EXERCISE 1.1 - Question No. 1

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

EXERCISE 1.1 - Question No. 2

Insert six rational numbers between 3 and 4.

EXERCISE 1.1 - Question No. 3

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

EXERCISE 1.1 - Question No. 4

State whether the following statements are true or false. Give reasons for your answers. (i) Every natural number is a whole number. (ii) Every integer is a whole number. (iii) Every rational number is a whole number.

EXERCISE 1.2 - Question No. 1

State whether the following statements are true or false. Justify your answers, (i) Every irrational number is a real number. (ii) Every point on the number line is of the form $\sqrt{m}$, where m is a natural number. (iii) Every real number is a

EXERCISE 1.2 - Question No. 2

Are the square roots of all positive integers irrational? If not, give an example of the square root of a number that is a rational number.

EXERCISE 1.2 - Question No. 3

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

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EXERCISE 1.2 - Question No. 4

Classroom activity (Constructing the 'square root spiral') : Take a large sheet of paper and construct the 'square root spiral' in the following fashion. Start with a point O and draw a line segment OP_1 of unit length. Draw a line segment `P_

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EXERCISE 1.3 - Question No. 1

Write the following in decimal form and say what kind of decimal expansion each has : (i) $\frac{36}{100}$ (ii) $\frac{1}{11}$ (iii) $4\frac{1}{11}$ (iv) $\frac{3}{13}$ (v) $\frac{2}{11}$ (iv) $\frac{329}{400}$

EXERCISE 1.3 - Question No. 2

You know that $\frac{1}{7} = 0.\overline{142857}$ Can you predict what the decimal expansion 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.]

EXERCISE 1.3 - Question No. 3

Express the following in the form $\frac{p}{q}$, , where p and q are integers and $q \neq 0$. (i) $0.\bar{6}$ (ii) $0.\overline{47}$ (iii) $0.\overline{001}$

EXERCISE 1.3 - Question No. 4

Express 0.99999 .... in the form $\frac{p}{q}$ . . Are you surprised by your answer? With your teacher and classmates discuss why the answer makes sense.

EXERCISE 1.3 - Question No. 5

What can the maximum number of digits be in the repeating block of digits in the decimal expansion of $\frac{1}{17}$? Perform the division to check your answer.

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EXERCISE 1.3 - Question No. 6

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?

EXERCISE 1.3 - Question No. 7

Write three numbers whose decimal expansions arc non-terminating non-recurring.

EXERCISE 1.3 - Question No. 8

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

EXERCISE 1.3 - Question No. 9

Classify the following numbers as rational or irrational: (i) $\sqrt{23}$ (ii) $\sqrt{225}$ (iii) 0.3796 (iv) 7.478478... (v) 1.101001000100001...

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EXERCISE 1.4 - Question No. 1

Visualise 3.765 on the number line, using successive magnification.

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EXERCISE 1.4 - Question No. 2

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

Visualise 3.765 on the number line, using succesive magnification

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EXERCISE 1.5 - Question No. 1

Classify the following numbers as rational or irrational: (i) $2-\sqrt{5}$

(ii) $\left(3+\sqrt{23}\right)-\sqrt{23}$ (iii) $\frac{2\sqrt{7}}{7\sqrt{7}}$ (iv) $\frac{1}{\sqrt{2}}$ (v) 2π

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EXERCISE 1.5 - Question No. 2

Simplify each of the following expressions: (i) $\left(3+\sqrt{3}\right)\left(2+\sqrt{2}\right)$

(ii) $\left(3+\sqrt{3}\right)\left(3-\sqrt{3}\right)$ (iii) $\left(\sqrt{5}+\sqrt{2}\right)^{2}$ (iv)

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

EXERCISE 1.5 - Question No. 3

Recall, 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 the π is irrational How will you resolve this contradiction?

EXERCISE 1.5 - Question No. 4

Represent $\sqrt{7}$ on the number line.

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EXERCISE 1.5 - Question No. 5

Rationalise the denominators of the following: (i) $\frac{1}{\sqrt{7}}$ (ii) $\frac{1}{\sqrt{7}-\sqrt{6}}$ (iii) $\frac{1}{\sqrt{5}+\sqrt{2}}$ (iv) $\frac{1}{\sqrt{7}-2}$

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EXERCISE 1.6 - Question No. 1

Find: (i) $64^{\frac{1}{2}}$ (ii) $32^{\frac{1}{5}}$ (iii) $125^{\frac{1}{3}}$

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EXERCISE 1.6 - Question No. 2

Find : (i) $9^{\frac{3}{2}}$ (ii) $32^{\frac{2}{5}}$ (iii) $16^{\frac{3}{4}}$ (iv) $125^{\frac{-1}{3}}$

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EXERCISE 1.6 - Question No. 3

Simplify : (i) $2^{\frac{2}{3}} . 2^{\frac{1}{5}}$ (ii) $\left(\frac{1}{3^3}\right)^7$ (iii) $\frac{11^{\frac{1}{2}}}{11^{\frac{1}{4}}}$ (iv) $7^{\frac{1}{2}} . 8^{\frac{1}{2}}$

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SOLVED EXAMPLES - Question No. 1

Are the following statements true or false? Give reasons for your answers. (i) Every whole number is a natural number. (ii) Every integer is a rational number. (iii) Every rational number is an integer.

SOLVED EXAMPLES - Question No. 2

Find five rational numbers between 1 and 2. We can approach this problem in at least two ways.

SOLVED EXAMPLES - Question No. 3

Locate $\sqrt{2}$ on the number line.

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SOLVED EXAMPLES - Question No. 4

Locate $\sqrt{3}$ on the number line.

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SOLVED EXAMPLES - Question No. 5

Find the decimal expansions of $\frac{10}{3}$, $\frac{7}{8}$ and $\frac{1}{7}$.

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SOLVED EXAMPLES - Question No. 6

Show that 3.142678 is a rational number. In other words, express 3.142678 in the form $\frac{p}{q}$, where p and q arc integers and $q \neq 0$.

SOLVED EXAMPLES - Question No. 7

Show that $0.3333\ldots = 0.\bar{3}$ can be expressed in the form $\frac{p}{q}$, where p and q are integers and $q \neq 0$.

SOLVED EXAMPLES - Question No. 8

Show that $1.272727... = 1.\overline{27}$ can be expressed in the form $\frac{p}{q}$, where p and q are integers and $q \neq 0$.

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SOLVED EXAMPLES - Question No. 9

Show that $0.2353535... = 0.2\overline{35}$ can be expressed in the form $\frac{p}{q}$, where p and q are integers and $q \neq 0$.

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SOLVED EXAMPLES - Question No. 10

Find the irrational number between $\frac{1}{7}$ and $\frac{2}{7}$.

SOLVED EXAMPLES - Question No. 11

Visualize the representation of $5.\ 3\bar{7}$ on the number line upto 5 decimal places, that is, up to 5.37777.

SOLVED EXAMPLES - Question No. 12

Check whether $7\sqrt{5}$, $\frac{7}{\sqrt{5}}$, $\sqrt{2}+21$, $\pi-2$ are irrational numbers or not.

SOLVED EXAMPLES - Question No. 13

Add $2\sqrt{2} + 5\sqrt{3}$ and $\sqrt{2} - 3\sqrt{3}$.

SOLVED EXAMPLES - Question No. 14

Multiply $6\sqrt{5}$ by $2\sqrt{5}$.

SOLVED EXAMPLES - Question No. 15

Divide $8\sqrt{15}$ and $2\sqrt{3}$.

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SOLVED EXAMPLES - Question No. 16

Simplify the following expressions. (i) $(5+\sqrt{7})(2+\sqrt{5})$ (ii)

$(5+\sqrt{5})(5-\sqrt{5})$ (iii) $(\sqrt{3}+\sqrt{7})^2$ (iv)

$(\sqrt{11}-\sqrt{7})(\sqrt{11}+\sqrt{7})$

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SOLVED EXAMPLES - Question No. 17

Rationalise the denominator of $\frac{1}{\sqrt{2}}$

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SOLVED EXAMPLES - Question No. 18

Rationalise the denominator of $\frac{1}{2+\sqrt{3}}$

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SOLVED EXAMPLES - Question No. 19

Rationalise the denominator of $\frac{5}{\sqrt{3}-\sqrt{5}}$

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SOLVED EXAMPLES - Question No. 20

Rationalise the denominator of $\frac{1}{7+3\sqrt{2}}$

SOLVED EXAMPLES - Question No. 21

Simplify (i) $2^{\frac{2}{3}} . 2^{\frac{1}{3}}$ (ii) $\left(3^{\frac{1}{5}}\right)^4$ (iii) $\frac{7^{\frac{1}{5}}}{7^{\frac{1}{3}}}$ (iv) $13^{\frac{1}{5}} . 17^{\frac{1}{5}}$