

# Excess & Shortage — Practice

CKSTEM Math Problem Solving · Grades 4–7

## 1 LEFTOVER-OVER-GAP

A teacher is packing snack bags for a field trip. If she fills 3 bags, 4 crackers are left over. If she fills 5 bags, the crackers fit exactly. How many crackers go in each bag?

WORK IT OUT HERE

## 2 LEFTOVER-OVER-GAP

A baker is loading muffins onto serving trays. If she loads 4 trays, 9 muffins are left over. If she loads 7 trays, the muffins fit exactly. How many muffins go on each tray?

WORK IT OUT HERE

## 3 LEFTOVER-OVER-GAP

A librarian is restocking books onto shelves. If she fills 6 shelves, 24 books are left over. If she fills 9 shelves, the books fit exactly. How many books go on each shelf?

WORK IT OUT HERE

**4** SHORTAGE-OVER-GAP

A teacher is setting plates for a class lunch. If she sets 7 plates, she is 4 sandwiches short. If she sets 5 plates, the sandwiches fit exactly. How many sandwiches go on each plate?

WORK IT OUT HERE

**5** SHORTAGE-OVER-GAP

A florist is filling vases with tulips. If she fills 9 vases, she is 12 tulips short. If she fills 6 vases, the tulips fit exactly. How many tulips go in each vase?

WORK IT OUT HERE

**6** SHORTAGE-OVER-GAP

A cook is filling jars with olives. If he fills 12 jars, he is 15 olives short. If he fills 7 jars, the olives fit exactly. How many olives go in each jar?

WORK IT OUT HERE

**7** SWING = EXCESS + SHORTAGE

A baker is filling small bags with muffins for a community breakfast. If she fills 3 bags, 5 muffins are left over. If she fills 5 bags, she is 1 muffin short. How many muffins are there altogether?

WORK IT OUT HERE

**8** SWING = EXCESS + SHORTAGE

A farmer is packing apples into baskets for the food bank. If he fills 4 baskets, 8 apples are left over. If he fills 7 baskets, he is 4 apples short. How many apples are there altogether?

WORK IT OUT HERE

**9** SWING = EXCESS + SHORTAGE

A volunteer is loading donated coats into shipping crates. If she loads 6 crates, 18 coats are left over. If she loads 10 crates, she is 6 coats short. How many coats are there altogether?

WORK IT OUT HERE

**10** DIFFERENCE OF LEFTOVERS

A teacher is packing pencil boxes for a homework club. If she fills 4 boxes, 14 pencils are left over. If she fills 6 boxes, 4 pencils are left over. How many pencils are there altogether?

WORK IT OUT HERE

**11** DIFFERENCE OF LEFTOVERS

A coach is loading water bottles onto trays for a tournament. If he loads 5 trays, 21 bottles are left over. If he loads 8 trays, 6 bottles are left over. How many bottles are there altogether?

WORK IT OUT HERE

**12** DIFFERENCE OF LEFTOVERS

A volunteer is bundling notebooks for a school giveaway. If she makes 6 bundles, 27 notebooks are left over. If she makes 9 bundles, 3 notebooks are left over. How many notebooks are there altogether?

WORK IT OUT HERE

**13** MATCH GROUPS FIRST, THEN BRIDGE

A baker is plating cookies for a charity tea. If she uses 4 plates, 12 cookies are left over. If she uses 6 plates with 1 more cookie on each plate than before, they fit exactly. How many cookies are there altogether?

WORK IT OUT HERE

**14** MATCH GROUPS FIRST, THEN BRIDGE

A florist is filling vases at a wedding hall. If she uses 3 vases, 16 roses are left over. If she uses 5 vases with 2 more roses in each vase than before, they fit exactly. How many roses are there altogether?

WORK IT OUT HERE

**15** MATCH GROUPS FIRST, THEN BRIDGE

A teacher is packing markers into pencil cases for art class. If she uses 4 cases, 24 markers are left over. If she uses 8 cases with 1 more marker in each case than before, they fit exactly. How many markers are there altogether?

WORK IT OUT HERE

**16** TIME-SAVED = SPEED BRIDGE

Theo cycles from home to his volunteer shift at the library. If he cycles at 30 metres per minute, he arrives 5 minutes late. If he cycles at 50 metres per minute, he arrives 1 minute late. How far is the library from his home?

WORK IT OUT HERE

**17** TIME-SAVED = SPEED BRIDGE

Ava walks from school to a senior centre for a reading-buddy visit. If she walks at 40 metres per minute, she arrives 9 minutes late. If she walks at 60 metres per minute, she arrives 1 minute late. How far is the senior centre from her school?

WORK IT OUT HERE

**18** TIME-SAVED = SPEED BRIDGE

Lin jogs from home to a community garden to help water plants. If she jogs at 50 metres per minute, she arrives 12 minutes late. If she jogs at 80 metres per minute, she arrives 3 minutes late. How far is the garden from her home?

WORK IT OUT HERE

## Answer Key

Each answer comes with a hint that names the move. The tag says which video to rewatch if you are stuck.

**1. 2 crackers per bag (and 10 crackers altogether).** — *Leftover-Over-Gap*

Both plans share the same pile of crackers; the 4 leftovers from the smaller plan must fill the 2 extra bags in the larger plan.

**2. 3 muffins per tray (and 21 muffins altogether).** — *Leftover-Over-Gap*

The 9 leftover muffins from the smaller plan have to fill the 3 extra trays in the larger plan.

**3. 8 books per shelf (and 72 books altogether).** — *Leftover-Over-Gap*

The 24 leftover books from the smaller plan must fill the 3 extra shelves in the larger plan.

**4. 2 sandwiches per plate (and 10 sandwiches altogether).** — *Shortage-Over-Gap*

The 4 sandwiches she runs short by must be the extra she would need to fill the 2 extra plates in the bigger plan.

**5. 4 tulips per vase (and 24 tulips altogether).** — *Shortage-Over-Gap*

The shortage equals what the extra vases in the bigger plan would need — set "shortage = (extra vases)  $\times$  (per-vase amount)" and solve for the per-vase amount.

**6. 3 olives per jar (and 21 olives altogether).** — *Shortage-Over-Gap*

The 15 missing olives equal the extra he would need for the 5 extra jars in the bigger plan.

**7. 14 muffins altogether (3 per bag).** — *Swing = Excess + Shortage*

Add the leftover and the shortage — that swing equals the per-bag amount times the gap of 2 bags; once you have the per-bag amount, count the muffins from either plan.

**8. 24 apples altogether (4 per basket).** — *Swing = Excess + Shortage*

Add the leftover and the shortage to get the swing; divide that swing by the 3-basket gap to find the per-basket amount.

**9. 54 coats altogether (6 per crate).** — *Swing = Excess + Shortage*

The swing is leftover plus shortage; divide that swing by the gap in crates to get the per-crate amount, then count the coats from either plan.

**10. 34 pencils altogether (5 per box).** — *Difference of Leftovers*

Subtract the smaller leftover from the bigger leftover; that difference filled the 2 extra boxes in the bigger plan, so divide it by 2 to find the per-box amount.

**11. 46 bottles altogether (5 per tray).** — *Difference of Leftovers*

Take the difference between the two leftover piles; that difference fills the 3 extra trays in the bigger plan, so divide by 3 to get the per-tray amount.

**12. 75 notebooks altogether (8 per bundle).** — *Difference of Leftovers*

Subtract the small leftover from the big leftover; that difference filled the 3 extra bundles in the bigger plan, so divide by 3 to find the per-bundle amount.

**13. 24 cookies altogether (3 per plate in the small plan).** — *Match Groups First, Then Bridge*

In the bigger plan each plate gets 1 more cookie — that absorbed offset spread over the bigger plan's plates must come out of the 12 leftovers. The rest fills the extra plates at the original per-plate amount.

**14. 25 roses altogether (3 per vase in the small plan).** — *Match Groups First, Then Bridge*

The bigger plan adds 2 more roses per vase — that absorbed offset across its 5 vases comes out of the 16 leftovers; whatever remains fills the 2 extra vases at the original per-vase amount.

**15. 40 markers altogether (4 per case in the small plan).** — *Match Groups First, Then Bridge*

Each case in the bigger plan holds 1 more marker — that absorbed offset across all 8 cases comes out of the 24 leftovers; what remains fills the 4 extra cases at the original per-case amount.

**16. 300 metres (his scheduled cycling time is 5 minutes).** — *Time-Saved = Speed Bridge*

The distance is the same in both plans, so the time he saves at the faster speed ( $5 - 1 = 4$  minutes) is the bridge — multiply the two speeds, then by that time saved, then divide by the speed gap.

**17. 960 metres (her scheduled walking time is 15 minutes).** — *Time-Saved = Speed Bridge*

The distance is fixed across both plans; the 8 minutes she saves by going faster is the time-saved bridge — multiply both speeds and that saved time, then divide by the speed gap.

**18. 1200 metres (her scheduled jogging time is 12 minutes).** — *Time-Saved = Speed Bridge*

Same distance, different speeds — the 9 minutes she saves at the faster speed is the bridge; multiply both speeds and that saved time, then divide by the speed gap.