

Fraction Decimal Detectives

Build models, show equivalence, justify order

GRADE 5 • 5.NS.1

5.NS.1 "The student will use reasoning and justification to identify and represent equivalency between fractions (with denominators that are thirds, eighths, and factors of 100) and decimals; and compare and order sets of fractions (proper..."

NAME _____

DATE _____

BUILD UNDERSTANDING

Use fraction strips or tiles divided into thirds and eighths, with equal-size wholes. Also use 100 counters as one whole. Match them to the printed models; dark parts are shaded. A decimal names part of one whole. Three dots mean the digit repeats forever: $0.333... = 1/3$ exactly. A terminating 0.333 is only an approximation. Use place value and benchmarks when comparing.

WORKED EXAMPLE

Use eight equal eighth-pieces to make a whole. Cover seven of them. Match the printed model and write the shaded fraction as a decimal.

1. The model has 7 of 8 equal parts shaded.
2. 7 divided by 8 = 0.875.

Answer: $7/8 = 0.875$.

Seven eighths



Whole = 1; dark = shaded

PRACTICE 4 problems

- 1** Build both printed amounts with fraction tiles or strips: $5/8$ and $2/3$ of a whole. Match the models, then write both decimals. Explain why the decimal for thirds repeats.

Five eighths



Whole = 1; dark = shaded

Two thirds



Whole = 1; dark = shaded

- 2** Use concrete fraction pieces to model 0.375 and 0.333... (3 repeats forever). Shade each matching blank strip. Write the two equivalent fractions and explain the shaded-part counts.

Model 0.375



Whole strip = 1

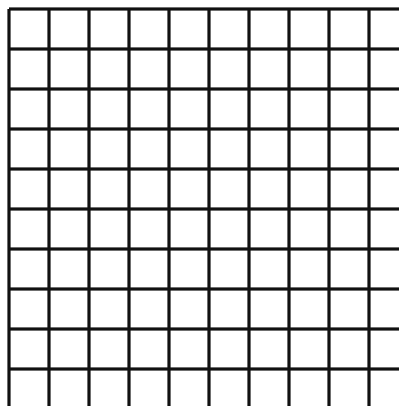
Model 0.333...



Whole strip = 1

- 3** Use 100 counters as one whole. Separate 45 counters to model 0.45, then shade the matching hundred grid. Write equivalent fractions with denominators 100 and 20. Explain how groups of five counters help.

Shade your decimal model



Whole grid = 1

- 4** Compare $\frac{2}{3}$ and 0.68 using $<$, $>$ or $=$. Then decide whether $\frac{13}{20}$ equals 0.65. Justify each comparison with an equivalent decimal or fraction.

APPLY IT Show your work

- 1** Three ribbons measure $1\frac{1}{4}$ m, 1.09 m and $\frac{13}{12}$ m. Order them from least to greatest. Use both the benchmark 1 and decimal place value to explain.

- 2** Two devices download the same-sized update: one is $\frac{5}{6}$ finished and the other 0.81 finished. Which has completed more? Explain to a partner, then write a decimal comparison.

CHALLENGE One step up

Order $\frac{5}{12}$, 0.42, $\frac{2}{3}$ and 0.6 from greatest to least. Justify using the benchmark $\frac{1}{2}$ to form groups, then decimal place value within each group.

Provide actual fraction pieces or folded strips for the worked example and Practice 1-2. Observe concrete models and the student's corresponding shaded pictures. Each whole must stay the same size. Thirds repeat indefinitely; do not mark 0.333 or 0.667 as exactly equal to a third or two thirds. Check the 45 selected counters, 45 shaded cells and 9 groups of 5 in Practice 3. Accept equivalent justified comparison strategies.

PRACTICE 1

$5/8 = 0.625$. $2/3 = 0.666...$ with 6 repeating forever. Dividing 2 by 3 keeps leaving remainder 2; a finite string of sixes is not exact.

PRACTICE 2

$0.375 = 3/8$: shade 3 of the 8 equal parts. $0.333... = 1/3$: shade 1 of the 3 equal parts. Each strip is one whole.

PRACTICE 3

Shade exactly 45 of 100 cells. $0.45 = 45/100 = 9/20$. Each group of 5 cells is $5/100 = 1/20$; 45 cells make 9 such groups.

PRACTICE 4

$2/3 < 0.68$ because $0.666... < 0.680$. $13/20 = 65/100 = 0.65$, so they are equal.

APPLY IT 1

13/12, 1.09, 1 1/4. All exceed 1; their excesses are $1/12 = 0.0833...$, 0.09 and 0.25. Thus $1.0833... < 1.090 < 1.250$.

Accept equivalent correct reasoning with the stated units and evidence.

APPLY IT 2

The 5/6 device has completed more: $5/6 = 0.8333... > 0.810$. Require an oral explanation and written comparison.

Accept equivalent correct reasoning with the stated units and evidence.

CHALLENGE

$2/3$, 0.6, 0.42, $5/12$. The first two exceed $1/2$ and $0.666... > 0.600$. The last two are below $1/2$ and $0.420 > 0.41666...$