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Edu2000

Geometry Journey Video Series

Program #4

Symmetry, Reasoning & Proof

**Satellite Broadcasting
VHS
and Internet/Intranet Streaming**



Topic

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Geometry Journey Series

Program #4 - Symmetry, Reasoning and Proof

Program Description

The most obvious evidence of geometric laws in nature is the symmetry and balance in so many of nature's creations. This video helps students develop not only the appreciation for the beauty of geometry, but also the skill to see the key constant property in any system. In addition, the visual environment also helps student easily understand the three types of reasoning: intuitive, inductive, and deductive.

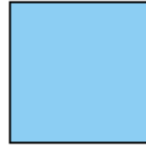
This program is the #4 episode in the fifteen 15-minute Geometry Journey Series.

Synopsis

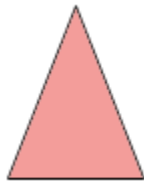
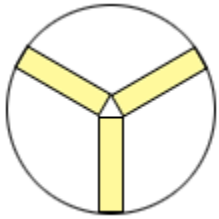
This program will cover the following topics:

1. Line symmetry
2. Point symmetry
3. Rotational symmetry
4. Translational symmetry
5. Glide-reflectional symmetry
6. Reasoning and Proof
 - a) Intuitive Reasoning
 - b) Inductive Reasoning
 - c) Deductive Reasoning

1) For each of the following shapes, find and draw the symmetry axes.

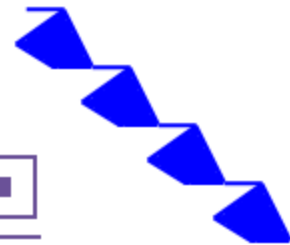
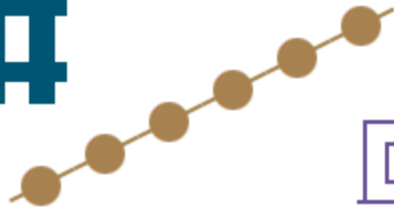


2) List the figure or figures that have rotational symmetry.



3) Using the fact that point symmetry is a rotational symmetry of 180° , list the figure or figures in the above exercise that have point symmetry.

4) Which patterns have translational symmetry if they were to continue indefinitely?



5) The following figures have glide-reflectional symmetry. Please complete the missing parts.



6) List the three kinds of reasoning we often use:

(a) _____

(b) _____

(c) _____

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Geometry Journey Series

Program #4 - Symmetry, Reasoning and Proof

Discussion Questions

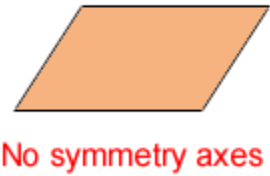
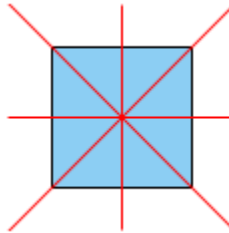
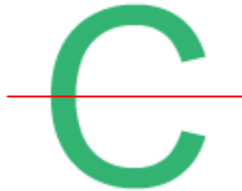
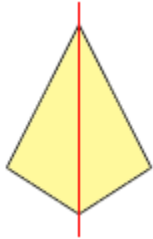
1) Students should work in groups to discuss and list objects around them that have different types of symmetries.

2) Can we find a few things around us that have line symmetry, rotational symmetry and point symmetry?

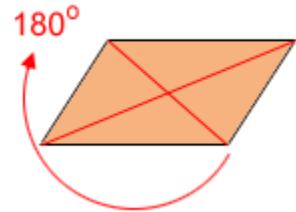
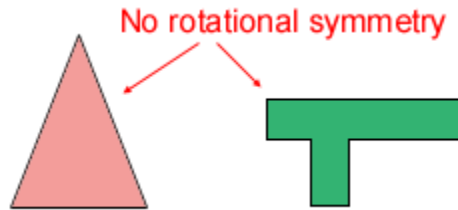
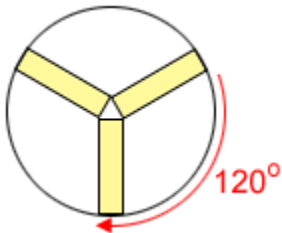
3) Can we find any symmetry in mathematical formulas?

4) List the symmetries that exist in the 26 alphabets.

1) For each of the following shapes, find and draw the symmetry axes.



2) List the figure or figures that have rotational symmetry.



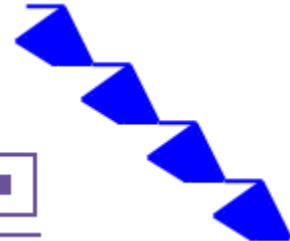
3) Using the fact that point symmetry is a rotational symmetry of 180° , list the figure or figures in the above exercise that have point symmetry.

As shown above, only the parallelogram has point symmetry.

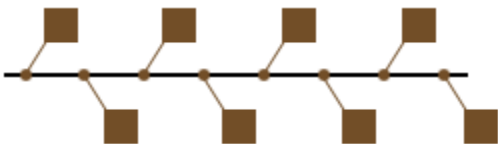
4) Which patterns have translational symmetry if they were to continue indefinitely?



They all have translational symmetry.



5) The following figures have glide-reflectional symmetry. Please complete the missing parts.



6) List the three kinds of reasoning we often use:

(a) Intuitive

(b) Inductive

(c) Deductive

1) Students should work in groups to discuss and list objects around them that have different types of symmetries.

Human bodies: line symmetry.

Wheels: rotational symmetry.

Desks: point symmetry (rotational symmetry of 180°).

Footprints: translational symmetry.

Certain plants: glide-reflectional symmetry.

2) Can we find a few things around us that have line symmetry, rotational symmetry and point symmetry?

Books, Music CDs: line symmetry, rotational symmetry and point symmetry.

3) Can we find any symmetry in mathematical formulas?

Reflexive axiom: $a = a$

Commutative axiom for addition: $a + b = b + a$

Commutative axiom for multiplication: $a b = b a$

Law of Sines (unsuitable for lower grades): $a / \sin A = b / \sin B = c / \sin C$

4) List the symmetries that exist in the 26 alphabets.

Symmetrical only in the vertical axis:

A, M, T, U, V, W, and Y

Symmetrical only in the horizontal axis:

B, C, D, E, and K

Symmetrical in both the vertical and horizontal axis:

H, I, O, and X

Rotational symmetry:

N, S, and Z

Asymmetric:

F, G, J, L, P, Q, and R