ANSWER KEY : FOR CLASS 9

EX - 1.1

2. One rational no. is $\frac{\frac{1}{3}+1/4}{2}$ = 7/24. Therefore, 1/3 <7/24<1/4.

Another rational no. is $\frac{\frac{1}{3}+7/24}{2}$ = 7/48. Other national no. is $\frac{\frac{7}{24}+1/4}{2}$ = 13/48.

Ans : ¼,13/48,7/24,1/3.

5. One rational no. between 4 and 4.5 is 4 +4.5/2 = 4.25 ; 2nd rational no. is 4+4.25/2 = 4.125 ; 3rd no. is 4+4.125/2 = 4.0625. Ans : 4.125,4.25,4.0625.

7. Multiplying numerator and denominator by 5+1=6,we get 18/30 and 24/30.
As 18<19<20<21<22<23<24, so, 18/30<19/30<20/30,21/30,22/30,23/30,24/30.
Or, 3/5, 19/30,2/3,7/10,11/15,23/30,4/5. Ans.

EX – 1.2

2. Let $\sqrt{7}$ be a rational no. then $\sqrt{7}$ = p/q, q≠ 0, p and q have no common factor. Or, p^2/q^2 = 49. Or, $p^2 = 7q^2$ .....(1). As 7 divides $7q^2$,so 7 divides p^2 but 7 is prime or, 7 divides p.
Now, let p = 7m where m is an integer. Putting the value of p in eqn(1) we get $49m^2 = q^2$
As 7 divides $49q^2$,so 7 divides q^2 but 7 is prime. Or, 7 divides q. Thus, p and q have a common factor 7. This contradicts that p and q have no common factor. Thus, $\sqrt{7}$ is irrational number. Proved.

5. Let $\sqrt{2}$ = p/q,where p,q are integers having no common factor and q≠0. Or, 2= p^2/q^2 or, $p^2= 2q^2$.....(1) let p=2m where m is an integer. Or, $2q^2 = 4m^2$ or,$q^2= 2m^2$ or, q^2 is an even integer or, q ia an even integer.so, both p and q have a common factor 2 but this contradicts .So, $\sqrt{2}$ is an irrational number.
Let 3- $\sqrt{2}$ = a and be rational so, (3-a) = $\sqrt{2}$. But the difference of two rational numbers is rational. So, (3-a) and $\sqrt{2}$ are both rational,which is not true. So, 3-$\sqrt{2}$ is irrational.

8.(iv). Let $\sqrt{2} + \sqrt{5}$ = a/b, or, a/b- $\sqrt{2} = \sqrt{5}$. Or, $(a/b-\sqrt{2})^2 = 5$ or, $a^2/b^2 - 3 = 2a.\ \sqrt{2}/ b$.
Or, $a^2-3b^2/2ab = \sqrt{2}$. Or,$\sqrt{2}$ is a rational number. But it is irrational no. So, our assumption is wrong. Hence, the given number is irrational.

EX – 1.4

1.iv) $8\sqrt{15} \div 2\sqrt{3} = 8\ \sqrt{3}$ x $\sqrt{5} \div 2\sqrt{3} = 4\sqrt{5}$. Ans.

2v) $(\sqrt{2} +\sqrt{3}) (\sqrt{5} + \sqrt{7}) = \sqrt{10} + \sqrt{15} +\sqrt{14} +\sqrt{21}$ ans.

3i) $\sqrt{8} +\sqrt{50}+\sqrt{72} + \sqrt{98} = \sqrt{2x2x2} +\sqrt{5x5x2} +\sqrt{8x9}+ \sqrt{7x7x2} = 2\sqrt{2} +5\sqrt{2}+ 6\sqrt{2}+7\sqrt{2}$
$= 20\ \sqrt{2}$ = 20x 1.414 = 28.28.

7v) $(2-\sqrt{3}) (2+\sqrt{3}) = 2^2 - (\sqrt{3})^2 = 4 - 3 = 1$ is rational number.

12. L.C.M of 3,2,6 =6
$\sqrt[3]{2} =(2^{2})^{1/6} = 4^{1/6.}$
$3^{1/2} =(3^3)^{1/6} = 8^{1/6.}$
$5^{1/6} = (5)^{1/6}$. 4< 5<8 or, $\sqrt[3]{2}, \sqrt[6]{5}, \sqrt{3}$ ans.

EX – 1.5

1iii) $\frac{3}{4-\sqrt{7}}$ = $\frac{3}{4-\sqrt{7}}$ x $\frac{4+\sqrt{7}}{4+\sqrt{7}}$ = $\frac{3(4+\sqrt{7})}{16-7}$ = $\frac{4+\sqrt{7}}{3}$ ans.

5i) $\frac{3-\sqrt{5}}{3+2\sqrt{5}}$ x $\frac{3-2\sqrt{5}}{3-2\sqrt{5}}$ = -19/11 + a$\sqrt{5}$ or, $\frac{19-9\sqrt{5}}{9-20}$ = -19/11 +a$\sqrt{5}$ or, -19/11 + 9$\sqrt{5}$/11 = -19/11+a$\sqrt{5}$. equating, a$\sqrt{5}$ = 9$\sqrt{5}$/11 or,a = 9/11 ans.

8. 1/a = $\frac{1}{2+\sqrt{3}}$ x $\frac{2-\sqrt{3}}{2-\sqrt{3}}$ = 2-$\sqrt{3}$ / 4-3. = 2-$\sqrt{3}$ therefore, a-1/a = 2+$\sqrt{3}$ -2+$\sqrt{3}$ = 4$\sqrt{3}$ ans.

9. 1/x = $\frac{1}{1-\sqrt{2}}$ x $\frac{1+\sqrt{2}}{1+\sqrt{2}}$ = $\frac{1+\sqrt{2}}{1-2}$ = -(1+ $\sqrt{2}$) therefore, $(x-1/x)^4$ = $(1-\sqrt{2} +1+\sqrt{2})^4$ = 16 ans.

11i) p + q = $\frac{2-\sqrt{5}}{2+\sqrt{5}}$ + $\frac{2+\sqrt{5}}{2-\sqrt{5}}$ = $\frac{18}{4-5}$ = -18. Ans

iii) $p^2+q^2 = (p+q)^2 - 2pq$ = $(-18)^2$ -2x $\frac{2-\sqrt{5}}{2+\sqrt{5}}$ x $\frac{2+\sqrt{5}}{2-\sqrt{5}}$ = 324-2 =322 ans.