

## WordsWorth Plus 1 to 26

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Grab your favorite dictionary and play the game of **WordsWorth**. As you play, you'll learn about **permutations** of words called **reverses**, **palindromes**, **semordnilaps**, and **anagrams**.

**WordsWorth Plus 1 to 26** is one of the games in our *system* of word and math games beginning at first grade and spiraling up, up, and away. This unit is excerpted from a 20-page WordsWorth Plus unit that has word lists, a glossary, lots of teacher support, and more than 50 activities, including challenging investigations.

Most of the play in WordsWorth is **thinking**: knowing words, learning more words, and devising strategies for finding answers. People are well equipped to do this type of play. Some of the play is more mundane: looking up letter scores and adding them to get the WordsWorth of a word. First grade students might start with **base-10 blocks** as their **WordsWorth calculator**, and then move on to mental math and paper and pencil math as their addition skills improve by playing WordsWorth.

### WordsWorths of 2-Letter Words

Assign a **letter score** to each letter in the alphabet, **a** through **z**, as follows:

a = 1	b = 2	c = 3	d = 4	e = 5	f = 6	g = 7	h = 8	i = 9
j = 10	k = 11	l = 12	m = 13	n = 14	o = 15	p = 16	q = 17	r = 18
s = 19	t = 20	u = 21	v = 22	w = 23	x = 24	y = 25	z = 26	

The **WordsWorth of a word** is the sum of the letter scores of the word's letters. Here are the WordsWorths of the 2-letter words *ah* and *ha*:

- The letter score of the letter *a* is 1.
- The letter score of the letter *h* is 8.
- The WordsWorth of the word *ah* is  $1 + 8 = 9$ .
- The WordsWorth of the word *ha* is  $8 + 1 = 9$ .

$$\begin{array}{|c|} \hline a \\ \hline 1 \\ \hline \end{array} + \begin{array}{|c|} \hline h \\ \hline 8 \\ \hline \end{array} = \begin{array}{|c|} \hline ah \\ \hline 9 \\ \hline \end{array}$$

$$\begin{array}{|c|} \hline h \\ \hline 8 \\ \hline \end{array} + \begin{array}{|c|} \hline a \\ \hline 1 \\ \hline \end{array} = \begin{array}{|c|} \hline ha \\ \hline 9 \\ \hline \end{array}$$

The words *ah* and *ha* are **reverses** of each other. The word *ha* is the reverse of *ah* which, of course, is the reverse of *ha*. If two different dictionary words are reverses of each other, they are **semordnilaps**.

Reverse <i>ah</i> to get <i>ha</i> .				
	a	a	a	
ah	h	h	h	ha

Addition is a **commutative operation**, so  $1 + 8 = 8 + 1$ . Word pairs that are semordnilaps have the same letters and the same letter scores, so they have the same WordsWorth.

### WordsWorths of 3-Letter Words

On to 3-letter words. Here again is the handy table of letter scores.

a = 1	b = 2	c = 3	d = 4	e = 5	f = 6	g = 7	h = 8	i = 9
j = 10	k = 11	l = 12	m = 13	n = 14	o = 15	p = 16	q = 17	r = 18
s = 19	t = 20	u = 21	v = 22	w = 23	x = 24	y = 25	z = 26	

We'll calculate the WordsWorths of some 3-letter words:

- The WordsWorth of *dad* is  $4 + 1 + 4 = 6$ .
- The WordsWorth of *mom* is  $13 + 15 + 13 = 41$ .
- The WordsWorth of *cat* is  $3 + 1 + 20 = 24$ .

d	+	a	+	d	=	dad
4		1		4		6

The word *dad* is a **palindrome**. It reads the same left to right or right to left, forward or backward. The reverse of *dad* is *dad*. The word *mom* is also a palindrome. The reverse of *mom* is *mom*.

Reverse <i>mom</i> to get <i>mom</i> .				
	m	m	m	
mom	o	o	o	mom
	m	m	m	

You can arrange the letters of *cat* to get *act*, so these words are **anagrams** of each other. Addition is a **commutative operation**, so *cat* and *act* have the same WordsWorth:

Arrange <i>cat</i> to get <i>act</i> .			
	c	c	
cat	at	a t	act

- WordsWorth of *cat* and *act*:  $3 + 1 + 20 = 1 + 3 + 20 = 24$ .

The words *alp*, *lap*, and *pal* are anagrams. Two of these, *lap* and *pal*, are also semordnilaps. The three words have the same letters and the same WordsWorth.

- WordsWorth of *alp*, *lap*, and *pal*:  $1 + 12 + 16 = 12 + 1 + 16 = 16 + 1 + 12 = 29$ .

Students who are just beginning to learn addition might use **base-10 blocks** as a **WordsWorth calculator**.

Word	Base-10 blocks	WordsWorth	WordsWorth
<i>ad</i>	■ + ■■■■	■■■■■	5
<i>hi</i>	■■■■■■■■ + ■■■■■■■■	■■■■■■■■■■	17
<i>me</i>	■■■■■■ + ■■■■	■■■■■■■■■■	18
<i>to</i>	■■■■ + ■■■■■■	■■■■■■■■■■	35

At the end of this unit, you'll find two sheets of **WordsWorth Letter Score Tiles**, one with lowercase letters and one with uppercase letters. Copy a page on stiff paper, cut out the tiles, and use them to play WordsWorth.

Make word lists that have the right stuff for your students. For first grade students, it might be handy to have a list of words constructed from the first nine letters, *a* through *i*, which have letter scores 1 through 9.

a = 1	b = 2	c = 3	d = 4	e = 5	f = 6	g = 7	h = 8	i = 9
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We perused *The Official Scrabble® Players Dictionary* and selected words having two to four letters using only the letters *a* through *i*.

- Two-letter words: ad, ah, be, fa, ha, he, if
- Three-letter words: ace, add, aga, age, aha, aid, baa, bad, bag, bah, bed, bee, beg, bib, bid, big, cab, cad, chi, dab, dad, deb, did, die, dig, ebb, egg, fad, fee, fid, fie, fig, gab, gag, gee, gig, had, hag, hah, heh, hic, hid, ice
- Four-letter words: ache, acid, aide, babe, bade, bead, beef, bide, cafe, cage, cede, chad, chic, dada, dead, deaf, deed, dice, died, each, edge, egad, face, fade, feed, fief, fife, gaff, gibe, head, hide, high, iced, idea

We found semordnilaps, palindromes, and anagrams in the above list of words.

- Semordnilaps: ah, ha; bad, dab; bag, gab; bed, deb
- Palindromes: aha, bib, dad, did, gag, gig, hah, heh, deed
- Anagrams: ah, ha; add, dad; bad, dab; bag, gab; chi, hic; bade, bead; cafe, face; deaf, fade, dice, iced; fief, fife

For more words, peruse your favorite dictionaries, or our favorite dictionaries:

- *Merriam-Webster's Collegiate Dictionary*, 11th Edition. Copyright (c) 2003. ISBN: 0877798095.
- *The Official Scrabble Players Dictionary*, Third Edition. Copyright (c) 1996. ISBN: 0877799156.
- The Internet version of *Merriam-Webster's Collegiate Dictionary*. Merriam-Webster Online – Dictionary (<http://www.m-w.com/>).

All 2-letter and 3-letter words in *The Official Scrabble® Players Dictionary* are listed at

- MidZine – Scrabble – All 2-Letter Words  
<http://www.msoworld.com/mindzine/news/proprietary/scrabble/features/all2s.html>
- MidZine – Scrabble – All 3-Letter Words  
<http://www.msoworld.com/mindzine/news/proprietary/scrabble/features/all3s.html>

As a first WordsWorth activity, we suggest **WordsWorth Plus 1 to 26**. You'll find a playsheet for this activity on page 4 of this unit. Big payoff for semordnilaps, palindromes, and anagrams! You get two or more words for one WordsWorth calculation. How about using this activity for **homeplay** instead of homework? Get the parents involved. Challenge teams of students to find, say, more than 200 words that have WordsWorths 1 to 26.

### WordsWorth Plus 1 to 26

For each natural number from 1 to 26, find words (the more the better) that have a **WordsWorth** equal to the number. Your words may have 1 letter, 2 letters, 3 letters, or more letters.

a = 1	b = 2	c = 3	d = 4	e = 5	f = 6	g = 7	h = 8	i = 9
j = 10	k = 11	l = 12	m = 13	n = 14	o = 15	p = 16	q = 17	r = 18
s = 19	t = 20	u = 21	v = 22	w = 23	x = 24	y = 25	z = 26	

1	2	3	4
5		6	
7		8	
9		10	
11		12	
13			
14			
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16			
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18			
19			
20			
21			
22			
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24			
25			
26			

WordsWorth Letter Score Tiles			
<p><b>a = 1</b> ▪</p>	<p><b>b = 2</b> ▪▪</p>	<p><b>c = 3</b> ▪▪▪</p>	<p><b>d = 4</b> ▪▪▪▪</p>
<p><b>e = 5</b> ▪▪▪▪▪</p>	<p><b>f = 6</b> ▪▪▪▪▪▪</p>	<p><b>g = 7</b> ▪▪▪▪▪▪▪</p>	<p><b>h = 8</b> ▪▪▪▪▪▪▪▪</p>
<p><b>i = 9</b> ▪▪▪▪▪▪▪▪▪</p>	<p><b>j = 10</b> —————</p>	<p><b>k = 11</b> ————— ▪</p>	<p><b>l = 12</b> ————— ▪▪</p>
<p><b>m = 13</b> ————— ▪▪▪</p>	<p><b>n = 14</b> ————— ▪▪▪▪</p>	<p><b>o = 15</b> ————— ▪▪▪▪▪</p>	<p><b>p = 16</b> ————— ▪▪▪▪▪▪</p>
<p><b>q = 17</b> ————— ▪▪▪▪▪▪▪</p>	<p><b>r = 18</b> ————— ▪▪▪▪▪▪▪▪</p>	<p><b>s = 19</b> ————— ▪▪▪▪▪▪▪▪▪</p>	<p><b>t = 20</b> ————— —————</p>
<p><b>u = 21</b> ————— ————— ▪</p>	<p><b>v = 22</b> ————— ————— ▪▪</p>	<p><b>w = 23</b> ————— ————— ▪▪▪</p>	<p><b>x = 24</b> ————— ————— ▪▪▪▪</p>
<p><b>y = 25</b> ————— ————— ▪▪▪▪▪</p>	<p><b>z = 26</b> ————— ————— ▪▪▪▪▪▪</p>		

WordsWorth Letter Score Tiles			
<b>A = 1</b> ▪	<b>B = 2</b> ▪▪	<b>C = 3</b> ▪▪▪	<b>D = 4</b> ▪▪▪▪
<b>E = 5</b> ▪▪▪▪▪	<b>F = 6</b> ▪▪▪▪▪▪	<b>G = 7</b> ▪▪▪▪▪▪▪	<b>H = 8</b> ▪▪▪▪▪▪▪▪
<b>I = 9</b> ▪▪▪▪▪▪▪▪▪	<b>J = 10</b> —————	<b>K = 11</b> ————— ▪	<b>L = 12</b> ————— ▪▪
<b>M = 13</b> ————— ▪▪▪	<b>N = 14</b> ————— ▪▪▪▪	<b>O = 15</b> ————— ▪▪▪▪▪	<b>P = 16</b> ————— ▪▪▪▪▪▪
<b>Q = 17</b> ————— ▪▪▪▪▪▪	<b>R = 18</b> ————— ▪▪▪▪▪▪▪	<b>S = 19</b> ————— ▪▪▪▪▪▪▪▪	<b>T = 20</b> ————— —————
<b>U = 21</b> ————— ————— ▪	<b>V = 22</b> ————— ————— ▪▪	<b>W = 23</b> ————— ————— ▪▪▪	<b>X = 24</b> ————— ————— ▪▪▪▪
<b>Y = 25</b> ————— ————— ▪▪▪▪▪	<b>Z = 26</b> ————— ————— ▪▪▪▪▪▪		