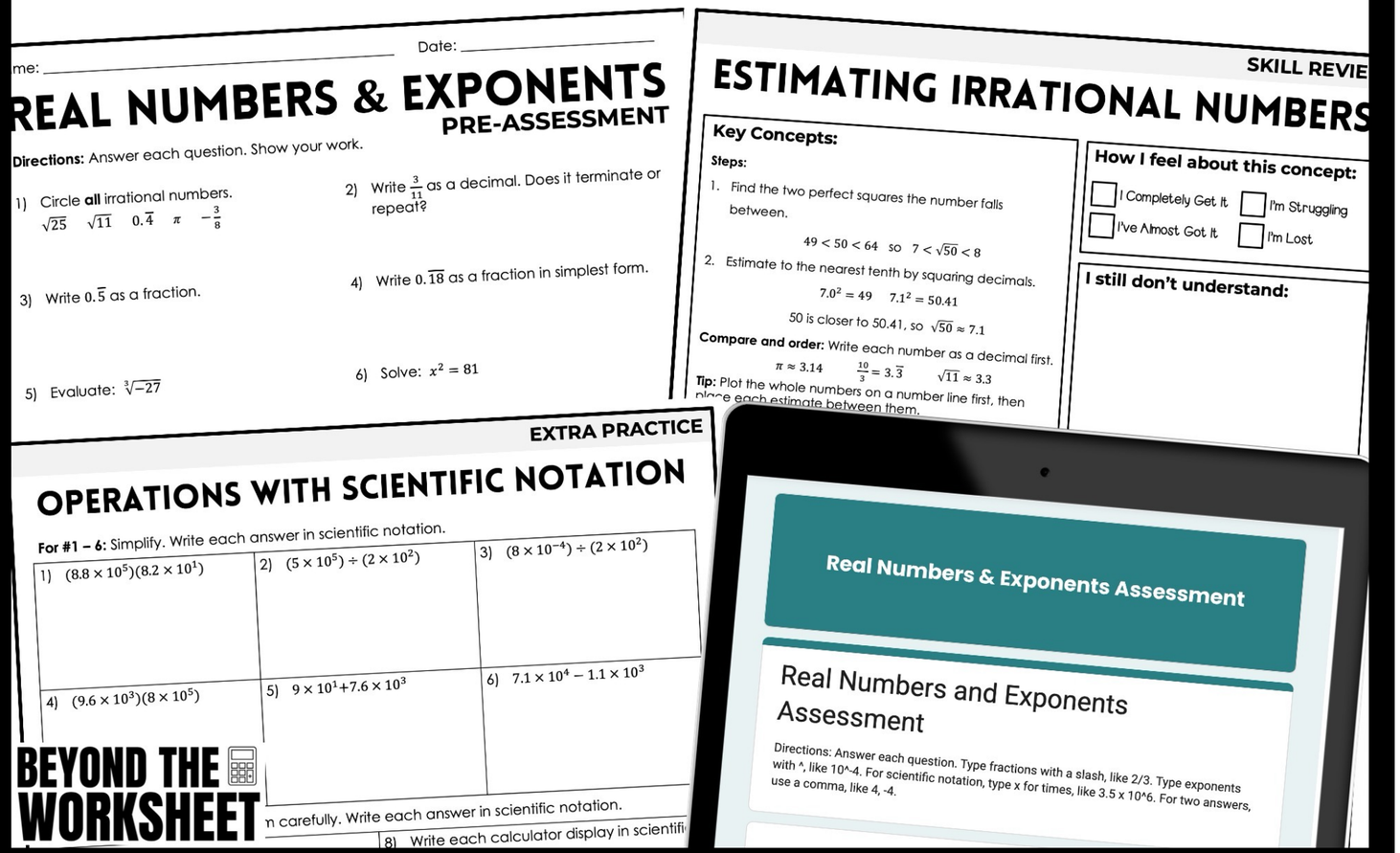
8TH GRADE MATH INTERVENTION UNIT

# REAL NUMBERS & EXPONENTS













BEYOND THE WORKSHEET

PRE + POST ASSESSMENTS • 7 TARGETED SKILLS • ERROR ANALYSIS

**This 8th grade math intervention unit gives you a pre-assessment that pinpoints each student's gap, and short, focused pages to reteach only the skills they missed. It covers real numbers, square and cube roots, integer exponents, and scientific notation.**

learn more!

# WHAT'S INCLUDED:

- **Intervention Planning Sheets**
  Three planning formats are included to help organize intervention groups, targeted skills, and instructional plans.
- **Pre and Post Assessments**
  Use the pre-assessment to identify individual skill gaps and the post-assessment to measure growth after intervention. In print and Google Forms.
- **Skill Review**
  A concise review of the skill with key concepts, guided practice, and a student self-assessment.
- **Extra Practice**
  Additional problems for independent, pairs or small group practice.
- **Error Analysis**
  Students analyze incorrect work, identify the mistake, and determine the correct solution.
- **Progress Tracking**
  Record student performance across the Skill Review, Extra Practice, and Error Analysis pages.
- **Editable Version**
  Adjust wording and problems to perfectly meet your standards or student needs.


| Resource | Pages |
|---|---|
| Resource Details | 2 – 4 |
| Intervention Plan Sheets | 5 – 7 |
| Tracking Sheet for Assessments | 8 |
| Real Numbers & Exponents Pre-Assessment | 9 |
| Real Number System | 10 – 13 |
| Repeating Decimals to Fractions | 14 – 17 |
| Square Roots and Cube Roots | 18 – 21 |
| Estimating Irrational Numbers | 22 – 25 |
| Properties of Integer Exponents | 26 – 29 |
| Scientific Notation and Powers of 10 | 30 – 33 |
| Operations with Scientific Notation | 34 – 37 |
| Real Numbers & Exponents Post-Assessment | 38 |

# PRE & POST ASSESSMENTS

Date: _____

## NUMBERS & EXPONENTS
### PRE-ASSESSMENT

each question. Show your work.

nal numbers.
$\overline{4}$ $\pi$ $-\frac{3}{8}$

fraction.

$\overline{27}$

en which two whole

a positive exponent.
$6^4 \cdot 6^{-6}$

$\frac{2^9}{2^7}$

times as large as $2\times10^2$

2) Write $\frac{3}{11}$ as a decimal. Does it terminate or repeat?

4) Write $0.\overline{18}$ as a fraction in simplest form.

6) Solve: $x^2 = 81$

8) Order from least to greatest:
$\sqrt{10}$ 3.2 $\pi$

10) Simplify: $(2^3)^4$

12) Write 0.000307 in scientific notation.

14) Simplify. Write your answer in scientific notation. $(2.5\times10^3)(4\times10^5)$

Name: _____ Date: _____

## REAL NUMBERS & EXPONENTS
### ASSESSMENT

**Directions:** Answer each question. Show your work.

1) Circle **all** irrational numbers.
$\sqrt{36}$ $\sqrt{19}$ $0.\overline{7}$ $2\pi$ $\frac{5}{9}$

2) Write $\frac{5}{12}$ as a decimal.
Does it terminate or repeat?

3) Write $0.\overline{8}$ as a fraction.

4) Write $0.\overline{36}$ as a fraction in simplest form.

5) Evaluate: $\sqrt[3]{-64}$

6) Solve: $x^2 = 144$

') $\sqrt{90}$ is between which two whole numbers?

8) Order from least to greatest:
$\sqrt{17}$ 4.1 $\frac{17}{4}$

Simplify. Use a positive exponent.
$3^5 \cdot 3^{-7}$

10) Simplify: $(5^2)^3$

) Evaluate: $\frac{15^8}{15^6}$

12) Write 0.00000502 in scientific notation.

How many times as large as $3 \times 10^3$ is $9 \times 10^8$?

14) Simplify. Write your answer in scientific notation. $(5 \times 10^4)(6 \times 10^2)$

PRE AND POST ASSES

NUMBERS & EXPO

| | Pre-Assessment | Post-Assessment | |
|---|---|---|---|
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |

# SKILLS REVIEW PAGES

SKILL REVIEW

## REAL NUMBER SYSTEM

an be written as a fraction $\frac{a}{b}$ where
s and b ≠ 0. As decimals, they
.
cannot be written as a fraction.
never end and never repeat.
de every rational and every

| Examples |
|---|
| 1, 2, 3, ... |
| 0, 1, 2, 3, ... |
| ..., −2, −1, 0, 1, 2, ... |
| $\frac{3}{4}, -5, 0.2, 0.\overline{3}, \sqrt{9}$ |
| $\pi, \sqrt{2}, \sqrt{10}, 0.1010010001...$ |

**How I feel about this concept:**

☐ I Completely Get It ☐ I'm Struggling
☐ I've Almost Got It ☐ I'm Lost

**I still don't understand:**

te $\frac{3}{8}$ as a decimal. Does it
repeat?

2) Divide to write $\frac{5}{6}$ as a decimal. Does it terminate or repeat?

et that −12 belongs to.

4) True or false: Every integer is a rational number. Explain.

SKILL REVIEW

## REPEATING DECIMALS TO FRACTIONS

**Key Concepts:**

- **Terminating decimals:**
  use place value, then simplify.
  $$0.45 = \frac{45}{100} = \frac{9}{20}$$
- **Repeating decimals:**
  1. Let $x$ equal the decimal.
  2. Multiply by 10 if 1 digit repeats. Multiply by 100 if 2 digits repeat.
  3. Subtract to get rid of the repeating part.
  4. Solve for x and simplify.
- **Example:** $0.\overline{4}$

  $x = 0.444...$ $\quad 10x = 4.444...$

  $10x - x = 4$ $\quad 9x = 4$ $\quad x = \frac{4}{9}$

**How I feel about this concept:**

☐ I Completely Get It ☐ I'm Struggling
☐ I've Almost Got It ☐ I'm Lost

**I still don't understand:**

**ractice:**

) Write $0.\overline{6}$ as a fraction in simplest form.
$x = 0.666...$

$10x =$ _____

$9x =$ _____

$x =$ _____

Write 0.35 as a fraction in simplest form.

Write $1.\overline{3}$ as a mixed number.

2) Write $0.\overline{27}$ as a fraction in simplest form.
$x = 0.2727...$

$100x =$ _____

$99x =$ _____

$x =$ _____

4) Which fraction is equal to $0.\overline{8}$?

A) $\frac{8}{10}$ B) $\frac{4}{5}$ C) $\frac{8}{9}$ D) $\frac{9}{8}$

6) Which is greater, $0.\overline{5}$ or 0.55? Explain.

## RE ROOTS AND CUBE

because $5^2 = 5 \cdot 5 = 25$.
1, 4, 9, 16, 25, 36, 49, 64, 81, 100, 121,

ecause $4^3 = 4 \cdot 4 \cdot 4 = 64$.
3, 27, 64, 125, 216, 343, 512, 729, 1,000
**es:**
$\cdot 2)^3 = -8$.

itions: $x = \pm\sqrt{p}$
ition: $x = \sqrt[3]{p}$
a number that is not a perfect
nal.

**How I feel abou**

☐ I Completely Get It
☐ I've Almost Got It

**I still don't unde**

2) $\sqrt[3]{125} =$

4) $\sqrt[3]{-8} =$

# EXTRA PRACTICE

EXTRA PRACTICE

## TING IRRATIONAL NUMBERS

...e two consecutive whole numbers each number falls between.

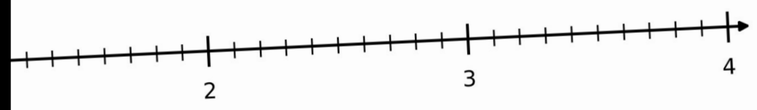
| | | |
|---|---|---|
| 2) $\sqrt{70}$ | 3) $\sqrt{99}$ | 4) $-\sqrt{40}$ |

...e to the nearest tenth. Show your work.

| | |
|---|---|
| 6) $\sqrt{45}$ | 7) $\sqrt{110}$ |

... each problem carefully.

...el $\sqrt{2}$, $\sqrt{7}$, π, and 2.2 on the number line.




| | |
|---|---|
| ...ber is closest to $\sqrt{55}$? | 10) Circle **all** numbers between 6 and 7.<br>$\sqrt{35}$ $\sqrt{38}$ $2\pi$ $\sqrt{49}$ $\frac{13}{2}$ |
| ...arden has an area of 90 | 12) Order from least to greatest: |

EXTRA PRACTICE

## PROPERTIES OF INTEGER EXPONENTS

**For #1 – 6:** Simplify. Write each answer using positive exponents.

| | | |
|---|---|---|
| 1) $5^4 \cdot 5^{-1}$ | 2) $8^2 \cdot 8^5 \cdot 8$ | 3) $\frac{10^{12}}{10^4}$ |
| 4) $\frac{2^3}{2^7}$ | 5) $(6^{-2})^3$ | 6) $(3 \cdot 5)^2$ |

**...or #7 – 8:** Evaluate.

| | |
|---|---|
| ...) $4^{-3}$ | 8) $(-2)^4$ and $-2^4$ |

**...r #9 – 12:** Read each problem carefully.

| | |
|---|---|
| Identify the missing exponent.<br>$3^{?} \cdot 3^4 = 3^{10}$ | 10) Identify the missing exponent.<br>$(7^{?})^3 = 7^{12}$ |
| Circle **all** expressions equal to $2^6$.<br>$2^2 \cdot 2^3$ $(2^3)^2$ $\frac{2^8}{2^2}$ | 12) True or false: $5^3 \cdot 5^2 = 25^5$. Explain. |

E...

## ...ENTIFIC NOTAT...

...ch number in scientific notation.

| | | |
|---|---|---|
| 2) 0.343 | 3) 0.0000043 | 4) |

...ch number in standard form.

| | |
|---|---|
| 6) $6 \times 10^4$ | 7) $1.53 \times 10$ |

...ch problem carefully.

...s written correctly in scientific notation.

$0^3$ $1.2 \times 10^3$ $0.5 \times 10^{-2}$ $9.99 \times 10^{-7}$ $7 \times$

| | |
|---|---|
| ...greatest:<br>$\times 10^{-5}$ $1.1 \times 10^{-3}$ | 10) About 330,000,000 people ... United States. Write this as ... times a power of 10. |
| ...ut $6 \times 10^2$ kilograms. ...ut $2 \times 10^0$ kilograms. ...heavy as the rabbit is | 12) A marble is about $1 \times 10^{-2}$ m... A grain of sand is about $5 \times$ ... wide. How many times as wi... grain of sand is the marble? |

# ERROR ANALYSIS



## ONS WITH SCIENTIFIC NOTATION

the error. Then explain it and solve the problem correctly.

$^{5}) = 18 \times 10^{15}$

2) $(4.8 \times 10^{12}) \div (8 \times 10^{6}) = 6 \times 10^{2}$

$3.2 \times 10^{5})$

$^{3}) + (3{,}200 \times 10^{3})$

$201.3 \times 10^{3}$

4) $(7.2 \times 10^{9}) - (5 \times 10^{8})$

$(7.2 \times 10^{9}) - (50 \times 10^{9})$

$-42.8 \times 10^{9}$

shows 5.6E−4.

56,000.

6) $(2 \times 10^{4}) + (3 \times 10^{4}) = 5 \times 10^{8}$



## SQUARE ROOTS AND CUBE ROOTS

**Directions:** Identify the error. Then explain it and solve the problem correctly.

1) Devon says $\sqrt{36} = 18$ because 18 + 18 = 36.

2) Solve $x^2 = 49$.

$x = \sqrt{49}$

$x = 7$

) Priya says $\sqrt[3]{27} = 9$ because $9 \cdot 3 = 27$.

4) Solve $x^2 = 576$.

$x^2 \div 2 = 576 \div 2$

$x = 288$

Gabe says $\sqrt[3]{-8}$ has no answer because you cannot take the root of a negative number.

6) Zoe wrote $\sqrt{\frac{9}{16}} = \frac{3}{16}$.

E

## 'ING DECIMALS TO FRA

the error. Then explain it and solve the problem correctly

$= \frac{7}{10}$.

2) Nia wrote $0.\overline{36} = \frac{36}{100} =$

ction.

.555 ...

5.555 ...

$x = 5$

$\frac{1}{2}$

$\frac{25}{99}$.

4) Write $0.\overline{12}$ as a fraction.

$x = 0.1212 \ldots$

$10x = 1.212 \ldots$

$9x = 1.09$

$x = \frac{1.09}{9}$

6) Bella wrote $2.\overline{4} = \frac{4}{9}$.

# TEACHER PAGES & ANSWER KEY

**EXTRA PRACTICE**

## REAL NUMBER SYSTEM

ch fraction as a decimal. Tell whether it terminates or repeats.

| | | |
|---|---|---|
| nates | 2) $\frac{2}{9}$ **$0.\overline{2}$; repeats** | 3) $\frac{11}{6}$ **$1.8\overline{3}$; repeats** |

every set each number belongs to.

| | | |
|---|---|---|
| natural / integer / whole / rational / irrational | 5) $\sqrt{64}$ natural / integer / whole / rational / irrational | |
| natural / integer / whole / rational / irrational | 7) $5.\overline{6}$ natural / integer / whole / rational / irrational | |

each problem carefully.

| | |
|---|---|
| onal numbers. $\sqrt{7}$ 0.121212… $\frac{\pi}{2}$ −18 | 9) Which one doesn't belong? Explain. −6 $\frac{14}{2}$ $\sqrt{81}$ $\sqrt{8}$ **$\sqrt{8}$. It is irrational. The others are integers: $-6, \frac{14}{2} = 7, \sqrt{81} = 9$.** |
| etimes, or never? A whole n integer. **Always** | 11) Always, sometimes, or never? The square root of a whole number is irrational. **Sometimes. $\sqrt{4} = 2$ is rational, but $\sqrt{2}$ is irrational.** |

k mark in every set each number belongs to.

| Number | Whole | Integer | Rational | Irrational |
|---|---|---|---|---|
| | | ✓ | ✓ | |

**8TH GRADE MATH INTERVENTION PROGRAM**

**Resource:** 8th Grade Math Intervention Unit 1 – Real Numbers and Exponents

**Suggested Class Time:** 30 minutes at a time as needed

**The Big Idea**

- This unit provides **targeted intervention and additional practice** with real numbers, square and cube roots, integer exponents, and scientific notation. Each skill review also revisits the earlier skills students need, such as dividing to write fractions as decimals, perfect squares, and powers of ten.
- Use the pre-assessment to identify specific skill gaps, then assign only the skill pages students need. The materials work best in **teacher-led small groups**, but the Extra Practice and Error Analysis pages can also be used for independent practice, partner work, reteaching, or progress monitoring.

**Each skill comes with:**

- **Skill Review**
  A concise review of the skill with key concepts, guided practice, and a student self-assessment.
- **Extra Practice**
  Additional problems students can complete independently, with a partner, or as continued small-group practice.
- **Error Analysis**
  Students analyze incorrect work, identify the mistake, and determine the correct solution. This provides an opportunity to uncover misconceptions that may not be obvious from a correct/incorrect answer alone.
- **Progress Tracking**
  Record student performance across the Skill Review, Extra Practice, and Error Analysis pages to monitor growth and determine next steps.

**lso included:**

**Pre- & Post-Assessments**
Use the pre-assessment to identify individual skill gaps and the post-assessment to measure growth after intervention. Print and Google Forms versions are included.

**Intervention Planning Sheets**
Three planning formats are included to help organize intervention groups, targeted skills, and instructional plans. These can also be used to communicate plans with interventionists, assistants, or other support staff.

**GGESTED INTERVENTION FLOW**
Assess → 2. Identify Skill Gaps → 3. Review & Reteach → 4. Practice → 5. Analyze Errors → 6. Reassess

**ndards (CCSS)**
8.NS.1, 8.NS.2, 8.EE.1, 8.EE.2, 8.EE.3, 8.EE.4
Gap skills reviewed: 5.NBT.2, 6.EE.1, 7.NS.2d

**Progression**

| equisite Skills | Skills Addressed in This Unit | Skills Students Will Build Toward |
|---|---|---|
| ividing to write fractions as | • Real number system | • Simplifying radicals |

**8TH GRADE MATH INTERVE**

**eptions & Teaching Tips**

**SYSTEM**
nts calling any decimal that "goes on forever" irrational
quare root symbol is irrational.
dents divide or simplify first. Repeating decimals and roo

**LS TO FRACTIONS**
nts writing 0.7 repeating as 7/10, or multiplying by 10 whe

repeating digits first. One digit means multiply by 10; tw

**JBE ROOTS**
ts dividing by 2 or 3 instead of finding a root, and giving

ents check each root by multiplying. Ask, "What else tim

**IAL NUMBERS**
finding the perfect squares (784 and 841) but not their
nts write the inequality with perfect squares, then take th

**R EXPONENTS**
multiplying exponents when multiplying powers, or thinki
e number negative.
nts write out the factors ($3^2 \cdot 3^3 = 3 \cdot 3 \cdot 3 \cdot 3 \cdot 3$) until the rules

reating the exponent as the number of zeros, or compa
irst digit.
ponents first. Have students write both numbers in stand

**NTIFIC NOTATION**
dding without matching exponents, or leaving answers
then check that the final decimal is at least 1 and less th