SURNAME ..... FIRST NAME .....
(Block capitals, please)
JUNIOR SCHOOL ..... SENIOR SCHOOL .....

Independent Schools Examinations Board

COMMON ENTRANCE EXAMINATION AT 13+

SCIENCE

PHYSICS

Wednesday 1 March 2006

Please read this information before the examination starts.

- This examination is 40 minutes long.
- The answers should be written on the question paper.
- Answer **all** the questions.
- Calculators may be required.

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1. Underline the number, word or phrase which best completes each of the following sentences.

(a) The mass of this examination paper is most likely to be

3 g **30 g** **300 g** **3 000 g.**

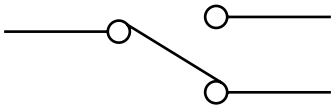
(b) If the particles in a substance are arranged in a regular pattern, it is likely to be a

gas **liquid** **solid** **vacuum.**

(c) A planet whose distance from the Sun is less than that of the Earth is

Mars **Jupiter** **Saturn** **Venus.**

(d) The type of switch denoted by this symbol is

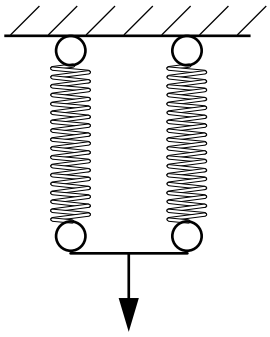


push **relay** **SPDT** **SPST.**

(e) A unit used for measuring the kinetic energy of a car is

hertz **joule** **km/h** **newton.**

(f) When two springs are hung up as shown,



they are said to be in

line **opposition** **parallel** **series.**

(g) We know that Mars is a planet because it

can be seen at night with the naked eye

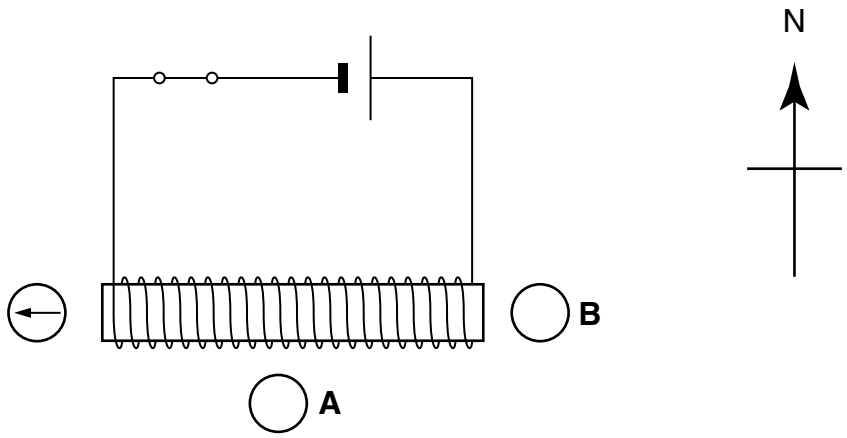
can be seen in detail through a telescope

orbits the Sun

reflects light from the Sun.

(7)

2. The diagram shows a length of copper wire coiled round a wooden rod. Three compasses are placed round the rod as shown.



(a) Draw arrows on the compasses labelled **A** and **B** to show the direction of the magnetic field at those places. (2)

(b) If the switch in the circuit is opened, what will happen to the needle on compasses **A** and **B**?

.....

..... (2)

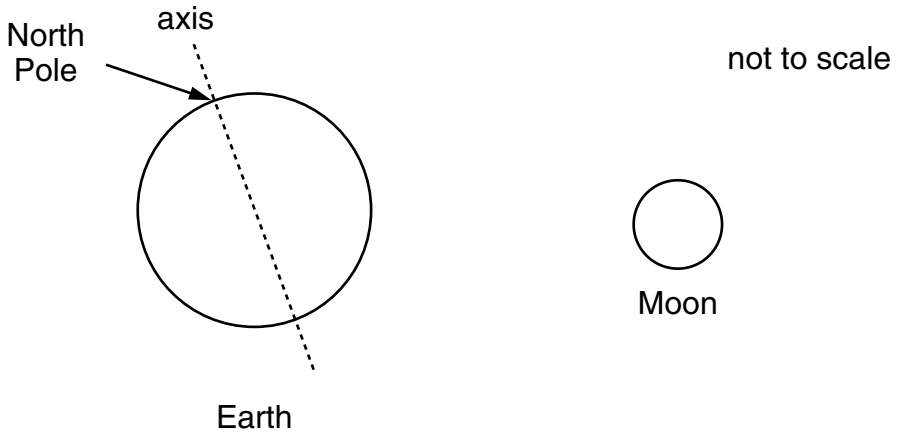
(c) Write down one way to reverse the direction of the magnetic field.

..... (1)

(d) Write down one way to increase the strength of the magnetic field.

..... (1)

3. The diagram shows the Earth and the Moon during an eclipse of the Moon.



(a) Draw on the diagram the position of the Sun. (1)

(b) (i) Shade in on the diagram the part of the Earth which is in darkness at this time. (1)

(ii) Explain why this part of the Earth does not stay in darkness all the time.

.....

..... (1)

(c) In the position shown, is it winter or summer in the northern half of the Earth?

..... (1)

How can you tell?

..... (1)

4. Phil and Sally are trying to measure the thickness of a single sheet of paper. They both use the same apparatus. Phil uses a pile of 10 sheets; Sally uses a pile of 100 sheets.

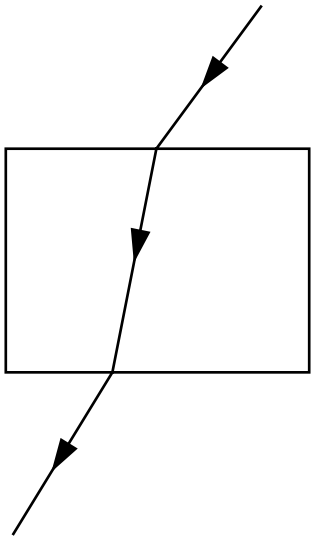
Give a reason why Sally's answer may be more accurate than Phil's.

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..... (2)

5. The diagram shows a ray of blue light passing through a glass block.

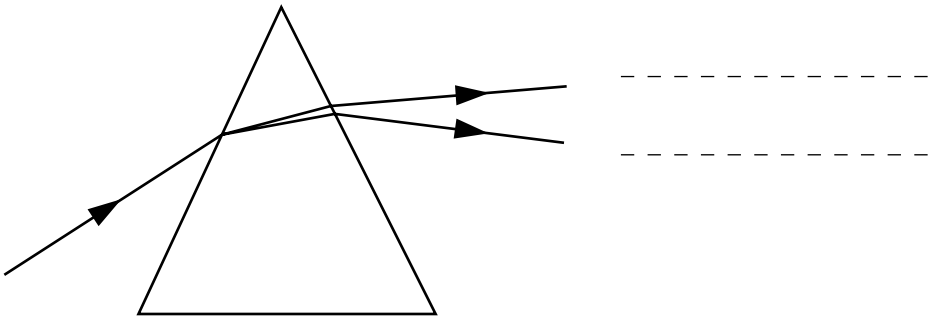


(a) When the light enters the glass block, it changes direction. What name is given to this effect?

..... (1)

(b) On the diagram above, draw in the path of the light which would be reflected from the first surface of the block. (2)

(c) The diagram shows a ray of white light passing through a prism.



The prism splits the light into several colours. The two extreme ends are shown. Write beside each of these rays which colour it **could** be. (3)

6. Tim is walking along the cliffs beside a golf course. He watches a golfer hit the ball and he hears the sound of the club hitting the ball a fraction of a second after he sees the club hit the ball.

(a) Explain why.

.....

..... (2)

Tim watches the player hit the ball again; he estimates that the ball is travelling 100 m in 2.5 s.

(b) Calculate the average speed of the ball in m/s.

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..... (2)

The ball is hit upwards. When it falls back to the flat fairway, it rolls to a halt.

(c) (i) Which form of energy allows the golfer to hit the ball?

..... (1)

(ii) Which form of energy does the ball gain as it rises into the air?

..... (1)

(iii) Into which form of energy is most of this transferred as the ball falls?

..... (1)

(iv) The energy of the ball is transferred into various forms as the ball hits the ground. Name two of these forms.

1 ..... (1)

2 ..... (1)

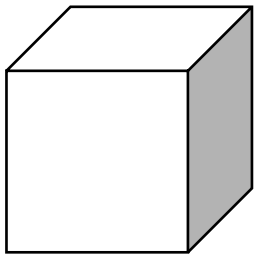
(d) (i) Which force causes the ball to fall to the ground?

..... (1)

(ii) Which force causes the ball to come to a halt?

..... (1)

7. Each edge of this cube measures 20 cm.



(a) Calculate the volume of the cube in cm^3.

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..... (2)

(b) The mass of the cube is 9.6 kg. Show that its density is 1.2 g/cm^3.

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..... (3)

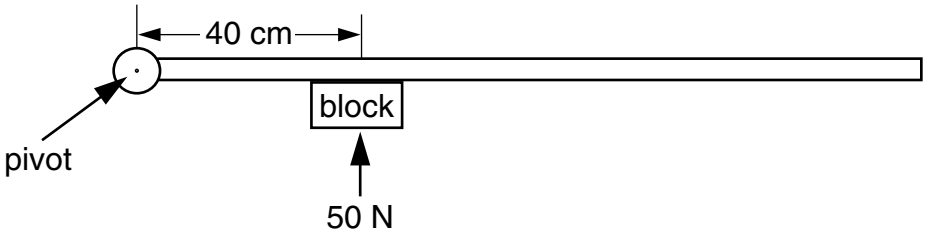
(c) Water has a density of 1.0 g/cm^3. Will the cube float or sink if it is placed in water? Explain your answer.

answer: ..... (1)

reason: .....

..... (1)

8. The diagram shows a plank pivoted at one end, resting on a block. Someone is pushing upwards with a force of 50 N on the block.



(a) Calculate the moment of the 50 N force about the pivot.

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..... (3)

The 50 N force is exerted over an area of 25 cm^2 of the block.

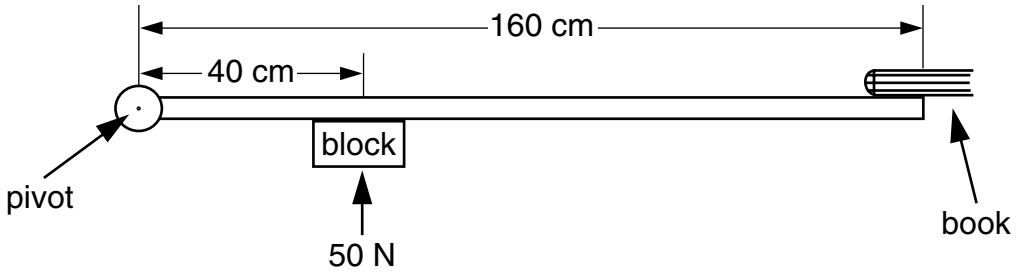
(b) Calculate the pressure which the force is exerting on the block.

.....

.....

..... (3)

The diagram now shows a book on the right hand end of the plank; the book just keeps the plank balanced.



(c) Show that the weight of the book is 12.5 N. You should ignore the weight of the plank.

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..... (3)

9. You are given three torches, all of which look similar, but all of which you think shine with a slightly different brightness.

You have available a LDR, a sensitive ammeter and a battery.

(a) Draw a diagram of the circuit you would use to measure the brightness of a torch.

(3)

(b) How could you use this apparatus to compare the brightness of each of the three torches? You should explain how you would make your test a fair one.

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..... (4)

(Total marks: 60)