

Criterion B Practice

A pattern of triangles

MYP 1–2

Instructions

1. A child is playing with toothpicks. The sequence of his game is shown below.



2. Explore the pattern created by the child: number of toothpicks vs triangles.
3. Express your findings as a general rule.
4. Write a justification about why your general rule works for any case of the pattern. Use mathematical terminology and write a logical, concise and complete explanation.

Related criteria

B and C (adapted)

Proportions

MYP 1–2

1. Show that $\frac{3}{2} = \frac{6}{4}$.

Now find the value of $\frac{3+2}{3-2}$ and $\frac{6+4}{6-4}$.

What do you notice?

2. Copy and complete the table below (and simplify your answer).

$\frac{4}{2} = \frac{12}{6}$	$\frac{4+2}{4-2} = \dots\dots$	$\frac{12+6}{12-6} = \dots\dots$
$\frac{2}{3} = \frac{4}{6}$	$\frac{2+3}{2-3} = \dots\dots$	$\frac{4+6}{4-6} = \dots\dots$
$\frac{4}{1} = \frac{8}{2}$	$\frac{4+1}{4-1} = \dots\dots$	$\frac{8+2}{8-2} = \dots\dots$

3. Based on your investigation above, complete the missing values.

$$\text{If } \frac{a}{b} = \frac{c}{d}, \text{ then } \frac{\dots + \dots}{\dots - \dots} = \frac{\dots + \dots}{\dots - \dots}$$

4. Give two examples of your own to show that the formula you found works.

Related criterion

B (adapted)

Equal ratio

MYP 1–2

We know that $\frac{3}{4} = \frac{6}{8}$ and that $\frac{2}{3} = \frac{6}{9}$ and that $\frac{5}{2} = \frac{25}{10}$

1. Copy and complete the table below.

$\frac{3}{4} = \frac{6}{8}$	$3 \times 8 = \dots$	$4 \times 6 = \dots$
$\frac{2}{3} = \frac{6}{9}$	$2 \times 9 = \dots$	$3 \times 6 = \dots$
$\frac{5}{2} = \frac{25}{10}$	$5 \times 10 = \dots$	$2 \times 25 = \dots$

Based on the investigation above, complete the following.

If $\frac{a}{b} = \frac{c}{d}$ then $\dots \times \dots = \dots \times \dots$

2. Copy and complete the table below.

$\frac{3}{4} = \frac{6}{8}$	$\frac{4 \times 6}{8} = \dots$	$\frac{3 \times 8}{6} = \dots$	$\frac{3 \times 8}{4} = \dots$	$\frac{4 \times 6}{3} = \dots$
$\frac{2}{3} = \frac{6}{9}$	$\frac{3 \times 6}{9} = \dots$	$\frac{2 \times 9}{6} = \dots$	$\frac{2 \times 9}{3} = \dots$	$\frac{3 \times 6}{2} = \dots$
$\frac{5}{2} = \frac{25}{10}$	$\frac{2 \times 25}{10} = \dots$	$\frac{5 \times 10}{25} = \dots$	$\frac{5 \times 10}{2} = \dots$	$\frac{2 \times 25}{5} = \dots$

Based on the investigation above, complete the following.

If $\frac{a}{b} = \frac{c}{d}$ then $a = \frac{\dots \times \dots}{\dots}$, $b = \frac{\dots \times \dots}{\dots}$, $c = \frac{\dots \times \dots}{\dots}$ and $d = \frac{\dots \times \dots}{\dots}$

3. Give another example of your choice to show that what you discovered works.

Related criterion

B (adapted)

Ratios

MYP 1–2

1. The ratio of size between a small bottle and a large bottle is 2 : 3. Given that the total capacity of the two bottles is 10 litres, show that the capacity of the small bottle is 4 litres and the capacity of the large bottle is 6 litres.
2. The ratio of the area between a small square of land and a large square of land is 3 : 7. Given that the total area of the two squares of land is $4,000 \text{ m}^2$, find the area of each square of land.
3. The ratio between the weight of a small dumb-bell and a large dumb-bell is 2 : 7. Given that the total weight of the two dumb-bells is 27 kg, find the weight of each dumb-bell.
4. The ratio between two measurements is $a : b$. Given that the total of the two measurements is L , find an expression for each of the two measurements.
5. Give two examples of your own to show that the expression that you found works.

Related criterion

B (adapted for MYP 1–2)

B

Achievement level	Adapted descriptors
0	The student does not reach a standard described by any of the descriptors given below.
1–2	The student applies, with guidance , mathematical problem-solving techniques to recognize <u>simple and familiar</u> patterns.
3–4	The student applies, with guidance , mathematical problem-solving techniques to recognize <u>simple and familiar</u> patterns, and suggests relationships or general rules.
5–6	The student applies, with guidance , mathematical problem-solving techniques to recognize <u>simple and familiar</u> patterns, describes them as relationships or general rules, and draws conclusions consistent with findings.
7–8	The student applies, with guidance mathematical problem-solving techniques to recognize <u>simple and familiar</u> patterns, describes them as relationships or general rules, draws conclusions consistent with findings, and provides justifications .