

# Fraction Crusher

PLAYER AND EDUCATOR MANUAL

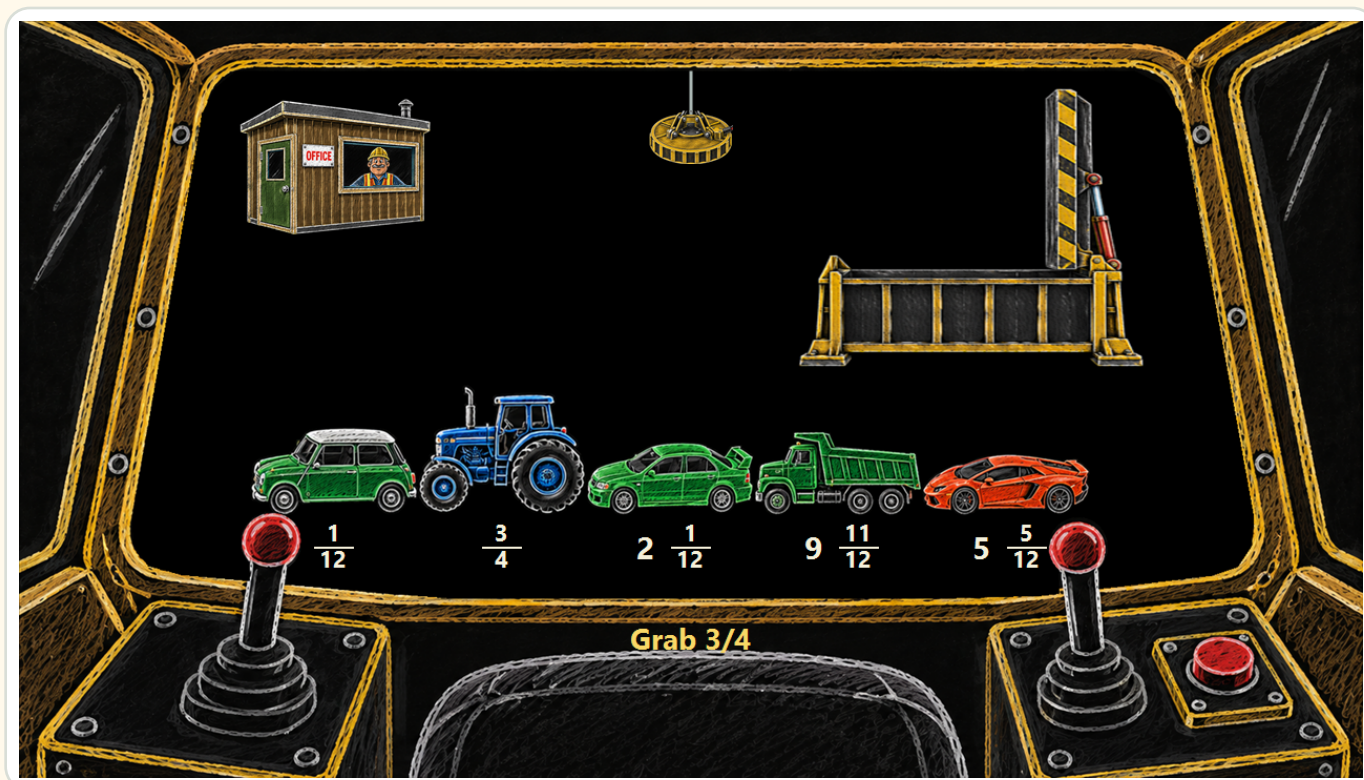


## Read the fraction. Plan the lift.

A colorful guide for players, parents, teachers, and educators.  
Recognize amounts, compare choices, and build solutions - one vehicle at a time.

# Your first lift

Five vehicles. One question. Read carefully, then let the crane do the hauling.



Actual game-rendered view: the question appears on the lower cab dashboard.

- 1 Start FractionCrusher.exe. The title screen lasts two seconds.
- 2 Choose a menu option with 1-9, the numeric keypad, or a click. After five seconds without a choice, Default starts.
- 3 Read the two-second speech bubble, then the dashboard question. Move the magnet over a vehicle and press Space or left-click.

## FIND YOUR WAY

Controls 3 | Modes 4 | Play & feedback 5-6 | Fraction ideas 7-10  
Progression 11 | Summary 12 | Worksheets 13 | Learning together 14

## Two ways to operate the crane

Keyboard and mouse can be used during the same game. Delivery is automatic after pickup.

### KEYBOARD

Arrow keys: move left, right, up, and down.

Space: collect the vehicle beneath the magnet;  
advance an explanation page.

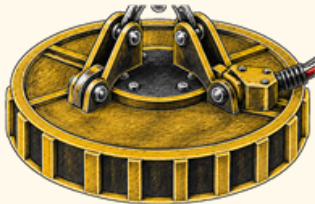
Escape: close the application.

### MOUSE

Move: position the magnet.

Left-click: try a pickup, select a menu line, or press  
a tutorial button.

Click the dashboard button to advance a tutorial.  
Clicking elsewhere does not advance it.



### Line up the whole magnet

The magnet must fit horizontally over the vehicle. It snaps to the lifting point when collected. Its vertical range stays between the upper windscreen and the vehicle roofs.

### Resizing and black bars

The view stays 16:9. In top or bottom letterbox bars, mouse movement still controls left/right; in side bars, it controls up/down. Keep the pointer inside the window. Click menu lines inside the game area.

# A broad journey or one focused skill

Default introduces new ideas through progression. Options 2-9 each provide ten minutes in one skill group.

**1****Default**

Progressive play; see the milestones on page 11.

**2****Fraction Recognition**

One vehicle matching the amount named by "Grab".

**3****Comparison**

The largest or smallest displayed amount.

**4****Classification**

An improper fraction or a mixed number.

**5****Equivalence**

One equal fraction, or two equivalent fractions.

**6****Addition**

Two amounts totaling 1 or another whole number.

**7****Mixed Number Addition**

Two amounts totaling a specified mixed number.

**8****Subtraction**

Two mixed numbers with a stated proper-fraction difference.

**9****Multi-Addend Reasoning**

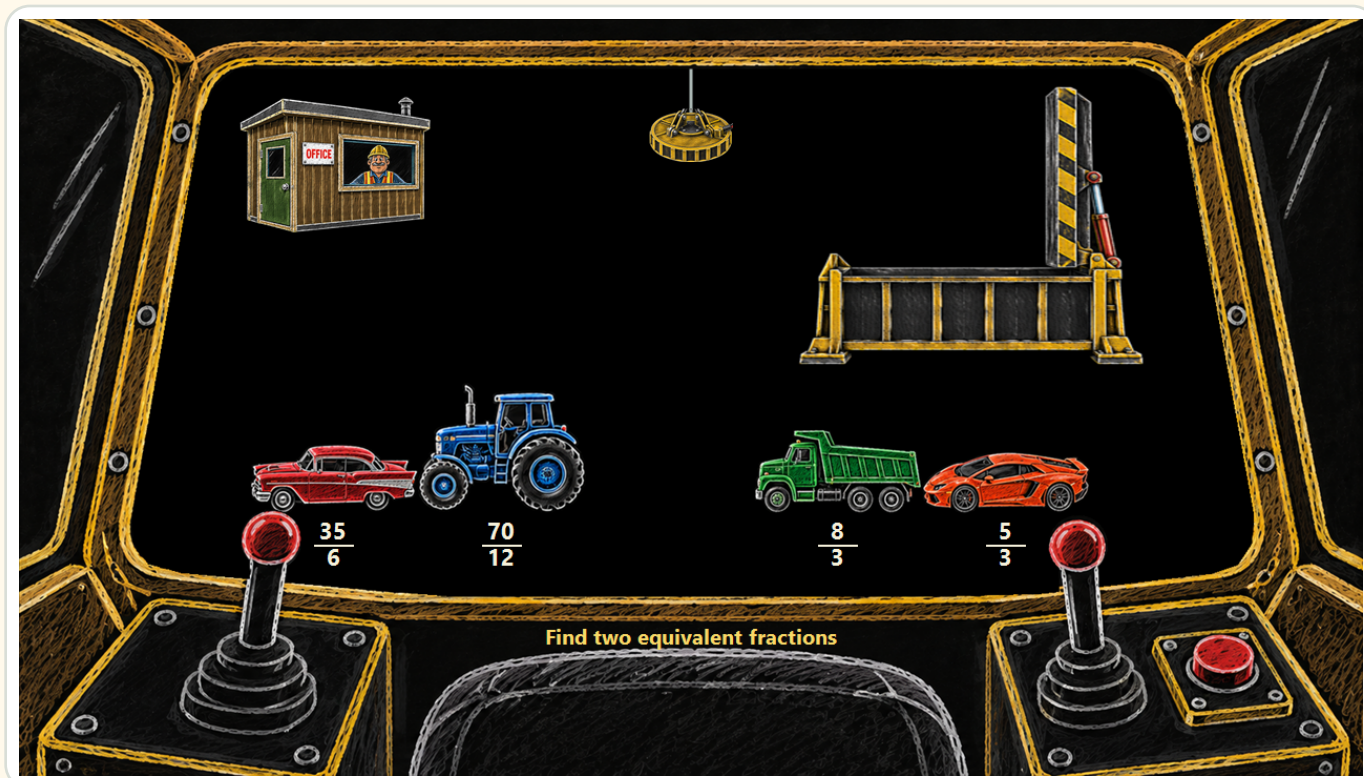
Three amounts with a requested total.

**What the ten-minute clock includes**

Instructions, movement, feedback, and tutorials use active window time. Switching away or minimizing pauses play. Skill modes do not stop at ten errors. A boss explanation already in progress can finish after time expires.

## Read, plan, collect

The speech bubble lasts two seconds. Pickup becomes available after it moves to the dashboard.



Pair and triple questions stay visible during collection, including the automatic deliveries.

- 1 Read the task. Decide whether it needs one vehicle, a pair, or three vehicles.
- 2 Collect one vehicle. Move the magnet over it, then press Space or click. Wait for its automatic delivery.
- 3 Complete the group. Choose another vehicle when needed. Selection order does not matter; each vehicle can be used only once.

### Watch the labels

Fraction labels remain until the last required pickup, then hide during feedback. Single-vehicle questions disappear on pickup; pair and triple questions remain through collection. New problems receive fresh choices.

# A mistake can start a conversation

Correct solutions close the crusher. The forklift collects the block and leaves before the next question starts.



Use the highlighted dashboard button or Space to advance the three explanation pages.

## When a choice is incorrect

The lid stays open. The boss leaves the office, throws his hat, and reacts. The tutorial explains the choice and the fraction rule. Read at your own pace before advancing.

## When time runs out

Ordinary play ends at ten minutes. An active boss reaction or explanation continues. The final button becomes View summary; it does not start another question.

## DEFAULT EXCEPTION

The tenth cumulative incorrect answer ends Default immediately, without another boss tutorial. Pair and triple problems each count as one problem.

## Equal parts, different written forms

The denominator tells how many equal parts make a whole. The numerator tells how many parts are counted.

**3/4: three of four equal parts**



Use equal parts and the same-sized whole when comparing amounts.

### PROPER FRACTION

$\frac{3}{4}$

The numerator is smaller than the denominator. The amount is less than one.

### IMPROPER FRACTION

$\frac{5}{4}$

The numerator is at least as large as the denominator. It is written as one fraction.

### MIXED NUMBER

$1 \frac{1}{4}$

A whole-number part beside a proper fraction. A whole number alone is not mixed.

### Same value does not mean the same form

$\frac{5}{4}$  and  $1 \frac{1}{4}$  name the same amount. Classification asks how the amount is written. Choose the single improper fraction or the mixed-number form requested.

### The amounts used in this game

Values run from  $\frac{1}{12}$  through  $9 \frac{11}{12}$  in steps of  $\frac{1}{12}$ . They are usually simplified:  $\frac{6}{12}$  appears as  $\frac{1}{2}$ . Whole numbers also appear. Equivalence questions intentionally use different names for equal amounts.

# Change the name, keep the amount

A common denominator makes the parts the same size. Then compare the number of parts.

$$\frac{2}{3} = \frac{8}{12}$$



$$\frac{3}{4} = \frac{9}{12}$$



Nine twelfths is greater than eight twelfths, so  $\frac{3}{4}$  is larger.

## Find the largest or smallest

Compare whole-number parts first when useful. Then compare fractional parts with a common denominator. A larger denominator alone does not make a larger fraction:  $\frac{1}{12}$  is smaller than  $\frac{1}{3}$ .

$$\frac{1}{2} = \frac{2}{4} = \frac{6}{12}$$

Multiply or divide BOTH numerator and denominator by the same nonzero number.

## Two kinds of equivalence questions

Find the fraction equal to ... asks for one matching amount.

Find two equivalent fractions asks for two vehicles with equal values, even though the fractions look different.

## Make the parts the same size

Use a common denominator. Add or subtract numerators; keep the denominator.

### ADD A PAIR

$$1/3 + 1/4 = 4/12 + 3/12 = 7/12$$

Do not add the denominators. They describe the size of the parts.



4 blue parts + 3 yellow parts = 7 of the 12 equal parts

### ADD TO A MIXED TOTAL

$$1 \frac{1}{2} + 2 \frac{1}{4} = 18/12 + 27/12 = 45/12 = 3 \frac{3}{4}$$

Mixed Number Addition names the target total. Both selected choices do not have to be mixed numbers.

### FIND A DIFFERENCE

$$2 \frac{1}{4} - 1 \frac{1}{2} = 27/12 - 18/12 = 9/12 = 3/4$$

The game uses the larger amount minus the smaller. Pickup order does not matter. Subtraction choices are mixed numbers and the target is a proper fraction.

## Plan a group of three

Choose three different vehicles whose amounts total the requested proper fraction, whole number, or mixed number.



**$\frac{1}{4}$**



**$\frac{1}{3}$**



**$\frac{5}{12}$**

$$\frac{1}{4} + \frac{1}{3} + \frac{5}{12} = \frac{3}{12} + \frac{4}{12} + \frac{5}{12} = 1$$

- 1 Try a pair. Here,  $\frac{1}{4} + \frac{1}{3}$  makes  $\frac{7}{12}$ .
- 2 Find the missing amount. To reach 1, we need  $\frac{12}{12} - \frac{7}{12} = \frac{5}{12}$ .
- 3 Check all three. Confirm the total before the final pickup. The crusher waits until the complete group has arrived.

### Use the question as a reminder

Pair and triple prompts stay on the dashboard while the magnet works. Talk through the target and your intended choices before lifting. If a combination fails, use the tutorial to check the entire group.

## New ideas join the question mix

Default has no ten-minute limit. These milestones introduce new question types; earlier eligible types remain in the mix.

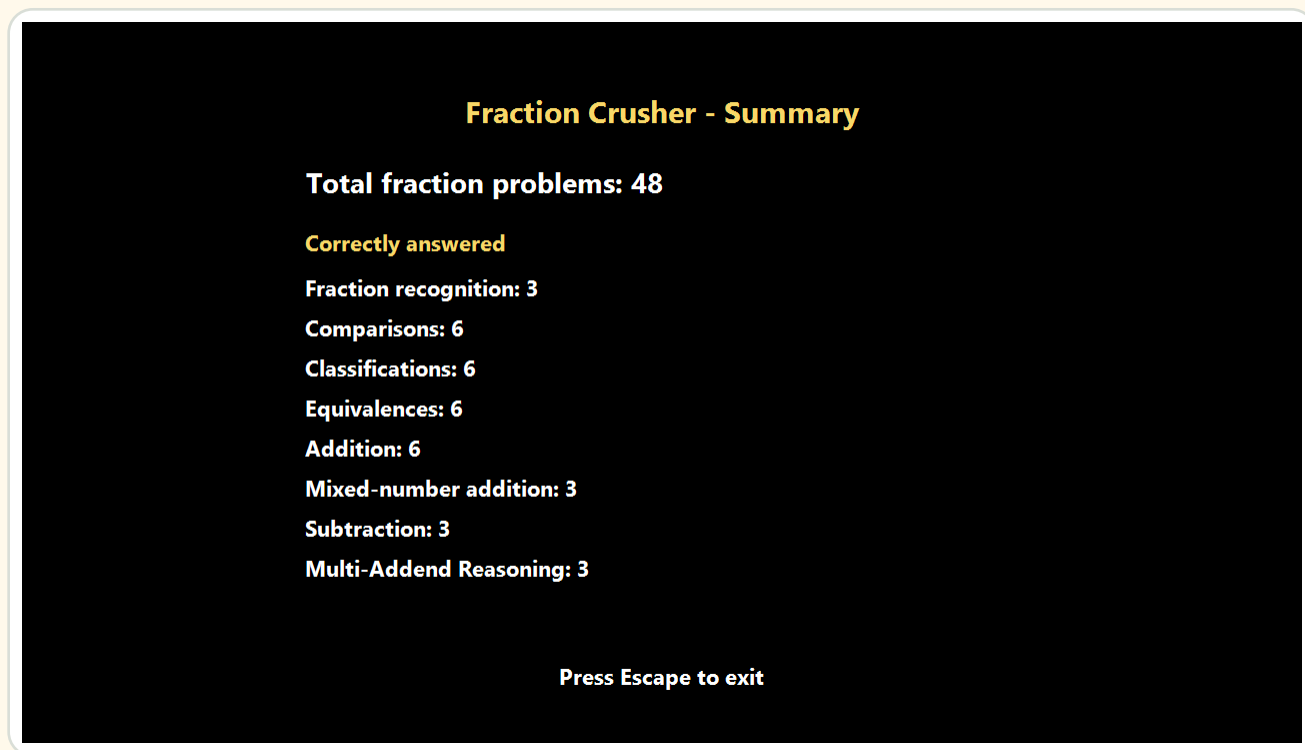
- 1 Recognition to comparison**  
 3 correct recognition answers introduce largest/smallest questions.
- 2 Comparison to classification**  
 2 correct largest and 2 correct smallest answers, then 3 more completed review problems (right or wrong).
- 3 Classification to mixed review**  
 Only improper and mixed identification until each is correct twice; then the first five types mix. After 3 more correct answers, equal-fraction questions join.
- 4 Equivalence to addition**  
 2 correct equal-fraction answers introduce equivalent pairs. 3 correct pair answers introduce totals of 1.
- 5 Addition targets change**  
 3 correct total-1 answers switch to other whole totals. 3 correct whole-total answers switch to mixed totals; each replaces the previous addition target type.
- 6 Subtraction to three addends**  
 1 correct mixed-total answer introduces subtraction. 3 correct subtraction answers introduce three-addend questions.
- 7 The final stretch**  
 10 further completed problems of any eligible type end the session, whether correct or incorrect.

### TEN ERRORS END DEFAULT

Errors are cumulative across skills. New or error-prone types tend to appear more often, but selection is random. History lasts only for the current session; it is not a saved student profile.

## Read the results with care

The total includes completed correct and incorrect problems. A pair or triple counts once, not once per vehicle.



Example summary from the game. Counts shown here are demonstration data.

### Eight skill groups

Recognition; comparisons; classifications; equivalences; addition to 1 or other whole totals; mixed-number addition; subtraction; and Multi-Addend Reasoning.

### What an omitted group means

Groups with zero correct answers are omitted. A missing group may be unattempted or may have no correct attempts. Separate incorrect counts are not displayed.

### Finish, talk, or play again

Use the results as a conversation starter, not a diagnosis or mastery test. Press Escape to close the application. Launch it again for a fresh session and another menu choice. Timed modes exclude any unresolved problem at expiry.

# Take the fractions to paper

The worksheet generator offers the same eight skills, with five shuffled choices per question.

- 1 After the title screen, press W or w while the opening menu is visible, before its five-second timeout. This option stays hidden in the app menu.
- 2 Choose 10 or 20 questions and one skill. The worksheet mode has no menu timeout.
- 3 Choose Generate PDF, then a save location. The two-page PDF always puts the answer key on its own page.

Name: \_\_\_\_\_ Date: \_\_\_\_\_

**Fraction Crusher**  
Equivalence  
Circle the fraction or fractions that answer each question.

|                                                                                     |                                      |                  |                 |                  |                  |                  |                                                                                       |
|-------------------------------------------------------------------------------------|--------------------------------------|------------------|-----------------|------------------|------------------|------------------|---------------------------------------------------------------------------------------|
|    | 1. Find two equivalent fractions     | $\frac{34}{6}$   | $\frac{35}{4}$  | $\frac{29}{4}$   | $\frac{17}{3}$   | $\frac{47}{12}$  |    |
|    | 2. Find two equivalent fractions     | $\frac{17}{12}$  | $\frac{14}{3}$  | $\frac{226}{24}$ | $\frac{55}{6}$   | $\frac{113}{12}$ |    |
|    | 3. Find the fraction equal to 94/24  | $\frac{35}{6}$   | $\frac{37}{4}$  | $\frac{91}{12}$  | $\frac{47}{12}$  | $\frac{5}{12}$   |    |
|    | 4. Find two equivalent fractions     | $\frac{29}{6}$   | $\frac{25}{4}$  | $\frac{7}{3}$    | $\frac{49}{6}$   | $\frac{14}{6}$   |    |
|    | 5. Find two equivalent fractions     | $\frac{194}{24}$ | $\frac{39}{4}$  | $\frac{95}{12}$  | $\frac{19}{6}$   | $\frac{97}{12}$  |    |
|    | 6. Find two equivalent fractions     | $\frac{27}{4}$   | $\frac{4}{3}$   | $\frac{54}{8}$   | $\frac{113}{12}$ | $\frac{26}{3}$   |    |
|  | 7. Find two equivalent fractions     | $\frac{65}{12}$  | $\frac{38}{4}$  | $\frac{7}{4}$    | $\frac{13}{2}$   | $\frac{19}{2}$   |  |
|  | 8. Find the fraction equal to 110/12 | $\frac{61}{12}$  | $\frac{55}{6}$  | $\frac{28}{3}$   | $\frac{97}{12}$  | $\frac{113}{12}$ |  |
|  | 9. Find the fraction equal to 22/8   | $\frac{49}{12}$  | $\frac{55}{12}$ | $\frac{22}{3}$   | $\frac{17}{4}$   | $\frac{11}{4}$   |  |
|  | 10. Find two equivalent fractions    | $\frac{61}{12}$  | $\frac{19}{4}$  | $\frac{43}{6}$   | $\frac{122}{24}$ | $\frac{71}{12}$  |  |

Worksheet - Page 1 of 2

Actual generated worksheet

## Student page and answer key

Children circle one, two, or three choices. Boss sprites mark questions; cars decorate the margins. Page 2 repeats the questions with correct choices circled. Print page 1 for learners and retain page 2 for checking.

## Keep practicing

Ten questions use one column; twenty use two. Save more sheets without restarting. Canceling Save returns to the controls. Back to menu restarts the five-second timeout. If already playing, relaunch the app to access W.

# Let the reasoning lead

For players, families, teachers, and educators: build understanding around the action, not just a score.

## BEFORE PLAY

Build an example with equal-sized fraction strips or a number line. Ask what the numerator and denominator mean. Choose one focused skill if a broad progression would be distracting.

## DURING PLAY

Ask the learner to name the target and explain a choice. A partner can operate the crane while the learner reasons. Switch away from the game to pause the timed session for discussion.

## QUESTIONS WORTH ASKING

Can you write both amounts in twelfths?  
Are we comparing values or identifying a written form?  
Why do these two fractions name the same amount?  
How much more do we need to reach the total?  
Does the complete group answer the question?

## AFTER PLAY

Draw or write one remembered solution. Revisit an error without rushing. Use a worksheet for quieter practice. The game is focused practice, not a complete fraction curriculum or a standardized assessment.

## ABOUT FRACTION CRUSHER

Written by Levi Abbott. The opening credits cite inspiration from MECC's 1987 Crusher for Apple IIE. This guide follows manual.txt and the current Windows game. Artwork and screenshots come from Fraction Crusher; fraction diagrams were generated for this manual.