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Number Patterns - Year 5

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WHAT ARE NUMBER PATTERNS?

A number pattern is an ordered sequence that follows a rule.

1, 2, 3,
...

TERM

each number
in the pattern



RULE

the instruction
connecting
the terms



RECURSIVE PATTERN

each term is built
from the previous term



CHECK

test the rule
between every
pair of terms



25, 40, 55, 70, ...

Rule: add 15



3.6, 3.1, 2.6, 2.1, ...

Rule: subtract 0.5



$\frac{1}{4}$, $\frac{2}{4}$, $\frac{3}{4}$, $\frac{4}{4}$, ...

Rule: add $\frac{1}{4}$





INCREASING AND DECREASING PATTERNS



INCREASING

Terms become greater.



1,200, 1,450
1,700, 1,950

Rule: add 250

DECREASING

Terms become smaller.



5,000, 4,600,
4,200, 3,800

Rule: subtract 400

- ✓ Compare consecutive terms.
- ✓ Name the operation and amount.
- ✓ Test the rule at every step.

FRACTION — AND — DECIMAL PATTERNS

FRACTIONS



When denominators match, compare the numerators.

$$\frac{2}{10}, \frac{5}{10}, \frac{8}{10}, \frac{11}{10}$$

→ Rule: add $\frac{3}{10}$

DECIMALS



Align decimal places before comparing terms.

$$0.75, 1.00, 1.25, 1.50$$

→ Rule: add 0.25

A pattern may move beyond one whole.





NUMBER PATTERN REFERENCE CARDS



1

INCREASING WHOLE NUMBERS

1,025, 1,350, 1,675



RULE: add 325

2

DECREASING WHOLE NUMBERS

3,800, 3,320, 2,840



RULE: subtract 480

3

FRACTIONS

$\frac{1}{7}$, $\frac{3}{7}$, $\frac{5}{7}$



RULE: add $\frac{2}{7}$

4

DECIMALS

2.1, 1.7, 1.3



RULE: subtract 0.4

5

FIND THE RULE



Compare two terms.



Name the operation and amount.



Test every step.

6

FUNCTION RULE

input 4 $\rightarrow$ $\times 3 + 2$ $\rightarrow$ output 14

GUESS MY PATTERN?

A yes-or-no reasoning game



YOU NEED

Pattern cards and a score sheet



SET UP

One player secretly chooses a pattern. The other players must not know it.



USEFUL QUESTIONS

- Is the pattern increasing?
- Does it use fractions?
- Is the change greater than 100?
- Is the operation multiplication?



HOW TO PLAY

- 1 Ask a question that can be answered yes or no.
- 2 Use each answer to narrow the possibilities.
- 3 Guess the starting number, direction and rule.
- 4 Reveal the card and check every term.



SCORING

- Correct direction: 1 point.
- Correct rule: 2 points.
- Correct full pattern: 3 points.
- First to 10 points wins.

GUESS MY PATTERN

Pattern:
120, 240, 360,
480, 600

Rule:
add 120

GUESS MY PATTERN

Pattern:
950, 875, 800,
725, 650

Rule:
subtract 75

GUESS MY PATTERN

Pattern:
2, 5, 8, 11, 14

Rule:
add 3

GUESS MY PATTERN

Pattern:
3,200, 3,050, 2,900,
2,750, 2,600

Rule:
subtract 150

GUESS MY PATTERN

Pattern:

$$\frac{1}{8}, \frac{3}{8}, \frac{5}{8}, \frac{7}{8}, \frac{9}{8}$$

Rule: add $\frac{2}{8}$.

GUESS MY PATTERN

Pattern:

$$\frac{3}{5}, \frac{4}{5}, \frac{5}{5}, \frac{6}{5}, \frac{7}{5}$$

Rule: add $\frac{1}{5}$.

GUESS MY PATTERN

Pattern:

$$\frac{11}{12}, \frac{9}{12}, \frac{7}{12}, \frac{5}{12}, \frac{3}{12}$$

Rule: subtract $\frac{2}{12}$.

GUESS MY PATTERN

Pattern:

$$1\frac{1}{4}, 1\frac{1}{2}, 1\frac{3}{4}, 2, 2\frac{1}{4}$$

Rule: add $\frac{1}{4}$.

GUESS MY PATTERN

Pattern:

0.4, 0.9, 1.4, 1.9, 2.4

Rule:

add 0.5

GUESS MY PATTERN

Pattern:

6.2, 5.8, 5.4, 5.0, 4.6

Rule:

subtract 0.4

GUESS MY PATTERN

Pattern:

1.25, 1.50, 1.75, 2.00, 2.25

Rule:

add 0.25

GUESS MY PATTERN

Pattern:

9.6, 8.8, 8.0, 7.2, 6.4

Rule:

subtract 0.8

GUESS MY PATTERN

Pattern:

15, 30, 60, 120, 240

Rule:

multiply by 2

GUESS MY PATTERN

Pattern:

1,600, 800, 400, 200, 100

Rule:

divide by 2

GUESS MY PATTERN

Pattern:

7, 21, 63, 189, 567

Rule:

multiply by 3

GUESS MY PATTERN

Pattern:

8,000, 2,000, 500, 125

Rule:

divide by 4

GUESS MY PATTERN

Pattern:

4, 11, 18, 25, 32

Rule:

add 7

GUESS MY PATTERN

Pattern:

2,450, 2,250, 2,050,
1,850, 1,650

Rule:

subtract 200

GUESS MY PATTERN

Pattern:

0.05, 0.15, 0.25,
0.35, 0.45

Rule:

add 0.10

GUESS MY PATTERN

Pattern:

$5\frac{1}{2}$, 5, $4\frac{1}{2}$, 4, $3\frac{1}{2}$

Rule:

subtract $\frac{1}{2}$

GUESS MY PATTERN

Pattern:
90, 81, 72,
63, 54

Rule:
subtract 9

GUESS MY PATTERN

Pattern:
125, 250, 500,
1,000, 2,000

Rule:
multiply by 2

GUESS MY PATTERN

Pattern:
 $2\frac{1}{3}$, $2\frac{2}{3}$, 3,
 $3\frac{1}{3}$, $3\frac{2}{3}$

Rule:
add $\frac{1}{3}$

GUESS MY PATTERN

Pattern:
12.0, 10.5, 9.0,
7.5, 6.0

Rule:
subtract 1.5

ROLL A RULE



YOU NEED — two dice,
counters and the recording sheet



STARTING NUMBER — roll Die A

1 = 120

2 = 250

3 = 400

4 = 600

5 = 800

6 = 1,000



PATTERN RULE — roll Die B

1 =
add 25

2 =
add 50

3 =
add 100

4 =
subtract 25

5 =
subtract 50

6 =
subtract 100

PLAY



1. Roll both dice.
2. Record the start and rule.
3. Build a 6-term pattern.
4. Your partner checks every step.
5. A correct pattern earns one point. First to five points wins.

START

TERM 2

TERM 3

TERM 4

TERM 5

TERM 6



ROLL A RULE - RECORDING SHEET



Name: _____ Partner: _____

ROUND	START	RULE	TERM 1	TERM 2	TERM 3	TERM 4	TERM 5	TERM 6	CHECK
1									
2									
3									
4									
5									

CHALLENGE ROUND

Choose two operations. Write the rule, create six terms and explain how your partner checked it.

Two-step rule: _____

Six-term pattern: _____

How we checked: _____



RECURSIVE WHOLE-NUMBER PATTERNS — PAGE 1

Name: _____



Continue each pattern. Then write the rule.

1. 1,250, 1,500, 1,750, _____, _____

Rule: _____

2. 5,400, 5,050, 4,700, _____, _____

Rule: _____

3. 72, 144, 216, _____, _____

Rule: _____

4. 9,600, 8,800, 8,000, _____, _____

Rule: _____



FIND THE MISSING TERMS

5. 320, _____, 560, 680, _____

6. 4,200, 3,900, _____, 3,300, _____



EXPLAIN

7. 1, 60, 75, _____

How do you know?

8. 2,400, 2,100, 1,800, 1,500, _____

How do you know?

RECURSIVE WHOLE-NUMBER PATTERNS — PAGE 1

Name: ANSWERS



Continue each pattern. Then write the rule.

1. 1,250, 1,500, 1,750, 2,000, 2,250

Rule: add 250

2. 5,400, 5,050, 4,700, 4,350, 4,000

Rule: subtract 350

3. 72, 144, 216, 288, 360

Rule: add 72

4. 9,600, 8,800, 8,000, 7,200, 6,400

Rule: subtract 800



FIND THE MISSING TERMS

5. 320, 440, 560, 680, 800

6. 4,200, 3,900, 3,600, 3,300, 3,000



EXPLAIN

7. 15, 60, 75, 105

How do you know?

The difference is 15 at every step.

8. 2,400, 2,100, 1,800, 1,500, 1,200

How do you know?

The difference is -300 at every step.

RECURSIVE WHOLE-NUMBER PATTERNS — PAGE 2

Name: _____

MULTIPLY OR DIVIDE



1. 6, 12, 24, _____, _____

Rule: _____

2. 3, 9, 27, _____, _____

Rule: _____

3. 960, 480, 240, _____, _____

Rule: _____

4. 6,250, 1,250, 250, _____, _____

Rule: _____

ERROR DETECTIVES



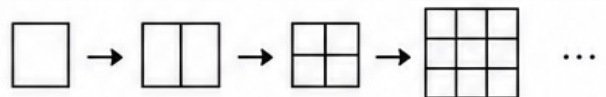
5. Sam wrote 800, 750, 700, 640. He used subtract 50.
Circle and correct the error.



6. Mia wrote 10, 30, 180, 40. She used multiply by 3.
Circle and correct the error.



CHALLENGE



7. Start at 125. Add 75. Write the first eight terms.

--	--	--	--	--	--	--	--

8. How is an additive pattern different from a multiplicative pattern?

RECURSIVE WHOLE-NUMBER PATTERNS — PAGE 2

Name: **ANSWERS**

MULTIPLY OR DIVIDE



1. 6, 12, 24, **48**, **96**

Rule: **multiply by 2**

2. 3, 9, 27, **81**, **243**

Rule: **multiply by 3**

3. 960, 480, 240, **120**, **60**

Rule: **divide by 2**

4. 6,250, 1,250, 250, **50**, **10**

Rule: **divide by 5**

ERROR DETECTIVES

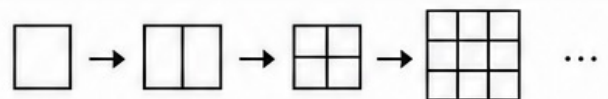
5. Sam wrote 800, 750, 700, 640. He used subtract 50. **650**
Circle and correct the error.



6. Mia wrote 10, 30, 180, 40. She used multiply by 3. **270**
Circle and correct the error.



CHALLENGE



7. Start at 125. Add 75. Write the first eight terms.

125

200

275

350

425

500

575

650

8. How is an additive pattern different from a multiplicative pattern?

An additive pattern changes by a constant amount. A multiplicative pattern changes by a constant factor.

FRACTION PATTERNS — PAGE 1

Name: _____



Continue each pattern and state the rule.

1. $\frac{1}{6}$, $\frac{3}{6}$, $\frac{5}{6}$, _____ , _____

Rule: _____

2. $\frac{11}{12}$, $\frac{9}{12}$, $\frac{7}{12}$, _____ , _____

Rule: _____

3. $\frac{2}{5}$, $\frac{3}{5}$, _____ , $\frac{5}{5}$, _____

Rule: _____

4. _____ , $\frac{5}{8}$, $\frac{7}{8}$, $\frac{9}{8}$

Rule: _____



FIND THE MISSING FRACTIONS

5. $\frac{1}{4}$, _____ , $\frac{3}{4}$, _____ , $\frac{5}{4}$

6. $\frac{7}{10}$, $\frac{6}{10}$, _____ , $\frac{4}{10}$, _____



REASON

Why can a fraction pattern continue beyond one whole?

FRACTION PATTERNS — PAGE 1

Name: ANSWERS



Continue each pattern and state the rule.

1. $\frac{1}{6}$, $\frac{3}{6}$, $\frac{5}{6}$, $\frac{7}{6}$, $\frac{9}{6}$

Rule: add $\frac{2}{6}$

2. $\frac{11}{12}$, $\frac{9}{12}$, $\frac{7}{12}$, $\frac{5}{12}$, $\frac{3}{12}$

Rule: subtract $\frac{2}{12}$

3. $\frac{2}{5}$, $\frac{3}{5}$, $\frac{4}{5}$, $\frac{5}{5}$, $\frac{6}{5}$

Rule: add $\frac{1}{5}$

4. $\frac{3}{8}$, $\frac{5}{8}$, $\frac{7}{8}$, $\frac{9}{8}$

Rule: add $\frac{2}{8}$



FIND THE MISSING FRACTIONS

5. $\frac{1}{4}$, $\frac{2}{4}$, $\frac{3}{4}$, $\frac{4}{4}$, $\frac{5}{4}$

6. $\frac{7}{10}$, $\frac{6}{10}$, $\frac{5}{10}$, $\frac{4}{10}$, $\frac{3}{10}$



REASON

Why can a fraction pattern continue beyond one whole?

Fractions can represent amounts greater than one, including improper fractions and mixed numbers.



FRACTION PATTERNS – PAGE 2

Name: _____



MIXED NUMBERS

1. $\frac{3}{4}$, 1, $1\frac{1}{4}$, _____, _____ Rule: _____

2. $2\frac{1}{3}$, $2\frac{2}{3}$, 3, _____, _____ Rule: _____

3. $4\frac{1}{2}$, 4, $3\frac{1}{2}$, _____, _____ Rule: _____



BUILD THE PATTERN

4. Start at $\frac{1}{5}$. Add $\frac{2}{5}$. Write the next six terms.

--	--	--	--	--	--	--

5. Start at $\frac{5}{6}$. Subtract $\frac{1}{6}$. Stop at $\frac{1}{6}$.

--	--	--	--	--



ERROR DETECTIVE

6. $\frac{2}{7}$, $\frac{4}{7}$, $\frac{6}{7}$, $\frac{9}{7}$, $\frac{10}{7}$. Circle and correct the error.

Rule: _____

FRACTION PATTERNS – PAGE 2

Name: _____ **ANSWERS**



MIXED NUMBERS

1. $\frac{3}{4}$, 1, $1\frac{1}{4}$, $1\frac{1}{2}$, $1\frac{3}{4}$ Rule: _____ **add** $\frac{1}{4}$ —

2. $2\frac{1}{3}$, $2\frac{2}{3}$, 3, $3\frac{1}{3}$, $3\frac{2}{3}$ Rule: _____ **add** $\frac{1}{3}$ —

3. $4\frac{1}{2}$, 4, $3\frac{1}{2}$, 3, $2\frac{1}{2}$ Rule: _____ **subtract** $\frac{1}{2}$ —



BUILD THE PATTERN

4. Start at $\frac{1}{5}$. Add $\frac{2}{5}$. Write six terms.

$$\frac{1}{5}$$

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

$$\frac{5}{5}$$

$$\frac{7}{5}$$

$$\frac{9}{5}$$

$$\frac{11}{5}$$

5. Start at $\frac{5}{6}$. Subtract $\frac{1}{6}$. Stop at $\frac{1}{6}$.

$$\frac{5}{6}$$

$$\frac{4}{6}$$

$$\frac{3}{6}$$

$$\frac{2}{6}$$

$$\frac{1}{6}$$



ERROR DETECTIVE

6. $\frac{2}{7}$, $\frac{4}{7}$, $\frac{6}{7}$, ~~$\frac{9}{7}$~~ , $\frac{10}{7}$, $\frac{8}{7}$ Circle and correct the error.

Rule: _____ **add** $\frac{2}{7}$ _____

DECIMAL PATTERNS — PAGE 1

Name: _____



Align decimal places before comparing terms.



CONTINUE AND STATE THE RULE

1. 0.25, 0.50, 0.75, _____, _____ Rule: _____

2. 3.6, 3.1, 2.6, _____, _____ Rule: _____

3. 1.20, 1.45, _____, 1.95, _____ Rule: _____

4. 8.00, 7.25, 6.50, _____, _____ Rule: _____



MISSING TERMS

5. 2.4, _____, 3.2, 3.6, _____

6. 9.5, 8.8, _____, 7.4, _____

ONES	TENTHS	HUNDREDTHS

DECIMAL PATTERNS — PAGE 1

Name: ANSWERS



Align decimal places before comparing terms.



CONTINUE AND STATE THE RULE

1. 0.25, 0.50, 0.75, 1.00, 1.25

Rule: add 0.25

2. 3.6, 3.1, 2.6, 2.1, 1.6

Rule: subtract 0.5

3. 1.20, 1.45, 1.70, 2.20

Rule: add 0.25

4. 8.00, 7.25, 6.50, 5.75, 5.00

Rule: subtract 0.75

MISSING TERMS

5. 2.4, 2.8, 3.2, 3.6, 4.0

6. 9.5, 8.8, 8.1, 7.4, 6.7

ONES	TENTHS	HUNDREDTHS

DECIMAL PATTERNS — PAGE 2

Name: _____



BUILD LONGER PATTERNS

1. Start at 0.35. Add 0.15. Write eight terms.

--	--	--	--	--	--	--	--

2. Start at 5.0. Subtract 0.6. Write six terms.

--	--	--	--	--	--



ERROR DETECTIVES

3. 2.4, 2.8, 3.2, 3.7, 4.0. Circle and correct the error.

4. 9.5, 8.75, 8, 7.35, 5. Circle and correct the error.



REASON

5. Are "add 0.3" and "add $\frac{3}{10}$ " the same rule? Explain.

DECIMAL PATTERNS — PAGE 2

Name: ANSWERS



BUILD LONGER PATTERNS

1. Start at 0.35. Add 0.15. Write eight terms.

0.35

0.50

0.65

0.80

0.95

1.10

1.25

1.40

2. Start at 5.0. Subtract 0.6. Write six terms.

5.0

4.4

3.8

3.2

2.6

2.0



ERROR DETECTIVES

3. 2.4, 2.8, 3.2, ~~3.7~~, 4.0. Circle and correct the error. **3.6**

4. 9.5, 8.75, 8, ~~7.35~~, 5. Circle and correct the error. **7.25**



REASON

5. Are "add 0.3" and "add $\frac{3}{10}$ " the same rule? Explain.

Yes. Three tenths written as a decimal is 0.3, so both rules add the same amount.

PATTERNS AND FUNCTION RULES — PAGE 1

Name: _____



Find the rule and write the next three terms.

1. 220, 290, 360, 430, _____, _____, _____



Rule: _____

2. 4,800, 4,320, 3,840, 3,360, _____, _____, _____



Rule: _____

3. 0.80, 1.15, 1.50, 1.85, _____, _____, _____



Rule: _____

4. $1\frac{1}{9}$, $\frac{4}{9}$, $\frac{7}{9}$, $\frac{10}{9}$, _____, _____, _____



Rule: _____



How did you check that your rule works at every step?

PATTERNS AND FUNCTION RULES — PAGE 1

Name: **ANSWERS**



Find the rule and write the next three terms.

1. 220, 290, 360, 430, 500 , 570 , 640



Rule: add 70

2. 4,800, 4,320, 3,840, 3,360, 2,880 , 2,400 , 1,920



Rule: subtract 480

3. 0.80, 1.15, 1.50, 1.85, 2.20 , 2.55 , 2.90



Rule: add 0.35

4. $1\frac{1}{9}$, $\frac{4}{9}$, $\frac{7}{9}$, $\frac{10}{9}$, $\frac{13}{9}$, $\frac{16}{9}$, $\frac{19}{9}$



Rule: add $\frac{3}{9}$



How did you check that your rule works at every step?

I applied the rule between every consecutive pair of terms.

PATTERNS AND FUNCTION RULES – PAGE 2

Name: _____



Complete each input-output table.

A

RULE: multiply by 4, then add 3



INPUT	OUTPUT
2	
5	
8	
11	

B

RULE: multiply by 3, then subtract 2



INPUT	OUTPUT
4	
7	
10	
13	

C

RULE: divide by 5, then add 6



INPUT	OUTPUT
25	
40	
55	
70	



Choose one row. Show the two calculation steps.

PATTERNS AND FUNCTION RULES – PAGE 2

Name: _____

ANSWERS



Complete each input-output table.

A

RULE: multiply by 4, then add 3



INPUT	OUTPUT
2	11
5	23
8	35
11	47

B

RULE: multiply by 3, then subtract 2



INPUT	OUTPUT
4	10
7	19
10	28
13	37

C

RULE: divide by 5, then add 6



INPUT	OUTPUT
25	11
40	14
55	17
70	20



Choose one row. Show the two calculation steps.

$$8 \times 4 = 32; 32 + 3 = 35$$

PATTERNS AND FUNCTION RULES – PAGE 3

Name: _____



REVERSE THE RULE

1. Rule: multiply by 5, then add 2. Output: 47. Input: _____
2. Rule: multiply by 4, then subtract 2. Output: 38. Input: _____
3. Rule: divide by 3, then add 4. Output: 22. Input: _____
4. Rule: divide by 5, then add 7. Output: 17. Input: _____



MIXED INPUTS AND OUTPUTS

Rule: multiply by 2, then add 5	
Input _____	Output 25
Input 11	Output _____
Input 30	Output _____
Input _____	Output 105



Explain how inverse operations help you work backwards.



PATTERNS AND FUNCTION RULES – PAGE 3

Name: **ANSWERS**



REVERSE THE RULE

1. Rule: multiply by 5, then add 2. Output: 47. Input: 9
2. Rule: multiply by 4, then subtract 2. Output: 38. Input: 10
3. Rule: divide by 3, then add 4. Output: 22. Input: 54
4. Rule: divide by 5, then add 7. Output: 17. Input: 40



MIXED INPUTS AND OUTPUTS

Rule: multiply by 2, then add 5	
Input <u>10</u>	Output 25
Input 17	Output <u>39</u>
Input 30	Output <u>65</u>
Input <u>50</u>	Output 105



Explain how inverse operations help you work backwards.

Undo the last operation first, then undo the first operation.



CREATE YOUR OWN PATTERNS — PAGE 1

Name: _____

A WHOLE-NUMBER PATTERN



Choose a start between 1,000 and 2,000. Use a constant addition or subtraction rule. Write eight terms.

Start: _____

Rule: _____

--	--	--	--	--	--	--	--

How I checked: _____

B FRACTION PATTERN



Start above 2. Use fourths and subtract $\frac{1}{4}$. Write seven terms.

Start: _____

Rule: _____

--	--	--	--	--	--	--

How I checked: _____

C DECIMAL PATTERN



Start below 1. Add either 0.20 or 0.25. Write eight terms.

Start: _____

Rule: _____

--	--	--	--	--	--	--	--

How I checked: _____

CREATE YOUR OWN PATTERNS — PAGE 2

Name: _____



A. FUNCTION-RULE DESIGN



Invent a two-step rule using multiplication and addition or subtraction.

My rule: _____

INPUT	OUTPUT



B. ERROR CHALLENGE



Write an almost-correct five-term pattern. Circle one deliberate error. Swap with a partner.

Pattern:

Actual rule:

Partner's correction:



C. JUSTIFY



How can you prove a recursive rule works for every step?



NUMBER PATTERN MASTERY — ASSESSMENT PAGE 1

Name: _____

Date: _____

Score: ____ / 12



1. 1,150, 1,425, 1,700, _____, _____

(2 marks)



2. 6,000, 5,550, 5,100, _____, _____

(2 marks)



3. $\frac{1}{6}$, $\frac{3}{6}$, $\frac{5}{6}$, _____, _____

(2 marks)



4. 4.80, 4.45, 4.10, _____, _____

(2 marks)



5. State the rule and next term: 320, 440, 560, 680, _____

(2 marks)

Rule: _____

Next term: _____



6. Complete: 2.5, _____, 3.3, 3.7, _____

(2 marks)



NUMBER PATTERN MASTERY — ASSESSMENT PAGE 1

Name: ANSWERS

Date: _____

Score: ____ / 12



1. 1,150, 1,425, 1,700, 1,975 , 2,250

(2 marks)



2. 6,000, 5,550, 5,100, 4,650 , 4,200

(2 marks)



3. $\frac{1}{6}$, $\frac{3}{6}$, $\frac{5}{6}$, $\frac{7}{6}$, $\frac{9}{6}$

(2 marks)



4. 4.80, 4.45, 4.10, 3.75 , 3.40

(2 marks)



5. State the rule and next term: 320, 440, 560, 680, 800

(2 marks)

Rule: add 120

Next term: 800



6. Complete: 2.5, 2.9 , 3.3, 3.7, 4.1

(2 marks)



NUMBER PATTERN MASTERY — ASSESSMENT PAGE 2

Name: _____

Date: _____

Score: ____ / 13



7. (3 marks) Complete the outputs for the rule “multiply by 3, then add 4”.

Input	Output
2	
6	
10	



8. (2 marks) Work backwards through “multiply by 5, then subtract 1”.
Find each input.

Output	Input
24	
49	



9. (2 marks) The rule is subtract 120.
Find and correct the error: 900, 780, 660, 550, 420.

Explanation: _____



10. (3 marks) Create a six-term fraction pattern that starts at $\frac{3}{8}$ and adds $\frac{2}{8}$.

--	--	--	--	--	--



11. (3 marks) Explain the difference between an additive recursive pattern and a multiplicative recursive pattern. Include one example.

NUMBER PATTERN MASTERY — ASSESSMENT PAGE 2

Name: ANSWERS

Date: _____

Score: ____ / 13



7. (3 marks) Complete the outputs for the rule “multiply by 3, then add 4”.

Input	Output
2	10
6	22
10	34



8. (2 marks) Work backwards through “multiply by 5, then subtract 1”. Find each input.

Output	Input
24	5
49	10



9. (2 marks) The rule is subtract 120.

Find and correct the error: 800, 780, 600, ~~550~~, 420. **540**

Explanation: $600 - 120 = 540$



10. (3 marks) Create a six-term fraction pattern that starts at $\frac{3}{8}$ and adds $\frac{2}{8}$.

$\frac{3}{8}$	$\frac{5}{8}$	$\frac{7}{8}$	$\frac{9}{8}$	$\frac{11}{8}$	$\frac{13}{8}$
---------------	---------------	---------------	---------------	----------------	----------------



11. (3 marks) Explain the difference between an additive recursive pattern and a multiplicative recursive pattern. Include one example.

An additive pattern changes by a constant amount, for example
5, 8, 11. A multiplicative pattern changes by a constant factor,
for example 5, 10, 20.

NUMBER PATTERNS RUBRIC

Student: _____

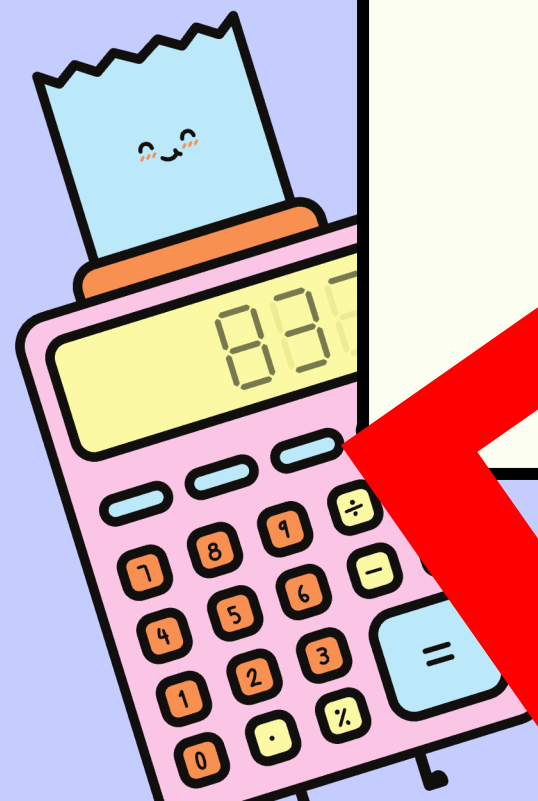
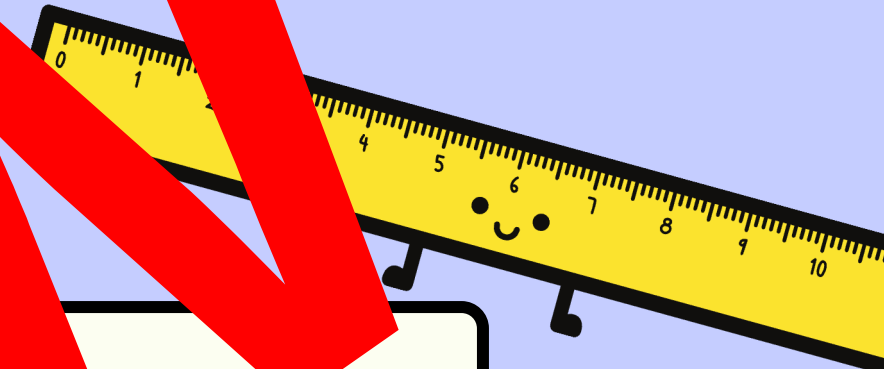
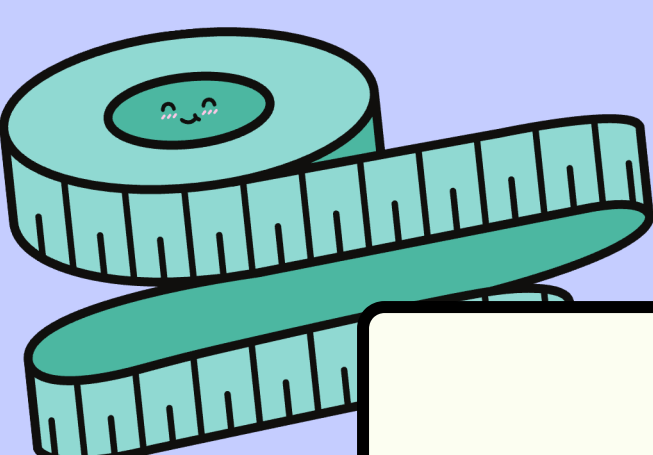
Date: _____

Teacher: _____

Total: _____ / 20

CRITERIA	5 — EXCEEDING	CONFIDENT	3 — ACHIEVING	2 — DEVELOPING	1 — BEGINNING
Identifies pattern rules and structure	Accurately identifies and compares pattern rules and structure in unfamiliar patterns. Explains choices fully and justifies reasoning with clear examples.	Accurately identifies pattern rules and structure in familiar and most unfamiliar patterns. Explains choices with relevant examples.	Identifies pattern rules and structure with mostly accurate understanding. Explains choices with some examples.	Identifies simple pattern rules and structure with some accuracy. Explanations are incomplete or lack relevant examples.	Identifies pattern rules and structure with limited accuracy. Ideas are unclear or incorrect. Support is required.
Extends and corrects whole-number, fraction and decimal patterns	Extends patterns accurately across whole numbers, fractions and decimals. Detects and corrects errors independently and fully justifies corrections.	Extends patterns accurately across whole numbers, fractions and decimals in most cases. Detects and corrects errors with minimal support and explains reasoning.	Extends patterns across whole numbers, fractions and decimals with mostly accurate understanding. Identifies some errors and attempts corrections.	Extends patterns with some accuracy and inconsistency across number types. Identifies few errors and needs support to correct them.	Struggles to extend patterns accurately across number types. Rarely identifies errors. Support is required to continue.
Applies and reverses function rules	Applies and reverses function rules accurately in a variety of contexts. Explains reasoning clearly and uses efficient methods.	Applies and reverses function rules accurately in most contexts. Explains reasoning with appropriate methods.	Applies and reverses function rules with mostly accurate understanding. Explains reasoning in some contexts.	Applies or reverses function rules with some accuracy. Errors occur in multi-step tasks. Support is helpful.	Limited ability to apply or reverse function rules. Errors are frequent. Support is required.
Communicates reasoning and checks solutions	Clearly communicates reasoning using precise mathematical language and representations. Checks solutions thoroughly and explains why they are correct.	Communicates reasoning clearly using appropriate language and representations. Checks solutions and explains results with minor omissions.	Communicates reasoning with adequate clarity using some representations. Checks solutions with some completeness.	Communicates reasoning with limited clarity. Representations may be incomplete. Checks solutions superficially and needs reminders.	Communication of reasoning is unclear or minimal. Representations are limited or incorrect. Rarely checks solutions. Support is required.

Teacher feedback and next steps



PREVIEW

Number Patterns

Learning Intentions

Recognise recursive number patterns.

Describe increasing and decreasing rules.

Continue and create whole-number, fraction and decimal patterns.

Write and reverse input-output rules.

Explain how you checked each step.



What Is a Number Pattern?

A number pattern is an ordered sequence that follows a rule.

Each number is a term.

In a recursive pattern each term is built from the previous term.

There is a rule between every pair of terms.



Pattern Language

Increasing — terms become greater.

Decreasing — terms become smaller.

Constant difference — the same amount is added or subtracted.

rule names the operation and the amount.



Increasing Whole-Number Patterns

1,200, 1,450, 1,700, 1,950, ...

The difference is 250 each time.

Rule: add 250.

Next terms: 2,200, 2,450.



Decreasing Whole-Number Patterns

5,000, 4,600, 4,200, 3,800, ...

The difference is 400 each time.

Rule: subtract 400.

Next terms: 3,400, 3,000.



Missing Terms

Work forwards and backwards using the same rule.

320, —, 560, 800, —

The constant difference is +120.

Missing terms: 440 and 800.



Multiplicative Patterns

6, 12, 24, 48, 96, ... multiply by 2

960, 480, 240, 120, 60, ... — divide by 2

Multiplicative patterns use a constant factor,
not a constant difference.



Fraction Patterns

Compare numerators when denominators match.

$1/6, 3/6, 5/6, 7/6, 9/6, \dots$

Rule: add $2/6$.

A fraction pattern can continue beyond one whole.



Fraction Practice

Continue: $7/12$, $9/12$, $7/12$, —, —

Rule: subtract $2/12$.

Making terms: $5/12$ and $3/12$.

Check every consecutive pair.



Decimal Patterns

Align decimal places before comparing terms.

0.25, 0.50, 0.75, 1.00, 1.25, ...

Rule: add 0.25.

Keep trailing zeros when they show place value.



Decimal Practice

Find the error: 2.4, 2.8, 3.2, 3.7, 4.0

The rule should be add 0.4.

3.7 should be 3.6.

Then the pattern continues to 4.0.



Identify the Rule

Compare consecutive terms.

Name the operation and amount.

State the rule at every step.

If one step fails, revise the rule or locate an error.



Function Rules

An input passes through a rule to make an output.

Input 4: multiply by 3, then add 2; output 14.

For a rule, the operations in order.

Use a table to check several input-output pairs.



One-Step Function Table

Rule: multiply by 4

Input 2 → Output 8

Input 5 → Output 20

Input → Output 32

Input 11 → Output 44



Multi-Step Function Rule

Rule: multiply by 2, then add 4

Input 2 → Output 10

Input 6 → Output 22

Input 7 → Output 34

Complete every operation in the stated order.



Reverse the Rule

To find an input, do the last operation first.

Output 47 came from 'multiply by 5, then add 2'.

$$47 - 2 = 45$$

$45 \div 5 = 9$, so the input is 9.



Create and Justify

Choose a start and a constant rule.

Write at least six terms.

State whether the pattern is additive or multiplicative.

Prove the rule works between every consecutive pair.



Review

Compare consecutive terms.

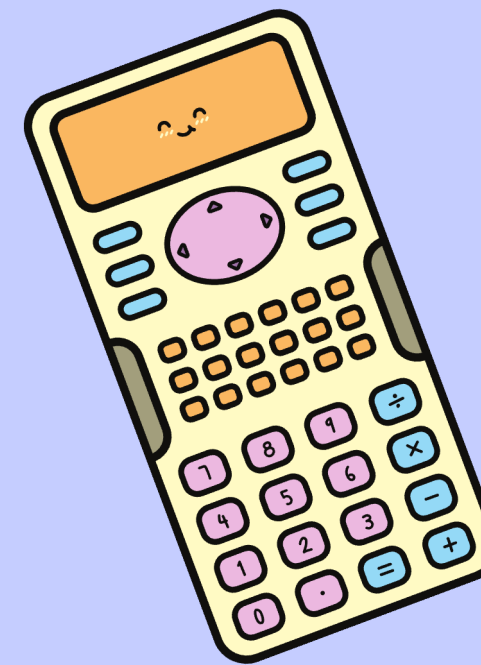
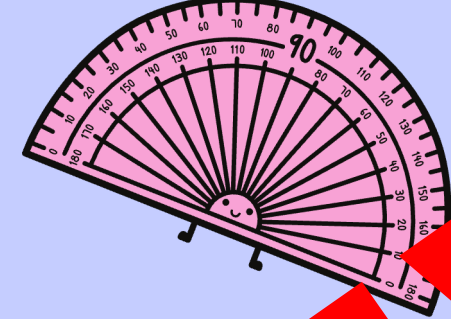
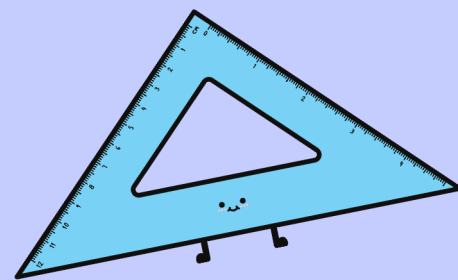
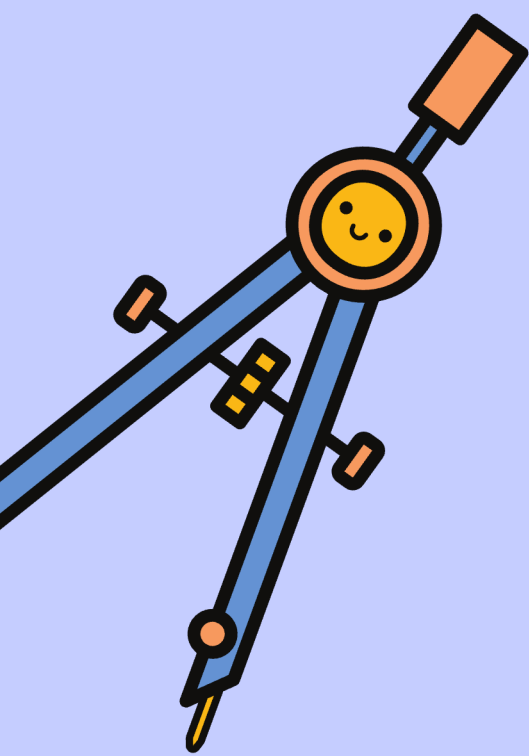
Keep fraction denominators and decimal places clear.

Apply function operations in order.

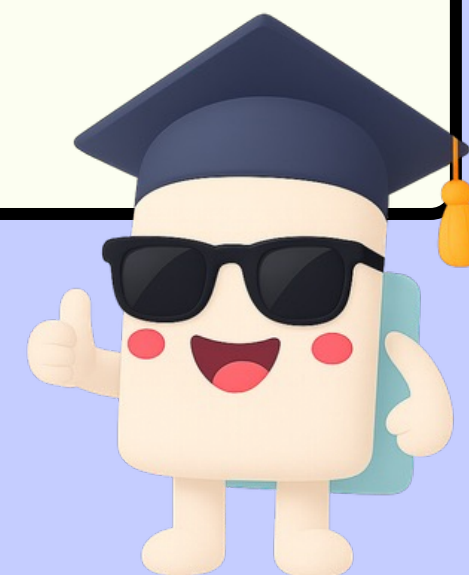
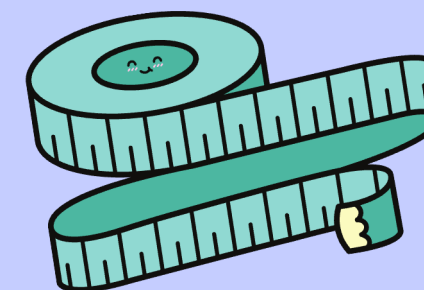
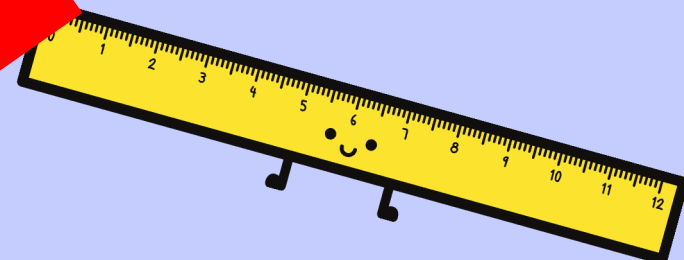
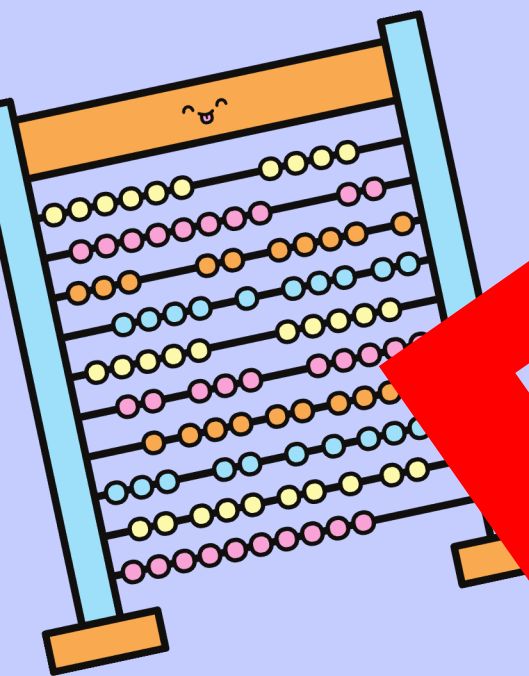
Reverse operations in reverse order.

Always test your rule.





Well Done!



Number Patterns Quiz



Question 1

Write the next two terms.

1,250, 1,450, 1,650, __, __

State the rule.



Answer 1

1, 2, 50

Rule: add 200.

Each consecutive difference is 200.



Question 2

Write the next two terms.

1,800, 2,350, 3,200, __, __

State the rule.



Answer 2

3,450,000

Rule: subtract 450.



Question 3

Choose the missing term.

1.20, 1.45, _____, 1.95, 2.20

A 1.55 B 1.65

C 1.70 D 1.80



Answer 3

C = 7

Rule: add 0.25.



Question 4

Write the next two terms.

$\frac{1}{8}, \frac{3}{8}, \frac{5}{8}, \frac{7}{8}, \underline{\hspace{1cm}}, \underline{\hspace{1cm}}$

State the rule.



Answer 4

$9/8, 11/8$

Rule: add $2/8$.



Question 5

True or false?

90, 72, 54, 36, ... follows the rule subtract 18.

Write the next term.



Answer 5

True.

Pre: subtract 18.

Next term: 18.



Question 6

Apply the rule to input 7.

Multiply by 6 then add 1.

A 36 B 42

C 43 D 49



Answer 6

$$7 \times 6 = 42$$

$$42 + 1 = 43$$



Question 7

Work backwards

The rule is multiply by 4, then add 2.

The output is 26.

What was the input?



Answer 7

Output:

$$26 - 2 = 24$$

$$24 \div 4 = 6$$



Question 8

Apply the rule to input 12.

Multiply by 3, then subtract 5.

A 21 B 31

C 36 D 41



Answer 8

$$12 \div 3 = 4$$

$$12 \times 3 = 36$$

$$2 - 5 = 31$$



Question a

True or false?

Every step in 2.5, 2.0, 1.5, 1.1 subtracts 0.5.

If false, correct the error.



Answer q

else
1.0 should be 1.0.
e rule is subtract 0.5.



Question 10

Which sequence starts at 5 and increases by 7?

A 5, 12, 19, 26, 33

B 5, 12, 19, 26, 33

C 5, 12, 19, 26, 33

D 7, 14, 21, 28, 35

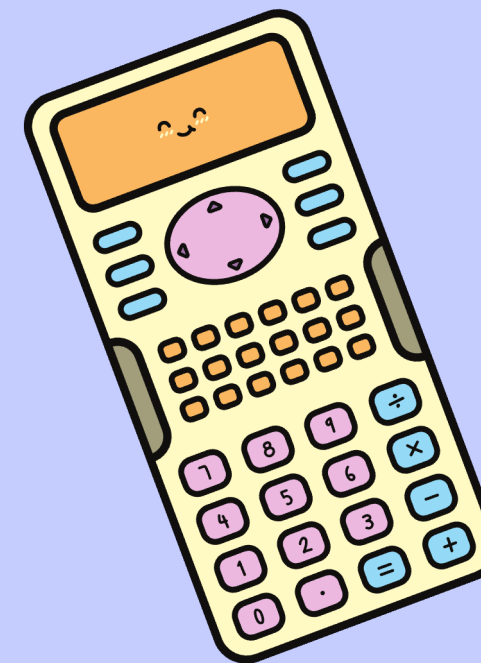
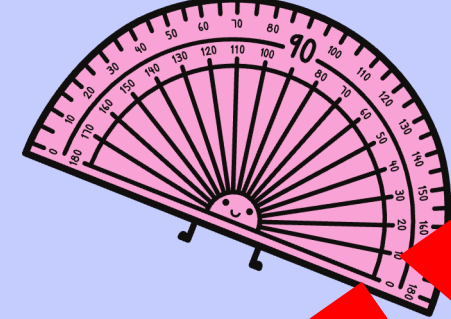
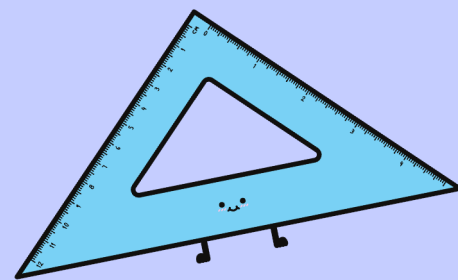
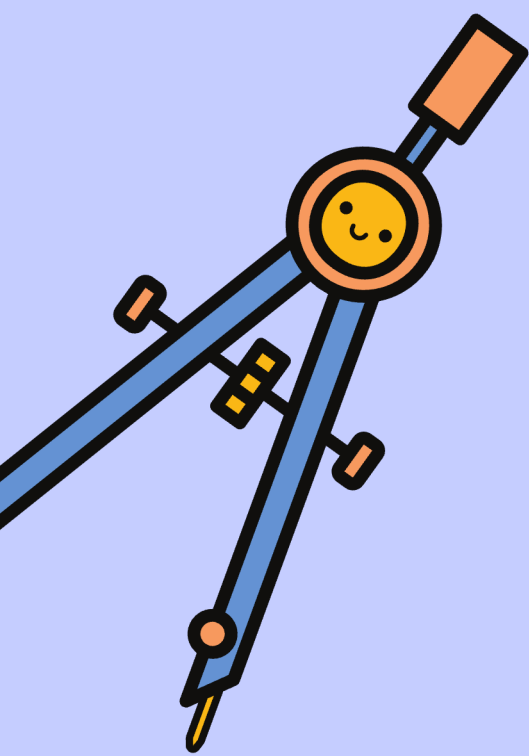


Answer 10

B — 5, 12, 19, 26, 33

Each difference is 7.





Well Done!

