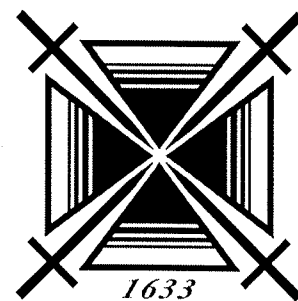


# Physics Entrance Exam



# 14+

Name:

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Current School:

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This paper lasts 30 minutes

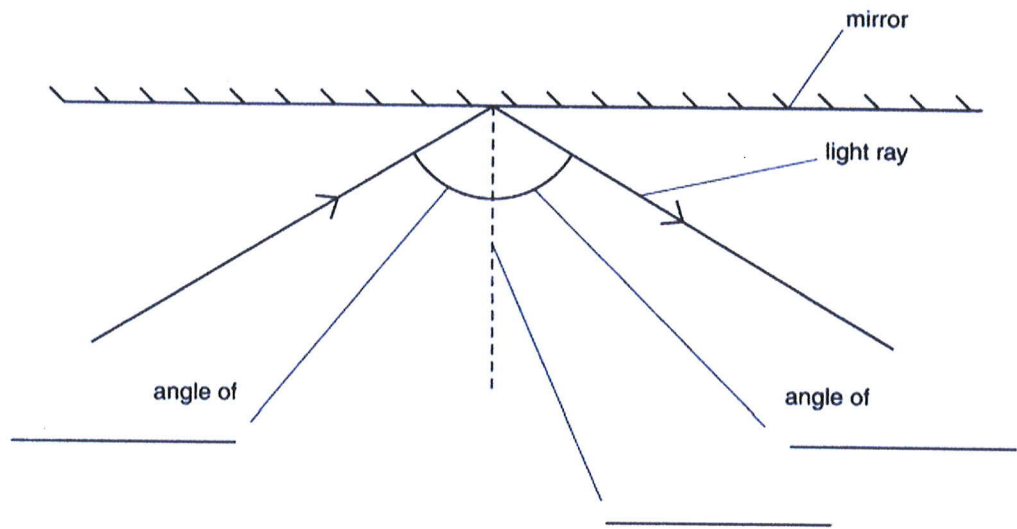
Attempt ALL questions

The number of marks available is shown in brackets

**Good Luck!**

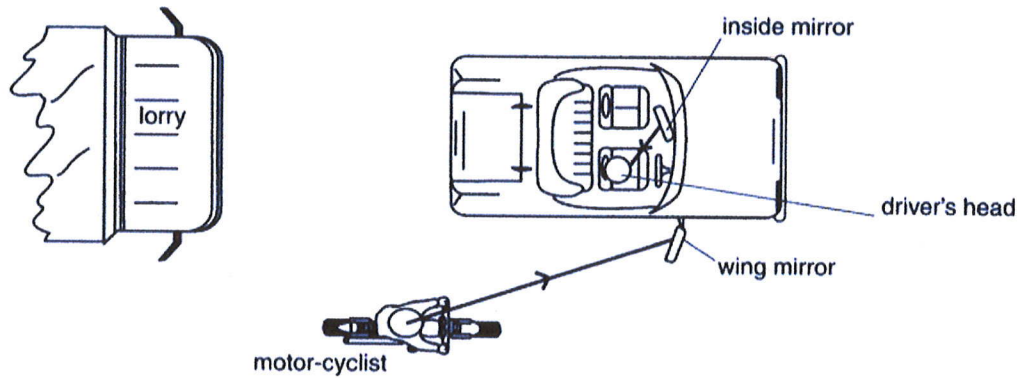
1

- (a) The diagram shows light reflecting off a plane mirror. Finish the **three** labels on the diagram.



[3]

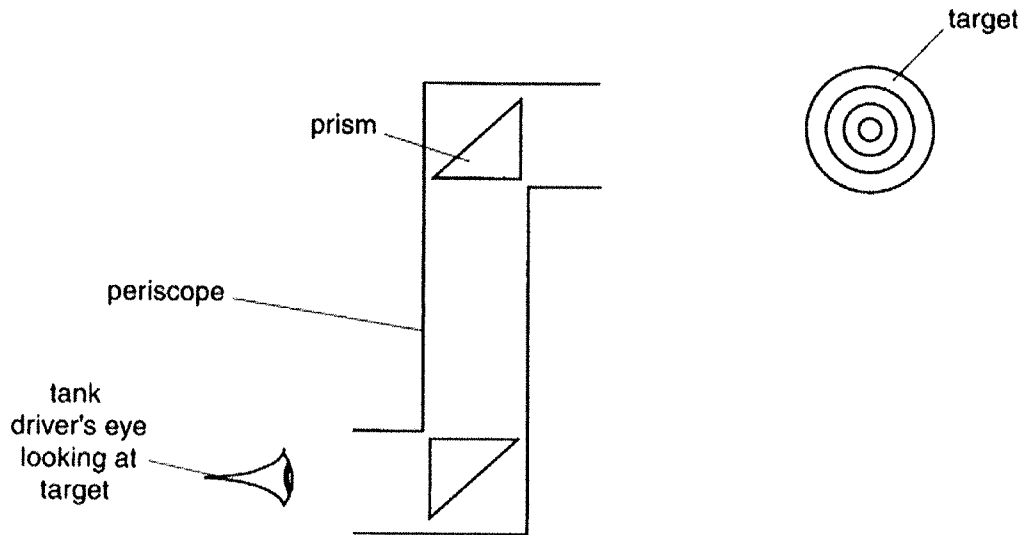
- (b) The diagram shows a driver in a car as seen from above. The car has two plane mirrors which the driver can use.



Finish the ray diagrams to show how light reaches the car driver's eyes from:

- (i) the motor-cyclist, reflected from the wing mirror.
- (ii) the lorry, reflected from the inside mirror.
- (c) Tank drivers use a periscope to see where they are going.

[3]



Describe what happens to the light as it passes through the periscope.

You may draw on the diagram to help you answer the question.

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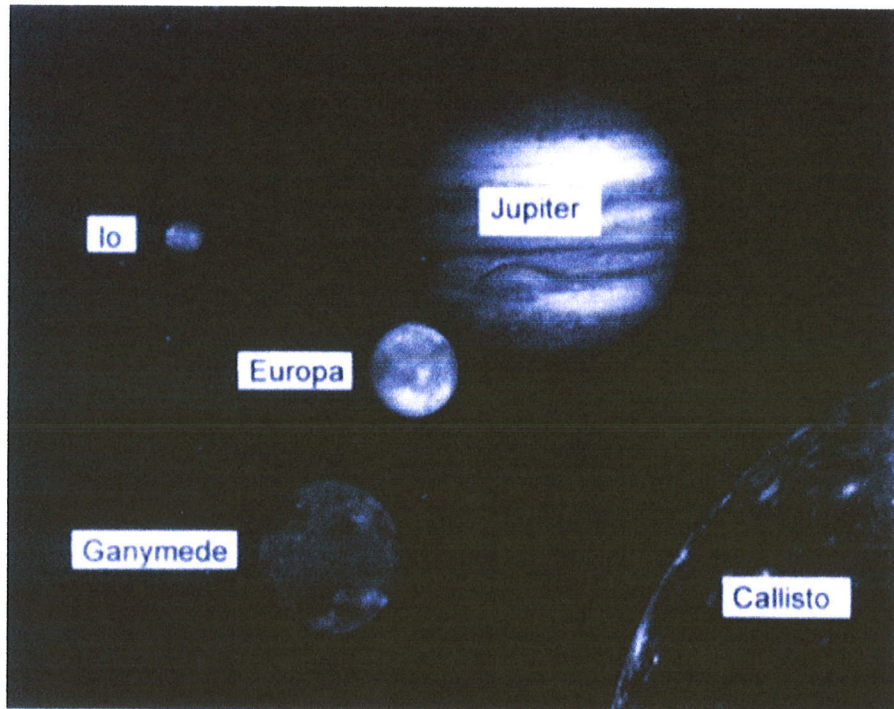


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[3]

2

Jupiter is the largest planet in the Solar System.  
 It is more massive than all the other planets put together.  
 Jupiter appears as bright as Mars even though it is much further from the Sun.  
 Apart from the Sun, the Moon and Venus, Mars and Jupiter are the brightest objects in the sky.



(a) The Solar System contains many objects.

Put rings around the names of **two** objects which are planets.

Mars

Moon

Sun

Venus

[2]

(b) Many objects orbit Jupiter.

Io, Europa, Ganymede and Callisto are the four largest.

They were discovered by Galileo with his telescope in 1610.

What are these objects called?

Put ings around the **two** correct answers.

asteroids

comets

meteorites

moons

satellites

[2]

(c) Finish this sentence.

The planets in our Solar System stay in orbit because of gravitational forces between each planet and the \_\_\_\_\_.

[1]

(d) The Sun 'wobbles' very slightly about its position in the centre of the Solar System.

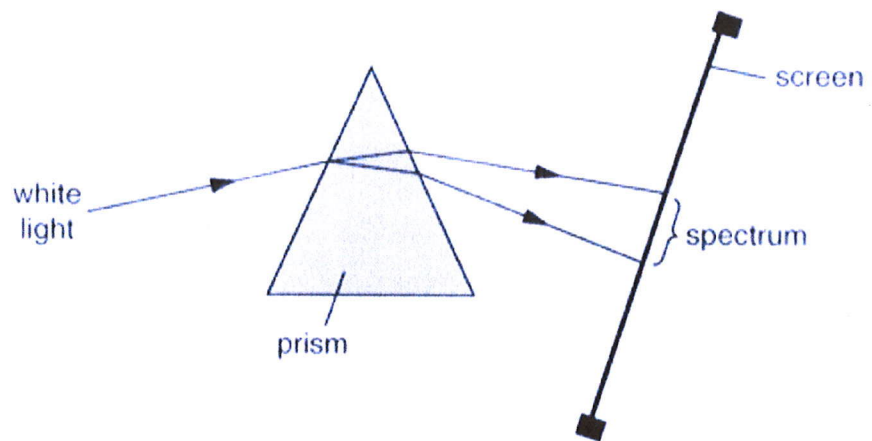
This is due to the gravitational pull of the planets.

Suggest why this 'wobble' is mainly due to the planet Jupiter.

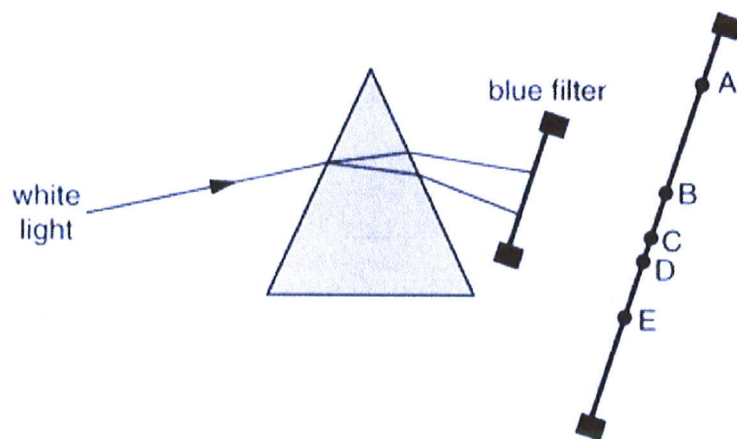
[1]

3

The diagram shows white light dispersed by a prism.



(a) A blue filter is placed in the path of the light. Only blue light is seen on the screen.



(i) Put a **ring** around the letter which represents the correct position of the blue light on the screen.

A B C D E

[1]

(ii) What is seen on the screen if the blue filter is replaced by a red filter?

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[1]

(iii) What is seen if a red filter **and** a blue filter are used together?  
Explain your answer.

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[2]

(b) Use your ideas about waves to explain why the white light is dispersed by the prism.

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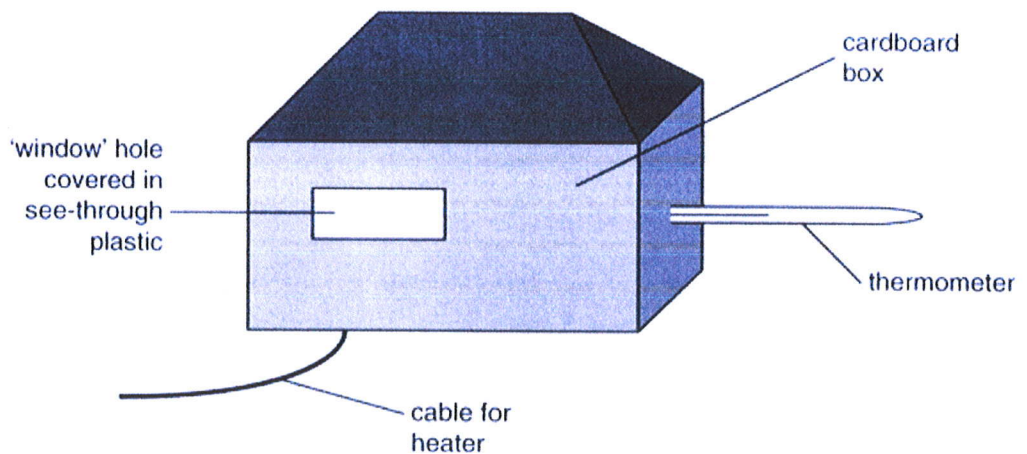
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[2]

4

Four groups of students investigate how the heat loss from a model house can be reduced.

Each group has the same type of model house.



The 'house' is a cardboard box with a roof and hole for the window.

The hole is covered with a see-through plastic window.

An electric heater is used to warm the house.

A thermometer shows the temperature inside the house.

(a) The heater is switched on.

How does the thermometer show that the heater is transferring energy to the house?

\_\_\_\_\_ [1]  
After twenty minutes, the heater is switched off.

The students record the temperature for another twenty minutes.

(b) Group 1 wrote this report.

	<u>GROUP 1</u>
	<i>Our house was used as the 'control' for the other groups, so we did not change our house in any way.</i>
	<i>The temperature fell when we turned the heater off.</i>

(i) Why did the temperature fall when they turned the heater off?

\_\_\_\_\_ [1]

(ii) Why did this group not make any changes to their 'house'?

\_\_\_\_\_ [1]

(c) Each of the other three groups changed the basic model house in a different way. Energy may be transferred by **conduction**, **convection** and **radiation**.

Use the words **conduction**, **convection** and **radiation** in your explanations of the students' observations.

(i) Group 2 wrote this report.

	<u>GROUP 2</u>
	<i>We covered the roof of our house with silver foil.</i>
	<i>The temperature did not fall as quickly as Group 1's house.</i>

Explain the observations of Group 2.

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_ [2]



(ii) Group 3 wrote this report.

	GROUP 3
	We lined the inside of the roof of our house with cotton wool.
	The temperature did not fall as quickly as Group 2's house.

Explain the observations of Group 3.

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[2]

(iii) Group 4 wrote this report.

	GROUP 4
	We took the polythene away from the window of our house.
	The temperature fell more quickly than the temperature of any other
	group's house.

Explain the observations of Group 4.

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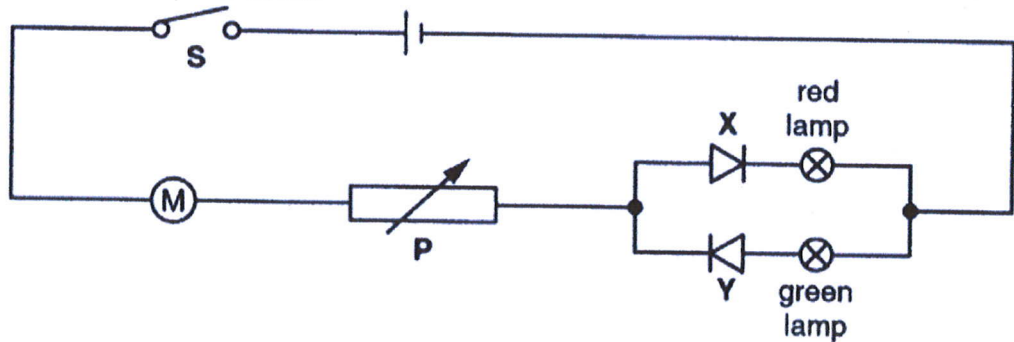
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[2]

5

Karen wires up this circuit.



(M) is the symbol for an electric motor.



(a) Finish the table by writing the names of components **S**, **P** and **X**.

Choose your answers from this list.

diode

LED

LDR

resistor

switch

variable resistor

component	name
<b>S</b>	
<b>P</b>	
<b>X</b>	

[3]

(b) Karen wants to make the motor spin faster.

(i) Which component must she adjust? \_\_\_\_\_

(ii) Explain why this works.

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[2]

(c) Karen closes **S**. She writes this down.

	• Motor spins
	• Red lamp is on
	• Green lamp is off

Use your ideas about current in circuits to explain her observations.

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[3]

(d) Karen reverses the cell. The motor spins in the opposite direction.

What happens to the lamps? Finish the sentences.

The red lamp \_\_\_\_\_

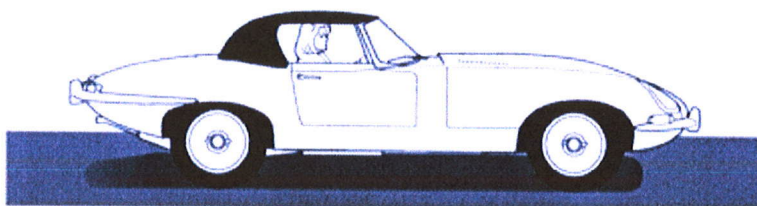
The green lamp \_\_\_\_\_

[1]

6

This question is about energy and movement.

Penny drives her car along a level road at a constant speed.



(a) Explain why the engine still has to work even though the car is not accelerating.

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[2]

(b) Most of the energy from the petrol used in the engine is 'wasted'.  
Suggest Most of the energy from the petrol used in the engine is 'wasted'.  
Suggest two ways in which energy is wasted. ways in which energy is wasted.

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[2]

(c) The windows of some very expensive cars are double-glazed.  
Suggest **two** advantages of double-glazing.

1. \_\_\_\_\_

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2. \_\_\_\_\_

\_\_\_\_\_

[2]

7

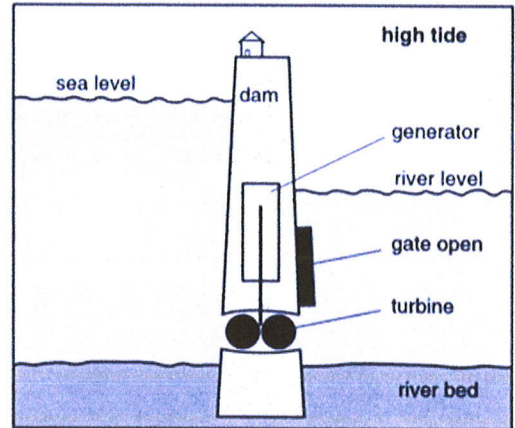
This question is about generating electricity.

A dam has been built across a river where it meets the sea.

The levels of the water go up and down twice a day.

The diagram shows the water levels around the dam at high tide.

The dam contains a tidal power station.



(a) Describe how the energy of the water can be used to produce electricity.

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

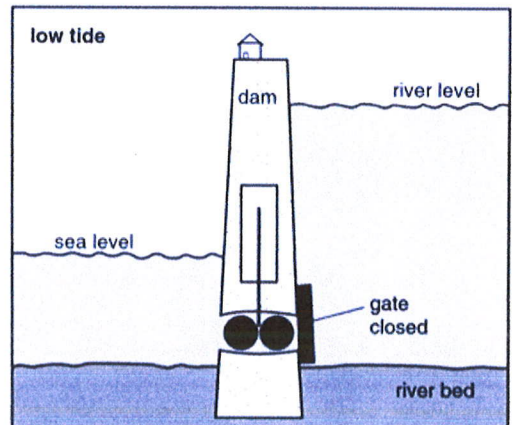
[3]

(b) Tidal and hydro-electric power are **renewable** sources of energy. Write down the name of **one** other renewable source of energy.

\_\_\_\_\_

[1]

(c) The gate on the dam was closed until low tide. This keeps the water level in the river high as shown in the diagram on the right.



Suggest **one** problem this can cause to the environment.

\_\_\_\_\_