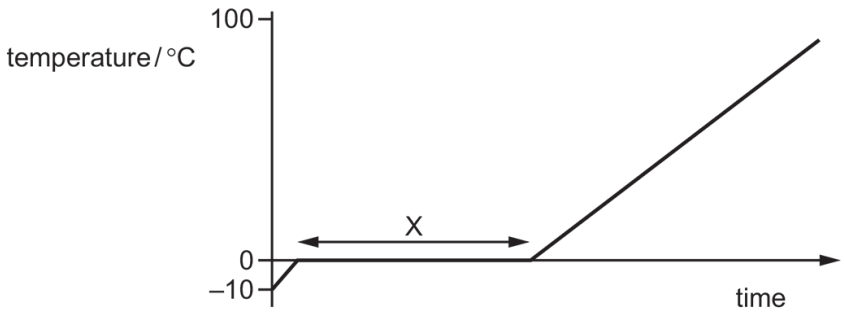
2.2 Thermal properties and temperature

01. 0625_m22_qp_22Q:17

Some ice is slowly heated and its temperature is measured. A graph is plotted of temperature against time.



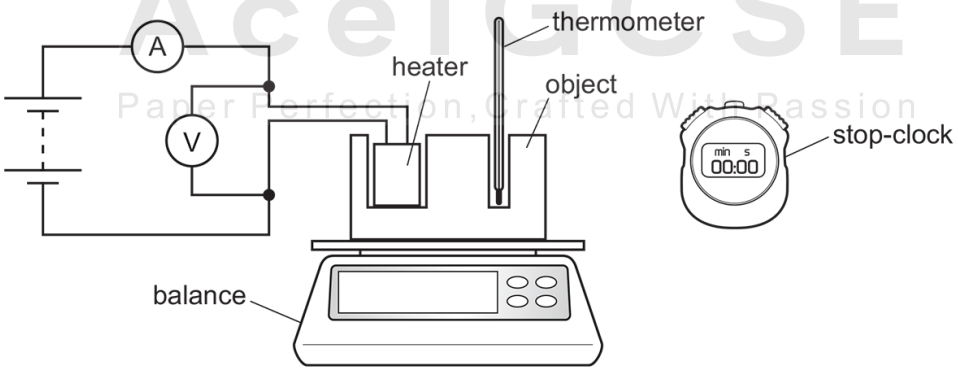
Which row describes what happens to the thermal energy and to the temperature in section X?

	thermal energy	temperature of ice
A	gained by ice	rises
B	gained by ice	stays the same
C	not gained by ice	rises
D	not gained by ice	stays the same

---

02. 0625_m22_qp_22 Q: 18

The diagram shows the apparatus needed for an experiment to determine the specific heat capacity of the material from which an object is made.



Which piece of apparatus could be omitted if the purpose of the experiment is to determine the thermal capacity of the object?

A ammeter

B balance

C stop-clock

D thermometer

---

03. 0625_m22_qp_22 Q: 19

Both boiling and evaporation involve a change of state from liquid to gas.

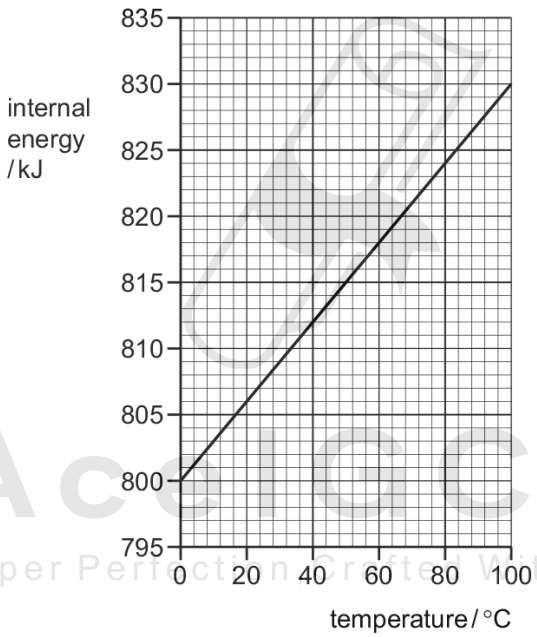
Which row gives the correct difference between boiling and evaporation?

	boiling	evaporation
A	no bubbles are formed	bubbles are formed
B	occurs at all temperatures	occurs at a definite temperature
C	occurs throughout the liquid	occurs at the surface only
D	the temperature falls	the temperature remains constant

---

04. 0625_m21_qp_22 Q: 16

The graph shows how the internal energy of 1.0 kg of a metal changes with temperature.



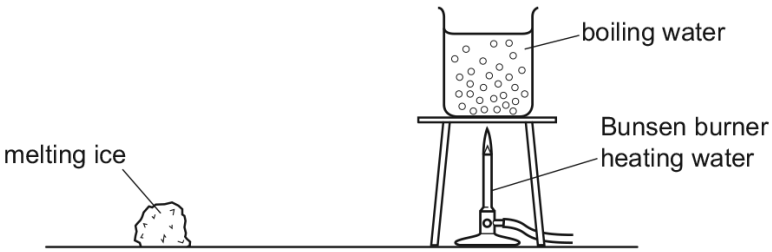
What is the increase in the internal energy of a block of the same metal of mass 0.25 kg when its temperature rises from 40 °C to 50 °C?

A 30 J **B** 300 J **C** 750 J **D** 1200 J

---

05. 0625_m21_qp_22 Q: 17

A piece of melting ice at 0 °C and a beaker of boiling water are both in a laboratory. The laboratory is at 20 °C.



What is happening to the temperature of the melting ice and what is happening to the temperature of the boiling water?

	temperature of melting ice	temperature of boiling water
A	constant	constant
B	constant	increasing
C	increasing	constant
D	increasing	increasing

06. 0625_s21_qp_21 Q: 16

Why are small gaps left between the metal rails of a railway track?

A to allow for expansion of the rails on a hot day

B to allow for contraction of the rails on a hot day

C to allow for expansion of the rails on a cold day

D to allow for contraction of the rails on a cold day

---

07. 0625_s21_qp_21 Q: 17

A block of metal absorbs 2000 J of thermal energy.

The temperature of the block rises from 10 °C to 20 °C.

The mass of the block is 2.0 kg.

What is the specific heat capacity of the metal?

A 50 J/(kg °C) **B** 100 J/(kg °C) **C** 200 J/(kg °C) **D** 400 J/(kg °C)

---

08. 0625_s21_qp_21 Q: 18

Which statement about boiling and evaporation is correct?

A Boiling requires a supply of thermal energy but evaporation does not.

B Evaporation takes place at the surface of a liquid but boiling takes place throughout the liquid.

C When water boils in a kettle, its temperature decreases.

D When water evaporates, its temperature increases.

---

09. 0625_s21_qp_22 Q: 16

A hole is drilled in a metal plate.

What happens to the length of the plate and to the diameter of the hole when the plate is cooled?

	length of plate	diameter of hole
A	decreases	decreases
B	decreases	increases
C	increases	decreases
D	increases	increases

---

10. 0625_s21_qp_22 Q: 17

Which statement describes a sensitive liquid-in-glass thermometer?

A a thermometer which can be used to measure very high and very low values of temperature

B a thermometer which gives the same increase in length of the liquid column for each degree of temperature rise

C a thermometer which is accurate because it has been calibrated

D a thermometer which gives a large increase in the length of the liquid column for each degree of temperature rise

---

11. 0625_s21_qp_22 Q: 18

A block of aluminium of mass 2.0 kg has an initial temperature of 20 °C. It absorbs 7300 J of thermal energy.

The specific heat capacity of aluminium is 913 J/(kg °C).

What is the final temperature of the aluminium block?

A 4.0 °C **B** 8.0 °C **C** 24 °C **D** 28 °C

---

12. 0625_s21_qp_23 Q: 16

The liquid level in a thermometer rises when the thermometer is placed in hot water.

What causes this?

A The liquid contracts.

B The liquid evaporates.

C The liquid expands.

D The liquid freezes.

---

13. 0625_s21_qp_23 Q: 17

A student calculates the energy needed to raise the temperature of an aluminium block from 50 °C to 60 °C.

He then does an experiment to measure the energy used to do this.

Which statement about the measured energy is correct?

A The measured energy will be greater than the calculated energy because some energy is transferred to the surroundings.

B The measured energy will be greater than the calculated energy because the block absorbs energy from the surroundings.

C The measured energy will be less than the calculated energy because the mass of the block decreases as it gets warmer.

D The measured energy will be less than the calculated energy because the thermal capacity of the block is low.

---

14. 0625_s21_qp_23 Q: 18

Which row correctly describes a liquid that is boiling?

	bubbles seen	where it takes place in the liquid
A	no	surface only
B	no	throughout liquid
C	yes	surface only
D	yes	throughout liquid

---

15. 0625_w21_qp_21 Q: 14

An aluminium block has a mass of 200 g.

The specific heat capacity of aluminium is 900 J/(kg °C).

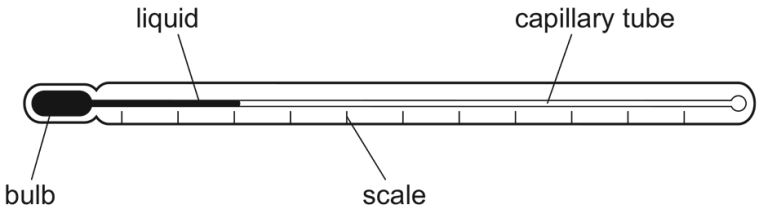
How much energy is needed to increase the temperature of the block from 20 °C to 110 °C?

A 2.0 J **B** 2000 J **C** 16 200 J **D** 16 200 000 J

---

16. 0625_w21_qp_21 Q: 15

The diagram shows a liquid-in-glass thermometer.



Which change to the design would result in a more sensitive thermometer?

A Increase the density of the liquid.

B Increase the diameter of the capillary tube.

C Increase the number of scale markings.

D Increase the volume of the bulb.

---

17. 0625_w21_qp_22 Q: 14

An aluminium block has a mass of 200 g.

The specific heat capacity of aluminium is 900 J/(kg °C).

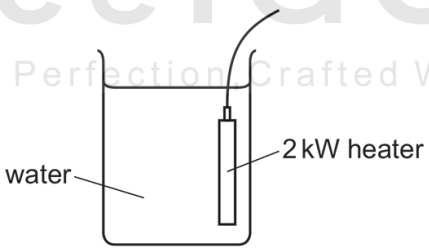
How much energy is needed to increase the temperature of the block from 20 °C to 110 °C?

A 2.0 J **B** 2000 J **C** 16 200 J **D** 16 200 000 J

---

18. 0625_w21_qp_22 Q: 15

The diagram shows the apparatus used to measure the specific latent heat of vaporisation of water.



After the water begins to boil, 110 g of water is converted to steam in 120 s.

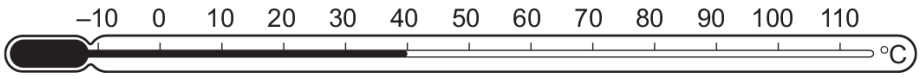
Using these results, what is the value of the specific latent heat of vaporisation of water?

A 1.8 J/kg **B** 1800 J/kg **C** 2200 J/kg **D** 2 200 000 J/kg

---

19. 0625_m20_qp_22 Q: 18

Which points are the fixed points of the liquid-in-glass thermometer shown?



A the beginning and end points of the column of liquid

B the points marked –10 °C and 110 °C

C the points marked 0 °C and 100 °C

D the top and bottom points of the thermometer bulb

20. 0625_m20_qp_22 Q: 19

The specific heat capacities of aluminium, iron, ethanol and water are given.

substance	specific heat capacity J / kg °C
aluminium	900
iron	450
ethanol	2400
water	4200

1 kg of each metal is put into 5 kg of each liquid.

The starting temperature of each metal is 60 °C. The starting temperature of each liquid is 10 °C.

Which example has the highest final temperature?

	metal	liquid
A	aluminium	ethanol
B	iron	ethanol
C	aluminium	water
D	iron	water

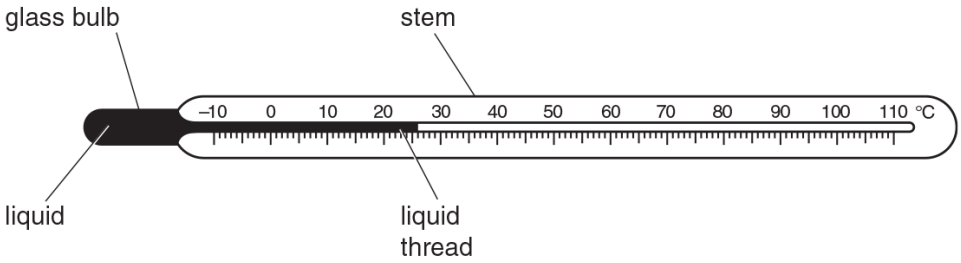
21. 0625_p20_qp_20 Q: 19

Which line in the table shows the relative expansion of the three states of matter from the most expansion to the least expansion?

	most expansion				least expansion
A	solids	>	liquids	>	gases
B	solids	>	gases	>	liquids
C	gases	>	liquids	>	solids
D	gases	>	solids	>	liquids

22. 0625_p20_qp_20 Q: 20

The diagram shows a liquid-in-glass thermometer.



Which two features both affect the sensitivity of the thermometer?

A mass of liquid and diameter of liquid thread

B mass of liquid and length of stem

C thickness of glass bulb and diameter of liquid thread

D thickness of glass bulb and length of stem

---

23. 0625_p20_qp_20 Q: 21

A student wishes to calculate the specific heat capacity of copper.

He has a block of copper and an electrical heater. He knows the power of the heater.

Which other apparatus does he need?

	balance	stop watch	thermometer
A	✓	✓	✓
B	✓	✓	×
C	✓	×	✓
D	×	✓	✓

key
✓ = needed
× = not needed

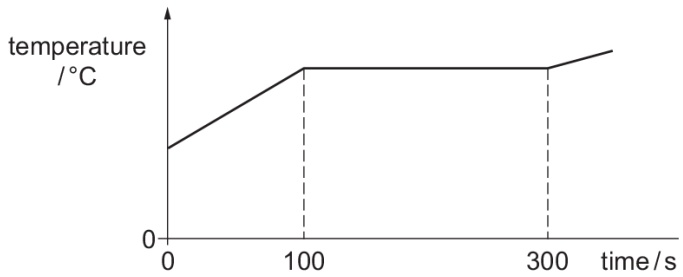
---

24. 0625_p20_qp_20 Q: 22

A mass of 0.20 kg of a substance is initially solid.

It is heated at a steady rate of 500 W.

The graph shows how the temperature of the substance changes with time.



What is the specific latent heat of fusion of the substance?

A 20 000 J / kg

B 30 000 J / kg

C 500 000 J / kg

D 750 000 J / kg

---

25. 0625_s20_qp_21 Q: 16

A solid is heated causing it to expand.

What effect does this have on its mass and on its density?

	mass	density
A	decreases	decreases
B	decreases	stays constant
C	stays constant	decreases
D	stays constant	stays constant

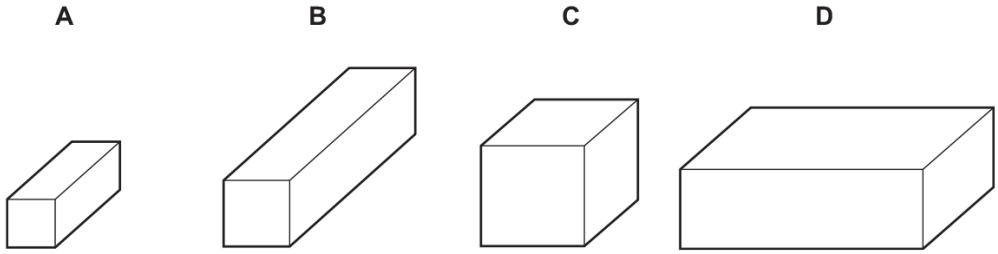
---

26. 0625_s20_qp_21 Q: 17

The diagrams show four blocks of steel. The blocks are all drawn to the same scale.

The same quantity of thermal energy is given to each block.

Which block shows the greatest rise in temperature?



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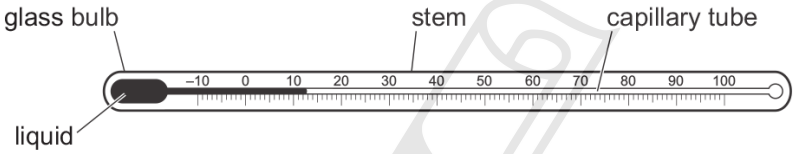
27. 0625_s20_qp_22 Q: 16

The diagram shows a liquid-in-glass thermometer.



The design of this thermometer includes the following features.

1 a liquid which expands linearly when it is heated

2 a glass bulb which has a thick glass wall

3 a capillary tube with a very small diameter

Which features increase the sensitivity of the thermometer?

A 1 only **B** 1 and 2 **C** 2 and 3 **D** 3 only

---

28. 0625_s20_qp_23 Q: 16

The diagram shows a liquid-in-glass thermometer.

Which row gives the correct labels for the thermometer?

	X	Y
A	water	narrow tube of uniform diameter
B	alcohol	narrow tube of uniform diameter
C	water	this end immersed in substance to be measured
D	alcohol	this end immersed in substance to be measured

---

29. 0625_w20_qp_21 Q: 16

When a bridge is built, a gap is left between each concrete slab.

Why are these gaps left?

A Concrete expands on warm days.

B Concrete contracts on warm days.

C The gaps expand on warm days.

D The gaps contract on cold days.

---

30. 0625_w20_qp_21 Q: 17

The specific heat capacity of solid P is greater than that of solid Q.

What does this statement mean?

A Less energy is needed to raise the temperature by 1 °C of unit mass of solid P than unit mass of solid Q.

B Less energy is needed to melt unit mass of solid P than unit mass of solid Q.

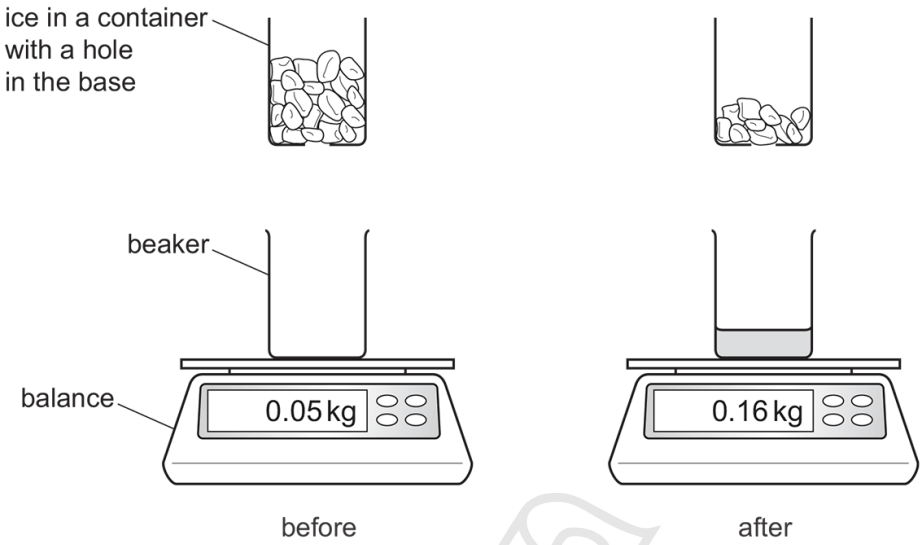
C More energy is needed to raise the temperature by 1 °C of unit mass of solid P than unit mass of solid Q.

D More energy is needed to melt unit mass of solid P than unit mass of solid Q.

---

31. 0625_w20_qp_21 Q: 18

A student placed a number of ice cubes in a container with a hole in the base. He left them to melt so that the water dripped into a beaker placed on a balance. The student recorded the initial mass of the beaker and the final mass of the beaker and water after five minutes.



The specific latent heat of fusion for water is 334 J/g.

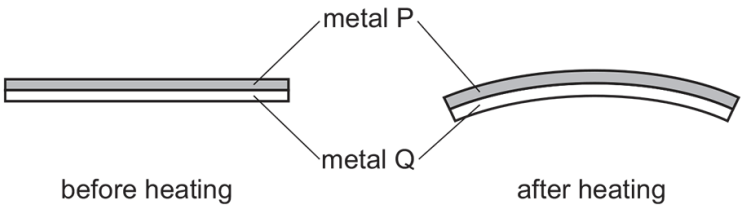
How much energy was absorbed from the surroundings in order to melt the ice?

A 37 J **B** 54 J **C** 37 000 J **D** 54 000 J

32. 0625_w20_qp_22 Q: 16

A bimetallic strip is used to control the temperature of electrical appliances. It is made of two different metals fixed together.

The diagram shows the shape of the bimetallic strip before and after heating.



Which statement is correct?

A Metal P contracts more than metal Q on heating.

B Metal Q contracts more than metal P on heating.

C Metal P expands more than metal Q on heating.

D Metal Q expands more than metal P on heating.

---

33. 0625_w20_qp_22 Q: 17

A student writes three statements about thermocouples.

1 They have a small thermal capacity.

2 They respond very slowly to temperature changes.

3 They can measure temperatures above 500 °C.

Which statements are correct?

A 1 only **B** 2 only **C** 1 and 3 **D** 2 and 3

---

34. 0625_w20_qp_22 Q: 18

Four blocks are made from different metals. Each block is heated for five minutes with an identical heater.

Assume there is no energy loss from the blocks.

The table gives the masses of the blocks and the temperature rises.

Which metal has the highest specific heat capacity?

	mass of block / kg	temperature rise / °C
A	2.0	5.0
B	2.0	9.0
C	4.0	5.0
D	4.0	9.0

---

35. 0625_w20_qp_22 Q: 19

A scientist measures the air temperature at different heights from the floor in a cave. The results are recorded in the table.

height / m	temperature / °C
0	10
10	11
20	13
30	14
40	16

Why does altering the height affect the temperature of the air?

A The molecules in warm air have less energy than the molecules in cool air.

B The molecules in cool air are further apart than the molecules in warm air.

C Warm air is less dense than cool air.

D Cool air rises above warm air.

---

36. 0625_w20_qp_23 Q: 16

Equal volumes of solids and liquids experience different changes of volume when they are heated through the same temperature range.

What is the reason for this?

A The average increase in separation of the particles in a liquid is greater than the average increase in separation of those in a solid.

B The average increase in separation of the particles in a liquid is less than the average increase in separation of those in a solid.

C The particles in liquids expand by less than those in solids.

D The particles in liquids expand by more than those in solids.

---

37. 0625_w20_qp_23 Q: 17

Which physical property changes when temperature is measured with a liquid-in-glass thermometer?

A electromotive force

B pressure

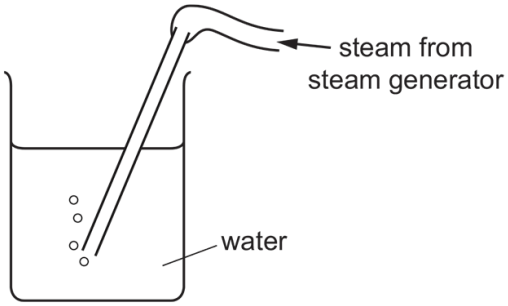
C resistance

D volume

---

38. 0625_w20_qp_23 Q: 18

The diagram shows steam being passed into water to raise the temperature of the water.



The specific latent heat of steam is 2200 J / g.

The specific heat capacity of water is 4.2 J / (g °C).

The mass of water being heated is 490 g.

Which mass of steam must be passed into the water to raise the water temperature from 19 °C to 100 °C?

A 19 g **B** 76 g **C** 80 g **D** 95 g

---

39. 0625_m19_qp_22 Q: 17

A thermometer has graduations which start at –10 °C and end at 110 °C.

What is the lower fixed point and what is the upper fixed point of the Celsius scale?

	lower fixed point / °C	upper fixed point / °C
A	–10	100
B	–10	110
C	0	100
D	0	110

---

40. 0625_m19_qp_22 Q: 18

A 1 kg block of aluminium requires more thermal energy to raise its temperature by 1 °C than a 1 kg block of copper requires.

Why is this?

A Aluminium is a better conductor of thermal energy than copper.

B Aluminium is a poorer conductor of thermal energy than copper.

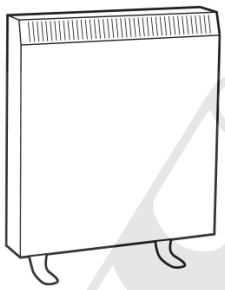
C Aluminium has a higher specific heat capacity than copper.

D Aluminium has a lower specific heat capacity than copper.

---

41. 0625_s19_qp_21 Q: 15

A night storage heater contains a large block of material that is heated electrically during the night. During the day the block cools down, releasing thermal energy into the room.



Which thermal capacity and which night-time temperature increase will cause the most energy to be stored by the block?

	thermal capacity of block	night-time temperature increase
A	large	large
B	large	small
C	small	large
D	small	small

---

42. 0625_s19_qp_21 Q: 16

100 g of water at 25 °C is poured into an insulating cup. 50 g of ice at 0 °C is added to the water. The water is stirred until the temperature of the water has fallen to 0 °C.

18 g of ice remains unmelted.

The specific heat capacity of water is 4.2 J/g °C.

Which value does this experiment give for the specific latent heat of fusion of ice?

A 210 J/g **B** 330 J/g **C** 580 J/g **D** 770 J/g

---

43. 0625_w19_qp_21 Q: 17

Which change in the design of a liquid-in-glass thermometer makes it more sensitive?

A a larger liquid reservoir

B a longer tube

C a smaller liquid reservoir

D a wider tube

---

44. 0625_w19_qp_21 Q: 18

A liquid turns into a gas. This occurs only at one particular temperature, and the change happens throughout the liquid.

What is this process called?

A boiling

B condensation

C evaporation

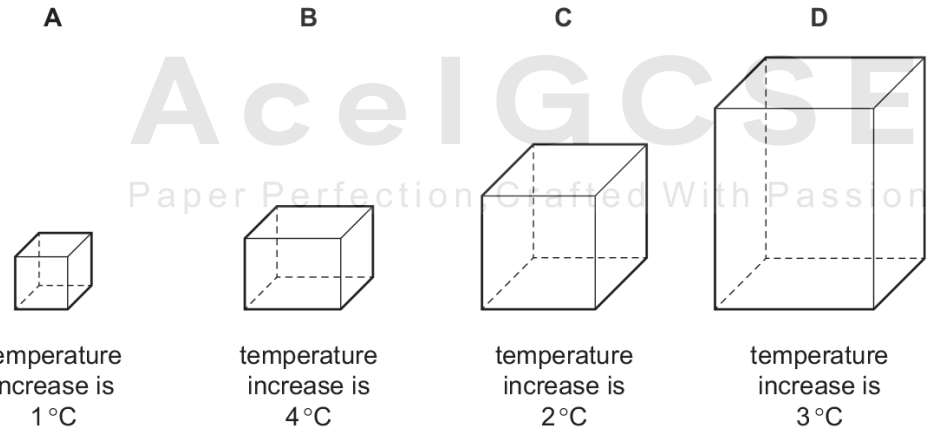
D fusion

---

45. 0625_w19_qp_22 Q: 18

The same quantity of thermal energy is supplied to each of four blocks. Each block is made from a different material.

Which block has the greatest thermal capacity?



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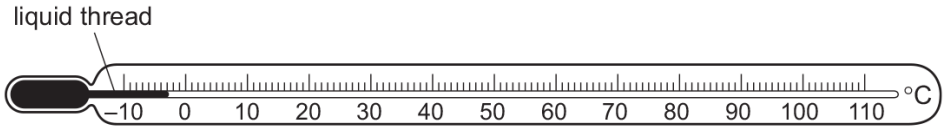
46. 0625_w19_qp_23 Q: 18

The diagram shows a liquid-in-glass thermometer.



When the temperature of the thermometer rises, the changes produced cause the liquid thread to move to the right.

Why does this happen when the temperature of the thermometer rises?

A Gases contract and liquids expand.

B Gases contract and solids expand.

C Liquids expand more than gases.

D Liquids expand more than solids.

---

47. 0625_m18_qp_22 Q: 17

Which quantity does **not** change when there is an increase in temperature?

A the density of a steel block

B the diameter of the hole in a metal nut

C the length of an iron rod

D the mass of a metal coin

---

48. 0625_m18_qp_22 Q: 18

A thermocouple is used to measure temperature.

Which is an advantage of using a thermocouple instead of a liquid-in-glass thermometer?

A It can measure temperature in the range –10 °C to 110 °C.

B It can measure temperature that changes rapidly.

C It has a linear scale.

D It is more sensitive.

---

49. 0625_m18_qp_22 Q: 19

A block of copper has a mass of 2.0 kg.

The block of copper absorbs 12 000 J thermal energy.

The specific heat capacity of copper is 385 J/(kg °C).

What is the temperature rise of the copper?

A 15.6 °C **B** 31.2 °C **C** 46.8 °C **D** 62.4 °C

---

50. 0625_s18_qp_21 Q: 16

A student wishes to calibrate a mercury-in-glass thermometer with a °C scale.

Which values should she use for the lower fixed point and for the upper fixed point?

	lower fixed point	upper fixed point
A	melting point of ice	boiling point of mercury
B	melting point of ice	boiling point of water
C	melting point of mercury	boiling point of mercury
D	melting point of mercury	boiling point of water

---

51. 0625_s18_qp_21 Q: 17

Which statements about boiling and about evaporation are both correct?

	boiling	evaporation
A	takes place only at the surface	takes place only at the surface
B	takes place only at the surface	takes place throughout the liquid
C	takes place throughout the liquid	takes place only at the surface
D	takes place throughout the liquid	takes place throughout the liquid

---

52. 0625_s18_qp_22 Q: 17

In an experiment, an object is heated.

The data from the experiment is shown.

- The energy transferred to the object is 3.0 kJ.
- The mass of the object is 2.0 kg.
- The rise in temperature of the object is 10 °C.
- The specific heat capacity of the object is 150 J / (kg °C).

What is the thermal capacity of the object?

A 30 J / °C **B** 300 J / °C **C** 3000 J / °C **D** 9000 J / °C

---

53. 0625_s18_qp_23 Q: 16

Two liquid-in-glass thermometers P and Q contain the same volume of mercury and have capillary tubes of the same length.

Thermometer P has a capillary tube with a smaller diameter than thermometer Q.

Which thermometer has the greater range and which has the greater sensitivity?

	greater range	greater sensitivity
A	P	P
B	P	Q
C	Q	P
D	Q	Q

---

54. 0625_w18_qp_21 Q: 16

The distance between two electricity pylons is 60 m. An engineer fits a cable of length 62 m between the pylons.

Why does the engineer choose a cable that is longer than the distance between the two pylons?

A to allow for contraction of the cable in cold weather

B to create a slope in the cable for electrons to flow down

C to keep the current low and the voltage high

D to reduce magnetic fields around the cable

---

55. 0625_w18_qp_21 Q: 17

The diagram shows a liquid-in-glass thermometer.

Which change increases the sensitivity of the thermometer?

A a narrower capillary tube

B a wider capillary tube

C thicker glass around the bulb

D thinner glass around the bulb

---

56. 0625_w18_qp_21 Q: 18

An object of mass 800 g and specific heat capacity 250 J/(kg °C) is heated. It absorbs 5300 J of energy.

What is the increase in temperature of the object?

A 0.027 °C **B** 17 °C **C** 27 °C **D** 17 000 °C

---

57. 0625_w18_qp_22 Q: 16

The metal lid on a glass jar is difficult to unscrew.

The jar is placed in a warm oven until the jar and the lid reach the same temperature. The lid is now easily unscrewed.

Which property accounts for this?

A thermal capacity of the jar

B thermal capacity of the lid

C thermal conduction

D thermal expansion

---

58. 0625_w18_qp_22 Q: 17

A block of iron of mass M is heated and gains 10 kJ of internal energy. The temperature of the block rises by θ °C.

A second block of iron of mass $2M$ is heated and gains 5.0 kJ of internal energy.

What is the temperature rise of the second block in °C?

A $\frac{\theta}{4}$ **B** $\frac{\theta}{2}$ **C** 2θ **D** 4θ

---

59. 0625_w18_qp_22 Q: 18

Which factors affect the sensitivity of a thermometer?

1 the diameter of the bore of the tube

2 the length of the capillary tube

3 the thickness of the bulb wall

A 1 only **B** 1 and 2 only **C** 1 and 3 only **D** 1, 2 and 3

---

60. 0625_w18_qp_23 Q: 16

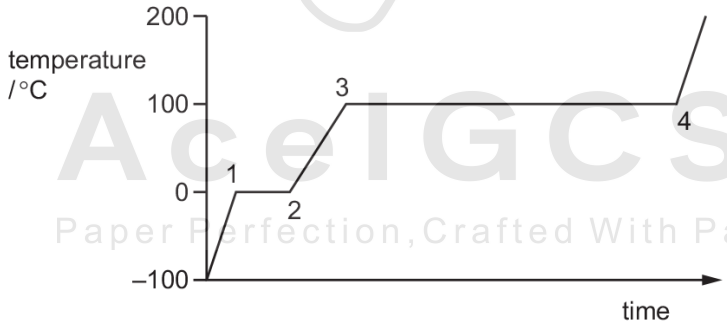
Which row shows the relative order of thermal expansion of solids, liquids and gases?

	most expansion →		least expansion
A	solids	liquids	gases
B	solids	gases	liquids
C	gases	solids	liquids
D	gases	liquids	solids

---

61. 0625_w18_qp_23 Q: 17

A block of ice is at a temperature of –100 °C. Energy is supplied at a constant rate. The graph shows how its temperature changes.



At which points has the ice completely changed state to water and all the water completely changed state to steam?

	completely changed to water	completely changed to steam
A	1	3
B	1	4
C	2	3
D	2	4

---

62. 0625_w18_qp_23 Q: 18

The temperature of the water at the bottom of a waterfall is greater than the temperature of the water at the top.

The gravitational potential energy of the water at the top is transferred to thermal energy at the bottom.

The specific heat capacity of water is 4200 J/(kg °C).

What is the temperature difference for a waterfall of height 21 m?

A 0.005 °C **B** 0.05 °C **C** 20 °C **D** 200 °C

---

63. 0625_m17_qp_22 Q: 14

At –39 °C, liquid mercury solidifies without a change of temperature.

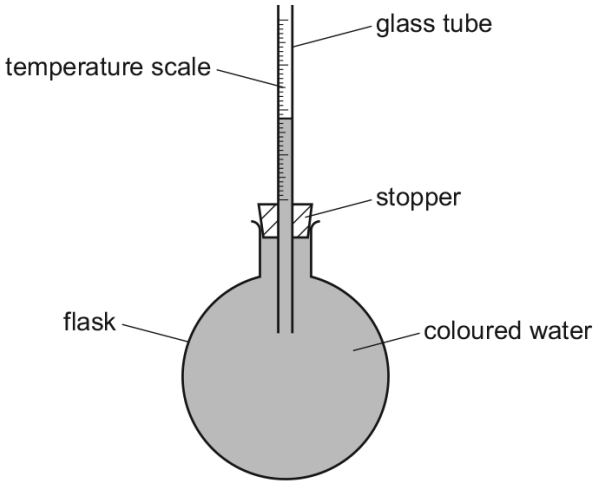
Which row shows whether the mercury absorbs or releases energy and what happens to the bonds between the mercury atoms?

	energy	bonds between atoms
A	absorbed	stronger
B	absorbed	weaker
C	released	stronger
D	released	weaker

---

64. 0625_m17_qp_22 Q: 15

A model thermometer consists of a flask of coloured water and a stopper with a glass tube passing through it, as shown.



The model thermometer can be changed in one of two ways.

- The flask can be replaced with a larger one full of coloured water.
- The glass tube can be replaced with one with a larger internal diameter.

Which statement is correct?

A Only using a larger flask increases the sensitivity.

B Only using a wider tube increases the sensitivity.

C Using a larger flask increases the sensitivity and using a wider tube increases the sensitivity.

D Neither using a larger flask nor using a wider tube increases the sensitivity.

---

65. 0625_m17_qp_22 Q: 16

A metal has a specific heat capacity of 360 J/(kg °C). An object made of this metal has a mass of 2.0 kg.

What is the thermal capacity (heat capacity) of the object?

A 180 J/°C **B** 180 J/kg **C** 720 J/°C **D** 720 J/kg

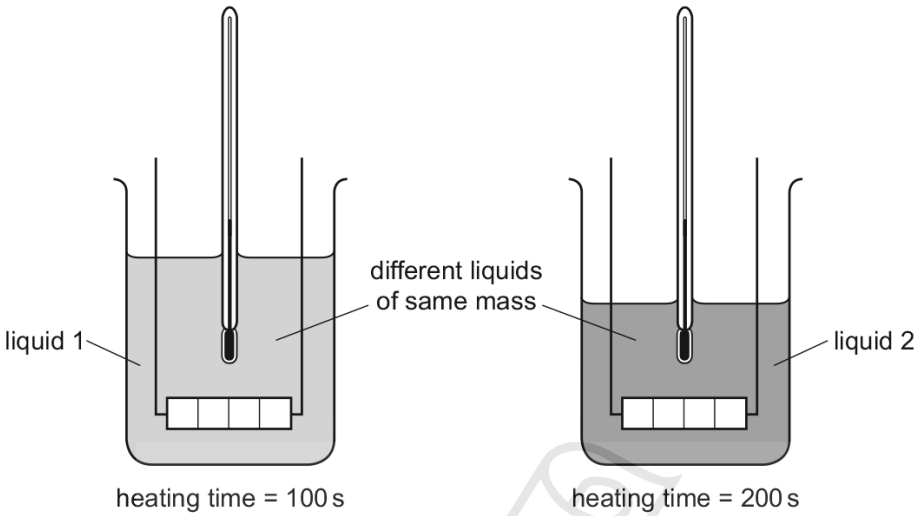
---

66. 0625_s17_qp_21 Q: 16

Equal masses of two different liquids are put into identical beakers.

Liquid 1 is heated for 100 s and liquid 2 is heated for 200 s by heaters of the **same power**.

Each liquid has the same rise in temperature.



Which statement is correct?

A Each beaker of liquid has the same thermal capacity.

B Each beaker of liquid receives the same energy.

C Liquid 1 receives more energy than liquid 2.

D The thermal capacity of liquid 1 is less than the thermal capacity of liquid 2.

---

67. 0625_s17_qp_21 Q: 17

Water of mass 100 g at a temperature of 100 °C is converted into steam at 100 °C. The specific latent heat of vaporisation of water is 2300 J/g.

How much thermal energy is absorbed by the water?

A 23 J **B** 230 J **C** 230 000 J **D** 23 000 000 J

---

68. 0625_s17_qp_22 Q: 16

What is meant by the specific latent heat of fusion of ice?

A the energy needed to change unit mass of ice into water at constant temperature

B the energy needed to change unit volume of ice into water at constant temperature

C the energy needed to produce unit temperature increase of unit mass of ice

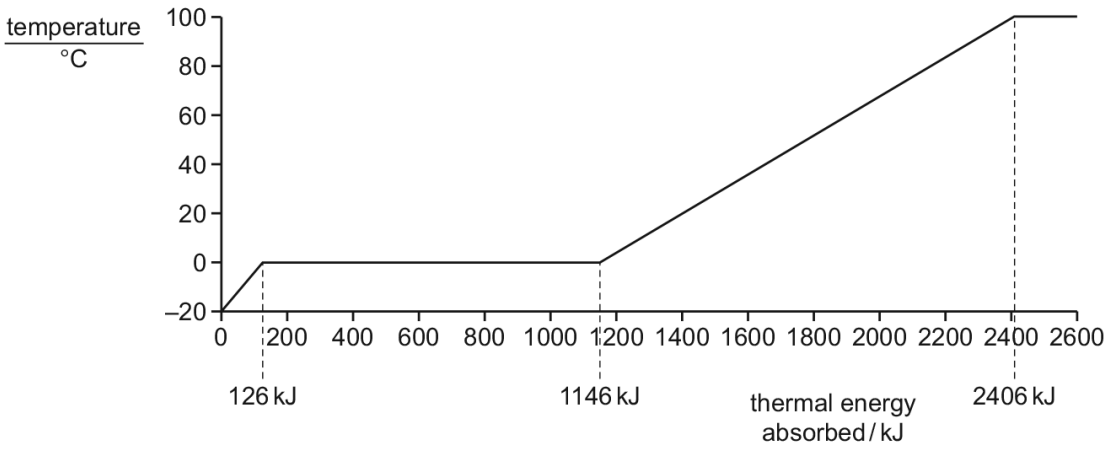
D the energy needed to produce unit temperature increase of unit volume of ice

---

69. 0625_s17_qp_23 Q: 17

A block of ice at –20 °C is heated until it turns to steam. The graph of temperature against thermal energy absorbed is shown.

The latent heat of fusion of ice is 340 kJ / kg.



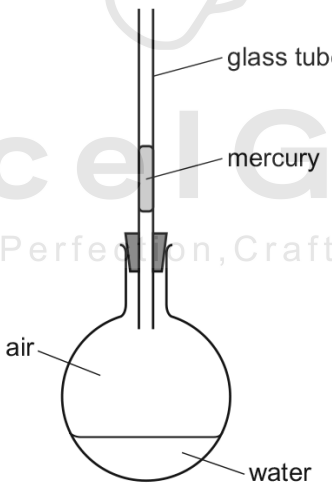
What is the mass of the ice?

A 1.0 kg **B** 2.0 kg **C** 3.0 kg **D** 4.0 kg

---

70. 0625_w17_qp_21 Q: 14

The diagram shows a glass flask, sealed with a small volume of mercury in a glass tube. When the flask is gently warmed the mercury rises up the tube.



What is the main cause of the movement of the mercury?

A expansion of air in the flask

B expansion of the glass flask

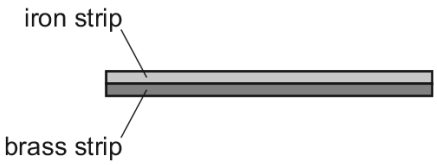
C expansion of the glass tube

D expansion of the mercury

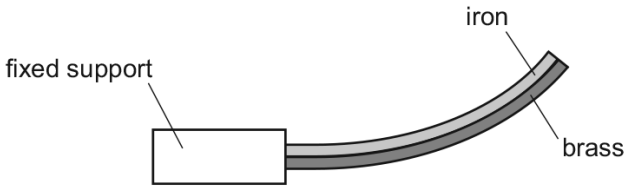
---

71. 0625_w17_qp_21 Q: 17

A strip of iron and a strip of brass are firmly attached to each other along their entire length. This combination is a bimetallic strip.



This bimetallic strip is heated and it bends as shown.



The bimetallic strip is now cooled and becomes straight again.

What causes the bimetallic strip to become straight again?

A The brass contracts more than the iron.

B The brass expands more than the iron.

C The iron contracts more than the brass.

D The iron expands more than the brass.

---

72. 0625_w17_qp_21 Q: 18

An aluminium block has a mass of 200 g.

The specific heat capacity of aluminium is 900 J / (kg °C).

How much energy is needed to raise the temperature of the block from 20 °C to 110 °C?

A 2.0 J **B** 200 J **C** 16 200 J **D** 16 200 000 J

---

73. 0625_w17_qp_22 Q: 17

Which row identifies the fixed points on the Celsius scale?

	lower fixed point	upper fixed point
A	boiling point of mercury	melting point of pure ice
B	boiling point of pure water	melting point of pure ice
C	melting point of mercury	boiling point of pure water
D	melting point of pure ice	boiling point of pure water

---

74. 0625_w17_qp_22 Q: 18

Aluminium has a specific heat capacity of 900 J/(kg °C).

The internal energy of a 2.0 kg block of aluminium increases by 13 500 J.

By how much does the temperature of the block increase?

A 0.067 °C **B** 0.13 °C **C** 7.5 °C **D** 15 °C

---

75. 0625_w17_qp_23 Q: 17

Which property **cannot** be used for the measurement of temperature?

A half-life of a radioactive isotope

B length of a solid metal bar

C pressure of a gas

D volume of a liquid

---

76. 0625_w17_qp_23 Q: 18

A student uses an immersion heater to heat some water in a beaker.

The water is heated from 20 °C to 80 °C.

The energy supplied to the water is 60.0 kJ.

What is the thermal capacity of the water? (Ignore any heat loss.)

A 667 J/°C **B** 750 J/°C **C** 1000 J/°C **D** 3000 J/°C

---

77. 0625_m16_qp_22 Q: 16

Which quantity gives the *thermal capacity* of a solid object?

A the energy lost by radiation from the object in 1.0 s

B the energy needed to melt the object

C the energy needed to raise the temperature of the object by 1.0 °C

D the total amount of thermal energy in the object

---

78. 0625_m16_qp_22 Q: 17

To mark a temperature scale on a thermometer, standard temperatures known as fixed points are needed.

Which of these is a fixed point on the Celsius scale?

A room temperature

B the temperature inside a freezer

C the temperature of pure melting ice

D the temperature of pure warm water

---

79. 0625_m16_qp_22 Q: 18

In an experiment, a liquid is heated at a constant rate.

The temperature of the liquid increases and eventually becomes constant.

Which statement about the experiment is correct?

A Boiling occurs at all temperatures but only on the liquid surface.

B Boiling occurs throughout the liquid but only at the constant temperature.

C Evaporation occurs throughout the liquid and at all temperatures.

D Evaporation occurs only at the constant temperature and only on the liquid surface.

---

80. 0625_p16_qp_20 Q: 19

Which line in the table shows the relative expansion of the three states of matter from the most expansion to the least expansion?

	most expansion				least expansion
A	solids	>	liquids	>	gases
B	solids	>	gases	>	liquids
C	gases	>	liquids	>	solids
D	gases	>	solids	>	liquids

---

81. 0625_p16_qp_20 Q: 21

A student wishes to calculate the specific heat capacity of copper.

He has a block of copper and an electrical heater. He knows the power of the heater.

Which other apparatus does he need?

	balance	stop watch	thermometer
A	✓	✓	✓
B	✓	✓	×
C	✓	×	✓
D	×	✓	✓

key

✓ = needed

× = not needed

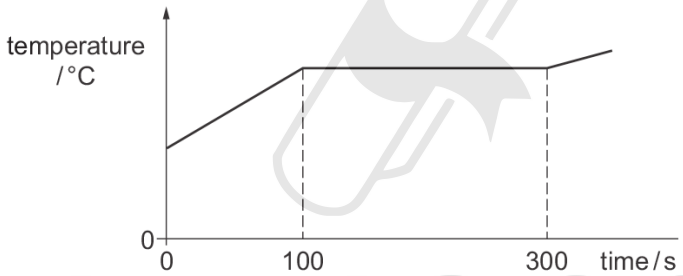
---

82. 0625_p16_qp_20 Q: 22

A mass of 0.20 kg of a substance is initially solid.

It is heated at a steady rate of 500 W.

The graph shows how the temperature of the substance changes with time.



What is the specific latent heat of fusion of the substance?

A 20 000 J / kg

B 30 000 J / kg

C 500 000 J / kg

D 750 000 J / kg

---

83. 0625_s16_qp_21 Q: 15

A beaker contains 0.500 kg of water at a temperature of 3.0 °C. The beaker is heated, and the internal energy of the water increases by 21.0 kJ.

The specific heat capacity of water is 4200 J / (kg °C).

What is the temperature of the water after it has been heated?

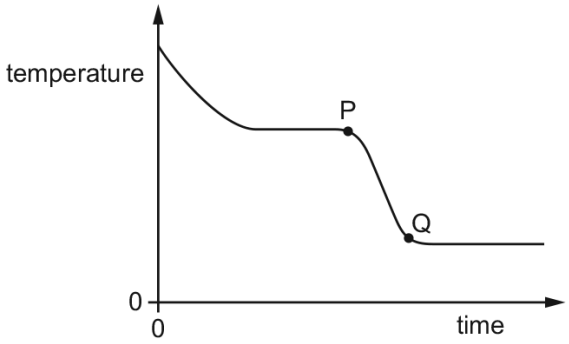
A 5.5 °C **B** 10.0 °C **C** 13.0 °C **D** 31.5 °C

---

84. 0625_s16_qp_21 Q: 16

A substance loses thermal energy (heat) to the surroundings at a steady rate.

The graph shows how the temperature of the substance changes with time.



What could the portion PQ of the graph represent?

A gas condensing

B gas cooling

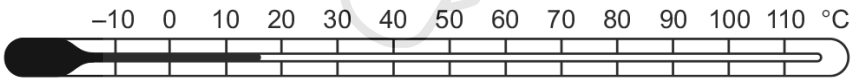
C liquid cooling

D liquid solidifying

---

85. 0625_s16_qp_21 Q: 17

A student wishes to check the upper and the lower fixed points on a Celsius scale thermometer.



She has four beakers P, Q, R and S.

Beaker P contains a mixture of ice and salt.

Beaker Q contains a mixture of ice and water.

Beaker R contains boiling salt solution.

Beaker S contains boiling water.

Which two beakers should she use to check the fixed points?

A P and R **B** P and S **C** Q and R **D** Q and S

---

86. 0625_s16_qp_22 Q: 14

Which statement describes what happens as ice at 0 °C starts to melt to become water?

A Energy is absorbed and the temperature remains constant.

B Energy is absorbed and the temperature rises.

C Energy is released and the temperature remains constant.

D Energy is released and the temperature rises.

---

87. 0625_s16_qp_22 Q: 20

5.0 g of water at 25 °C is dropped onto a large block of ice at 0 °C. The water cools to 0 °C and some of the ice melts.

Assume that all the energy lost by the water is gained by the ice.

What is the mass of ice that melts?

The specific heat capacity of water is 4.2 J/(g °C).

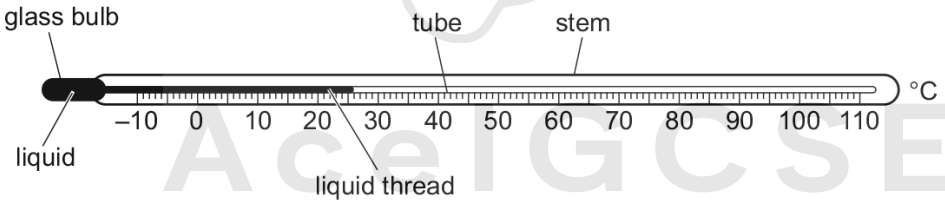
The specific latent heat of fusion of ice is 340 J/g.

A 0.062 g **B** 0.087 g **C** 1.5 g **D** 10 g

---

88. 0625_s16_qp_23 Q: 16

The diagram shows a liquid-in-glass thermometer.



How can the thermometer be made more sensitive?

A increase the internal diameter of the tube containing the liquid thread

B increase the internal volume of the glass bulb and the volume of the liquid

C increase the length of the tube and stem

D increase the thickness of the glass in the glass bulb

---

89. 0625_s16_qp_23 Q: 17

In an experiment to measure specific heat capacity, a block of aluminium is heated and its rise in temperature is measured.

The amount of energy gained by the block is E. The mass of the block is m. The rise in temperature of the block is ΔT.

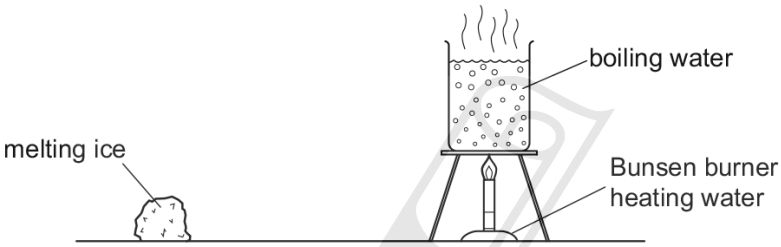
Which expression gives the specific heat capacity of aluminium?

A $\frac{m}{E\Delta T}$ **B** $\frac{m\Delta T}{E}$ **C** $\frac{E}{m\Delta T}$ **D** $\frac{E\Delta T}{m}$

---

90. 0625_w16_qp_21 Q: 16

A piece of melting ice at 0 °C and a beaker of boiling water are both in a laboratory. The laboratory is at 20 °C.



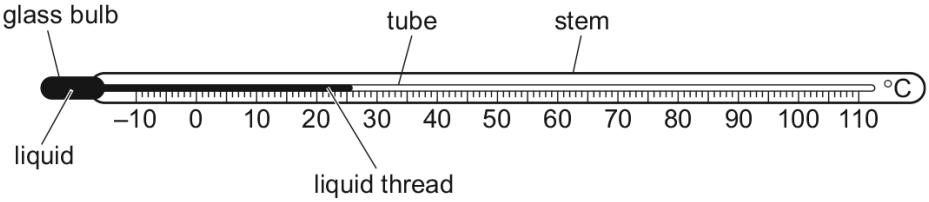
What is happening to the temperature of the melting ice and what is happening to the temperature of the boiling water?

	temperature of melting ice	temperature of boiling water
A	constant	constant
B	constant	increasing
C	increasing	constant
D	increasing	increasing

---

91. 0625_w16_qp_21 Q: 17

The diagram shows a liquid-in-glass thermometer.



Which feature would give a thermometer with an increased range?

A a smaller internal diameter of the tube containing the liquid thread

B a thinner glass bulb

C a larger length of the tube and stem

D a larger volume of the liquid

---

92. 0625_w16_qp_21 Q: 18

A copper container of mass 0.20 kg contains 0.10 kg of water.

The specific heat capacity of copper is 385 J/(kg °C) and the specific heat capacity of water is 4200 J/(kg °C).

How much energy, in joules, is needed to raise the temperature of the copper container and the water by 10 °C?

A $(0.20 \times 385 \times 10) - (0.10 \times 4200 \times 10)$

B $(0.20 \times 385 \times 10) + (0.10 \times 4200 \times 10)$

C $(0.10 + 0.20) \times \left(\frac{4200 + 385}{2}\right) \times 10$

D $(0.10 + 0.20) \times (4200 + 385) \times 10$

---

93. 0625_w16_qp_23 Q: 17

A scientist has two thermometers available: a liquid-in-glass thermometer and a thermocouple thermometer.

Which thermometer is better for measuring a very high temperature, and which thermometer is better for measuring a rapidly varying temperature?

	very high temperature	rapidly varying temperature
A	liquid-in-glass	liquid-in-glass
B	liquid-in-glass	thermocouple
C	thermocouple	liquid-in-glass
D	thermocouple	thermocouple

---

94. 0625_m15_qp_12 Q: 14

When steam condenses it becomes liquid water. When liquid water solidifies it becomes ice.

What happens to the temperature of steam while it is condensing, and what happens to the temperature of water while it is solidifying?

	temperature of steam while it is condensing	temperature of water while it is solidifying
A	decreases	decreases
B	decreases	stays the same
C	stays the same	decreases
D	stays the same	stays the same

---

95. 0625_m15_qp_12 Q: 15

A thermometer has graduations which start at –10 °C and end at 110 °C.

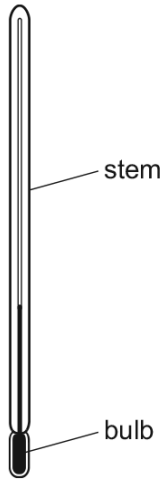
What is the lower fixed point and what is the upper fixed point of the Celsius scale?

	lower fixed point / °C	upper fixed point / °C
A	–10	100
B	–10	110
C	0	100
D	0	110

---

96. 0625_s15_qp_11 Q: 14

The thermometer in the diagram has no scale.



Where must the bulb be placed so that 0 °C can be marked on the stem?

A in a freezer

B in pure boiling water

C in pure cold water

D in pure melting ice

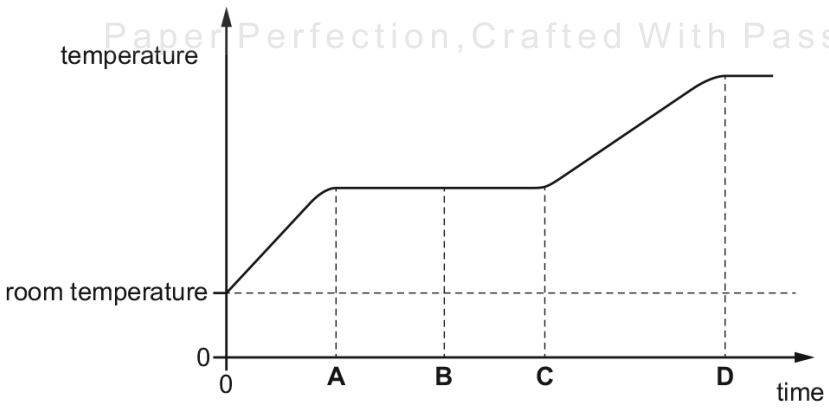
---

97. 0625_s15_qp_11 Q: 15

A solid is heated from room temperature.

The graph shows how its temperature changes with time as it is heated constantly.

At which time has it just become **completely** liquid?



---

98. 0625_s15_qp_12 Q: 15

Two metal blocks X and Y are at room temperature. Each block is heated so that its temperature rises by 10 °C.

The blocks are now allowed to cool back to room temperature.

Block Y has a greater thermal capacity than block X.

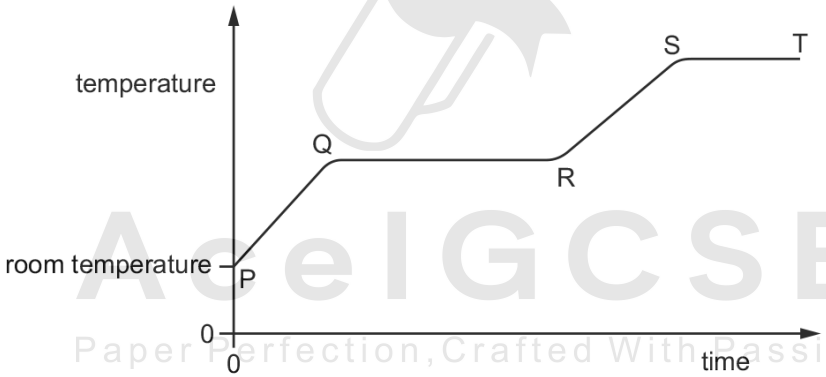
Which block needs more thermal (heat) energy to heat it up by 10 °C and which block loses more thermal (heat) energy as it cools back to room temperature?

	more energy	
	heating	cooling
A	X	X
B	X	Y
C	Y	X
D	Y	Y

---

99. 0625_s15_qp_13 Q: 15

A solid is heated from room temperature. The graph shows how its temperature changes with time as it is heated constantly.



Between which labelled points on the graph is the substance partly solid and partly liquid?

A between P and Q

B between Q and R

C between R and S

D between S and T

---

100. 0625_w15_qp_11 Q: 14

A circular metal disc is heated.

Which quantity decreases?

A its density

B its diameter

C its thickness

D its volume

---

101. 0625_w15_qp_11 Q: 15

The same quantity of thermal (heat) energy is given to two objects X and Y. The temperature rise of object X is less than the temperature rise of object Y.

What accounts for this difference?

A X has a larger thermal capacity than Y.

B X is a better thermal conductor than Y.

C Y has a larger thermal capacity than X.

D Y is a better thermal conductor than X.

---

102. 0625_w15_qp_12 Q: 14

A circular metal disc is heated.

Which quantity decreases?

A its density

B its diameter

C its thickness

D its volume

---

103. 0625_w15_qp_12 Q: 15

A block of copper and a block of lead are heated. The internal energy of each block increases by the same amount.

The block of copper has a lower thermal capacity than the block of lead.

Which conclusion can be made from this information?

A The temperature increase of the copper is greater than the temperature increase of the lead.

B The temperature increase of the copper is the same as the temperature increase of the lead.

C The temperature increase of the copper is less than the temperature increase of the lead.

D The melting point of copper is lower than the melting point of lead.

---

104. 0625_w15_qp_13 Q: 15

The diagram shows a mercury-in-glass thermometer. The scale of the thermometer has not been marked.

The length l increases uniformly with temperature.

The length l is measured when the thermometer bulb is placed in water at 0 °C, and also when it is in water at 100 °C. The table shows the results.

temperature / °C	length l / cm
0	2.0
100	26.0

What is the value of l when the bulb is placed in water at 50 °C?

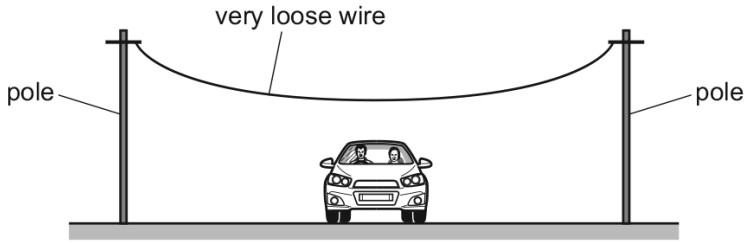
A 12.0 cm **B** 13.0 cm **C** 14.0 cm **D** 16.0 cm

---

105. 0625_s14_qp_11 Q: 14

A telephone engineer connects a wire between two poles when the weather is very cold.

He makes the wire very loose. The wire passes over a road.



The weather changes and it becomes very hot.

What could happen to the wire and why?

	what could happen	why
A	it breaks	it contracts
B	it breaks	it expands
C	it sags and touches cars on the road	it contracts
D	it sags and touches cars on the road	it expands

---

106. 0625_s14_qp_11 Q: 15

In an experiment, a thermometer is placed in a test-tube of hot liquid. The temperature of the liquid is recorded every half minute. The table shows the results.

time / minutes	0.0	0.5	1.0	1.5	2.0	2.5	3.0	3.5	4.0	4.5	5.0	5.5	6.0	6.5	7.0	7.5
temperature / °C	73	65	59	55	55	55	51	48	45	42	40	38	36	35	34	33

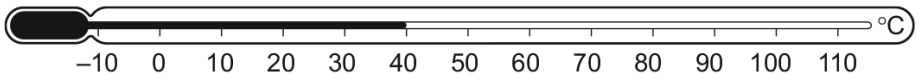
What is the melting point of the substance?

A 0 °C **B** 33 °C **C** 55 °C **D** 73 °C

---

107. 0625_s14_qp_12 Q: 14

A liquid-in-glass thermometer is marked with a scale in °C.



What is the temperature difference between the two fixed points for this thermometer?

A 40°C **B** 50°C **C** 100°C **D** 120°C

---

108. 0625_s14_qp_12 Q: 15

Which statement gives the thermal capacity of a solid body?

A the energy needed to melt the body without a change in temperature

B the energy per degree Celsius needed to raise the temperature of the body

C the increase in the volume of the body when its temperature is raised by one degree Celsius

D the total amount of internal energy in the body

---

109. 0625_s14_qp_12 Q: 16

In an experiment, a thermometer is placed in a test-tube of hot liquid. The temperature of the liquid is recorded every half minute. The table shows the results.

time/minutes	0.0	0.5	1.0	1.5	2.0	2.5	3.0	3.5	4.0	4.5	5.0	5.5	6.0	6.5	7.0	7.5
temperature/°C	73	65	59	55	55	55	51	48	45	42	40	38	36	35	34	33

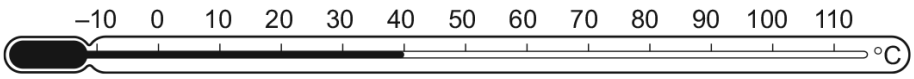
What is the melting point of the substance?

A 0 °C **B** 33 °C **C** 55 °C **D** 73 °C

---

110. 0625_w14_qp_11 Q: 15

Which points are the fixed points of the liquid-in-glass thermometer shown?



A the beginning and end points of the column of liquid

B the beginning and end points of the thermometer scale

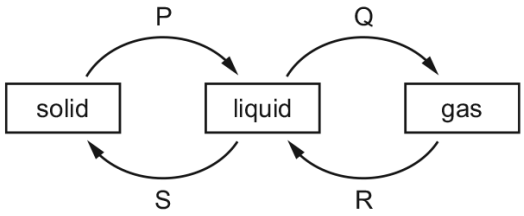
C the points marked 0 °C and 100 °C

D the top and bottom points of the thermometer bulb

---

111. 0625_w14_qp_13 Q: 15

The diagram shows four labelled changes of state between solid, liquid and gas.



Which changes need an energy input?

A P and Q **B** Q and R **C** R and S **D** S and P

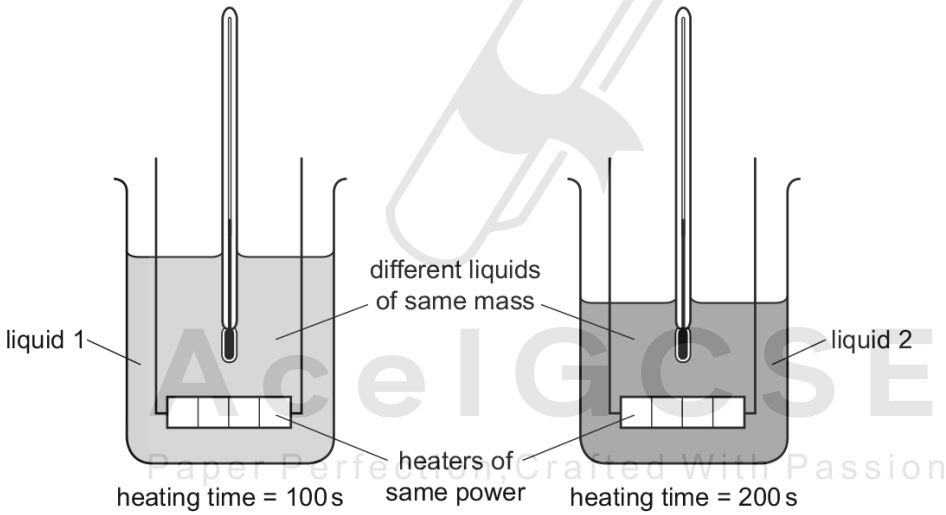
---

112. 0625_w14_qp_13 Q: 16

Equal masses of two different liquids are put into identical beakers.

Liquid 1 is heated for 100 s and liquid 2 is heated for 200 s by heaters of the same power.

The temperature of both liquids increases by the same amount.



Which statement is correct?

A Both liquids receive the same amount of energy.

B Liquid 1 receives more energy than liquid 2.

C Both liquids have equal thermal capacity.

D The thermal capacity of liquid 1 is less than the thermal capacity of liquid 2.

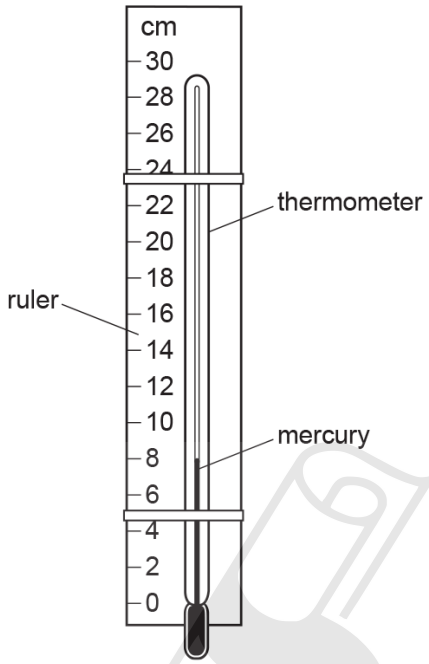
---

113. 0625_s13_qp_11 Q: 16

A mercury thermometer with no scale is taped to a ruler as shown.

When the thermometer is placed in steam, the mercury level rises to 22.0 cm.

When the thermometer is placed in pure melting ice, the mercury level falls to 2.0 cm.

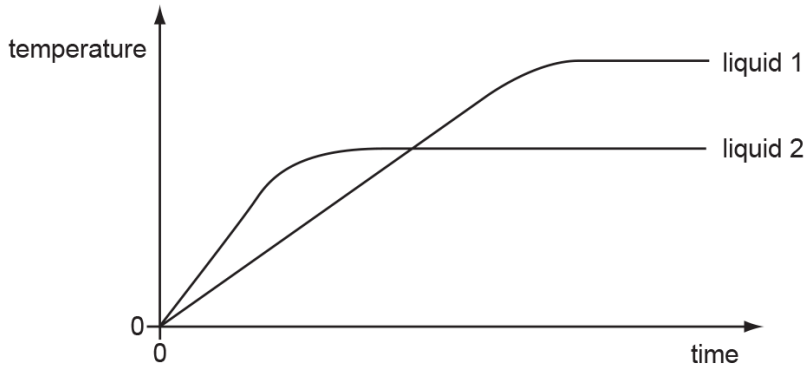


Which temperature is shown by the mercury level in the diagram?

A 6 °C **B** 8 °C **C** 30 °C **D** 40 °C

114. 0625_w13_qp_11 Q: 15

Equal masses of two different liquids are heated using the same heater. The graph shows how the temperature of each liquid changes with time.



What does the graph tell us about the liquids?

A Liquid 1 has a higher melting point than liquid 2.

B Liquid 1 has a higher boiling point than liquid 2.

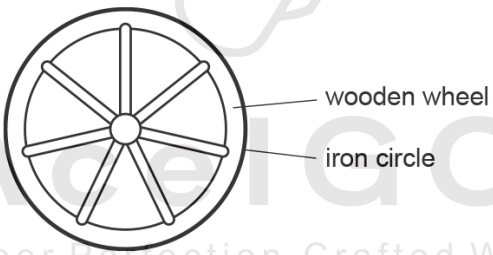
C Liquid 1 starts to melt sooner than liquid 2.

D Liquid 1 starts to boil sooner than liquid 2.

---

115. 0625_w13_qp_11 Q: 16

A wooden wheel can be strengthened by putting a tight circle of iron around it.



Which action would make it easier to fit the circle over the wood?

A cooling the iron circle

B heating the iron circle

C heating the wooden wheel and cooling the iron circle

D heating the wooden wheel but not heating or cooling the iron circle

---

116. 0625_s12_qp_11 Q: 15

Which pair contains **only** physical quantities that vary with temperature and so could be used in making a thermometer?

A activity of a radioactive source, volume of a gas

B mass of a liquid, volume of a liquid

C activity of a radioactive source, mass of a solid

D volume of a gas, volume of a liquid

---

117. 0625_s12_qp_11 Q: 16

A heater supplies 80 J of energy to a block of metal. The temperature of the block rises by 20 °C.

What happens to the block of metal when its temperature falls by 10 °C?

A Its internal energy decreases by 40 J.

B Its internal energy decreases by 160 J.

C Its internal energy increases by 40 J.

D Its internal energy increases by 160 J.

---

118. 0625_s12_qp_11 Q: 17

An engineer wants to fix a steel washer on to a steel rod. The rod is just too big to fit into the hole of the washer.

How can the engineer fit the washer on to the rod?

A Cool the washer and put it over the rod.

B Cool the washer and rod to the same temperature and push them together.

C Heat the rod and then place it in the hole.

D Heat the washer and then place it over the rod.

---

119. 0625_s12_qp_12 Q: 15

A solid object has a very large thermal capacity.

What does this mean?

A A large amount of energy is needed to make the object become hot.

B A large amount of energy is needed to make the object melt.

C A small amount of energy is needed to make the object become hot.

D A small amount of energy is needed to make the object melt.

---

120. 0625_s12_qp_12 Q: 16

A hot drink is left in a room that is at a temperature of 20 °C.

What has happened to the drink after ten minutes?

A Its density is lower.

B Its internal energy is lower.

C Its particles have equal energies.

D Its particles move more quickly.

---

121. 0625_w12_qp_11 Q: 16

Which physical property is used to measure temperature in a liquid-in-glass thermometer?

A the length of the thermometer

B the thickness of the glass bulb

C the volume of the glass bulb

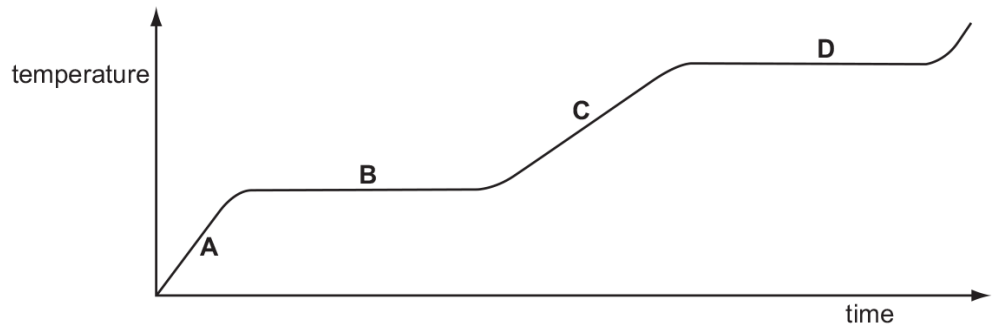
D the volume of the liquid

---

122. 0625_w12_qp_11 Q: 17

The graph shows the temperature of a substance as it is heated steadily.

In which part of the graph is the substance boiling?



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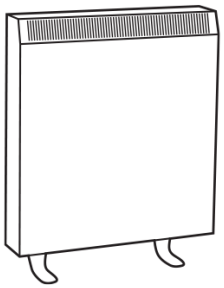
123. 0625_w12_qp_11 Q: 18

A night storage heater contains a large block of material that is heated electrically during the night. During the day the block cools down, releasing thermal energy into the room.



Which thermal capacity and which night-time temperature increase will cause the most energy to be stored by the block?

	thermal capacity of block	night-time temperature increase
A	large	large
B	large	small
C	small	large
D	small	small

---

124. 0625_w12_qp_12 Q: 15

Which physical property is used to measure temperature in a liquid-in-glass thermometer?

A the length of the thermometer

B the thickness of the glass bulb

C the volume of the glass bulb

D the volume of the liquid

---

125. 0625_w12_qp_13 Q: 15

The table lists the melting points and the boiling points of four different substances.

Which substance is a liquid at 0 °C?

	melting point / °C	boiling point / °C
A	–219	–183
B	–7	58
C	98	890
D	1083	2582

SN	Paper	Q. No.	Answer
01	0625_m22_qp_22	17	B
02	0625_m22_qp_22	18	B
03	0625_m22_qp_22	19	C
04	0625_m21_qp_22	16	C
05	0625_m21_qp_22	17	A
06	0625_s21_qp_21	16	A
07	0625_s21_qp_21	17	B
08	0625_s21_qp_21	18	B
09	0625_s21_qp_22	16	A
10	0625_s21_qp_22	17	D
11	0625_s21_qp_22	18	C
12	0625_s21_qp_23	16	C
13	0625_s21_qp_23	17	A
14	0625_s21_qp_23	18	D
15	0625_w21_qp_21	14	C
16	0625_w21_qp_21	15	D
17	0625_w21_qp_22	14	C
18	0625_w21_qp_22	15	D
19	0625_m20_qp_22	18	C
20	0625_m20_qp_22	19	A
21	0625_p20_qp_20	19	C
22	0625_p20_qp_20	20	A
23	0625_p20_qp_20	21	A
24	0625_p20_qp_20	22	C
25	0625_s20_qp_21	16	C
26	0625_s20_qp_21	17	A
27	0625_s20_qp_22	16	D
28	0625_s20_qp_23	16	B
29	0625_w20_qp_21	16	A
30	0625_w20_qp_21	17	C
31	0625_w20_qp_21	18	C
32	0625_w20_qp_22	16	C
33	0625_w20_qp_22	17	C
34	0625_w20_qp_22	18	A
35	0625_w20_qp_22	19	C
36	0625_w20_qp_23	16	A
37	0625_w20_qp_23	17	D
38	0625_w20_qp_23	18	B
39	0625_m19_qp_22	17	C
40	0625_m19_qp_22	18	C
41	0625_s19_qp_21	15	D
42	0625_s19_qp_21	16	D
43	0625_w19_qp_21	17	A
44	0625_w19_qp_21	18	A
45	0625_w19_qp_22	18	A
46	0625_w19_qp_23	18	D
47	0625_m18_qp_22	17	D
48	0625_m18_qp_22	18	B
49	0625_m18_qp_22	19	A

SN	Paper	Q. No.	Answer
50	0625_s18_qp_21	16	B
51	0625_s18_qp_21	17	C
52	0625_s18_qp_22	17	B
53	0625_s18_qp_23	16	C
54	0625_w18_qp_21	16	A
55	0625_w18_qp_21	17	A
56	0625_w18_qp_21	18	C
57	0625_w18_qp_22	16	D
58	0625_w18_qp_22	17	A
59	0625_w18_qp_22	18	A
60	0625_w18_qp_23	16	D
61	0625_w18_qp_23	17	D
62	0625_w18_qp_23	18	B
63	0625_m17_qp_22	14	C
64	0625_m17_qp_22	15	A
65	0625_m17_qp_22	16	C
66	0625_s17_qp_21	16	D
67	0625_s17_qp_21	17	C
68	0625_s17_qp_22	16	A
69	0625_s17_qp_23	17	C
70	0625_w17_qp_21	14	A
71	0625_w17_qp_21	17	A
72	0625_w17_qp_21	18	C
73	0625_w17_qp_22	17	D
74	0625_w17_qp_22	18	C
75	0625_w17_qp_23	17	A
76	0625_w17_qp_23	18	C
77	0625_m16_qp_22	16	C
78	0625_m16_qp_22	17	C
79	0625_m16_qp_22	18	B
80	0625_p16_qp_20	19	C
81	0625_p16_qp_20	21	A
82	0625_p16_qp_20	22	C
83	0625_s16_qp_21	15	C
84	0625_s16_qp_21	16	C
85	0625_s16_qp_21	17	D
86	0625_s16_qp_22	14	A
87	0625_s16_qp_22	20	C
88	0625_s16_qp_23	16	B
89	0625_s16_qp_23	17	C
90	0625_w16_qp_21	16	A
91	0625_w16_qp_21	17	C
92	0625_w16_qp_21	18	B
93	0625_w16_qp_23	17	D
94	0625_m15_qp_12	14	D
95	0625_m15_qp_12	15	C
96	0625_s15_qp_11	14	D
97	0625_s15_qp_11	15	C
98	0625_s15_qp_12	15	D

SN	Paper	Q. No.	Answer
99	0625_s15_qp_13	15	B
100	0625_w15_qp_11	14	A
101	0625_w15_qp_11	15	A
102	0625_w15_qp_12	14	A
103	0625_w15_qp_12	15	A
104	0625_w15_qp_13	15	C
105	0625_s14_qp_11	14	D
106	0625_s14_qp_11	15	C
107	0625_s14_qp_12	14	C
108	0625_s14_qp_12	15	B
109	0625_s14_qp_12	16	C
110	0625_w14_qp_11	15	C
111	0625_w14_qp_13	15	A
112	0625_w14_qp_13	16	D
113	0625_s13_qp_11	16	C
114	0625_w13_qp_11	15	B
115	0625_w13_qp_11	16	B
116	0625_s12_qp_11	15	D
117	0625_s12_qp_11	16	A
118	0625_s12_qp_11	17	D
119	0625_s12_qp_12	15	A
120	0625_s12_qp_12	16	B
121	0625_w12_qp_11	16	D
122	0625_w12_qp_11	17	D
123	0625_w12_qp_11	18	A
124	0625_w12_qp_12	15	D
125	0625_w12_qp_13	15	B