

Unit 1- Number System - Real Numbers and Exponents

Review Guide

Math 8

Identify each number as rational or irrational.

1.

| | |
|----------------|--|
| $\frac{4}{20}$ | |
| $\sqrt{33}$ | |
| -56 | |
| $\sqrt{71}$ | |

2.

| | |
|-----------------------|--|
| $\sqrt{\frac{6}{13}}$ | |
| 8 | |
| $\sqrt{14,884}$ | |
| $\sqrt{15}$ | |

Write each rational number in the form $\frac{p}{q}$, where p and q are integers.

3. -36

4. -11

Graph each pair of numbers on the number line. Use the graph and write $<$, $>$ or $=$ to compare the numbers.

5. -2.5 2.5



6. -4.1 $\frac{4}{1}$



Identify each decimal as repeating or terminating.

7.

| | |
|------------------|--|
| 33.5 | |
| 6.213213 ... | |
| $4.\overline{6}$ | |

8.

| | |
|-------------------|--|
| 2.2 | |
| -12.4 | |
| $43.\overline{6}$ | |

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Math 8

Find each sum or difference.

9. $44.11 + (-8.1) - 3^2 =$

10. $\left(5 - \frac{1}{2}\right) + \left(\frac{3}{5} + \frac{2}{3}\right)$

Find each product.

11. $(-0.4) \times (-1.6) =$

12. $5\frac{1}{3} \times \frac{(-12)}{16} =$

Find each quotient.

13. $-0.3 \div (-0.2) =$

14. $3\frac{3}{4} \div (-5) =$

Name: _____ Period: _____ Date: _____

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Math 8

Convert each fraction to a decimal, then determine if its decimal expansion is repeating or terminating.

15. $\frac{24}{64}$

16. $2\frac{3}{7}$

Convert each terminating decimal to a fraction.

17. 0.012

18. -2.05

Name: _____ Period: _____ Date: _____

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Review Guide

Math 8

Convert each repeating decimal to a fraction.

19. $0.666666 \dots$

20. $5.5\overline{3}$

Convert each fraction to a decimal, then determine if it is a rational or an irrational number.

21. $\frac{17}{34}$

22. $3\frac{5}{7}$

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Math 8

Determine whether each square root is rational or irrational number.

23. $\sqrt{\frac{729}{81}}$

24. $\sqrt{222}$

Identify if the answer will be rational or irrational.

25. $\pi + 5$

26. $\sqrt{8} - \sqrt{2}$

Insert a rational and an irrational number between each numbers

27. 6 and 7

28. 8 and 9

Write the numbers in order from least to greatest.

29. $\sqrt{62}$, $5\sqrt{2}$, $4\sqrt{3}$, $4\sqrt{6}$

30. $\sqrt{345}$, $8\sqrt{5}$, $5\sqrt{6}$, $9\sqrt{3}$

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Math 8

Place a point on the number line given for each of the following irrational numbers.

31. $M = \sqrt{7}$ $N = 2\sqrt{3}$ $K = 3\sqrt{2}$



32. $A = \sqrt{17}$ $B = -\sqrt{17}$ $C = \sqrt{13}$



Approximate the following square roots to the nearest hundredth .

33. $\sqrt{125}$

34. $\sqrt{224}$

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Math 8

Approximate the following cube roots to the nearest integer.

35. $\sqrt[3]{490}$

36. $\sqrt[3]{(-1,999)}$

Evaluate each expression.

37. $\sqrt[3]{(-1,728)} + \sqrt{169} + 11^2$

38. $(\sqrt[3]{(-125)} + \sqrt{81}) - \sqrt{676}$

Simplify to find the product.

39. $(-a^8) * (3a^4)$

40. $-4a^5b^6 * (-a^{-6}b^{-5})$

Simplify to find the quotients.

41. $\frac{(5ab)^{-2}}{(2b^{-2})^3}$

42. $\left(\frac{x^{-6}y}{x^{-3}y^{-2}}\right)^{-2}$

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Math 8

Convert each number to scientific notation.

43. 0.00601

44. 2,000,000

45. -2,090

46. 0.000000000000012

Find the sum or difference. Write each answer in scientific notation

47. $(2.5 \times 10^{-2}) - (6 \times 10^2)$

48. $7,123 - (4 \times 10^3)$

Find the product or quotient. Write your answer in scientific notation.

49. $(3.2 \times 10^{-5}) \times (5 \times 10^{-1})$

50. $(2 \times 10^6) \div 0.0017$

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Math 8

Evaluate the expression. Write your answer in scientific notation.

51. $(5,670 + (3.3 \times 10^4)) \times (7.3 \times 10^6)$

52.
$$\frac{((6 \times 10^{-3}) + (2 \times 10^{-4}))}{(0.045 - (4 \times 10^{-3}))}$$

Unit 1- Number System - Real Numbers and Exponents

Review Guide

Math 8

ANSWERS

Identify each number as rational or irrational.

1.

| | |
|----------------|------------|
| $\frac{4}{20}$ | Rational |
| $\sqrt{33}$ | Irrational |
| -56 | Rational |
| $\sqrt{71}$ | Irrational |

2.

| | |
|-----------------------|------------|
| $\sqrt{\frac{6}{13}}$ | Irrational |
| 8 | Rational |
| $\sqrt{14,884}$ | Rational |
| $\sqrt{15}$ | Irrational |

Write each rational number in the form $\frac{p}{q}$, where p and q are integers.

3. -36

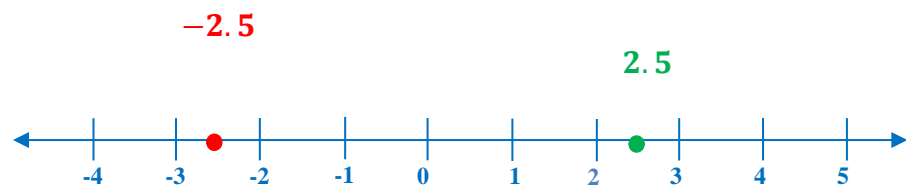
$$-36 = -\frac{72}{2}$$

4. -11

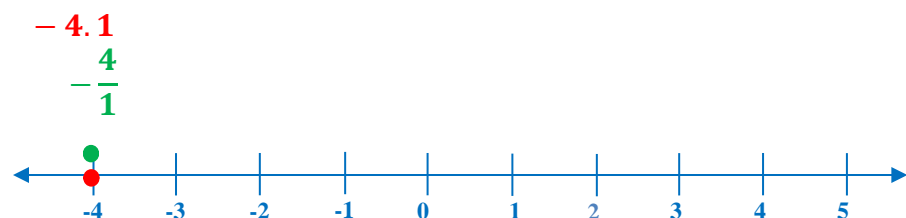
$$-11 = \frac{-33}{3}$$

Graph each pair of numbers on the number line. Use the graph and write $<$, $>$ or $=$ to compare the numbers.

5. -2.5 $<$ 2.5



6. -4.1 $<$ $-\frac{4}{1}$



Identify each decimal as repeating or terminating.

7.

| | |
|------|---------------------|
| 33.5 | terminating decimal |
|------|---------------------|

8.

| | |
|-----|---------------------|
| 2.2 | terminating decimal |
|-----|---------------------|

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Math 8

| | |
|------------------|-------------------|
| 6.213213 | repeating decimal |
| $4.\overline{6}$ | repeating decimal |

| | |
|-------------------|---------------------|
| -12.4 | terminating decimal |
| $43.\overline{6}$ | repeating decimal |

Find each sum or difference.

9. $44.11 + (-8.1) - 3^2 =$

$$\begin{aligned} & 44.11 + (-8.1) - 3^2 = \\ & = 44.11 - 8.1 - 9 = \\ & = 44.11 - 17.1 = \\ & = \mathbf{27.01} \end{aligned}$$

10. $\left(5 - \frac{1}{2}\right) + \left(\frac{3}{5} + \frac{2}{3}\right) =$

$$\begin{aligned} & \left(5 - \frac{1}{2}\right) + \left(\frac{3}{5} + \frac{2}{3}\right) = \\ & \left(5 - \frac{1}{2}\right) + \left(\frac{3}{5} + \frac{2}{3}\right) = \\ & = \left(\frac{10}{2} - \frac{1}{2}\right) + \left(\frac{9}{15} + \frac{10}{15}\right) = \\ & = \frac{9}{2} + \frac{19}{15} = \\ & = \frac{135}{30} + \frac{38}{30} = \\ & = \mathbf{\frac{173}{30}} \end{aligned}$$

Find each product.

11. $(-0.4) \times (-1.6) =$

$$\begin{aligned} & (-0.4) \times (-1.6) = \\ & = \frac{-4}{10} \times \frac{-16}{10} = \\ & = \frac{(-4) \times (-16)}{10 \times 10} = \\ & = \frac{64}{100} = \\ & = \mathbf{0.64} \end{aligned}$$

12. $5\frac{1}{3} \times \frac{(-12)}{16} =$

$$\begin{aligned} & 5\frac{1}{3} \times \frac{(-12)}{16} = \\ & 5\frac{1}{3} \times \frac{(-12)}{16} = \\ & = \frac{16}{4} \times \frac{(-12)}{16} = \\ & = \frac{16 \times 4 \times (-3)}{4 \times 16} = \\ & = \frac{(-3)}{1} = \\ & = \mathbf{-3} \end{aligned}$$

Find each quotient.

13. $-0.3 \div (-0.2) =$

$$\begin{aligned} & -0.3 \div (-0.2) = \\ & = \frac{-3}{10} \div \frac{(-2)}{10} = \\ & = \frac{-3}{10} \times \frac{10}{(-2)} = \\ & = \frac{-3 \times 10}{10 \times (-2)} = \\ & = \frac{-3}{-2} = \end{aligned}$$

14. $3\frac{3}{4} \div (-5) =$

$$\begin{aligned} & 3\frac{3}{4} \div (-5) = \\ & 3\frac{3}{4} \div (-5) = \\ & = \frac{15}{4} \times \frac{-1}{5} = \\ & = \frac{5 \times 3 \times (-1)}{4 \times 5} = \\ & = \mathbf{\frac{-3}{4}} \end{aligned}$$

Unit 1- Number System - Real Numbers and Exponents

Review Guide

Math 8

$$= \frac{3}{2}$$

Convert each fraction to a decimal, then determine if its decimal expansion is repeating or terminating.

15. $\frac{24}{64}$

$$\frac{24}{64} = \frac{8 \times 3}{8 \times 8} = \frac{3}{8} = 0.375$$

$$\frac{24}{64} = 0.375$$

A terminating decimal

16. $2\frac{3}{7}$

$$2\frac{3}{7} = \frac{17}{7}$$

$$17 \div 7 = 2.4285714$$

$$\begin{array}{r} -14 \\ 30 \\ -28 \\ 20 \\ -14 \\ 60 \\ -56 \\ 40 \\ -35 \\ 50 \\ -49 \\ 10 \\ -7 \\ 30 \\ -28 \end{array}$$

$$2\frac{3}{7} = 2.\overline{428571}$$

A repeating decimal

Convert each terminating decimal to a fraction.

17. 0.012

$$0.15 = \frac{15}{100} = \frac{3 \times 5}{5 \times 20} = \frac{3}{20}$$

$$0.15 = \frac{3}{20}$$

18. -2.05

$$-2.05 = -2\frac{5}{100} = -2\frac{5}{5 \times 20} = -2\frac{1}{20}$$

$$-2.05 = -2\frac{1}{20}$$

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Math 8

Convert each repeating decimal to a fraction.

19. $0.666666 \dots$

$$\begin{aligned} 0.666666 \dots \\ 10x &= 6.66666 \\ -x &= 0.66666 \end{aligned}$$

$$\begin{aligned} 9x &= 6 \\ x &= \frac{6}{9} = \frac{2}{3} \end{aligned}$$

$$0.666666 \dots = \frac{2}{3}$$

20. $5.5\bar{3}$

$$\begin{aligned} 5.5\bar{3} &= 5.533333 \dots \\ 100x &= 553.33333 \\ -10x &= 55.33333 \end{aligned}$$

$$\begin{aligned} 90x &= 498 \\ x &= \frac{498}{90} = \frac{83(2)(3)}{15(2)(3)} = \frac{83}{15} = 5 \frac{8}{15} \end{aligned}$$

$$5.5\bar{3} = 5 \frac{8}{15}$$

Convert each fraction to a decimal, then determine if it is a rational or an irrational number.

21. $\frac{17}{34}$

$$\begin{aligned} \frac{17}{34} &= \frac{17}{17 \times 2} = \frac{1}{2} = 0.5 \\ \frac{17}{34} &= 0.5 \end{aligned}$$

A terminating decimal
Rational number

22. $3\frac{5}{7}$

$$\begin{aligned} 3\frac{4}{7} &= \frac{25}{7} \\ 25 \div 7 &= 3.571428 \dots \end{aligned}$$

$$\begin{array}{r} 25 \\ -21 \\ \hline 40 \\ -35 \\ \hline 50 \\ -49 \\ \hline 10 \\ -7 \\ \hline 30 \\ -28 \\ \hline 20 \\ -14 \\ \hline 60 \\ -56 \\ \hline \end{array}$$

$$3\frac{4}{7} = 3.\overline{571428}$$

A repeating decimal
Rational number

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Math 8

Determine whether each square root is rational or irrational number.

23. $\sqrt{\frac{729}{81}}$

$$\sqrt{\frac{729}{81}} = \sqrt{\frac{27^2}{9^2}} = \frac{27}{9} = 3$$

This number is rational.

24. $\sqrt{222}$

$$\sqrt{222} = 14.899664425 \dots \dots$$

This number is irrational.

Identify if the answer will be rational or irrational.

25. $\pi + 5$

$$\pi + 5 = 3.14159 \dots \dots + 5 = 8.14158 \dots \dots$$

Irrational

26. $\sqrt{8} - \sqrt{2}$

$$\sqrt{8} - \sqrt{2} = 2.828 \dots - 1.4141 \dots \dots$$

$$\sqrt{8} - \sqrt{2} = 2.41423 \dots \dots \dots$$

Irrational

Insert a rational and an irrational number between each numbers

27. 6 and 7

$$\frac{6+7}{2} = \frac{13}{2} = 6.5 \quad \text{Rational}$$

$$\sqrt{6 \times 7} = \sqrt{42} \quad \text{Irrational}$$

28. 8 and 9

$$\frac{8+9}{2} = \frac{17}{2} = 8.5 \quad \text{Rational}$$

$$\sqrt{8 \times 9} = 6\sqrt{2} \quad \text{Irrational}$$

Write the numbers in order from least to greatest.

29. $\sqrt{62}$, $5\sqrt{2}$, $4\sqrt{3}$, $4\sqrt{6}$

$$(\sqrt{62})^2 = 62$$

$$(5\sqrt{2})^2 = 5^2 \times (\sqrt{2})^2 = 25 \times 2 = 50$$

30. $\sqrt{345}$, $8\sqrt{5}$, $5\sqrt{6}$, $9\sqrt{3}$

$$(\sqrt{345})^2 = 345$$

$$(8\sqrt{5})^2 = 8^2 \times (\sqrt{5})^2 = 64 \times 5 = 320$$

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$$(4\sqrt{3})^2 = 4^2 \times (\sqrt{3})^2 = 16 \times 3 = 48$$

$$(4\sqrt{6})^2 = 4^2 \times (\sqrt{6})^2 = 16 \times 6 = 96$$

$$(5\sqrt{6})^2 = 5^2 \times (\sqrt{6})^2 = 25 \times 6 = 150$$

$$(9\sqrt{3})^2 = 9^2 \times (\sqrt{3})^2 = 81 \times 3 = 243$$

$$4\sqrt{3} < 5\sqrt{2} < \sqrt{62} < 4\sqrt{6}$$

$$5\sqrt{6} < 9\sqrt{3} < 8\sqrt{5} < \sqrt{345}$$

Place a point on the number line given for each of the following irrational numbers.

31. $M = \sqrt{7}$ $N = 2\sqrt{3}$ $K = 3\sqrt{2}$

$$M = \sqrt{7} \quad 2^2 < (\sqrt{7})^2 < 3^2$$

$$N = 2\sqrt{3} \quad 2 * 1^2 < 2(\sqrt{3})^2 < 2 * 2^2$$

$$K = 3\sqrt{2} \quad 3 * 1^2 < 3(\sqrt{2})^2 < 3 * 2^2$$



32. $A = \sqrt{17}$ $B = -\sqrt{17}$ $C = \sqrt{13}$

$$A = \sqrt{17} \quad 4^2 < (\sqrt{17})^2 < 5^2$$

$$B = -\sqrt{17} \quad -5^2 < -(\sqrt{17})^2 < -4^2$$

$$C = \sqrt{13} \quad 3^2 < (\sqrt{13})^2 < 4^2$$



Approximate the following square roots to the nearest hundredths.

33. $\sqrt{125}$

$$11^2 < (\sqrt{125})^2 < 12^2$$

$$121 < 125 < 144$$

$$125 - 121 = 4$$

$$144 - 121 = 23$$

$$\frac{4}{23} = 0.18$$

34. $\sqrt{224}$

$$14^2 < (\sqrt{224})^2 < 15^2$$

$$196 < 224 < 225$$

$$224 - 196 = 28$$

$$225 - 196 = 29$$

$$\frac{28}{29} = 0.96$$

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$$\sqrt{125} \approx \mathbf{11.18}$$

$$\sqrt{224} \approx \mathbf{14.96}$$

Approximate the following cube roots to the nearest integer.

35. $\sqrt[3]{490}$

$$\begin{aligned} 7^3 &< \sqrt[3]{490} < 8^3 \\ 343 &< 490 < 512 \end{aligned}$$

$$\sqrt[3]{459} \approx \mathbf{8}$$

36. $\sqrt[3]{(-1,999)}$

$$\begin{aligned} (-12)^3 &> \left(\sqrt[3]{(-1,999)}\right)^3 > (-13)^3 \\ (-1,728) &> (-1,999) > (-2,197) \end{aligned}$$

$$\sqrt[3]{(-1,777)} \approx \mathbf{-13}$$

Evaluate each expression.

37. $\sqrt[3]{(-1,728)} + \sqrt{169} + 11^2$

$$\begin{aligned} &\sqrt[3]{(-1,728)} + \sqrt{169} + 11^2 = \\ &= -12 + 13 + 121 = \\ &= 1 + 121 = \\ &= \mathbf{122} \end{aligned}$$

38. $\left(\sqrt[3]{(-125)} + \sqrt{81}\right) - \sqrt{676}$

$$\begin{aligned} &\left(\sqrt[3]{(-125)} + \sqrt{81}\right) - \sqrt{676} = \\ &= (-5 + 9) - 26 = \\ &= 4 - 26 = \\ &= \mathbf{-22} \end{aligned}$$

Simplify to find the product.

39. $(-a^8) \cdot (3a^4)$

$$\begin{aligned} &(-a^8) \cdot (3a^4) = \\ &= -3a^{8+4} = \\ &= \mathbf{-3a^{12}} \end{aligned}$$

40. $-4a^5b^6 \cdot (-a^{-6}b^{-5})$

$$\begin{aligned} &-4a^5b^6 \cdot (-a^{-6}b^{-5}) = \\ &= (-4 \cdot (-1)) \cdot (a^{5+(-6)}b^{6+(-5)}) = \\ &= 4 \cdot (a^{-1}b) = \\ &= \mathbf{\frac{4b}{a}} \end{aligned}$$

Simplify to find the quotients.

41. $\frac{(5ab)^{-2}}{(2b^{-2})^3}$

42. $\left(\frac{x^{-6}y}{x^{-3}y^{-2}}\right)^{-2}$

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$$\begin{aligned} \frac{(5ab)^{-2}}{(2b^{-2})^3} &= \frac{5^{-2}a^{-2}b^{-2}}{2^3b^{(-2)*3}} = \\ &= \frac{a^{-2}b^{-2}}{8 * 5^2 * b^{-6}} = \\ &= \frac{b^{-2-(-6)}}{8 \cdot 25 \cdot a^2} = \frac{b^{-2+6}}{200 \cdot a^2} \\ &= \frac{b^4}{200a^2} \end{aligned}$$

$$\begin{aligned} \left(\frac{x^{-6}y}{x^{-3}y^{-2}}\right)^{-2} &= (x^{-6-(-3)}y^{1-(-2)})^{-2} = \\ &= (x^{-6+3}y^{1+2})^{-2} = \\ &= (x^{-3}y^3)^{-2} = \\ &= x^{-3*(-2)}y^{3*(-2)} = \\ &= x^6y^{-6} = \\ &= \frac{x^6}{y^6} \end{aligned}$$

Convert each number to scientific notation.

43. 0.00601

$0.00601 = 6.01 \times 10^{-3}$

44. 2,000,000

$2,000,000 = 2 \times 10^6$

45. -2,090

$-2,090 = -2.09 \times 10^3$

46. 0.0000000000000012

$0.0000000000000012 = 1.2 \times 10^{-14}$

Find the sum or difference. Write each answer in scientific notation

47. $(2.5 \times 10^{-2}) - (6 \times 10^2)$

$$\begin{aligned} (2.5 \times 10^{-2}) - (6 \times 10^2) &= \\ = (0.00025 \times 10^2) - (6 \times 10^2) &= \\ = (0.00025 - 6) \times 10^2 &= \\ = -5.99975 \times 10^2 & \end{aligned}$$

48. $7,123 - (4 \times 10^3)$

$$\begin{aligned} 7,123 - (4 \times 10^3) &= \\ = (7.123 \times 10^3) - (4 \times 10^3) &= \\ = (7.123 - 4) \times 10^3 &= \\ = 3.123 \times 10^3 & \end{aligned}$$

Find the product or quotient. Write your answer in scientific notation.

49. $(3.2 \times 10^{-5}) \times (5 \times 10^{-1})$

$$\begin{aligned} (3.2 \times 10^{-5}) \times (5 \times 10^{-1}) &= \\ = (3.2 \times 5) \times 10^{-5+(-1)} &= \\ = 16 \times 10^{-6} &= \\ = 1.6 \times 10^{-5} & \end{aligned}$$

50. $(2 \times 10^6) \div 0.0017$

$$\begin{aligned} (2 \times 10^6) \div 0.0017 &= \\ = (2 \times 10^6) \div (1.7 \times 10^{-3}) &= \\ = (2 \div 1.7) \times 10^{6-(-3)} &= \\ \approx 1.17 \times 10^{6+3} &= \\ \approx 1.17 \times 10^9 & \end{aligned}$$

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Evaluate the expression. Write your answer in scientific notation.

$$\begin{aligned}
 51. \quad & (5,670 + (3.3 \times 10^4)) \times (7.3 \times 10^6) \\
 & (5,670 + (3.3 \times 10^4)) \times (7.3 \times 10^6) = \\
 & = ((0.567 \times 10^4) + (3.3 \times 10^4)) \times (7.3 \times 10^6) = \\
 & = ((0.567 + 3.3) \times 10^4) \times (7.3 \times 10^6) = \\
 & = (3.867 \times 10^4) \times (7.3 \times 10^6) \\
 & = (3.867 \times 7.3) \times 10^{4+6} \\
 & = 2.82291 \times 10^{11} \\
 & = \mathbf{2.82291 \times 10^{11}}
 \end{aligned}$$

$$\begin{aligned}
 52. \quad & \frac{((6 \times 10^{-3}) + (2 \times 10^{-4}))}{(0.045 - (4 \times 10^{-3}))} \\
 & \frac{((6 \times 10^{-3}) + (2 \times 10^{-4}))}{(0.045 - (4 \times 10^{-3}))} = \\
 & = \frac{((6 \times 10^{-3}) + (0.2 \times 10^{-3}))}{(45 \times 10^{-3}) - (4 \times 10^{-3})} = \\
 & = \frac{(6 + 0.2) \times 10^{-3}}{(45 - 4) \times 10^{-3}} = \\
 & = \frac{6.2}{41} \times 10^{-3-(-3)} = \\
 & = \frac{6.2}{41} \times 10^{-3+3} = \\
 & = 0.1513 \times 10^0 = \\
 & = \mathbf{1.513 \times 10^{-1}}
 \end{aligned}$$