Name: _____ Period: _____ Date: _____

Rational Numbers Assignment

Find between which two consecutive integers the following irrational number falls

1. $\sqrt{55}$

2. $\sqrt{42}$

3. $\sqrt{13}$

4. $\sqrt{89}$

State whether the following numbers are rational or irrational. Give reasons

5. 0.2727272727….

6. 3.8729833462….

7. 4.8989794855….

8. 0.8888888888….

Find the value of following irrational numbers up to two decimal points by decimal expansion.

9. $\sqrt{2}$

10. $\sqrt{5}$

11. $\sqrt{17}$

12. $\sqrt{10}$

State true or false

13. $\sqrt[3]{8}$ is an irrational number

(a) True

(b) False

14. π is a rational number

(a) True

(b) False

15. $\sqrt{20}$ is an irrational number

(a) True

(b) False

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Rational Numbers Assignment

ANSWERS

Find between which two consecutive integers the following irrational number falls

1. $\sqrt{55}$

   The greatest perfect square less than 55 is 49 = 7^2.
   The least perfect square greater than 55 is 64 = 8^2.
   $\sqrt{55}$ falls between the two consecutive integers, **7 and 8.**

2. $\sqrt{42}$

   The greatest perfect square less than 42 is 36 = 6^2.
   The least perfect square greater than 42 is 49 = 7^2.
   $\sqrt{42}$ falls between the two consecutive integers, **6 and 7.**

3. $\sqrt{13}$

   The greatest perfect square less than 13 is 9 = 3^2.
   The least perfect square greater than 13 is 16 = 4^2.
   $\sqrt{13}$ falls between the two consecutive integers, **3 and 4.**

4. $\sqrt{89}$

   The greatest perfect square less than 89 is 81 = 9^2.
   The least perfect square greater than 89 is 100 = 10^2.
   $\sqrt{42}$ falls between the two consecutive integers, **9 and 10.**

State whether the following numbers are rational or irrational. Give reasons

5. **0.2727272727….**

   0.2727272727…. is a **rational number** as the digits represent a repetitive pattern and the number can also be represented as a simple fraction $\frac{3}{11}$.

6. **3.8729833462….**

   3.8729833462…. is an **irrational number** as the digits represents a non-repetitive pattern and the number cannot be represented as a simple fraction.

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Rational Numbers Assignment

7. 4.8989794855….

4.8989794855…. is an **irrational number** as the digits represents a non-repetitive pattern and the number cannot be represented as a simple fraction.

8. 0.8888888888….

0.8888888888…. is a **rational number** as the digits represent a repetitive pattern and the number can also be represented as a simple fraction $\frac{8}{9}$.

Find the value of following irrational numbers up to two decimal points by decimal expansion.

9. $\sqrt{2}$

$\sqrt{2}$ is between the two perfect squares $\sqrt{1}$ and $\sqrt{4}$. So, $\sqrt{2}$ is between 1 and 2. To get more precise we will look at the tenths between 1 and 2.

Is $\sqrt{2}$ is between 1.2 and 1.3 try and check $1.2^2 < 3 < 1.3^2$. But $1.2^2 = 1.44$ and $1.3^2 = 1.69$ these squares are small.

Is $\sqrt{2}$ is between 1.3 and 1.4 try and check $1.3^2 < 3 < 1.4^2$. But $1.3^2 = 1.69$ and $1.4^2 = 1.96$ these squares are also small.

Is $\sqrt{2}$ is between 1.4 and 1.5 try and check $1.4^2 < 3 < 1.5^2$. $1.4^2 = 1.96$ and $1.5^2 = 2.25$;

$1.96 < 2 < 2.25$ therefore $1.4 < \sqrt{2} < 1.5$ So, $\sqrt{2}$ lies between 1.4 and 1.5.

For the next decimal look at the tenths between 1.4 and 1.5 by trial and error method we found that $\sqrt{2}$ lies between 1.41 and 1.42 as $1.41^2 = 1.9881$ and $1.42^2 = 2.0164$.

Therefore, first two decimal place values of $\sqrt{2}$ is 1.41….

10. $\sqrt{5}$

$\sqrt{5}$ is between the two perfect squares $\sqrt{4}$ and $\sqrt{9}$. So, $\sqrt{5}$ is between 2 and 3. To get more precise we will look at the tenths between 2 and 3.

Is $\sqrt{5}$ is between 2.1 and 2.2 try and check $2.1^2 < 5 < 2.2^2$. But $2.1^2 = 4.41$ and $2.2^2 = 4.84$ these squares are small.

Is $\sqrt{5}$ is between 2.2 and 2.3 try and check $2.2^2 < 5 < 2.3^2$; $2.2^2 = 4.84$ and $2.3^2 = 5.29$;

$4.84 < 5 < 5.29$ therefore $2.2 < \sqrt{5} < 2.3$ so, $\sqrt{5}$ lies between 2.2 and 2.3.

For the next decimal look at the tenths between 2.2 and 2.3 by trial and error method we found that $\sqrt{5}$ lies between 2.24 and 2.25 as $2.24^2 = 4.9952$ and $2.25^2 = 5.0625$

Therefore, first two decimal place values of $\sqrt{5}$ is 2.24….

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11. $\sqrt{17}$

$\sqrt{17}$ is between the two perfect squares $\sqrt{16}$ and $\sqrt{25}$. So, $\sqrt{17}$ is between 4 and 5. To get more precise we will look at the tenths between 4 and 5.

Is $\sqrt{17}$ is between 4.1 and 4.2 try and check $4.1^2 < 7 < 4.2^2$ and $4.1^2 = 16.81$ and $4.2^2 = 17.64$;

$16.81 < 17 < 17.64$ therefore $4.1 < \sqrt{5} < 4.2$ so, $\sqrt{17}$ lies between 4.1 and 4.2.

For the next decimal look at the tenths between 4.1 and 4.2 by trial and error method we found that $\sqrt{17}$ lies between 4.12 and 4.13 as $4.12^2 = 16.9744$ and $4.13^2 = 17.0569$

Therefore, first two decimal place values of $\sqrt{17}$ is 4.12….

12. $\sqrt{10}$

$\sqrt{10}$ is between the two perfect squares $\sqrt{9}$ and $\sqrt{16}$. So, $\sqrt{10}$ is between 3 and 4. To get more precise we will look at the tenths between 3 and 4.

Is $\sqrt{10}$ is between 3.1 and 3.2 try and check $3.1^2 < 10 < 3.2^2$ and $3.1^2 = 9.61$ and $3.2^2 = 10.24$;

$9.61 < 10 < 10.24$ therefore $3.1 < \sqrt{10} < 3.2$ so, $\sqrt{10}$ lies between 3.1 and 3.2.

For the next decimal look at the tenths between 3.1 and 3.2 by trial and error method we found that $\sqrt{10}$ lies between 3.16 and 3.17 as $3.16^2 = 9.9856$ and $3.17^2 = 10.0489$

Therefore, first two decimal place values of $\sqrt{10}$ is 3.16….

State true or false

13. $\sqrt[3]{8}$ **is an irrational number**

(a) **True** (b) **False**

14. π **is a rational number**

(a) **True** (b) **False**

15. $\sqrt{20}$ **is an irrational number**

(a) **True** (b) **False**