EQUATIONS WORKSHEET

R1

NAME ____

REMAINDER (EM ONLY) - I

PRINCIPLE

The Remainder variation says: "*A* ·I· *B* (·I· is a sideways ÷) equals the remainder when *A* is divided by *B. A* and *B* are positive integers, and *A* is less than or equal to 1000."

The phrase "*A* is less than or equal to 1000" does not mean you may use a three-digit number for *A* (unless Decimal Point also in play). It means the *value* of *A* can be no bigger than 1000.

EXAMPLES

1. 15 ·I· 2 = 1 since 15 divided by 2 gives a quotient of 7 with remainder 1.
2. (30 * 2) ·I· 5 = 0, the remainder when 900 is divided by 5.
3. 45 ·I· 70 = 45, since 70 goes into 45 zero times with 45 remainder.
4. (32 * 2) ·I· 6 is not allowed since 32*2 is 1024, which is over the 1000 limit.
5. 6 ·I· (32 * 2) = 6. There is no limit on the value of *B*, the number after the ·I· sign.
6. (6 ·I· 32) * 2 = 6 * 2 = 36.
7. The Goal 5–9·I·13 has only one value.
   a. 5 – (9 ·I· 13) = 5 – 9 = -4.
   b. (5 – 9) ·I· 13 is not allowed since 5 – 9 is negative.
8. The Goal 5*27·I·4 has only one value.
   a. 5 * (27 ·I· 4) = 5 * 3 = 125.
   b. (5 * 27) ·I· 4 is not allowed since 5 * 27 is far beyond the 1000 limit.

EXERCISES

With Remainder, write all values of each Goal.

	Goal	Values		Goal	Values
1.	7 ·I· 3	________	**2.**	10 ·I· 4	________
3.	4 ·I· 9	________	**4.**	17 ·I· 6	________
5.	18 ·I· 5	________	**6.**	5 ·I· 18	________
7.	41 ·I· 2	________	**8.**	38 ·I· 2	________
9.	71·I·10	________	**10.**	97·I·10	________
11.	7+9·I·4	________	**12.**	5*3·I·4	________
13.	18·I·5x2	________	**14.**	9·I·2+13	________
15.	6-8·I·3	________	**16.**	29·I·5-8	________
17.	71·I·9·I·2	________	**18.**	83·I·7·I·5	________
19.	2*9·I·64	________	**20.**	7*3·I·5	________
21.	13–9·I·4	________	**22.**	6*3·I·10	________

EQUATIONS WORKSHEET

R2

NAME ____

REMAINDER (EM ONLY) - II

PRINCIPLE

The Remainder variation may be used with other variations.

EXAMPLES

1. Upside-down: Neither the number before the ·l· sign nor the number after the ·l· sign may be negative.
2. 0 wild: 15 ·l· 0 = 0 (when 0 is 1, 3, or 5), 1 (when 0 is 2 or 7), 3 (when 0 is 4 or 6), 6 (when 0 is 9), or 7 (when 0 is 8).
3. Factorial: 6! ·l· 5 = 0 since 5 is one of the factors of 6! 6 ·l· 5! = 6 since 5! = 120. 6! ·l· 5! = 0 since 5! is included in 6!
4. Multiple Operations: Any ÷ cube may be used multiple times in the Solution. Each ÷ sign in the Solution may be either division or remainder. Middle: If 0 wild is also chosen, any 0 may be used multiple times as either ÷ or ·l·.
5. Three-operation Solution: ·l· counts as an operation.

EXERCISES

With Remainder and the variation listed chosen, write all values of each Goal.

	Variation	Goal	Values
1.	Sideways	7÷~·l·3	______________
2.	0 wild	24 ·l· 0	______________
3.	Factorial	5 ·l· 3	______________
4.	Percent	9·l·25_/^8	______________
5.	Dec. Point	135*·l·7	______________
6.	Dec. Point	999*·l·5	______________

#7-8 are for Elementary Division only.

	Variation	Goal	Values
7.	Smallest Prime	x32·l·6	______________
8.	Smallest Prime	x99·l·7	______________

#9-10 are for Middle Division only.

	Variation	Goal	Values
9.	Red Exponent	72·l·5 (red 2)	______________
10.	Powers of Base	1·l·6	______________

MORE CHALLENGING EXERCISES – MIDDLE DIVISION

In **#11-13**, x and y positive whole numbers.

11. If $x \geq y$, then $x! \cdot\!|\!\cdot\ y! =$ _____

12. If $x \geq y$, then $x! \cdot\!|\!\cdot\ y =$ _____

13. If $x < y$, then $x \cdot\!|\!\cdot\ y! =$ _____

EQUATIONS WORKSHEET

R3

NAME ____

REMAINDER (EM ONLY) - III

PRINCIPLE
The Remainder variation may be used to pad Solutions.

EXAMPLES

1. Since 3 ·l· 4 = 3, 3 ·l· 5 = 3, 3 ·l· 6 = 3, etc., you can pad Solutions like this.

Equation: (7 x 4) + 3 = 31 Padded Equation: (7 x 4) + (3 ·l· __) = 31
Any number bigger than 3 ┘

2. The remainder when you divide any whole number by 1 is 0. So you can pad Solutions like this.

Equation: (7 x 4) + 0 = 28 Padded Equation: (7 x 4) + (__ ·l· 1) = 28
Any positive whole number ┘

3. The remainder when you divide any positive whole number by itself is 0. Also, the remainder is 0 when the number before the ·l· is a *multiple* of the number behind the ·l·. Use this fact to pad Solutions like this.

Equation: (7 x 4) – 0 = 28 Padded Equation: (7 x 4) – (__ ·l· __) = 28
↑ ↑
Same number in both places or combinations like 4·l·2, 9·l·3, etc.

4. 9 ·l· 8 = 1, 8 ·l· 7 = 1, 7 ·l· 6 = 1, etc. Use this pattern to pad Solutions like this.

Equation: (7 x 4) x 1 = 28 Padded Equation: (7 x 4) x (8 ·l· 7) = 28
↑
One less than the number before the ·l·

EXERCISES

*With Remainder chosen, use **all** the Resources listed to make a Solution for each Goal.*

	Goal	Resources	Equation
1.	49	4 5 6 9 ÷ + x	______________________________
2.	35	1 3 4 5 9 + – x ÷	______________________________
3.	69	2 3 5 8 9 + + ÷ *	______________________________
4.	54	3 6 7 9 9 + x x ÷	______________________________

MORE CHALLENGING EXERCISES – MIDDLE DIVISION

In each case, *x* is a positive whole number.

5. *x* ·l· *x* = _____

6. (*x* + 1) ·l· *x* = _____

7. *x* ·l· 1 = _____

8. (*x* ^ *n*) ·l· *x* = _____ (*n* = positive whole #)

SOLUTION KEY

WORKSHEET R1

1. 1
2. 2
3. 4
4. 5
5. 3
6. 5
7. 1
8. 0
9. 1
10. 7
11. 0, 8
12. 1, 125
13. 6, 8
14. 9, 14
15. 15. 4
16. -4
17. 0, 71
18. 1, 2
19. 0, 512
20. 3, 343
21. 0, 12
22. 6, 216

WORKSHEET R2

1. 2
2. 0, 3, 4, 6
3. 0, 5, 40
4. 0.72, 1
5. 2
6. 4
7. 1, 3
8. 2, 3
9. 2, 4
10. 1, 4
11. 0
12. 0
13. *x*

WORKSHEET R3

1. (5 x 9) + (4 ÷ 6)
2. [(4 + 3) x 5] – (9 ÷ 1)
3. [(8 * 2) + 5] + (9 ÷ 3)
4. (6 x 9) x [(3 + 7) ÷ 9]
5. 0
6. 1
7. 0
8. 0