Bangladesh International Tutorial Limited

Physics Worksheet

Class-X

Worksheet- 05

Subject Teacher- P.K. Saha

Total Marks- 50

Name: _____

1.

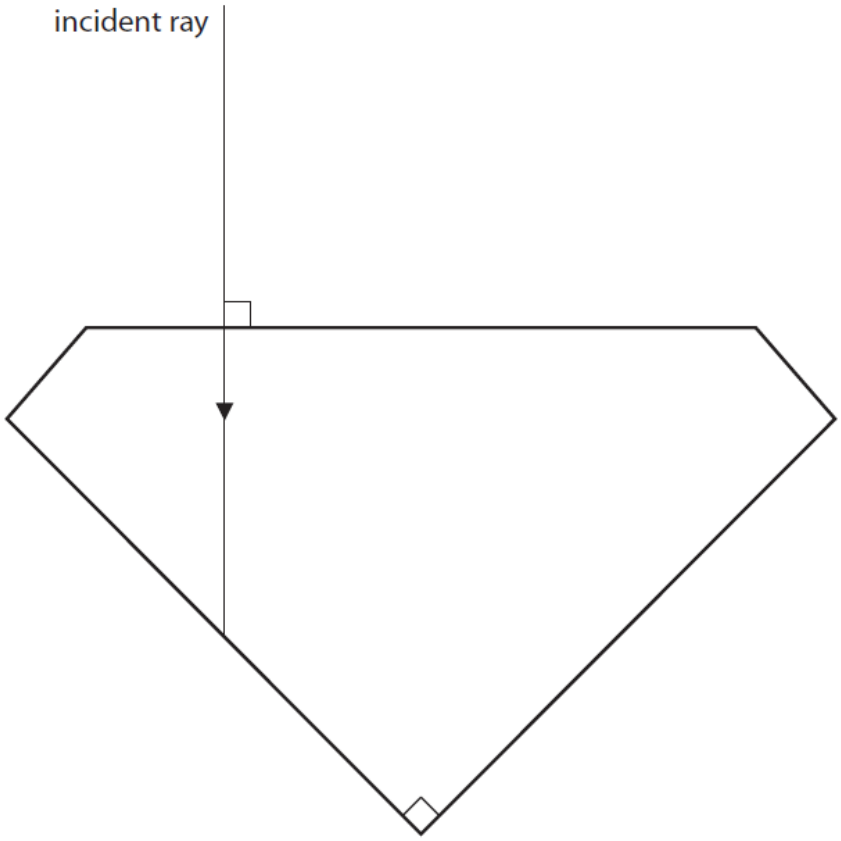
Diamonds are used in jewellery.

Diamonds are cut to increase the effect of total internal reflection of light.

The critical angle for diamond is 24°.

(a) Continue the incident ray on the diagram to show the path of the ray until it emerges from the diamond.

(3)



(b) (i) State the equation linking critical angle and refractive index.

(1)

(ii) Calculate the refractive index of diamond.

(3)

refractive index = ...

(c) State another use of total internal reflection.

(1)

.....

.....

2.

(a) Wind turbines are used to generate electricity.

What is the useful energy transfer in a wind turbine?

(1)

☒ **A** chemical to kinetic

☒ **B** electrical to kinetic

☒ **C** kinetic to chemical

☒ **D** kinetic to electrical

(b) Wind turbines use a renewable energy resource to generate electricity.

State two other methods of generating electricity using renewable energy resources.

(2)

1 .....

2 .....

(c) Modern wind turbines operate with an efficiency of 30%.

(i) State a type of energy that is wasted by the wind turbine.

(1)

.....

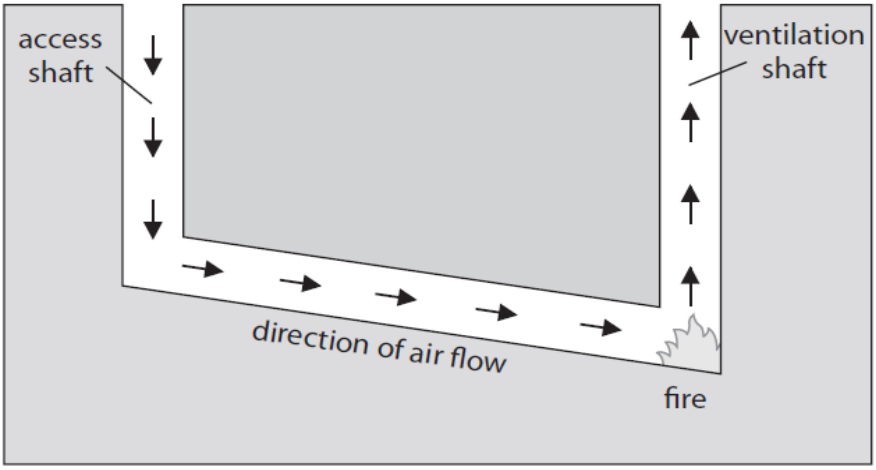
(ii) Draw a labelled Sankey diagram for a modern wind turbine.

(3)

3.

Before the invention of modern air pumping systems, fires were sometimes used to help ventilate mines.

A fire was lit at the bottom of the ventilation shaft to make sure that fresh air flowed in to the mine through the access shaft, as shown in the diagram.



(a) The passage explains the movement of air in the mine.

Use words from the box to complete the passage.

Each word may be used once, more than once, or not at all.

(4)

conduction	contracts	faster	expands
increases	convection	decreases	slower

Air is heated by the fire and the air molecules move ..... .

The air ..... as the molecules move further apart.

The density of the air ..... and the hot air rises.

Cold air flows in to replace the hot air and the process continues as a

..... current.

(b) A large rock of mass 50 kg is lifted 80 m to remove it from the mine.

(i) State the equation linking gravitational potential energy (GPE), mass, *g* and height.

(1)

(ii) Calculate the gain in GPE when the rock is lifted 80 m.

(2)

gain in GPE = ... J

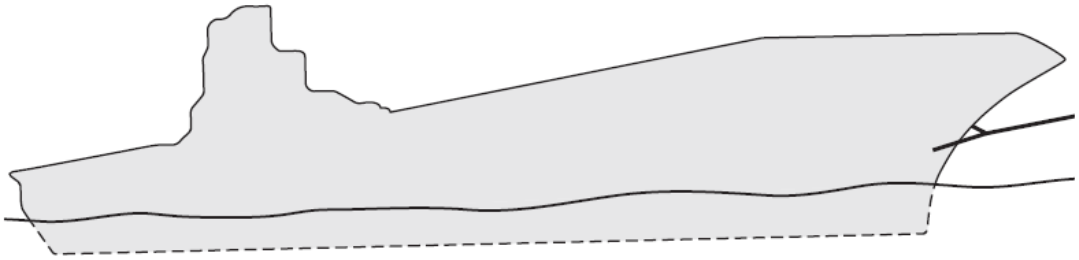
(iii) State the work done in lifting the rock.

(1)

work done = ... J

4.

A ship is taken out to sea before being intentionally sunk.



(a) The ship is floating on the water and is not moving.

Add two labelled arrows to the diagram to show the forces acting on the ship.

(2)

(b) The ship is then sunk.

It sinks to a depth of 48 m below the surface of the sea.

(i) State the equation linking pressure difference, height, density and *g*.

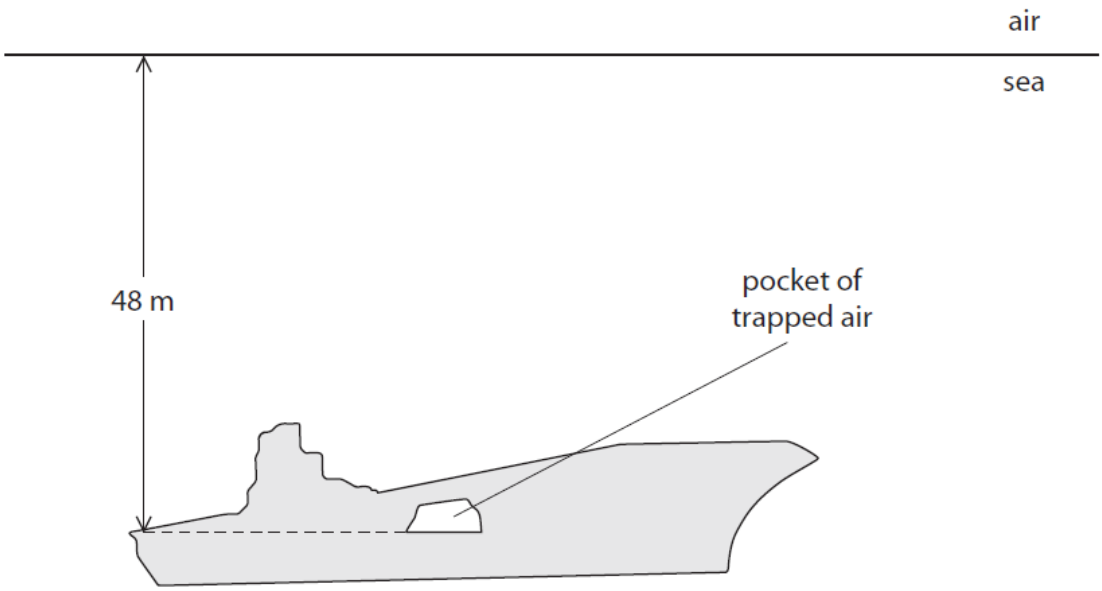
(1)

(ii) The density of sea water is 1030 kg/m^3.

Show that the pressure difference from the surface is about 500 kPa when the ship is at a depth of 48 m.

(2)

(c) A small pocket of air is trapped inside the ship as it sinks.



Air has a pressure of 100 kPa at the surface of the sea.

(i) Calculate the total pressure of the air at a depth of 48 m below the surface.

(1)

pressure = ... kPa

(ii) The volume of trapped air is 24 m^3 at the surface of the sea.

Calculate the volume of the trapped air at a depth of 48 m below the surface.

(3)

volume = ... m^3

5.

This question is about magnetic fields.

(a) Describe an investigation to show the shape of the magnetic field for a permanent bar magnet.

(3)

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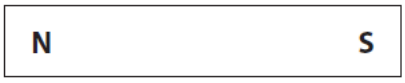
(b) The diagram shows a bar magnet.

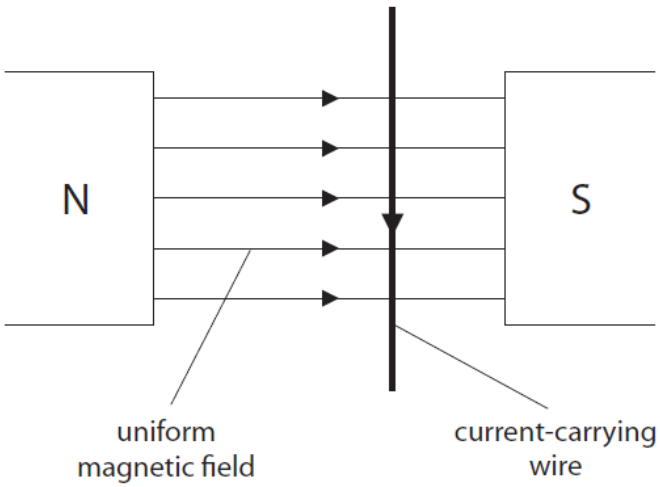
Draw the magnetic field pattern of the bar magnet.

(3)



(c) A student uses two bar magnets to create a uniform magnetic field.

She places a current-carrying wire at right angles to the magnetic field, as shown in the diagram.



(i) The student observes that the wire experiences a force.

What is the direction of the force on the wire?

(1)

- ☒ **A** to the left
- ☒ **B** to the right
- ☒ **C** out of the page
- ☒ **D** into the page

(ii) State two changes, each of which would reverse the direction of the force.

(2)

1 .....

.....

2 .....

.....

(iii) The student moves the bar magnets further apart.

Explain what effect this would have on the force on the wire.

(2)

.....

.....

.....

6.

A student investigates how the current in a filament lamp varies as the voltage across it changes.

(a) Draw a suitable circuit diagram for this investigation.

(3)

(b) Describe a method the student could use for this investigation.

(4)