Multi-Step Word Problem Unit
Grade 4

By Angela Ziegler
Multi-Step Word Problem Unit
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In this unit you will find:
- a complete, comprehensive unit plan
- 12, two-step word problems and solutions
- 6 word problems and solutions for students to analyze
- student Planning Sheet
- assessment and solutions

Suggestions:
- Make packets of student problems - copy and staple both sheets of problems and the sheet of problems to analyze.
- Make the Planning Sheet double-sided to provide students with ample work space.
- I've provided you with 12 problems, which is more than you will need for the duration of the unit but feel free to use as many as you’d like.
**Grade Level/Course:** Grade 4, Math  

**Lesson/Unit:** Solving Multi-Step Word Problems  

**Rationale:** Students need to know how to read, solve and interpret word problems in many facets of life, e.g., shopping, cooking, planning and organizing materials for projects, driving, traveling and banking.  

**Common Core Learning Standard** – 4.OA.A.3 – Solve multi-step word problems posed with whole numbers and having whole-number answers using the four operations, including problems in which remainders must be interpreted. Represent these problems using equations with a letter standing for the unknown quantity. Assess the reasonableness of answers using mental computation and estimation strategies including rounding.  

**“Kid Friendly” Language:** I can solve word problems with more than one step with addition, subtraction, multiplication or division and figure out what to do with remainders. I can use equations with letters that stand for unknown amounts. I can check and explain my answers using mental math, estimating and rounding.  

**Focus Area:** Multi-Step Word Problems  

**Nouns:** word problems, operations, problems, equations, letters, unknown quantity, answers, mental computation, estimation strategies, rounding  

**Verbs:** solve, use, represent, assess  

**Vocabulary:** multi-step, operations, represent, equations, unknown quantity, mental computation, estimation, rounding  

**Activity/Lesson:**  

Day 1: Hand out question packets. Post one of the multi-step word problems on your SMART Board, document camera, chart paper, white board or chalkboard. Students should locate that same problem in their packets. Have students solve with just a pencil. Discuss solutions and strategies. Discuss other strategies, such as highlighting, excluding unnecessary information, and formulating a plan, and let students know that they will be trying these strategies next time.  

Day 2: Post a multi-step word problem. Students should locate that same problem in their packets. Have students highlight important information and cross out unnecessary information in their packets as you do the same on the posted example. Students will take “private think time” to develop a plan and then share with a partner to compare plans. Students should discuss how they determined which operations to use. Students will carry out plans independently and share strategies with the group.  

Day 3: Repeat the process from day 2 but introduce the Planning Sheet. Discuss how to use letters for the unknown in word problems and review how to estimate the reasonableness of their answers. Let students complete a few problems using all strategies (highlighting, crossing out unnecessary information, using the planning sheet, creating equations with unknowns and estimating before solving).  

Day 4: Give students examples of problems that were solved incorrectly (provided for you). Have them work with partners to determine the mistakes that were made and how each problem can be corrected.  

Day 5: Assessment – 4, multi-step word problems. These problems will assess students’ abilities to choose the correct operations and use appropriate strategies when solving problems.  

**Assessments:** paper and pencil assessment of 4, multi-step word problems, in which students have to determine the operations necessary to solve the problems, find the answers and show their work  

**Materials/Resources:** packets of questions, planning sheets, highlighters, pencils, assessments  

**Timeframe:** 1 week – 5, 30 minute sessions
1. Chris and his friends collect bugs. Chris caught 5 times as many bugs as Mike, who caught 4 more than Paul. If Paul caught 13 bugs, how many did Chris catch?

2. Julie rakes 4 lawns on Saturdays and 3 on Sundays. Each lawn takes her 20 minutes and she makes $3 for each one. If the ant farm Julie wants to buy costs $45, how many weekends will she need to rake lawns to earn enough money to buy her ant farm?

3. 4th grade students at Smith Elementary are going on a field trip to a nature preserve. They hope to see at least 10 different kinds of bugs while they are there. If there are 76 students, 2 teachers and 3 parents attending the trip, and tour guides can take groups no larger than 6, how many tour guides will be needed for all people to take the tour?

4. Brandon’s lizard eats 12 crickets, twice a day. If crickets are 3 cents each, how much money does Brandon spend on crickets every week?

5. Marie and her 10 family members saw 5 spiders, 7 ants and 6 lady bugs at her picnic. How many legs do these bugs have all together?

6. Tyler wants to buy a microscope to study bugs. He has already saved $35 but the microscope costs $75. If Tyler washes cars for $5 each, how many more cars will he need to wash to make enough money to buy his microscope?

Name: ____________________________
1. Chris and his friends collect bugs. Chris caught 5 times as many bugs as Mike, who caught 4 more than Paul. If Paul caught 13 bugs, how many did Chris catch?

\[ M = P + 4 \]
\[ M = 13 + 4 \]
\[ M = 17 \text{ bugs} \]

\[ C = 5 \times M \]
\[ C = 5 \times 17 \]
\[ C = 85 \text{ bugs} \]

Chris caught 85 bugs.

2. Julie rakes 4 lawns on Saturdays and 3 on Sundays. Each lawn takes her 20 minutes and she makes $3 for each one. If the ant farm Julie wants to buy costs $45, how many weekends will she need to rake lawns to earn enough money to buy her ant farm?

\[ 4 + 3 = 7 \]
\[ W = 3 \times 7 \]
\[ W = 21 \text{ per weekend} \]

\[ 21 + 21 = 42, \text{ which is not quite enough, so Julie will need to rake for 3 weekends to earn enough money to buy her ant farm.} \]

3. 4th grade students at Smith Elementary are going on a field trip to a nature preserve. They hope to see at least 10 different kinds of bugs while they are there. If there are 76 students, 2 teachers and 3 parents attending the trip, and tour guides can take groups no larger than 6, how many tour guides will be needed for all people to take the tour?

\[ 76 + 2 + 3 = 81 \]
\[ T = 81 \div 6 \]
\[ T = 13 \text{ r } 3 \]

14 tour guides will be needed for all 81 people to take the tour.

4. Brandon’s lizard eats 12 crickets, twice a day. If crickets are 3 cents each, how much money does Brandon spend on crickets every week?

\[ 12 \times 2 = 24 \text{ crickets per day} \]
\[ 24 \times 3 = 72 \text{ cents per day} \]
\[ W = 72 \times 7 \]
\[ W = 504 \text{ cents per week, which is the same as } $5.04 \]

Brandon’s spends $5.04 on crickets each week.

5. Marie and her 10 family members saw 5 spiders, 7 ants and 6 lady bugs at her picnic. How many legs do these bugs have all together?

\[ S = 5 \times 8 \]
\[ 40 \text{ spider legs} \]

\[ A = 7 \times 6 \]
\[ 42 \text{ ant legs} \]

\[ A = 42 \text{ ant legs} \]

\[ L = 6 \times 6 \]
\[ 36 \text{ ant legs} \]

\[ A = 36 \text{ ant legs} \]

There are 118 legs in all.

6. Tyler wants to buy a microscope to study bugs. He has already saved $35 but the microscope costs $75. If Tyler washes cars for $5 each, how many more cars will he need to wash to make enough money to buy his microscope?

\[ 75 - 35 = 40 \]
\[ C = 40 \div 5 \]
\[ C = 8 \]

Tyler will need to wash 8 more cars.
### Multi-Step Word Problems (2)

7. Jamie read 3, 22 page books about spiders and 4, 15 page books about centipedes. It took her 6 days to complete all of her reading. About which bug did she read more pages? How many more pages?

8. Alex and Shane collected data about the bugs they saw last weekend. They saw a total of 12 bugs. They saw 3 ants, 5 lady bugs and the rest were spiders. What fraction of the bugs that Alex and Shane saw were spiders?

9. Jocelyn wrote an essay about grasshoppers. \( \frac{1}{5} \) of the essay was her introduction and \( \frac{2}{5} \) of her essay contained details. The rest of the essay was her conclusion. Jocelyn’s conclusion was what fraction of her essay?

10. Bobby learned that there are 43,678 species of spiders in the world. He also learned that there are about 22,599 species of ants. If the total number of spider, ant and grasshopper species is approximately 77,281, how many species of grasshoppers are there?

11. Sam watched a week-long special on praying mantises. The program was a total of 420 minutes. If he watched \( \frac{1}{3} \) of the program on one day and the rest of the program over a span of 2 days, how many minutes is \( \frac{3}{4} \) of the program?

12. Ella went to the zoo and saw cockroaches, spiders, and moths. She was there for 3 hours. She saw 3 times as many spiders as cockroaches and twice as many moths as cockroaches. If Ella saw 5 cockroaches, how many bugs did she see altogether?
7. Jamie read 3, 22 page books about spiders and 4, 15 page books about centipedes. It took her 6 days to complete all of her reading. About which bug did she read more pages? How many more pages?

- 22 x 3 = 66 pages about spiders
- 4 x 15 = 60 pages about centipedes

Jamie read 6 more pages about spiders.

8. Alex and Shane collected data about the bugs they saw last weekend. They saw a total of 12 bugs. They saw 3 ants, 5 lady bugs and the rest were spiders. What fraction of the bugs that Alex and Shane saw were spiders?

- 3 + 5 = 8
- 12 - 8 = 4 spiders
- 4 is \( \frac{1}{3} \) of 12 because 4 + 4 + 4 = 12
- \( \frac{1}{3} \) of the bugs that Alex and Shane saw were spiders.

9. Jocelyn wrote an essay about grasshoppers. \( \frac{1}{5} \) of the essay was her introduction and \( \frac{2}{5} \) of her essay contained details. The rest of the essay was her conclusion. Jocelyn’s conclusion was what fraction of her essay?

- \( \frac{1}{5} + \frac{2}{5} = \frac{3}{5} \)
- \( C = \frac{5}{5} - \frac{3}{5} \)
- \( C = \frac{2}{5} \)

Jocelyn’s conclusion is \( \frac{2}{5} \) of her essay.

10. Bobby learned that there are 43,678 species of spiders in the world. He also learned that there are about 22,599 species of ants. If the total number of spider, ant and grasshopper species is approximately 77,281, how many species of grasshoppers are there?

- 43,678 + 22,599 = 66,277
- 77,281 - 66,277 = 11,004

There are about 11,004 species of grasshoppers.

11. Sam watched a week-long special on praying mantises. The program was a total of 420 minutes. If he watched \( \frac{1}{3} \) of the program on one day and the rest of the program over a span of 2 days, how many minutes is \( \frac{3}{5} \) of the program?

- 420 ÷ 3 = 140 minutes
- P = 140 + 140
- P = 280 minutes

280 minutes is \( \frac{3}{5} \) of the program.

12. Ella went to the zoo and saw cockroaches, spiders, and moths. She was there for 3 hours. She saw 3 times as many spiders as cockroaches and twice as many moths as cockroaches. If Ella saw 5 cockroaches, how many bugs did she see altogether?

- S = 3 x C
- M = 2 x C
- B = C + S + M
- S = 3 x 5
- M = 2 x 5
- B = 5 + 15 + 10
- S = 15 spiders
- M = 10 moths
- B = 30 bugs

Ella saw 30 bugs at the zoo.
**Directions:** Read each two-step word problem and solution below. If the solution is correct, give that problem a star or smiley face. If the solution is incorrect, find the mistake and fix it. Cross out the incorrect work and write the correct answer.

1. James wanted to put an insect border around his room. His room is 9ft long and 8ft wide. His room is also 8 feet tall. If he wants to go around the top and bottom of his room, how many feet of border will James need?

   \[9 + 9 + 8 + 8 = 34\text{ft}\]
   \[B = 34 + 34\]
   \[B = 68\text{ft}\]

   James will need 68 ft of border.

2. To make money to buy a tarantula and a tank for her room, Sarah has decided to rake lawns. She will make \$7 for each lawn she rakes. If the tank costs \$22 and the tarantula costs \$15, how many lawns will Sarah need to rake to make enough money to buy what she wants?

   \[22 + 15 = 37\]
   \[7 \times L = 37\]
   \[7 \times 5 = 35, \text{ which is close to 37 without going over}\]
   \[L = 5 \text{ lawns}\]

   Sarah will need to rake 5 lawns.

3. Emma bought 48 crickets at \$0.05 each. If her lizard eats \(\frac{2}{6}\) of the crickets in the morning and double that amount in the evening, how many crickets does Emma’s lizard eat in the evening?

   \[48 \div 6 = 8\]
   \[\frac{1}{6} \text{ of 48 is 8 so } \frac{2}{6} \text{ of 48 is 16 because } 8 + 8 = 16.\]
   \[\text{If } \frac{2}{6} \text{ of 48 is 16 then doubling gives us } \frac{4}{6}.\]

   Emma’s lizard eats \(\frac{4}{6}\) of the crickets in the evening.

4. Peter’s insect collection includes 36 specimens, which is 4 times as many as his friend’s collection and 3 times as many as his brother’s. How many specimens do Peter’s friend and brother have in all?

   \[36 \times 4 = F\]
   \[36 \times 3 = B\]
   \[F = 144 \text{ specimens}\]
   \[B = 108 \text{ specimens}\]
   \[144 + 108 = 252 \text{ specimens}\]

   Peter’s friend and brother have 252 specimens in all.

5. Johnny collects bug shirts. Each shirt costs \$12. If Johnny has \$100, how many bug shirts can he buy? If Johnny saved \$10 per month, how long did it take him to save enough money to buy that many shirts?

   \[\$100 \div 12 = S\]
   \[S = 8r4\]

   Johnny can buy 8 shirts with \$100.

   \[\$100 \div \$10 = 10 \text{ months}\]

   It took Johnny 10 months to save enough money to buy 8 shirts.

6. Thomas has 3 chameleons. Each one eats 7 crickets per meal. They eat twice a day. Each meal takes 30 minutes. If crickets are 5 cents each, how much does it cost Thomas to feed his chameleons each week?

   \[7 \times 2 = 14 \text{ crickets per chameleon, per day}\]
   \[14 \times 3 = 42 \text{ crickets total, per day}\]
   \[42 \times 5 = 210 \text{ cents, or } \$2.10 \text{ per day}\]

   It costs Thomas \$2.10 per day to feed his chameleons.
1. James wanted to put an insect border around his room. His room is 9ft long and 8ft wide. His room is also 8 feet tall. If he wants to go around the top and bottom of his room, how many feet of border will James need?

\[9+9+8+8=34\text{ft}\]

B=34+34

B=68ft

James will need 68 ft of border.

2. To make money to buy a tarantula and a tank for her room, Sarah has decided to rake lawns. She will make $7 for each lawn she rakes. If the tank costs $22 and the tarantula costs $15, how many lawns will Sarah need to rake to make enough money to buy what she wants?

22+15=37

7xL=37

7x5=35, which is close to 37 without going over

L=5 lawns

Sarah will need to rake 5 lawns.

3. Emma bought 48 crickets at $0.05 each. If her lizard eats \(\frac{2}{6}\) of the crickets in the morning and double that amount in the evening, how many crickets does Emma’s lizard eat in the evening?

\[48 \div 6 = 8\]

\(\frac{1}{6}\) of 48 is 8 so \(\frac{2}{6}\) of 48 is 16 because 8+8=16.

If \(\frac{2}{6}\) of 48 is 16 then doubling gives us \(\frac{4}{6}\).

Emma’s lizard eats \(\frac{4}{6}\) of the crickets in the evening.

4. Peter’s insect collection includes 36 specimens, which is 4 times as many as his friend’s collection and 3 times as many as his brother’s. How many specimens do Peter’s friend and brother have in all?

36x4=F

36x3=B

F=144 specimens

B=108 specimens

144+108=252 specimens

Peter’s friend and brother have 252 specimens in all.

5. Johnny collects bug shirts. Each shirt costs $12. If Johnny has $100, how many bug shirts can he buy? If Johnny saved $10 per month, how long did it take him to save enough money to buy that many shirts?

\$100 \div 12 = 5

S=8r4

Johnny can buy 8 shirts with $100.

\$100 \div \$10 = 10 months

It took Johnny 10 months to save enough money to buy 8 shirts.

6. Thomas has 3 chameleons. Each one eats 7 crickets per meal. They eat twice a day. Each meal takes 30 minutes. If crickets are 5 cents each, how much does it cost Thomas to feed his chameleons each week?

7x2=14 crickets per chameleon, per day

14x3=42 crickets total, per day

42x5=210 cents, or $2.10 per day

It costs Thomas $2.10 per day to feed his chameleons.
<table>
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<tr>
<th>Equation with unknown - What am I looking for?</th>
<th>Estimate - What is reasonable?</th>
<th>Plan - Which operation should I choose and why?</th>
<th>Solution - Solve the problem and show your work.</th>
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</table>
1. Christina is setting up an ant farm in her room. Her room is 8 feet tall. The length and width of the tank are \(\frac{1}{3}\) the length and width of the table she plans to put it on. If the length of the table is 21 inches and the width of the table is 15 inches, what is the area of the tank?

2. Allen and his dad went on a nature hike. They were gone for 2 hours and saw 36 bugs. If \(\frac{1}{4}\) of the bugs they saw were spiders, how many spiders did Allen and his dad see? What fraction of the bugs were not spiders?

3. Chuck read 12 books about bugs. Alison read 6 times as many books as Chuck did. Mariah read \(\frac{1}{3}\) as many books as Alison read. How many books did Mariah read?

4. Jessica learned that there are about 44,000 species of spiders in the world. She also learned that there are about 3,540 species of mosquitoes and about 18,430 species of butterflies. About how many more species of spiders are there than butterflies and mosquitoes put together?
1. Christina is setting up an ant farm in her room. Her room is 8 feet tall. The length and width of the tank are \( \frac{1}{3} \) the length and width of the table she plans to put it on. If the length of the table is 21 inches and the width of the table is 15 inches, what is the area of the tank?

\[
\begin{align*}
21 \div 3 &= 7 \text{ inches} \\
15 \div 3 &= 5 \text{ inches} \\
A &= 7 \times 5 \\
A &= 35 \text{ square inches}
\end{align*}
\]

The area of the tank is 35 square inches.

2. Allen and his dad went on a nature hike. They were gone for 2 hours and saw 36 bugs. If \( \frac{1}{4} \) of the bugs they saw were spiders, how many spiders did Allen and his dad see? What fraction of the bugs were not spiders?

\[
\begin{align*}
S &= 36 \div 4 \\
S &= 9 \text{ spiders} \\
\frac{3}{4} - \frac{1}{4} &= \frac{3}{4} \\
\frac{3}{4} \text{ of the bugs were not spiders.}
\end{align*}
\]

3. Chuck read 12 books about bugs. Alison read 6 times as many books as Chuck did. Mariah read \( \frac{1}{3} \) as many books as Alison read. How many books did Mariah read?

\[
\begin{align*}
A &= 12 \times 6 \\
A &= 72 \text{ books} \\
M &= 72 \div 3 \\
M &= 24 \text{ books} \\
\text{Mariah read 24 books.}
\end{align*}
\]

4. Jessica learned that there are about 44,000 species of spiders in the world. She also learned that there are about 3,540 species of mosquitoes and about 18,430 species of butterflies. About how many more species of spiders are there than butterflies and mosquitoes put together?

\[
\begin{align*}
T &= 18,430 + 3,540 \\
T &= 21,970 \text{ butterflies and mosquitoes} \\
S &= 44,000 - 21,970 \\
S &= 22,030 \\
\text{There are about 22,030 more species of spiders than butterflies and mosquitoes put together.}
\end{align*}
\]
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