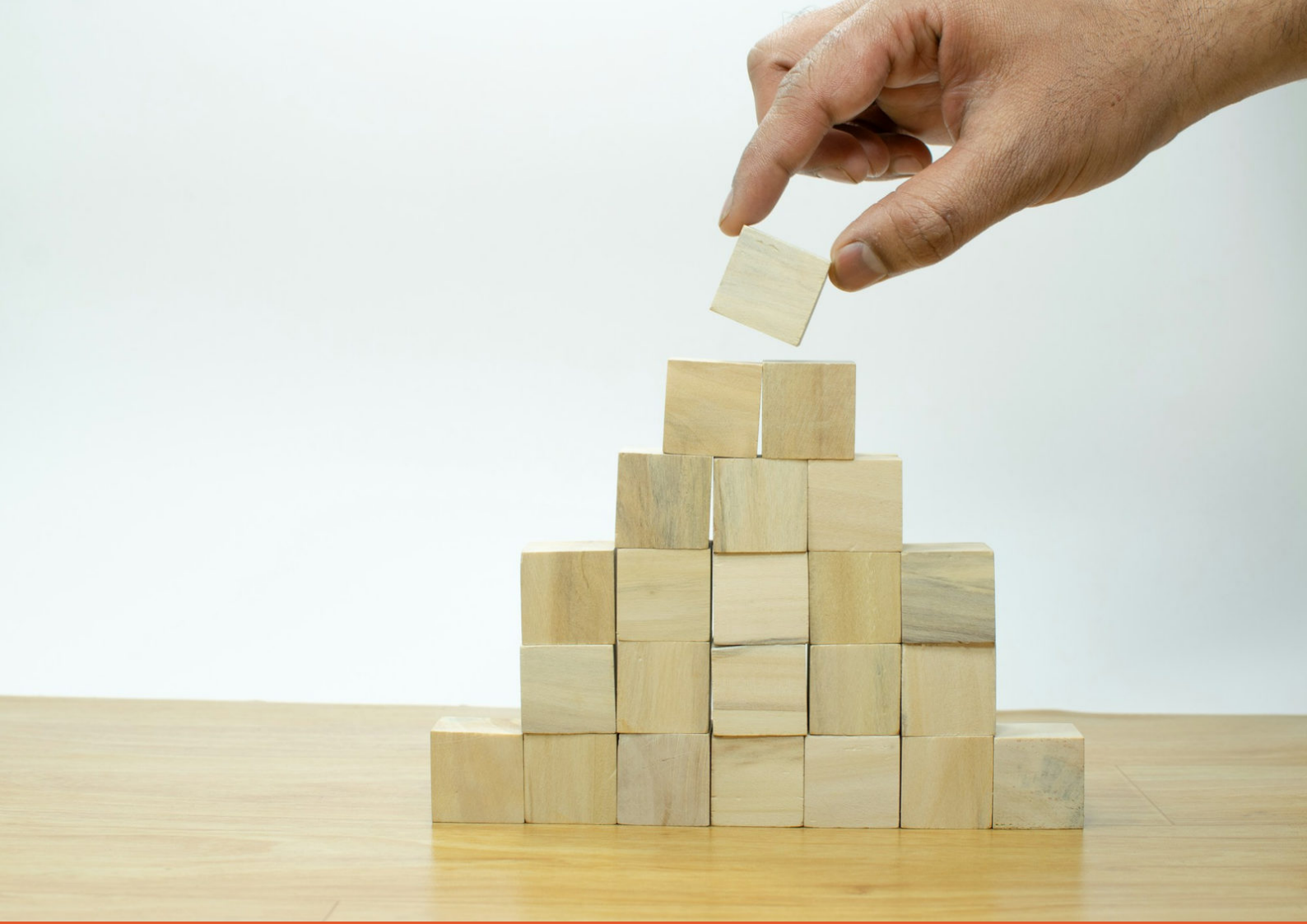




## EduTrend Contents

G4C · BUILDING AND CONSTRUCTION GAMES · MIDDLE SCHOOL

# Strong Shapes Lab

Test squares and triangles made of straws, then use what you found to build a frame that holds a load

Ages 11–13

Level: Intermediate

40 minutes

Pairs · up to 30

Activity 03

Inside: activity at a glance · step-by-step session plan · facilitator notes · 3 student worksheets · assessment checklist

## ACTIVITY 03 · AT A GLANCE

# Strong Shapes Lab

Pairs make a square and a triangle from straws joined with pipe cleaners, then gently push a corner of each. Which keeps its shape? Pairs record results, add a diagonal to the square and test again. Using what they found, they build a frame at least 20 cm tall that holds a small load, such as a pencil case, for ten seconds.

## Learning outcomes

By the end of the session students can:

- compare shape stability;
- explain why triangles are rigid;
- apply findings to a build;
- record and present results.

**KEY WORDS**

triangle · rigid · frame · load ·  
diagonal · stable

**CURRICULUM LINKS**

Design and technology: structures.  
Maths: shape. Science: forces.

**1****WARM UP**

Hands and ideas  
ready

**2****EXPLAIN**

One challenge,  
clear rules

**3****BUILD**

Try, test, rebuild

**4****TEST**

What happens?

**5****TALK**

Why did it stand or  
fall?

**6****TIDY**

Photo, then clear  
up

## Materials (per pair)

- Straws and pipe cleaners
- Small loads such as pencil cases
- Rulers
- Worksheets 1, 2 and 3

## Before the session

- Prepare straw kits.
- Choose loads.
- Model a push test.
- Set height rule.

**SAFETY**

Push gently; keep straw ends away from eyes.

ACTIVITY 03 · SESSION PLAN

# Step by step

Link the triangle finding to real frames they can see around school.

| Time                | What happens                                   | Say or ask                              |
|---------------------|------------------------------------------------|-----------------------------------------|
| 0–5 min<br>Warm up  | Spot triangles in photos of bridges and roofs. | <i>“Why so many triangles?”</i>         |
| 5–10 min<br>Explain | Build and test shapes.                         | <i>“Which will hold its shape?”</i>     |
| 10–32 min<br>Build  | Test shapes, then build the frame.             | <i>“Where did you add triangles?”</i>   |
| 32–40 min<br>Talk   | Test loads and compare.                        | <i>“What made the strongest frame?”</i> |

**CHALLENGE CARD (print or copy onto the board)**

Build a frame 20 cm tall that holds a load for ten seconds, using what you learned about shapes.

## ACTIVITY 03 · FACILITATOR NOTES

# The building game know-how in brief

Some joins and shapes are stronger than others; triangles keep their shape under a push.

Testing and improving after failure is at the heart of engineering thinking.

## Common ideas to listen for

- “Thicker is always stronger.” Shape matters too.
- “Squares are strongest because they look solid.” They can fold.
- “A failed test is wasted.” It shows what to change.

## Adapting the activity

### Support

Provide a pre-made triangle to copy.

### Stretch

Use the fewest straws possible for the same load.

**WORKSHEET 1**

# Shape test

Name: \_\_\_\_\_

Class: \_\_\_\_\_ Date: \_\_\_\_\_

Record what happened.

**Results**

| Shape                | Kept shape? | Notes |
|----------------------|-------------|-------|
| Square               |             |       |
| Triangle             |             |       |
| Square with diagonal |             |       |

WORKSHEET 2

# Frame design

Sketch your frame.

## Design

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**WORKSHEET 3**

# Reflection

Reflect.

**Triangles helped our frame because...**

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FOR THE TEACHER

# Assessment checklist

Use during the session. One sheet covers up to eight students; copy as needed.

| Student | Tests fairly | Explains rigidity | Applies findings |
|---------|--------------|-------------------|------------------|
|         |              |                   |                  |
|         |              |                   |                  |
|         |              |                   |                  |
|         |              |                   |                  |
|         |              |                   |                  |
|         |              |                   |                  |
|         |              |                   |                  |
|         |              |                   |                  |

Suggested codes: W = working towards · E = expected · G = greater depth

ABOUT THIS ACTIVITY

Strong Shapes Lab is a sample activity from the EduTrend Contents G4C Building and Construction Games programme (middle school, level: intermediate). Every activity in the programme follows the same format: a practical challenge, a clear session plan, facilitator notes and ready-to-print worksheets, so that teachers, club leaders and parents can run it without extra preparation.

Full 15-, 20- and 32-week programmes are available from EduStore at [edutrend.org](https://edutrend.org).

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