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A TOWN THAT BORROWS THE SUN

A TOWN IN SHADOW

For half the year, the sun never climbs over the RIDGE above Rjukan. The town sits in a narrow valley in NORWAY. From late September to mid-March, the valley FLOOR stays in shadow while the mountaintops above it glow. A worker in the town first suggested mirrors a hundred years ago. Nobody managed it until 2013, when three mirrors were raised on the mountainside. On the day they were switched on, people crowded into the town square to stand in winter daylight.

SPELL Spell: RIDGE

RIDGE

SPELL Spell: FLOOR

FLOOR

KNOWN What is the name of the country where Rjukan sits in its narrow valley?

NORWAY

OPEN What would you want to do first if sunlight finally reached the town square?

Open response - use practitioner judgment

MATH The valley floor sits in shadow for about 6 months each year. How many months of the year does sunlight reach it?

6

MIRRORS THAT FOLLOW THE SUN

Each mirror is a heliostat. It is a flat mirror that turns slowly to follow the sun, so the light it bounces always lands on the same spot. Motors tilt the GLASS a little at a time. A computer keeps TRACK of where the sun sits in the sky. Light bounces off smooth glass at a matching angle, and that bouncing is REFLECTION. The mirrors sit high on the mountainside and throw a wide beam of sunlight down onto the square far below.

SPELL Spell: GLASS

GLASS

SPELL Spell: TRACK

TRACK

KNOWN Light bounces off smooth glass at a matching angle. What is that bouncing called?

REFLECTION

OPEN The mirrors turn a little at a time all day to follow the sun. What else would you point at the sun if you could?

Open response - use practitioner judgment

MATH The mirror array on the mountainside uses 3 heliostats, and each one covers 17 square meters. How many square meters of mirror is that in all?

51

THE LIGHT'S LIMITS

The borrowed light is thinner than it sounds. The beam covers the square and little else, so the STREETS and houses nearby stay in shadow. Clouds cancel the show, and the reflected light warms almost nothing. It is bright, not hot. Rjukan already had an older answer too: a CABLE car, opened in 1928, that hauled people up the steep valley WALL to reach the sun. A village called Viganella, in Italy, hung its own mirror above its square years before Rjukan did.

SPELL Spell: STREETS

STREETS

SPELL Spell: WALL

WALL

KNOWN What kind of car hauled people up the steep valley wall to reach the sun starting in 1928?

CABLE

OPEN Before the mirrors, people rode a cable car up the valley wall just to stand in sunlight. How far would you go for an hour of sun in winter?

Open response - use practitioner judgment

MATH Rjukan's mirrors cover 51 square meters in all. Viganella's mirror covers 40 square meters. How many more square meters of mirror does Rjukan have?

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YOUR OWN WINTER

A hand mirror can throw a spot of light onto a wall. That is a smaller version of what Rjukan does with its mirrors on the mountain. Your own winter works the same way. Near the SOLSTICE, the shortest day of the year, the sun stays low and skims the HORIZON, the line where the land meets the sky. A HILL, a tall building, or a row of TREES is enough to keep a whole street dark until spring.

SPELL Spell: TREES

TREES

SPELL Spell: HILL

HILL

KNOWN What is the name for the shortest day of the year, when the sun stays lowest in the sky?

SOLSTICE

KNOWN What is the line called where the land meets the sky?

HORIZON

OPEN If a spot of mirror light could land anywhere in your home, where would you want it to land?

Open response - use practitioner judgment

MATH Near the solstice in Rjukan, the sun is above the horizon for about 6 hours. A full day is 24 hours. How many hours is the sun down?

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