

*The* CHARLOTTE MASON  
JUNIOR MATH SERIES

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P R E - A L G E B R A



SOLUTIONS GUIDE

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ART MIDDLEKAUFF

*Simply*  
*Charlotte Mason*

The Charlotte Mason  
Junior Math Series

*Pre-Algebra*

Solutions Guide

by Art Middlekauf

The Charlotte Mason Junior Math Series: Pre-Algebra  
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# Introduction

Some parents feel less confident in upper level math concepts; others don't have the time to refresh their memories on particular concepts. Whatever your situation, this convenient and complete solutions guide will provide what you need as the terrain in the mountainous land of mathematics becomes more challenging.

As your student progresses, the math becomes more complex and the problems or exercises often involve multiple steps. The full working of every assigned math problem or exercise in *The Charlotte Mason Junior Math Series: Pre-Algebra* is included here so you can see all of the steps involved in solving them, not just the answers.

Use the solutions to help you successfully guide your student. If your student reads through a math problem or exercise and is unsure how to go about solving it, you can refer to the solutions and offer guidance about where to begin. You can also use them if your student happens to end up at the wrong answer for a problem. It can be very helpful to retrace the steps she took and, together, discover where she got off track. The full solutions provided in this book will enable you to quickly and confidently guide that discovery process. Keep in mind that, in many cases, there are multiple paths a student can take to arrive at a correct answer, and that path may differ from the one outlined in this guide. As long as your student can explain her approach, do not worry about each step matching this guide's presentation.

The amount of independent work will increase as your student continues through the Charlotte Mason math studies. You can encourage her in the habits of perseverance, thoroughness, and honesty by keeping these answers in a separate location not easily accessed without your permission.



# Answers

## Adding Numbers with the Same Sign *p. 28*

1.  $-114$     2.  $+83$     3.  $-112$     4.  $-102$     5.  $-55$   
6.  $-101$     7.  $+65$     8.  $+59$     9.  $-65$     10.  $-125$   
11.  $+4$     12.  $+2\frac{1}{9}$     13.  $-1\frac{13}{36}$     14.  $-3\frac{3}{8}$     15.  $-4\frac{3}{7}$   
16.  $+7.85$     17.  $+8.77$     18.  $+5.23$     19.  $-5.41$     20.  $-2.62$

## Adding Two Numbers with Different Signs *p. 31*

1.  $-48$     2.  $-36$     3.  $-8$     4.  $-16$     5.  $+8$   
6.  $+791$     7.  $-261$     8.  $-743$     9.  $-182$     10.  $+552$   
11.  $+1\frac{1}{12}$     12.  $+\frac{1}{6}$     13.  $+\frac{3}{5}$     14.  $-\frac{1}{4}$     15.  $-\frac{8}{21}$   
16.  $-26.3$     17.  $-61.11$     18.  $-16.22$     19.  $+22.02$     20.  $+11.9$

## Adding a List of Signed Numbers *p. 34*

1. Add  $+10, +19 = +29$   
Add  $-17, -8, -19, -6 = -50$   
 $50 - 29 = 21$   

$-21$
-------

2. Add  $+2, +13, +5, +7 = +27$

Add  $-19, -12 = -31$

$31 - 27 = 4$

$\boxed{-4}$

3. Add  $+5, +16 = +21$

Add  $-6, -14, -10, -11 = -41$

$41 - 21 = 20$

$\boxed{-20}$

4. Add  $+8, +10, +7 = +25$

Add  $-19, -14, -1 = -34$

$34 - 25 = 9$

$\boxed{-9}$

5. Add  $+4, +18 = +22$

Add  $-13, -3, -12, -2 = -30$

$30 - 22 = 8$

$\boxed{-8}$

6. Add  $+65, +36 = +101$

Add  $-86, -18, -72, -75 = -251$

$251 - 101 = 150$

$\boxed{-150}$

7. Add  $+5, +31, +82 = +118$

Add  $-81, -56, -28 = -165$

$165 - 118 = 47$

$\boxed{-47}$

8. Add  $+12, +43, +12, +45 = +112$

Add  $-73, -97 = -170$

$170 - 112 = 58$

$\boxed{-58}$

9. Add  $+449$ ,  $+204 = +653$

$$-563$$

$$653 - 563 = 90$$

$$\boxed{+90}$$

10.  $+24$

Add  $-128$ ,  $-909 = -1037$

$$1037 - 24 = 1013$$

$$\boxed{-1013}$$

11. Add  $+\frac{4}{5}$ ,  $+\frac{2}{5} = +\frac{6}{5}$

$$-\frac{3}{5}$$

$$\frac{6}{5} - \frac{3}{5} = \frac{3}{5}$$

$$\boxed{+\frac{3}{5}}$$

12.  $+\frac{1}{2}$

Add  $-1$ ,  $-\frac{3}{4} = -1\frac{3}{4}$

$$1\frac{3}{4} = \frac{7}{4}$$

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

$$\frac{7}{4} - \frac{2}{4} = \frac{5}{4} = 1\frac{1}{4}$$

$$\boxed{-1\frac{1}{4}}$$

13.  $+1\frac{1}{3} = +\frac{8}{6}$

$$-\frac{1}{3} = -\frac{2}{6}$$

$$-2\frac{1}{2} = -\frac{15}{6}$$

Add  $-\frac{2}{6}$ ,  $-\frac{15}{6} = -\frac{17}{6}$

$$\frac{17}{6} - \frac{8}{6} = \frac{9}{6} = \frac{3}{2} = 1\frac{1}{2}$$

$$\boxed{-1\frac{1}{2}}$$

## Using the Distributive Law with Subtraction p. 68

1.  $(-2 \times 6) + (-2 \times -9) + 4 - 10$

$$-12 + 18 + 4 - 10$$

$$22 - 22$$

$$\boxed{0}$$

2.  $(3 \times -3) + (3 \times 10) + (3 \times 8) + (3 \times 3)$

$$-9 + 30 + 24 + 9$$

$$63 - 9$$

$$\boxed{54}$$

3.  $6 + (-2) \times (-6 - 2) + (10 \times -3)$

$$6 + (-2 \times -6) + (-2 \times -2) + (-30)$$

$$6 + 12 + 4 - 30$$

$$22 - 30$$

$$\boxed{-8}$$

4.  $(4 \times 6) + (4 \times -2) - (-16)$

$$24 - 8 + 16$$

$$40 - 8$$

$$\boxed{32}$$

5.  $1 - 5 + 9 + (5 \times 4) + (5 \times 4)$

$$1 - 5 + 9 + 20 + 20$$

$$50 - 5$$

$$\boxed{45}$$

6.  $6 + (-63) + (10 \times -2) + (10 \times -7)$

$$6 - 63 - 20 - 70$$

$$6 - 153$$

$$\boxed{-147}$$

7.  $-7 + 10 - 9 \times 3 - 6 - 1$

$$-7 + 10 - 27 - 6 - 1$$

$$10 - 41$$

$$\boxed{-31}$$

$$\begin{aligned} 8. & (-5 \times 4) + (-5 \times 8) - 4 + 6 \times 4 \\ & -20 - 40 - 4 + 24 \\ & 24 - 64 \\ & \boxed{-40} \end{aligned}$$

$$\begin{aligned} 9. & (-2 \times -5) + (-4 \times -5) + (6 \times 2) + (6 \times 3) \\ & 10 + 20 + 12 + 18 \\ & \boxed{60} \end{aligned}$$

$$\begin{aligned} 10. & (3 \times 10) + (-6 \times 10) + (6 \times -10) + (-2 \times -10) \\ & 30 - 60 - 60 + 20 \\ & 50 - 120 \\ & \boxed{-70} \end{aligned}$$

$$\begin{aligned} 11. & (30 \times 2) + (73 \times 2) + (-368) \\ & 60 + 146 - 368 \\ & 206 - 368 \\ & \boxed{-162} \end{aligned}$$

$$\begin{aligned} 12. & (2 \times 28) + (-3 \times 28) - 66 - 78 \times 4 \\ & 56 - 84 - 66 - 312 \\ & 56 - 462 \\ & \boxed{-406} \end{aligned}$$

$$\begin{aligned} 13. & -92 + 12 + 2397 - 92 \\ & 2409 - 184 \\ & \boxed{2,225} \end{aligned}$$

$$\begin{aligned} 14. & -29 \times 26 + 15 + 6 \times 9 \\ & -754 + 15 + 54 \\ & 69 - 754 \\ & \boxed{-685} \end{aligned}$$

$$\begin{aligned} 15. & 43 + 71 + (4 \times -14) + (4 \times 18) \\ & 43 + 71 - 56 + 72 \\ & 186 - 56 \\ & \boxed{130} \end{aligned}$$

$$\begin{aligned}
 16. & -3.31 + 3.07 + (2 \times -9.4) + (2 \times 5.9) \\
 & -3.31 + 3.07 - 18.8 + 11.8 \\
 & 14.87 - 22.11 \\
 & \boxed{-7.24}
 \end{aligned}$$

$$\begin{aligned}
 17. & 3.48 - 2.48 + 46.431 \\
 & 49.911 - 2.48 \\
 & \boxed{47.431}
 \end{aligned}$$

$$\begin{aligned}
 18. & (-4.94 \times 5) + (0.3 \times 5) - 4.35 + 0.33 \\
 & -24.7 + 1.5 - 4.35 + 0.33 \\
 & 1.83 - 29.05 \\
 & \boxed{-27.22}
 \end{aligned}$$

$$\begin{aligned}
 19. & 1 - \frac{2}{5} + \frac{4}{5} + (5 \times \frac{1}{2}) + (5 \times -5) \\
 & 1 - \frac{2}{5} + \frac{4}{5} + \frac{5}{2} - 25 \\
 & \frac{10}{10} - \frac{4}{10} + \frac{8}{10} + \frac{25}{10} - \frac{250}{10} \\
 & \frac{43}{10} - \frac{254}{10} \\
 & -\frac{211}{10} \\
 & \boxed{-21\frac{1}{10}}
 \end{aligned}$$

$$\begin{aligned}
 20. & -\frac{2}{5} \times \frac{5}{3} + (-\frac{4}{5} \times \frac{3}{4}) + (\frac{4}{5} \times -\frac{2}{3}) \\
 & -\frac{2}{3} - \frac{3}{5} + \frac{8}{15} \\
 & \frac{8}{15} - \frac{19}{15} \\
 & \boxed{-\frac{11}{15}}
 \end{aligned}$$

## Repeated Multiplication *p.* 72

$$1. 5 \times 5 \times 5 = \boxed{125 \text{ letters}}$$

$$2. 3 \times 3 \times 3 \times 3 = \boxed{81 \text{ rectangles}}$$

$$3. 7 \times 7 \times 7 \times 7 \times 7 = \boxed{16,807 \text{ weeds}}$$

$$4. 4 \times 4 \times 4 \times 4 \times 4 = \boxed{1,024 \text{ people}}$$

$$5. 2 \times 2 \times 2 \times 2 \times 2 = \boxed{32 \text{ books}}$$

### Powers of Other Kinds of Numbers *p.* 78

$$1. \left(\frac{1}{2}\right)^3 = \boxed{\frac{1}{8} \text{ of the original size}}$$

$$2. \left(\frac{5}{6}\right)^4 = \boxed{\frac{625}{1296} \text{ of the air}}$$

$$3. 1.2^3 = \boxed{1.728 \text{ times more weeds}}$$

$$4. 1.5^3 = \boxed{3.375 \text{ magnification factor}}$$

$$5. -(2 \times 2 \times 2 \times 2) = \boxed{-16}$$

$$6. (-2) \times (-2) \times (-2) \times (-2) = \boxed{16}$$

$$7. -(3 \times 3 \times 3) = \boxed{-27}$$

$$8. (-3) \times (-3) \times (-3) = \boxed{-27}$$

$$9. \frac{2}{3} \times \frac{2}{3} \times \frac{2}{3} = \boxed{\frac{8}{27}}$$

$$10. \frac{2 \times 2 \times 2}{3} = \boxed{\frac{8}{3}}$$

$$11. (-1)^2 = 1; \quad (-1)^3 = -1; \quad (-1)^4 = 1; \quad (-1)^5 = \boxed{-1}$$
$$(-2)^2 = 4; \quad (-2)^3 = -8; \quad (-2)^4 = 16; \quad (-2)^5 = \boxed{-32}$$

The pattern is that odd powers are negative, while even powers are positive.

### Powers with Special Names *p.* 81

$$1. 6^2 \text{ in.}^2 = \boxed{36 \text{ in.}^2}$$

$$2. 2.5^2 \text{ cm}^2 = \boxed{6.25 \text{ cm}^2}$$

$$3. 5.1^2 \text{ m}^2 = \boxed{26.01 \text{ m}^2}$$

$$4. \left(\frac{2}{3}\right)^2 \text{ ft.}^2 = \boxed{\frac{4}{9} \text{ ft.}^2}$$