Answer: (c) A is true; R is false

Explanation: A is correct. √2, √3, and √5 are all irrational. But R is the exact opposite of the definition of irrational numbers. By definition, an irrational number

CANNOT be expressed as p/q. R reverses the definition, making it false. Option (c).

Q.13

Assertion (A): If $\sqrt{2} = 1.414$ and $\sqrt{3} = 1.732$, then $\sqrt{5} = \sqrt{2} + \sqrt{3}$.

Reason (R): The square root of a positive real number always exists.

Answer: (d) A is false; R is true

Explanation: $\sqrt{2} + \sqrt{3} = 1.414 + 1.732 = 3.146$, but $\sqrt{5} = 2.236$. These are not equal. $\sqrt{(a+b)} \neq \sqrt{a} + \sqrt{b}$. A is false. R is independently true so Option (d).

Q.14

Assertion (A): A rational number lying between 1/4 and 1/2 is 3/8.

Reason (R): A rational number lying between two rational numbers a and b can be found using the mean formula $(a + b)/2$.

Answer: (a) Both A and R are true; R is the correct explanation of A

Explanation: Using the mean formula: $(1/4 + 1/2)/2 = (1/4 + 2/4)/2 = (3/4)/2 = 3/8$. This lies between 1/4 and 1/2. A is correct. R is the correct method used to arrive at A. Option (a).

Q.15

Assertion (A): The product of $\sqrt{2}$ and $\sqrt{8}$ is a rational number.

Reason (R): The product of two irrational numbers is always irrational.

Answer: (c) A is true; R is false

Explanation: $\sqrt{2} \times \sqrt{8} = \sqrt{16} = 4$, which is rational. So A is true. R, however, is false as the product of two irrationals CAN be rational so Option (c).