Unit 3: Ratios, Rates & Percents — Bicycle Sprockets, Supermarket Aisles & Field Surveys

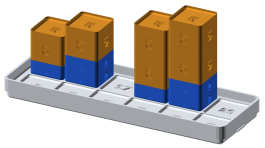
Ratios & Tape Diagrams, Ratio Tables, Unit Rates, Percents, Discounts & Unit Conversions

Devon always wondered why pedaling his mountain bike uphill felt impossible in high gear, while shifting to low gear made his feet spin fast and easy. Flipping his bike upside down in the driveway, he counted 48 spiky teeth on the front pedal sprocket and 16 teeth on the back wheel sprocket. Because each link of the metal chain grabs one tooth at a time, pulling 48 front teeth forward forces the 16-tooth back gear to spin around three full times! One turn of Devon's feet spins the rear tire three times—trading harder pedal push for triple the speed.

That same day, Priya was at the grocery store buying granola bars for the robotics club and felt stuck in front of the shelf. Box A had 6 bars for $4.50, while Box B had 10 bars for $7.00. At first she thought the $4.50 box had to be the better deal simply because $4.50 is smaller than $7.00, until she wondered if she was paying more per bar without realizing it.

Over at the wildlife center, Zoe had a similar comparison problem: how do you fairly compare 17 out of 20 gigabytes used on a field tablet, 9 out of 25 penalty kicks made on the soccer field, and 21 out of 24 counting questions answered by an African grey parrot when every total is different?

Whether Devon is comparing bike gears, Priya is stretching the club snack budget, or Zoe is scaling scores to a 0-to-100 percent meter, all three of them learn how ratios, unit rates, and percents let you compare almost anything fairly—and how to check every ratio, unit rate, and percent change on the SC-6.



Real-World Mathematical Context & Two-Method Mastery • Hands-On Models: Prime Factor, Fraction & Place Value Blocks

UNIT 3 LESSONS — LEARN TWO TEXTBOOK WAYS FIRST, THEN CHECK YOUR WORK ON THE SC-6 CALCULATOR

SEC 3.1 (pp.26-27) Ratios and Tape Diagrams

Textbook Ways: Way 1: Tape Diagram (Equal Boxes) | Way 2: Equivalent Ratio Fraction | Way 3: Divide by GCF

Learn by Hand: A ratio compares two quantities (a to b, a:b, or a/b). On the Prime Factor Towers Ratio Lid, Back Row sockets A1..A6 and Front Row sockets B1..B5 act as a physical Tape Diagram: placing the same Prime Block tower (GCF) into each occupied socket gives every box the exact same unit value, while removing shared GCF prime blocks from A1 and B1 reduces any ratio to simplest form.

Check Your Work on the SC-6 Calculator:

[1] [2] [ENTER] [8] [g] [a:b]

Press 12 [ENTER] 8 [g][a:b] to simplify directly to 3:2 (and tap [10F] to view the Ratio Table)!

SEC 3.2 (pp.28-29) Using Ratio Tables and Double Number Lines

Textbook Ways: Way 1: Multiplicative Scale Factor (Prime Blocks) | Way 2: Double Number Line / Repeated Addition | Way 3: Scale Down Then Up

Learn by Hand: Columns 1–5 of the Prime Factor Towers lid pair sockets (A1, B1) through (A5, B5) as a physical 5-column Ratio Table. Because Prime Factor blocks are logarithmic, stacking the exact same Prime Block ([2], [3], or [5]) onto both Row A and Row B multiplies both terms by that factor, while removing a shared Prime Block scales both terms down!

Check Your Work on the SC-6 Calculator:

[8] [g] [REP] [+] [+] [+] [+]

Enter 3 [ENTER] 8 [g][a:b] and press [10F] to step through the Ratio Table (or repeat steps with [g][REP]) to verify 15 to 40!

SEC 3.3 (pp.30-31) Rates, Unit Rates, and Comparing Rates

Textbook Ways: Way 1: Divide to Find the Unit Rate (1 Unit) | Way 2: Common Multiple Comparison | Way 3: Double Number Line

Learn by Hand: A rate compares two quantities measured in different units (such as miles and hours). A unit rate gives the amount per 1 unit of the second quantity (divide numerator ÷ denominator). Comparing unit prices shows which package is the better buy.

Check Your Work on the SC-6 Calculator:

[3] [1] [5] [ENTER] [5] [÷]

Press 315 [ENTER] 5 [÷] to confirm 63 words per minute.

SEC 3.4 (pp.32-33) Percents, Fractions, and Decimals

Textbook Ways: Way 1: Equivalent Fraction over 100 | Way 2: Divide Numerator ÷ Denominator | Way 3: Percent Bar / Benchmark Model

Learn by Hand: 'Percent' (%) means 'per hundred' or 'out of 100.' Any fraction, decimal, or percent can be converted into the other two forms: scale the denominator to 100 (or divide numerator ÷ denominator and multiply by 100%). To find p% of a whole w, multiply (p/100) × w.

Check Your Work on the SC-6 Calculator:

[.] [7] [.] [2] [0] [ENTER] [FDISP] [1] [0] [0] [×]

Type [.] 7 [.] 20 [ENTER] [FDISP] to see 0.35, and press [f][→%] (or 100 [×]) to confirm 35%.

SEC 3.5 (pp.34-35) Solving Percent Problems, Discounts & Conversions

Textbook Ways: Way 1: Find Discount & Subtract | Way 2: Multiply by Remaining % | Way 3: Percent Proportion / Ratio Bar

Learn by Hand: In Big Ideas Math, you can find a discounted sale price in two ways: (1) find the discount amount and subtract it from the original price, or (2) subtract the discount percent from 100% first and multiply! For percent change, divide (Change ÷ Original Amount) × 100%. For unit conversions, multiply by a conversion factor so the old units cancel.

Check Your Work on the SC-6 Calculator:

[6] [0] [ENTER] [2] [5] [%] [-]

Type 60 [ENTER] 25 [%] (which computes 25% of 60 = $15 while keeping 60 on Y!) and press [-] to get the $45 sale price.

HANDS-ON MODEL: PRIME FACTOR TOWERS

Section 3.1 — Practice A: Ratios and Tape Diagrams

Key Vocabulary: ratio • part-to-part ratio • part-to-whole ratio • equivalent ratios • tape diagram

Name: _____ Date: _____ Score: ____ / 100

TEXTBOOK CONCEPT & HANDS-ON MODEL (PRIME FACTOR TOWERS)

Ratio Tape Diagram on Lid (A1..A3 vs. B1..B2): |2||2| = 4 per Socket

Row A (A1..A3): [2][2]=4 [2][2]=4 [2][2]=4 = 12 Builders ([2][2][3])

Row B (B1..B2): [2][2]=4 [2][2]=4 = 8 Program ([2][2][2])

Remove shared GCF [2][2]=4 → Part-to-Part = 3:2 | Part-to-Whole = 3:5 (5 sockets)

HOW THE TEXTBOOK & VISUAL MODEL WORK TOGETHER:

Textbook Concept: A ratio compares two quantities as a to b, a:b, or a/b. Distinguish Part-to-Part (3:2) from Part-to-Whole (3:5).

Textbook Visual Model (Tape Diagram): Draw equal-sized boxes for each ratio part so every box represents the same unit amount.

WATCH OUT: Order matters in ratios! Check whether the question asks for Part-to-Part (3:2) or Part-to-Whole (3:5).

WORKED EXAMPLE — 3 TEXTBOOK WAYS (ANY 2 WAYS = +20 PTS)

Problem: A robotics team has 12 builders and 8 programmers. Write the simplified Part-to-Part and Part-to-Whole ratios.

WAY 1: Divide Both Terms by Their GCF (Prime Tower Reduction)

Build 12 = [2][2][3] in A1 and 8 = [2][2][2] in B1. Remove shared GCF = [2][2] = 4 → [3] : [2] (3:2). Total = 12+8 = 20 → Part-to-Whole = 3:5.

WAY 2: Tape Diagram Model (A1..A3 & B1..B2 Sockets)

Place a |2||2| = 4 prime tower in each socket: 12 fills 3 sockets (A1..A3) and 8 fills 2 sockets (B1..B2, 5 total) → Part-to-Part = 3:2; Part-to-Whole = 3:5.

WAY 3: Equivalent Ratio Table

Remove one [2] block at a time: (12, 8, 20) ÷ 2 → (6, 4, 10) ÷ 2 → (3, 2, 5).

Answer: Part-to-Part = 3:2; Part-to-Whole = 3:5

CHECK YOUR WORK ON THE SC-6 CALCULATOR — SECTION 3.1 PRACTICE A (SOLVE BY HAND FIRST, THEN VERIFY!)

Worked Example SC-6 Check Keystrokes:

1 2 ENTER 8 g a:b

Model 12 to 8 with Prime Blocks ([2][2]=4 in A1..A3 and B1..B2) on paper first, then check on your SC-6: Press 12 [ENTER] 8 [g][a:b] to simplify directly to 3:2 (and tap [10F] to view the Ratio Table)!

SECTION 3.1 PRACTICE A — KEY IDEAS & MULTI-METHOD PRACTICE

100-PT GOAL: Any 5 in 2 Ways (+20) OR All 10 in 1 Way (+10)!

1 **Write the ratio 12 : 18 in simplest form.**

Starter Step 1: Find the Greatest Common Factor (GCF) of 12 and 18, then divide both terms of the ratio by that GCF.

Way 1 (Paper Work):

Divide Both Terms by GCF:

GCF = ___ → ___ : ___

WARM-UP • [ ] +10 (1 Way) [ ] +20 (2 Ways) **Ans:** _____

2 **Write the ratio 24 : 16 in simplest form.**

Starter Step 1: Find the Greatest Common Factor (GCF) of 24 and 16, then divide both terms of the ratio by that GCF.

Way 1 (Paper Work):

Divide Both Terms by GCF:

GCF = ___ → ___ : ___

WARM-UP • [ ] +10 (1 Way) [ ] +20 (2 Ways) **Ans:** _____

3 **A pouch holds 4 red marbles and 6 blue marbles. Find the simplified ratio of red marbles to total marbles.**

Way 1 (Paper Work):

Tape Model:

CORE • [ ] +10 (1 Way) [ ] +20 (2 Ways) **Ans:** _____

4 **In a 3:4 tape diagram, each box represents 6 items. Find the two parts and the total.**

Way 1 (Paper Work):

Tape Model:

CORE • [ ] +10 (1 Way) [ ] +20 (2 Ways) **Ans:** _____

5 **Living-Wall Hydroponic Reservoir: Nutrient solution mixes 2 parts plant concentrate with 15 parts water. How many liters of concentrate and water are in a 34-liter tank?**

Way 1 (Show Paper Steps):

Way 2 (2nd Method / Check):

CORE • [ ] +10 (1 Way) [ ] +20 (2 Ways) **Ans:** _____

6 **The ratio of cats to dogs at an animal shelter is 4:5. If there are 36 animals in all, how many are dogs?**

Way 1 (Show Paper Steps):

Way 2 (2nd Method / Check):

CORE • [ ] +10 (1 Way) [ ] +20 (2 Ways) **Ans:** _____

7 **The ratio of sixth graders to seventh graders in a chess club is 3:5. If there are 15 sixth graders, how many seventh graders are in the club?**

Way 1 (Show Paper Steps):

Way 2 (2nd Method / Check):

CORE • [ ] +10 (1 Way) [ ] +20 (2 Ways) **Ans:** _____

8 **The ratio of acoustic guitars to electric guitars in a music shop is 2:5. There are 18 more electric guitars than acoustic guitars. How many electric guitars are there?**

Way 1 (Show Paper Steps):

Way 2 (2nd Method / Check):

CORE • [ ] +10 (1 Way) [ ] +20 (2 Ways) **Ans:** _____

9 **Robotics Wheel Split: Two robotics squads split 84 wheels in a 4:3 ratio. How many wheels does each squad receive?**

Way 1 (Show Paper Steps):

Way 2 (2nd Method / Check):

CHALLENGE • [ ] +10 (1 Way) [ ] +20 (2 Ways) **Ans:** _____

10 **The ratio of gold coins to silver coins in a chest is 7:4. If there are 21 more gold coins than silver coins, how many coins are in the chest in all?**

Way 1 (Show Paper Steps):

Way 2 (2nd Method / Check):

CHALLENGE • [ ] +10 (1 Way) [ ] +20 (2 Ways) **Ans:** _____

HANDS-ON MODEL: PRIME FACTOR TOWERS

Section 3.1 — Practice B: Modeling Real Life (Ratios and Tape Diagrams)

Textbook Ways: Tape Diagram (Equal Boxes) | Equivalent Ratio Fraction | Divide by GCF Name: _____ Date: _____ Score: ____ / 100

WORKED EXAMPLE — TEAM WIN-LOSS RATIO (3 TEXTBOOK WAYS • ANY 2 = +20 PTS)

Problem: A robotics team's ratio of wins to losses is 5:3. If the team played 32 matches in all, how many matches did they win?

WAY 1: Tape Diagram on Lid (A1..A5 vs. B1..B3)
Use 5 Win sockets (A1..A5) and 3 Loss sockets (B1..B3) = 8 sockets total. Each socket holds 32 ÷ 8 = 4 = [2][2] matches. Wins = 5 × 4 = 20 matches.

WAY 2: Scale the Part-to-Whole Ratio
Wins to Total is 5 to (5 + 3) = 5/8. Stack [2][2] = 4 onto both: (5 × 4)/(8 × 4) = 20/32 → 20 wins.

WAY 3: Repeated Addition Ratio Table
(Wins, Losses, Total): (5, 3, 8) → (10, 6, 16) → (15, 9, 24) → (20, 12, 32) → 20 wins.

WATCH OUT: Order matters in ratios! Check whether the question asks for Part-to-Part (3:2) or Part-to-Whole (3:5).

Answer: 20 wins (and 12 losses)

CHECK YOUR WORK ON THE SC-6 CALCULATOR — SECTION 3.1 PRACTICE B (SOLVE BY HAND FIRST, THEN VERIFY!)

Worked Example SC-6 Check Keystrokes:

3 2 ENTER 5 ENTER 3 + ÷ 5 ×

Place [2][2]=4 in the 5 + 3 = 8 tape sockets (A1..A5 and B1..B3) first, then check on your SC-6:
Press 32 [ENTER] 5 [ENTER] 3 [+] [÷] (4 games per socket) and 5 [×] to confirm 20 wins.

When a smoothie recipe called for strawberries and bananas in a 4:3 ratio using 28 pieces of fruit in all, Devon initially tried dividing 28 by 4 and 28 by 3—and when 28 ÷ 3 didn't even come out whole, he thought the problem was broken. Then he looked at the A1..A6 and B1..B5 sockets on his Prime Factor Towers lid, reserving 4 Back-Row sockets (A1..A4) for strawberries and 3 Front-Row sockets (B1..B3) for bananas. Looking at the lid, he saw his mistake right away: there were 4 + 3 = 7 equal sockets sharing the 28 fruits ([2][2][7])! Placing a [2][2] = 4 prime tower in each of the 7 sockets gave 16 strawberries and 12 bananas without any guesswork.

SECTION 3.1 PRACTICE B — MODELING REAL LIFE & APPLICATIONS

100-PT GOAL: Any 5 in 2 Ways (+20) OR All 10 in 1 Way (+10)!

1 **Robotics Club Roles: A club has 15 coders and 10 builders. Write the simplified ratio of coders to builders, and the simplified ratio of coders to total club members.**

Starter Step 1: Part-to-Part compares coders to builders (15:10); Part-to-Whole compares coders to total club members (15 + 10).

Way 1 (Paper Work):

Tape Model:

WARM-UP • [ ] +10 (1 Way) [ ] +20 (2 Ways) Ans: _____

2 **Smoothie Berry Mix: The ratio of strawberries to bananas in a smoothie is 4:3. If there are 28 pieces of fruit in all, how many are strawberries and how many are bananas?**

Starter Step 1: Add the ratio parts (4 + 3) to find the total equal boxes in the tape diagram, then divide 28 fruit by that total.

Way 1 (Paper Work):

Tape Model:

WARM-UP • [ ] +10 (1 Way) [ ] +20 (2 Ways) Ans: _____

3 **Paint Color Mixing: Forest green paint uses 5 parts blue to 2 parts yellow. If you use 15 cups of blue paint, how many cups of yellow paint do you need?**

Way 1 (Paper Work):

Tape Model:

CORE • [ ] +10 (1 Way) [ ] +20 (2 Ways) Ans: _____

4 **Scrub-Jay Seed Caches: When a western scrub-jay sees a rival jay watching, it re-hides its food in a 7:5 ratio of secret trays to open trays. Out of 60 seeds, how many are hidden in secret trays vs. open trays?**

Way 1 (Paper Work):

Tape Model:

CORE • [ ] +10 (1 Way) [ ] +20 (2 Ways) Ans: _____

5 **Treasure Chest Coins: The ratio of gold coins to silver coins in a chest is 7:3. There are 24 more gold coins than silver coins. How many gold coins and how many silver coins are in the chest?**

Way 1 (Show Paper Steps):

Way 2 (2nd Method / Check):

CORE • [ ] +10 (1 Way) [ ] +20 (2 Ways) Ans: _____

6 **How Bike Gears Work: A bike's 48-tooth front pedal gear pulls a chain to spin a 16-tooth back wheel gear (every 16 front teeth spin the back wheel 1 full turn). What is the simplified ratio of front teeth to back teeth?**

Way 1 (Show Paper Steps):

Way 2 (2nd Method / Check):

CORE • [ ] +10 (1 Way) [ ] +20 (2 Ways) Ans: _____

7 **School Band Instruments: A band has 16 flutes, 12 clarinets, and 8 trumpets. What is the simplified ratio of flutes to total instruments?**

Way 1 (Show Paper Steps):

Way 2 (2nd Method / Check):

CORE • [ ] +10 (1 Way) [ ] +20 (2 Ways) Ans: _____

8 **Screen Aspect Ratio: A monitor is 1,920 pixels wide by 1,080 pixels tall. Write the simplified width-to-height aspect ratio.**

Way 1 (Show Paper Steps):

Way 2 (2nd Method / Check):

CORE • [ ] +10 (1 Way) [ ] +20 (2 Ways) Ans: _____

9 **Trail Mix Ratio: A trail mix uses almonds, cashews, and raisins in a 3 : 2 : 5 ratio. How many grams of each ingredient are in a 500-gram bag?**

Way 1 (Show Paper Steps):

Way 2 (2nd Method / Check):

CHALLENGE • [ ] +10 (1 Way) [ ] +20 (2 Ways) Ans: _____

10 **Chess Tournament Record: You won 24 games and lost 8 games. What is the simplified ratio of wins to total games played?**

Way 1 (Show Paper Steps):

Way 2 (2nd Method / Check):

CHALLENGE • [ ] +10 (1 Way) [ ] +20 (2 Ways) Ans: _____

HANDS-ON MODEL: PRIME FACTOR TOWERS

Section 3.2 — Practice A: Using Ratio Tables and Double Number Lines

Key Vocabulary: ratio table • equivalent ratios • double number line • scaling (multiplying or dividing) Name: _____ Date: _____ Score: ____ / 100

TEXTBOOK CONCEPT & HANDS-ON MODEL (PRIME FACTOR TOWERS)

Way 1 & 2: Ratio Table Lid (A1/B1..A5/B5)

Row A	3	6	9	15
Row B	8	16	24	40

Stack [5] on Both: [3][5]=15 & [2]³[5]=40

Way 3: Double Number Line



HOW THE TEXTBOOK & VISUAL MODEL WORK TOGETHER:

Textbook Method 1 (Ratio Table — Addition): Add the base ratio quantities repeatedly to build a table of equivalent ratios.

Textbook Method 2 (Scale Factor — Multiplication/Division): Multiply or divide both quantities in a ratio by the same nonzero number.

WATCH OUT: Never add the same number to both rows of a ratio table — always MULTIPLY or DIVIDE both quantities by the same scale factor!

WORKED EXAMPLE — 3 TEXTBOOK WAYS (ANY 2 WAYS = +20 PTS)

Problem: A drone flies 8 meters every 3 seconds. How far does it fly in 15 seconds?

WAY 1: Stack the Same Scale-Factor Prime Block on Row A & Row B

Build 3 s = [3] in A1 and 8 m = [2][2][2] in B1. Stack a [5] block on both in A5/B5: Time = [3][5] = 15 s and Distance = [2][2][2][5] = 40 m.

WAY 2: Build Columns A1/B1..A5/B5 Across the Ratio Table

Scale 3:8 across the 5 lid columns (×1, ×2, ×3, ×4, ×5): (3, 8) → (6, 16) → (9, 24) → (12, 32) → (15, 40) → 40 m.

WAY 3: Double Number Line Jumps

Mark jumps of +3 s on the top line (0, 3, 6, 9, 12, 15) and matching jumps of +8 m on the bottom line (0, 8, 16, 24, 32, 40).

Answer: 40 meters 1 Way = +10 | 2 Ways = +20!

CHECK YOUR WORK ON THE SC-6 CALCULATOR — SECTION 3.2 PRACTICE A (SOLVE BY HAND FIRST, THEN VERIFY!)

Worked Example SC-6 Check Keystrokes:

8 g REP + + + +

Scale [3] and [2][2][2]=8 by stacking [5] on A5/B5 first, then check on your SC-6:
Enter 3 [ENTER] 8 [g][a:b] and press [10F] to step through the Ratio Table (or repeat steps with [g][REP]) to verify 15 to 40!

SECTION 3.2 PRACTICE A — KEY IDEAS & MULTI-METHOD PRACTICE

100-PT GOAL: Any 5 in 2 Ways (+20) OR All 10 in 1 Way (+10)!

1 **Write the first 4 equivalent ratios of 4 : 9.**

Starter Step 1: Multiply both 4 and 9 by 1, 2, 3, and 4 to build the first four equivalent columns of the ratio table.

Way 1 (Paper Work):

Ratio Table:

WARM-UP • [ ] +10 (1 Way) [ ] +20 (2 Ways) **Ans:** _____

2 **In a ratio table where A : B = 4 : 9, find B when A = 28.**

Starter Step 1: Find what 4 is multiplied by to reach 28, then multiply 9 by that exact same scale factor.

Way 1 (Paper Work):

Ratio Table:

WARM-UP • [ ] +10 (1 Way) [ ] +20 (2 Ways) **Ans:** _____

3 **In a ratio table where X : Y = 5 : 12, find X when Y = 60.**

Way 1 (Paper Work):

Ratio Table:

CORE • [ ] +10 (1 Way) [ ] +20 (2 Ways) **Ans:** _____

4 **A laser printer prints 15 pages every 2 minutes. How many pages does it print in 8 minutes?**

Way 1 (Paper Work):

Ratio Table:

CORE • [ ] +10 (1 Way) [ ] +20 (2 Ways) **Ans:** _____

5 **Hot cocoa uses 3 tablespoons of cocoa for every 8 ounces of milk. How many ounces of milk are needed for 18 tablespoons of cocoa?**

Way 1 (Paper Work):

Ratio Table:

CORE • [ ] +10 (1 Way) [ ] +20 (2 Ways) **Ans:** _____

6 **8 studio markers cost $12. Find the cost of 10 markers.**

Way 1 (Paper Work):

Ratio Table:

CORE • [ ] +10 (1 Way) [ ] +20 (2 Ways) **Ans:** _____

7 **A runner's heart beats 21 times in 15 seconds. At this rate, how many times does it beat in 1 minute (60 seconds)?**

Way 1 (Show Paper Steps):

Way 2 (2nd Method / Check):

CORE • [ ] +10 (1 Way) [ ] +20 (2 Ways) **Ans:** _____

8 **Error Analysis: To find a ratio equivalent to 3:5, Sam added 4 to both terms and wrote 7:9. Explain why 3:5 and 7:9 are not equivalent.**

Way 1 (Show Paper Steps):

Way 2 (2nd Method / Check):

CORE • [ ] +10 (1 Way) [ ] +20 (2 Ways) **Ans:** _____

9 **Smoothie Bar: 9 berry smoothies require 12 cups of berries. How many cups of berries are needed to blend 15 smoothies?**

Way 1 (Show Paper Steps):

Way 2 (2nd Method / Check):

CHALLENGE • [ ] +10 (1 Way) [ ] +20 (2 Ways) **Ans:** _____

10 **Electric Scooter Range: An e-scooter travels 14 miles on 35% of its battery. At this rate, how many miles can it travel on a 100% full charge?**

Way 1 (Show Paper Steps):

Way 2 (2nd Method / Check):

CHALLENGE • [ ] +10 (1 Way) [ ] +20 (2 Ways) **Ans:** _____

HANDS-ON MODEL: PRIME FACTOR TOWERS

Section 3.2 — Practice B: Modeling Real Life (Using Ratio Tables and Double Number Lines)

Textbook Ways: Multiplicative Scale Factor (Prime Blocks) | Double Number Line / Repeated Addition | Scale Down Then Up

Name: _____ Date: _____ Score: ____ / 100

WORKED EXAMPLE — SKATE PARK PASSES (3 TEXTBOOK WAYS • ANY 2 = +20 PTS)

Problem: Six skate park passes cost $45. At this rate, how much do 10 skate park passes cost?

WAY 1: Scale Down Then Scale Up with Prime Blocks (A1/B1 → A2/B2 → A3/B3)
Build 6 = [2][3] in A1 and 45 = [3][3][5] in B1. Remove shared [3] (÷3) → A2 = [2] (2 passes), B2 = [3][5] ($15). Stack [5] on both (×5) → A3 = [2][5] = 10 passes, B3 = [3][5][5] = $75.

WAY 2: Add Columns in the Ratio Table (6 Passes + 4 Passes)
Since 2 passes cost $15, 4 passes cost $30. Add 6 passes ($45) + 4 passes ($30) = 10 passes for $75.

WAY 3: Unit Rate (Cost per 1 Pass)
Divide $45 ÷ 6 = $7.50 per pass. Multiply by 10 passes: 10 × $7.50 = $75.

WATCH OUT: Never add the same number to both rows of a ratio table — always MULTIPLY or DIVIDE both quantities by the same scale factor!

Answer: $75

CHECK YOUR WORK ON THE SC-6 CALCULATOR — SECTION 3.2 PRACTICE B (SOLVE BY HAND FIRST, THEN VERIFY!)

Worked Example SC-6 Check Keystrokes:

4 5 ENTER 3 ÷ 5 ×

Remove shared [3] from (6, 45) and stack [5] on A3/B3 first, then check on your SC-6:
Press 45 [ENTER] 3 [÷] 5 [×] to confirm $75.

Priya had to bake 10 pizza crusts for the robotics club using a recipe written for 4 crusts (6 cups of flour for 4 crusts), and she got stuck because 4 doesn't multiply evenly into 10. Then she built 4 = [2][2] in socket A1 and 6 = [2][3] in socket B1 of her Prime Factor Ratio Table lid and realized nobody forces you to jump from 4 to 10 in one step: she could remove the shared [2] block first (dividing by 2) in Column 2 (A2 = [2] = 2 crusts, B2 = [3] = 3 cups of flour), and then stack a [5] block onto both in Column 3 to reach A3 = [2][5] = 10 crusts and B3 = [3][5] = 15 cups of flour.

SECTION 3.2 PRACTICE B — MODELING REAL LIFE & APPLICATIONS

100-PT GOAL: Any 5 in 2 Ways (+20) OR All 10 in 1 Way (+10)!

1 **3D Printing Speed: A printer extrudes 15 grams of filament every 20 minutes. At this rate, how many grams does it extrude in 60 minutes?**

Starter Step 1: Find how many 20-minute blocks fit in 60 minutes, then multiply 15 grams by that same scale factor.

Way 1 (Paper Work):

Ratio Table:

WARM-UP • [ ] +10 (1 Way) [ ] +20 (2 Ways) **Ans:** _____

2 **Aquarium Salt Mix: A marine tank needs 7 scoops of sea salt for every 2 gallons of water. How many scoops are needed for a 16-gallon tank?**

Starter Step 1: Find what 2 gallons is multiplied by to reach 16 gallons, then multiply 7 scoops by that same scale factor.

Way 1 (Paper Work):

Ratio Table:

WARM-UP • [ ] +10 (1 Way) [ ] +20 (2 Ways) **Ans:** _____

3 **School Store Notebooks: If 8 notebooks cost $12, how much do 10 notebooks cost at the same rate?**

Way 1 (Paper Work):

Ratio Table:

CORE • [ ] +10 (1 Way) [ ] +20 (2 Ways) **Ans:** _____

4 **Dove Heartbeat Rate: A resting dove's heart beats 28 times in 15 seconds. At this rate, how many times does its heart beat in 1 minute?**

Way 1 (Paper Work):

Ratio Table:

CORE • [ ] +10 (1 Way) [ ] +20 (2 Ways) **Ans:** _____

5 **Maple Syrup Sap: It takes 40 gallons of tree sap to boil down 1 gallon of pure maple syrup. How many gallons of sap are needed for 6.5 gallons of syrup?**

Way 1 (Paper Work):

Ratio Table:

CORE • [ ] +10 (1 Way) [ ] +20 (2 Ways) **Ans:** _____

6 **Moon Weight Ratio: An object weighing 60 pounds on Earth weighs 10 pounds on the Moon. How much would a 150-pound astronaut weigh on the Moon?**

Way 1 (Paper Work):

Ratio Table:

CORE • [ ] +10 (1 Way) [ ] +20 (2 Ways) **Ans:** _____

7 **Pizza Dough Flour: Six cups of flour make 4 pizza crusts. How many cups of flour are needed to make 10 pizza crusts?**

Way 1 (Show Paper Steps):

Way 2 (2nd Method / Check):

CORE • [ ] +10 (1 Way) [ ] +20 (2 Ways) **Ans:** _____

8 **Solar Charger: A portable solar panel charges 18% of a battery every 15 minutes. At this rate, how many minutes does it take to charge 90% of the battery?**

Way 1 (Show Paper Steps):

Way 2 (2nd Method / Check):

CORE • [ ] +10 (1 Way) [ ] +20 (2 Ways) **Ans:** _____

9 **Model Train Scale: A scale model uses 2 inches to represent 15 feet of a real train. If a real boxcar is 60 feet long, how many inches long is the model?**

Way 1 (Show Paper Steps):

Way 2 (2nd Method / Check):

CHALLENGE • [ ] +10 (1 Way) [ ] +20 (2 Ways) **Ans:** _____

10 **Lemonade Pitcher: Nine lemons make 6 cups of lemonade. How many lemons do you need to make 20 cups of lemonade?**

Way 1 (Show Paper Steps):

Way 2 (2nd Method / Check):

CHALLENGE • [ ] +10 (1 Way) [ ] +20 (2 Ways) **Ans:** _____

TEXTBOOK MODEL: PAPER / GRAPH / FORMULA

Section 3.3 — Practice A: Rates, Unit Rates, and Comparing Rates

Key Vocabulary: rate • unit rate • unit cost (unit price) • equivalent rates

Name: _____ Date: _____ Score: ____ / 100

TEXTBOOK CONCEPT & VISUAL DIAGRAM

Unit Rate: Denominator of 1 Unit

315 words / 5 minutes ÷5→ 63 words / 1 minute

Unit Rate = 63 words/min

In 8 min: 63 × 8 = 504 words

Comparing Rates (Better Buy)

Pack A: $5.80 ÷ 4 = $1.45 / battery

(12 batteries = 3 × $5.80 = $17.40)

Pack B: $8.40 ÷ 6 = $1.40 / battery

Pack B is cheaper! ($16.80 for 12)

HOW THE TEXTBOOK & VISUAL MODEL WORK TOGETHER:

Textbook Concept: A rate compares two quantities with different units. A unit rate has a denominator of 1 unit (divide numerator ÷ denominator).

Textbook Comparison Strategy: To find the 'Better Buy' or faster speed, compare the unit rates (cost per 1 item) or scale to a common multiple.

WATCH OUT: For unit price ('per item' or 'per ounce'), divide Money ÷ Quantity. The smaller unit cost is the better buy!

WORKED EXAMPLE — 3 TEXTBOOK WAYS (ANY 2 WAYS = +20 PTS)

Problem: You type 315 words in 5 minutes. Find your unit rate in words per minute.

WAY 1: Divide Numerator and Denominator by 5

Write 315 words / 5 min. Divide top and bottom by 5: (315 ÷ 5) / (5 ÷ 5) = 63 words per 1 minute.

WAY 2: Partial Quotients / Place-Value Split

Split 315 = 300 + 15: (300 ÷ 5) + (15 ÷ 5) = 60 + 3 = 63 words per minute.

WAY 3: Double Number Line Partition

Divide the 0-to-315 segment into 5 equal 1-minute intervals: each interval is 63 words.

Answer: 63 words per minute 1 Way = +10 | 2 Ways = +20!

CHECK YOUR WORK ON THE SC-6 CALCULATOR — SECTION 3.3 PRACTICE A (SOLVE BY HAND FIRST, THEN VERIFY!)

Worked Example SC-6 Check Keystrokes:

3 1 5 ENTER 5 ÷

Divide 315 words by 5 minutes on paper first to find the unit rate per 1 minute. Then check on your SC-6:
Press 315 [ENTER] 5 [÷] to confirm 63 words per minute.

SECTION 3.3 PRACTICE A — KEY IDEAS & MULTI-METHOD PRACTICE

100-PT GOAL: Any 5 in 2 Ways (+20) OR All 10 in 1 Way (+10)!

1 **A car travels 195 miles in 3 hours. Find the average speed in miles per hour.**

Starter Step 1: Divide total distance by total time (195 miles ÷ 3 hours) to find the unit rate for 1 hour.

Way 1 (Paper Work):

Unit Rate = Total ÷ Units

_____ ÷ _____ = _____ per 1

WARM-UP • [ ] +10 (1 Way) [ ] +20 (2 Ways) **Ans:** _____

2 **You earn $36 for 4 hours of tutoring. What is your hourly pay rate?**

Starter Step 1: Divide total pay by total hours ($36 ÷ 4 hours) to find the unit pay rate for 1 hour.

Way 1 (Paper Work):

Unit Rate = Total ÷ Units

_____ ÷ _____ = _____ per 1

WARM-UP • [ ] +10 (1 Way) [ ] +20 (2 Ways) **Ans:** _____

3 **A 6-pound bag of apples costs $7.80. What is the price per pound?**

Way 1 (Paper Work):

Unit Rate = Total ÷ Units

_____ ÷ _____ = _____ per 1

CORE • [ ] +10 (1 Way) [ ] +20 (2 Ways) **Ans:** _____

4 **A 3D printer extrudes 90 grams of filament in 6 hours. How many grams does it extrude per hour?**

Way 1 (Paper Work):

Unit Rate = Total ÷ Units

_____ ÷ _____ = _____ per 1

CORE • [ ] +10 (1 Way) [ ] +20 (2 Ways) **Ans:** _____

5 **Craft Foil Comparison: Supplier A sells an 18-oz roll of copper craft foil for $3.24. Supplier B sells a 24-oz roll for $4.08. Find both unit prices—which supplier is cheaper per ounce?**

Way 1 (Show Paper Steps):

Way 2 (2nd Method / Check):

CORE • [ ] +10 (1 Way) [ ] +20 (2 Ways) **Ans:** _____

6 **A 6-pack of gel pens costs $5.10, and a 10-pack costs $8.20. Which pack has the lower cost per pen?**

Way 1 (Show Paper Steps):

Way 2 (2nd Method / Check):

CORE • [ ] +10 (1 Way) [ ] +20 (2 Ways) **Ans:** _____

7 **A train travels 210 miles in 3.5 hours. At this constant speed, how far will it travel in 5 hours?**

Way 1 (Show Paper Steps):

Way 2 (2nd Method / Check):

CORE • [ ] +10 (1 Way) [ ] +20 (2 Ways) **Ans:** _____

8 **Pump A fills 45 gallons in 5 minutes. Pump B fills 64 gallons in 8 minutes. Which pump has the faster flow rate?**

Way 1 (Show Paper Steps):

Way 2 (2nd Method / Check):

CORE • [ ] +10 (1 Way) [ ] +20 (2 Ways) **Ans:** _____

9 **3D Printer Feed Speed: Marcus's 3D printer pushes 45 mm of filament into the nozzle in 15 seconds. At this rate, how many millimeters of filament does it push in 1 minute (60 seconds)?**

Way 1 (Show Paper Steps):

Way 2 (2nd Method / Check):

CHALLENGE • [ ] +10 (1 Way) [ ] +20 (2 Ways) **Ans:** _____

10 **Car A drives 168 miles on 6 gallons of gas. Car B drives 232 miles on 8 gallons. Which car gets better fuel mileage, and by how many miles per gallon?**

Way 1 (Show Paper Steps):

Way 2 (2nd Method / Check):

CHALLENGE • [ ] +10 (1 Way) [ ] +20 (2 Ways) **Ans:** _____

TEXTBOOK MODEL: PAPER / GRAPH / FORMULA

Section 3.3 — Practice B: Modeling Real Life (Rates, Unit Rates, and Comparing Rates)

Textbook Ways: Divide to Find the Unit Rate (1 Unit) | Common Multiple Comparison | Double Number Line Name: _____ Date: _____ Score: ____ / 100

WORKED EXAMPLE — COMPARING UNIT PRICES (3 TEXTBOOK WAYS • ANY 2 = +20 PTS)

Problem: Pack A has 8 AA batteries for $11.60. Pack B has 12 AA batteries for $16.80. Which pack is the better buy?

WAY 1: Compare Unit Prices (Cost per 1 Battery)
Pack A: $11.60 ÷ 8 = $1.45 per battery. Pack B: $16.80 ÷ 12 = $1.40 per battery. Pack B is cheaper ($1.40 < $1.45).

WAY 2: Scale Both Packs to LCM(8, 12) = 24 Batteries
For 24 batteries: 3 of Pack A cost 3 × $11.60 = $34.80; 2 of Pack B cost 2 × $16.80 = $33.60. Pack B saves $1.20.

WAY 3: Compare Cost of 4 Batteries (GCF = 4)
Divide Pack A by 2 → 4 batteries cost $5.80. Divide Pack B by 3 → 4 batteries cost $5.60. Pack B is the better buy.

WATCH OUT: For unit price ('per item' or 'per ounce'), divide Money ÷ Quantity. The smaller unit cost is the better buy!

Answer: Pack B ($1.40 per battery vs. $1.45 per battery)

CHECK YOUR WORK ON THE SC-6 CALCULATOR — SECTION 3.3 PRACTICE B (SOLVE BY HAND FIRST, THEN VERIFY!)

Worked Example SC-6 Check Keystrokes:

[1] [1] [•] [6] [0] [ENTER] [8] [÷] [1] [6] [•] [8] [0] [ENTER] [1] [2] [÷]

Find both unit prices on paper first. Then check on your SC-6:
Press 11.60 [ENTER] 8 [÷] ($1.45 sits on Y) and 16.80 [ENTER] 12 [÷] ($1.40 sits on X), then press [g][<] (flashes YES!) to confirm $1.40 < $1.45.

Standing in the snack aisle, Priya held a 6-bar box of granola bars priced at $4.50 and a 10-bar box priced at $7.00. Her first instinct was to grab the $4.50 box because the price tag looked smaller, while Devon guessed the 10-bar box because bulk boxes are usually cheaper—neither of them was actually sure. Instead of arguing, Priya divided the cost by the number of bars to find the price of 1 single bar: $4.50 ÷ 6 = $0.75 per bar versus $7.00 ÷ 10 = $0.70 per bar. Stripping both packages down to a 'per 1' unit rate settled the question in seconds.

SECTION 3.3 PRACTICE B — MODELING REAL LIFE & APPLICATIONS

100-PT GOAL: Any 5 in 2 Ways (+20) OR All 10 in 1 Way (+10)!

1 **High-Speed Train: A bullet train travels 450 miles in 3 hours. What is its average speed in miles per hour?**
Starter Step 1: Divide 450 miles ÷ 3 hours so the denominator becomes 1 hour.

Way 1 (Paper Work):

Unit Rate = Total ÷ Units
_____ ÷ _____ = _____ per 1

WARM-UP • [ ] +10 (1 Way) [ ] +20 (2 Ways) **Ans:** _____

2 **Best-Buy Granola Bars: Box A has 6 bars for $4.50. Box B has 10 bars for $7.00. Find the unit price per bar for each box. Which box is the better buy?**
Starter Step 1: Divide Total Cost ÷ Number of Bars for each box ($4.50 ÷ 6 and $7.00 ÷ 10) to compare the unit price per bar.

Way 1 (Paper Work):

Unit Rate = Total ÷ Units
_____ ÷ _____ = _____ per 1

WARM-UP • [ ] +10 (1 Way) [ ] +20 (2 Ways) **Ans:** _____

3 **3D Filament Comparison: Spool A is 500 grams for $11.00. Spool B is 1,000 grams for $19.50. Find the price per 100 grams for each spool. Which is the better buy?**

Way 1 (Paper Work):

Unit Rate = Total ÷ Units
_____ ÷ _____ = _____ per 1

CORE • [ ] +10 (1 Way) [ ] +20 (2 Ways) **Ans:** _____

4 **Swimming Pool Pump: A pump fills 180 gallons in 12 minutes. What is its unit rate in gallons per minute, and how many gallons does it pump in 25 minutes?**

Way 1 (Paper Work):

Unit Rate = Total ÷ Units
_____ ÷ _____ = _____ per 1

CORE • [ ] +10 (1 Way) [ ] +20 (2 Ways) **Ans:** _____

5 **Woodpecker Tapping Speed: Woodpecker A taps a tree 220 times in 4 minutes to locate larvae. Woodpecker B taps 285 times in 5 minutes. Find each bird's unit rate in taps per minute. Which bird taps faster?**

Way 1 (Show Paper Steps):

Way 2 (2nd Method / Check):

CORE • [ ] +10 (1 Way) [ ] +20 (2 Ways) **Ans:** _____

6 **Fuel Economy Test: Car A drives 336 miles on 12 gallons of gas. Car B drives 405 miles on 15 gallons. Which car gets more miles per gallon?**

Way 1 (Show Paper Steps):

Way 2 (2nd Method / Check):

CORE • [ ] +10 (1 Way) [ ] +20 (2 Ways) **Ans:** _____

7 **Dog Walking Job: You earn $54 for walking 6 dogs. At this rate, how many dogs must you walk to earn $99?**

Way 1 (Show Paper Steps):

Way 2 (2nd Method / Check):

CORE • [ ] +10 (1 Way) [ ] +20 (2 Ways) **Ans:** _____

8 **Juice Box Bulk Pack: An 8-pack of juice boxes costs $3.60. A 12-pack costs $5.04. Find the unit price per juice box for each pack. Which is cheaper per box?**

Way 1 (Show Paper Steps):

Way 2 (2nd Method / Check):

CORE • [ ] +10 (1 Way) [ ] +20 (2 Ways) **Ans:** _____

9 **Snowfall Rate: During a snowstorm, 14 inches of snow fall in 3.5 hours. What is the snowfall rate in inches per hour?**

Way 1 (Show Paper Steps):

Way 2 (2nd Method / Check):

CHALLENGE • [ ] +10 (1 Way) [ ] +20 (2 Ways) **Ans:** _____

10 **Rover Speed: A planetary rover drives 27 meters in 6 seconds. What is its speed in meters per second, and how far does it travel in 20 seconds?**

Way 1 (Show Paper Steps):

Way 2 (2nd Method / Check):

CHALLENGE • [ ] +10 (1 Way) [ ] +20 (2 Ways) **Ans:** _____

TEXTBOOK MODEL: PAPER / GRAPH / FORMULA

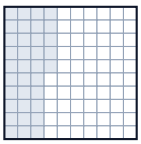
Section 3.4 — Practice A: Percents, Fractions, and Decimals

Key Vocabulary: percent ('per hundred') • hundredths grid • benchmark percent • percent proportion

Name: _____ Date: _____ Score: ____ / 100

TEXTBOOK CONCEPT & VISUAL DIAGRAM

10×10 Grid: 7/20 = 35/100 = 35%



35 of 100 squares

= 0.35

= 35%

3 Ways: Fraction = Decimal = %

Way 1 (Scale to 100):
7/20 × 5/5 = 35/100 = 35%

Way 2 (Divide):
7 ÷ 20 = 0.35 → 35%

Way 3 (% of Whole):
35% of 80 = 0.35 × 80 = 28

HOW THE TEXTBOOK & VISUAL MODEL WORK TOGETHER:

Textbook Concept: Percent (%) means 'per hundred' (out of 100). Write an equivalent fraction with denominator 100, or divide numerator ÷ denominator.

Textbook Finding a Percent of a Number: Convert the percent to a decimal or fraction and multiply by the whole (p% of w = (p/100) × w).

WATCH OUT: 'Percent' means per 100: move the decimal 2 places RIGHT for % (0.06 = 6%, NOT 60%), and 2 places LEFT for a decimal.

WORKED EXAMPLE — 3 TEXTBOOK WAYS (ANY 2 WAYS = +20 PTS)

Problem: Write 7/20 as a decimal and as a percent.

WAY 1: Equivalent Fraction with Denominator 100
Since 20 × 5 = 100, multiply top and bottom of 7/20 by 5: (7 × 5)/(20 × 5) = 35/100 = 0.35 = 35%.

WAY 2: Divide Numerator by Denominator
Divide 7 ÷ 20 = 0.35. Multiply by 100% (move decimal 2 places right) → 35%.

WAY 3: Benchmark 1/20 = 5% Bar Model
On a percent bar, 1/20 of 100% is 5%. Seven twentieths is 7 × 5% = 35%.

Answer: 0.35 and 35%

1 Way = +10 | 2 Ways = +20!

CHECK YOUR WORK ON THE SC-6 CALCULATOR — SECTION 3.4 PRACTICE A (SOLVE BY HAND FIRST, THEN VERIFY!)

Worked Example SC-6 Check Keystrokes:

[•] [7] [•] [2] [0] [ENTER] [FDISP] [1] [0] [0] [×]

Convert 7/20 to a decimal and percent on paper first. Then check on your SC-6 using Two-Dot fraction entry: Type [.] 7 [.] 20 [ENTER] [FDISP] to see 0.35, and press [f][→%] (or 100 [×]) to confirm 35%.

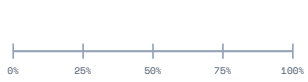
SECTION 3.4 PRACTICE A — KEY IDEAS & MULTI-METHOD PRACTICE

100-PT GOAL: Any 5 in 2 Ways (+20) OR All 10 in 1 Way (+10)!

1 Write 3/5 as a decimal and as a percent.

Starter Step 1: Scale the denominator of 3/5 to 100 by multiplying top and bottom by 20, then write as a decimal and percent.

Way 1 (Paper Work):

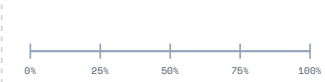


WARM-UP • [ ] +10 (1 Way) [ ] +20 (2 Ways) Ans: _____

2 Write 9/25 as a decimal and as a percent.

Starter Step 1: Scale the denominator of 9/25 to 100 by multiplying top and bottom by 4, then write as a decimal and percent.

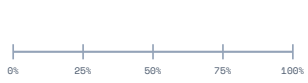
Way 1 (Paper Work):



WARM-UP • [ ] +10 (1 Way) [ ] +20 (2 Ways) Ans: _____

3 Write 45% as a decimal and as a fraction in simplest form.

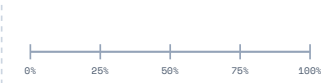
Way 1 (Paper Work):



CORE • [ ] +10 (1 Way) [ ] +20 (2 Ways) Ans: _____

4 Write 0.125 as a percent and as a fraction in simplest form.

Way 1 (Paper Work):



CORE • [ ] +10 (1 Way) [ ] +20 (2 Ways) Ans: _____

5 Harvest Co-Op Banquet: A community hall seats 450 guests. If 60% of the seats are reserved for farm families, how many seats are reserved?

Way 1 (Show Paper Steps):

Way 2 (2nd Method / Check):

CORE • [ ] +10 (1 Way) [ ] +20 (2 Ways) Ans: _____

6 Bakery Dough Hydration: Elena uses a 65% hydration recipe (water weight is 65% of flour weight). For 5,400 grams of flour, how many grams of water are needed?

Way 1 (Show Paper Steps):

Way 2 (2nd Method / Check):

CORE • [ ] +10 (1 Way) [ ] +20 (2 Ways) Ans: _____

7 Grading Golden Honey Jars: An inspector grades 42 out of 50 jars of wildflower honey as Grade A Amber. What percent of the jars earned Grade A?

Way 1 (Show Paper Steps):

Way 2 (2nd Method / Check):

CORE • [ ] +10 (1 Way) [ ] +20 (2 Ways) Ans: _____

8 Write 150% as a decimal and as a mixed number in simplest form.

Way 1 (Show Paper Steps):

Way 2 (2nd Method / Check):

CORE • [ ] +10 (1 Way) [ ] +20 (2 Ways) Ans: _____

9 Order 5/8, 60%, and 0.61 from least to greatest.

Way 1 (Show Paper Steps):

Way 2 (2nd Method / Check):

CHALLENGE • [ ] +10 (1 Way) [ ] +20 (2 Ways) Ans: _____

10 Phone Battery Charge: A phone battery is at 35% of its 4,000 mAh capacity. How many mAh of charge remain?

Way 1 (Show Paper Steps):

Way 2 (2nd Method / Check):

CHALLENGE • [ ] +10 (1 Way) [ ] +20 (2 Ways) Ans: _____

TEXTBOOK MODEL: PAPER / GRAPH / FORMULA

Section 3.4 — Practice B: Modeling Real Life (Percents, Fractions, and Decimals)

Textbook Ways: Equivalent Fraction over 100 | Divide Numerator ÷ Denominator | Percent Bar / Benchmark Model Name: _____ Date: _____ Score: ____ / 100

WORKED EXAMPLE — FREE-THROW PERCENTAGE (3 TEXTBOOK WAYS • ANY 2 = +20 PTS)

Problem: A basketball player makes 18 out of 24 free throws. What percent of the free throws did the player make?

WAY 1: Simplify by GCF First, Then Scale to 100
Divide 18 and 24 by GCF = 6: 18/24 = 3/4. Scale 3/4 by ×25: 75/100 = 75%.

WAY 2: Divide Part ÷ Whole (18 ÷ 24)
Divide 18 ÷ 24 = 0.75. Write the decimal as a percent: 0.75 = 75%.

WAY 3: Percent Proportion (Part / Whole = p / 100)
Write 18 / 24 = p / 100 → 24p = 1,800 → p = 1,800 ÷ 24 = 75%.

WATCH OUT: 'Percent' means per 100: move the decimal 2 places RIGHT for % (0.06 = 6%, NOT 60%), and 2 places LEFT for a decimal.

Answer: 75% (3/4 = 0.75)

CHECK YOUR WORK ON THE SC-6 CALCULATOR — SECTION 3.4 PRACTICE B (SOLVE BY HAND FIRST, THEN VERIFY!)

Worked Example SC-6 Check Keystrokes:
1 8 ENTER 2 4 ÷ FDISP

Simplify 18/24 and scale to 100 on paper first. Then check on your SC-6:
Press 18 [ENTER] 24 [÷] [FDISP] to toggle between 3/4 and 0.75 (and [d][→%] for 75%).

Zoe was trying to compare three different results—17 out of 20 gigabytes used on a tablet, 9 out of 25 soccer penalty kicks made, and 21 out of 24 counting trials answered by Alex the African grey parrot—and felt overwhelmed because every fraction had a different denominator. Finding a common denominator for 20, 25, and 24 looked miserable. Then she remembered that 'percent' simply means 'out of 100.' By turning each score into a percent on the same 0-to-100 scale (85%, 36%, and 87.5%), she could compare all three at a single glance.

SECTION 3.4 PRACTICE B — MODELING REAL LIFE & APPLICATIONS

100-PT GOAL: Any 5 in 2 Ways (+20) OR All 10 in 1 Way (+10)!

1 **Tablet Storage: You have used 17 out of 20 gigabytes on your tablet. Write the fraction of storage used as a decimal and as a percent.**

Starter Step 1: Scale the denominator of 17/20 to 100 by multiplying top and bottom by 5 to find the decimal and percent.

Way 1 (Paper Work):



WARM-UP • [ ] +10 (1 Way) [ ] +20 (2 Ways) Ans: _____

2 **Soccer Goal Rate: A striker scores on 9 out of 25 penalty kicks. Write her scoring rate as a decimal and as a percent.**

Starter Step 1: Scale 9/25 to an equivalent fraction out of 100 (or divide 9 ÷ 25) to find the decimal and percent.

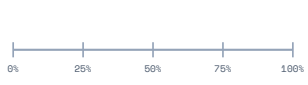
Way 1 (Paper Work):



WARM-UP • [ ] +10 (1 Way) [ ] +20 (2 Ways) Ans: _____

3 **Quiz Mastery Score: You earn 40% of the points on Part A (worth 50 points) and 80% of the points on Part B (worth 50 points). How many total points did you score?**

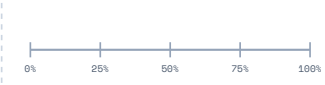
Way 1 (Paper Work):



CORE • [ ] +10 (1 Way) [ ] +20 (2 Ways) Ans: _____

4 **School Survey: In a poll of 160 middle schoolers, 65% voted for a robotics elective. How many students voted for robotics?**

Way 1 (Paper Work):



CORE • [ ] +10 (1 Way) [ ] +20 (2 Ways) Ans: _____

5 **Battery Charge Remaining: A laptop shows 15% battery remaining. Write 15% as a decimal and as a fraction in simplest form.**

Way 1 (Show Paper Steps):

Way 2 (2nd Method / Check):

CORE • [ ] +10 (1 Way) [ ] +20 (2 Ways) Ans: _____

6 **Science Club Membership: Eighteen students in the science club are 6th graders. If 6th graders make up 40% of the club, how many total students are in the science club?**

Way 1 (Show Paper Steps):

Way 2 (2nd Method / Check):

CORE • [ ] +10 (1 Way) [ ] +20 (2 Ways) Ans: _____

7 **Mental Math Tip: What is 15% of $60?**

Way 1 (Show Paper Steps):

Way 2 (2nd Method / Check):

CORE • [ ] +10 (1 Way) [ ] +20 (2 Ways) Ans: _____

8 **Alex the Parrot's Counting Trials: In Dr. Irene Pepperberg's lab, Alex the African grey parrot answered 21 out of 24 counting questions correctly! Write his accuracy as a simplified fraction, a decimal, and a percent.**

Way 1 (Show Paper Steps):

Way 2 (2nd Method / Check):

CORE • [ ] +10 (1 Way) [ ] +20 (2 Ways) Ans: _____

9 **Fundraiser Goal: A class has raised $360, which is 75% of their goal. What is their total fundraiser goal?**

Way 1 (Show Paper Steps):

Way 2 (2nd Method / Check):

CHALLENGE • [ ] +10 (1 Way) [ ] +20 (2 Ways) Ans: _____

10 **Order 3/5, 58%, and 0.62 from least to greatest.**

Way 1 (Show Paper Steps):

Way 2 (2nd Method / Check):

CHALLENGE • [ ] +10 (1 Way) [ ] +20 (2 Ways) Ans: _____

TEXTBOOK MODEL: PAPER / GRAPH / FORMULA

Section 3.5 — Practice A: Solving Percent Problems, Discounts & Conversions

Key Vocabulary: discount • sale price • markup • sales tax • percent of change • conversion factor

Name: _____ Date: _____ Score: ____ / 100

TEXTBOOK CONCEPT & VISUAL DIAGRAM

Percent Discount Bar Model ($60 Hoodie at 25% Off) & Unit Conversion

Sale Price: 75% of $60 = $45	-25% ($15)

Way 1: $60 - $15 = $45 | Way 2: 0.75 × $60 = $45

% Change = (Change ÷ Original) × 100%

Watch Out: Always divide by the ORIGINAL amount!

Unit Conversion

Cancel old units:

32 in × (2.54 cm / 1 in)

= 81.28 cm

HOW THE TEXTBOOK & VISUAL MODEL WORK TOGETHER:

Textbook Discounts & Markups: Method 1: Find the discount/tax and subtract or add. Method 2: Multiply by the remaining/total percent (e.g., 75% or 107.5%).

Textbook Percent of Change & Conversions: Percent Change = (Amount of Change ÷ Original Amount) × 100%; multiply by unit conversion factors so old units cancel.

WATCH OUT: For percent change, ALWAYS divide the change by the ORIGINAL starting amount — never the new ending amount!

WORKED EXAMPLE — 3 TEXTBOOK WAYS (ANY 2 WAYS = +20 PTS)

Problem: A $60 video game is on sale for 25% off. Find the discount and the sale price.

WAY 1: Find the 25% Discount First, Then Subtract

Discount = 25% of $60 = 0.25 × $60 = $15. Subtract from original price: $60 - $15 = $45.

WAY 2: Multiply by the Remaining Percent (75%)

Taking 25% off leaves 100% - 25% = 75% of the price: 0.75 × $60 = (3/4) × $60 = $45.

WAY 3: Benchmark Quarters Bar Model

Split $60 into four 25% quarters ($15 each). Remove 1 quarter ($15); 3 quarters ($45) remain.

Answer: Discount = $15; Sale Price = $45

CHECK YOUR WORK ON THE SC-6 CALCULATOR — SECTION 3.5 PRACTICE A (SOLVE BY HAND FIRST, THEN VERIFY!)

Worked Example SC-6 Check Keystrokes:

[6] [0] [ENTER] [2] [5] [%] [-]

Calculate the 25% discount on paper first. Then check on your SC-6:

Type 60 [ENTER] 25 [%] (which computes 25% of 60 = $15 while keeping 60 on Y!) and press [-] to get the $45 sale price.

SECTION 3.5 PRACTICE A — KEY IDEAS & MULTI-METHOD PRACTICE

100-PT GOAL: Any 5 in 2 Ways (+20) OR All 10 in 1 Way (+10)!

1 **Wool Work Coat: An $85 wool coat is on sale for 20% off. Find the discount amount and the sale price.**

Starter Step 1: Multiply $85 × 0.20 to find the 20% discount amount first, then subtract that discount from $85.

Way 1 (Paper Work):

Part = % × Whole: ___ × ___ = ___

Orig: _____ ± %Amt: _____ = _____

WARM-UP • [ ] +10 (1 Way) [ ] +20 (2 Ways) **Ans:** _____

2 **Garden Cart Checkout: A steel garden cart costs $120.00 before an 8.5% sales tax. Find the sales tax and the final price.**

Starter Step 1: Multiply $120 × 0.085 to find the sales tax amount first, then add the tax to $120.00.

Way 1 (Paper Work):

Part = % × Whole: ___ × ___ = ___

Orig: _____ ± %Amt: _____ = _____

WARM-UP • [ ] +10 (1 Way) [ ] +20 (2 Ways) **Ans:** _____

3 **Seedling Height Surge: A pine seedling grows from 15 mm to 75 mm. What is the percent of increase in its height?**

Way 1 (Paper Work):

Part = % × Whole: ___ × ___ = ___

Orig: _____ ± %Amt: _____ = _____

CORE • [ ] +10 (1 Way) [ ] +20 (2 Ways) **Ans:** _____

4 **Find the percent of decrease from 80 down to 60.**

Way 1 (Paper Work):

Part = % × Whole: ___ × ___ = ___

Orig: _____ ± %Amt: _____ = _____

CORE • [ ] +10 (1 Way) [ ] +20 (2 Ways) **Ans:** _____

5 **Use the conversion factor 1 in = 2.54 cm to convert 10 inches to centimeters.**

Way 1 (Show Paper Steps):

Way 2 (2nd Method / Check):

CORE • [ ] +10 (1 Way) [ ] +20 (2 Ways) **Ans:** _____

6 **Use the conversion factor 1 in = 2.54 cm to convert 50.8 centimeters to inches.**

Way 1 (Show Paper Steps):

Way 2 (2nd Method / Check):

CORE • [ ] +10 (1 Way) [ ] +20 (2 Ways) **Ans:** _____

7 **Workshop Tool Backpack: A $56 canvas tool backpack is on sale for 30% off. What is the sale price?**

Way 1 (Show Paper Steps):

Way 2 (2nd Method / Check):

CORE • [ ] +10 (1 Way) [ ] +20 (2 Ways) **Ans:** _____

8 **18 is 25% of what whole number?**

Way 1 (Show Paper Steps):

Way 2 (2nd Method / Check):

CORE • [ ] +10 (1 Way) [ ] +20 (2 Ways) **Ans:** _____

9 **Stacking Two Discounts on a Solar Battery: A $200 solar battery is marked 20% off, and an extra 10% clearance coupon is applied to the reduced sale price. What is the final price?**

Way 1 (Show Paper Steps):

Way 2 (2nd Method / Check):

CHALLENGE • [ ] +10 (1 Way) [ ] +20 (2 Ways) **Ans:** _____

10 **A 32-inch skateboard deck weighs 5 pounds. Convert its length to centimeters (1 in = 2.54 cm) and its mass to kilograms (1 lb ≈ 0.4536 kg, rounded to the nearest hundredth).**

Way 1 (Show Paper Steps):

Way 2 (2nd Method / Check):

CHALLENGE • [ ] +10 (1 Way) [ ] +20 (2 Ways) **Ans:** _____

TEXTBOOK MODEL: PAPER / GRAPH / FORMULA

Section 3.5 — Practice B: Modeling Real Life (Solving Percent Problems, Discounts & Conversions)

Textbook Ways: Find Discount & Subtract | Multiply by Remaining % | Percent Proportion / Ratio Bar Name: _____ Date: _____ Score: ____ / 100

WORKED EXAMPLE — PERCENT INCREASE & UNIT CONVERSION (2 TEXTBOOK WAYS = +20 PTS DOUBLE)

Problem: A robotics club grows from 250 to 325 members. Find the percent of increase, and convert a 32-inch robot arm to centimeters (1 in = 2.54 cm).

WAY 1: Amount of Change ÷ Original Amount

Change = 325 - 250 = 75. Divide by original: 75 ÷ 250 = 0.30 = 30% increase. Conversion: 32 in × (2.54 cm / 1 in) = 81.28 cm.

WAY 2: Scale Ratio to 100 (or New ÷ Original)

75/250 = 15/50 = 30/100 = 30% (or 325 ÷ 250 = 130% → +30%). For 32 in: 30(2.54) + 2(2.54) = 76.2 + 5.08 = 81.28 cm.

Check: 250 + 0.30(250) = 250 + 75 = 325 members.

WATCH OUT: For percent change, ALWAYS divide the change by the ORIGINAL starting amount — never the new ending amount!

Answer: 30% increase; 81.28 cm

CHECK YOUR WORK ON THE SC-6 CALCULATOR — SECTION 3.5 PRACTICE B (SOLVE BY HAND FIRST, THEN VERIFY!)

Worked Example SC-6 Check Keystrokes:

2 5 0 ENTER 3 2 5 g %CHG 3 2 f ▶cm

Find the percent change and unit conversion on paper first. On your SC-6, type 250 [ENTER] 325 [g][%CHG] to verify +30%, and 32 [f][→cm] to convert 32 inches to 81.28 cm!

When a $100 bike helmet bundle went on sale for 20% off and Priya had an extra coupon for '10% off the sale price,' she confidently added 20% + 10% = 30% off and expected to pay $70. When the register rang up $72 instead, she thought the store had overcharged her! Writing out the two steps on paper, she saw why: the first 20% off dropped the $100 price to $80, and the extra 10% coupon came off that new $80 sale price (10% of $80 is $8, leaving $72). She realized you always have to ask what starting 'whole' a percent is being taken from.

SECTION 3.5 PRACTICE B — MODELING REAL LIFE & APPLICATIONS

100-PT GOAL: Any 5 in 2 Ways (+20) OR All 10 in 1 Way (+10)!

1 **Gaming Headset Deal: A $75 wireless headset is on sale for 20% off. What is the discount amount, and what is the sale price?**

Starter Step 1: Multiply $75 × 0.20 to find the 20% discount amount, then subtract it from $75 (or multiply $75 × 0.80).

Way 1 (Paper Work):

Part = % × Whole: ___ × ___ = ___

Orig: _____ ± %Amt: _____ = _____

WARM-UP • [ ] +10 (1 Way) [ ] +20 (2 Ways) **Ans:** _____

2 **Team Dinner Tip: A team dinner costs $64.00 before tip. Your family leaves a 15% tip. What is the tip amount, and what is the total bill?**

Starter Step 1: Find 15% of $64.00 (find 10% + 5%, or multiply $64 × 0.15), then add the tip to $64.00.

Way 1 (Paper Work):

Part = % × Whole: ___ × ___ = ___

Orig: _____ ± %Amt: _____ = _____

WARM-UP • [ ] +10 (1 Way) [ ] +20 (2 Ways) **Ans:** _____

3 **Sales Tax Checkout: You buy a $48.00 build plate plus 7.5% sales tax. Find the tax amount and the total cost.**

Way 1 (Paper Work):

Part = % × Whole: ___ × ___ = ___

Orig: _____ ± %Amt: _____ = _____

CORE • [ ] +10 (1 Way) [ ] +20 (2 Ways) **Ans:** _____

4 **Wildlife Sanctuary Bald Eagle Recovery: A sanctuary's nesting eagle count rose from 40 pairs last year to 52 pairs this year. What is the percent of increase?**

Way 1 (Paper Work):

Part = % × Whole: ___ × ___ = ___

Orig: _____ ± %Amt: _____ = _____

CORE • [ ] +10 (1 Way) [ ] +20 (2 Ways) **Ans:** _____

5 **Winter Jacket Clearance: A jacket was marked down from $90 to $63. What is the percent of decrease?**

Way 1 (Show Paper Steps):

Way 2 (2nd Method / Check):

CORE • [ ] +10 (1 Way) [ ] +20 (2 Ways) **Ans:** _____

6 **Race Distance Conversion: How many kilometers are in a 10-mile race? (Use 1 mi ≈ 1.609 km.)**

Way 1 (Show Paper Steps):

Way 2 (2nd Method / Check):

CORE • [ ] +10 (1 Way) [ ] +20 (2 Ways) **Ans:** _____

7 **Luggage Weight: Your suitcase weighs 20 kilograms. How many pounds does it weigh? (Use 1 kg ≈ 2.205 lb.)**

Way 1 (Show Paper Steps):

Way 2 (2nd Method / Check):

CORE • [ ] +10 (1 Way) [ ] +20 (2 Ways) **Ans:** _____

8 **Water Jug Capacity: A sports jug holds 1 gallon of water. How many liters is that (1 gal ≈ 3.79 L), and how many fluid ounces (1 gal = 128 fl oz)?**

Way 1 (Show Paper Steps):

Way 2 (2nd Method / Check):

CORE • [ ] +10 (1 Way) [ ] +20 (2 Ways) **Ans:** _____

9 **Successive Discounts: A $100 bike is on sale for 20% off, and you have an additional 10%-off coupon that applies to the sale price. What is the final price, and why is it not $70?**

Way 1 (Show Paper Steps):

Way 2 (2nd Method / Check):

CHALLENGE • [ ] +10 (1 Way) [ ] +20 (2 Ways) **Ans:** _____

10 **Temperature Lab: Room temperature in a science lab is 20°C. What is this temperature in degrees Fahrenheit? (Use F = 1.8C + 32.)**

Way 1 (Show Paper Steps):

Way 2 (2nd Method / Check):

CHALLENGE • [ ] +10 (1 Way) [ ] +20 (2 Ways) **Ans:** _____

SUMMATIVE QUIZ: 10 ITEMS × 10 PTS = 100

Unit 3 Mastery Quiz: Ratios, Rates & Percents

Directions: Show all paper steps in each box (+6 pts work, +4 pts answer). Name: _____ Date: _____ Score: ____ / 100

ASSESSMENT BREAKDOWN: #1–#6 CORE FLUENCY (60 PTS) • #7–#9 REAL-LIFE APPLICATIONS (30 PTS) • #10 ERROR ANALYSIS (10 PTS)

Standards Assessed: CCSS 6.RP.A.1–3 • TEKS 6.4B–H, 6.5B • FL MA.6.AR.3.1–5 • MathCounts & TMSCA Ratios, Rates & Percents

1 CORE FLUENCY (SEC 3.1) • 10 PTS

Write the ratio 18 : 24 in simplest form and find an equivalent ratio with second term 40.

[ ] Work (+6) [ ] Ans (+4) Ans: _____

2 CORE FLUENCY (SEC 3.2) • 10 PTS

In a ratio table, if 4 laps take 10 minutes, how many minutes do 14 laps take at the same rate?

[ ] Work (+6) [ ] Ans (+4) Ans: _____

3 CORE FLUENCY (SEC 3.3) • 10 PTS

Find the unit rate in miles per gallon: 270 miles driven on 12 gallons of gas.

[ ] Work (+6) [ ] Ans (+4) Ans: _____

4 CORE FLUENCY (SEC 3.4) • 10 PTS

Write the fraction 3/8 as an exact decimal and as a percent.

[ ] Work (+6) [ ] Ans (+4) Ans: _____

5 CORE FLUENCY (SEC 3.5) • 10 PTS

Find 35% of 80.

[ ] Work (+6) [ ] Ans (+4) Ans: _____

6 CORE FLUENCY (SEC 3.5) • 10 PTS

18 is 24% of what number?

[ ] Work (+6) [ ] Ans (+4) Ans: _____

7 REAL LIFE (SEC 3.1) • 10 PTS

Bronze alloy is mixed in a copper-to-tin ratio of 5 : 2. If a batch has 35 kg of total alloy, how many kilograms of copper are in the batch?

[ ] Work (+6) [ ] Ans (+4) Ans: _____

8 REAL LIFE (SEC 3.3) • 10 PTS

Store A sells 5 avocados for $6.25. Store B sells 8 avocados for $9.60. Which store has the lower unit price, and what is that price?

[ ] Work (+6) [ ] Ans (+4) Ans: _____

9 REAL LIFE (SEC 3.5) • 10 PTS

A $60 backpack is on sale for 25% off. What is the sale price before tax?

[ ] Work (+6) [ ] Ans (+4) Ans: _____

10 ERROR ANALYSIS (SEC 3.1) • 10 PTS

In a club with 12 boys and 18 girls, Leo says the ratio of boys to the whole club is 12 : 18 = 2 : 3. Explain the mistake and write the true ratio.

[ ] Work (+6) [ ] Ans (+4) Ans: _____

Unit 3: Ratios, Rates & Percents — Practice A & B Complete Key

Big Ideas Math Grade 6 — Chapters 3, 4 & 5 (Ratios, Rates & Percents) • Concept → Blocks (When Applicable: Prime Factor, Fraction & Place Value Blocks) → Calculator

1. Concept (Stack Approach): Ratios, unit rates, and percents are multiplicative comparisons. Keeping Y and X paired preserves the two quantities being compared across scaling steps.

2. Blocks (Prime Factor, Fraction & Place Value): Use the Prime Factor A1..A6 / B1..B5 lid sockets to build equal-tower Tape Diagrams (e.g., [2][2]=4 per socket), remove shared GCF prime blocks to simplify ratios, and stack identical scale-factor blocks across columns for Ratio Tables.

3. Calculator (SC-6): Simplify ratios on Y:X with [g][a:b], step through ratio tables with [g][REP], swap upside-down unit rates with [x swap y], and toggle forms with [FDISP].



SEC 3.1 (pp.26-27): RATIOS AND TAPE DIAGRAMS

Methods: W1: Tape Diagram (Equal Boxes) | W2: Equivalent Ratio Fraction | W3: Divide by GCF

PRACTICE A (p.26): KEY IDEAS (#1-#10) — ExA: Part-to-Part = 3:2; Part-to-Whole = 3:5		PRACTICE B (p.27): REAL LIFE (#1-#10) — ExB: 20 wins (and 12 losses)	
A1: 2 : 3 (Ratio(12:18)) Check: 12 [ENT] 18 [g][a:b]	**A2: 3 : 2 (Ratio(24:16))** Check: 24 [ENT] 16 [g][a:b]	B1: Part-to-Part = 3:2; Part-to-Whole = 3:5 (Ratio(15:10)) Check: 15 [ENT] 10 [g][a:b]	**B2: 16 strawberries, 12 bananas ((28 ÷ 7) × 4)** Check: 28 [ENT] 7 [÷] 4 [×]
A3: 2 : 5 (Ratio(4:10)) Check: 4 [ENT] 10 [g][a:b]	**A4: 18 and 24 (Total = 42) (4 × 6)** Check: 3 [ENT] 6 [×], 4 [ENT] 6 [×]	**B3: 6 cups yellow (21 cups total) ((15 ÷ 5) × 2)** Check: 15 [ENT] 5 [÷] 2 [×]	**B4: 35 secret and 25 open ((60 ÷ 12) × 7)** Check: 60 [ENT] 12 [÷] 7 [×]
A5: 4 L concentrate, 30 L water (34 ÷ 17) Check: 34 [ENT] 17 [÷] → 2/part	**A6: 20 dogs ((36 ÷ 9) × 5)** Check: 36 [ENT] 9 [÷] 5 [×]	**B5: 42 gold coins, 18 silver coins ((24 ÷ 4) × 7)** Check: 24 [ENT] 4 [÷] 7 [×]	**B6: 3 : 1 (Ratio(48:16))** Check: 48 [ENT] 16 [g][a:b]
A7: 25 seventh graders ((15 ÷ 3) × 5) Check: 15 [ENT] 3 [÷] 5 [×]	**A8: 30 electric guitars (12 acoustic) ((18 ÷ 3) × 5)** Check: 18 [ENT] 3 [÷] 5 [×]	**B7: 4 : 9 (16 out of 36) (Ratio(16:36))** Check: 16 [ENT] 36 [g][a:b]	**B8: 16 : 9 (Ratio(1920:1080))** Check: 1920 [ENT] 1080 [g][a:b]
A9: 48 gears and 36 gears (84 ÷ 7) Check: 84 [ENT] 7 [÷] → 12/box	**A10: 77 coins total (49 gold, 28 silver) ((21 ÷ 3) × 11)** Check: 21 [ENT] 3 [÷] 11 [×]	**B9: 150g almonds, 100g cashews, 250g raisins (500 ÷ 10)** Check: 500 [ENT] 10 [÷]	**B10: 3 : 4 (Ratio(24:32))** Check: 24 [ENT] 32 [g][a:b]

SEC 3.2 (pp.28-29): USING RATIO TABLES AND DOUBLE NUMBER LINES

Methods: W1: Multiplicative Scale Factor (Prime Blocks) | W2: Double Number Line / Repeated Addition | W3: Scale Down Then Up

PRACTICE A (p.28): KEY IDEAS (#1-#10) — ExA: 40 meters		PRACTICE B (p.29): REAL LIFE (#1-#10) — ExB: $75	
A1: 4:9, 8:18, 12:27, 16:36 (Repeat(+4), Repeat(+9)) Check: 4 [g][REP] [+], 9 [g][REP] [+]	**A2: 63 ((28 ÷ 4) × 9)** Check: 28 [ENT] 4 [÷] 9 [×]	**B1: 45 grams (15 × 3)** Check: 15 [ENT] 3 [×]	**B2: 56 scoops ((16 ÷ 2) × 7)** Check: 16 [ENT] 2 [÷] 7 [×]
A3: 25 ((60 ÷ 12) × 5) Check: 60 [ENT] 12 [÷] 5 [×]	**A4: 60 pages ((8 ÷ 2) × 15)** Check: 8 [ENT] 2 [÷] 15 [×]	**B3: $15 for 10 notebooks ((12 ÷ 4) × 5)** Check: 12 [ENT] 4 [÷] 5 [×]	**B4: 112 beats per minute (28 × 4)** Check: 28 [ENT] 4 [×]
A5: 48 ounces ((18 ÷ 3) × 8) Check: 18 [ENT] 3 [÷] 8 [×]	**A6: $15 ((12 ÷ 4) × 5)** Check: 12 [ENT] 4 [÷] 5 [×]	**B5: 260 gallons of sap (40 × 6.5)** Check: 40 [ENT] 6.5 [×]	**B6: 25 pounds (150 ÷ 6)** Check: 150 [ENT] 6 [÷]
A7: 84 beats ((60 ÷ 15) × 21) Check: 60 [ENT] 15 [÷] 21 [×]	A8: Ratios scale by multiplication (e.g., ×3 gives 9:15), not addition Check: 7 [ENT] 9 [g][a:b]	**B7: 15 cups of flour ((6 ÷ 2) × 5)** Check: 6 [ENT] 2 [÷] 5 [×]	**B8: 75 minutes (1 hr 15 min) ((90 ÷ 18) × 15)** Check: 90 [ENT] 18 [÷] 15 [×]
A9: 20 cups ((12 ÷ 3) × 5) Check: 12 [ENT] 3 [÷] 5 [×]	**A10: 40 miles ((14 ÷ 7) × 20)** Check: 14 [ENT] 7 [÷] 20 [×]	**B9: 8 inches ((60 ÷ 15) × 2)** Check: 60 [ENT] 15 [÷] 2 [×]	**B10: 30 lemons ((9 ÷ 3) × 10)** Check: 9 [ENT] 3 [÷] 10 [×]

SEC 3.3 (pp.30-31): RATES, UNIT RATES, AND COMPARING RATES

Methods: W1: Divide to Find the Unit Rate (1 Unit) | W2: Common Multiple Comparison | W3: Double Number Line

PRACTICE A (p.30): KEY IDEAS (#1-#10) — ExA: 63 words per minute		PRACTICE B (p.31): REAL LIFE (#1-#10) — ExB: Pack B ($1.40 per battery vs. $1.45 per battery)	
A1: 65 mph (195 ÷ 3) Check: 195 [ENT] 3 [÷]	**A2: $9 per hour (36 ÷ 4)** Check: 36 [ENT] 4 [÷]	**B1: 150 miles per hour (450 ÷ 3)** Check: 450 [ENT] 3 [÷]	**B2: Box B ($0.70/bar vs. $0.75/bar) (7.00 ÷ 10)** Check: 4.50 [ENT] 6 [÷] 7.00 [ENT] 10 [÷]
A3: $1.30 per pound (7.80 ÷ 6) Check: 7.80 [ENT] 6 [÷]	**A4: 15 grams per hour (90 ÷ 6)** Check: 90 [ENT] 6 [÷]	**B3: Spool B ($1.95 vs. $2.20 per 100g) (19.50 ÷ 10)** Check: 11 [ENT] 5 [÷] 19.50 [ENT] 10 [÷]	**B4: 15 gal/min; 375 gallons ((180 ÷ 12) × 25)** Check: 180 [ENT] 12 [÷] 25 [×]
A5: Supplier B ($0.17/oz vs. $0.18/oz) (3.24 ÷ 18; 4.08 ÷ 24) Check: 3.24 [ENT] 18 [÷]; 4.08 [ENT] 24 [÷]	**A6: 10-pack ($0.82/pen vs. $0.85/pen) (5.10 ÷ 6; 8.20 ÷ 10)** Check: 5.10 [ENT] 6 [÷]; 8.20 [ENT] 10 [÷]	**B5: B (57 taps/min vs. A's 55 taps/min) (285 ÷ 5)** Check: 220 [ENT] 4 [÷] 285 [ENT] 5 [÷]	**B6: Car A (28 mpg vs. 27 mpg) (405 ÷ 15)** Check: 336 [ENT] 12 [÷] 405 [ENT] 15 [÷]
A7: 300 miles ((210 ÷ 3.5) × 5) Check: 210 [ENT] 3.5 [÷] 5 [×]	**A8: Pump A (9 gal/min vs. 8 gal/min) (45 ÷ 5; 64 ÷ 8)** Check: 45 [ENT] 5 [÷]; 64 [ENT] 8 [÷]	**B7: $9 per dog → 11 dogs (99 ÷ (54 ÷ 6))** Check: 54 [ENT] 6 [÷] 99 [x swap y] [÷]	**B8: 12-pack ($0.42 vs. $0.45 each) (5.04 ÷ 12)** Check: 3.60 [ENT] 8 [÷] 5.04 [ENT] 12 [÷]
A9: 180 mm ((45 ÷ 15) × 60) Check: 45 [ENT] 15 [÷] 60 [×]	**A10: Car B by 1 mpg (29 mpg vs. 28 mpg) (168 ÷ 6; 232 ÷ 8)** Check: 168 [ENT] 6 [÷]; 232 [ENT] 8 [÷]	**B9: 4 inches per hour (14 ÷ 3.5)** Check: 14 [ENT] 3.5 [÷]	**B10: 4.5 m/s → 90 meters ((27 ÷ 6) × 20)** Check: 27 [ENT] 6 [÷] 20 [×]

SEC 3.4 (pp.32-33): PERCENTS, FRACTIONS, AND DECIMALS

Methods: W1: Equivalent Fraction over 100 | W2: Divide Numerator ÷ Denominator | W3: Percent Bar / Benchmark Model

PRACTICE A (p.32): KEY IDEAS (#1-#10) — ExA: 0.35 and 35%		PRACTICE B (p.33): REAL LIFE (#1-#10) — ExB: 75% (3/4 = 0.75)	
A1: 0.6 and 60% (3/5 → Dec/Frac) Check: [.] 3 [.] 5 [ENT] [FDISP]	**A2: 0.36 and 36% (9/25 → Dec/Frac)** Check: [.] 9 [.] 25 [ENT] [FDISP]	**B1: 0.85 = 85% (17/20 × 100)** Check: [.] 17 [.] 20 [FDISP] 100 [×]	**B2: 0.36 = 36% (9/25 × 100)** Check: [.] 9 [.] 25 [FDISP] 100 [×]
A3: 0.45 and 9/20 (45 ÷ 100) Check: 45 [ENT] 100 [÷] [FDISP]	**A4: 12.5% and 1/8 (0.125 → Dec/Frac)** Check: 0.125 [ENT] [FDISP]	**B3: 20 + 40 = 60 points (40% of 50 + 80% of 50)** Check: 50 [ENT] 40 [%] 50 [ENT] 80 [%] [+]	**B4: 104 students (65% of 160)** Check: 160 [ENT] 65 [%]
A5: 270 seats (60% of 450) Check: 450 [ENT] 60 [%]	**A6: 3,510 grams (65% of 5400)** Check: 5400 [ENT] 65 [%]	**B5: 0.15 and 3/20 (Simp(15/100))** Check: [.] 15 [.] 100 [g][SIMP]	**B6: 45 students total (18 ÷ 0.40)** Check: 18 [ENT] 0.40 [÷]
A7: 84% (42 ÷ 50) Check: 42 [ENT] 50 [÷]	**A8: 1.5 and 1 1/2 (150 ÷ 100)** Check: 150 [ENT] 100 [÷] [FDISP]	**B7: $9.00 (15% of 60)** Check: 60 [ENT] 15 [%]	**B8: 7/8 = 0.875 = 87.5% (21 ÷ 24)** Check: 21 [ENT] 24 [÷] [FDISP]
A9: 60%, 0.61, 5/8 (5/8 → Dec/Frac) Check: [.] 5 [.] 8 [FDISP] → 0.625	**A10: 1,400 mAh (35% of 4000)** Check: 4000 [ENT] 35 [%]	**B9: $480 goal (360 ÷ 0.75)** Check: 360 [ENT] 0.75 [÷]	**B10: 58% < 3/5 (60%) < 0.62 (62%) (3/5 → Dec/Frac)** Check: [.] 3 [.] 5 [FDISP]

SEC 3.5 (pp.34-35): SOLVING PERCENT PROBLEMS, DISCOUNTS & CONVERSIONS

Methods: W1: Find Discount & Subtract | W2: Multiply by Remaining % | W3: Percent Proportion / Ratio Bar

PRACTICE A (p.34): KEY IDEAS (#1-#10) — ExA: Discount = $15; Sale Price = $45		PRACTICE B (p.35): REAL LIFE (#1-#10) — ExB: 30% increase; 81.28 cm	
A1: Discount $17; Sale price $68 (20% of 85) Check: 85 [ENT] 20 [%] [-]	**A2: Tax $10.20; Total $130.20 (8.5% of 120)** Check: 120 [ENT] 8.5 [%] [+]	**B1: Discount = $15; Sale Price = $60 (20% of 75)** Check: 75 [ENT] 20 [%] [-]	**B2: Tip = $9.60; Total = $73.60 (15% of 64)** Check: 64 [ENT] 15 [%] [+]
A3: +400% ((75-15)÷15 = 400%) (%Chg(15→75)) Check: 15 [ENT] 75 [g][%CHG]	**A4: 25% decrease (%Chg(80→60))** Check: 80 [ENT] 60 [g][%CHG]	**B3: Tax = $3.60; Total = $51.60 (7.5% of 48)** Check: 48 [ENT] 7.5 [%] [+]	**B4: 30% increase (%Chg(40→52))** Check: 40 [ENT] 52 [g][%CHG]
A5: 25.4 cm (10 (to cm)) Check: 10 [f][→cm]	**A6: 20 in (50.8 (to in))** Check: 50.8 [g][→in]	**B5: 30% decrease (%Chg(90→63))** Check: 90 [ENT] 63 [g][%CHG]	**B6: 16.09 km (10 × 1.609344)** Check: 10 [ENT] 1.609344 [×]
A7: $39.20 (30% of 56) Check: 56 [ENT] 30 [%] [-]	**A8: 72 (18 ÷ 0.25)** Check: 18 [ENT] 0.25 [÷]	**B7: 44.09 lb (20 (to lb))** Check: 20 [g][→lb]	**B8: 3.79 liters; 128 fl oz (1 (to L))** Check: 1 [f][→L]
A9: $144 ($200 → $160 → $144) (10% of 20% of 200) Check: 200 [ENT] 20 [%] [-] 10 [%] [-]	**A10: 81.28 cm and 2.27 kg (32 (to cm); 5 (to kg))** Check: 32 [f][→cm]; 5 [f][→kg]	B9: $72 (10% is taken off $80, not $100) (10% of 20% of 100) Check: 100 [ENT] 20 [%] [-] 10 [%] [-]	**B10: 68°F (20 (to °F))** Check: 20 [g][→°F]

UNIT 03 MASTERY QUIZ KEY (p.114 • TEKS 6.4B-H, 6.5B): Q1: 3 : 4 and 30 : 40 Q2: 35 min Q3: 22.5 mpg Q4: 0.375 and 37.5% Q5: 28

Quiz Q6-Q10 Answers: Q6: 75 Q7: 25 kg Q8: Store B ($1.20) Q9: $45 Q10: Whole is 30 → 2 : 5