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SECOND SEMESTER EXAMINATION
FOUNDATION IGCSE:: 2013-2014

SUBJECT: PHYSICS

CLASS: VIII
NAME: ....................
DATE: 4/3/14

MARKS: 100
TIME: 2 hrs

INSTRUCTIONS:
Write your name on all the work you hand in.
Write in dark blue or black pen.
You may use a pencil for any diagrams, graphs or rough working.
Do not use staples, paper clips, highlighters, and glue or correction fluids.
Answer all questions.
At the end of the examination, fasten all your work securely together

<table>
<thead>
<tr>
<th>Q. No.</th>
<th>Marks</th>
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<tbody>
<tr>
<td>1</td>
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SECTION-I (30 Marks)

Qn. 1 A micrometer is used to measure the diameter of a uniform wire.

What is done to obtain an accurate answer?
A. Find the reading and add or subtract the zero error.
B. Make the micrometer horizontal.
C. Subtract the fixed scale reading from the rotating scale reading.
D. Subtract the rotating scale reading from the fixed scale reading.

Qn. 2 A brick of weight 80 N stands upright on the ground as shown.

What is the pressure it exerts on the ground?
A. 0.080N/cm$^2$  B. 0.40N/cm$^2$  C. 0.80N/cm$^2$  D. 1.6N/cm$^2$

Qn. 3 Which characteristics describe an image formed by a vertical plane mirror?
A. real and inverted
B. virtual and not inverted
C. real and larger than the object
D. virtual and smaller than the object
Qn. 4 Which row correctly compares the speeds of sound in air, liquid and solid?

<table>
<thead>
<tr>
<th></th>
<th>highest → lowest</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>air</td>
</tr>
<tr>
<td>B</td>
<td>air</td>
</tr>
<tr>
<td>C</td>
<td>liquid</td>
</tr>
<tr>
<td>D</td>
<td>solid</td>
</tr>
</tbody>
</table>

Qn. 5 Which wave property has the same value for all X-rays travelling in air?

A. amplitude  B. frequency  C. speed  D. wavelength

Qn. 6 A guitar string is made to vibrate.

What makes the pitch of the note rise?

A. a decrease in the amplitude of vibration  
B. a decrease in the frequency of vibration  
C. an increase in the amplitude of vibration  
D. an increase in the frequency of vibration

Qn. 7 A beam is pivoted at its centre. Two masses are suspended at equal distances from the pivot as shown in the diagram:

```
--------
|       |
|  pivot |
|       |
--------

block X  2kg mass
```

Which statement is correct?

A. if X has a mass of exactly 2kg, it will rise  
B. if X has a mass of less than 2kg, it will fall  
C. if X has a mass of more than 2kg, it will fall  
D. if X has a mass of more than 2kg, it will rise
Qn. 8  The diagrams show a small compass close to a strong bar magnet. Which diagram shows the correct compass direction?

A  B  C  D

\[ \begin{array}{c}
\text{S} \\
\text{N}
\end{array} \quad \begin{array}{c}
\text{S} \\
\text{N}
\end{array} \quad \begin{array}{c}
\text{S} \\
\text{N}
\end{array} \quad \begin{array}{c}
\text{S} \\
\text{N}
\end{array} \]

Qn. 9  A wire hangs between the poles of a magnet. When there is a current in the wire, in which direction does the wire move?

Qn. 10 The diagram shows a simple d.c. motor.

Which labelled part is the commutator?
Qn. 11 In a race, a car travels 60 times around a 3.6 km track. This takes 2.4 hours.

What is the average speed of the car?
A. 1.5km/h  B. 90km/h  C. 144km/h  D. 216km/h

Qn. 12 A car is moving downhill along a road at a constant speed.

Which graph is the speed / time graph for the car?

![Graphs A, B, C, D](image)

Qn. 13 A geologist places a small rock on the left-hand pan of a balance. The two pans are level as shown when masses with a total weight of 23 N are placed on the right-hand pan. Take the weight of 1.0 kg to be 10 N.

![Balance Diagram](image)

What is the mass of the small rock?
A. 0.023kg  B. 2.3kg  C. 23kg  D. 230kg
Qn. 14 Which statement is correct about the speed of electromagnetic waves in vacuum?

A. ultra-violet waves have the greatest speed.
B. visible light waves have the greatest speed.
C. infrared waves have the greatest speed
D. all electromagnetic waves have the same speed.

Qn. 15 The diagram shows a transformer with an alternating voltage of 100 volts applied to the primary coil.

What is the voltage produced across the secondary coil?

A. 50 V  B. 100 V  C. 200 V  D. 8000 V

Qn. 16 A stone has a volume of 0.50cm$^3$ and a mass of 2.0g.

What is the density of the stone?

A 0.25g/cm$^3$  B 1.5g/cm$^3$  C 2.5g/cm$^3$  D 4.0g/cm$^3$

Qn. 17 Which row correctly describes light waves and radio waves?

<table>
<thead>
<tr>
<th></th>
<th>light waves</th>
<th>radio waves</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>longitudinal</td>
<td>longitudinal</td>
</tr>
<tr>
<td>B</td>
<td>longitudinal</td>
<td>transverse</td>
</tr>
<tr>
<td>C</td>
<td>transverse</td>
<td>longitudinal</td>
</tr>
<tr>
<td>D</td>
<td>transverse</td>
<td>transverse</td>
</tr>
</tbody>
</table>
Qn. 18 The diagram shows a wave pattern.
Which labelled distance represents half wavelength of the wave?

Qn. 19 The diagram shows water waves passing through a gap in a harbour wall.
The waves curve round the wall and reach a small boat in the harbour.

What is the name of this curving effect, and how can the gap be changed so that
the waves are less likely to reach the boat?

<table>
<thead>
<tr>
<th>name of effect</th>
<th>change to the gap</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>diffraction</td>
</tr>
<tr>
<td>B</td>
<td>make the gap slightly bigger</td>
</tr>
<tr>
<td>C</td>
<td>diffraction</td>
</tr>
<tr>
<td>D</td>
<td>make the gap slightly smaller</td>
</tr>
<tr>
<td>C</td>
<td>refraction</td>
</tr>
<tr>
<td>D</td>
<td>make the gap slightly bigger</td>
</tr>
<tr>
<td>D</td>
<td>refraction</td>
</tr>
<tr>
<td>D</td>
<td>make the gap slightly smaller</td>
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</tbody>
</table>
Qn. 20 The image formed by a plane mirror is upright.

What are the other characteristics of the image?

<table>
<thead>
<tr>
<th></th>
<th>laterally inverted (left to right)</th>
<th>magnified (larger than the object)</th>
<th>virtual</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>no</td>
<td>yes</td>
<td>yes</td>
</tr>
<tr>
<td>B</td>
<td>yes</td>
<td>no</td>
<td>no</td>
</tr>
<tr>
<td>C</td>
<td>yes</td>
<td>no</td>
<td>yes</td>
</tr>
<tr>
<td>D</td>
<td>yes</td>
<td>yes</td>
<td>no</td>
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</table>

Qn. 21 A student draws three rays of light from point P through a converging lens. Each point labelled F is a principal focus of the lens.

Which of the rays are drawn correctly?

A. ray Y only
B. ray Z only
C. ray X and ray Y
D. ray X and ray Z
Qn. 22 The diagrams represent the waves produced by four sources of sound.

The scales are the same for all the diagrams.

Which sound has the highest frequency?

A

B

C

D

Qn. 23 A girl notices that when she shouts into a cave she hears an echo.

Which wave property causes the echo?

A. diffraction
B. dispersion
C. reflection
D. refraction
Qn. 24 Two bars of soft iron are placed near a bar magnet.

Which row states and explains the behaviour of poles P and Q of the soft iron bars?

<table>
<thead>
<tr>
<th>P and Q</th>
<th>reason</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>attract</td>
</tr>
<tr>
<td>B</td>
<td>attract</td>
</tr>
<tr>
<td>C</td>
<td>repel</td>
</tr>
<tr>
<td>D</td>
<td>repel</td>
</tr>
</tbody>
</table>

P and Q are like poles
P and Q are unlike poles
P and Q are like poles
P and Q are unlike poles

Qn. 25 The graph shows the progress of an athlete in a 100m race.

What time was taken to travel 20m from the start?

A. 2.4s  B. 2.8s  C. 4.8s  D. 70s
Qn. 26 A wire perpendicular to the page carries an electric current in a direction out of the page. There are four compasses near the wire.

Which compass shows the direction of magnetic field caused by the current?

Qn. 27 A car moves along a level road.

The diagram shows all of the horizontal forces acting on the car.

Which statement is correct?
A. The car is slowing down.
B. The car is speeding up.
C. The car is moving at a constant speed.
D. The car is moving backwards.
Qn. 28 A man stands on the ground. Which action will increase the pressure that the man exerts on the ground?

A. The man slowly bends his knees.
B. The man slowly lies down on the ground.
C. The man slowly raises his arms.
D. The man slowly raises one foot off the ground.

Qn. 29 The diagram shows a simple mercury barometer.

Which length is used to find the value of atmospheric pressure?

A. 12 cm  
B. 74 cm  
C. 86 cm  
D. 100 cm

Qn. 30 Which statement about magnetism is correct?

A. Aluminium is a ferrous metal.
B. A steel magnet can be demagnetised by heating it.
C. The core of an electromagnet is usually made of steel.
D. The magnetic field lines around a bar magnet are evenly spaced.
SECTION-II (Structured Questions) - 50 Marks

Qn. 1 Fig 1.1 shows part of a measuring instrument.

Fig. 1.1

(a) State the name of this instrument.

…………………………………………… [1]

(b) Record the reading shown in Fig. 1.1.

…………………………………………… [1]

(c) Describe how you would find the thickness of a sheet of paper used in a magazine.

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Qn. 2 (a) In Fig 2.1, a ray of light is shown passing into water from air.

The angle of the refracted ray to the normal is 40°.

On Fig. 2.1, mark clearly the angle of incidence i. ray of light [1]
(b) In Fig. 2.2, a ray of light is shown in water and reaching the surface with the air at an angle of 40° to the normal.

Fig 2.2

(i) On Fig. 2.2, draw accurately the path of the ray in the air.

The angle in the water in Fig. 2.2 is increased from 40° to 70°, and the ray no longer emerges into the air.

(ii) State what happens to the ray at the surface and explain why this happens.

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[2]
Qn. 3 (a) A train moves with a constant velocity of 30 m/s for 10 s before decelerating uniformly to rest in a further 15 s.

Draw a velocity–time graph on the axes below. [4]

(b) State the property of a velocity–time graph that can be used to determine the distance travelled by the train. [1]

(c) Calculate the distance travelled by the train. [3]
Qn. 4 Fig. 4.1 shows apparatus that demonstrates how a coin and a piece of paper fall from rest.

![Diagram of apparatus](image)

**Fig 4.1**  
**Fig 4.2**

At the positions shown in Fig. 4.1, the coin and paper are falling through air in the tube. The forces on them are shown in Fig. 4.2. The length of an arrow indicates the size of each force.

(a) State the initial value of the acceleration of the coin as it falls.  

........................................................................................................................................... [1]

(b) Explain how Fig. 4.2 shows that

(i) the paper falls with constant speed,

...........................................................................................................................................  
...........................................................................................................................................

(ii) the coin accelerates.

...........................................................................................................................................

........................................................................................................................................... [2]

(c) A vacuum pump is connected to A and the air in the tube is removed. The coin and paper fall differently in a vacuum from the way they fall in air. State two of these differences.

1. ...........................................................................................................................................

2. ........................................................................................................................................... [2]
**Qn. 5** A girl of weight 550 N is playing on a see-saw with her brother. Fig. 5.1 shows her brother of weight \( W \) sitting 1.1 m to the right of the balance point.

![Diagram showing a see-saw with a girl and a brother at different positions](image)

**Fig 5.1**

The see-saw is balanced when the girl sits 0.86 m to the left of the balance point.

(a) Calculate \( W \).

\[
W = \text{[Expression]} \quad [3]
\]

(b) The girl and her brother slide equal distances along the see-saw away from each other. Describe and explain what happens.

................................................................................................................................. [2]

**Qn. 6** Fig. 6.1 shows the waveform of the note from a bell. A grid is given to help you take measurements.

![Graph showing a waveform](image)

**Fig 6.1**
(a) (i) State what, if anything, is happening to the loudness of the note.

..................................................................................................................................................[1]

(ii) State how you deduced your answer to (a)(i).

..................................................................................................................................................[1]

(b) (i) State what, if anything, is happening to the frequency of the note.

..................................................................................................................................................[1]

(ii) State how you deduced your answer to (b)(i).

..................................................................................................................................................[1]

(c) (i) How many oscillations does it take for the amplitude of the wave to decrease to half its initial value?

..................................................................................................................................................[1]

The wave has a frequency of 300 Hz.

1. What is meant by a frequency of 300Hz?

..................................................................................................................................................[1]

2. How long does 1 cycle of the wave take?

..................................................................................................................................................[1]

(d) A student says that the sound waves, which travelled through the air from the bell, were longitudinal waves, and that the air molecules moved repeatedly closer together and then further apart.

(i) Is the student correct in saying that the sound waves are longitudinal? ..................

(ii) Is the student correct about the movement of the air molecules? ......................

(iii) The student gives light as another example of longitudinal waves. Is this correct?

..................................................................................................................................................[3]
Qn. 7 The figure below is a diagram of a transformer.

![Diagram of a transformer with 30 turns and 300 turns, 12V a.c. input, and a.c. voltmeter output.]

**Fig 7.1**

(a) (i) Name a suitable material from which the core could be made.

................................................................................................................................................ [1]

(ii) On Fig 7.1, clearly label the core of the transformer.

................................................................................................................................................ [1]

(iii) State the purpose of the core.

................................................................................................................................................ [1]

(b) Calculate the reading on the voltmeter.

Voltmeter reading = ......................... [3]
Qn. 8 Loudspeakers reproduce sounds which are transmitted through the air to the ears.

(a) Describe how sound travels through the air.

[2]

(b) A high-pitched note has a frequency of 3500 Hz.

This travels through the air at a speed of 330 m/s.

Calculate the wavelength of the wave.

[2]

(b) Sound is diffracted as it leaves a loudspeaker.

Explain what this means.

[2]
Qn.1 A student is investigating the passage of light through a transparent block, as shown in Fig. 1.1.

Fig.1.1
The student looks through the block. He places pins so that two pins marking the incident ray and two pins marking the emergent ray all appear to be exactly one behind the other.

On Fig. 1.1, mark suitable positions for the four pins, two on the incident ray and two on the emergent ray. [2]

(i) On Fig. 1.1, draw the normal at point A. [1]

(ii) On Fig. 1.1, draw in the line AB and name the ray.

(iii) Measure and record the angle of refraction $r$ between the line AB and the normal.

$$r = \ldots$$ [1]

(iv) Measure and record the angle of incidence $i$ between the incident ray and the normal.

$$i = \ldots$$ [1]

(v) Measure and record the angle of incidence $e$ between the emergent ray and the normal.

$$e = \ldots$$ [1]

(v) Define the term 'refraction'. State the cause of refraction of light.

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[2]
Qn. 2 Fig. 2.1 shows the principal axis PQ of a converging lens and the centre line XY of the lens.

Fig 2.1

An object 2.0 cm high is placed 2.0 cm to the left of the lens. The converging lens has a focal length of 3.0cm. [3]

(a) On Fig. 2.1, draw a full-scale diagram to find the distance of the image from the lens, and the height of the image.

distance of image from the lens = ......................................................

height of image = ...................................................... [4]

(b) State and explain whether the image in (a) is real or virtual.

........................................................................................................
........................................................................................................
........................................................................................................ [3]