Year 9 May Assessment
Physics Paper 1
Separate Science Award

Name:……

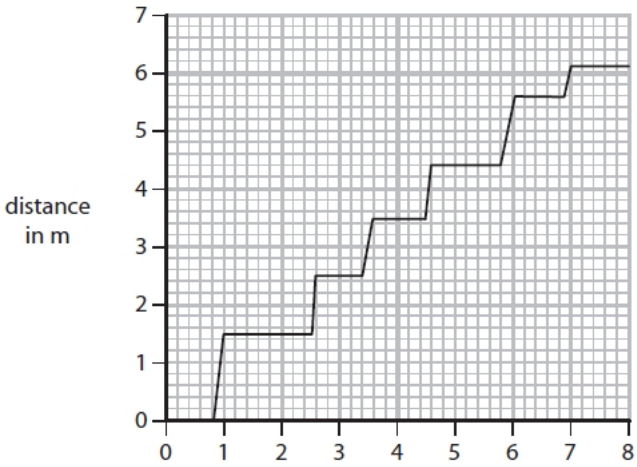
Time allowed: 45 minutes
Answer **all** questions in the spaces provided. You may use a calculator

Total Marks available	/	Teacher comment:
	%	
Level/Grade		

	Student Reflection
1. Distance-time graph	
2. Energy Transfer	
3. Change of State	
4. Density and nature of science	
5. Velocity-time graph	
6. Thermal Energy Transfer	
Overall reflection including the revision techniques you thought worked best	

Q1. The diagram shows some people waiting in a queue at a supermarket.

The queue moves forward each time a person leaves the checkout. Person X spends seven minutes in the queue before reaching the checkout. The graph shows how distance changes with time (**in seconds)** for person X.



(a) (i) What is the initial length of the queue? **(1)**

initial length = ... m

(ii) Explain how you could use the graph to work out the number of times person X is stationary. **(2)**

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(b) (i) State the equation linking average speed, distance moved and time taken. **(1)**

(ii) Calculate the average speed of person X in the queue. Give the unit. **(3)**

average speed = ... unit .....

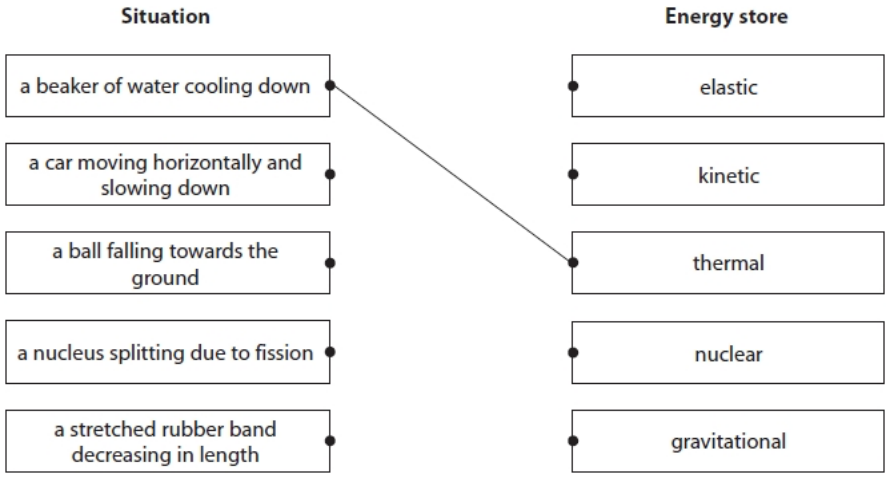
(Total for question = 7 marks)

Q2.

(a) The boxes give some situations and some energy stores.

Draw one straight line from each situation to the energy store that decreases for that situation. The first one has been done for you.

(4)



(b) Energy is transferred when a filament lamp is connected to a battery.

(i) Which method of energy transfer takes place between the battery and the lamp?

(1)

- ☒ **A** electrical
- ☒ **B** heating
- ☒ **C** mechanical
- ☒ **D** radiation

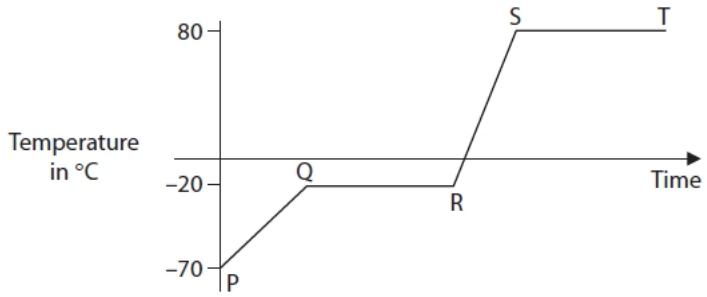
(ii) Which method of energy transfer takes place between the lamp and the surroundings?

(1)

- ☒ **A** electrical
- ☒ **B** light radiation
- ☒ **C** mechanical
- ☒ **D** sound radiation

(Total for question = 6 marks)

Q3. The diagram shows the temperature-time graph for a substance which is heated at a constant rate.



(a) (i) Which section of the graph shows when the substance is melting?

(1)

- ☒ **A** PQ
- ☒ **B** QR
- ☒ **C** RS
- ☒ **D** ST

(ii) Which section of the graph shows when all the substance is a solid?

(1)

- ☒ **A** PQ
- ☒ **B** QR
- ☒ **C** RS
- ☒ **D** ST

(iii) Draw particles in the box to show the arrangement of particles when the substance is a gas.

(1)

(iv) Which of these statements best describes the motion of particles in a gas?

(1)

- ☒ **A** they vibrate about fixed points
- ☒ **B** they are stationary
- ☒ **C** they slide past each other
- ☒ **D** they move quickly and randomly

(b) (i) Name a piece of apparatus that could be used to measure the temperature of the substance.

(1)

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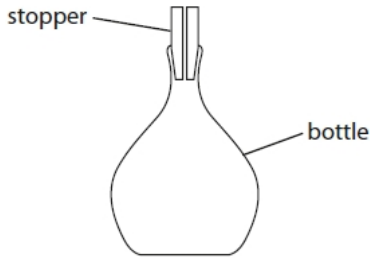
(ii) Determine the boiling point of this substance.

(1)

boiling point = ... °C

(Total for question = 6 marks)

Q4. A student uses a bottle and a stopper to find the density of an unknown liquid. The stopper fits tightly into the bottle and has a small diameter hole through it.



(a) This is the student's method.

- use a balance to find the mass of the bottle and stopper
- completely fill the bottle with water
- insert the stopper and dry the outside of the bottle
- use the balance to find the mass of the full bottle and stopper

These are the student's results.
mass of empty bottle and stopper = 63.4 g
mass of full bottle and stopper = 112.9 g

Use the student's results to determine the volume of the water in the bottle.
Give your answer to three significant figures.
[density of water = 0.998 g/cm^3]

(4)

volume = ... cm^3

(b) The student empties the bottle and then dries it.

He refills the bottle with the unknown liquid.

He measures the mass of the full bottle and stopper as 143.8 g.

Calculate the density of the unknown liquid.

(3)

density of unknown liquid = ... g/cm^3

(c) Another student uses a measuring cylinder to find the volume of the unknown liquid. Discuss the advantages and disadvantages of using each method to find the volume of the unknown liquid.

(3)

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(Total for question = 10 marks)

Q5.

(a) A speed camera is positioned at the side of a road.

© Darryl Sleath/Shutterstock

The camera measures the speed of a vehicle on the road to determine whether the vehicle is travelling too fast.
The camera takes two photographs of the vehicle 0.25 s apart.
The photographs are used to measure the distance travelled by the vehicle during this time.

(i) State the formula linking average speed, distance moved and time taken.

(ii) In the time between the two photographs, the car travels a distance of 6.5 m. Calculate the average speed of the car.

(2)

average speed = ... m/s

(iii) The speed limit of the road is 80 kilometres per hour. Determine whether the car is exceeding the speed limit. **(2)**

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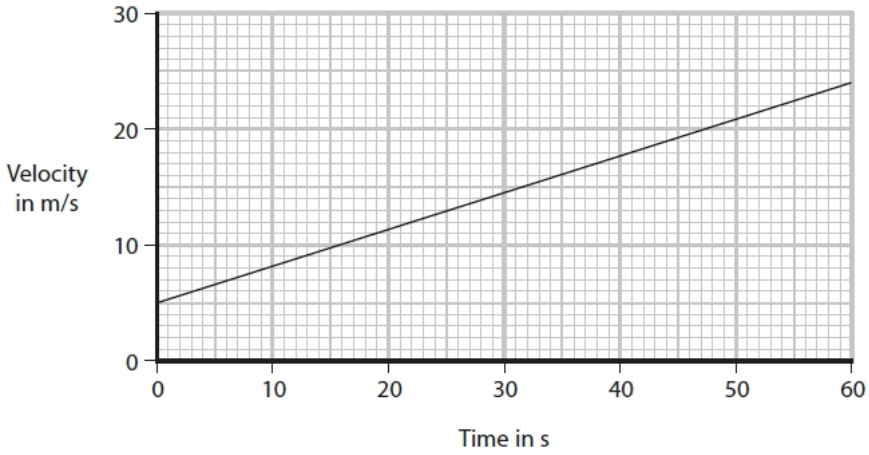
(b) The velocity-time graph shows how the velocity of a lorry changes with time.



(i) State the formula linking acceleration, change in velocity and time taken.

(1)

(iii) Calculate the acceleration of the lorry.

(2)

acceleration = ... m/s^2

(iii) Calculate the distance travelled by the lorry over the 60 seconds shown in its velocity-time graph above. (4)

(Total for question = 11 marks)

Q6. The photographs show two different breeds of cat.

© Kucher Serhii/Shutterstock

Cat X

© Eric Isselee/Shutterstock

Cat Y

Cat X has no fur and light-coloured skin. Cat Y has thick, black fur.

Both cats have the same body temperature and transfer energy to their surroundings when they are outside on a cold day.

Compare how cat X and cat Y transfer energy to their surroundings.

Refer to conduction, convection and radiation in your answer.

(6)

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(Total for question = 6 marks)