Practice Question Set For GCSE
Subject : Physics
Paper-1 Topic: Energy (High Demand)

Name of the Student:_____
Max. Marks : 22 Marks **Time : 22 Minutes**

Q1.

Ice cream is made by cooling a mixture of liquid ingredients until they freeze.

(a) Which statement describes the motion of the particles in solid ice cream?

Tick (✓) **one** box.

They are stationary. ☐

They move freely. ☐

They vibrate about fixed positions. ☐

(1)

(b) How do the kinetic energy and the potential energy of the particles change as a liquid is cooled and frozen?

Tick (✓) **one** box.

Kinetic energy	**Potential energy**	
Decreases	Decreases	☐
Decreases	Does not change	☐
Does not change	Decreases	☐
Does not change	Does not change	☐

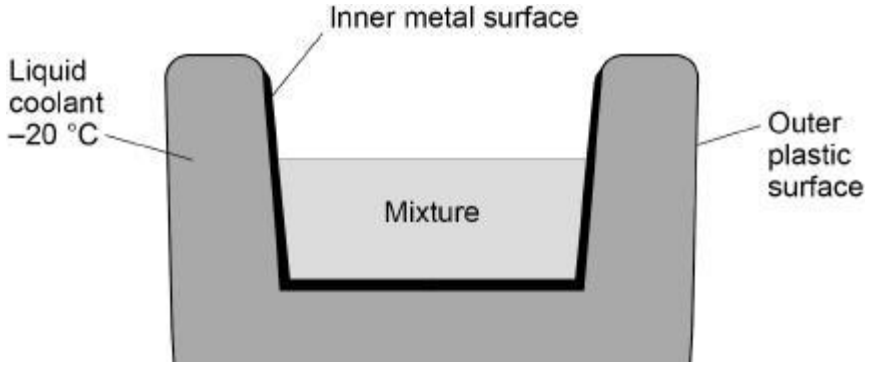
(1)

The diagram below shows a bowl used for making ice cream.

The walls of the bowl contain a liquid coolant.

The bowl is cooled to –20 °C before the mixture is put in the bowl.

The bowl causes the mixture to cool down and freeze.



(c) Explain why the different thermal conductivities of metal and plastic are important in the design of the bowl.

Metal _____

_____

_____

_____

Plastic _____

_____

_____

_____

(4)

(d) The liquid coolant has a freezing point below –20 °C

Explain **one** other property that the liquid coolant should have.

_____

_____

_____

_____

(2)

(e) The initial temperature of the mixture was +20 °C. The mixture froze at –1.5 °C.

A total of 165 kJ of internal energy was transferred from the mixture to cool and freeze it.

specific heat capacity of the mixture = 3500 J/kg °C

specific latent heat of fusion of the mixture = 255 000 J/kg

Calculate the mass of the mixture.

Give your answer to 2 significant figures.

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

Mass (2 significant figures) = _____ kg

(6)

(Total 14 marks)

Q2.

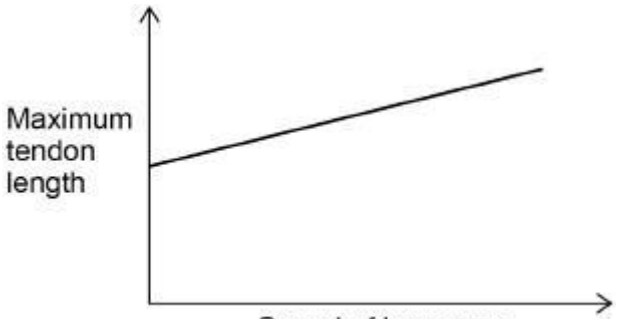
Kangaroos are large animals that travel by jumping.

The photograph below shows a kangaroo.

Each leg of a kangaroo has a tendon connected to a muscle. Each tendon can be modelled as a spring.

When a jumping kangaroo lands on the ground, the tendons stretch.

(a) The diagram below shows a sketch graph of how the maximum tendon length during a jump changes with the speed of the kangaroo.



Explain why a kangaroo can jump higher as its speed increases.

(3)

(b) A kangaroo has a maximum gravitational potential energy during one jump of 770 J

When the kangaroo lands on the ground 14% of the maximum gravitational potential energy is transferred to elastic potential energy in one tendon.

The tendon has an unstretched length of 35.0 cm

When the kangaroo lands on the ground the tendon stretches to a length of 42.0 cm

Calculate the spring constant of the tendon.

Spring constant = _____ N/m

(5)

(Total 8 marks)