Numbers and shapes

VOCABULARY PRACTICE

UPPER-INTERMEDIATE | B2

Name: _____ **Date:** _____

1 Match each mathematical concept with its meaning.

1 ratio	____	a equality of shape and size
2 proportion	____	b ordered list following a rule
3 sequence	____	c measurable extent such as length, width or height
4 variable	____	d comparison of two quantities by division
5 coefficient	____	e numerical factor multiplying a variable
6 polygon	____	f closed flat shape made of straight sides
7 symmetry	____	g relationship in which two ratios are equal
8 congruence	____	h balanced correspondence across a line or point
9 circumference	____	i distance around a circle
10 dimension	____	j symbol representing a value that may change

2 Complete the mathematical collocations.

coefficient | congruent | constant | dimension | proportion | ratio | sequence | symmetry

1 in direct _____

2 a numerical _____

3 a common _____

4 a constant _____

5 a geometric _____

6 maintain the same _____

7 _____ triangles

8 an axis of _____

3 Choose the most precise term for the context.

1 The quantities increase at the same rate: *direct proportion / congruence*.

2 The pattern doubles each time: *geometric sequence / symmetry*.

3 Two triangles match exactly: *congruent / proportional*.

4 The letter x can change value: *variable / coefficient*.

5 A pentagon is a five-sided *polygon / dimension*.

6 The distance around a circle is its *circumference / diameter*.

7 A reflection preserves mirror *symmetry / ratio*.

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4 Complete the mathematical review with terms from the box.

circumference | coefficient | congruence | dimension | polygon | proportion | ratio | sequence | symmetry | variable

In the expression 3x, x is a **1** _____ and 3 is its **2** _____. A pattern of values arranged by a rule is a **3** _____. A **4** _____ compares quantities, while a **5** _____ states that two such comparisons are equal. In geometry, a closed figure with straight sides is a **6** _____. Exact agreement in size and shape is **7** _____, while balanced correspondence is **8** _____. Length, width and height are each a **9** _____. For a circle, the boundary length is the **10** _____.

5 Read the text and answer the questions briefly.

The geometry of efficient packing

Identical circles leave gaps when arranged on a flat surface. A hexagonal pattern places each circle beside six neighbours and uses space more efficiently than a square grid. Honeycomb cells are hexagonal for a related reason: they divide a surface into equal regions without gaps while using relatively little boundary material. Similar geometric principles influence tiling, storage design and the arrangement of components in engineering.

1 What happens when circles are arranged on a surface? _____

2 How many neighbours surround each circle hexagonally? _____

3 Which arrangement is less efficient? _____

4 Why are honeycomb cells useful? _____

5 What material advantage do they offer? _____

6 Where else are these principles applied? _____

6 Rewrite using the expression in capitals.

1 The two shapes are identical in size and form. **CONGRUENT** _

2 Width is related to height as 4 to 3. **RATIO** _____

3 The pattern has mirror balance. **SYMMETRY** _____

4 The values increase according to a fixed rule. **SEQUENCE** _

OVER TO YOU

Write a **120-150 word** explanation of how a numerical or geometric pattern is used in design, nature or technology.

[ ] Use at least ten target terms. [ ] Explain the relationship precisely. [ ] Include a clear example.

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ANSWER KEY

1 Mathematical concepts

1 **d** 2 **g** 3 **b** 4 **j** 5 **e** 6 **f** 7 **h** 8 **a** 9 **i** 10 **c**

2 Mathematical collocations

1 **proportion** 2 **coefficient** 3 **ratio** 4 **dimension** 5 **sequence** 6 **constant** 7 **congruent** 8 **symmetry**

3 Precise terms

1 **direct proportion** 2 **geometric sequence** 3 **congruent** 4 **variable**
5 **polygon** 6 **circumference** 7 **symmetry**

4 Mathematical review

1 **variable** 2 **coefficient** 3 **sequence** 4 **ratio** 5 **proportion**
6 **polygon** 7 **congruence** 8 **symmetry** 9 **dimension** 10 **circumference**

5 Reading - suggested answers

1 Gaps remain. 2 Six. 3 A square grid. 4 They create equal regions without gaps.
5 They use little boundary material. 6 Tiling, storage and engineering.

6 Rewriting - possible answers

1 The shapes are **congruent**. 2 The width-to-height **ratio** is 4:3. 3 The pattern has mirror **symmetry**. 4 The values form a **sequence**.

Over to you: Answers will vary. Check mathematical precision, relationships and examples.