Algebra 1

Unit 1

Day 4

Jul 12-7:55 PM

What Are Our Learning Goals?

MGSE9–12.N.RN.3 **Explain why the sum or product of rational numbers is rational; why the sum of a rational number and an irrational number is irrational; and why the product of a nonzero rational number and an irrational number is irrational.**

H.O.T.Questions

- Why is the sum or product of rational numbers rational?
- Why is the sum of a rational number and irrational number irrational?
- Why is the product of a nonzero rational number and an irrational number irrational?

Opening

What do we know about rational and irrational numbers?

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Pre-Assessment

Is it Rational?

Remember that a bar over digits indicates a recurring decimal number, e.g. $0.\overline{256} = 0.2565656...$

1. For each of the numbers below, decide whether it is rational or irrational.
   Explain your reasoning in detail.

5	
$\frac{5}{7}$	
0.575	
$\sqrt{5}$	
$5+\sqrt{7}$	
$\frac{\sqrt{10}}{2}$	
$5.75....$	
$(5+\sqrt{5})(5-\sqrt{5})$	
$(7+\sqrt{5})(5-\sqrt{5})$	

2. Arlo, Hao, Eiji, Korbin, and Hank were discussing $0.\overline{57}$.

This is the script of their conversation.

Student	Statement	Agree or disagree?
Arlo:	$0.\overline{57}$ is an irrational number.	
Hao:	No, Arlo, it is rational, because $0.\overline{57}$ can be written as a fraction.	
Eiji:	Maybe Hao's correct, you know. Because $0.\overline{57} = \frac{57}{100}$.	
Korbin:	Hang on. The decimal for $0.\overline{57}$ would go on forever if you tried to write it. That's what the bar thing means, right?	
Hank:	And because it goes on forever, that *proves* $0.\overline{57}$ has *got* to be irrational.	

a. In the right hand column, write whether you agree or disagree with each student's statement.

b. If you think $0.\overline{57}$ is rational, say what fraction it is and explain why.

If you think it is not rational, explain how you know.

Work Period

Classifying Rational and Irrational Numbers Task

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Classifying Rational and Irrational Numbers	
Non-terminating non-repeating decimal	Terminating decimal
Non-terminating repeating decimal	Rational numbers
Irrational numbers	

Poster Headings

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Instructions for Placing Number Cards

- Take turns to choose a number card.
- When it is your turn:
  - Decide where your number card fits on the poster.
  - Does it fit in just one place, or in more than one place?
  - Give reasons for your decisions.
- When it is your partner's turn:
  - If you agree with your partner's reasoning, explain it in your own words.
  - If you disagree with your partner's decision, explain why. Then together, figure out where to put the card.
- When you have reached an agreement:
  - Write reasons for your decision on the number card.
  - If the number card fits in just one place on the poster, place it on the poster.
  - If not, put it to one side.

Rational and Irrational Numbers (1)

$\frac{7}{8}$	$0.123\ldots$	$0.\overline{9}$
$\frac{2}{3}$	$\frac{22}{7}$	$(8+\sqrt{2})(8-\sqrt{2})$
π	$\frac{\sqrt{8}}{\sqrt{2}}$	$\sqrt{8}$

Rational and Irrational Numbers (2)

$\sqrt{2} \times \sqrt{8}$	$\sqrt{2} + \sqrt{8}$	$\frac{\sqrt{3}}{4}$
$0.\overline{123}$	0.123 rounded correct to 3 decimal places	Calculator display: 3.14159265
0.123	$0.1\overline{23}$	

Hint Sheet

$0.\overline{123}$ Figure out the changes from one line to the next: $x = 0.\overline{43}$ $100x = 43.\overline{43}$ $99x = 43$ $x = \frac{43}{99}$ How can this help you figure out $0.\overline{123}$ as a fraction?	$\frac{\sqrt{3}}{4}$ What kind of number is $\sqrt{3}$? What is your definition of a rational number? Are all fractions rational numbers?
Calculator display: 3.14159265 Does this calculator display show π? Why might you say *yes*? Why might you say *no*?	$0.\overline{9}$ Write $\frac{1}{9}$ as a decimal. Write $\frac{2}{9}$ as a decimal. What fraction would you consider next? Continue the pattern.

Classifying Rational and Irrational Numbers

1. For each of the numbers below, decide whether it is rational or irrational.
   Explain your answers.

Number	Reasoning
0.21	
$\frac{3}{12}$	
$\sqrt{12}-2$	
$\frac{\sqrt{12}}{4}$	
$4.125...$	
$(\sqrt{12}-4)(4+\sqrt{12})$	
12.52 (rounded to 2 d.p.)	

2. Some students were classifying numbers as rational and irrational.

Decide whether you agree or disagree with each statement.

Correct any errors. Explain your answers clearly.

Student	Statement	Agree or disagree?
Otis	$\frac{\sqrt{3}}{8}$ is a rational number because it can be written as a fraction.	
Lulu	$\frac{\sqrt{3}}{8}$ is irrational because $\sqrt{3}$ is irrational.	
Leon	$0.\overline{286}$ is rational because you can write it as the fraction $\frac{286}{1000}$.	
Joan	$0.\overline{286}$ is an irrational number because that decimal will carry on forever.	
Ray	0.286 (rounded to three decimal places) might be rational or irrational.	
Arita	0.286… is rational - the little dots show the digits carry on in the same pattern forever.	

Classifying Rational and Irrational Numbers

	Rational Numbers	Irrational Numbers
Terminating decimal		
Non-terminating repeating decimal		
Non-terminating non-repeating decimal		

Closing

Answer the lesson's H.O.T. question
Share solutions and strategies.

Discuss reasoning for classification.

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Homework

Simplify:

1.) $2\sqrt{6} + 5\sqrt{6}$

A. $7\sqrt{12}$
B. $10\sqrt{36}$
C. $7\sqrt{6}$
D. $10\sqrt{6}$

2.) $\sqrt{12} \cdot \sqrt{3}$

A. $\sqrt{15}$
B. $\sqrt{6}$
C. $\sqrt{36}$
D. 6.

3.) $\sqrt{8} \cdot \sqrt{8}$

A. 64
B. 16
C. 8
D. 4

4.) $\frac{12\sqrt{40}}{2\sqrt{10}}$

A. 24
B. 12
C. $10\sqrt{4}$
D. $6\sqrt{2}$

5.) $\sqrt{6} + \sqrt{3}$

A. 2
B. $2\sqrt{3}$
C. $3\sqrt{3}$
D. None of the above.

6.) $4\sqrt{28} - \sqrt{7}$

A. $7\sqrt{7}$
B. $9\sqrt{7}$
C. $15\sqrt{7}$
D. None of the above.

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7.) $3\sqrt{3} \cdot 3\sqrt{4}$

A. $9\sqrt{3}$
B. $18\sqrt{7}$
C. $18\sqrt{3}$
D. $9\sqrt{12}$

8.) $\frac{3\sqrt{14}}{15\sqrt{7}}$

A. $5\sqrt{7}$
B. $5\sqrt{2}$
C. $\frac{\sqrt{7}}{5}$
D. $\frac{\sqrt{2}}{5}$

For problems 9-10, perform the indicated operations. Justify your answer by showing your work in the column to the right.

9.) (3x - 9) (3x – 9)

10.) (3x - 9) (3x + 9)

11.) Compare problems 9 and 10. What do you notice? Write your conclusion:

_____
_____
_____
_____
_____
_____
_____

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Algebra 1

Unit 1

Day 5

Jul 12-7:55 PM

What Are Our Learning Goals?

MGSE9–12.N.RN.3 Explain why the sum or product of rational numbers is rational; why the sum of a rational number and an irrational number is irrational; and why the product of a nonzero rational number and an irrational number is irrational.

H.O.T.Questions

- Why is the sum or product of rational numbers rational?
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Warm-Up

Skills Practice/Homework Review

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Opening

Review our learning progress on RN. 3

MGSE9–12.N.RN.3 **Explain why the sum or product of rational numbers is rational; why the sum of a rational number and an irrational number is irrational; and why the product of a nonzero rational number and an irrational number is irrational.**

What have we accomplished so far in our task on rational and irrational numbers?

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Work Period

Continue our Classifying Rational and Irrational Numbers Task.

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Closing

Answer the lesson's H.O.T. question
Share solutions and strategies.

Discuss reasoning for classifying numbers.

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Homework

1.) Which is an example of the sum of a rational number and irrational number being irrational? **Explain your decision.**

A. $\frac{\pi}{\pi}$
B. $\sqrt{3} + \sqrt{4}$
C. $4 + \sqrt{36}$
D. $\sqrt{3} + \pi$

2.) Which is an example of the product of a rational number and an irrational number being irrational? **Explain.**

A. $\sqrt{16} \cdot \pi$
B. $\sqrt{3} \cdot \sqrt{3}$
C. $\sqrt{3} \cdot \sqrt{5}$
D. $3 \cdot 5$

For problems 3-10, specify where the product/sum will be a rational or irrational number. **Explain why.**

3.) $\sqrt{16} + \sqrt{36}$ _____

4.) $\sqrt{12} \cdot \sqrt{3}$ _____

5.) $\sqrt{8} \cdot \sqrt{8}$ _____

6.) $\sqrt{6} + \sqrt{3}$ _____

7.) $6 - \sqrt{3}$ _____

8.) $6 + 3$ _____

9.) $\sqrt{28} - \sqrt{4}$ _____

10.) $28 - \sqrt{4}$ _____

11.) The perimeter of a rectangle is a rational number. The length of a rectangle is 6 units. The width of a rectangle must be a/an _____ number.
(rational/ irrational)

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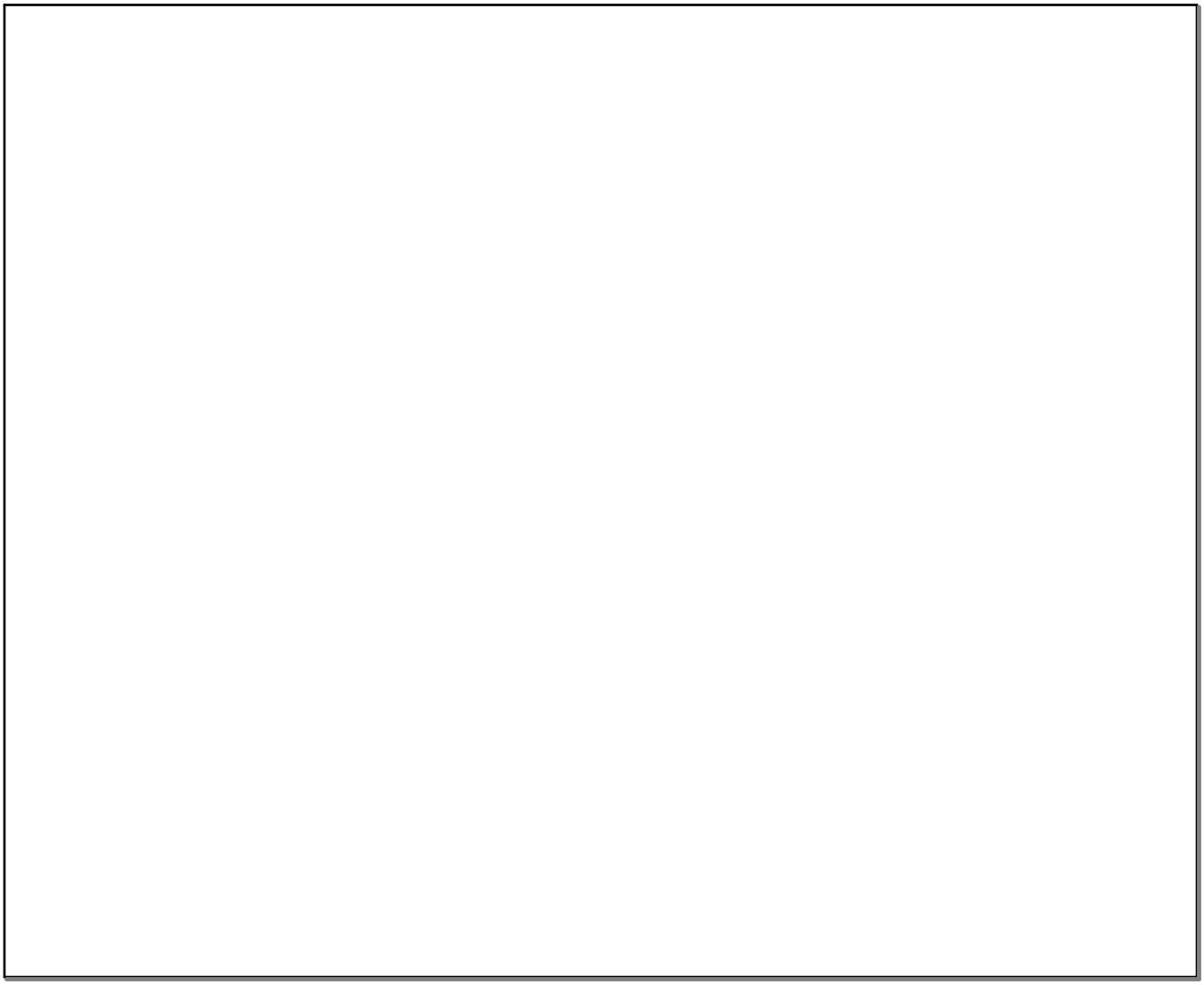

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