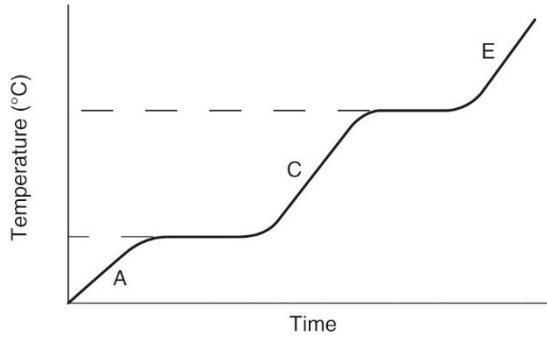


Name \_\_\_\_\_ Class \_\_\_\_\_ Date \_\_\_\_\_

1 The graph shows the temperature of a block of ice as it is heated.



- a On the graph, in the area marked E, the water is in the form of gas; it is steam.  
Explain what happens to the spacing of the molecules in the steam as its temperature increases.

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(2 marks)

- b Each of these diagrams shows the arrangement of the particles of water from the graph above, for the regions A, C and E.

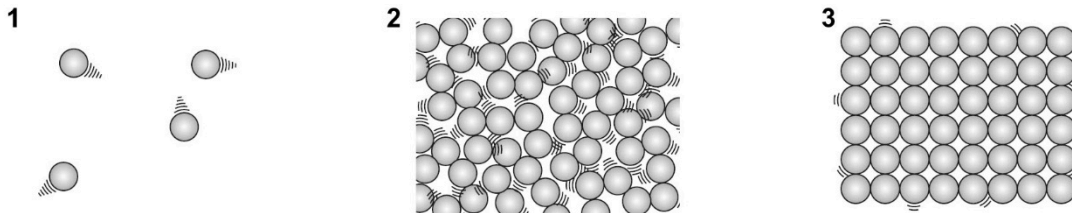


Diagram 2 shows the arrangement and movement of the particles in the region marked C on the graph. Explain how the arrangement and movement of particles tells us that diagram 1 is for region E, and diagram 3 is for region A.

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(2 marks)

**c** This is the formula for working out density:

$$\text{density} = \frac{\text{mass}}{\text{volume}}$$

The ice had a mass of 117 g and a volume of 125 cm<sup>3</sup>. Calculate its density in g/cm<sup>3</sup>. Show your working.

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(2 marks)

**d** As time goes by, the water volume increases (in the region marked C on the graph). What effect will this have on the density of the water? Tick *one* box.

- A As water volume increases, density becomes zero.
- B As water volume increases, density increases.
- C As water volume increases, density reduces.
- D As water volume increases, density stays the same.

(1 mark)

**e** Some thermometers use the way that liquids expand as they are heated to measure temperature. They use a coloured liquid in a thin tube.

Compare the differences between reading a thermometer with a thin tube and one with a wider tube.

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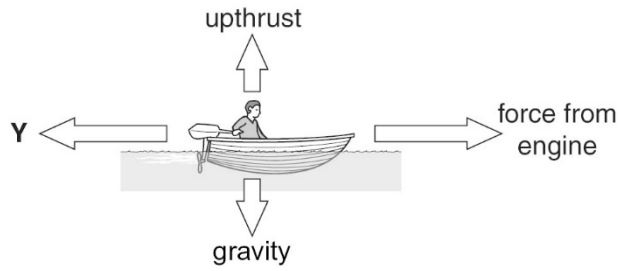
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(3 marks)

(Total for Question 1 = 10 marks)

2 This drawing shows a boat travelling across a lake. The arrows show the four forces acting on the boat.



a What is force Y?

\_\_\_\_\_ (1 mark)

b Describe what causes force Y.

\_\_\_\_\_ (1 mark)

c Describe how you could change the design of the boat to reduce force Y (when the boat is travelling at the same speed).

\_\_\_\_\_  
\_\_\_\_\_ (1 mark)

d Wood floats in water. Explain why.

\_\_\_\_\_  
\_\_\_\_\_ (1 mark)

(Total for Question 2 = 4 marks)

3 a As you go deeper under water, what happens? Tick *one* box.

- A Pressure stays the same all the way down.
- B Pressure decreases as you go deeper.
- C Pressure increases as you go deeper.
- D Pressure becomes zero.

(1 mark)

**b** The atmosphere creates pressure on your body and everything around you.

Which of these statements about atmospheric pressure on your body is true? Tick *one* box.

- A It is the result of your weight force balancing atmospheric pressure.
- B It is caused by a vacuum.
- C It is caused by forces from air particles hitting you.
- D It is the same at all heights.

(1 mark)

(Total for Question 3 = 2 marks)

**4** This table compares the speed of light and the speed of sound in different substances. However, only two of the rows in the table are correct.

One row has a tick in the last column to show that it is correct. Which other row is correct? Put a tick in *one* more box.

Light travelling in...	Sound travelling in...	Comparison	Is comparison correct?
a vacuum	air	light is faster	✓
water	glass	sound is faster	
glass	a vacuum	light is faster	
a vacuum	a vacuum	sound is faster	
air	iron	sound is faster	

(1 mark)

(Total for Question 4 = 1 mark)

**5** Transparent materials let light through easily. Give the word that we use for objects that block all light.

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(1 mark)

(Total for Question 5 = 1 mark)

**6** If you shine white light through a glass prism, you can split it into a rainbow (also called a spectrum).

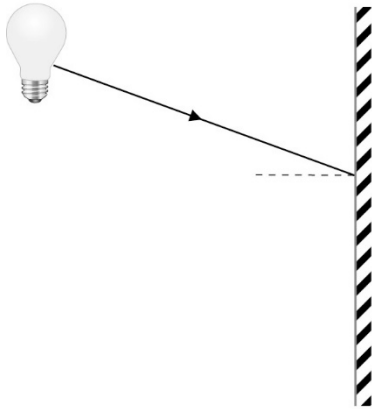
Which word describes this effect? Tick *one* box.

- A absorption
- B diffraction
- C dispersion
- D reflection

(1 mark)

(Total for Question 6 = 1 mark)

7 The diagram shows one ray of light travelling from a bulb to a mirror.



a Where will the ray from the light bulb go after it hits the mirror? Draw the ray accurately on the diagram.

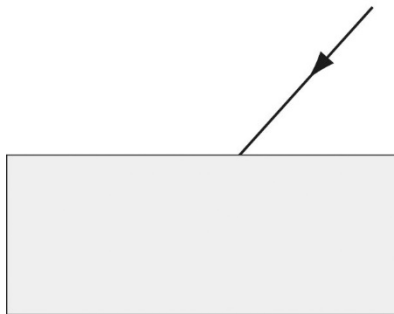
(1 mark)

b Where will the reflected image of the light bulb appear to be? Draw the reflected image accurately on the diagram. Include lines to show how you worked out where to draw the reflected image.

(1 mark)

(Total for Question 7 = 2 marks)

8 The drawing shows one ray of light moving in air and reaching the edge of a glass block.



a Draw accurately on the diagram a normal line where the ray reaches the glass block.

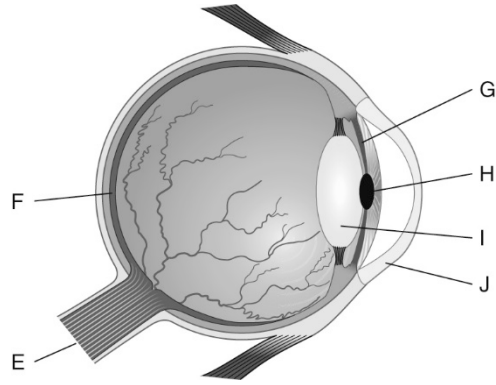
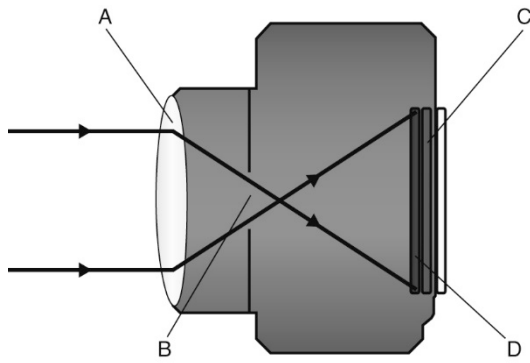
(1 mark)

b The refracted light ray passes through and out of the glass block. Draw accurately on the diagram the path of the refracted light.

(2 marks)

(Total for Question 8 = 3 marks)

9 The drawing shows the structure of a simple camera and the human eye.



a What is the name of part A? Tick *one* box.

- A aperture
- B lens
- C shutter
- D sensor

(1 mark)

b Which label points to the part called the cornea? Tick *one* box.

- B
- C
- F
- J

(1 mark)

c Which part lets light into the camera? Which part lets light enter the eye? (Give the letters and the names.)

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(1 mark)

d Which part of the camera senses light? Which part of the eye senses light? (Give the letters and the names.)

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(1 mark)

(Total for Question 9 = 4 marks)

**10** Fariza wears a red hat in her school play. On stage, she is lit by a spotlight shining only green light. When our eyes receive no light from an object, it looks black. Explain why Fariza's hat looks black on stage.

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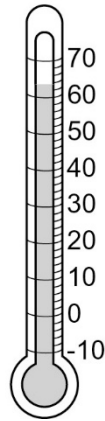
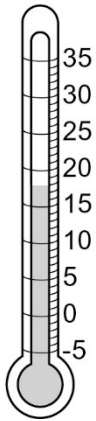
(2 marks)

(Total for Question 10 = 2 marks)

**11** Elena takes measurements with two thermometers. The thermometer on the left shows the temperature of the air in Elena's kitchen. The one on the right shows the temperature of the tea in her cup.

Kitchen air

Cup of tea



**a** Write down the temperature shown on each thermometer.

Kitchen air = \_\_\_\_\_ °C

Cup of tea = \_\_\_\_\_ °C

(1 mark)

**b** Energy is transferred from the cup of tea to the kitchen air. Explain why.

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(1 mark)

**c** Look closely at the two thermometers. Which one can measure temperature more accurately? Explain your choice.

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(2 marks)

(Total for Question 11 = 4 marks)

**12** Two electric fans have stickers on them with the power ratings:

Fan A power = 800 W

Fan B power = 1.2 kW

**a** State which fan has the higher power rating.

\_\_\_\_\_ (1 mark)

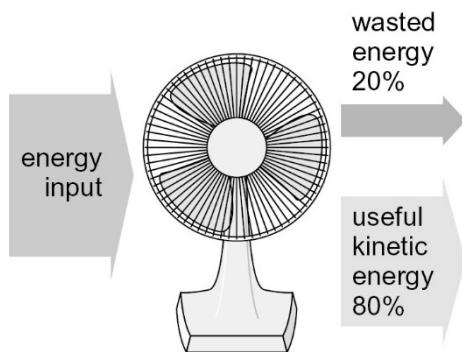
**b** Calculate how many joules of energy fan A transfers in one minute.

\_\_\_\_\_ (1 mark)

**c** Calculate how many kilowatt-hours (kWh) of energy fan B transfers in one day.

\_\_\_\_\_ (1 mark)

The drawing shows how fan A uses energy.



**d** State the efficiency of fan A.

\_\_\_\_\_ (1 mark)

**e** If 2200 J of energy is supplied to fan A, how many joules are wasted?

\_\_\_\_\_ (1 mark)

**f** Give *one* way in which fan A might waste energy.

\_\_\_\_\_ (1 mark)

(Total for Question 12 = 6 marks)



**13** Marek gets a coat and hat for the cold winter weather. The coat has a silver-coloured lining and thick padding with air trapped in it.



**a** The silver lining helps stop Marek losing heat on a cold day.  
State the type of heat transfer that the silver lining reduces.

\_\_\_\_\_ (1 mark)

**b** Describe how the trapped air in the coat's padding reduces heat loss.

\_\_\_\_\_ (1 mark)

**c** Marek's teacher says that, without his hat, Marek could lose heat by convection, even when there is no wind.

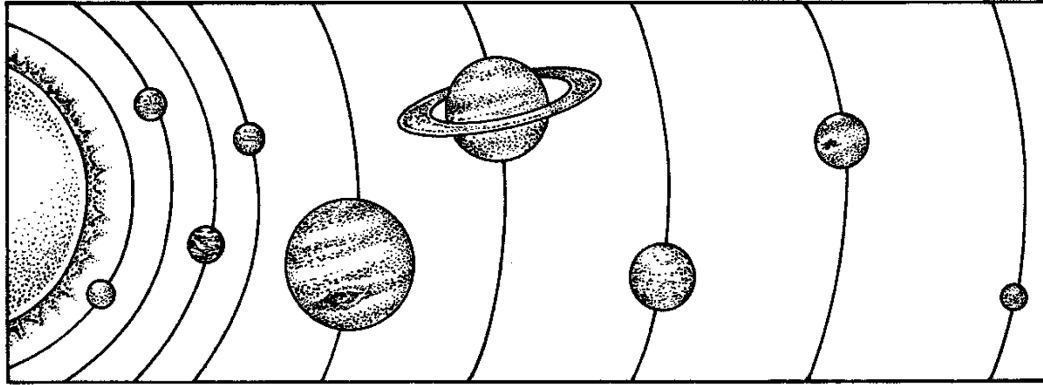
Explain how convection can transfer energy away from Marek's head.

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

(3 marks)

(Total for Question 13 = 5 marks)

14 This drawing shows an old model of the Solar System.



a This model of the Solar System was updated in 2006 to the one we use today. Describe what has changed in our current model of the Solar System.

\_\_\_\_\_ (1 mark)

b Mars has two moons, but they do not give out their own light. Describe how astronomers can see these moons.

\_\_\_\_\_ (1 mark)

c Mercury's year lasts for 88 Earth days. Explain why this tells you that Mercury is closer to the Sun than the Earth is.

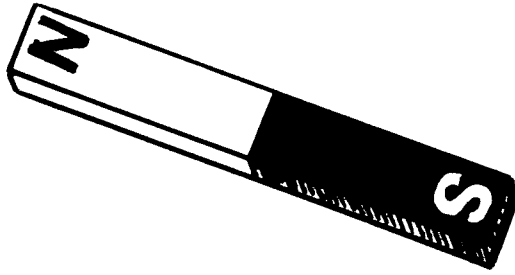
\_\_\_\_\_ (2 marks)

d Mercury has no seasons – its days are the same length all year. What does this tell you about Mercury's axis?

\_\_\_\_\_ (1 mark)

(Total for Question 14 = 5 marks)

**15** This is a drawing of a bar magnet.



**a** On the diagram, draw the magnetic field around the bar magnet.

(2 marks)

**b** A compass for navigation contains a small bar magnet. Explain why a compass contains a magnet.

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(2 marks)

(Total for Question 15 = 4 marks)

**16** Imagine an astronaut travelling in space.

**a** Which of these would change the *mass* of the astronaut? Tick *all* the boxes that apply.

- A having a haircut
- B eating lunch
- C going to the Moon
- D orbiting the Earth at a constant distance

(1 mark)

**b** Which of these would change the *weight* of the astronaut? Tick *all* the boxes that apply.

- A having a haircut
- B eating lunch
- C going to the Moon
- D orbiting the Earth at a constant distance

(1 mark)

(Total for Question 16 = 2 marks)

**17 a** The star Proxima Centauri is 4.2 light years from Earth. What does this mean?

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(1 mark)

**b** Proxima Centauri does not reflect light from our Sun. Give the reason why we can see Proxima Centauri.

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(1 mark)

**c** Proxima Centauri and our Sun are both in a large spiral-shaped group of stars in the Universe.

**i** What is the name for a large group of stars like this? Tick *one* box.

- A asteroid belt
- B galaxy
- C planet
- D satellite

(1 mark)

**ii** State the name of the large group of stars that includes Proxima Centauri.

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(1 mark)

(Total for Question 17 = 4 marks)

TOTAL FOR TEST = 60 MARKS