



## MATHS

### BOOKS - ICSE

## RATIONAL AND IRRATIONAL NUMBERS

### Questions

1. Which of the rational numbers  $\frac{3}{5}$  and  $\frac{5}{7}$  is greater ? Insert three rational numbers between  $\frac{3}{5}$  and  $\frac{5}{7}$  so that all the five numbers are in ascending order of their values.

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2. Without doing any actual division find whether each of the following is a terminating decimal or not , (i)  $\frac{17}{50}$  (ii)  $\frac{7}{8}$  (iii)  $\frac{23}{72}$  .

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3. Prove that  $5 - \sqrt{3}$  is irrational .

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4. Prove that  $\sqrt{8} + 5$  is irrational .

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5. Identify each of the following as rational or irrational number .

(i)  $\sqrt{12}$  (ii)  $3\sqrt{2} \times \sqrt{8}$

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6. Insert a rational number and an irrational number between 3 and 4.

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7. Find two irrational numbers between 2 and 3 .

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8. Examine each of the as a rational number or an irrational number.

$$(3 + \sqrt{2})^2$$

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9. Examine each of the as a rational number or an irrational number.

$$(3 + \sqrt{3})(3 - \sqrt{3})$$

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10. Examine each of the as a rational number or an irrational number.

$$\frac{6}{\sqrt{3}}$$

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11. Insert two rational numbers and two irrational numbers between  $\sqrt{3}$  and  $\sqrt{7}$ .

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12. Which of the numbers is greater:

$$3\sqrt{2} \text{ and } 2\sqrt{3}$$

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13. Which of the numbers is greater:

$$6\sqrt[3]{3} \text{ and } 5\sqrt[3]{4}$$

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14. Compare :  $\sqrt[3]{4}$  and  $\sqrt{3}$

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15. Compare :  $\sqrt[4]{8}$  and  $\sqrt[6]{22}$



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16. State with reasons which of the following is a surd which is not :

(i)  $\sqrt{27}$  (ii)  $\sqrt{225} \times \sqrt{4}$

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17. Find the least rationalizing factor of : (i)  $\sqrt{27}$  (ii)  $2\sqrt{125}$

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18. Rationalize the denominator of  $\frac{1}{\sqrt{2}}$

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19. Simplify the following by rationalizing the denominator

$$\frac{1}{3 - \sqrt{7}}$$

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20. Simplify the following by rationalizing the denominator:

$$\frac{3}{\sqrt{5} + \sqrt{3}}$$

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21. Simplify the following by rationalizing the denominator:

$$\frac{\sqrt{3} - \sqrt{2}}{\sqrt{3} + \sqrt{2}}$$

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22. Simplify the following by rationalizing the denominator:

$$\frac{7}{\sqrt{15} + 2\sqrt{2}}$$

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23. Simplify the following by rationalizing the denominator:

$$\frac{30}{\sqrt{15} + 2\sqrt{2}}$$

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24. Find the values of a and b if:  $\frac{2\sqrt{3} + 3\sqrt{2}}{2\sqrt{3} - 3\sqrt{2}} = a + b\sqrt{6}$

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25. If  $x = 2 + \sqrt{3}$  find the value of  $x^2 + \frac{1}{x^2}$



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26. Prove that :  $\frac{1}{\sqrt{2} + 1} + \frac{1}{\sqrt{3} + \sqrt{2}} + \frac{1}{2 + \sqrt{3}} = 1$

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27. Rationalize the denominator of :  $\frac{1}{\sqrt{3} + \sqrt{2} - 1}$

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28. Evaluate :

$$\frac{1}{3 - \sqrt{8}} - \frac{1}{\sqrt{8} - \sqrt{7}} + \frac{1}{\sqrt{7} - \sqrt{6}} - \frac{1}{\sqrt{6} - \sqrt{5}} + \frac{1}{\sqrt{5} - 2}.$$

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29. If  $\sqrt{3} = 1.73$  find the value of :

$$\frac{2 + \sqrt{3}}{2 - \sqrt{3}} + \frac{2 - \sqrt{3}}{2 + \sqrt{3}} + \frac{\sqrt{3} - 1}{\sqrt{3} + 1} - \frac{\sqrt{3} + 1}{\sqrt{3} - 1}.$$

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30. If  $x = 3 + 2\sqrt{2}$  check whether  $x + \frac{1}{x}$  is rational or irrational.

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## Exercise 1 A

1. Is zero a rational number? Can it be written in the form  $\frac{p}{q}$  where  $p$  and  $q$  are integers and  $q \neq 0$ ?

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2. Are the following statements true or false ? Give reasons for your answers.

(i) Every whole number is a natural number.

(ii) Every whole number is a rational number.

(iii) Every integer is a rational number.

(iv) Every rational number is a whole number.

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3. Arrange  $-\frac{5}{9}$ ,  $\frac{7}{12}$ ,  $-\frac{2}{3}$  and  $\frac{11}{18}$  in the ascending order of their magnitudes. Also, find the difference between the largest and the smallest of these rational numbers. Express this difference as a decimal fraction correct to one decimal place.

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4. Arrange  $\frac{5}{8}$ ,  $-\frac{3}{16}$ ,  $-\frac{1}{4}$  and  $\frac{17}{32}$  in the descending order of their magnitudes. Also, find the sum of the lowest and the largest of these rational numbers. Express the result obtained as a decimal fraction correct to two decimal places.

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5. Without doing any actual division, find which of the rational numbers have terminating decimal representation :

(i)  $\frac{7}{16}$

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6. Without doing any actual division, find which of the rational numbers have terminating decimal representation :

$$\frac{23}{125}$$



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7. Without doing any actual division, find which of the rational numbers have terminating decimal representation :

$$\frac{9}{14}$$



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8. Without doing any actual division, find which of the rational numbers have terminating decimal representation :

$$\frac{32}{45}$$



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9. Without doing any actual division, find which of the rational numbers have terminating decimal representation :

$$\frac{43}{50}$$

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10. Without doing any actual division, find which of the rational numbers have terminating decimal representation :

$$\frac{17}{40}$$

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11. Without doing any actual division, find which of the rational numbers have terminating decimal representation :

$$\frac{61}{75}$$

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12. Without doing any actual division, find which of the rational numbers have terminating decimal representation :

$$\frac{123}{250}$$

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### Exercise 1 B

1. State, whether the following numbers are rational or not:

$$(2 + \sqrt{2})^2$$

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2. State, whether the following numbers are rational or not:

$$(3 - \sqrt{3})^2$$

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3. State, whether the following numbers are rational or not:

$$(5 + \sqrt{5})(5 - \sqrt{5})$$

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4. State, whether the following numbers are rational or not:

$$(\sqrt{3} - \sqrt{2})^2$$

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5. State, whether the following numbers are rational or not:

$$\left(\frac{3}{2\sqrt{2}}\right)^2$$

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6. State, whether the following numbers are rational or not:

$$\left(\frac{\sqrt{7}}{6\sqrt{2}}\right)^2$$



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7. Find the square of:

$$\frac{3\sqrt{5}}{5}$$



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8. Find the square of:

$$\sqrt{3} + \sqrt{2}$$



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9. Find the square of :

$$\sqrt{5} - 2$$



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10. Find the square of :

$$3 + 2\sqrt{5}$$



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11. State in each case whether true or false:

$$\sqrt{2} + \sqrt{3} = \sqrt{5}$$



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12. State in each case whether true or false:

$$2\sqrt{4} + 2 = 6$$

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13. State in each case whether true or false:

$$3\sqrt{7} - 2\sqrt{7} = \sqrt{7}$$

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14. State in each case whether true or false:

$\frac{2}{7}$  is an irrational number .

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15. State in each case whether true or false:

$\frac{5}{11}$  is a rational number.

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16. State in each case whether true or false:

All rational numbers are real numbers.

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17. State in each case whether true or false:

All real numbers are rational numbers.

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18. State in each case whether true or false:

Some real numbers are rational numbers.



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19. Given universal set =  
 $\left\{ -6, -5\frac{3}{4}, -\sqrt{4}, -\frac{3}{5}, -\frac{3}{8}, 0, \frac{4}{5}, 1, 1\frac{2}{3}, \sqrt{8}, 3.01, \pi, 8.47 \right\}$

From the given set find :

(i) set of rational numbers

(ii) set of irrational numbers

(iii) set of integers

set of non - negative integers



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20. Prove that each of the numbers is irrational :

$$\sqrt{3} + \sqrt{2}$$

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21. Prove that each of the numbers is irrational :

$$3 - \sqrt{2}$$

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22. Prove that each of the numbers is irrational :

$$\sqrt{5} - 2$$

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23. Write a pair of irrational numbers whose sum is irrational .

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24. Write a pair of irrational numbers whose sum is rational .

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25. Write of pair of irrational numbers whose difference is irrational .

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26. Write a pair of irrational numbers whose difference is rational.

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27. Write a pair of irrational numbers whose product is irrational.

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28. Write a pair of irrational numbers whose product is rational.

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29. Write in ascending order:

$$3\sqrt[3]{5} \text{ and } 4\sqrt{3}$$

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30. Write in ascending order:

$$2\sqrt[3]{5} \text{ and } 3\sqrt[3]{2}$$





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**31.** Write in ascending order:

$$6\sqrt{5}, 7\sqrt{3} \text{ and } 8\sqrt{2}$$



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**32.** Write in descending order :

$$2^4\sqrt{6} \text{ and } 3^4\sqrt{2}$$



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**33.** Write in descending order :

$$7\sqrt{3} \text{ and } 3\sqrt{7}$$



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**34.** Compare :

$$\sqrt[6]{15} \text{ and } \sqrt[4]{12}$$

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**35.** Compare :

$$\sqrt{24} \text{ and } \sqrt[3]{35}$$

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**36.** Insert two irrational numbers between 5 and 6.

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**37.** Insert five irrational numbers between  $2\sqrt{5}$  and  $3\sqrt{3}$ .



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38. Write two rational numbers between  $\sqrt{2}$  and  $\sqrt{3}$

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39. Write three rational numbers between  $\sqrt{3}$  and  $\sqrt{5}$

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40. Simplify each of the

$$\sqrt[5]{16} \times \sqrt[5]{2}$$

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41. Simplify each of the

$$\frac{\sqrt[4]{243}}{\sqrt[4]{3}}$$

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42. Simplify the following

$$(3 + \sqrt{2})(4 + \sqrt{7})$$

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43. Simplify the following

$$(\sqrt{3} - \sqrt{2})^2$$

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1. State, with reason which of the are surds and which are not :

$$\sqrt{180}$$



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2. State, with reason which of the are surds and which are not :

$$\sqrt[4]{27}$$



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3. Solve :

$$\sqrt[5]{128}$$



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4. solve:

$$(64)^{\frac{1}{2}}$$



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5. Solve :

$$(25)^{\frac{1}{2}}$$



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6. State, with reason which of the are surds and which are not :

$$\sqrt[3]{-125}$$



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7. State, with reason which of the are surds and which are not :

$$\sqrt{\pi}$$

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8. State, with reason which of the are surds and which are not :

$$\sqrt{3 + \sqrt{2}}$$

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9. Write the lowest rationalising factor of :

$$5\sqrt{2}$$

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10. Write the lowest rationalising factor of :

$$\sqrt{24}$$

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11. Write the lowest rationalising factor of :

$$\sqrt{5} - 3$$

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12. Write the lowest rationalising factor of :

$$7 - \sqrt{7}$$

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13. Write the lowest rationalising factor of :

$$\sqrt{18} - \sqrt{50}$$

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14. Write the lowest rationalising factor of :

$$\sqrt{5} - \sqrt{2}$$

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15. Write the lowest rationalising factor of :

$$\sqrt{18} - \sqrt{50}$$

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16. Write the lowest rationalising factor of :

$$15 - 3\sqrt{2}$$

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17. Write the lowest rationalising factor of :

$$3\sqrt{2} + 2\sqrt{3}$$

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18. Rationalize the denominator of :

$$\frac{3}{\sqrt{5}}$$

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19. Rationalize the denominators of :

$$\frac{2\sqrt{3}}{5}$$



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20. Rationalize the denominator of :

$$\frac{1}{\sqrt{3} - \sqrt{2}}$$



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21. Rationalize the denominator of :

$$\frac{3}{\sqrt{5} + \sqrt{2}}$$



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22. Rationalize the denominator of :

$$\frac{2 - \sqrt{3}}{2 + \sqrt{3}}$$

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23. Rationalize the denominator of :

$$\frac{\sqrt{3} + 1}{\sqrt{3} - 1}$$

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24. Simplify the following by rationalizing the denominator:

$$\frac{\sqrt{3} - \sqrt{2}}{\sqrt{3} + \sqrt{2}}$$

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25. Rationalize the denominators of :

$$\frac{\sqrt{6} - \sqrt{5}}{\sqrt{6} + \sqrt{5}}$$

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26. Rationalize the denominators of :

$$\frac{2\sqrt{5} + 3\sqrt{2}}{2\sqrt{5} - 3\sqrt{2}}$$

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27. Find the values of a and b in each of the

$$\frac{2 + \sqrt{3}}{2 - \sqrt{3}} = a + b\sqrt{3}$$

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28. Find the values of a and b in each of the

$$\frac{\sqrt{7} - 2}{\sqrt{7} + 2} = a\sqrt{7} + b$$



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29. Find the values of a and b in each of the

$$\frac{3}{\sqrt{3} - \sqrt{2}} = a\sqrt{3} - b\sqrt{2}$$



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30. Find the values of a and b in each of the

$$\frac{5 + 3\sqrt{2}}{5 - 3\sqrt{2}} = a + b\sqrt{2}$$



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31. Simplify :

$$\frac{22}{2\sqrt{3} + 1} + \frac{17}{2\sqrt{3} - 1}$$



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32. Simplify :

$$\frac{\sqrt{2}}{\sqrt{6} - \sqrt{2}} - \frac{\sqrt{3}}{\sqrt{6} + \sqrt{2}}$$



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33. If  $x = \frac{\sqrt{5} - 2}{\sqrt{5} + 2}$  and  $y = \frac{\sqrt{5} + 2}{\sqrt{5} - 2}$  : find :  
 $x^2$



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34. If  $x = \frac{\sqrt{5} - 2}{\sqrt{5} + 2}$  and  $y = \frac{\sqrt{5} + 2}{\sqrt{5} - 2}$  : find :

$$y^2$$

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35. If  $x = \frac{\sqrt{5} - 2}{\sqrt{5} + 2}$  and  $y = \frac{\sqrt{5} + 2}{\sqrt{5} - 2}$  : find :

$$xy$$

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36. If  $x = \frac{\sqrt{5} - 2}{\sqrt{5} + 2}$  and  $y = \frac{\sqrt{5} + 2}{\sqrt{5} - 2}$  : find :

$$x^2 + y^2 + xy$$

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37. If  $m = \frac{1}{3 - 2\sqrt{2}}$  and  $n = \frac{1}{3 + 2\sqrt{2}}$  find :

(i)  $m^2$  (ii)  $n^2$  (iii)  $mn$

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38. If  $x=2\sqrt{3} + 2\sqrt{2}$  find :

$$\frac{1}{x}$$

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39. If  $x=2\sqrt{3} + 2\sqrt{2}$  find :

$$x + \frac{1}{x}$$

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40. If  $x=2\sqrt{3} + 2\sqrt{2}$  find :

$$\left(x + \frac{1}{x}\right)^2$$

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41. If  $x=1-\sqrt{2}$  find the value of  $\left(x - \frac{1}{x}\right)^3$

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42. If  $x=5 - 2\sqrt{6}$  find :  $x^2 + \frac{1}{x^2}$

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43. Show that :

$$\frac{1}{3 - 2\sqrt{2}} - \frac{1}{2\sqrt{2} - \sqrt{7}} + \frac{1}{\sqrt{7} - \sqrt{6}} - \frac{1}{\sqrt{6} - \sqrt{5}} + \frac{1}{\sqrt{5} - 2} = 5$$

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44. Rationalize the denominator of:  $\frac{1}{\sqrt{3} - \sqrt{2} + 1}$

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45. If  $\sqrt{2} = 1.4$  and  $\sqrt{3} = 1.7$  find the value of each of the correct to one decimal place:

$$\frac{1}{\sqrt{3} - \sqrt{2}}$$

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46. If  $\sqrt{2} = 1.4$  and  $\sqrt{3} = 1.7$  find the value of each of the correct to one decimal place:

$$\frac{1}{3 + 2\sqrt{2}}$$

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47. If  $\sqrt{2} = 1.4$  and  $\sqrt{3} = 1.7$  find the value of each of the correct to one decimal place:

$$\frac{2 - \sqrt{3}}{\sqrt{3}}$$

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48. Evaluate:  $\frac{4 - \sqrt{5}}{4 + \sqrt{5}} + \frac{4 + \sqrt{5}}{4 - \sqrt{5}}$

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

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## Exercise 1 D

1. Simplify:  $\frac{\sqrt{18}}{5\sqrt{18} + 3\sqrt{72} - 2\sqrt{162}}$

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2. Simplify:  $\frac{\sqrt{x^2 + y^2} - y}{x - \sqrt{x^2 + y^2}} \div \frac{\sqrt{x^2 + y^2} + x}{\sqrt{x^2 + y^2} + y}$

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3. Evaluate, Correct to one place to decimal, the expression

$$\frac{5}{\sqrt{20} - \sqrt{10}}, \text{ if } \sqrt{5} = 2.2 \text{ and } \sqrt{10} = 3.2$$

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

$$x + \frac{1}{x}$$

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

$$x^2 + \frac{1}{x^2}$$

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

$$x^3 + \frac{1}{x^3}$$

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

$$x^3 + \frac{1}{x^3} - 3\left(x^2 + \frac{1}{x^2}\right) + x + \frac{1}{x}$$

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8. State true or false:

(i) Negative of an irrational number is irrational .

(ii) The product of a non- zero rational number and an irrational number is a rational number.

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9. Draw a line segment of length  $\sqrt{3}$  cm.

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10. Draw a line segment of length  $\sqrt{8}$  cm.



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11. Solve :  $\frac{4 - \sqrt{5}}{4 + \sqrt{5}} + \frac{2}{5 + \sqrt{3}} + \frac{4 + \sqrt{5}}{4 - \sqrt{5}}$



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12. Show that :

$$x^3 + \frac{1}{x^3} = 52, \quad \text{if } x = 2 + \sqrt{3}$$



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13. Show that :

$$x^2 + \frac{1}{x^2} = 34, \quad \text{if } x = 3 + 2\sqrt{2}$$



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14. Show that :

$$\frac{3\sqrt{2} - 2\sqrt{3}}{3\sqrt{2} + 2\sqrt{3}} + \frac{2\sqrt{3}}{\sqrt{3} - \sqrt{2}} = 11$$

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15. Show that  $x$  is irrational if:

$$x^2 = 6$$

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16. Show that  $x$  is irrational if:

$$x^2 = 0.009$$

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17. Show that  $x$  is irrational if:

$$x^2 = 27$$



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18. Show that  $x$  is rational if :

$$x^2 = 16$$



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19. Show that  $x$  is rational if :

$$x^2 = 0.0004$$



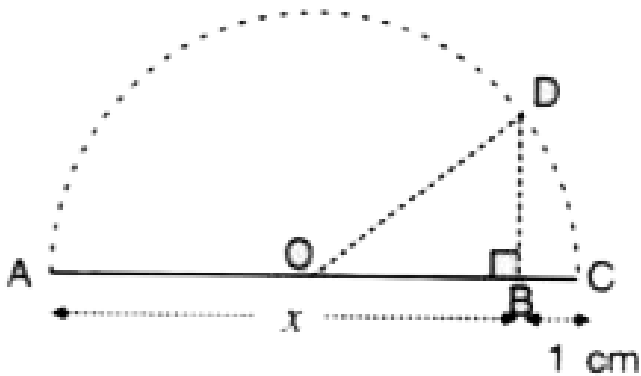
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20. Show that  $x$  is rational if :

$$x^2 = 1\frac{7}{9}$$

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21. Using the following figure show that  $BD = \sqrt{x}$



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1. Is zero a rational number? Can it be written in the form  $\frac{p}{q}$ , where  $p$  and  $q$  are integers and  $q \neq 0$ ?

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2. Without doing any actual division, find which of the following rational numbers have terminating decimal representation :

(i)  $\frac{7}{16}$    (ii)  $\frac{23}{125}$    (iii)  $\frac{9}{14}$

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3. State, whether the following numbers are rational or not :

(i)  $(2 + \sqrt{2})^2$    (ii)  $(5 + \sqrt{5})(5 - \sqrt{5})$

(iii)  $\left(\frac{\sqrt{7}}{5\sqrt{2}}\right)^2$

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4. Find the square of :

(i)  $\frac{3\sqrt{5}}{5}$     (ii)  $3 + 2\sqrt{5}$

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5. Write a pair of irrational number whose product is rational.

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6. Compare :

(i)  $\sqrt[6]{15}$  and  $\sqrt[4]{12}$     (ii)  $\sqrt{24}$  and  $\sqrt[3]{25}$

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7. Write three rational numbers between  $\sqrt{3}$  and  $\sqrt{5}$



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## Properties Of Rational And Irrational Numbers 4 Marks Questions

1. Arrange  $-\frac{5}{9}$ ,  $\frac{7}{12}$ ,  $-\frac{2}{3}$  and  $\frac{11}{18}$  in the ascending order of their magnitudes. Also, find the difference between the largest and the smallest of these rational numbers. Express this difference as a decimal fraction correct to one decimal place.



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2. Given Universal set

$$= \left\{ -6, -5\frac{3}{4}, -\sqrt{4}, \frac{-3}{5}, \frac{-3}{8}, 0, \frac{4}{5}, 1, 1\frac{2}{5}, \sqrt{8}, 3.01, \pi, 8.47 \right\}$$

From the given set, find :

(i) Set of rational numbers

(ii) Set of irrational numbers

(iii) Set of integers

(iv) Set of non-negative integers.

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3. Prove that  $3 - \sqrt{2}$  is irrational.

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4. Write of pair of irrational numbers whose difference is irrational .

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5. Write in ascending order :

(i)  $3\sqrt{5}$  and  $4\sqrt{3}$

(ii)  $2\sqrt[3]{5}$  and  $3\sqrt[3]{2}$

(iii)  $6\sqrt{5}$ ,  $7\sqrt{3}$  and  $8\sqrt{2}$

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6. Insert five irrational numbers between  $2\sqrt{5}$  and  $3\sqrt{3}$ .

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7. Simplify each of the following :

(i)  $\sqrt[5]{16} \times \sqrt[5]{2}$     (ii)  $\frac{\sqrt[4]{243}}{\sqrt[4]{3}}$

(iii)  $(3 + \sqrt{2})(4 + \sqrt{7})$     (iv)  $(\sqrt{3} - \sqrt{2})^2$

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## Surds Or Radicals 3 Marks Questions

1. State, with reason, which of the following are surds and which are not :

(i)  $\sqrt{180}$  (ii)  $\sqrt[3]{64}$  (iii)  $\sqrt[3]{25} \times \sqrt[3]{40}$

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2. Write the lowest rationalising factor of :

(i)  $5\sqrt{2}$  (ii)  $\sqrt{18} - \sqrt{50}$  (iii)  $(2\sqrt{2} + 2\sqrt{3})$

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3. Rationalize the denominator of :

(i)  $\frac{2\sqrt{3}}{\sqrt{5}}$  (ii)  $\frac{1}{\sqrt{3} - \sqrt{2}}$

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4. If  $x = 5 - 2\sqrt{6}$ , find:  $x^2 + \frac{1}{x^2}$

A. 98

B. 77

C. 89

D. 44

**Answer: A**

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5. Simplify:  $\frac{\sqrt{18}}{5\sqrt{18} + 3\sqrt{72} - 2\sqrt{162}}$

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6. Simplify:  $\frac{\sqrt{x^2 + y^2} - y}{x - \sqrt{x^2 - y^2}} \div \frac{\sqrt{x^2 - y^2} + x}{\sqrt{x^2 + y^2} + y}$

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7. Evaluate, Correct to one place to decimal, the expression

$\frac{5}{\sqrt{20} - \sqrt{10}}$ , if  $\sqrt{5} = 2.2$  and  $\sqrt{10} = 3.2$

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8. Rationalize the denominator :

$\frac{14}{5\sqrt{3} - \sqrt{5}}$

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9. Rationalize the denominator and simplify to find the value of

$\frac{4}{\sqrt{5} + \sqrt{3}}$ , given that

$$\sqrt{5} = 2.236 \text{ and } \sqrt{3} = 1.732$$

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## Surds Or Radicals 4 Marks Questions

1. Find the values of a and b in each of the

$$\frac{5 + 3\sqrt{2}}{5 - 3\sqrt{2}} = a + b\sqrt{2}$$

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2. Simplify :

$$\frac{\sqrt{2}}{\sqrt{6} - \sqrt{2}} - \frac{\sqrt{3}}{\sqrt{6} + \sqrt{2}}$$

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3. If  $x = \frac{\sqrt{5} - 2}{\sqrt{5} + 2}$  and  $y = \frac{\sqrt{5} + 2}{\sqrt{5} - 2}$ : find

(i)  $x^2$  (ii)  $y^2$

(iii)  $xy$  (iv)  $x^2 + y^2 + xy$

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4. If  $x = 2\sqrt{3} + 2\sqrt{2}$ , find :

(i)  $\frac{1}{x}$  (ii)  $x + \frac{1}{x}$  (iii)  $\left(x + \frac{1}{x}\right)^2$

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5. Show that:

$$\frac{1}{3 - \sqrt{8}} - \frac{1}{\sqrt{8} - \sqrt{7}} + \frac{1}{\sqrt{7} - \sqrt{6}} - \frac{1}{\sqrt{6} - \sqrt{5}} + \frac{1}{\sqrt{5} - 2} = 5$$

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6. Rationalize the denominator of:  $\frac{1}{\sqrt{3} - \sqrt{2} + 1}$

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7. If  $\sqrt{2} = 1 \cdot 4$  and  $\sqrt{3} = 1 \cdot 7$ , find the value of  $\frac{1}{\sqrt{3} - \sqrt{2}}$ , correct to one place of decimal.

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8. Show that :

$$\frac{3\sqrt{2} - 2\sqrt{3}}{3\sqrt{2} + 2\sqrt{3}} + \frac{2\sqrt{3}}{\sqrt{3} - \sqrt{2}} = 11$$

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