



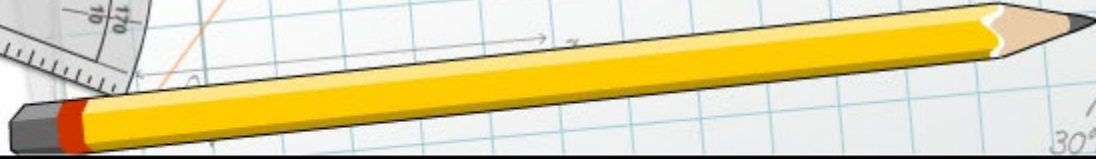
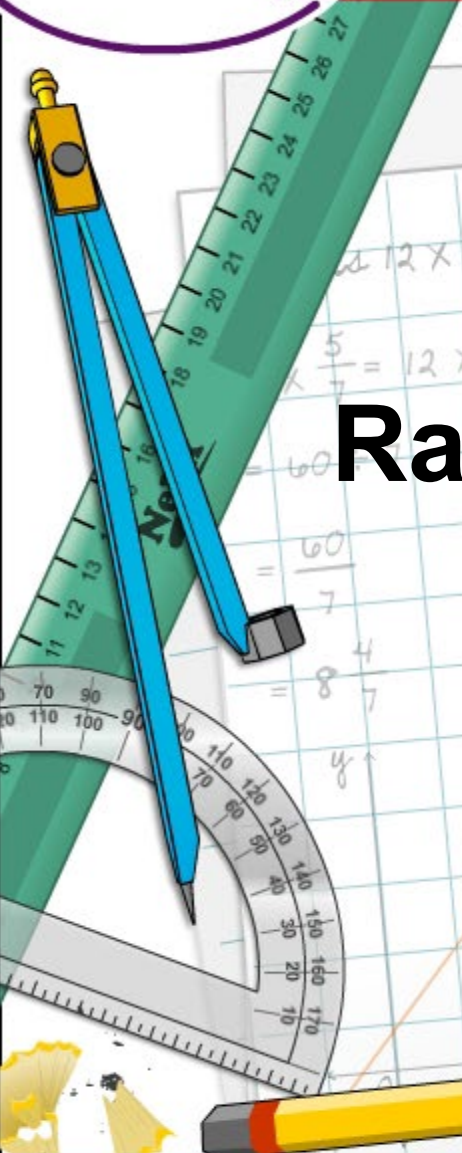
$$12 \times \frac{5}{7} ?$$

$$\frac{5}{7} = 12 \times 5 \div 7$$

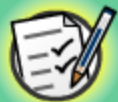
$$= \frac{60}{7}$$

$$= 8 \frac{4}{7}$$

Rational and Irrational Numbers



Common core icons



This icon indicates a slide where the Standards for Mathematical Practice are being developed. Details of these are given in the Notes field.



Slides containing examples of mathematical modeling are marked with this stamp.



This icon indicates an opportunity for discussion or group work.

The **Standards for Mathematical Practice** outlined in the Common Core State Standards for Mathematics describe varieties of expertise that mathematics educators at all levels should seek to develop in their students.

They are:

- 1) **Make sense of problems and persevere in solving them.**
- 2) **Reason abstractly and quantitatively.**
- 3) **Construct viable arguments and critique the reasoning of others.**
- 4) **Model with mathematics.**
- 5) **Use appropriate tools strategically.**
- 6) **Attend to precision.**
- 7) **Look for and make use of structure.**
- 8) **Look for and express regularity in repeated reasoning.**



This icon indicates that the slide contains activities created in Flash. These activities are not editable.



This icon indicates teacher's notes in the Notes field.



Press below to learn about rational and irrational numbers.

Numbers can be split into those that are **rational** and those that are **irrational**.

Press the buttons for an explanation of the differences between the two types of number.

rational

irrational



Any number can be expanded and written as a decimal.

What are the decimal notations of the following?

$$\frac{3}{4} = 0.75$$

$$2 = 2.0$$

Decimal notations of rational numbers eventually terminate or repeat. If a decimal repeats infinitely, it is called a **repeating decimal**.

Can you think of an example?

$$\frac{1}{3} = 1 \div 3 = 0.33333\dots = 0.\overline{3}$$





How should we represent the following repeating decimals?

$$\frac{1}{6} = 1 \div 6 = 0.16666\dots = 0.1\overline{6}$$

$$\frac{2}{11} = 2 \div 11 = 0.18181\dots = 0.1\overline{8}$$

$$\frac{3}{7} = 3 \div 7 = 0.42857142857142\dots = 0.\overline{428571}$$

We can also use rounding to write $\frac{3}{7}$ as 0.43.



Converting fractions to decimals



$$\frac{1}{2}$$

Press the gray arrows to create a fraction. Press the red arrows to convert it to a decimal.

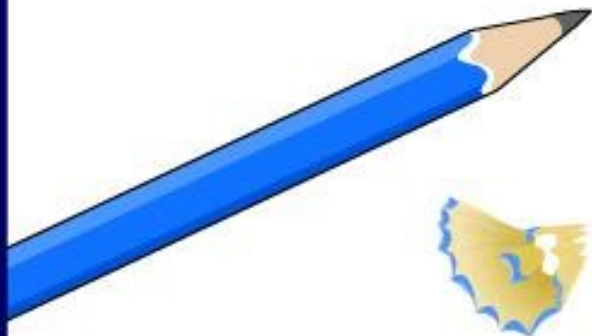


Converting decimals to fractions



Use the blue scroll buttons to create a decimal.
Press the red arrows to convert it to a fraction.

| 1s | $\frac{1}{10}$ s | $\frac{1}{100}$ s | $\frac{1}{1000}$ s |
|-------------|------------------|-------------------|--------------------|
| ▲ 0 ▼ | ▲ 0 ▼ | ▲ 0 ▼ | ▲ 0 ▼ |



Matching – fractions and decimals



Press the cards to match pairs of equivalent fractions and decimals.

| | | | | | |
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| | | | | | |
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level 1

level 2

level 3



Estimating irrational numbers

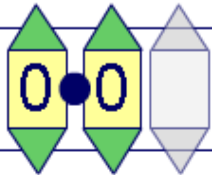


If you are required to give a numerical answer to a calculation involving irrational numbers, it is necessary to use approximations.

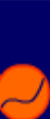
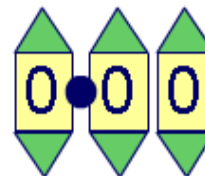




Find $\sqrt{99}$ to the nearest hundredth.

| | | |
|---|--|--|
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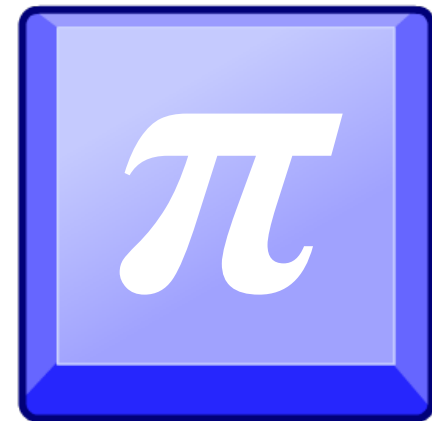
Answer to the nearest hundredth:



Approximations for the value of π

One of the most common irrational numbers is π (pi). Although π is a number, it cannot be written down exactly because it has an infinite number of non-repeating decimal places.

When we are doing calculations involving π , we have to use an approximation for the value.



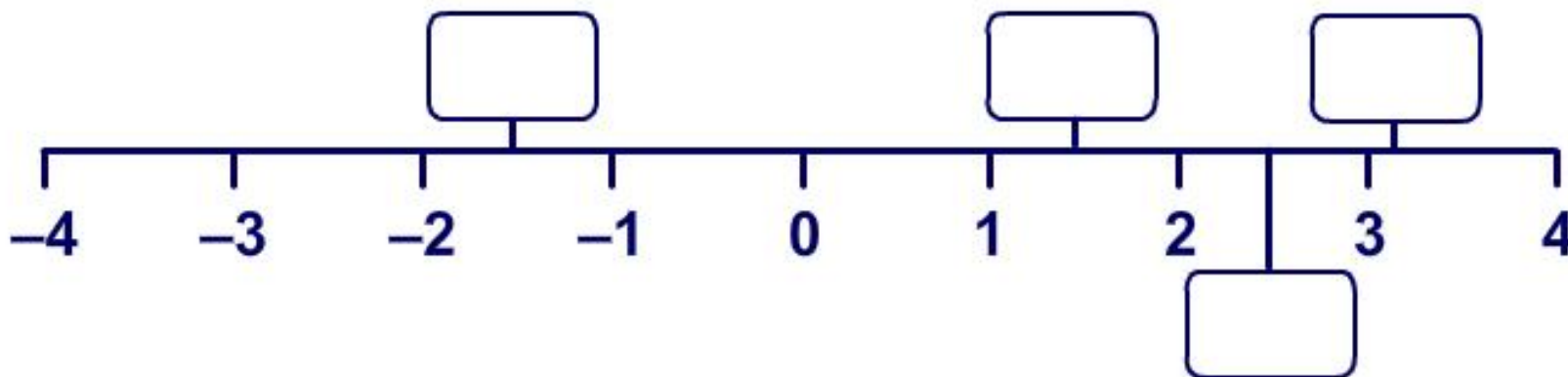
We usually approximate π as 3.14. We can also use the π button on a calculator to get a more accurate approximation.



Irrational numbers on a line



Drag the irrational numbers into place on the number line.



$$-\frac{1}{2}\pi$$

$$\sqrt{2}$$

$$\sqrt{6}$$

$$\pi$$



Calculating with irrational numbers



Estimate the values of the expressions to the nearest hundredth.

1. $\sqrt{2} \times \sqrt{3}$

?

W

2. $\sqrt{10} - 1$

?

W

3. $\frac{-2}{\pi}$

?

W

4. $\frac{5}{6\pi}$

?

W

5. $\sqrt{52 + 1}$

?

W

