



Game Overview

- Heat Quest is a comprehensive assessment board game developed to reinforce students' understanding of heat, temperature, and heat transfer through engaging and structured gameplay. It integrates question cards, picture-based prompts, and real-life scenarios to enable students to apply scientific knowledge in both conceptual and practical contexts.
- The game is designed around three tiers of increasing difficulty:
 - Bronze Level Basic knowledge (e.g., temperature, heat sources, thermal expansion)
 - Silver Level Intermediate understanding (e.g., conduction, convection, radiation, particle behaviour)
 - Gold Level Advanced concepts (e.g., unit conversions, formulas, real-world thermal insulation)
- By the end of the game, students will be able to identify sources of heat, explain how heat is transferred, and demonstrate understanding of temperature measurement and conversion.
- A complete game set, for one group, includes the following materials:
 - 1 game board
 - 1 dice and 4–5 coloured counters
 - Cards
 - 16 Bronze Level cards (Level 1)
 - 16 Silver Level cards (Level 2)
 - 17 Gold Level cards (Level 3)
 - Answer sheets
 - Reward points (bronze, silver, gold used for level progression)

Gameplay Instructions

- Divide students into groups of 4–5. Provide each group with a game board, dice, counters, and full sets of cards.
- Place the Bronze, Silver, and Gold cards in three separate piles, sorted by type.
- Assign one student per group as the scorekeeper. The teacher will monitor play and support groups as needed.
- Each player begins at the START and rolls the dice to move forward.
- Players land on spaces directing them to draw one of the following:
 - Question Card (1 to 3 points, based on level)
 - Picture Card (visual question with interpretive task)
 - Scenario Card (applied real-world question)
 - Special tiles: "Skip turn", "Move forward", "Move back" for added engagement
- The player answers the prompt aloud or writes in their notebook (as directed).
- The group or teacher uses the answer key to confirm correctness.
- Players earn points for correct responses and continue advancing.
- The first player to reach the FINISH wins. Alternatively, the player with the highest point total at the end can be declared the winner in timed play.

Debriefing and Reflection

Conclude the game with a whole-class reflection to reinforce learning. Suggested discussion prompts:

- Ask students to summarise the do's and don'ts related to heat safety, heat transfer, and temperature measurement discussed during the game.
- Reflect on the questions, pictures, or scenarios that were most difficult. Ask students to share what challenged them and revisit any misunderstood concepts.
- Encourage students to explain the difference between conduction, convection, and radiation using examples from daily life.
- Invite students to describe one new insight they gained during the game that they had not known before.

Adaptations for Gamplay

- For Lower Grades: Simplify the cards to focus on basic heatrelated concepts such as identifying heat sources and simple visuals. Limit gameplay to Level 1 or 2, depending on gradelevel expectations.
- For Higher Grades: Include cards with advanced applications such as temperature conversions (Celsius to Fahrenheit), reallife examples of conduction/radiation, or scenarios requiring justification. Extend Level 3 to include complex problemsolving tasks.





































ANSWER KEYS (BRONZE LEVEL)

QUESTION CARD

Bronze 1- Temperature Bronze 2- Energy Bronze 3- True Bronze 4- Chocolate melts Bronze 5- All of these Bronze 6- A thermometer Bronze 7- Electrical energy Bronze 8- Friction Bronze 9- Increase significantly. Bronze 10- False

PICTURE CARD

Bronze 11- Fire Bronze 12- It is a thermometer that tells us the temperature, whether it is hot or cold. Bronze 13- The snowman will melt. Bronze 14- It keeps drinks hot or cold by using a vacuum insulation layer to prevent heat transfer.

SCENERIO CARD



- **Bronze 15- A temperature above the** normal range (37°C) may indicate a fever, suggesting that your body is fighting off an infection or illness.
- Bronze 16- Ice cream contains water, which melts when exposed to temperatures above its freezing point

ANSWER KEYS (SILVER LEVEL)

QUESTION CARD

- Silver 1- Material expand on heating and contract on cooling
- Silver 2- It expands
- Silver 3- They move faster and spread farther apart.
- Silver 4- Expansion of molecules
- Silver 5- Decrease in inter-particle distances
- Silver 6- A material that lets heat pass through it easily
- Silver 7- Steel
- Silver 8- Convection
- Silver 9- Conduction
- Silver 10- Radiation

PICTURE CARD

Silver 11- Radiation Silver 12- Convection Silver 13- Conduction Silver 14- Conduction



SCENERIO CARD

- Silver 15- Heat is transferred from the hot tea to the metal spoon through conduction. The particles in the metal gain kinetic energy from the hot tea, causing them to vibrate and transfer heat to your hand when you touch the spoon.
- Silver 16- Heat transfers from the stove to the pot primarily through conduction, and then from the pot to the soup through convection

ANSWER KEYS (GOLD LEVEL)

QUESTION CARD

Gold 1- Kelvin **Gold 2-** Temperature in kelvin = temperature in °C + 273 Gold 3- $^{\circ}F = 9/5$ ($^{\circ}C+32$) Gold 4- °C = 5/9 (°F-32) Gold 5- 0°C Gold 6- 32°F Gold 7- 273 K Gold 8- 0°C Gold 9- 100°C Gold 10- 32°F Gold 11- Styrofoam Gold 12- To decrease heat transfer

PICTURE CARD SCENERIO CARD Gold 13 Celsius Gold 16- Insulation works by reducing scale heat transfer between the interior and exterior of a Bulb Capillary building. Stem Mercury Gold 14- Thermal insulation Gold 17- Metal expands when heated **Gold 15-** Thermal expansion because the increase in increased length.



temperature causes the atoms in the material to vibrate more vigorously, leading to an increase in their average spacing. This expansion is why the bridge creaks as its components adjust to the