



# MATHS

## BOOKS - NAND LAL PUBLICATION

### NUMBER SYSTEMS

#### Exercise 1 1

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



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2. Find six rational numbers between 3 and 4.



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3. Find five rational numbers between  $\frac{3}{5}$  and  $\frac{4}{5}$ .



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4. State whether the following statements are true or false. Give reasons for your answers:-

Every natural number is a whole number.



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5. State whether the following statements are true or false. Give reasons for your answers:-

Every integer is a whole number.



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6. State whether the following statements are true. or false. Give reasons for your answers.

Every rational number is a whole number.



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## Exercise 1 2

1. Are the following statement true and false ?

Justify your answer. Every irrational number is a real number.



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2. Are the following statement true and false ?

Justify your answer. Every point on the number line is of the form  $\sqrt{m}$  , where m is a natural number.



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3. Are the following statement true and false ?

Justify your answer. Every real number is a irrational number.



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4. Are the square root of all positive integers irrational ? If no, give an example of the square root of a number that is a rational numebr.



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5. Show how  $\sqrt{5}$  can be represented on the number line.



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## Exercise 13

1. Write the following in decimal form and say what kind of decimal expansion each has :

$$\frac{36}{100}.$$



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2. Write the following in decimal form and say what kind of decimal expansion each has :  $\frac{1}{11}$



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3. Write the following in decimal form and say what kind of decimal expansion each has :  $4\frac{1}{8}$



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4. Write the following in decimal form and say what kind of decimal expansion each has :  $\frac{3}{13}$ .



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5. Write the following in decimal form and say what kind of decimal expansion each has :  $\frac{2}{11}$ .



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6. Write the following in decimal form and say what kind of decimal expansion each has :  $\frac{329}{400}$



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7. You know that  $\frac{1}{7} = 0.\overline{142857}$  Can you predict what the decimal expansions of  $\frac{2}{7}, \frac{3}{7}, \frac{4}{7}, \frac{5}{7}, \frac{6}{7}$  are, without actually doing the long division? If so, how? [Hint : Study the remainders while finding the value of  $\frac{1}{7}$  carefully.]



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8. Express the following in the form  $\frac{p}{q}$ , where  $p$  and  $q$  are integers and  $q \neq 0$  :-  $0.\overline{6}$





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9. Express the following in the form  $\frac{p}{q}$  where  $p$  and  $q$  are integers and  $q \neq 0$ .

$$0.\overline{47}$$



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10. Express the following in the form  $\frac{p}{q}$ , where  $p$  and  $q$  are integers and  $q \neq 0$  :-  $0.\overline{001}$



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11. Express  $0.99999\dots$  in the form  $\frac{P}{q}$ . Are you surprised by your answer ? Discuss why the answer makes sense with your teacher and classmates.



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12. What is the maximum number of digits in the repeating block of digits in the quotient while computing  $\frac{1}{17}$  ? Perform the division to check your answer.





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**13.** Look at several examples of rational numbers in the form  $\frac{P}{q}$  ( $q \neq 0$ ), where  $p$  and  $q$  are integers with no common factors other than 1 and having terminating decimal representations (expansions). Can you guess what property  $q$  must satisfy?



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**14.** Write three numbers whose decimal expansions are non-terminating non-recurring.



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**15.** Find three different irrational numbers between the rational numbers  $\frac{5}{7}$  and  $\frac{9}{11}$ .



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**16.** Classify the following number as rational or

irrational :  $\sqrt{23}$



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**17.** Classify the following numbers as rational

or irrational :  $\sqrt{225}$ .



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**18.** Classify the following number as rational or irrational : 0.3796



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**19.** Classify the following number as rational or irrational : 7.478478...



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20. Classify the following numbers as rational or irrational :  $1.101001000100001\dots$



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## Exercise 1 4

1. Visualise 3.765 on the number line, using successive magnification.



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2. Visualise  $4.\overline{26}$  on the number line, up to 4 decimal places.



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## Exercise 1 5

1. Classify the following number as rational or irrational:  $2 - \sqrt{5}$



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2. Classify the following numbers as rational or irrational :  $(3 + \sqrt{23}) - \sqrt{23}$ .



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3. Classify the following number as rational or irrational:  $\frac{2\sqrt{7}}{7\sqrt{7}}$



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4. Classify the following number as rational or

irrational:  $\frac{1}{\sqrt{2}}$



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5. Classify the following number as rational or

irrational:  $2\pi$



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6. Simplify each of the following expressions:

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



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7. Simplify each of the following expressions:

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



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8. Simplify each of the following expressions:

$$(\sqrt{5} + \sqrt{2})^2$$



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9. Simplify each of the following expressions :

$$(\sqrt{5} - \sqrt{2})(\sqrt{5} + \sqrt{2})$$



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**10.** Recall,  $\pi$  is defined as the ratio of the circumference (say  $c$ ) of a circle to its diameter (say  $d$ ). That is,  $\pi = \frac{c}{d}$ . This seems to contradict the fact that  $\pi$  is irrational. How will you resolve this contradiction?



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**11.** Represent  $\sqrt{9.3}$  on the number line.



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12. Rationalise the denominator of the

following:  $\frac{1}{\sqrt{7}}$



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13. Rationalise the denominator of the

following:  $\frac{1}{\sqrt{7} - \sqrt{6}}$



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14. Rationalise the denominator of the

following:  $\frac{1}{\sqrt{5} + \sqrt{2}}$



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15. Rationalise the denominator of the

following:  $\frac{1}{\sqrt{7} - 2}$



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1. Find :  $64^{\frac{1}{2}}$ .



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2. Find :  $32^{\frac{1}{5}}$ .



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3. Find :  $125^{\frac{1}{3}}$ .



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4. Find:

$$9^2$$



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5. Find :  $32^{\frac{2}{5}}$ .



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6. Find :  $16^{\frac{3}{4}}$ .



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7. Find :  $125^{-\frac{1}{3}}$ .



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8. Simplify :  $2^{\frac{2}{3}} \cdot 2^{\frac{1}{5}}$



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9. Simplify :  $\left(\frac{1}{3^3}\right)^7$



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10. Simplify :  $\frac{11^{\frac{1}{2}}}{11^{\frac{1}{4}}}$



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11. Simplify :  $7^{\frac{1}{2}} \cdot 8^{\frac{1}{2}}$



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