

Maths Holiday Home Work

Class: IX

(NOTE: The assignment should be done in the Practice Notebook)

1. Define an rational and an irrational number. Give any 5 examples of each.
2. Express each of the following as vulgar fraction: $0.1\overline{73}$
3. Classify the following as rational or irrational
 - a) $\frac{3}{5}$
 - b) $-\frac{2}{5}$
 - c) $-\sqrt{8}$
 - d) $\frac{3}{4\sqrt{3}}$
 - e) $\sqrt{6.25}$
 - f) $\sqrt{\frac{81}{27}}$
4. Express $0.\overline{6} + 0.\overline{7} + 0.\overline{47}$ in the form of $\frac{p}{q}$ where p & q are integers and , q \neq 0
5. Express $1.\overline{32} + 0.\overline{35}$ in the form of $\frac{p}{q}$ where p & q are integers and , q \neq 0
6. Express $2.\overline{36} + 0.\overline{23}$ in the form of $\frac{p}{q}$ where p & q are integers and , q \neq 0
7. Find two irrational numbers between 0.111001000100001..... and 0.1101000100001
8. Find one rational & one irrational number between $\sqrt{3}$ and $\sqrt{5}$
9. Find two rational numbers between $\sqrt{3}$ and $\sqrt{5}$
10. Find two irrational numbers between $\sqrt{3}$ and $\sqrt{5}$
11. Find two irrational numbers between 0.12 and 0.13
12. Prove that $2 + \sqrt{2}$ is an irrational number.
13. Represent $1 + \sqrt{3}$ is on number line.
14. Locate $\sqrt{5}$ and $\sqrt{10}$ on number line using spiral method.
15. Represent geometrically the following numbers on the number line:
 - a) $\sqrt{8.7}$
 - b) $\sqrt{5.3}$
 - c) $\sqrt{6.7}$
16. Simplify each of the following expressions:
 - a) $4\sqrt{3} - 3\sqrt{12} + 2\sqrt{75}$
 - b) $(4\sqrt{2} + 3\sqrt{3})(4\sqrt{2} - 3\sqrt{3})$
17. Rationalise the denominator $\frac{30}{5\sqrt{3}-3\sqrt{5}}$
18. Rationalise the denominator $\frac{6-4\sqrt{3}}{6+4\sqrt{3}}$
19. Find the rational values of a and b from each of the following:
 - a) $\frac{\sqrt{5}-\sqrt{3}}{\sqrt{5}+\sqrt{3}} = a + b\sqrt{15}$
 - b) $\frac{\sqrt{2}-\sqrt{3}}{3\sqrt{2}-2\sqrt{3}} = a + b\sqrt{6}$
 - c) $\frac{4-3\sqrt{5}}{4+3\sqrt{5}} = a + b\sqrt{5}$
20. Find the rational value of a and b for the given problem:
$$\frac{\sqrt{5}+1}{\sqrt{5}-1} + \frac{\sqrt{5}+1}{\sqrt{5}-1} = a + b\sqrt{5}$$
21. If $2^x = 5^y = 40^z$, then prove that $\frac{1}{z} = \frac{3}{x} + \frac{1}{y}$.
22. Simplify : $3\sqrt{147} - \frac{7}{3}\sqrt{\frac{1}{3}} + 7\sqrt{\frac{1}{3}}$
23. Rationalise the denominator of the following : : $\frac{1}{\sqrt{6}+\sqrt{5}-\sqrt{11}}$
24. Rationalise the denominator of the following : : $\frac{1}{\sqrt{7}+\sqrt{6}-\sqrt{13}}$
25. If $\sqrt{2} = 1.414$, $\sqrt{3} = 1.732$, then find the value of $\frac{4}{3\sqrt{3}-2\sqrt{2}} + \frac{3}{3\sqrt{3}-2\sqrt{2}}$
26. Simplify $\sqrt{45} - \sqrt{125} + \sqrt{200} - \sqrt{50}$
27. Simplify $\sqrt[4]{81} - 8 \cdot \sqrt[3]{216} + 15 \cdot \sqrt[5]{32} + \sqrt{225}$
28. Show that: $(x^{a-b})^{a+b} \cdot (x^{b-c})^{b+c} \cdot (x^{c-a})^{c+a} = 1$

29. Prove that: $\frac{2^{30} + 2^{29} + 2^{28}}{2^{31} + 2^{30} - 2^{29}} = \frac{7}{10}$

30. Prove that $\frac{1}{1+x^{a-b}} + \frac{1}{1+x^{b-a}} = 1$

31. Find the value of $\frac{1}{2}\sqrt{486} - \sqrt{\frac{27}{2}}$

32. If $x = 3 - 2\sqrt{2}$, find the value of :

a) $\frac{1}{x}$ b) $x + \frac{1}{x}$ c) $x - \frac{1}{x}$ d) $\sqrt{x} + \frac{1}{\sqrt{x}}$
 e) $x^2 + \frac{1}{x^2}$ f) $x^2 - \frac{1}{x^2}$ g) $x^3 + \frac{1}{x^3}$ h) $x^3 - \frac{1}{x^3}$

33. If $x = 9 + 4\sqrt{5}$, find the value of $\sqrt{x} - \frac{1}{\sqrt{x}}$

34. If $x = \frac{\sqrt{5}-\sqrt{3}}{\sqrt{5}+\sqrt{3}}$ and $y = \frac{\sqrt{5}+\sqrt{3}}{\sqrt{5}-\sqrt{3}}$, find the value of $x^2 + y^2 - 6xy$

35. If $y = \frac{\sqrt{a+2b} + \sqrt{a-2b}}{\sqrt{a+2b} - \sqrt{a-2b}}$, prove that $by^2 - ay + b = 0$

36. If $x = 2 + \sqrt{3}$, find the value of (i) $x^2 + \frac{1}{x^2}$ (ii) $x + \frac{1}{x}$

37. If $x = 1 - \sqrt{2}$, find the value of $\left(x - \frac{1}{x}\right)^2$

38. Rewrite the following numbers in descending order:

(i) $\sqrt[4]{9}$, $\sqrt[6]{26}$, $\sqrt[3]{5}$

(ii) $\sqrt[3]{10}$, $\sqrt[3]{36} \sqrt{3}$, $\sqrt[6]{5}$, $\sqrt[8]{60}$

39. Which is greater: (a) $\sqrt{18} - \sqrt{10}$ or $\sqrt{12} - \sqrt{6}$ (b) $\sqrt[4]{30}$ or $\sqrt[3]{5}$

40. Which is smaller: $\sqrt{5} - \sqrt{3}$ or $\sqrt{3} - 1$ (b) $\sqrt[3]{18}$ or $\sqrt[4]{40}$

41. Which is greater $0.\bar{9}$ or 1? Justify

42. Insert 10 rational numbers between $\frac{1}{5}$ and $\frac{5}{7}$.

43. If $a^x = b$, $b^y = c$, $c^z = a$, Then prove that $xyz = 1$.

44. Express as pure surd

(a) $6\sqrt{6}$ (b) $3\sqrt[3]{4}$ (c) $4\sqrt[4]{7}$ (d) $5\sqrt{7}$

45. Express as mixed surd.

(a) $\sqrt[3]{72}$ (b) $\sqrt[4]{1280}$ (d) $\sqrt{90}$ (d) $\sqrt[5]{128}$

46. Simplify

(a) $\sqrt{15} \times \sqrt{23}$ (b) $6\sqrt{3} \div 5\sqrt{2}$ (c) $\sqrt[3]{2} \times \sqrt{5}$

47. If $x + y + z = 8$ and $xy + yz + zx = 20$, find the value of $x^3 + y^3 + z^3 - 3xyz$.

48. Solve the following

(a) $5^{x-3} \times 3^{2x-8} = 225$.

(b) $2^{x+3} = 4^{x-1}$

(c) $5^{2x+1} = 6 \times 5^x - 1$