Important Dates

Deadline for applications for the Calgary Youth Science Fair

January 30th, 2026

Glenmeadows Science Fair project due

March 13th, 2026

EGS Science Fair Showcase (Gr. 5/6)

March 16th, 2026

Learning Outcomes

- ❑ I will discuss technologies that provide scientists with evidence that cannot be directly observed by using the human senses.
- ❑ I will identify biases that could influence an investigation.
- ❑ I will plan and conduct a controlled experiment.
- ❑ I will identify the variables in a controlled experiment.
- ❑ I will apply the correct vocabulary for variables in scientific contexts.
- ❑ I will evaluate the effect of the manipulated variable on the responding variable in a controlled experiment.
- ❑ I will defend a conclusion regarding cause and effect based on evidence from a controlled experiment.
- ❑ I will discuss the use of diverse data representations in communicating evidence.
- ❑ I will compare the clarity and accuracy of evidence communicated through diverse data representations.
- ❑ Discuss potential impacts of evidence that is not communicated clearly and accurately.
- ❑ Examine the importance of scientific ethics in investigations.
- ❑ Demonstrate scientific ethics during investigations.

Jan 17, 2026

Topics and ideas I am interested in:

- Forces
  Investigating how roof design impacts a houses ability to withstand uplift force caused by strong winds.
- Computer science
  Developing code that converts English text into Braille and generates a 3D printable output.

Questions about these topics:

- Forces

1. To what extent can different roof shapes minimize the damage caused by strong winds?
2. What types of internal forces act on roof during strong winds?
3. How does climate proofing houses help reduce damage during strong winds?
4. How does the angle of a roof change how much wind force it can resist?
5. Wind resistance force types?

- Computer science

1. To what extent is lack of accesibility a problem for blind individuals?
2. Can 3D printers make smooth consistent shapes?
3. How can technology improve quality of life of people with vision loss?
4. What is the optimal height, size and spacing to improve readability?

Topic: Which roof shape pyramid hip or gable, is most effective at reducing wind uplift.

Science questions about the topic:

1. How does wind flow over a pyramid hip roof compare with a gable roof?
2. How does roof movement in cm compare across two different roof designs when exposed to wind?
3. How is the roof shape related to the amount of uplift force produced?
4. Which roof shape creates more pressure on corner vertices?
5. What is the function of a roof pitch in increasing wind resistence?
6. How do openings like attic ventilation affect the internal air pressure inside a house during strong winds?
7. How does the geometric shape of a roof ... such as ridge length, slope angle and length of hip line affect wind pressure on roof?

8. How does roof symmetry (same slopes vs. uneven slopes) influence wind forces?
9. Which parts of the roof corners, edges or ridge experience the most wind suction?
10. How does the angle of wind hitting the roof change suction and pressure?
11. Does having overhang affect roof uplift?

Hypothesis: If a roof has a pyramid hip shape then it will move less and will withstand wind for a longer period of time than a gable roof because wind flows smoothly around its sloped triangular sides causing less uplift, while the flat face of a gable roof forces wind to split and speed up along the sides of the roof, causing the roof to be impacted more by wind uplift.

Independent variable:
- Shape of the roof - pyramid hip vs. gable

Dependent variables:
- How much the roof moves when exposed to wind
- How long it takes for a roof to start moving when wind is applied

Controlled variables:
- Wind speed
- Wind direction

- Materials roofs are made of
- Distance from fan
- Roof
- Weight used to hold roofs
- Size of house roofs are put on

Materials:

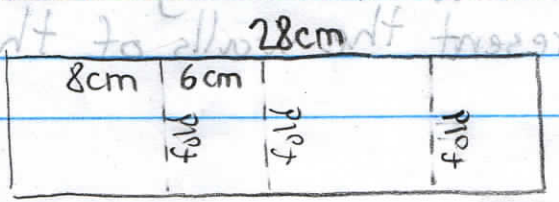
- Cardboard - 5 sheets each 25cm x 30cm
- Shoebox lid
- Ruler
- Pencil
- Glue or scotch tape
- Utility knife or scissors
- Hair dryer
- Stopwatch
- Measuring tape
- Scale
- 8cm long yarn
- 11 g of plasticine
- 15 marbles
- 1 sheet of tissue paper

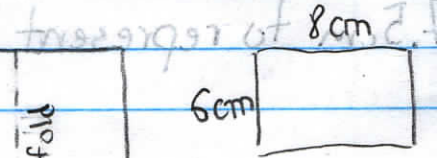
Procedure:

House structure

1. Before you start make sure you have all the materials and flat working surface.
2. Using pencil and ruler draw a rectangle measuring 28cm by 7.5cm to represent the walls of the house.

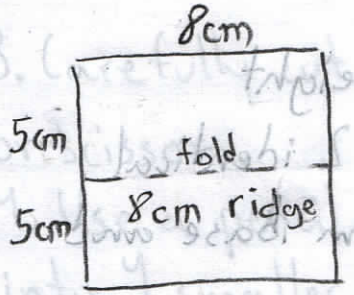
3. Carefully cut rectangle with a utility knife or scissors.
4. Use a pencil and ruler to divide the rectangle into 4 smaller rectangles with widths of 8cm, 6cm, 8cm, 6cm.
5. Fold the rectangle along each dividing line mark to form the 4 walls
6. Press firmly along each dividing line so the folds create a clear, distinct crease.
7. Bring 2 edges measuring 7.5cm together to form a box shape.
8. Tape or glue the edges to create the house structure.
9. Using pencil and ruler draw two rectangles 6cm x 8cm for house base.
10. Cut rectangles.
11. Glue rectangles on the top and bottom of the house.
12. Glue the house to the shoebox lid.
13. Put 15 marbles in shoebox lid.

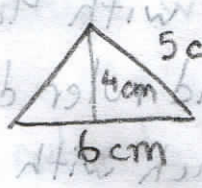




Gable roof structure with 4cm height

1. Using a pencil and ruler draw 2 identical isosceles triangles each with a 6cm base and a 4cm height.
2. Carefully cut triangles with utility knife or scissors.
3. Measure the length of the equal sides of one triangle carefully using a ruler. (5cm)
4. Draw a rectangle that is 8cm long and twice the length of the triangles side. (the measurement you just took)
5. Carefully cut rectangle with utility knife or scissors.
6. Using pencil and ruler draw a line down the center of the rectangle to divide it into 2 equal halves.
7. Fold the rectangle along the center line to form the 2 sloping sides of the gable roof.
8. Press firmly along each dividing line so the folds create a clear distinct crease.
9. Attach the 2 triangles to the folded rectangle using tape or glue to complete the gable roof.





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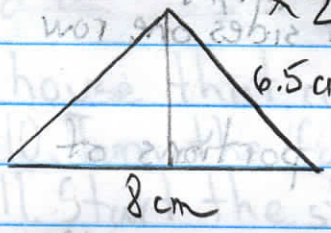
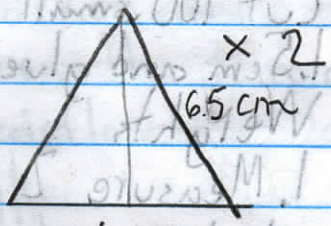
Gable roof structure with 6cm height

1. Using pencil and ruler draw 2 identical isosceles triangles each with a 6cm base and a 6cm height.
2. Carefully cut triangles with utility knife or scissors.
3. Measure the length of the equal sides of one triangle carefully using a ruler. (7cm)
4. Draw a rectangle that is 8cm long and twice the length of the triangles side. (the measurement you just took)
5. Repeat steps 5-8 from the gable roof structure with 4cm height.

Pyramid hip roof structure with 4cm height

1. Using pencil and ruler draw 2 identical isosceles triangles each with a 6cm base and 6.5cm sides.
2. Using pencil and ruler draw 2 identical isosceles triangles each with a 8cm base and 6.5cm sides.
3. Carefully cut all triangles with utility knife or scissors.
4. Place pairs of identical triangles across from each other.
5. Connect all sides of triangles using glue or tape to create pyramid shape.





Pyramid hip roof structure with 6cm height

1. Using pencil and ruler draw 2 identical isosceles triangles each with a 6cm base and 8cm sides.
2. Using pencil and ruler draw 2 identical isosceles triangles each with a 8cm base and 8cm sides.
3. Carefully cut all triangles with utility knife or scissors.
4. Place pairs of identical triangles across from each other.
5. Connect all sides of triangles using glue or tape to form a pyramid.

Tissue paper

Cut 100 small pieces of tissue paper each 0.5cm x 1.5cm and glue them on all roofs.

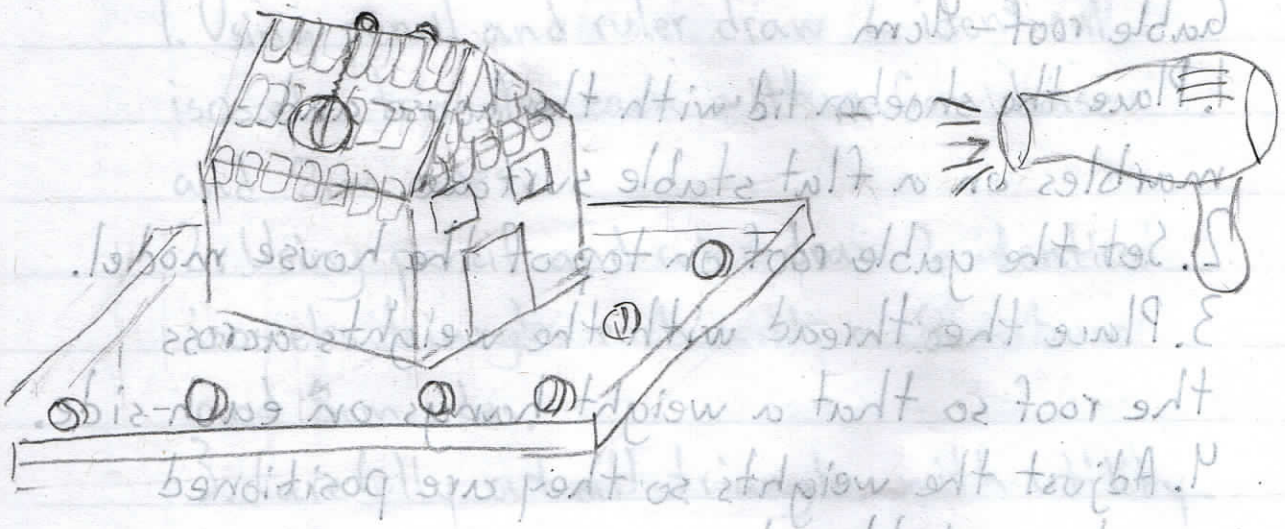
Weights

1. Measure 2 seperate 5g portions of plasticine on scale.
2. Stick each pile of plasticine on the end of the string.
3. Roll each plasticine piece into a smooth ball.

Experiment:

Gable roof - 4cm

1. Place the shoebox lid with the house and marbles on a flat stable surface.
2. Set the gable roof on top of the house model.
3. Place the thread with the weights across the roof so that a weight hangs on each side.
4. Adjust the weights so they are positioned evenly on both sides.
5. Stick plasticine onto the roof edges.
6. Secure the thread to the roof ridge using 1g of plasticine.
7. Use measuring tape to mark 65cm away from the front of the house.
8. Place the fan on the marked line.
9. Ensure nothing is between the fan and the house that could block airflow.
10. Turn the fan on to high.
11. Start the stopwatch at the same moment you turn on the fan.
12. Record the time when the roof first begins to move.



13. Record the time when the roof fully detaches.
14. Turn off fan.
15. Measure the distance the roof travelled using a measuring tape.

Pyramid hip roof - 4cm

1. Place pyramid hip roof on top of the house model
2. Repeat steps 2-12.

Gable roof - 6cm

1. Place the gable roof with higher pitch (steeper slopes) on top of the house model.
2. Repeat steps 2-12.

Pyramid hip roof - 6cm

1. Place the pyramid hip roof with higher pitch (steeper slopes) on top of the house model.
2. Repeat steps 2-12.

Feb 14, 2026

Observations:

Gable roof observations

- The wind pushes hard against the flat front wall and presses paper against the wall.
- Paper pieces nearest to the corners, edges and ridge lift the most.
- Paper at the back lifted more than those at the front or middle.
- Higher pitch gable roof shakes more and detaches faster than lower pitch gable roof.
- Paper pieces behave similarly for both slopes, those placed along sides, corners and ridge lift more.
- Paper along the ridge of steeper roof lifts more.

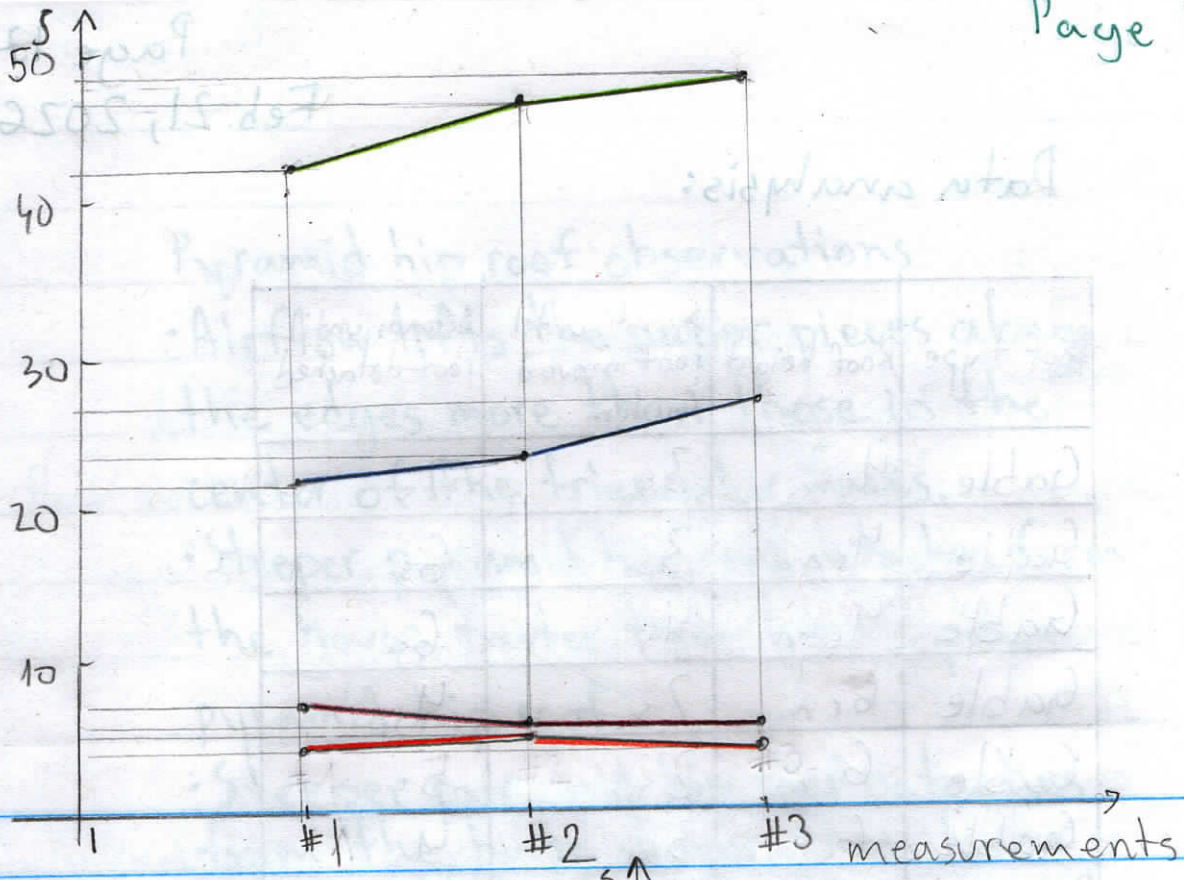
Pyramid hip roof observations

- Airflow lifts the paper pieces along the edges more than those in the center of the triangular faces.
- Steeper pyramid hip roof detaches from the house faster than lower pitch pyramid hip roof.
- Steeper pyramid hip roof detaches from the house slower than lower pitch gable roof.
- Both pyramid hip roofs shake less than gable roofs.

Feb. 21, 2026

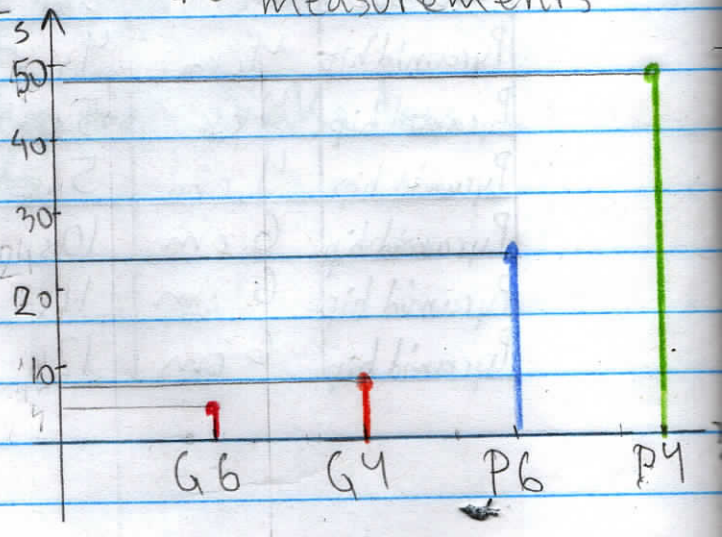
Data analysis:

Roof type	Roof height	seconds until roof moved for 1cm	seconds until roof detached
Gable	4cm	3s	7s
Gable	4cm	3s	6s
Gable	4cm	4s	6s
Gable	6cm	2s	4s
Gable	6cm	2s	5s
Gable	6cm	3s	4s
Pyramid hip	4cm	4s	22s
Pyramid hip	4 cm	5s	23s
Pyramid hip	4 cm	5s	27s
Pyramid hip	6 cm	10s	43s
Pyramid hip	6 cm	11s	47s
Pyramid hip	6 cm	12s	48s



Average time until roof detaches

	Roof type	Avg. S
G4	Gable 4cm	6.33
G6	Gable 6cm	4.33
P4	Pyramid hip 4cm	46
P6	Pyramid hip 6cm	24



Conclusion:

The results of this investigation show that the pyramid hip roof moves less and stays in place longer than the gable roof when exposed to wind from the front. There is a substancial difference between the two roof types due to their shapes. The flat vertical face of a gable roof redirects wind towards the sides, increasing wind speed and decreasing air pressure over the roof surface. This creates uplift demonstrated by the tissue paper flying up, against gravity, making the roof more likely to seperate from the house. In contrast, the pyramid hip roof has four sloping triangular sides that push the wind upward and around the structure. This causes the wind force to be distributed more evenly across the entire roof, and causes a smaller area to be affected by uplift compared to gable supporting my hypothesis.

The roof pitch also played a major role in wind resistance. Lower pitched roofs performed better than higher pitched ones because steeper sides create a larger surface area exposed to wind. A larger area results in greater uplift force, increasing the likehood of roof movement or failure. Overall, the pyramid hip roof design proved to be more stable and more wind resistant than the gable roof under the same testing conditions.