

Plan, Solve, Check

Use a plan, do the math, and test whether your answer makes sense.

GRADE 8 • 8.MP.1

8.MP.1 "Make sense of problems and persevere in solving them."

NAME _____

DATE _____

A PROBLEM-SOLVING PLAN

Read the question and identify needed facts. Choose a plan, solve, and check against the original conditions. If your first plan fails, try a table, a simpler case, or a revised choice. Explain how the revision helps.

WORKED EXAMPLE

The design club orders 18 button pins that cost \$4.50 each. What is the total cost?

1. Multiply the number of pins by the cost per pin: 18×4.50 .
2. Calculate $18 \times 4.50 = 81.00$.
3. Check with an estimate: $20 \times 4.50 = 90$, so \$81.00 is reasonable.

Answer: \$81.00

PRACTICE 6 problems

- 1** A student has 900 MB of free space on a tablet. Three video files each need 250 MB. Will all the files fit? If so, how much free space will remain? Show a calculation that checks your answer.

ANSWER _____

- 2** The team has sold 46 tickets at \$7 each toward a \$400 goal. Choose an equation, table, or other plan to find the fewest additional tickets needed. Show why one fewer would fail.

ANSWER _____

- 3** After buying a game add-on, Nia's account balance is -\$12. She earns \$29 for helping a neighbor. What is her new balance? Check by using addition.

ANSWER _____

- 4** Jordan has made 40 of 64 free throws. If every next throw is made, how many more makes will bring the overall fraction to $\frac{2}{3}$? Choose a plan and check both the made and total counts.

ANSWER _____

- 5** A hoodie costs \$80 and is on sale for 15% off. What is the sale price? Estimate first to check that your answer is reasonable.

ANSWER _____

- 6** A phone plan begins with 2 GB of data. A student uses $\frac{3}{10}$ GB each day for 6 days. Is at least $\frac{1}{4}$ GB left? State the amount left and compare it to $\frac{1}{4}$ GB.

ANSWER _____

APPLY IT Show your work

1

The media club has a \$120 budget for equipment. The table lists its order. Can the club buy every item? Find the total cost and tell how far over or under budget it is. If the order is over budget, revise it by removing exactly two items of one type. Keep at least one of every type. Show a choice that works and check the revised total.

MEDIA CLUB EQUIPMENT ORDER

Item	Quantity	Price Each
USB drive	6	\$9
Headset	4	\$15
Adapter	3	\$8

ANSWER _____

2

Kai wants headphones that cost \$91. Kai already has \$35 and saves \$8 each week. How many whole weeks will Kai need to save enough money? Show an equation or a sequence of totals that checks your answer.

ANSWER _____

CHALLENGE One step up

For the school dance, student tickets cost \$6 and guest tickets cost \$9. The school sells 28 tickets and collects \$204. How many student tickets and guest tickets were sold? Explain how you know your numbers satisfy both facts. If you get stuck, test an all-student-ticket case first, then adjust it.

PRACTICE 1

A student has 900 MB of free space on a tablet. Three video files each need 250 MB. Will all the files fit? If so, how much free space will remain? Show a calculation that checks your answer.

Yes. Used space: $3(250) = 750$ MB.

Remaining: $900 - 750 = 150$ MB. Check: $750 + 150 = 900$ MB.

PRACTICE 2

The team has sold 46 tickets at \$7 each toward a \$400 goal. Choose an equation, table, or other plan to find the fewest additional tickets needed. Show why one fewer would fail.

One plan: $7(46 + n) \geq 400$. The team has \$322 and needs \$78 more; $78/7$ is just over 11. It needs 12 tickets: $58(7) = \$406$. One fewer gives $57(7) = \$399$, below the goal.

PRACTICE 3

After buying a game add-on, Nia's account balance is -\$12. She earns \$29 for helping a neighbor. What is her new balance? Check by using addition.

New balance: $-12 + 29 = \$17$. Addition check: $-12 + (12 + 17) = 0 + 17 = 17$.

PRACTICE 4

Jordan has made 40 of 64 free throws. If every next throw is made, how many more makes will bring the overall fraction to $2/3$? Choose a plan and check both the made and total counts.

One plan: $(40 + n)/(64 + n) = 2/3$. Then $120 + 3n = 128 + 2n$, so $n = 8$. Check: 48 made out of 72 total, and $48/72 = 2/3$. Accept a table or equivalent reasoning.

PRACTICE 5

A hoodie costs \$80 and is on sale for 15% off. What is the sale price? Estimate first to check that your answer is reasonable.

Estimate: 15% off lies between 10% and 20% off, so expect \$64 to \$72. Discount: $0.15(80) = \$12$. Sale price: $80 - 12 = \$68$, within that range.

PRACTICE 6

A phone plan begins with 2 GB of data. A student uses $3/10$ GB each day for 6 days. Is at least $1/4$ GB left? State the amount left and compare it to $1/4$ GB.

Used: $(3/10)(6) = 18/10$ GB. Left: $2 - 18/10 = 1/5$ GB. No: $1/5 = 4/20 < 5/20 = 1/4$. Check: $18/10 + 2/10 = 2$ GB.

APPLY IT 1

Original total \$138: \$18 over budget. One valid revision removes two \$9 USB drives, leaving 4 drives, 4 headsets, 3 adapters. Revised total: $4(9) + 4(15) + 3(8) = \$120$.

Another valid revision removes two \$15 headsets: 6 drives, 2 headsets, 3 adapters cost \$108. Removing two adapters saves only \$16 and leaves \$122, so that choice fails. Each valid choice keeps at least one of every type.

APPLY IT 2

7 whole weeks. Check: $35 + 8(7) = \$91$; after 6 weeks, $35 + 8(6) = \$83$, which is not enough. Amount still needed: $91 - 35 = \$56$. Divide by \$8 per week: $56/8 = 7$ weeks.

CHALLENGE

16 student tickets and 12 guest tickets. All 28 student tickets would raise $28(6) = \$168$. The extra \$36 requires $36/(9 - 6) = 12$ guest tickets. Check: $16 + 12 = 28$ and $16(6) + 12(9) = 204$.

Accept equivalent valid plans and checks. In Apply It 1, require a revision removing exactly two items of one type, meeting the budget and retaining each type. The challenge models perseverance through a simpler starting case and adjustment. Practice 2 and 4 invite a chosen strategy; accept equations, tables, or coherent arithmetic plans.