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Physics Grade 10 — Chapter 1

Heat Capacity and Modes of Heat Transfer

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Independent practice MCQs from the supplied Class 10 Physics DeepSeek notes PDF. Total: 50 questions.

A. Important / Main Topics

1. Specific heat capacity is defined as the amount of heat required to raise the temperature of:

(A) 1 kg of a substance by 1 K
(B) 1 g of a substance by 1 °C
(C) Any mass of a substance by 1 K
(D) 1 kg of a substance by 100 K

Correct Answer: A

Explanation: Specific heat capacity is the heat needed per kilogram per kelvin rise in temperature.

2. The SI unit of specific heat capacity is:

(A) J K□¹
(B) J kg□¹ K□¹
(C) J kg□¹
(D) J kg K□¹

Correct Answer: B

Explanation: From , the unit is joule per kilogram per kelvin.

3. Which substance in Table 10.1 has the highest specific heat capacity?

(A) Copper
(B) Aluminium
(C) Water
(D) Iron

Correct Answer: C

Explanation: Water has a specific heat of 4190 J kg□¹ K□¹, the highest among the listed substances.

4. Thermal conduction is the transfer of heat due to:

(A) Bulk movement of fluid
(B) Electromagnetic waves
(C) Change of state
(D) Collisions of atoms and motion of free electrons

Correct Answer: D

Explanation: Thermal conduction is the transfer of heat due to Collisions of atoms and motion of free electrons.

5. The method of heat transfer that requires no material medium is:

(A) Radiation
(B) Conduction
(C) Convection c = Q/(mΔT)
(D) Insulation

Correct Answer: A

Explanation: Radiation transfers heat via electromagnetic waves and can travel through a vacuum.

6. Which colour surface is the best absorber of radiation?

(A) White
(B) Black
(C) Shiny silver
(D) Light grey

Correct Answer: B

Explanation: According to Table 10.2, black surfaces are the best absorbers (and emitters) of radiation.

7. The process by which heat is trapped near Earth's surface by greenhouse gases is called:

(A) Global warming
(B) Thermal equilibrium
(C) Greenhouse effect
(D) Radiation

Correct Answer: C

Explanation: The greenhouse effect is the trapping of heat by greenhouse gases in the atmosphere.

8. The temperature of the Earth's core is about:

(A) 1000 °C
(B) 4000 °C
(C) 10,000 °C
(D) 6000 °C

Correct Answer: D

Explanation: The textbook states the core temperature is about 6000 °C.

9. The layer of the Earth between the core and the crust is the:

(A) Mantle
(B) Lithosphere
(C) Asthenosphere
(D) Crust

Correct Answer: A

Explanation: The layer of the Earth between the core and the crust is the Mantle.

10. Sea breeze blows from:

(A) Land to sea during the day
(B) Sea to land during the day
(C) Land to sea during the night
(D) Sea to land during the night

Correct Answer: B

Explanation: During the day, hot air rises over land and cool air from the sea moves in — a sea breeze.

11. Which of the following is a unit of specific heat capacity?

(A) J kg °C□¹
(B) J□¹ kg□¹ °C□¹
(C) J kg□¹ °C□¹
(D) J kg□¹ °C

Correct Answer: C

Explanation: The unit is joule per kilogram per degree Celsius (equivalent to J kg□¹ K□¹).

12. Thermal equilibrium is reached when:

(A) Emission stops completely
(B) Absorption stops completely
(C) Temperature becomes zero
(D) Absorption rate equals emission rate

Correct Answer: D

Explanation: At thermal equilibrium, an object absorbs and radiates heat at equal rates, so its temperature stays constant.

13. The main cause of global warming is:

(A) Increased concentration of greenhouse gases due to human activities
(B) Decreased greenhouse gases
(C) The ozone hole
(D) Natural climate cycles only

Correct Answer: A

Explanation: The main cause of global warming is Increased concentration of greenhouse gases due to human activities.

14. Convection occurs in:

(A) Solids only
(B) Liquids and gases
(C) Solids and liquids
(D) All states of matter

Correct Answer: B

Explanation: Convection occurs in Liquids and gases.

15. The handle of a cooking pan is made of plastic because plastic is:

(A) A good conductor of heat
(B) A good absorber of radiation
(C) A poor conductor of heat
(D) A good reflector

Correct Answer: C

Explanation: Plastic is an insulator, so heat does not easily pass through to the handle.

16. If the same amount of heat is supplied to equal masses of water and copper, the temperature of copper rises more because copper has:

(A) Higher specific heat
(B) Higher density
(C) Higher thermal conductivity
(D) Lower specific heat

Correct Answer: D

Explanation: Lower specific heat means a smaller amount of heat causes a larger temperature rise.

17. Water is used as a coolant in car radiators mainly because:

(A) It has a high specific heat
(B) It is cheap
(C) It has a low specific heat
(D) It is a good conductor of electricity

Correct Answer: A

Explanation: Water's high specific heat allows it to absorb a large amount of heat with a small rise in temperature.

18. In the method of mixtures, the heat lost by the hot solid is equal to:

(A) Heat gained by the calorimeter only
(B) Heat gained by the water and the calorimeter
(C) Heat gained by the water only
(D) Heat gained by the surroundings

Correct Answer: B

Explanation: In the method of mixtures, the heat lost by the hot solid is equal to Heat gained by the water and the calorimeter.

19. In the electrical heating method, the heat energy supplied by the heater is given by:

(A) V/I
(B) VI/t
(C) VIt
(D) It/V

Correct Answer: C

Explanation: In the electrical heating method, the heat energy supplied by the heater is given by VIt.

20. Why is the calorimeter insulated in the method of mixtures?

(A) To increase heat absorption

(B) To increase temperature
(C) To reduce mass
(D) To prevent heat loss to the surroundings

Correct Answer: D

Explanation: Insulation minimizes heat exchange with the surroundings, ensuring heat lost equals heat gained.

21. During conduction, the particles of the medium:

(A) Remain in their mean positions and vibrate
(B) Move from hot end to cold end
(C) Move from cold end to hot end
(D) Disappear

Correct Answer: A

Explanation: In solids, particles vibrate about their mean positions; they do not travel with the heat.

22. In the conduction experiment with wax and drawing pins, the pin that drops first indicates:

(A) The worst conductor
(B) The best conductor
(C) The highest specific heat
(D) The lowest melting point

Correct Answer: B

Explanation: The pin drops when the wax melts, which happens fastest for the best conductor.

23. During convection, warm fluid: V It

(A) Sinks because it is denser
(B) Remains stationary
(C) Rises because it is less dense
(D) Moves sideways

Correct Answer: C

Explanation: Heating causes fluid to expand, decreasing its density, so it rises.

24. The upward movement of deep seawater is called:

(A) Downwelling
(B) Conduction
(C) Radiation
(D) Upwelling

Correct Answer: D

Explanation: Upwelling is the rising of deep, cold, nutrient-rich water to the surface.

25. Which of the following is NOT caused by convection?

(A) Heat transfer through a metal rod
(B) Sea breeze
(C) Land breeze
(D) Ocean currents

Correct Answer: A

Explanation: Heat transfer through a metal rod is conduction, not convection.

B. Less Important / Secondary Topics

26. In the potassium permanganate experiment, the purple colour rises because:

(A) The heated water at the bottom becomes less dense and rises
(B) It is lighter than water
(C) The crystals dissolve and float
(D) Conduction carries the colour upward

Correct Answer: A

Explanation: In the potassium permanganate experiment, the purple colour rises because The heated water at the bottom becomes less dense and rises.

27. Hurricanes are powered by:

(A) Conduction of heat through the ocean floor
(B) Latent heat released during condensation
(C) Radiation from the Sun
(D) Conduction through the atmosphere

Correct Answer: B

Explanation: Condensation releases latent heat, which warms the atmosphere and drives the hurricane's convection cycle.

28. Birds like eagles ride on:

(A) Ocean currents
(B) Land breezes
(C) Thermals (rising columns of warm air)
(D) Conduction currents

Correct Answer: C

Explanation: Thermals are rising columns of warm air that birds use to gain altitude without flapping.

29. Which of the following is true about a good absorber?

(A) It is a good reflector
(B) It is a poor emitter
(C) It does not emit radiation
(D) It is a good emitter

Correct Answer: D

Explanation: A good absorber is also a good emitter.

30. The best reflector of radiation is:

(A) Shiny silver surface
(B) Black surface
(C) Dull dark surface
(D) White surface

Correct Answer: A

Explanation: The best reflector of radiation is Shiny silver surface.

31. The rate of radiation emitted by an object is directly proportional to:

(A) Its mass
(B) Its temperature
(C) Its volume
(D) Its density

Correct Answer: B

Explanation: The rate of radiation emitted by an object is directly proportional to Its temperature.

32. In a thermos flask, the vacuum between the double walls prevents:

(A) Radiation only
(B) Convection and radiation
(C) Conduction and convection
(D) Conduction and radiation

Correct Answer: C

Explanation: In a thermos flask, the vacuum between the double walls prevents Conduction and convection.

33. The inner walls of a thermos flask are silvered to prevent heat loss by:

(A) Conduction
(B) Convection
(C) Evaporation

(D) Radiation

Correct Answer: D

Explanation: The inner walls of a thermos flask are silvered to prevent heat loss by Radiation.

34. The freezer compartment of a refrigerator is placed at the top because:

(A) Both B and C
(B) It is easier to access
(C) Cold air sinks, cooling the lower compartments
(D) Warm air rises to the freezer

Correct Answer: A

Explanation: Cold air from the freezer sinks to cool lower compartments, and warm air from the bottom rises to be cooled.

35. Deforestation contributes to global warming because:

(A) It increases CO□ absorption
(B) It reduces CO□ absorption, increasing atmospheric CO□
(C) It has no effect on climate
(D) It cools the Earth

Correct Answer: B

Explanation: Deforestation contributes to global warming because It reduces CO□ absorption, increasing atmospheric CO□.

36. A 150 g piece of an unknown solid cylinder is heated to 100 °C and then placed into a calorimeter containing 200 g of water at 25 °C. The calorimeter has a mass of 50 g and a specific heat capacity of 0.9 J/g°C. The final temperature of the system is 30 °C. Calculate the specific heat capacity of the solid.

(A) 0.84 J/g°C
(B) 0.21 J/g°C
(C) 0.42 J/g°C
(D) 0.63 J/g°C

Correct Answer: C

Explanation: "0.42 J/g°C" is correct: it matches the idea asked in the question ("A 150 g piece of an unknown solid cylinder is heated to 100 °C and then placed into a calorimeter containing 200 g of water at 25 °C. The calorimeter has a mass of 50 g and a specific heat capacity of 0.9 J/g°C. The final temperature of the system is 30 °C. Calculate the specific heat capacity of the solid"), while the other choices do not.

37. A 2 kg block of copper is heated from 25 °C to 75 °C. Calculate the heat energy absorbed. (Specific heat of copper = 387 J kg□¹ °C□¹)

(A) 19.35 kJ
(B) 77.4 kJ
(C) 3.87 kJ
(D) 38.7 kJ

Correct Answer: D

Explanation: "38.7 kJ" is correct: it matches the idea asked in the question ("A 2 kg block of copper is heated from 25 °C to 75 °C. Calculate the heat energy absorbed. (Specific heat of copper = 387 J kg□¹ °C□¹)"), while the other choices do not.

38. An old steel bridge has an original length of 1.5 km. The average daily temperature change is 15 °C. Steel has a coefficient of linear expansion of . How much will the bridge length change?

(A) 0.27 m
(B) 0.54 m
(C) 0.135 m
(D) 0.81 m

Correct Answer: A

Explanation: 0.27 m — this correctly answers the question.

39. A ship sends a sound wave in the Pacific Ocean and it takes 14.7 s to return. Find the depth of the Pacific Ocean. (Speed of sound in water = 1500 m/s)

(A) 22,050 m
(B) 11,025 m
(C) 5,512.5 m
(D) 1,500 m

Correct Answer: B

Explanation: "11,025 m" is correct: it matches the idea asked in the question ("A ship sends a sound wave in the Pacific Ocean and it takes 14.7 s to return. Find the depth of the Pacific Ocean. (Speed of sound in water = 1500 m/s)"), while the other choices do not.

40. A boy hears thunder 3.0 s after seeing lightning. How far away is the lightning? (Speed of sound = 343 m/s)

(A) 2.058 km
(B) 0.514 km
(C) 1.029 km
(D) 3.430 km

Correct Answer: C

Explanation: "1.029 km" is correct: it matches the idea asked in the question ("A boy hears thunder 3.0 s after seeing lightning. How far away is the lightning? (Speed of sound = 343 m/s)"), while the other choices do not.

41. Which statement best explains why the Earth experiences more heat from the Sun than the Moon, despite being almost the same distance away? Q = mcΔT = (2)(387)(50) = 38,700 12 × 10 K −6 −1 ΔL = αL ΔT = 0 (12 × 10)(1500)(15) = −6 0.27 d = (v × t)/2 = (1500 × 14.7)/2 = 11,025 d = v × t = 343 × 3.0 = 1029

(A) Earth is a better conductor than the Moon
(B) The Moon reflects most of the Sun's radiation
(C) The Moon traps heat effectively
(D) Earth has greenhouse gases

Correct Answer: D

Explanation: Earth's atmosphere contains greenhouse gases that trap heat, unlike the Moon which has no atmosphere.

42. If an object is absorbing more heat than it is radiating, its temperature will:

(A) Increase
(B) Decrease
(C) Remain constant
(D) Become zero

Correct Answer: A

Explanation: If an object is absorbing more heat than it is radiating, its temperature will Increase.

43. A good absorber is a good emitter, but a bad reflector. Which of the following best explains this?

(A) Absorbers and emitters are unrelated
(B) Good absorbers absorb radiation well and also emit well, but do not reflect well
(C) Good absorbers reflect well
(D) Absorbers do not emit radiation

Correct Answer: B

Explanation: The textbook states that a good absorber is a good emitter but a bad reflector.

44. Why does the freezer compartment in a refrigerator need to be at the top?

(A) To make it easier to reach
(B) To increase the freezer's volume
(C) To take advantage of convection: cold air from the freezer travels down and cools the bottom, while warm air from the bottom rises and gets cooled again
(D) To reduce electricity consumption

Correct Answer: C

Explanation: The freezer is placed at the top to take advantage of convection, as stated in the textbook.

45. Two identical cans are filled with hot water. One has a dull black surface; the other has a shiny silver surface. A heater is placed between them. After ten minutes:

(A) The water in the shiny silver can is hotter
(B) Both are at the same temperature
(C) The shiny silver can is cooler
(D) The water in the dull black can is hotter

Correct Answer: D

Explanation: The dull black surface is a good absorber, so it absorbs more radiation from the heater, making the water hotter.

46. A student observes that a metal spoon becomes hot when placed in boiling water. Which mode of heat transfer is primarily responsible?

(A) Conduction
(B) Convection
(C) Radiation
(D) Evaporation

Correct Answer: A

Explanation: Conduction — this correctly answers the question.

47. A hot cup of tea is placed on a table. Initially, it emits radiation faster than it absorbs. What happens to its temperature?

(A) It increases
(B) It decreases
(C) It remains constant
(D) It becomes zero

Correct Answer: B

Explanation: When emission exceeds absorption, the object loses net heat and its temperature drops until thermal equilibrium is reached.

48. Which of the following statements about the greenhouse effect is correct?

(A) It is entirely harmful
(B) It is the same as global warming
(C) It is a natural process necessary for life
(D) It is caused only by human activities

Correct Answer: C

Explanation: The greenhouse effect is natural and necessary; without it, Earth would be too cold for life.

49. Why does a thermos flask have silvered inner walls?

(A) To increase conduction
(B) To increase convection
(C) To increase heat loss by radiation
(D) To minimize heat loss by radiation

Correct Answer: D

Explanation: To minimize heat loss by radiation — this correctly answers the question.

50. What is the primary driving force behind the movement of tectonic plates?

(A) Mantle convection currents
(B) Gravitational pull of the Moon
(C) Solar radiation
(D) Magnetic field of the Earth

Correct Answer: A

Explanation: Tectonic plates move due to mantle convection currents, as stated in the textbook. Answer.