

# NUMCoT: Numerals and Units of Measurement in Chain-of-Thought Reasoning using Large Language Models

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## Abstract

Numeral systems and units of measurement are two conjoined topics in activities of human beings and have mutual effects with the languages expressing them. Currently, the evaluation of Large Language Models (LLMs) often involves mathematical reasoning, yet little attention is given to how minor changes in numbers or units can drastically alter the complexity of problems and the performance of LLMs. In this paper, we scrutinize existing LLMs on processing of numerals and units of measurement by constructing datasets with perturbations. We first anatomize the reasoning of math word problems to different sub-procedures like numeral conversions from language to numbers and measurement conversions based on units. Then we further annotate math word problems from ancient Chinese arithmetic works which are challenging in numerals and units of measurement. Experiments on perturbed datasets demonstrate that LLMs still encounter difficulties in handling numeral and measurement conversions. The code and data are available at: <https://github.com/CAS-SIAT-ConsistencyAI/NUMCoT>.

## 1 Introduction

Numbers and counting are the basic concepts in human experience. Numbers are a set of conceptual tools made from words and other symbols for specific quantities and a key set of linguistically based innovations that distinguish human species from others (Everett, 2017). The development of numeral systems allows humans to express numbers in a consistent manner.<sup>1</sup> Counting is usually not a monotone process of manipulating numbers from a numeral system but to quantify objects with a units of measurement<sup>2</sup> to compare the magnitude.

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<sup>1</sup>[https://en.wikipedia.org/w/index.php?title=Numeral\\_system](https://en.wikipedia.org/w/index.php?title=Numeral_system)

<sup>2</sup>[https://en.wikipedia.org/w/index.php?title=Unit\\_of\\_measurement](https://en.wikipedia.org/w/index.php?title=Unit_of_measurement)

In the literature, Thawani et al. (2021) adopt the taxonomy discipline called Core Systems of Number (Feigenson et al., 2004) from cognitive science. The tasks in numeracy are then categorized by the granularity and units attached to the quantities in the task, where granularity means whether the encoding of the number is exact or approximate, and units represent whether the numerals are in their numerical forms or grounded with units of measurement. Based on the taxonomy, existing numeracy-oriented tasks are identified as simple arithmetic tasks (Wang et al., 2021), numeration tasks (Naik et al., 2019; Wallace et al., 2019; Johnson et al., 2020), magnitude comparison tasks (Naik et al., 2019; Wallace et al., 2019), Math Word Problems (MWP) (Roy and Roth, 2015; Wang et al., 2017; Amini et al., 2019), exact facts in the context of numeracy (Lin et al., 2020; Mishra et al., 2020), measurement estimation tasks (Forbes and Choi, 2017; Elazar et al., 2019; Zhou et al., 2020) and numerical language modeling tasks. There are still tasks which fall out the taxonomy, such as numeric paraphrasing (one-to-one correspondences between different surface forms of the same number), quantity entailment tasks (Mishra et al., 2020), numeral understanding tasks, Fused-Head Resolution, counting tasks (Suzgun et al., 2019; Bhattamishra et al., 2020) and other domain-specific tasks. As far as we are concerned, the tasks discussed above cover a wide range of topics in numeracy and address a lot of challenges faced by numerals and units of measurement.

However, we still need to address the issue of numeracy when discussing arithmetic by using pure numerals and making an extra effort to take units of measurement into consideration. The inadequacy in accurately converting numerals with units of measurement may lead to unpredictable consequences in real-life scenarios, especially in the era of Large Language Models (LLMs) where decoder-only generation methods are being employed.

<p style="text-align: center;"><b>Numerals</b></p> <p>二百四十 <span style="float: right;">240</span></p> <p style="text-align: center; color: blue;">Two Hundred And Forty</p> <hr style="border-top: 1px dashed black;"/> <p>二分之一 <span style="float: right;"><math>\frac{1}{2}</math></span></p> <p style="text-align: center; color: blue;">One over Two</p> <hr style="border-top: 1px dashed black;"/> <p>七千三百八十一 分之六千九百三十九</p> <div style="border: 1px solid gray; padding: 2px; width: fit-content; margin: 0 auto;"> <math display="block">\frac{6939}{7381}</math> </div> <p style="text-align: center; color: blue;">Six Thousand Nine Hundred And Thirty Nine over Seven Thousand Three Hundred And Eighty One</p> <hr style="border-top: 1px dashed black;"/> <p>三十六点八零 <span style="float: right;">36.80</span></p> <p style="text-align: center; color: blue;">Thirty-six Point Eight Zero</p>	<p style="text-align: center;"><b>Units of Measurement</b></p> <div style="border: 1px solid gray; padding: 5px; margin-bottom: 5px;"> <p>一 亩 <span style="float: right;">二百四十 积步</span></p> <p>1 Mu <span style="float: right;">240 Bu<sup>2</sup></span></p> </div> <div style="border: 1px solid gray; padding: 5px; margin-bottom: 5px;"> <p>一 步 半 <span style="float: right;">一又二分之一 步</span></p> <p>1 Bu half <span style="float: right;">1.5 Bu</span></p> </div> <p>4895米=? 厘米 4895 meters = ? centimeters</p> <p>776周 - 972天 = ?天 776 weeks - 972 days = ? days</p> <p>8吨815千克 + 37吨 = ?吨?千克 8 tons 815 kilograms + 37 tons = ? tons ? kilograms</p> <p style="text-align: center;"><b>Cross Lingual MWP</b></p> <div style="border: 1px solid gray; padding: 5px; background-color: #e0f0ff;"> <p>一支铅笔重28.3克。5支铅笔有多重? One pencil weighs 28.3 grams. How much do 5 pencils weigh?</p> </div>	<p style="text-align: center;"><b>SUANJING</b></p> <div style="border: 1px solid black; padding: 5px; margin-bottom: 5px;"> <p style="font-size: small;">今有田广一步半，三分步之一，四分步之一，五分步之一，六分步之一，七分步之一，八分步之一，九分步之一，十分步之一。求田一亩，问：从几何？ 答：八十一步，七千三百八十一分步之六千九百三十九。</p> </div> <p style="text-align: center; color: red;">古</p> <p style="text-align: center; color: red;">↑</p> <p style="text-align: center; color: red;">ZH</p> <p style="text-align: center; color: red;">↓</p> <p style="text-align: center; color: red;">今</p> <p>现在有一块田，宽一步半外加三分之一步再加四分之一步再加五分之一步再加六分之一步再加七分之一步再加八分之一步再加九分之一步再加十分之一步。如果田面积为一亩，那么长度是多少？ 答：八十一又七千三百八十一分之六千九百三十九步。</p> <p>Now we have a field, the width of the field is <math>1 + \frac{1}{2} + \frac{1}{3} + \frac{1}{4} + \frac{1}{5} + \frac{1}{6} + \frac{1}{7} + \frac{1}{8} + \frac{1}{9} + \frac{1}{10}</math> Bu(step). What is the length of the field if the area is 1 Mu?</p> <p>Answer: <math>81 \frac{6939}{7381}</math> Bu.</p> <p style="text-align: center; color: blue; border: 1px solid blue; border-radius: 50%; padding: 2px;">EN</p>
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Figure 1: On the left of the image are numeral conversions tasks. In the middle are challenges related to unit conversion and mathematical problems. On the far right is an example from SUANJING, featuring its original problem in ancient Chinese.

Conventional LLMs (Workshop, 2023; OpenAI, 2023; Zeng et al., 2023; Touvron et al., 2023a) implicitly assume that numeral systems and units of measurement are innate, and they conduct analysis at the reasoning level to demonstrate their ability in solving math word problems. For example, Wei et al. (2023) uses Chain-of-Thought method to prompt LLMs to generate coherent series of intermediate reasoning steps to solve problems. We argue that this assumption needs further verification, and better prompting methods are also needed to explore the extent to which the assumption actually works. In a math word problem, if the conversion of numerals or scale of units fails, it's not guaranteed to be correct, even if each further reasoning step is on the right track. We justify our claim from the following aspects: (1) In LLMs, the extrapolation of numerals is more difficult to define, as the numbers in the training set have a wider range compared to traditional models. (2) Although most math word problems adopt the Hindu-Arabic writing style for numerals, it's still common to use pronunciations with written style to mark a number for the advantage of being irrevocable, especially in Chinese. When writing Arabic numerals, we often overlook the magnitude and only focus on the length of the numerals. However, the rules for

reading numbers are very different. For example, in English, every three digits are divided into a scale, while in Chinese, it is every four digits. When pronouncing, we first focus on the length of the numbers, then on the magnitude, and finally group and read them one by one. (3) To our best knowledge, the investigation on units of measurement has been conducted through measuring skill tests (unit conversion, reference range detection, and measure comparison) (Park et al., 2022) with pretrained language models and has identified their lack of such abilities. It is still unknown to what extent LLMs can overcome this challenge, especially in uniting numeral conversions with units of measurement.

To achieve these goals, we construct four datasets to synthesize the procedure of how humans process numerals and units of measurement. The procedure is anatomized into sub-procedures like converting words into numbers, dealing with units of measurement with different scales and solving the problem using reasoning and rationale. For each sub-procedure, we employ random numbers and addition operations to perturb the dataset, thereby reducing the generation of memorization issues.

In this paper, we focus on ChatGPT (OpenAI, 2022), ChatGLM series models (Zhipu.AI, 2023)

, ERNIE-Bot (Baidu, 2023) and LLaMA-2 family models (Touvron et al., 2023b). We construct different prompts to elicit LLMs to generate responses for the datasets above. Our experiments reveal that LLMs exhibit robustness in converting between numbers and English text, but less effectiveness in converting between numbers and Chinese text.

Furthermore, LLMs consistently struggle to memorize conversion ratios between different units, posing challenges for automatic numeral conversions based on unit changes. In MWPs involving numeral conversions and units of measurement, LLMs perform well. However, LLMs often struggle to provide correct answers to SUANJING problems that require specialized long-tail knowledge.

In summary, our work makes the following contributions:

1. We construct four datasets to explore the performance of LLMs in tasks that involve numeral conversions and unit conversion, which are crucial research questions for LLMs.
2. We discover and verify that introducing CoT in certain subtasks significantly deteriorates the reasoning performance of LLMs. In the experimental section, we provide the corresponding analysis.
3. We conduct prompt-based experiments on LLMs to assess their ability in numeral conversions and units of measurement, thereby highlighting a new direction for training and benchmarking LLMs.

## 2 Related Work

### 2.1 Units of Measurement in Numeracy

Units of measurement in numeracy have been attracting attention from the community because of their relationship with common sense in life and domain knowledge in applications. Despite recent success of pre-trained language models (PLMs) (Devlin et al., 2019; Liu et al., 2020), their reasoning abilities using numerical common-sense is surprisingly poor (Lin et al., 2020) and PLMs lack the capability required for reasoning over measurements (Park et al., 2022). The knowledge on scaling of measurement, such as *1000 meters make a km*, can add extra challenge to numerical reasoning tasks (Mishra et al., 2022).

While traditional explorations over measurements address more on quantity identification with

measurements (Harper et al., 2021; Göpfert et al., 2022) and their comparable properties (Forbes and Choi, 2017; Lin et al., 2020; Park et al., 2022), we focus more on the accuracy of their usage from arithmetic perspective. With the development of CoT-based approaches in LLMs, we are also curious how they perform on dealing with different system of units in either base forms and derived forms.

### 2.2 Numeracy in Large Language Models

Besides the survey conducted by Thawani et al. (2021) that is mentioned in Section 1, we also review how numeracy is discussed in the era of LLMs. The evaluation of GPT-3 (Brown et al., 2020) over NumGLUE (Mishra et al., 2022) indicates that it is a better few-shot learner but not necessarily a better many-shot learner. In arithmetic, MathGLM (Yang et al., 2023) breaks the misconception that LLMs are unable to accurately perform arithmetic operations and trains a model which can accurately perform multi-digit arithmetic operations with almost 100% accuracy without data leakage, significantly surpassing GPT-4 (OpenAI, 2023).

## 3 Datasets and Perturbations

### 3.1 Datasets

For math word problems using different numeral systems and units of measurement, we are curious about how LLMs process such information in their reasoning steps. We choose to anatomize the reasoning of math word problems into different sub-procedures, like conversions between numbers and words, conversions with units of measurement. We first build the *Numerical Conversions* dataset and the *Conversions with Units of Measurement* dataset. Then we construct the *Cross Lingual MWPs* dataset that involves math word problems with Chinese and English, and the SUANJING dataset abundant with these challenges. The datasets are illustrated in Figure 1.

**Numerical Conversions** The conversion of numerals to words (*Num2Words*) and its inverse process *Words2Num* are two basic abilities for humans to manipulate numbers. Pronunciation of numerals is critical for humans to express quantities precisely. For example, an integer 21,600,900 should be pronounced as “twenty one million six hundred thousand nine hundred only” in English and “二千一百六十万零九百” in Chinese. The task is also called

as (Numeric) Paraphrasing (Thawani et al., 2021). The practice using text conversion from numerical to standard spelled-out numbers in numeracy probing has been conducted earlier in other multilingual numerical understanding works (Johnson et al., 2020).

Different from them, where numbers are generated from a smaller range of 0 to 999, we generate numbers from 0 to trillions and consider the complexity of each number from both scale and pronunciation forms. The *Numeral Conversions* dataset is separated into the following splits:

1. The *Numeral Conversions Medium* split consists of 400 randomly generated integers falling into the ranges of zero to a thousand (0-1K), a thousand to a million (1K-1M), a million to a billion (1M-1B), and a billion to a trillion (1B-1T), with each range containing 100 integers.
2. The *Numeral Conversions Easy* split comprises 400 Arabic numerals with lengths identical to those in the *Numeral Conversions Medium* split, but the corresponding pronunciation forms in Chinese and English are significantly shorter.
3. The *Numeral Conversions Hard* split consists of 200 fractions and 200 decimals. For fractions, the numerators and denominators of the fractions are randomly sampled from the same four numerical ranges mentioned earlier, ensuring they are of similar scales. Two random integers, A and B, are generated within their respective numerical range, forming a fraction in the format  $A/B$ . Similarly, two random integers, C and D, are selected within their corresponding numerical range, composing a decimal in the format  $C.D$ .

**Conversions with Units of Measurement** In most human experiences, numbers are used in joint with units of measurement to express real-world quantities. In specific scenarios, units of measurement with different scales are also ubiquitous. For example, 1.5 litre is equivalent to 1 litre plus 500 milliliters. However, it’s still questionable whether LLMs process such information similarly as humans.

To emphasize this sub-procedure, we create parallel datasets in both Chinese and English based on 18 units commonly used by humans, such as length,

time, weight, and money, including centimeters, seconds, kilograms, yuan, and other units. These datasets are generated using random numbers and are identical in all aspects except for the language. Additionally, we categorize the questions into three levels of difficulty.

1. The *Units of Measurement Easy* split involves the conversion of numerical values from one unit to another. For example, 856 grams = ? milligrams.
2. The *Units of Measurement Medium* split requires performing addition or subtraction between two units before converting to another unit. For example, 738 seconds - 5 milliseconds = ? milliseconds.
3. The *Units of Measurement Hard* split involves a more complex process: combining two units into one and then performing addition or subtraction operations before converting to another unit. For example, 4 days 387 hours + 81 days = ? days ? hours.

LLMs require common sense and reasoning abilities to complete conversions at all three levels.

**MWPs and SUANJING** To compare the challenges introduced by numeral conversions and units of measurement, we utilize a bilingual MWPs dataset redacted by Tan et al. (2022) and a Chinese dataset SUANJING translated from ancient Chinese MWPs. The bilingual MWPs dataset is compiled from AddSub (Hosseini et al., 2014), SingleOp (Roy et al., 2015) and MultiArith (Roy and Roth, 2015), containing 1557 elementary school math word problems.

SUANJING problems are constructed by translating ancient Chinese to modern Chinese while preserving character-level numeral representations. We select SUANJING because it comprehensively tests LLMs on tasks like Num2Words, Words2Num, and Conversations with Units of Measurement. This setup allows us to examine LLMs’ performance under various conditions: without CoT, with CoT but lacking rare knowledge, and with CoT plus rare knowledge. The translation is performed by ChatGLM-6B (Du et al., 2022; Zeng et al., 2022) and further refined by human experts. We list details about SUANJING in Appendix A.

	Num2Words								Words2Num							
	Zero-shot		Zero-shot CoT		Few-shot		Few-shot CoT		Zero-shot		Zero-shot CoT		Few-shot		Few-shot CoT	
	ZH	EN	ZH	EN	ZH	EN	ZH	EN	ZH	EN	ZH	EN	ZH	EN	ZH	EN
ChatGLM-6B	28.75	6.50	22.75	1.50	20.00	7.75	7.00	4.50	75.50	50.25	59.75	40.25	70.25	45.75	55.50	32.50
ERNIE-Bot-turbo	39.00	12.25	28.50	8.75	48.25	44.75	33.25	36.75	74.75	57.00	<b>66.25</b>	29.50	87.00	67.75	<b>76.00</b>	51.00
ChatGLM-Turbo	39.25	41.75	38.75	35.25	45.75	42.00	32.25	30.00	<b>80.50</b>	61.25	53.00	40.00	<b>88.50</b>	73.50	62.50	38.50
Llama2-7B	12.50	18.50	9.50	12.75	21.50	44.75	7.50	23.75	27.00	30.50	14.00	28.25	39.00	68.50	17.00	29.75
Llama2-13B	19.50	37.00	7.75	15.00	33.00	52.75	4.25	17.50	27.00	20.50	13.25	10.50	62.50	76.50	33.75	31.50
Llama2-70B	32.75	45.50	8.25	17.25	33.00	54.75	6.50	48.50	38.00	62.75	27.00	21.00	38.75	67.75	19.75	23.75
ChatGPT	<b>68.00</b>	<b>98.25</b>	<b>54.25</b>	<b>90.25</b>	<b>72.50</b>	<b>99.25</b>	<b>57.25</b>	<b>96.50</b>	61.25	<b>100.00</b>	45.75	<b>68.00</b>	63.75	<b>99.75</b>	58.50	<b>89.00</b>

Table 1: Overview of conversion accuracy for Num2words and Words2Num on the Numeral Conversions Medium split using the four prompt methods: Zero-shot, Zero-shot with CoT, Few-shot and Few-shot with CoT.

### 3.2 Perturbations

To avoid the generation from memorization issues that might occur with LLMs, we decide to perturb the datasets created above. For example, to design a dataset with Arabic numeral lengths equal to those in the *Numeral Conversions Medium* dataset, and with Chinese and English representations shorter than those in the *Numeral Conversions Medium* dataset, the numerical format of the *Numeral Conversions Easy* dataset should ideally follow that of  $M \times 10^N$ .

However, considering the likelihood of LLMs encountering *Numeral Conversions Easy* dataset numbers frequently during pretraining, we introduce perturbations by adding one to each number in the *Numeral Conversions Easy* dataset, with the format being  $M \times 10^N + 1$ .

## 4 Experiments

We conduct the experiments using open-sourced LLMs as well as API-based LLMs supporting both English and Chinese languages. For publicly available LLMs, we chose ChatGLM2-6B<sup>3</sup> and three models from the LLaMA-2<sup>4</sup> family: 7B, 13B, and 70B, which were deployed to A6000 GPU server locally. For API-based LLMs, we use ChatGPT<sup>5</sup>, ERNIE-Bot-turbo<sup>6</sup>, ChatGLM-Turbo<sup>7</sup>.

We consider the following prompt: (1) **Zero-shot**: We simply present the questions to the

<sup>3</sup><https://github.com/THUDM/ChatGLM2-6B>

<sup>4</sup><https://llama.meta.com/llama2>

<sup>5</sup><https://platform.openai.com/docs/models/gpt-3-5>

<sup>6</sup><https://cloud.baidu.com/doc/WENXINWORKSHOP/s/4l1lb21pf>

<sup>7</sup><https://open.bigmodel.cn/dev/howuse/model>

LLMs without introducing any examples, reasoning steps, or CoT. (2) **Zero-shot CoT**: We simply present the questions to the LLMs, employing the CoT framework without introducing any examples or deductive steps. Our approach involve the simple addition of the phrase *Let's think step by step*. (3) **Few-shot**: We present four analogous questions accompanied by concise responses in the prompt before presenting the questions to the LLMs, without introducing deductive steps. (4) **Few-shot CoT**: We present four analogous questions, each accompanied by concise responses, within the prompt prior to presenting them to the LLMs. Additionally, deductive steps are introduced alongside the questions.

### 4.1 The Accuracy of Numeral Conversions

We list the experimental results for the *Numeral Conversions Medium* splits in Table 1. For more information about the prompt design for the current experiment, please refer to Table 5 to 10 in the Appendix.

We have the following findings: (1) ChatGPT has significant advantages over other models in conversions using English and is almost perfect at *Num2Words* task. (2) Introducing CoT and deductive steps in the *Num2Words* and *Words2Num* tasks results in a significant decrease in accuracy compared to prompts without the incorporation of CoT and deductive steps.

**Accuracy against Different Scales** From a numerical scale perspective, different models exhibit significant variance in performance, with ChatGPT outperforming all other models. When the number is less than 1000, all models achieve their best performance, and the gap is smallest compared to

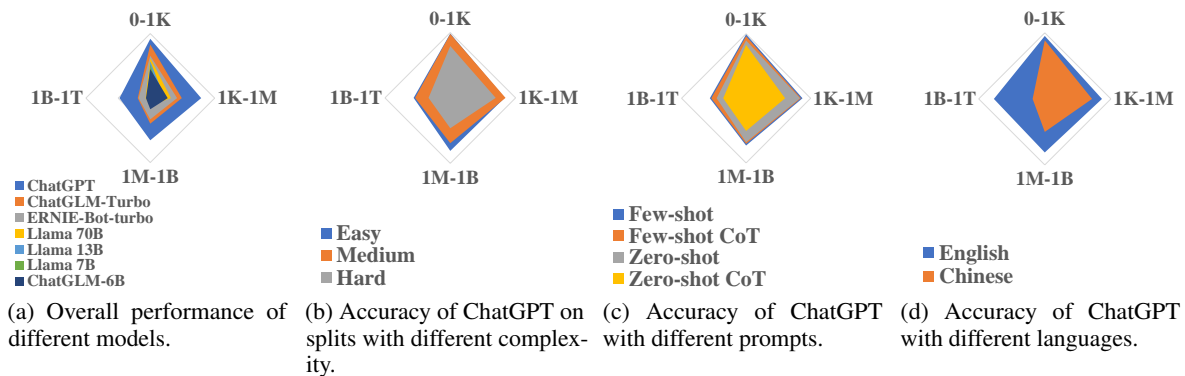


Figure 2: Accuracy against different scales with respect to different dimensions.

	Zero-shot		Zero-shot CoT		Few-shot		Few-shot CoT		Few-shot CoT with knowledge	
	ZH	EN	ZH	EN	ZH	EN	ZH	EN	ZH	EN
ChatGLM-6B	22.83	5.67	44.33	18.33	18.17	6.50	49.50	30.17	46.33	24.33
ERNIE-Bot-turbo	28.00	29.33	42.00	31.83	15.50	22.50	37.83	41.83	37.67	39.50
ChatGLM-turbo	39.33	34.33	58.83	55.67	33.83	27.67	56.50	57.50	55.00	50.67
Llama2-7B	7.83	18.50	6.50	20.00	5.83	16.17	9.83	25.00	12.00	20.67
Llama2-13B	13.67	28.50	7.33	27.50	11.67	16.83	23.00	37.17	18.83	30.50
Llama2-70B	18.67	44.33	23.67	44.33	16.50	43.67	24.33	47.83	27.50	44.67
ChatGPT	45.50	48.00	68.83	77.33	46.17	49.67	72.67	79.67	73.67	76.00

Table 2: Overview of reasoning accuracy for Units of Measurement on the Numeral Conversions Medium split using the five prompt methods: Zero-shot, Zero-shot CoT, Few-shot, Few-shot CoT and Few-shot CoT with knowledge.

that of ChatGPT. However, as the scale of numbers increases, there is a consistent decrease in accuracy for all models. The comparison is shown in Figure 2a.

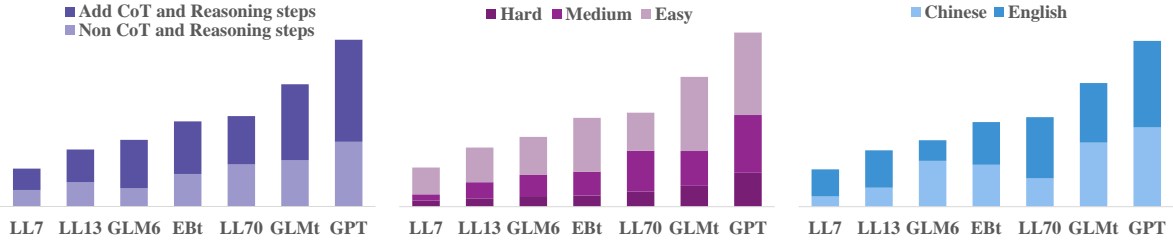
**ChatGPT over Different Scales** Given that ChatGPT performs exceptionally well among other models, we further analyze ChatGPT as the representative model. For data related to other models, please refer to Table 14 to 15 in the Appendix. We illustrate how ChatGPT performs across different scales from the following aspects: (1) **Complexity**: As the decoding length for ChatGPT increases from Easy to Hard difficulty, the accuracy decreases consistently across all scales, see Figure 2b. (2) **Prompt Method**: Figure 2c shows that the inclusion of CoT in Zero-shot harms performance across all scales while Few-shot works better for large scales. (3) **Language**: As both Chinese and English have relative high number system transparency (Johnson et al., 2020), the gaps between two languages is surprising, see Figure 2d. This partially shows that either training corpus is skewed

or numeral conversions knowledge is less transferable across languages.

## 4.2 Evaluation of Numerals with Units of Measurement

In the experiment concerning units of measurement, we adopt the same prompt design as in the previous experiment. To further investigate the impact of unit conversion knowledge on the reasoning capabilities of LLMs in this experiment, we define **Few-shot CoT with knowledge** that involves the addition of necessary unit conversion knowledge to the Few-shot CoT framework. For all prompt designs regarding units of measurement, please refer to Table 11 in the appendix.

The Table 2 is experimental results of the seven models across datasets of three different difficulty levels. The results clearly demonstrate that (1) ChatGPT, compared to other models, consistently exhibits superior performance and reasoning capabilities across all levels of dataset difficulty and in both languages. (2) Unlike the previous



(a) The difference in accuracy of the model with and without CoT. (b) The difference in accuracy of the model on datasets of different difficulty levels. (c) The difference in accuracy of the model on datasets of different language.

Figure 3: Variations in accuracy among LLMs are observed after distinguishing between CoT, difficulty, and language in Units of Measurement problems. Due to space constraints, we use abbreviations here. LL7 represents Llama2-7B, LL13 represents Llama2-13B, LL70 represents Llama2-70B, GLM6 represents ChatGLM2-6B, EBT represents ERNIE-Bot-turbo, GLMt represents ChatGLM-turbo, and GPT represents ChatGPT.

	MWP								SUANJING				
	Zero-shot		Zero-shot CoT		Few-shot		Few-shot CoT		Zero-shot	Zero-shot CoT	Few-shot	Few-shot CoT	Few-shot CoT with knowledge
	ZH	EN	ZH	EN	ZH	EN	ZH	EN	ZH	ZH	ZH	ZH	ZH
<b>ChatGLM-Turbo</b>	82.98	87.48	<b>87.80</b>	<b>93.32</b>	59.86	70.13	88.18	93.9	<b>8.00</b>	6.50	<b>2.50</b>	2.00	5.00
<b>ChatGPT</b>	<b>83.75</b>	<b>92.68</b>	86.90	93.26	77.01	85.74	<b>88.38</b>	<b>95.31</b>	5.50	<b>9.00</b>	2.00	<b>5.50</b>	<b>8.00</b>
<b>Llama2-70B</b>	82.08	91.91	81.95	90.75	<b>81.63</b>	<b>91.78</b>	81.18	90.11	0.00	0.00	0.00	0.00	0.00

Table 3: Overview of the impact of four prompts and three models on the accuracy of answers in the bilingual MWPs set and the SUANJING set.

Num2words and Words2Num experiments, the introduction of CoT and reasoning steps in this experiment significantly enhances the success rate of LLMs in accurately generating answers.

To delve into more specific information, we categorize the experimental data and create three bar graphs as depicted in the Figure 3. Figure 3a illustrates that the introduction of CoT and reasoning steps led to a noticeable improvement in the accuracy of each model when handling units of measurement tasks, Figure 3b shows that as the difficulty of the questions increased, the accuracy of each model in dealing with units of measurement tasks decreased correspondingly. Figure 3c indicates that the models exhibit roughly the same accuracy in handling tasks in both Chinese and English, even in the case of ChatGPT.

### 4.3 Comparisons over MWPs and SUANJING

In this section, we employ three state-of-the-art models, ChatGPT, ChatGLM-Turbo and Llama2-70B, to evaluate the performance of LLMs on MWPs and SUANJING. We select 100 questions from SUANJING that share the same operators and complexity level as MWPs. Additionally, SUAN-

JING poses extra challenges due to the textual format of numbers and the requirement for unit conversions during the reasoning process when necessary.

The experimental results for MWPs are presented in the left part of Table 3, which clearly indicate the following: (1) LLMs can handle both English and Chinese questions very effectively. (2) The incorporation of CoT significantly enhances the accuracy of LLMs on MWPs.

Contrary to this, the experimental results for SUANJING, as shown in the right part of Table 3, demonstrate a substantial decline in accuracy. Furthermore, the addition of CoT does not yield any improvement and, in fact, seems to deteriorate the performance.

### 4.4 Analysis of Errors from LLMs

In the numeral conversions experiments, the majority of errors are primarily concentrated on LLMs' inability to correctly identify the magnitudes of individual numbers. As illustrated in the figure 4a, the number 6, originally representing hundred million in Arabic numerals, is incorrectly identified as billion. Additionally, errors arise from LLMs' mishandling of the digit zero, including failure to

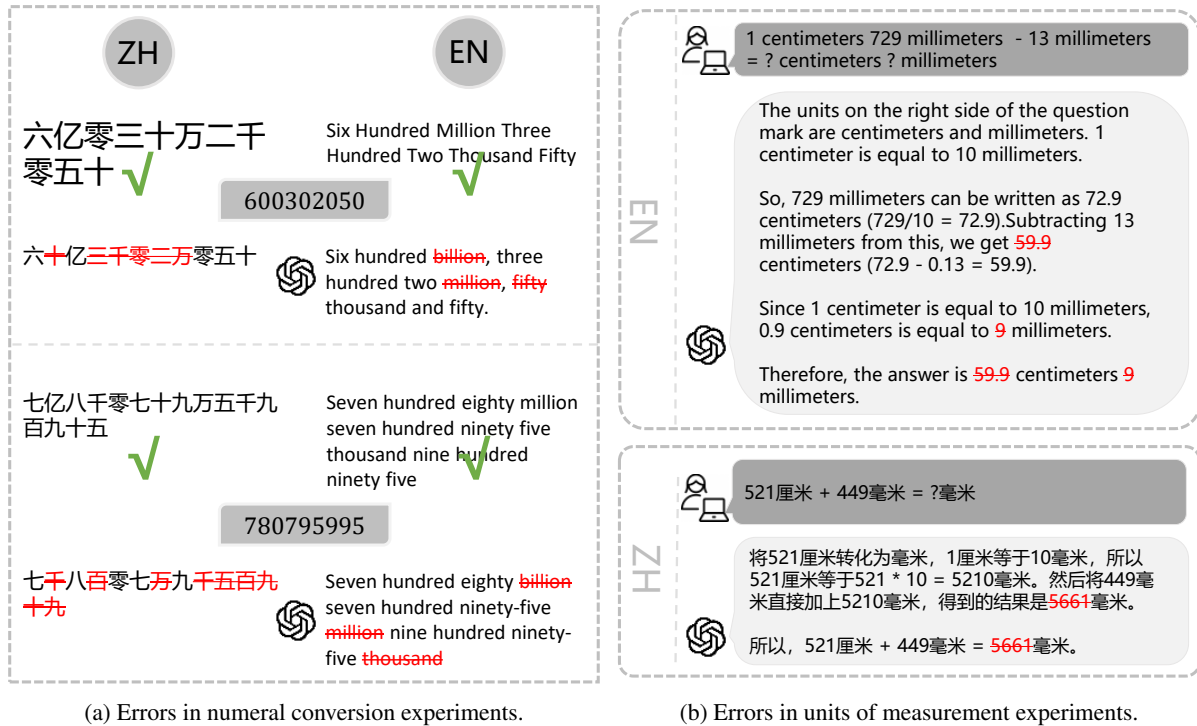


Figure 4: Common errors in Numeral and Units of Measurement experiments from LLMs.

recognize its significance and inability to accurately restore the quantity and position of zero in the numerical context. To enhance the accuracy of LLMs in such tasks, future improvements could focus on refining LLMs’ ability to recognize the length and magnitude of numbers.

Our experiments also demonstrated that CoT did not work in the numeral conversion experiments. LLMs achieved significantly higher accuracy rates on the *easy* dataset, which was of comparable scale to the *medium* dataset but required shorter answer lengths. This discrepancy highlights two main challenges that LLMs face in numerical reasoning. First, the linguistic nature of input text makes it difficult for LLMs to understand numerical data. Second, the flexibility and complexity of the answers increase the likelihood of errors in longer outputs. Given that CoT primarily enhances performance on complex inference tasks rather than simple ones, its application to simpler tasks such as Num2Words and Words2Num increases the length of the generated text, thereby diminishing LLMs accuracy.

In the units of measurement experiment, the majority of errors primarily stem from LLMs’ failure to correctly recognize the conversion magnitude relationship when multiple units are involved. As

depicted in the figure 4b, there exists a tenfold progressive relationship between decimeters and centimeters, yet LLMs overlook the magnitude relationship inherent in textual units. Introducing CoT significantly mitigates the occurrence of such errors but still requires further refinement. Additionally, even when LLMs have correctly grasped the magnitude relationship inherent in textual units, errors may still occur during the calculation process. To enhance the accuracy of LLMs in such tasks, efforts could be directed towards improving LLMs’ recognition of textual units and the magnitude relationships between units.

In the SUANJING experiment, LLMs face more comprehensive problem-solving tasks. As depicted in the figure 5, LLMs encounter errors in handling units in SUANJING problems, as some ancient units are extremely rare in contemporary society, making it difficult for LLMs to correctly understand SUANJING problems. This long tail problem can be addressed by introducing external knowledge in the prompt, thereby enabling LLMs to have a chance of correctly handling SUANJING problems. However, LLMs frequently make errors in recognizing numbers and performing numerical calculations, especially in the recognition and computation of more challenging fractions and decimals.



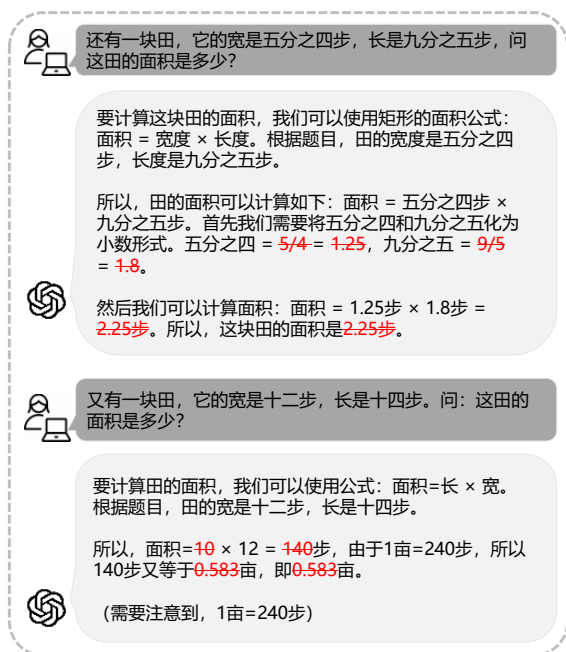


Figure 5: Errors in SUANJING experiments.

Consequently, even if LLMs can correctly utilize the external prompt-introduced knowledge of ancient units, their accuracy remains relatively low. Due to the extensive use of fractions described in Classical Chinese in SUANJING, LLMs need to undergo multiple Hard-level Words2Num tasks before answering questions, significantly reducing the accuracy of SUANJING experiments.

In the MWPs experiment, the majority of errors are similar to those in the units of measurement experiment, as the MWPs experiment can be considered a natural language version of the units of measurement experiment to some extent. Furthermore, SUANJING can be seen as a more challenging version of MWPs, hence many errors observed in the preceding experiments are also frequent in SUANJING. To improve the accuracy of LLMs in such tasks, besides focusing on the improvement directions of units of measurement experiments, attention should also be given to the performance of LLMs on long tail problems.

## 5 Conclusion

We investigate the performance of various LLMs on tasks involving numeral conversions and units of measurement in both Chinese and English languages. Additionally, we explore the capability boundaries of LLMs by introducing CoT and external knowledge. Based on a series of experiments, the conclusions are as follows:

1. There is a noticeable performance gap between Chinese LLMs and top-tier models like ChatGPT.
2. The same large language model exhibits varying levels of performance facing problems in different languages.
3. Despite the introduction of external knowledge and CoT, LLMs still struggle to effectively handle comprehensive problems involving numeral conversions and units of measurement.

## Limitations

In this paper, we introduce datasets to investigate whether LLMs can process numeral conversions and units of measurement like humans, despite certain limitations.

Firstly, LLMs' responses exhibit randomness, and we do not conduct repeated trials of the same question with the same model. Conducting repeated trials could reduce randomness and yield more precise accuracy estimates. Secondly, Our experiments involve only seven types of models. Incorporating commercial models such as GPT-4 and Claude might provide a more representative performance curve.

Future work could diversify experimental data by incorporating datasets from professional backgrounds like financial accounting, aiding in exploring the performance boundaries of LLMs.

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## A SUANJING Dataset

	Title	Count
《周髀算经》	<i>Zhou Shadow Mathematical Classic</i>	-
《九章算术》	<i>The Nine Chapters on the Mathematical Art</i>	246
《海岛算经》	<i>The Sea Island Mathematical Classic</i>	9
《孙子算经》	<i>The Mathematical Classic of Sun Zi</i>	65
《张邱建算经》	<i>The Mathematical Classic of Zhang Qujian</i>	92
《五曹算经》	<i>Computational Canon of the Five Administrations</i>	68
《夏侯阳算经》	<i>The Mathematical Classic of Xiahou Yang</i>	82
《五经算术》	<i>Computational Prescriptions of the Five Classics</i>	
《缉古算经》	<i>Continuation of Ancient Mathematical Classic</i>	20
《缀术》	<i>Method of Interpolation</i>	-
《益古演段》	<i>Old Mathematics in Expanded Sections</i>	64
《数学九章》	<i>The Mathematical Treatise in Nine Sections</i>	80
Total		726

Table 4: Statistics for math word problems extracted from ancient Chinese mathematics classics.

To facilitate the evaluation of reasoning integrating all sub-procedures, we need a dataset with challenges discussed above. We construct SUANJING (算经) by extracting and annotating math word problems from a collection of ancient Chinese algorithmic books.

Although grammars and lexicons of the Chinese language endure great changes in history, the numeral systems and units of measurement are reserved and still used in daily life. Especially in formal documents and statements of financial institutions, the representation of numerals are required to be written in both traditional style<sup>8</sup> and

<sup>8</sup>[https://en.wikipedia.org/w/index.php?title=Chinese\\_numerals](https://en.wikipedia.org/w/index.php?title=Chinese_numerals)

Hindu–Arabic style in order to avoid subsequent manipulations. This presents us a great opportunity to reuse ancient math word problems and look closely at how numeral systems and units of measurement affect reasoning steps of LLMs.

Problems in SUANJING are collected from ancient Chinese mathematical classics. Since Tang Dynasty (唐朝), Mingsuan (明算, comprehend of arithmetic) has been an important subject in Keju (科举, imperial examinations) for bureaucrats selection. Mathematician Li Chunfeng<sup>9</sup> edited The Ten Computational Canons<sup>10</sup>, which was a collection of ten Chinese mathematical works. We additionally add *Old Mathematics in Expanded Sections* and *The Mathematical Treatise in Nine Sections* to SUANJING. The full list of classics and extracted problem counts are shown in Table 4.

<sup>9</sup>[https://en.wikipedia.org/w/index.php?title=Li\\_Chunfeng](https://en.wikipedia.org/w/index.php?title=Li_Chunfeng)

<sup>10</sup>[https://en.wikipedia.org/w/index.php?title=Ten\\_Computational\\_Canons](https://en.wikipedia.org/w/index.php?title=Ten_Computational_Canons)

Prompt that convert integer into English in Num2Words	
Zero-shot	<b>The following is a question about how to convert integers into English pronunciation. Please provide the correct answer based on the numbers in the question. Question:XXX Answer:</b>
Zero-shot CoT	<b>The following is a question about how to convert integers into English pronunciation. Please provide the correct answer based on the numbers in the question. Question:XXX Answer: Let's think step by step.</b>
	The following are questions about converting integers into their English reading forms. Please give the correct answers based on the numbers in the questions. Question: 123 <b>Answer:</b> One hundred twenty-three
	The following are questions about converting integers into their English reading forms. Please give the correct answers based on the numbers in the questions. Question: 123456 <b>Answer:</b> One hundred twenty-three thousand four hundred fifty-six
Few-shot	The following are questions about converting integers into their English reading forms. Please give the correct answers based on the numbers in the questions. Question: 123456789 <b>Answer:</b> One hundred twenty-three million four hundred fifty-six thousand seven hundred eighty-nine
	The following are questions about converting integers into their English reading forms. Please give the correct answers based on the numbers in the questions. Question: 123456789012 <b>Answer:</b> One hundred twenty-three billion four hundred fifty-six million seven hundred eighty-nine thousand twelve
	<b>The following are questions about converting integers into their English reading forms. Please give the correct answers based on the numbers in the questions. Question: XXX Answer:</b>
	The following are questions about converting integers into their English reading forms. Please give the correct answers based on the numbers in the questions. Question: 123 <b>Answer: Let's think step by step.</b> 1. The length of this integer is 3 digits, which in English grammar is a number at the hundred level; 2. From high to low, each level of this number reads as: one hundred, twenty, three; 3. From left to right, it can be written as one hundred twenty-three. So, the answer is one hundred twenty-three.
	The following are questions about converting integers into their English reading forms. Please give the correct answers based on the numbers in the questions. Question: 123456 <b>Answer: Let's think step by step.</b> 1. The length of this integer is 6 digits, which in English grammar is a number at the hundred thousand level; 2. From high to low, each level of this number reads as: one hundred thousand, twenty thousand, three thousand, four hundred, fifty, six; 3. From left to right, it can be written as one hundred twenty-three thousand four hundred fifty-six. So, the answer is one hundred twenty-three thousand four hundred fifty-six.
	The following are questions about converting integers into their English reading forms. Please give the correct answers based on the numbers in the questions. Question: 123456789 <b>Answer: Let's think step by step.</b> 1. The length of this integer is 9 digits, which in English grammar is a number at the hundred million level; 2. From high to low, each level of this number reads as: one hundred million, twenty million, three million, four hundred thousand, fifty thousand, six thousand, seven hundred, eighty, nine; 3. From left to right, it can be written as one hundred twenty-three million four hundred fifty-six thousand seven hundred eighty-nine. So, the answer is one hundred twenty-three million four hundred fifty-six thousand seven hundred eighty-nine.
Few-shot CoT	The following are questions about converting integers into their English reading forms. Please give the correct answers based on the numbers in the questions. Question: 123456789002 <b>Answer: Let's think step by step.</b> 1. The length of this integer is 12 digits, which in English grammar is a number at the hundred billion level; 2. From high to low, each level of this number reads as: one hundred billion, twenty billion, three billion, four hundred million, fifty million, six million, seven hundred thousand, eighty thousand, nine thousand, zero, zero, two; 3. From left to right, it can be written as one hundred and twenty-three billion four hundred and fifty-six million seven hundred and eighty-nine thousand and two. So, the answer is one hundred and twenty-three billion four hundred and fifty-six million seven hundred and eighty-nine thousand and two.
	<b>The following are questions about converting integers into their English reading forms. Please give the correct answers based on the numbers in the questions. Question: XXX Answer: Let's think step by step,</b>

Prompt that convert integer into Chinese in Num2Words	
Zero-shot	<b>以下是关于整数转为中文读法的题目，请根据题目的数字，给出正确的答案。题目：XXX 答案：</b>
Zero-shot CoT	<b>以下是关于整数转为中文读法的题目，请根据题目的数字，给出正确的答案。题目：XXX 答案：让我们一步一步思考，</b>
	以下是关于整数转为中文读法的题目，请根据题目的数字，给出正确的答案。 题目： 123 <b>答案：</b> 一百二十三。
	以下是关于整数转为中文读法的题目，请根据题目的数字，给出正确的答案。 题目： 123456 <b>答案：</b> 十二万三千四百五十六。
Few-shot	以下是关于整数转为中文读法的题目，请根据题目的数字，给出正确的答案。 题目： 123456789 <b>答案：</b> 一亿二千三百四十五万六千七百八十九。
	以下是关于整数转为中文读法的题目，请根据题目的数字，给出正确的答案。 题目： 123456789012 <b>答案：</b> 一千二百三十四亿五千六百七十八万九千零一十二。
	<b>以下是关于整数转为中文读法的题目，请根据题目的数字，给出正确的答案。 题目：XXX 答案：</b>
	以下是关于整数转为中文读法的题目，请根据题目的数字，给出正确的答案。题目： 123 <b>答案：让我们一步一步思考，</b> 1、这个整数的长度一共是3位，按照中文的语法，3位数字是百级别的数字； 2、这个数字从高到低，各级别分别读作：一百、二十、三； 3、从左到右依次可以写出一百二十三。所以答案是一百二十三。
	以下是关于整数转为中文读法的题目，请根据题目的数字，给出正确的答案。 题目： 123456 <b>答案：让我们一步一步思考，</b> 1、这个整数的长度一共是6位，按照中文的语法，6位数字是十万级别的数字； 2、这个数字从高到低，各级别分别读作：十万、二万、三千、四百、五十、六； 3、从左到右依次可以写出十二万三千四百五十六。所以答案是十二万三千四百五十六。
Few-shot CoT	以下是关于整数转为中文读法的题目，请根据题目的数字，给出正确的答案。 题目： 123456789 <b>答案：让我们一步一步思考，</b> 1、这个整数的长度一共是9位，按照中文的语法，9位数字是亿级别的数字； 2、这个数字从高到低，各级别分别读作：一亿、二千万、三百万、四十万、五万、六千、七百、八十、九； 3、从左到右依次可以写出一亿二千三百四十五万六千七百八十九。所以答案是一亿二千三百四十五万六千七百八十九。
	以下是关于整数转为中文读法的题目，请根据题目的数字，给出正确的答案。 题目： 123456789012 <b>答案：让我们一步一步思考，</b> 1、这个整数的长度一共是12位，按照中文的语法，12位数字是千亿级别的数字； 2、这个数字从高到低，各级别分别读作：一千亿、二百亿、三十亿、四亿、五千万、六百万、七十万、八万、九千、零、零、二； 3、出现了连续两个零，那么只写一个零； 4、从左到右依次可以写出一千二百三十四亿五千六百七十八万九千零二。所以答案是一千二百三十四亿五千六百七十八万九千零二。
	<b>以下是关于整数转为中文读法的题目，请根据题目的数字，给出正确的答案。 题目：XXX 答案：让我们一步一步思考，</b>

Table 5: Prompt that convert integers to English and Chinese in Num2Words task, 'XXX' is a word or numerical question in the dataset.

## Prompt that convert decimal into English in Num2Words

Zero-shot	<p>The following is a question about how to convert decimals into English pronunciation. Please provide the correct answer based on the numbers in the question. Question:XXX <b>Answer:</b></p>
Zero-shot CoT	<p>The following is a question about how to convert decimals into English pronunciation. Please provide the correct answer based on the numbers in the question. Question:XXX <b>Answer: Let's think step by step,</b></p>
Few-shot	<p>The following are questions about how to convert decimals into English pronunciation. Please provide the correct answer based on the numbers in the question. Question:123.456 <b>Answer:</b> one hundred twenty three point four five six.</p> <p>The following are questions about how to convert decimals into English pronunciation. Please provide the correct answer based on the numbers in the question. Question: 123456.789012 <b>Answer:</b> one hundred twenty three thousand four hundred fifty six point seven eight nine zero one two.</p> <p>The following are questions about how to convert decimals into English pronunciation. Please provide the correct answer based on the numbers in the question. Question: 123456789.987654321 <b>Answer:</b> one hundred twenty three million four hundred fifty six thousand seven hundred eighty nine point nine eight seven six five four three two one.</p> <p>The following are questions about how to convert decimals into English pronunciation. Please provide the correct answer based on the numbers in the question. Question: 123456789012.210987654321 <b>Answer:</b> one hundred twenty three billion four hundred fifty six million seven hundred eighty nine thousand twelve point two one zero nine eight seven six five four three two one.</p> <p><b>The following are questions about how to convert decimals into English pronunciation. Please provide the correct answer based on the numbers in the question. Question: XXX Answer:</b></p>
Few-shot CoT	<p>The following are questions about how to convert decimals into English pronunciation. Please provide the correct answer based on the numbers in the question. Question:123.456 <b>Answer: Let's think step by step,</b> 1. This number has a decimal point, so it's a decimal.2. The integer part to the left of the decimal point is 123, which is a 3-digit integer. According to English grammar, a 3-digit number is at the hundred level.3. So, the integer part from left to right can be written as one hundred twenty three.4. The decimal part to the right of the decimal point is 456, which according to English grammar, is written out one digit at a time.5. So the decimal part from left to right can be written as four five six.6. The decimal point is read as 'point'.So the answer is one hundred twenty three point four five six.</p> <p>The following are questions about how to convert decimals into English pronunciation. Please provide the correct answer based on the numbers in the question. Question: 123456.789012 <b>Answer: Let's think step by step,</b> 1. This number has a decimal point, so it's a decimal.2. The integer part to the left of the decimal point is 123456, which is a 6-digit integer. According to English grammar, a 6-digit number is at the hundred-thousand level.3. So, the integer part from left to right can be written as one hundred twenty three thousand four hundred fifty six.4. The decimal part to the right of the decimal point is 789012, which according to English grammar, is written out one digit at a time.5. So the decimal part from left to right can be written as seven eight nine zero one two.6. The decimal point is read as 'point'.So the answer is one hundred twenty three thousand four hundred fifty six point seven eight nine zero one two.</p> <p>The following are questions about how to convert decimals into English pronunciation. Please provide the correct answer based on the numbers in the question. Question: 123456789.987654321 <b>Answer: Let's think step by step,</b> 1. This number has a decimal point, so it's a decimal.2. The integer part to the left of the decimal point is 123456789, which is a 9-digit integer. According to English grammar, a 9-digit number is at the hundred-million level.3. So, the integer part from left to right can be written as one hundred twenty-three million four hundred fifty-six thousand seven hundred eighty-nine.4. The decimal part to the right of the decimal point is 987654321, which according to English grammar, is written out one digit at a time.5. So the decimal part from left to right can be written as nine eight seven six five four three two one.6. The decimal point is read as 'point'.So the answer is one hundred twenty-three million four hundred fifty-six thousand seven hundred eighty-nine point nine eight seven six five four three two one.</p> <p>The following are questions about how to convert decimals into English pronunciation. Please provide the correct answer based on the numbers in the question. Question: 123456789012.210987654321 <b>Answer: Let's think step by step,</b> 1. This number has a decimal point, so it's a decimal.2. The integer part to the left of the decimal point is 123456789012, which is a 12-digit integer. According to English grammar, a 12-digit number is at the hundred-billion level.3. So, the integer part from left to right can be written as one hundred twenty-three billion four hundred fifty-six million seven hundred eighty-nine thousand twelve.4. The decimal part to the right of the decimal point is 210987654321, which according to English grammar, is written out one digit at a time.5. So the decimal part from left to right can be written as two one zero nine eight seven six five four three two one.6. The decimal point is read as 'point'.So the answer is one hundred twenty-three billion four hundred fifty-six million seven hundred eighty-nine thousand twelve point two one zero nine eight seven six five four three two one.</p> <p><b>The following are questions about how to convert decimals into English pronunciation. Please provide the correct answer based on the numbers in the question. Question: XXX Answer: Let's think step by step,</b></p>

## Prompt that convert decimal into Chinese in Num2Words

Zero-shot	<p>以下是关于小数为中文读法的题目，请根据题目的数字，给出正确的答案。题目: XXX <b>答案:</b></p>
Zero-shot CoT	<p>以下是关于小数为中文读法的题目，请根据题目的数字，给出正确的答案。题目: XXX <b>答案: 让我们一步一步思考,</b></p>
Few-shot	<p>以下是关于小数为中文读法的题目，请根据题目的数字，给出正确的答案。题目: 123.456 <b>答案:</b> 一百二十三点四五六</p> <p>以下是关于小数为中文读法的题目，请根据题目的数字，给出正确的答案。题目: 123456.789012 <b>答案:</b> 十二万三千四百五十六点七八九零一二</p> <p>以下是关于小数为中文读法的题目，请根据题目的数字，给出正确的答案。题目: 123456789.987654321 <b>答案:</b> 一亿二千三百四十五万六千七百八十九点九八七六五四三二一</p> <p>以下是关于小数为中文读法的题目，请根据题目的数字，给出正确的答案。题目: 123456789012.210987654321 <b>答案:</b> 一千二百三十四亿五千六百七十八万九千零一十二点二零九八七六五四三二一</p> <p><b>以下是关于小数为中文读法的题目，请根据题目的数字，给出正确的答案。题目: XXX 答案:</b></p>
Few-shot CoT	<p>以下是关于小数为中文读法的题目，请根据题目的数字，给出正确的答案。题目: 123.456 <b>答案: 让我们一步一步思考,</b> 1、这个数字有小数点，所以这是一个小数；2、小数点左侧的整数部分是123，这是一个长度为3的整数，按照中文的语法，3位数字是百级别的数字；3、所以整数部分从左到右依次可以写出一百二十三；4、小数右侧的小数部分是456，按照中文的语法，小数部分一个数字写出来即可；5、所以小数部分从左到右依次可以写出四五六；6、小数点读作点；所以答案是一百二十三点四五六。</p> <p>以下是关于小数为中文读法的题目，请根据题目的数字，给出正确的答案。题目: 123456.789012 <b>答案: 让我们一步一步思考,</b> 1、这个数字有小数点，所以这是一个小数；2、小数点左侧的整数部分是123456，这是一个长度为6的整数，按照中文的语法，6位数字是十万级别的数字；3、所以整数部分从左到右依次可以写出十二万三千四百五十六；4、小数右侧的小数部分是789012，按照中文的语法，小数部分一个数字写出来即可；5、所以小数部分从左到右依次可以写出七八九零一二；6、小数点读作点；所以答案是十二万三千四百五十六点七八九零一二。</p> <p>以下是关于小数为中文读法的题目，请根据题目的数字，给出正确的答案。题目: 123456789.987654321 <b>答案: 让我们一步一步思考,</b> 1、这个数字有小数点，所以这是一个小数；2、小数点左侧的整数部分是123456789，这是一个长度为9的整数，按照中文的语法，9位数字是亿级别的数字；3、所以整数部分从左到右依次可以写出一亿二千三百四十五万六千七百八十九；4、小数右侧的小数部分是987654321，按照中文的语法，小数部分一个数字写出来即可；5、所以小数部分从左到右依次可以写出九八七六五四三二一；6、小数点读作点；所以答案是一亿二千三百四十五万六千七百八十九点九八七六五四三二一。</p> <p>以下是关于小数为中文读法的题目，请根据题目的数字，给出正确的答案。题目: 123456789012.210987654321 <b>答案: 让我们一步一步思考,</b> 1、这个数字有小数点，所以这是一个小数；2、小数点左侧的整数部分是123456789012，这是一个长度为12的整数，按照中文的语法，12位数字是千亿级别的数字；3、所以整数部分从左到右依次可以写出一千二百三十四亿五千六百七十八万九千零一十二；4、小数右侧的小数部分是210987654321，按照中文的语法，小数部分一个数字写出来即可；5、所以小数部分从左到右依次可以写出二零九八七六五四三二一；6、小数点读作点；所以答案是一千二百三十四亿五千六百七十八万九千零一十二点二零九八七六五四三二一。</p> <p><b>以下是关于小数为中文读法的题目，请根据题目的数字，给出正确的答案。题目: XXX 答案: 让我们一步一步思考,</b></p>

Table 6: Prompt that convert decimals to English and Chinese in Num2Words task, 'XXX' is a word or numerical question in the dataset.

## Prompt that convert fraction into English in Num2Words

Zero-shot	<b>The following is a question about how to convert fractions into English pronunciation. Please provide the correct answer based on the numbers in the question.Question:XXX Answer:</b>
Zero-shot CoT	<b>The following is a question about how to convert fractions into English pronunciation. Please provide the correct answer based on the numbers in the question.Question:XXX Answer: Let's think step by step,</b>
	The following are questions about how to convert fractions into English pronunciation. Please provide the correct answer based on the numbers in the question.Question:123/456 Answer:one hundred twenty three over four hundred fifty six.
	The following are questions about how to convert fractions into English pronunciation. Please provide the correct answer based on the numbers in the question.Question:123456/789012 Answer: one hundred twenty three thousand four hundred fifty six over seven hundred eighty nine thousand twelve.
Few-shot	The following are questions about how to convert fractions into English pronunciation. Please provide the correct answer based on the numbers in the question.Question:123456789/987654321 Answer: one hundred twenty three million four hundred fifty six thousand seven hundred eighty nine over nine hundred eighty seven million six hundred fifty four thousand three hundred twenty one.
	The following are questions about how to convert fractions into English pronunciation. Please provide the correct answer based on the numbers in the question.Question:123456789012/210987654321 Answer: one hundred twenty three billion four hundred fifty six million seven hundred eighty nine thousand twelve over two hundred ten billion nine hundred eighty seven million six hundred fifty four thousand three hundred twenty one.
	<b>The following are questions about how to convert fractions into English pronunciation. Please provide the correct answer based on the numbers in the question.Question:XXX Answer:</b>
	The following are questions about how to convert fractions into English pronunciation. Please provide the correct answer based on the numbers in the question.Question:123/456 Answer: Let's think step by step. 1. This number has a slash, so it's a fraction.2. The numerator to the left of the slash is 123, which is a 3-digit integer. According to English grammar, a 3-digit number is at the hundred level.3. So the numerator from left to right can be written as one hundred twenty-three.4. The denominator to the right of the slash is 456, which is also a 3-digit integer. According to English grammar, a 3-digit number is at the hundred level.5. So the denominator from left to right can be written as four hundred fifty-six.6. The slash is read as 'over'.So the answer is one hundred twenty-three over four hundred fifty-six.
	The following are questions about how to convert fractions into English pronunciation. Please provide the correct answer based on the numbers in the question.Question:123456/789012 Answer: Let's think step by step. 1. This number has a slash, so it's a fraction.2. The numerator to the left of the slash is 123456, which is a 6-digit integer. According to English grammar, a 6-digit number is at the hundred-thousand level.3. So the numerator from left to right can be written as one hundred twenty-three thousand four hundred fifty-six.4. The denominator to the right of the slash is 789012, which is also a 6-digit integer. According to English grammar, a 6-digit number is at the hundred-thousand level.5. So the denominator from left to right can be written as seven hundred eighty-nine thousand twelve.6. The slash is read as 'over'.So the answer is one hundred twenty-three thousand four hundred fifty-six over seven hundred eighty-nine thousand twelve.
Few-shot CoT	The following are questions about how to convert fractions into English pronunciation. Please provide the correct answer based on the numbers in the question.Question:123456789/987654321 Answer: Let's think step by step. 1. This number has a slash, so it's a fraction.2. The numerator to the left of the slash is 123456789, which is a 9-digit integer. According to English grammar, a 9-digit number is at the hundred-million level.3. So the numerator from left to right can be written as one hundred twenty-three million four hundred fifty-six thousand seven hundred eighty-nine.4. The denominator to the right of the slash is 987654321, which is also a 9-digit integer. According to English grammar, a 9-digit number is at the hundred-million level.5. So the denominator from left to right can be written as nine hundred eighty-seven million six hundred fifty-four thousand three hundred twenty-one.6. The slash is read as 'over'.So the answer is one hundred twenty-three million four hundred fifty-six thousand seven hundred eighty-nine over nine hundred eighty-seven million six hundred fifty-four thousand three hundred twenty-one.
	The following are questions about how to convert fractions into English pronunciation. Please provide the correct answer based on the numbers in the question.Question:123456789012/210987654321 Answer: Let's think step by step. 1. This number has a slash, so it's a fraction.2. The numerator to the left of the slash is 123456789012, which is a 12-digit integer. According to English grammar, a 12-digit number is at the hundred-billion level.3. So the numerator from left to right can be written as one hundred twenty-three billion four hundred fifty-six million seven hundred eighty-nine thousand twelve.4. The denominator to the right of the slash is 210987654321, which is also a 12-digit integer. According to English grammar, a 12-digit number is at the hundred-billion level.5. So the denominator from left to right can be written as two hundred ten billion nine hundred eighty-seven million six hundred fifty-four thousand three hundred twenty-one.6. The slash is read as 'over'.So the answer is one hundred twenty-three billion four hundred fifty-six million seven hundred eighty-nine thousand twelve over two hundred ten billion nine hundred eighty-seven million six hundred fifty-four thousand three hundred twenty-one.
	<b>The following are questions about how to convert fractions into English pronunciation. Please provide the correct answer based on the numbers in the question.Question:XXX Answer: Let's think step by step,</b>

## Prompt that convert fraction into Chinese in Num2Words

Zero-shot	<b>以下是关于分数转为中文读法的题目，请根据题目的数字，给出正确的答案。题目: XXX 答案:</b>
Zero-shot CoT	<b>以下是关于分数转为中文读法的题目，请根据题目的数字，给出正确的答案。题目: XXX 答案: 让我们一步一步思考，</b>
	以下是关于分数转为中文读法的题目，请根据题目的数字，给出正确的答案。题目: 123/456 答案: 四百五十六分之一百二十三
	以下是关于分数转为中文读法的题目，请根据题目的数字，给出正确的答案。题目: 123456/789012 答案: 七十八万九千零一十二分之十二万三千四百五十六
Few-shot	以下是关于分数转为中文读法的题目，请根据题目的数字，给出正确的答案。题目: 123456789/987654321 答案: 九亿八千七百六十五万四千三百二十一分之一亿二千三百四十五万六千七百八十九
	以下是关于分数转为中文读法的题目，请根据题目的数字，给出正确的答案。题目: 123456789012/210987654321 答案: 二千一百零九亿八千七百六十五万四千三百二十一之一千二百三十四亿五千六百七十八万九千零一十二
	<b>以下是关于分数转为中文读法的题目，请根据题目的数字，给出正确的答案。题目: XXX 答案:</b>
	以下是关于分数转为中文读法的题目，请根据题目的数字，给出正确的答案。题目: 123/456 答案: 让我们一步一步思考，1、这个数字有斜杠，所以这是一个分数；2、斜杠左侧的分子是123，这个整数的长度一共是3位，按照中文的语法，3位数字是百级别的数字；3、所以分子从左到右依次可以写出一百二十三；4、斜杠右侧的分母是456，这个整数的长度一共是3位，按照中文的语法，3位数字是百级别的数字；5、所以分子从左到右依次可以写出四百五十六；6、斜杠读作分之；7、中文的语法里，要先读分母，再读斜杠，再读分子；所以答案是四百五十六分之一百二十三。
	以下是关于分数转为中文读法的题目，请根据题目的数字，给出正确的答案。题目: 123456/789012 答案: 让我们一步一步思考，1、这个数字有斜杠，所以这是一个分数；2、斜杠左侧的分子是123456，这个整数的长度一共是6位，按照中文的语法，6位数字是十万级别的数字；3、所以分子从左到右依次可以写出十二万三千四百五十六；4、斜杠右侧的分母是789012，这个整数的长度一共是6位，按照中文的语法，6位数字是十万级别的数字；5、所以分子从左到右依次可以写出七十八万九千零一十二；6、斜杠读作分之；7、中文的语法里，要先读分母，再读斜杠，再读分子；所以答案是七十八万九千零一十二分之十二万三千四百五十六。
Few-shot CoT	以下是关于分数转为中文读法的题目，请根据题目的数字，给出正确的答案。题目: 123456789/987654321 答案: 让我们一步一步思考，1、这个数字有斜杠，所以这是一个分数；2、斜杠左侧的分子是123456789，这个整数的长度一共是9位，按照中文的语法，9位数字是亿级别的数字；3、所以分子从左到右依次可以写出一亿二千三百四十五万六千七百八十九；4、斜杠右侧的分母是987654321，这个整数的长度一共是9位，按照中文的语法，9位数字是亿级别的数字；5、所以分子从左到右依次可以写出九亿八千七百六十五万四千三百二十一；6、斜杠读作分之；7、中文的语法里，要先读分母，再读斜杠，再读分子；所以答案是九亿八千七百六十五万四千三百二十一之一亿二千三百四十五万六千七百八十九。
	以下是关于分数转为中文读法的题目，请根据题目的数字，给出正确的答案。题目: 123456789012/210987654321 答案: 让我们一步一步思考，1、这个数字有斜杠，所以这是一个分数；2、斜杠左侧的分子是123456789012，这个整数的长度一共是12位，按照中文的语法，12位数字是千亿级别的数字；3、所以分子从左到右依次可以写出一千二百三十四亿五千六百七十八万九千零一十二；4、斜杠右侧的分母是210987654321，这个整数的长度一共是12位，按照中文的语法，12位数字是千亿级别的数字；5、所以分子从左到右依次可以写出二千一百零九亿八千七百六十五万四千三百二十一；6、斜杠读作分之；7、中文的语法里，要先读分母，再读斜杠，再读分子；所以答案是二千一百零九亿八千七百六十五万四千三百二十一之一千二百三十四亿五千六百七十八万九千零一十二。
	<b>以下是关于分数转为中文读法的题目，请根据题目的数字，给出正确的答案。题目: XXX 答案: 让我们一步一步思考，</b>

Table 7: Prompt that convert fractions to English and Chinese in Num2Words task, 'XXX' is a word or numerical question in the dataset.

## Prompt that convert English into integer in Words2Num

Zero-shot	<p><b>The following is a question about how to convert English pronunciation into integers. Please provide the correct answer based on the numbers in the question. Question: XXX Answer:</b></p>
Zero-shot CoT	<p><b>The following is a question about how to convert English pronunciation into integers. Please provide the correct answer based on the numbers in the question. Question: XXX Answer: Let's think step by step.</b></p> <hr/> <p>The following are questions about how to convert English pronunciation into integers. Please provide the correct answer based on the numbers in the question. Question: One hundred twenty-three Answer: 123</p> <p>The following are questions about how to convert English pronunciation into integers. Please provide the correct answer based on the numbers in the question. Question: One hundred twenty-three thousand four hundred fifty-six Answer: 123456</p>
Few-shot	<p>The following are questions about how to convert English pronunciation into integers. Please provide the correct answer based on the numbers in the question. Question: One hundred twenty-three million four hundred fifty-six thousand seven hundred eighty-nine Answer: 123456789</p> <p>The following are questions about how to convert English pronunciation into integers. Please provide the correct answer based on the numbers in the question. Question: One hundred twenty-three billion four hundred fifty-six million seven hundred eighty-nine thousand twelve Answer: 123456789012</p> <p><b>The following are questions about how to convert English pronunciation into integers. Please provide the correct answer based on the numbers in the question. Question: XXX Answer:</b></p> <hr/> <p>The following are questions about how to convert English pronunciation into integers. Please give the correct answers based on the English words in the questions. Question: One hundred twenty-three Answer: Let's think step by step. 1. Write it down in order from left to right, one hundred is written as 100, twenty is written as 20, three is written as 3; 2. Add all the numbers above, <math>100 + 20 + 3 = 123</math>; So, the answer is 123.</p> <p>The following are questions about how to convert English pronunciation into integers. Please give the correct answers based on the English words in the questions. Question: One hundred twenty-three thousand four hundred fifty-six Answer: Let's think step by step. 1. Write it down in order from left to right, one hundred twenty-three thousand is written as 123000, four hundred fifty-six is written as 456; 2. Add all the numbers above, <math>123000 + 456 = 123456</math>; So, the answer is 123456.</p> <p>The following are questions about how to convert English pronunciation into integers. Please give the correct answers based on the English words in the questions. Question: One hundred twenty-three million four hundred fifty-six thousand seven hundred eighty-nine Answer: Let's think step by step. 1. Write it down in order from left to right, one hundred twenty-three million is written as 123000000, four hundred fifty-six thousand is written as 456000, seven hundred eighty-nine is written as 789; 2. Add all the numbers above, <math>123000000 + 456000 + 789 = 123456789</math>; So, the answer is 123456789.</p> <p>The following are questions about how to convert English pronunciation into integers. Please give the correct answers based on the English words in the questions. Question: One hundred twenty-three billion four hundred fifty-six million seven hundred eighty-nine thousand and twelve Answer: Let's think step by step. 1. Write it down in order from left to right, one hundred twenty-three billion is written as 123000000000, four hundred fifty-six million is written as 456000000, seven hundred eighty-nine thousand is written as 789000, twelve is written as 12; 2. Add all the numbers above, <math>123000000000 + 456000000 + 789000 + 12 = 123456789012</math>; So, the answer is 123456789012.</p> <p><b>The following are questions about how to convert English pronunciation into integers. Please give the correct answers based on the English words in the questions. Question: XXX Answer: Let's think step by step.</b></p>
Few-shot CoT	<p>The following are questions about how to convert English pronunciation into integers. Please give the correct answers based on the English words in the questions. Question: One hundred twenty-three Answer: Let's think step by step. 1. Write it down in order from left to right, one hundred is written as 100, twenty is written as 20, three is written as 3; 2. Add all the numbers above, <math>100 + 20 + 3 = 123</math>; So, the answer is 123.</p> <p>The following are questions about how to convert English pronunciation into integers. Please give the correct answers based on the English words in the questions. Question: One hundred twenty-three thousand four hundred fifty-six Answer: Let's think step by step. 1. Write it down in order from left to right, one hundred twenty-three thousand is written as 123000, four hundred fifty-six is written as 456; 2. Add all the numbers above, <math>123000 + 456 = 123456</math>; So, the answer is 123456.</p> <p>The following are questions about how to convert English pronunciation into integers. Please give the correct answers based on the English words in the questions. Question: One hundred twenty-three million four hundred fifty-six thousand seven hundred eighty-nine Answer: Let's think step by step. 1. Write it down in order from left to right, one hundred twenty-three million is written as 123000000, four hundred fifty-six thousand is written as 456000, seven hundred eighty-nine is written as 789; 2. Add all the numbers above, <math>123000000 + 456000 + 789 = 123456789</math>; So, the answer is 123456789.</p> <p>The following are questions about how to convert English pronunciation into integers. Please give the correct answers based on the English words in the questions. Question: One hundred twenty-three billion four hundred fifty-six million seven hundred eighty-nine thousand and twelve Answer: Let's think step by step. 1. Write it down in order from left to right, one hundred twenty-three billion is written as 123000000000, four hundred fifty-six million is written as 456000000, seven hundred eighty-nine thousand is written as 789000, twelve is written as 12; 2. Add all the numbers above, <math>123000000000 + 456000000 + 789000 + 12 = 123456789012</math>; So, the answer is 123456789012.</p> <p><b>The following are questions about how to convert English pronunciation into integers. Please give the correct answers based on the English words in the questions. Question: XXX Answer: Let's think step by step.</b></p>

## Prompt that convert Chinese into integer in Words2Num

Zero-shot	<p><b>以下是关于中文转为整数的题目，请根据题目的中文，给出正确的答案。 题目: XXX 答案:</b></p>
Zero-shot CoT	<p><b>以下是关于中文转为整数的题目，请根据题目的中文，给出正确的答案。 题目: XXX 答案: 让我们一步一步思考，</b></p> <hr/> <p>以下是关于中文转为整数的题目，请根据题目的中文，给出正确的答案。 题目: 一百二十三 答案: 123</p> <p>以下是关于中文转为整数的题目，请根据题目的中文，给出正确的答案。 题目: 十二万三千四百五十六 答案: 123456</p>
Few-shot	<p>以下是关于中文转为整数的题目，请根据题目的中文，给出正确的答案。 题目: 一亿二千三百四十五万六千七百八十九 答案: 123456789</p> <p>以下是关于中文转为整数的题目，请根据题目的中文，给出正确的答案。 题目: 一千二百三十四亿五千六百七十八万九千零一十二 答案: 123456789012</p> <p><b>以下是关于中文转为整数的题目，请根据题目的中文，给出正确的答案。 题目: XXX 答案:</b></p> <hr/> <p>以下是关于中文转为整数的题目，请根据题目的中文，给出正确的答案。 题目: 一百二十三 答案: 让我们一步一步思考，1、按照顺序从左到右写下来，一百写作100，二十写作20，三写作3；2、上面所有的数字相加，<math>100+20+3=123</math>；所以答案是123。</p> <p>以下是关于中文转为整数的题目，请根据题目的中文，给出正确的答案。 题目: 十二万三千四百五十六 答案: 让我们一步一步思考，1、按照顺序从左到右写下来，十二万写作120000，三千四百五十六写作3456；2、上面所有的数字相加，<math>120000+3456=123456</math>所以答案是123456。</p> <p>以下是关于中文转为整数的题目，请根据题目的中文，给出正确的答案。 题目: 一亿二千三百四十五万六千七百八十九 答案: 让我们一步一步思考，1、按照顺序从左到右写下来，一亿写作100000000，二千三百四十五万写作23450000，六千七百八十九写作6789；2、上面所有的数字相加，<math>100000000+23450000+6789=123456789</math>；所以答案是123456789。</p> <p>以下是关于中文转为整数的题目，请根据题目的中文，给出正确的答案。 题目: 一千二百三十四亿五千六百七十八万九千零一十二 答案: 让我们一步一步思考，1、按照顺序从左到右写下来，一千二百三十四亿写作123400000000，五千六百七十八万写作56780000，九千零一十二写作9012；2、上面所有的数字相加，<math>123400000000+56780000+9012=123456789012</math>；所以答案是123456789012。</p> <p><b>以下是关于中文转为整数的题目，请根据题目的中文，给出正确的答案。 题目: XXX 答案: 让我们一步一步思考，</b></p>

Table 8: Prompt that convert English and Chinese to integer in Words2Num task, 'XXX' is a word or numerical question in the dataset.



## Prompt that convert English into decimal in Words2Num

Zero-shot	<b>The following is a question about how to convert English pronunciation into decimals. Please provide the correct answer based on the numbers in the question. Question: XXX Answer:</b>
Zero-shot CoT	<b>The following is a question about how to convert English pronunciation into decimals. Please provide the correct answer based on the numbers in the question. Question: XXX Answer: Let's think step by step.</b>
Few-shot	<p>The following are questions about how to convert English pronunciation into decimals. Please provide the correct answer based on the numbers in the question. Question: one hundred twenty three point four five six Answer:123.456</p> <p>The following are questions about how to convert English pronunciation into decimals. Please provide the correct answer based on the numbers in the question. Question: one hundred twenty three thousand four hundred fifty six point seven eight nine zero one two Answer:123456.789012</p> <p>The following are questions about how to convert English pronunciation into decimals. Please provide the correct answer based on the numbers in the question. Question: one hundred and twenty-three million four hundred and fifty-six thousand seven hundred and eighty-nine point nine eight seven six five four three two one Answer:123456789.987654321</p> <p>The following are questions about how to convert English pronunciation into decimals. Please provide the correct answer based on the numbers in the question. Question: one hundred twenty three billion four hundred fifty six million seven hundred eighty nine thousand twelve point two one zero nine eight seven six five four three two one Answer:123456789012.210987654321</p> <p><b>The following are questions about how to convert English pronunciation into decimals. Please provide the correct answer based on the numbers in the question. Question: XXX Answer:</b></p> <p>The following are questions about how to convert English pronunciation into decimals. Please provide the correct answer based on the numbers in the question. Question: one hundred twenty three point four five six Answer: Let's think step by step. 1. The presence of the character 'point' in the problem indicates that this is a decimal number;2. To the left of 'point', 'one hundred and twenty-three' is the integer part, written as 123;3. To the right of 'point', 'four five six' is the decimal part, written as 456;4. The 'point' is written as '.';So the answer is 123.456.</p> <p>The following are questions about how to convert English pronunciation into decimals. Please provide the correct answer based on the numbers in the question. Question: one hundred twenty three thousand four hundred fifty six point seven eight nine zero one two Answer: Let's think step by step. 1. The presence of the character 'point' in the problem indicates that this is a decimal number;2. To the left of 'point', 'one hundred twenty-three thousand four hundred fifty-six' is the integer part, written as 123456;3. To the right of 'point', 'seven eight nine zero one two' is the decimal part, written as 789012;4. The 'point' is written as '.';So the answer is 123456.789012.</p> <p>The following are questions about how to convert English pronunciation into decimals. Please provide the correct answer based on the numbers in the question. Question: one hundred twenty three billion four hundred fifty six million seven hundred eighty nine thousand twelve point two one zero nine eight seven six five four three two one Answer: Let's think step by step. 1. The presence of the character 'point' in the problem indicates that this is a decimal number;2. To the left of 'point', 'one hundred twenty-three billion four hundred fifty-six thousand seven hundred eighty-nine' is the integer part, written as 123456789;3. To the right of 'point', 'two one zero nine eight seven six five four three two one' is the decimal part, written as 210987654321;4. The 'point' is written as '.';So the answer is 123456789012.210987654321.</p> <p><b>The following are questions about how to convert English pronunciation into decimals. Please provide the correct answer based on the numbers in the question. Question: XXX Answer: Let's think step by step.</b></p>
Few-shot CoT	<p>The following are questions about how to convert English pronunciation into decimals. Please provide the correct answer based on the numbers in the question. Question: one hundred twenty three thousand four hundred fifty six point seven eight nine zero one two Answer: Let's think step by step. 1. The presence of the character 'point' in the problem indicates that this is a decimal number;2. To the left of 'point', 'one hundred twenty-three thousand four hundred fifty-six' is the integer part, written as 123456;3. To the right of 'point', 'seven eight nine zero one two' is the decimal part, written as 789012;4. The 'point' is written as '.';So the answer is 123456.789012.</p> <p>The following are questions about how to convert English pronunciation into decimals. Please provide the correct answer based on the numbers in the question. Question: one hundred twenty three billion four hundred fifty six million seven hundred eighty nine thousand twelve point two one zero nine eight seven six five four three two one Answer: Let's think step by step. 1. The presence of the character 'point' in the problem indicates that this is a decimal number;2. To the left of 'point', 'one hundred twenty-three billion four hundred fifty-six thousand seven hundred eighty-nine thousand twelve' is the integer part, written as 123456789012;3. To the right of 'point', 'two one zero nine eight seven six five four three two one' is the decimal part, written as 210987654321;4. The 'point' is written as '.';So the answer is 123456789012.210987654321.</p> <p><b>The following are questions about how to convert English pronunciation into decimals. Please provide the correct answer based on the numbers in the question. Question: XXX Answer: Let's think step by step.</b></p>

## Prompt that convert Chinese into decimal in Words2Num

Zero-shot	<b>以下是关于中文转为小数的题目，请根据题目的中文，给出正确的答案。 题目：XXX 答案：</b>
Zero-shot CoT	<b>以下是关于中文转为小数的题目，请根据题目的中文，给出正确的答案。 题目：XXX 答案：让我们一步一步思考，</b>
Few-shot	<p>以下是关于中文转为小数的题目，请根据题目的中文，给出正确的答案。 题目：一百二十三点四五六 答案：123.456</p> <p>以下是关于中文转为小数的题目，请根据题目的中文，给出正确的答案。 题目：十二万三千四百五十六点七八九零一二 答案：123456.789012</p> <p>以下是关于中文转为小数的题目，请根据题目的中文，给出正确的答案。 题目：一亿二千三百四十五万六千七百八十九点九八七六五四三二一 答案：123456789.987654321</p> <p>以下是关于中文转为小数的题目，请根据题目的中文，给出正确的答案。 题目：一千二百三十四亿五千六百七十八万九千零一十二点二一零九八七六五四三二一 答案：123456789012.210987654321</p> <p><b>以下是关于中文转为小数的题目，请根据题目的中文，给出正确的答案。 题目：XXX 答案：</b></p> <p>以下是关于中文转为小数的题目，请根据题目的中文，给出正确的答案。 题目：一百二十三点四五六 答案：让我们一步一步思考，1、题目里出现了'点'这个汉字，说明这是一个小数；2、'点'字左边'一百二十三'的是整数部分，写作123；3、'点'字右边'四五六'的是小数部分，写作456；4、'点'字写作'.'；所以答案是123.456。</p> <p>以下是关于中文转为小数的题目，请根据题目的中文，给出正确的答案。 题目：十二万三千四百五十六点七八九零一二 答案：让我们一步一步思考，1、题目里出现了'点'这个汉字，说明这是一个小数；2、'点'字左边'十二万三千四百五十六'的是整数部分，写作123456；3、'点'字右边'七八九零一二'的是小数部分，写作789012；4、'点'字写作'.'；所以答案是123456.789012。</p> <p>以下是关于中文转为小数的题目，请根据题目的中文，给出正确的答案。 题目：一亿二千三百四十五万六千七百八十九点九八七六五四三二一 答案：让我们一步一步思考，1、题目里出现了'点'这个汉字，说明这是一个小数；2、'点'字左边'一亿二千三百四十五万六千七百八十九'的是整数部分，写作123456789；3、'点'字右边'九八七六五四三二一'的是小数部分，写作987654321；4、'点'字写作'.'；所以答案是123456789.987654321。</p> <p>以下是关于中文转为小数的题目，请根据题目的中文，给出正确的答案。 题目：一千二百三十四亿五千六百七十八万九千零一十二点二一零九八七六五四三二一 答案：让我们一步一步思考，1、题目里出现了'点'这个汉字，说明这是一个小数；2、'点'字左边'一千二百三十四亿五千六百七十八万九千零一十二'的是整数部分，写作123456789012；3、'点'字右边'二一零九八七六五四三二一'的是小数部分，写作210987654321；4、'点'字写作'.'；所以答案是123456789012.210987654321。</p> <p><b>以下是关于中文转为小数的题目，请根据题目的中文，给出正确的答案。 题目：XXX 答案：让我们一步一步思考，</b></p>
Few-shot CoT	<p>以下是关于中文转为小数的题目，请根据题目的中文，给出正确的答案。 题目：一亿二千三百四十五万六千七百八十九点九八七六五四三二一 答案：让我们一步一步思考，1、题目里出现了'点'这个汉字，说明这是一个小数；2、'点'字左边'一亿二千三百四十五万六千七百八十九'的是整数部分，写作123456789；3、'点'字右边'九八七六五四三二一'的是小数部分，写作987654321；4、'点'字写作'.'；所以答案是123456789.987654321。</p> <p>以下是关于中文转为小数的题目，请根据题目的中文，给出正确的答案。 题目：一千二百三十四亿五千六百七十八万九千零一十二点二一零九八七六五四三二一 答案：让我们一步一步思考，1、题目里出现了'点'这个汉字，说明这是一个小数；2、'点'字左边'一千二百三十四亿五千六百七十八万九千零一十二'的是整数部分，写作123456789012；3、'点'字右边'二一零九八七六五四三二一'的是小数部分，写作210987654321；4、'点'字写作'.'；所以答案是123456789012.210987654321。</p> <p><b>以下是关于中文转为小数的题目，请根据题目的中文，给出正确的答案。 题目：XXX 答案：让我们一步一步思考，</b></p>

Table 9: Prompt that convert English and Chinese to decimal in Words2Num task, 'XXX' is a word or numerical question in the dataset.

## Prompt that convert English into fraction in Words2Num

Zero-shot	<b>The following is a question about how to convert English pronunciation into fractions. Please provide the correct answer based on the numbers in the question. Question: XXX Answer:</b>
Zero-shot CoT	<b>The following is a question about how to convert English pronunciation into fractions. Please provide the correct answer based on the numbers in the question. Question: XXX Answer: Let's think step by step.</b>
	The following is a question about how to convert English pronunciation into fractions. Please provide the correct answer based on the numbers in the question. Question: one hundred twenty three over four hundred fifty six Answer: 123/456
	The following is a question about how to convert English pronunciation into fractions. Please provide the correct answer based on the numbers in the question. Question: one hundred twenty three thousand four hundred fifty six over seven hundred eighty nine thousand twelve Answer: 123456/789012
Few-shot	The following is a question about how to convert English pronunciation into fractions. Please provide the correct answer based on the numbers in the question. Question: one hundred twenty three million four hundred fifty six thousand seven hundred eighty nine over nine hundred eighty seven million six hundred fifty four thousand three hundred twenty one Answer: 123456789/987654321
	The following is a question about how to convert English pronunciation into fractions. Please provide the correct answer based on the numbers in the question. Question: one hundred twenty three billion four hundred fifty six million seven hundred eighty nine thousand twelve over two hundred ten billion nine hundred eighty seven million six hundred fifty four thousand three hundred twenty one Answer: 123456789012/210987654321
	<b>The following is a question about how to convert English pronunciation into fractions. Please provide the correct answer based on the numbers in the question. Question: XXX Answer:</b>
	The following is a question about how to convert English pronunciation into fractions. Please provide the correct answer based on the numbers in the question. Question: one hundred twenty three over four hundred fifty six Answer: Let's think step by step. 1. The appearance of the term 'over' in the problem indicates that this is a fraction; 2. To the left of 'over', 'four hundred fifty-six' is the denominator, written as 456; 3. To the right of 'over', 'one hundred twenty-three' is the numerator, written as 123; 4. 'over' is written as '/'; 5. When written as a fraction, the numerator is written first, followed by '/', and then the denominator; So the answer is 123/456.
	The following is a question about how to convert English pronunciation into fractions. Please provide the correct answer based on the numbers in the question. Question: one hundred twenty three thousand four hundred fifty six over seven hundred eighty nine thousand twelve Answer: Let's think step by step. 1. The appearance of the term 'over' in the problem indicates that this is a fraction; 2. To the left of 'over', 'seven hundred eighty-nine thousand twelve' is the denominator, written as 789012; 3. To the right of 'over', 'one hundred twenty-three thousand four hundred fifty-six' is the numerator, written as 123456; 4. 'over' is written as '/'; 5. When written as a fraction, the numerator is written first, followed by '/', and then the denominator; So the answer is 123456/789012.
Few-shot CoT	The following is a question about how to convert English pronunciation into fractions. Please provide the correct answer based on the numbers in the question. Question: one hundred twenty three million four hundred fifty six thousand seven hundred eighty nine over nine hundred eighty seven million six hundred fifty four thousand three hundred twenty one Answer: Let's think step by step. 1. The appearance of the term 'over' in the problem indicates that this is a fraction; 2. To the left of 'over', 'nine hundred eighty-seven million six hundred fifty four thousand three hundred twenty-one' is the denominator, written as 987654321; 3. To the right of 'over', 'one hundred twenty-three million four hundred fifty-six thousand seven hundred eighty-nine' is the numerator, written as 123456789; 4. 'over' is written as '/'; 5. When written as a fraction, the numerator is written first, followed by '/', and then the denominator; So the answer is 123456789/987654321.
	The following is a question about how to convert English pronunciation into fractions. Please provide the correct answer based on the numbers in the question. Question: one hundred twenty three billion four hundred fifty six million seven hundred eighty nine thousand twelve over two hundred ten billion nine hundred eighty seven million six hundred fifty four thousand three hundred twenty one Answer: Let's think step by step. 1. The appearance of the term 'over' in the problem indicates that this is a fraction; 2. To the left of 'over', 'two hundred ten billion nine hundred eighty-seven million six hundred fifty-four thousand three hundred twenty-one' is the denominator, written as 210987654321; 3. To the right of 'over', 'one hundred twenty-three billion four hundred fifty-six million seven hundred eighty-nine thousand twelve' is the numerator, written as 123456789012; 4. 'over' is written as '/'; 5. When written as a fraction, the numerator is written first, followed by '/', and then the denominator; So the answer is 123456789012/210987654321.
	<b>The following is a question about how to convert English pronunciation into fractions. Please provide the correct answer based on the numbers in the question. Question: XXX Answer: Let's think step by step.</b>

## Prompt that convert Chinese into fraction in Words2Num

Zero-shot	<b>以下是关于中文转为分数的题目，请根据题目的中文，给出正确的答案。 题目: XXX 答案:</b>
Zero-shot CoT	<b>以下是关于中文转为分数的题目，请根据题目的中文，给出正确的答案。 题目: XXX 答案: 让我们一步一步思考,</b>
	以下是关于中文转为分数的题目，请根据题目的中文，给出正确的答案。 题目: 四百五十六分之一百二十三 答案: 123/456
	以下是关于中文转为分数的题目，请根据题目的中文，给出正确的答案。 题目: 七十八万九千零一十二分之十二万三千四百五十六 答案: 123456/789012
Few-shot	以下是关于中文转为分数的题目，请根据题目的中文，给出正确的答案。 题目: 九亿八千七百六十五万四千三百二十一分之一亿二千三百四十五万六千七百八十九 答案: 123456789/987654321
	以下是关于中文转为分数的题目，请根据题目的中文，给出正确的答案。 题目: 二千一百零九亿八千七百六十五万四千三百二十一分之一千二百三十四亿五千六百七十八万九千零一十二 答案: 123456789012/210987654321
	<b>以下是关于中文转为分数的题目，请根据题目的中文，给出正确的答案。 题目: XXX 答案:</b>
	以下是关于中文转为分数的题目，请根据题目的中文，给出正确的答案。 题目: 四百五十六分之一百二十三 答案: 让我们一步一步思考, 1、题目里出现了'分之'这个词，说明这是一个分数; 2、'分之'左边的'四百五十六'是分母，写作456; 3、'分之'右边的'一百二十三'是分子，写作123; 4、'分之'写作'/'; 5、写为分数的时候，从左到右要先写分子，再写'/', 最后写分母; 所以答案是123/456。
	以下是关于中文转为分数的题目，请根据题目的中文，给出正确的答案。 题目: 七十八万九千零一十二分之十二万三千四百五十六 答案: 让我们一步一步思考, 1、题目里出现了'分之'这个词，说明这是一个分数; 2、'分之'左边的'七十八万九千零一十二'是分母，写作789012; 3、'分之'右边的'十二万三千四百五十六'是分子，写作123456; 4、'分之'写作'/'; 5、写为分数的时候，从左到右要先写分子，再写'/', 最后写分母; 所以答案是123456/789012。
Few-shot CoT	以下是关于中文转为分数的题目，请根据题目的中文，给出正确的答案。 题目: 九亿八千七百六十五万四千三百二十一分之一亿二千三百四十五万六千七百八十九 答案: 让我们一步一步思考, 1、题目里出现了'分之'这个词，说明这是一个分数; 2、'分之'左边的'九亿八千七百六十五万四千三百二十一'是分母，写作987654321; 3、'分之'右边的'一亿二千三百四十五万六千七百八十九'是分子，写作123456789; 4、'分之'写作'/'; 5、写为分数的时候，从左到右要先写分子，再写'/', 最后写分母; 所以答案是123456789/987654321。
	以下是关于中文转为分数的题目，请根据题目的中文，给出正确的答案。 题目: 二千一百零九亿八千七百六十五万四千三百二十一分之一千二百三十四亿五千六百七十八万九千零一十二 答案: 让我们一步一步思考, 1、题目里出现了'分之'这个词，说明这是一个分数; 2、'分之'左边的'二千一百零九亿八千七百六十五万四千三百二十一'是分母，写作210987654321; 3、'分之'右边的'一千二百三十四亿五千六百七十八万九千零一十二'是分子，写作123456789012; 4、'分之'写作'/'; 5、写为分数的时候，从左到右要先写分子，再写'/', 最后写分母; 所以答案是123456789012/210987654321。
	<b>以下是关于中文转为分数的题目，请根据题目的中文，给出正确的答案。 题目: XXX 答案: 让我们一步一步思考,</b>

Table 10: Prompt that convert English and Chinese to fraction in Words2Num task, 'XXX' is a word or numerical question in the dataset.

## Prompt of English unit conversion in Unit of Measurement

Zero-shot	<b>The following is a question about unit conversion. Please provide the correct answer at the question mark according to the question. question: XXX answer:</b>
Zero-shot CoT	<b>The following is a question about unit conversion. Please provide the correct answer at the question mark according to the question. question: XXX answer: Let's think step by step.</b>
	The following is a question about unit conversion. Please provide the correct answer at the question mark according to the question. question: 5900 meters= ?centimeters answer: 590000 centimeters.
	The following is a question about unit conversion. Please provide the correct answer at the question mark according to the question. question: 479 minutes - 630 seconds= ?seconds answer: 28110 seconds.
Few-shot	The following is a question about unit conversion. Please provide the correct answer at the question mark according to the question. question: 7 tons 54 kilogram + 68 kilogram= ?tons ?kilograms answer: 7 tons 122 kilograms.
	<b>The following is a question about unit conversion. Please provide the correct answer at the question mark according to the question. question: XXX answer:</b>
	The following is a question about unit conversion. Please provide the correct answer at the question mark according to the question. question: 5900 meters= ?centimeter answer: Let's think step by step. The unit on the right side of the question mark is centimeters. Since 1 meter=100 centimeters, 5900 meters=5900 * 100 centimeters, so the answer is 590000 centimeters.
	The following is a question about unit conversion. Please provide the correct answer at the question mark according to the question. question: 479 minutes - 630 seconds= ?seconds answer: Let's think step by step. The unit on the right side of the question mark is seconds. Since 1 minute equals 60 seconds, 479 minutes=479 * 60 seconds=28740 seconds. Because 28740 seconds - 630 seconds=28110 seconds, the answer is 28110 seconds.
Few-shot CoT	The following is a question about unit conversion. Please provide the correct answer at the question mark according to the question. question: 7 tons 54 kilogram + 68 kilogram= ?tons ?kilograms answer: Let's think step by step. The units on the right side of the question mark are tons and kilograms. Since 1 ton=1000 kilograms, 7 tons and 54 kilograms=7 * 1000+54=7054 kilograms. Because 7054 kg+68 kg=7122 kg, and 1 kg=1/1000 tons, 7122 kg=7 tons 122 kg.
	<b>The following is a question about unit conversion. Please provide the correct answer at the question mark according to the question. question: XXX answer: Let's think step by step.</b>
	The following is a question about unit conversion. Please provide the correct answer at the question mark according to the question. question: 5900 meters= ?centimeter answer: Let's think step by step. Firstly, it is necessary to understand the following common knowledge about unit conversion: 1 ton=1000 kilograms; 1 kilogram=1000 grams; 1 gram=1000 milligrams; 1 week=7 days; 1 day=24 hours; 1 hour=60 minutes; 1 minute=60 seconds; 1 second=1000 milliseconds; 1 kilometer=1000 meters; 1 meter=10 decimeters; 1 decimeter=10 centimeters; 1 centimeter=10 millimeters; 1 yuan=10 jiao; 1 jiao=10 cents. The unit on the right side of the question mark is centimeters. Since 1 meter=100 centimeters, 5900 meters=5900 * 100 centimeters, so the answer is 590000 centimeters.
	The following is a question about unit conversion. Please provide the correct answer at the question mark according to the question. question: 479 minutes - 630 seconds= ?seconds answer: Let's think step by step. Firstly, it is necessary to understand the following common knowledge about unit conversion: 1 ton=1000 kilograms; 1 kilogram=1000 grams; 1 gram=1000 milligrams; 1 week=7 days; 1 day=24 hours; 1 hour=60 minutes; 1 minute=60 seconds; 1 second=1000 milliseconds; 1 kilometer=1000 meters; 1 meter=10 decimeters; 1 decimeter=10 centimeters; 1 centimeter=10 millimeters; 1 yuan=10 jiao; 1 jiao=10 cents. The unit on the right side of the question mark is seconds. Since 1 minute equals 60 seconds, 479 minutes=479 * 60 seconds=28740 seconds. Because 28740 seconds - 630 seconds=28110 seconds, the answer is 28110 seconds.
Few-shot CoT with knowledge	The following is a question about unit conversion. Please provide the correct answer at the question mark according to the question. question: 7 tons 54 kilogram + 68 kilogram= ?tons ?kilograms answer: Let's think step by step. Firstly, it is necessary to understand the following common knowledge about unit conversion: 1 ton=1000 kilograms; 1 kilogram=1000 grams; 1 gram=1000 milligrams; 1 week=7 days; 1 day=24 hours; 1 hour=60 minutes; 1 minute=60 seconds; 1 second=1000 milliseconds; 1 kilometer=1000 meters; 1 meter=10 decimeters; 1 decimeter=10 centimeters; 1 centimeter=10 millimeters; 1 yuan=10 jiao; 1 jiao=10 cents. The units on the right side of the question mark are tons and kilograms. Since 1 ton=1000 kilograms, 7 tons and 54 kilograms=7 * 1000+54=7054 kilograms. Because 7054 kg+68 kg=7122 kg, and 1 kg=1/1000 tons, 7122 kg=7 tons 122 kg.
	<b>The following is a question about unit conversion. Please provide the correct answer at the question mark according to the question. question: XXX answer: Let's think step by step. Firstly, it is necessary to understand the following common knowledge about unit conversion: 1 ton=1000 kilograms; 1 kilogram=1000 grams; 1 gram=1000 milligrams; 1 week=7 days; 1 day=24 hours; 1 hour=60 minutes; 1 minute=60 seconds; 1 second=1000 milliseconds; 1 kilometer=1000 meters; 1 meter=10 decimeters; 1 decimeter=10 centimeters; 1 centimeter=10 millimeters; 1 yuan=10 jiao; 1 jiao=10 cents.</b>

## Prompt of Chinese unit conversion in Unit of Measurement

Zero-shot	<b>以下是关于单位转化的题目，请根据题目，给出问号处的正确答案。 题目: XXX 答案:</b>
Zero-shot CoT	<b>以下是关于单位转化的题目，请根据题目，给出问号处的正确答案。 题目: XXX 答案: 让我们一步一步思考,</b>
	以下是关于单位转化的题目，请根据题目，给出问号处的正确答案。 题目: 5900米=? 厘米 答案: 590000厘米
	以下是关于单位转化的题目，请根据题目，给出问号处的正确答案。 题目: 479分钟 - 630秒钟 = ?秒钟 答案: 28110秒钟
Few-shot	以下是关于单位转化的题目，请根据题目，给出问号处的正确答案。 题目: 7吨54千克 + 68千克 = ?吨?千克 答案: 7吨122千克
	<b>以下是关于单位转化的题目，请根据题目，给出问号处的正确答案。 题目: XXX 答案:</b>
	以下是关于单位转化的题目，请根据题目，给出问号处的正确答案。 题目: 5900米=? 厘米 答案: 让我们一步一步思考, 问号右侧的单位是厘米, 由于1米=100厘米, 所以5900米=5900*100厘米, 所以答案是590000厘米。
	以下是关于单位转化的题目，请根据题目，给出问号处的正确答案。 题目: 479分钟 - 630秒钟 = ?秒钟 答案: 让我们一步一步思考, 问号右侧的单位是秒钟, 由于1分钟=60秒钟, 因此479分钟=479*60秒钟=28740秒钟。又因为28740秒钟-630秒钟=28110秒钟, 所以答案是28110秒钟。
Few-shot CoT	以下是关于单位转化的题目，请根据题目，给出问号处的正确答案。 题目: 7吨54千克 + 68千克 = ?吨?千克 答案: 让我们一步一步思考, 问号右侧的单位是吨和千克, 由于1吨=1000千克, 因此7吨54千克=7*1000+54=7054千克。因为7054千克+68千克=7122千克, 且1千克=1/1000吨, 所以7122千克=7吨122千克。
	<b>以下是关于单位转化的题目，请根据题目，给出问号处的正确答案。 题目: XXX 答案: 让我们一步一步思考,</b>
	以下是关于单位转化的题目，请根据题目，给出问号处的正确答案。 题目: 5900米=? 厘米 答案: 让我们一步一步思考, 首先需要了解如下的单位转化常识: 1吨=1000千克; 1千克=1000克; 1克=1000毫克; 1周=7天; 1天=24小时; 1小时=60分钟; 1分钟=60秒钟; 1秒钟=1000毫秒; 1千米=1000米; 1米=10分米; 1分米=10厘米; 1厘米=10毫米; 1元=10角; 1角=10分。问号右侧的单位是厘米, 由于1米=100厘米, 所以5900米=5900*100厘米, 所以答案是590000厘米。
	以下是关于单位转化的题目，请根据题目，给出问号处的正确答案。 题目: 479分钟 - 630秒钟 = ?秒钟 答案: 让我们一步一步思考, 首先需要了解如下的单位转化常识: 1吨=1000千克; 1千克=1000克; 1克=1000毫克; 1周=7天; 1天=24小时; 1小时=60分钟; 1分钟=60秒钟; 1秒钟=1000毫秒; 1千米=1000米; 1米=10分米; 1分米=10厘米; 1厘米=10毫米; 1元=10角; 1角=10分。问号右侧的单位是秒钟, 由于1分钟=60秒钟, 因此479分钟=479*60秒钟=28740秒钟。又因为28740秒钟-630秒钟=28110秒钟, 所以答案是28110秒钟。
Few-shot CoT with knowledge	以下是关于单位转化的题目，请根据题目，给出问号处的正确答案。 题目: 7吨54千克 + 68千克 = ?吨?千克 答案: 让我们一步一步思考, 首先需要了解如下的单位转化常识: 1吨=1000千克; 1千克=1000克; 1克=1000毫克; 1周=7天; 1天=24小时; 1小时=60分钟; 1分钟=60秒钟; 1秒钟=1000毫秒; 1千米=1000米; 1米=10分米; 1分米=10厘米; 1厘米=10毫米; 1元=10角; 1角=10分。问号右侧的单位是吨和千克, 由于1吨=1000千克, 因此7吨54千克=7*1000+54=7054千克。因为7054千克+68千克=7122千克, 且1千克=1/1000吨, 所以7122千克=7吨122千克。
	<b>以下是关于单位转化的题目，请根据题目，给出问号处的正确答案。 题目: {question} 答案: 让我们一步一步思考, 首先需要了解如下的单位转化常识: 1吨=1000千克; 1千克=1000克; 1克=1000毫克; 1周=7天; 1天=24小时; 1小时=60分钟; 1分钟=60秒钟; 1秒钟=1000毫秒; 1千米=1000米; 1米=10分米; 1分米=10厘米; 1厘米=10毫米; 1元=10角; 1角=10分。</b>

Table 11: Prompt of English and Chinese unit conversion in Units of Measurement task, 'XXX' is a word or numerical question in the dataset.

### Prompt of calculate English Math Problems of MWP

Zero-shot	<b>The following are questions containing unit and numerical calculations. Please provide the correct answers based on the questions.</b> <b>Question: XXX Answer:</b>
Zero-shot CoT	<b>The following are questions containing unit and numerical calculations. Please provide the correct answers based on the questions.</b> <b>Question: XXX Answer: Let's think step by step,</b>
	The following are questions containing unit and numerical calculations. Please provide the correct answers based on the questions. Question: Mike picked 7 apples , Nancy picked 3 apples , and Keith picked 6 apples and 4 pears , at the farm . How many apples were picked in total ? <b>Answer:</b> 16.
Few-shot	The following are questions containing unit and numerical calculations. Please provide the correct answers based on the questions. Question: Tammy drove 55 miles in one hour. At that rate, how far can she drive in 36 hours? <b>Answer:</b> 1980.
	The following are questions containing unit and numerical calculations. Please provide the correct answers based on the questions. Question: A trivia team had 15 members total, but during a game 6 members didn't show up. If each member that did show up scored 3 points, how many points were scored total? <b>Answer:</b> 27.
	<b>The following are questions containing unit and numerical calculations. Please provide the correct answers based on the questions.</b> <b>Question: XXX Answer:</b>
	The following are questions containing unit and numerical calculations. Please provide the correct answers based on the questions. Question: Mike picked 7 apples , Nancy picked 3 apples , and Keith picked 6 apples and 4 pears , at the farm . How many apples were picked in total ? <b>Answer: Let's think step by step,</b> Due to Mike having 7 apples, Nancy having 3 apples, and Keith having 6 apples, there are a total of $7+3+6=16$ apples picked.
Few-shot CoT	The following are questions containing unit and numerical calculations. Please provide the correct answers based on the questions. Question: Tammy drove 55 miles in one hour. At that rate, how far can she drive in 36 hours? <b>Answer: Let's think step by step,</b> Tammy can drive 55 miles per hour, with a total distance of 36 hours, totaling $55 * 36=1980$ miles. The answer is that it can drive 1980 miles.
	The following are questions containing unit and numerical calculations. Please provide the correct answers based on the questions. Question: A trivia team had 15 members total, but during a game 6 members didn't show up. If each member that did show up scored 3 points, how many points were scored total? <b>Answer: Let's think step by step,</b> There are a total of 15 members in the team, and 6 members did not appear, indicating the presence of 9 members from 15-6. Each member who appears has 3 points, so a total of 9 members scored $9 * (15-9)=27$ points, and the answer is 27 points.
	<b>The following are questions containing unit and numerical calculations. Please provide the correct answers based on the questions.</b> <b>Question: XXX Answer: Let's think step by step,</b>

### Prompt of calculate Chinese Math Problems of MWP

Zero-shot	<b>以下是含有单位和数字计算的题目，请根据题目，给出正确的答案。 题目: XXX 答案:</b>
Zero-shot CoT	<b>以下是含有单位和数字计算的题目，请根据题目，给出正确的答案。 题目: XXX 答案: 让我们一步一步思考,</b>
	以下是含有单位和数字计算的题目，请根据题目，给出正确的答案。 题目: 在农场，迈克摘了7个苹果，南希摘了3个，基思摘了6个苹果和4个梨。一共摘了多少个苹果？ <b>答案:</b> 16。
Few-shot	以下是含有单位和数字计算的题目，请根据题目，给出正确的答案。 题目: 塔米一小时开了55英里。照这样下去，她36小时能开多远？ <b>答案:</b> 1980。
	以下是含有单位和数字计算的题目，请根据题目，给出正确的答案。 题目: 一个琐事小组总共有15名成员，但在一场比赛中有6名成员没有出现。如果每个出现的成员都得了3分，总共得了多少分？ <b>答案:</b> 27。
	<b>以下是含有单位和数字计算的题目，请根据题目，给出正确的答案。 题目: XXX 答案:</b>
	以下是含有单位和数字计算的题目，请根据题目，给出正确的答案。 题目: 在农场，迈克摘了7个苹果，南希摘了3个，基思摘了6个苹果和4个梨。一共摘了多少个苹果？ <b>答案: 让我们一步一步思考,</b> 由于迈克有7个苹果，南希有3个苹果，基思有6个苹果，所以一共有 $7+3+6=16$ ，答案是一共摘了16个苹果。
Few-shot CoT	以下是含有单位和数字计算的题目，请根据题目，给出正确的答案。 题目: 塔米一小时开了55英里。照这样下去，她36小时能开多远？ <b>答案: 让我们一步一步思考,</b> 塔米一小时能开55英里，开了36小时的总距离，一共有 $55*36=1980$ 英里，答案是能开1980英里。
	以下是含有单位和数字计算的题目，请根据题目，给出正确的答案。 题目: 一个琐事小组总共有15名成员，但在一场比赛中有6名成员没有出现。如果每个出现的成员都得了3分，总共得了多少分？ <b>答案: 让我们一步一步思考,</b> 小组一共有15名成员，6名成员没有出现，说明出现了 $15-6=9$ 名成员。每名出现的成员有3分，所以9名成员一共得了 $9*(15-9)=27$ 分，答案是一共得了27分。
	<b>以下是含有单位和数字计算的题目，请根据题目，给出正确的答案。 题目: XXX 答案: 让我们一步一步思考,</b>

Table 12: Prompt of calculate English and Chinese math problems of MWPs, 'XXX' is a question in the dataset.

## Prompt of calculate Chinese Math Problems of SUANJING

Zero-shot	<p>以下是含有单位和关于汉字数字计算的题目，请根据题目，给出正确的答案。 题目：XXX 答案：</p>
Zero-shot CoT	<p>以下是含有单位和关于汉字数字计算的题目，请根据题目，给出正确的答案。 题目：XXX 答案：让我们一步一步思考，</p>
Few-shot	<p>以下是含有单位和关于汉字数字计算的题目，请根据题目，给出正确的答案。 题目：现在有七个人平分八又三分之一钱。问：每个人各得到多少钱？ 答案：人得一钱、二十一分钱之四。</p> <p>以下是含有单位和关于汉字数字计算的题目，请根据题目，给出正确的答案。 题目：现在有一个直角梯形田，其中一面宽三十步，另外一面宽四十二步，高六十四步。问这个田的面积是多少？ 答案：九亩一百四十四步。</p> <p>以下是含有单位和关于汉字数字计算的题目，请根据题目，给出正确的答案。 题目：现在有九块黄金和十一块白银，它们的质量相同。如果将其中一块黄金和白银进行交换，那么黄金的重量就会轻十三两。问：每块黄金和每块白银的重量各是多少？ 答案：金重二斤三两一十八铢，银重一斤十三两六铢。</p> <p>以下是含有单位和关于汉字数字计算的题目，请根据题目，给出正确的答案。 题目：XXX 答案：</p> <p>以下是含有单位和关于汉字数字计算的题目，请根据题目，给出正确的答案。 题目：现在在七个人平分八又三分之一钱。问：每个人各得到多少钱？ 答案：让我们一步一步思考，我们首先要明确“八又三分之一”这个数字的确切意思。在这里，“八又三分之一”意味着 8 加上 1/3，等于25/3。这个问题是关于平均分配的，所以我们需要将总金额除以人数。这里的总金额是25/3，平均每个人可以分到25/3除以7，这个结果用小数表示约等于1.19钱，用分数表示是25/21钱，或表示为一又二十一分之四钱，或表示为一钱二十一分钱之四。</p> <p>以下是含有单位和关于汉字数字计算的题目，请根据题目，给出正确的答案。 题目：现在有一个直角梯形田，其中一面宽三十步，另外一面宽四十二步，高六十四步。问这个田的面积是多少？ 答案：让我们一步一步思考，要计算直角梯形的面积，我们可以使用公式：梯形面积=(上底+下底) * 高 / 2。在这个问题中，梯形的上底和下底是两个不同的边。由于梯形是直角梯形，我们可以直接使用这些边作为上底和下底。根据题目，这两边的长度分别是 30 步和 42 步，高是 64 步。所以，梯形的面积可以计算如下：梯形面积= (30+42) * 64 / 2 = 2304步，由于1亩=240步，所以2304步又等于9亩144步，即九亩一百四十四步。</p> <p>以下是含有单位和关于汉字数字计算的题目，请根据题目，给出正确的答案。 题目：现在有九块黄金和十一块白银，它们的质量相同。如果将其中一块黄金和白银进行交换，那么黄金的重量就会轻十三两。问：每块黄金和每块白银的重量各是多少？ 答案：让我们一步一步思考，这是一个典型的数学问题，我们可以用方程来解决。设每块黄金的重量为X两，每块白银的重量为Y两。根据题意，我们有9块黄金和11块白银，所以黄金部分的重量为9X，白银部分的重量为11Y。首先9块黄金和11块白银的质量相同，所以9X = 11Y。当我们把一块黄金和一块白银进行交换后，黄金部分的重量变为9X - X + Y = 8X + Y，白银部分的重量变为11Y - Y + X = 10Y + X。根据题意，新的黄金部分重量比新的白银重量轻十三两，即10Y + X - (8X + Y) = 13。现在我们可以通过9X = 11Y和10Y + X - (8X + Y) = 13这两个方程，来解出每块黄金和每块白银的重量，让我们计算一下。首先，让我们处理第二个方程10Y + X - (8X + Y) = 13。我们可以简化它，然后使用第一个方程来找到解。这个简化过程如下：先化简为10Y + X - 8X - Y = 13，再化简为9Y - 7X = 13。接下来，我们可以利用第一个方程9X = 11Y来解9Y - 7X = 13。求解之后，我们可以得到以下结果：X (黄金的重量) 是143/4两，即35.75两。Y (白银的重量) 是117/4两，即29.25两。又因为1斤=16两，一两=24铢，所以金重35.75两等于二斤三两三两一十八铢，银重29.25两等于一斤十三两六铢。</p> <p>以下是含有单位和关于汉字数字计算的题目，请根据题目，给出正确的答案。 题目：XXX 答案：让我们一步一步思考，</p> <p>以下是含有单位和关于汉字数字计算的题目，请根据题目，给出正确的答案。 题目：现在在七个人平分八又三分之一钱。问：每个人各得到多少钱？ 答案：让我们一步一步思考，这里我们要先了解一些知识，1秒=10忽；1毫=10秒；1厘=10毫；1分=10厘；一寸=10分；1尺=10寸；1丈=10尺；1引=10丈；1端=50尺；1疋=40尺；1匹=1疋；1步=6尺；1顷=100亩；1亩=240步；1亩=240积步；1里=300步；1里=375亩；1两=24铢；1斤=16两；1钧=30斤；1石=4钧；1圭=6粟；1抄=10圭；1撮=10抄；1勺=10撮；1合=10勺；1升=10合；1斗=10升；1斛=10斗；1乘=16斛；50粟米=30粳米；50粟米=27粳米；50粟米=24粟米；50粟米=21粟米；50粟米=13.5小觔；50粟米=54大觔；50粟米=75粳饭；50粟米=54粳饭；50粟米=42御饭；50粟米=45菽；50粟米=45荳；50粟米=45荳；50粟米=60稻；50粟米=63菽；50粟米=90菽；50粟米=115熟菽；50粟米=175糜；1岁=354日；4穿地=5墟；4穿地=5墟；4穿地=5墟。我们首先要明确“八又三分之一”这个数字的确切意思。在这里，“八又三分之一”意味着 8 加上 1/3，等于25/3。这个问题是关于平均分配的，所以我们需要将总金额除以人数。这里的总金额是25/3，平均每个人可以分到25/3除以7，这个结果用小数表示约等于1.19钱，用分数表示是25/21钱，或表示为一又二十一分之四钱，或表示为一钱二十一分钱之四。</p> <p>以下是含有单位和关于汉字数字计算的题目，请根据题目，给出正确的答案。 题目：现在有一个直角梯形田，其中一面宽三十步，另外一面宽四十二步，高六十四步。问这个田的面积是多少？ 答案：让我们一步一步思考，这里我们要先了解一些知识，1秒=10忽；1毫=10秒；1厘=10毫；1分=10厘；一寸=10分；1尺=10寸；1丈=10尺；1引=10丈；1端=50尺；1疋=40尺；1匹=1疋；1步=6尺；1顷=100亩；1亩=240步；1亩=240积步；1里=300步；1里=375亩；1两=24铢；1斤=16两；1钧=30斤；1石=4钧；1圭=6粟；1抄=10圭；1撮=10抄；1勺=10撮；1合=10勺；1升=10合；1斗=10升；1斛=10斗；1乘=16斛；50粟米=30粳米；50粟米=27粳米；50粟米=24粟米；50粟米=21粟米；50粟米=13.5小觔；50粟米=54大觔；50粟米=75粳饭；50粟米=54粳饭；50粟米=42御饭；50粟米=45菽；50粟米=45荳；50粟米=45荳；50粟米=60稻；50粟米=63菽；50粟米=90菽；50粟米=115熟菽；50粟米=175糜；1岁=354日；4穿地=5墟；4穿地=5墟；4穿地=5墟。要计算直角梯形的面积，我们可以使用公式：梯形面积=(上底+下底) * 高 / 2。在这个问题中，梯形的上底和下底是两个不同的边。由于梯形是直角梯形，我们可以直接使用这些边作为上底和下底。根据题目，这两边的长度分别是 30 步和 42 步，高是 64 步。所以，梯形的面积可以计算如下：梯形面积= (30+42) * 64 / 2 = 2304步，由于1亩=240步，所以2304步又等于9亩144步，即九亩一百四十四步。</p> <p>以下是含有单位和关于汉字数字计算的题目，请根据题目，给出正确的答案。 题目：现在有九块黄金和十一块白银，它们的质量相同。如果将其中一块黄金和白银进行交换，那么黄金的重量就会轻十三两。问：每块黄金和每块白银的重量各是多少？ 答案：让我们一步一步思考，这里我们要先了解一些知识，1秒=10忽；1毫=10秒；1厘=10毫；1分=10厘；一寸=10分；1尺=10寸；1丈=10尺；1引=10丈；1端=50尺；1疋=40尺；1匹=1疋；1步=6尺；1顷=100亩；1亩=240步；1亩=240积步；1里=300步；1里=375亩；1两=24铢；1斤=16两；1钧=30斤；1石=4钧；1圭=6粟；1抄=10圭；1撮=10抄；1勺=10撮；1合=10勺；1升=10合；1斗=10升；1斛=10斗；1乘=16斛；50粟米=30粳米；50粟米=27粳米；50粟米=24粟米；50粟米=21粟米；50粟米=13.5小觔；50粟米=54大觔；50粟米=75粳饭；50粟米=54粳饭；50粟米=42御饭；50粟米=45菽；50粟米=45荳；50粟米=45荳；50粟米=60稻；50粟米=63菽；50粟米=90菽；50粟米=115熟菽；50粟米=175糜；1岁=354日；4穿地=5墟；4穿地=5墟；4穿地=5墟。这是一个典型的数学问题，我们可以用方程来解决。设每块黄金的重量为X两，每块白银的重量为Y两，根据题意，我们有9块黄金和11块白银，所以黄金部分的重量为9X，白银部分的重量为11Y。首先9块黄金和11块白银的质量相同，所以9X = 11Y。当我们把一块黄金和一块白银进行交换后，黄金部分的重量变为9X - X + Y = 8X + Y，白银部分的重量变为11Y - Y + X = 10Y + X。根据题意，新的黄金部分重量比新的白银重量轻十三两，即10Y + X - (8X + Y) = 13。现在我们可以通过9X = 11Y和10Y + X - (8X + Y) = 13这两个方程，来解出每块黄金和每块白银的重量，让我们计算一下。首先，让我们处理第二个方程10Y + X - (8X + Y) = 13。我们可以简化它，然后使用第一个方程来找到解。这个简化过程如下：先化简为10Y + X - 8X - Y = 13，再化简为9Y - 7X = 13。接下来，我们可以利用第一个方程9X = 11Y来解9Y - 7X = 13。求解之后，我们可以得到以下结果：X (黄金的重量) 是143/4两，即35.75两。Y (白银的重量) 是117/4两，即29.25两。又因为1斤=16两，一两=24铢，所以金重35.75两等于二斤三两三两一十八铢，银重29.25两等于一斤十三两六铢。</p> <p>以下是含有单位和关于汉字数字计算的题目，请根据题目，给出正确的答案。 题目：XXX 答案：让我们一步一步思考，这里我们要先了解一些知识，1秒=10忽；1毫=10秒；1厘=10毫；1分=10厘；一寸=10分；1尺=10寸；1丈=10尺；1引=10丈；1端=50尺；1疋=40尺；1匹=1疋；1步=6尺；1顷=100亩；1亩=240步；1亩=240积步；1里=300步；1里=375亩；1两=24铢；1斤=16两；1钧=30斤；1石=4钧；1圭=6粟；1抄=10圭；1撮=10抄；1勺=10撮；1合=10勺；1升=10合；1斗=10升；1斛=10斗；1乘=16斛；50粟米=30粳米；50粟米=27粳米；50粟米=24粟米；50粟米=21粟米；50粟米=13.5小觔；50粟米=54大觔；50粟米=75粳饭；50粟米=54粳饭；50粟米=42御饭；50粟米=45菽；50粟米=45荳；50粟米=45荳；50粟米=60稻；50粟米=63菽；50粟米=90菽；50粟米=115熟菽；50粟米=175糜；1岁=354日；4穿地=5墟；4穿地=5墟；4穿地=5墟。</p>
Few-shot CoT with knowledge	<p>以下是含有单位和关于汉字数字计算的题目，请根据题目，给出正确的答案。 题目：XXX 答案：让我们一步一步思考，这里我们要先了解一些知识，1秒=10忽；1毫=10秒；1厘=10毫；1分=10厘；一寸=10分；1尺=10寸；1丈=10尺；1引=10丈；1端=50尺；1疋=40尺；1匹=1疋；1步=6尺；1顷=100亩；1亩=240步；1亩=240积步；1里=300步；1里=375亩；1两=24铢；1斤=16两；1钧=30斤；1石=4钧；1圭=6粟；1抄=10圭；1撮=10抄；1勺=10撮；1合=10勺；1升=10合；1斗=10升；1斛=10斗；1乘=16斛；50粟米=30粳米；50粟米=27粳米；50粟米=24粟米；50粟米=21粟米；50粟米=13.5小觔；50粟米=54大觔；50粟米=75粳饭；50粟米=54粳饭；50粟米=42御饭；50粟米=45菽；50粟米=45荳；50粟米=45荳；50粟米=60稻；50粟米=63菽；50粟米=90菽；50粟米=115熟菽；50粟米=175糜；1岁=354日；4穿地=5墟；4穿地=5墟；4穿地=5墟。</p>

Table 13: Prompt of calculate the modern version of mathematical problems of SUANJING, ‘XXX’ is a question in the dataset.

	Zero-shot		Zero-shot CoT		Few-shot		Few-shot CoT	
	ZH	EN	ZH	EN	ZH	EN	ZH	EN
<b>ChatGLM-6B Num2Words</b>								
<b>Easy</b>	<b>37.75</b>	<b>8.25</b>	<b>39.75</b>	1.00	<b>25.25</b>	6.25	<b>16.00</b>	4.25
<b>Medium</b>	28.75	6.50	22.75	<b>1.50</b>	20.00	<b>7.75</b>	7.00	4.50
<b>Hard</b>	7.50	2.00	3.75	0.00	5.00	1.25	1.25	1.00
<b>ChatGLM-6B Words2Num</b>								
<b>Easy</b>	64.00	35.25	59.00	36.25	47.75	20.50	54.50	<b>38.50</b>
<b>Medium</b>	<b>75.50</b>	<b>50.25</b>	<b>59.75</b>	<b>40.25</b>	<b>70.25</b>	<b>45.75</b>	<b>55.50</b>	32.50
<b>Hard</b>	17.75	15.50	4.25	2.75	20.75	21.75	14.75	9.50
<b>ERNIE-Bot-turbo Num2Words</b>								
<b>Easy</b>	<b>46.75</b>	<b>20.00</b>	<b>41.75</b>	<b>11.50</b>	47.25	<b>54.50</b>	31.00	<b>45.50</b>
<b>Medium</b>	39.00	12.25	28.50	8.75	<b>48.25</b>	44.75	<b>33.25</b>	36.75
<b>Hard</b>	13.75	15.50	9.00	11.00	18.50	23.75	11.00	26.50
<b>ERNIE-Bot-turbo Words2Num</b>								
<b>Easy</b>	<b>76.75</b>	45.25	<b>72.50</b>	28.25	80.50	31.50	72.00	<b>63.50</b>
<b>Medium</b>	74.75	<b>57.00</b>	66.25	<b>29.50</b>	<b>87.00</b>	<b>67.75</b>	<b>76.00</b>	51.00
<b>Hard</b>	23.00	24.25	21.75	13.50	42.25	42.00	36.75	36.50
<b>ChatGLM-Turbo Num2Words</b>								
<b>Easy</b>	<b>43.00</b>	<b>50.00</b>	<b>46.00</b>	43.75	<b>59.25</b>	<b>47.50</b>	<b>43.00</b>	<b>43.75</b>
<b>Medium</b>	39.25	41.75	38.75	35.25	45.75	42.00	32.25	30.00
<b>Hard</b>	13.00	22.25	14.00	15.50	22.25	42.50	25.25	22.00
<b>ChatGLM-Turbo Words2Num</b>								
<b>Easy</b>	<b>95.75</b>	<b>85.50</b>	<b>69.25</b>	<b>56.75</b>	<b>96.25</b>	71.50	<b>84.25</b>	<b>82.00</b>
<b>Medium</b>	80.50	61.25	53.00	40.00	88.50	<b>73.50</b>	62.50	38.50
<b>Hard</b>	24.50	32.25	18.50	21.50	49.25	51.25	56.75	42.75

Table 14: The accuracy performance of models ChatGLM-6B, ERNIE-Bot-turbo, and ChatGLM-Turbo in different difficulty levels of Num2words and Words2Num tasks.

	Zero-shot		Zero-shot CoT		Few-shot		Few-shot CoT	
	ZH	EN	ZH	EN	ZH	EN	ZH	EN
<b>Llama2-7B Num2Words</b>								
<b>Easy</b>	<b>13.50</b>	<b>20.00</b>	8.75	<b>13.25</b>	<b>25.00</b>	<b>57.25</b>	<b>10.00</b>	<b>34.50</b>
<b>Medium</b>	12.50	18.50	<b>9.50</b>	12.75	21.50	44.75	7.50	23.75
<b>Hard</b>	0.50	6.25	1.00	4.00	5.00	28.25	1.25	17.00
<b>Llama2-7B Words2Num</b>								
<b>Easy</b>	<b>32.00</b>	17.25	<b>20.50</b>	24.00	21.25	27.00	<b>21.50</b>	<b>39.25</b>
<b>Medium</b>	27.00	30.50	14.00	<b>28.25</b>	<b>39.00</b>	<b>68.50</b>	17.00	29.75
<b>Hard</b>	4.75	8.50	2.50	12.25	10.75	43.25	15.75	27.75
<b>Llama2-13B Num2Words</b>								
<b>Easy</b>	18.50	<b>43.75</b>	6.75	<b>17.00</b>	<b>45.75</b>	40.75	2.75	20.25
<b>Medium</b>	<b>19.50</b>	37.00	<b>7.75</b>	15.00	33.00	<b>52.75</b>	<b>4.25</b>	17.50
<b>Hard</b>	5.50	14.75	1.00	4.50	12.25	43.75	1.50	14.75
<b>Llama2-13B Words2Num</b>								
<b>Easy</b>	25.00	<b>22.25</b>	12.75	<b>14.75</b>	35.00	44.75	<b>48.50</b>	<b>33.75</b>
<b>Medium</b>	<b>27.00</b>	20.50	<b>13.25</b>	10.50	<b>62.50</b>	<b>76.50</b>	33.75	31.50
<b>Hard</b>	9.75	13.00	2.25	3.25	20.75	47.50	20.50	27.75
<b>Llama2-70B Num2Words</b>								
<b>Easy</b>	<b>37.25</b>	36.75	<b>10.50</b>	<b>26.25</b>	<b>36.75</b>	45.00	<b>9.75</b>	45.25
<b>Medium</b>	32.75	<b>45.50</b>	8.25	17.25	33.00	<b>54.75</b>	6.50	<b>48.50</b>
<b>Hard</b>	15.75	32.00	6.75	10.75	16.50	35.75	4.25	12.00
<b>Llama2-70B Words2Num</b>								
<b>Easy</b>	<b>41.00</b>	60.75	<b>32.25</b>	11.50	<b>45.00</b>	57.75	<b>28.75</b>	8.50
<b>Medium</b>	38.00	<b>62.75</b>	27.00	<b>21.00</b>	38.75	<b>67.75</b>	19.75	<b>23.75</b>
<b>Hard</b>	15.75	37.25	3.50	16.25	16.75	35.25	3.00	20.50

Table 15: The accuracy performance of models Llama2-7B, Llama2-13B and Llama2-70B in different difficulty levels of Num2words and Words2Num tasks.