

Decimal Sense Studio: From Grids to Reasoning

6 complete activities from Decimal Sense Studio, each with a worked answer.



ones	tenths	hundredths
0	7	5

HOW TO USE

1. Read the situation and the evidence first.
2. Show your thinking in the work boxes, not only an answer.
3. Explain how you know your answer makes sense.
4. Try the new problem at the bottom of the page.

6 activities • 4 answer pages • From the 32-activity collection

11 US Letter pages • Print at 100% / Actual Size

Original Bobotemp educational printable • Fictional names, places and prices

Name _____ Date _____

Grid Garden

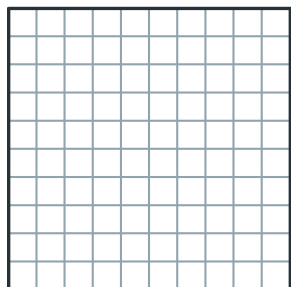
LEVEL 1



Use the 10-by-10 grids. Each small square is one hundredth of the whole grid.

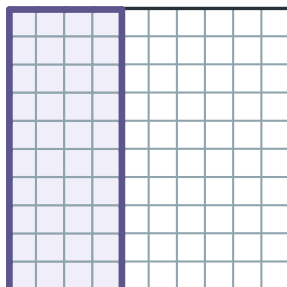
Grid A has 3 full columns shaded, plus 7 more single squares. A full column has 10 squares. What decimal names the shaded part of Grid A? Write it as a fraction too. Next, look at two more grids. Grid B has 4 full columns shaded. Grid C has 40 single squares shaded. Do Grid B and Grid C show the same amount?

GRID A (SHADE IT)



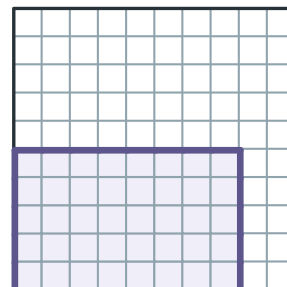
1 square = 0.01

GRID B: 4 FULL COLUMNS



1 column = 10 squares = 0.1

GRID C: 40 SINGLE SQUARES



1 whole grid = 100 squares

1. Shade Grid A, then write its decimal and fraction.

2. Write the decimal for Grid B and for Grid C.

3. Explain why 0.4 and 0.40 cover the same area.

TRY IT • A grid has 6 full columns and 2 extra squares shaded. Write the decimal and the fraction.

Name _____ Date _____

LEVEL 1

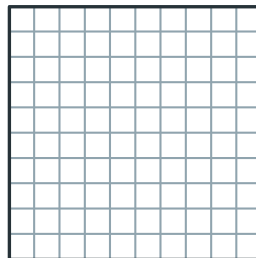


Read each clue. Cross out any card that does not fit the clue.

Six cards are on the table: $\frac{6}{100}$, $\frac{60}{100}$, 0.60, $\frac{600}{1000}$, 0.06, and 6. Use the clues to find the one mystery card. Clue 1: It names the same amount as $\frac{6}{10}$. Clue 2: It is written as a fraction. Clue 3: Its denominator is 100.

SHADE TO PROVE

Candidate	Clue 1	Clue 2	Clue 3
6/100			
60/100			
0.60			
600/1000			
0.06			
6			



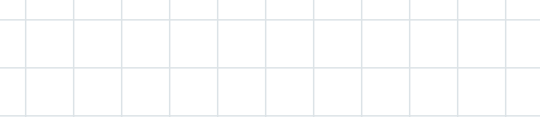
- $6/10 = 6$ tenths
- 1 tenth = 10 hundredths
- 1 hundredth = 10 thousandths
- Cards: $6/100$, $60/100$, 0.60 , $600/1000$, 0.06 , 6

1. List the cards that pass Clue 1.

[illegible]

2. Cross out the cards that fail Clue 2 or Clue 3.

3. Name the mystery card, then shade the blank grid to prove it equals 0.6.

A large rectangular area filled with a light gray grid, intended for drawing a picture. The grid consists of 10 columns and 10 rows.

TRY IT • Which two of these name 0.3: $\frac{3}{100}$, $\frac{30}{100}$, $\frac{300}{1000}$, 0.03?

Zoom Lens Number Lines



Name _____ Date _____

LEVEL 2



Rewrite each decimal with three decimal places (in thousandths) before you compare.

Five runners wear decimal number bibs: 0.093, 0.3, 0.309, 0.39, and 0.039. First, line the bibs up from least to greatest. Then find the mystery bib. Clue 1: It is greater than 0.3. Clue 2: It is less than 0.35. Clue 3: It has a 9 in the thousandths place.

BIBS

Candidate	3 decimal places	Clue 1	Clue 2	Clue 3
0.093				
0.3				
0.309				
0.39				
0.039				

EVIDENCE TO USE

- Rewrite each bib with three decimal places
- $0.3 = 0.300$
- $0.39 = 0.390$
- Compare tenths, then hundredths, then thousandths

1. Rewrite all five bibs in thousandths.

[illegible]

2. Order the bibs from least to greatest.

3. Use the clues to name the mystery bib.

TRY IT • Order from greatest to least: 0.7, 0.077, 0.707, 0.77.

Name _____ Date _____

LEVEL 3



All prices are fictional samples for a class planning task. Show your work in cents.

A class has a sample supply budget of \$20.00. The plan is to buy 3 glue sticks at \$1.25 each, 2 rulers at \$2.40 each, and 1 pack of paper for \$6.85. How much money will be left? The class also wants a \$4.75 set of colored pencils. Can they afford it with the money that is left? If not, how much more would they need?

SAMPLE SUPPLY PLAN	
3 glue sticks at \$1.25	?
2 rulers at \$2.40	?
1 pack of paper	\$6.85
Budget	\$20.00
Left	?

EVIDENCE TO USE

- All prices are fictional samples
- Budget: \$20.00
- Glue sticks: \$1.25 each, need 3
- Rulers: \$2.40 each, need 2
- Paper: \$6.85, need 1
- Colored pencil set: \$4.75

1. Find the cost of each item group in cents.

[illegible]

2. Find how much is left from the \$20.00 budget.

[illegible]

3. Decide whether the pencil set fits the budget, and explain.

TRY IT • A club has a \$10.00 budget. It buys 4 folders at \$0.85 each and 1 stapler at \$3.99. How much money is left?

Name _____ Date _____

Area Model Products

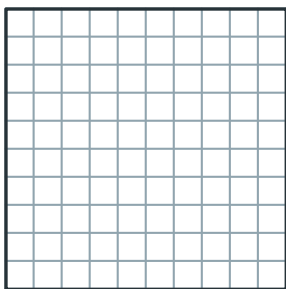
LEVEL 3



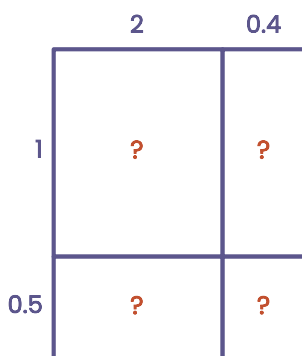
Draw a rectangle and split each side by place value. Label every part.

Warm-up: Use a hundredths grid to show 0.3×0.4 . Main task: A rectangle on grid paper measures 1.5 units by 2.4 units. Split each side by place value, so $1.5 = 1 + 0.5$ and $2.4 = 2 + 0.4$. Find the area of each of the 4 parts, then add the parts to find the whole area.

WARM-UP GRID



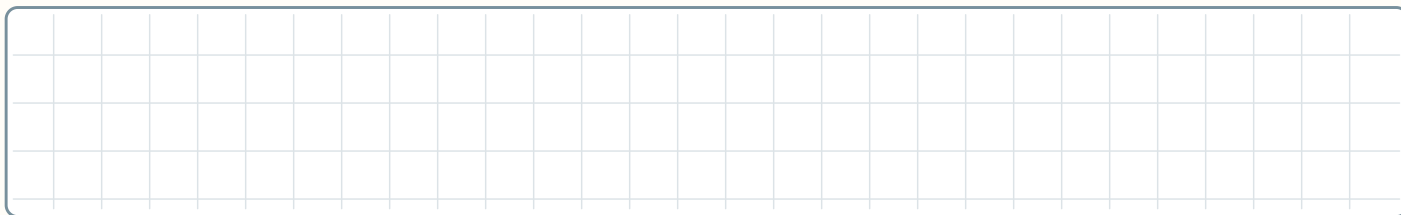
1.5×2.4 (NOT TO SCALE)



EVIDENCE TO USE

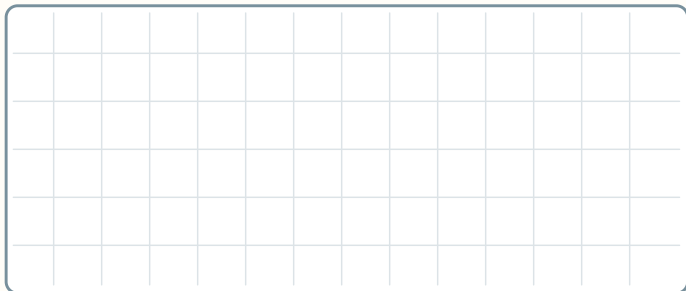
- Warm-up: 0.3×0.4 on a 10-by-10 grid
- Side lengths: 1.5 and 2.4
- $1.5 = 1 + 0.5$
- $2.4 = 2 + 0.4$
- tenths $\times$ tenths = hundredths

1. Shade 0.3×0.4 on a grid and name the overlap.



2. Find the four partial products for 1.5×2.4 .

3. Add the parts, then check with an estimate.



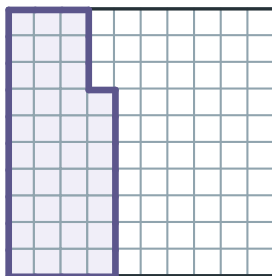
TRY IT • Find 2.5×1.2 by adding the four partial products of an area model.

1. Grid Garden

LEVEL 1

Grid A shows 0.37, or $37/100$, because $0.3 + 0.07 = 0.37$. Grids B and C both shade 40 squares, so $0.4 = 0.40 = 40/100$.

GRID A SHADED: 37 SQUARES = 0.37



WORKED REASONING • 3 columns are 3 tenths, which is 0.3 or 30 squares. The 7 extra squares are 7 hundredths, or 0.07. Together that is $30 + 7 = 37$ squares out of 100, so $0.3 + 0.07 = 0.37 = 37/100$. Grid B shows 4 columns, which is 4 tenths, or 0.4. Grid C shows 40 squares, which is 40 hundredths, or 0.40. Both grids cover 40 of the 100 squares, so $0.4 = 0.40$. Estimate check: 37 squares is a little more than one third of the grid, so 0.37 is reasonable.

WATCH FOR • Some students record the columns and the squares as separate digits and put them in the wrong places, writing 0.307 or 3.7. Others think 0.40 is bigger than 0.4 because it has more digits. The grids show that both cover the same area.

TRANSFER • $0.62 = 62/100$

2. Same Amount, Different Names

LEVEL 1

The mystery card is $60/100$.

WORKED REASONING • $6/10$ means 6 tenths. Each tenth is 10 hundredths, so 6 tenths = 60 hundredths = $60/100 = 0.60$. Each hundredth is 10 thousandths, so $6/10$ also equals $600/1000$. Clue 1 keeps $60/100$, 0.60 , and $600/1000$. Of those, Clue 2 keeps the fractions $60/100$ and $600/1000$, so 0.60 is crossed out. Clue 3 keeps only $60/100$, because $600/1000$ has a denominator of 1000. Only $60/100$ passes all three clues. On a hundredths grid, 6 full columns make 60 squares.

WATCH FOR • Some students think $6/100$ equals $6/10$ because both show a 6. But $6/100$ is only 6 small squares, which is one tenth as much as $6/10$.

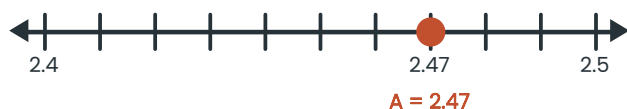
TRANSFER • $30/100$ and $300/1000$

11. Zoom Lens Number Lines

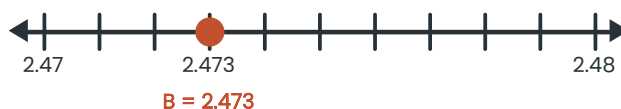
LEVEL 2

A = 2.47 and B = 2.473, because $2.47 + 0.003 = 2.473$.

LINE 1: EACH TICK 0.01



LINE 2: EACH TICK 0.001



WORKED REASONING • Line 1 spans 0.1, split into 10 spaces, so each space is 0.01. Seven spaces past 2.4 is A = 2.47. Line 2 spans from 2.47 to 2.48, a distance of 0.01, split into 10 spaces of 0.001 each. Three spaces past 2.47 is B = $2.47 + 0.003 = 2.473$. In expanded form, $B = 2 + 0.4 + 0.07 + 0.003$. Check: 2.473 is between 2.47 and 2.48, closer to 2.47.

WATCH FOR • Some students reuse Line 1's space value and treat each space on Line 2 as a hundredth, so they name B as $2.47 + 0.03 = 2.50$. Others count 3 hundredths from 2.4 instead of from A and write 2.43. Find the value of one space before naming a point: each zoom makes the spaces one tenth as large.

TRANSFER • 0.368

12. Order the Lineup

LEVEL 2

Order from least to greatest: 0.039, 0.093, 0.3, 0.309, 0.39. The mystery bib is 0.309.

WORKED REASONING • In thousandths, the bibs are $0.093 = 93$ thousandths, $0.300 = 300$ thousandths, $0.309 = 309$ thousandths, $0.390 = 390$ thousandths, and $0.039 = 39$ thousandths. (In Question 1, accept 0.093 or 93 thousandths.) Since $39 < 93 < 300 < 309 < 390$ thousandths, the order is 0.039, 0.093, 0.3, 0.309, 0.39. Clue 1 keeps 0.309 and 0.39. Clue 2 keeps 0.039, 0.093, 0.3, and 0.309. Clue 3 keeps 0.309 and 0.039. Only 0.309 passes all three clues.

WATCH FOR • Students who think 'longer is larger' put 0.3 first and put 0.309 or 0.093 last. Adding zeros so every number has the same number of places makes the comparison fair.

TRANSFER • 0.77, 0.707, 0.7, 0.077

21. Budget Planner

LEVEL 3

\$4.60 (460 cents) is left. The \$4.75 pencil set does not fit; the class would need 15 more cents.

WORKED REASONING • Glue sticks: $3 \times 125 = 375$ cents. Rulers: $2 \times 240 = 480$ cents. Paper: 685 cents. Total: $375 + 480 + 685 = 1540$ cents, or \$15.40. Money left: $2000 - 1540 = 460$ cents, or \$4.60. The pencils cost 475 cents, and $475 - 460 = 15$, so the class is 15 cents short. Estimate check: about $4 + 5 + 7 = 16$ dollars spent leaves about 4 dollars, so \$4.60 is reasonable.

WATCH FOR • Some students count each item only once ($1.25 + 2.40 + 6.85 = 10.50$) and forget the quantities. Others round \$4.60 up and say the pencils fit. Exact cents decide whether a budget works.

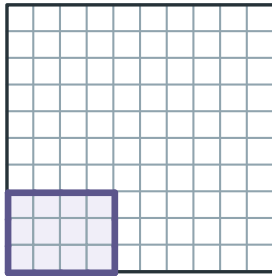
TRANSFER • \$2.61

22. Area Model Products

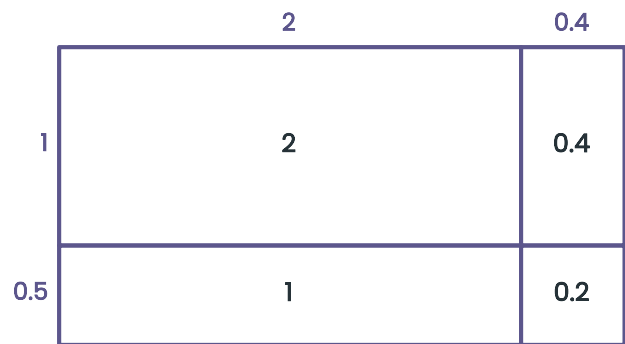
LEVEL 3

$1.5 \times 2.4 = 3.6$, so the area is 3.6 square units. (Warm-up: $0.3 \times 0.4 = 0.12$.)

WARM-UP: $0.3 \times 0.4 = 12$ SQUARES = 0.12



$1.5 \times 2.4 = 3.6$ SQUARE UNITS



WORKED REASONING • Warm-up: shading 3 tenths one way and 4 tenths the other way makes an overlap of 12 small squares, so $0.3 \times 0.4 = 0.12$. Main task: $1 \times 2 = 2$, $1 \times 0.4 = 0.4$, $0.5 \times 2 = 1$, and $0.5 \times 0.4 = 0.20$. The sum is $2 + 0.4 + 1 + 0.2 = 3.6$ (3.60 is also accepted). Estimate check: 1.5×2.4 must be between $1 \times 2 = 2$ and $2 \times 3 = 6$. Also, half of 2.4 is 1.2, and $2.4 + 1.2 = 3.6$.

WATCH FOR • Some students write $0.3 \times 0.4 = 1.2$. Others get $1.5 \times 2.4 = 2.20$ by multiplying only matching places (1×2 and 0.5×0.4). The area model shows all four partial products.

TRANSFER • 3. The partial products are $2 + 0.4 + 0.5 + 0.1 = 3$.