🔑 ANSWER KEY

The Babylonian Numeral System Worksheet

Part 1: Time Travel Challenge

1. Paper hadn't been invented yet! Babylonians wrote on soft, wet **clay**.
2. They used a reed stick called a **stylus** to press marks into the clay.
3. The wedge-shaped marks they made are called **cuneiform** (from Latin "cuneus" = wedge).
4. After writing, they let the clay dry in the **sun** to make it permanent.

Part 2: Meet the Symbols

> **Reminder: V = vertical wedge (worth 1), H = horizontal wedge (worth 10)**

5. 3 = **VVV** (three vertical wedges)
6. 7 = **VVVVVVV** (seven vertical wedges)
7. 10 = **H** (one horizontal wedge)
8. 23 = **HH VVV** (two horizontal wedges + three vertical wedges = 20 + 3)
9. 45 = **HHHH VVVVV** (four horizontal wedges + five vertical wedges = 40 + 5)
10. 59 = **HHHHH VVVVVVVVV** (five horizontal wedges + nine vertical wedges = 50 + 9)

Part 3: The Base-60 System

11. Babylonian: 1 | 12 → (1 × 60) + (12 × 1) = **60** + **12** = **72**

12. Babylonian: 2 | 30 → (**2** × 60) + (**30** × 1) = **120** + **30** = **150**

13. Babylonian: 1 | 0 | 0 → (1 × 3600) + (0 × 60) + (0 × 1) = **3,600**

14. Babylonian: 1 | 30 | 15 → (**1** × 3600) + (**30** × 60) + (**15** × 1) = **5,415**

Calculation: 3600 + 1800 + 15 = 5,415

15. 90 = **1** | **30**

90 ÷ 60 = 1 remainder 30, so 1 in the 60s place, 30 in the ones place

16. 125 = **2** | **5**

125 ÷ 60 = 2 remainder 5, so 2 in the 60s place, 5 in the ones place

17. 3660 = **1** | **1** | **0**

3660 ÷ 3600 = 1 remainder 60; 60 ÷ 60 = 1 remainder 0

Part 4: The Zero Problem

18. Why is zero important as a placeholder?

> *Without zeros, you couldn't tell the difference between 35, 305, and 350. They would all look the same! Zero shows that a place is empty but still counts for the position.*

19. What could go wrong if a Babylonian scribe was sloppy with spacing?

> *The number could be misread completely. For example, 1|0|5 (3,605) might look like 1|5 (65) if the empty space wasn't clear. This could cause serious errors in trade, astronomy, or record-keeping.*

Part 5: Why Base-60 Was Brilliant

Fraction	In Base-10 (decimal)	In Base-60 (as sixtieths)
½	0.5	30/60 = **30** sixtieths
⅓	0.333... (repeating!)	20/60 = **20** sixtieths
¼	0.25	**15**/60 = **15** sixtieths
⅕	0.2	**12**/60 = **12** sixtieths
⅙	0.1666... (repeating!)	**10**/60 = **10** sixtieths

20. Which system makes ⅓ easier to work with? **BASE-60**

In base-10, ⅓ = 0.333... (infinite repeating decimal). In base-60, ⅓ = exactly 20 sixtieths — clean and simple!

21. Why do you think Babylonian mathematicians and astronomers loved base-60?

> *Because 60 has so many factors, fractions usually came out as whole numbers. This made calculations much easier and more accurate, especially for astronomy where precise measurements were crucial.*

Part 6: The Living Legacy

22. There are **60** seconds in a minute.

23. There are **60** minutes in an hour.

24. There are **360** degrees in a circle.

25. When you look at a clock, check a map, or measure an angle, you are using math invented by the **Babylonians** over **5,000** years ago!

Part 7: System Comparison

Feature	Our Base-10 System	Babylonian Base-60
Base Number	10	**60**
Core Symbols	0, 1, 2, 3, 4, 5, 6, 7, 8, 9	Vertical wedge (**1**) and Horizontal wedge (**10**)
Did they have zero?	Yes	**No** (placeholder only, added later)
Place value system?	Yes	**Yes**
Writing direction	Left to right	**Left to right**
Main strength	Easy to learn (10 fingers)	**Many factors make fractions easy; good for astronomy**
Main challenge	Large numbers need many digits	**Sloppy spacing could change the number; must memorize 1-59**

Part 8: Challenge Problems

26. 45 + 28 = **73** → In Babylonian: **1** | **13**

73 ÷ 60 = 1 remainder 13. So 1 in the 60s place, 13 in the ones place. Check: (1×60) + 13 = 73 ✓

27. 52 + 35 = **87** → In Babylonian: **1** | **27**

87 ÷ 60 = 1 remainder 27. So 1 in the 60s place, 27 in the ones place. Check: (1×60) + 27 = 87 ✓

28. A Babylonian astronomer wrote: 2 | 15 | 30
What is this number in our system? **8,130**

Calculation: (2 × 3600) + (15 × 60) + (30 × 1) = 7,200 + 900 + 30 = 8,130

Part 9: Reflection

29. What surprised you most about the Babylonian number system?

> ***Accept reasonable answers such as:*** *That we still use their base-60 system today for time and angles; that they only needed two symbols; that they didn't have a zero at first; that their system was invented over 5,000 years ago; that base-60 actually has advantages over base-10 for fractions.*

30. If you could ask a Babylonian mathematician one question, what would it be?

> ***Accept thoughtful questions such as:*** *Why did you choose 60 as your base? How did you do calculations without a zero? What was the hardest math problem you ever solved? Did you know your system would still be used thousands of years later? How did you figure out how to track the stars so accurately?*

📊 Grading Guide

Parts 1-3: 1 point each (17 points)

Parts 4-5: 2 points each for short answers, 3 points for explanations (12 points)

Part 6: 1 point each (4 points)

Part 7: 1 point per blank (9 points)

Part 8: 2 points each (6 points)

Part 9: 3 points each for thoughtful responses (6 points)

Total: approximately 54 points