



**KULLEGG MARIA REGINA
BOYS' SECONDARY MOSTA
HALF-YEARLY EXAMINATIONS 2012/2013**



SUBJECT: PHYSICS

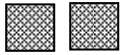
Form 4

TIME: 1 HR 30 MIN

NAME : _____

CLASS : _____

INDEX NO : _____



Track 2

Answer ALL questions in the spaces provided on the exam paper.

All working must be shown. The use of a calculator is allowed.

Where necessary take the acceleration due to gravity, $g = 10 \text{ m/s}^2$.

Waves and Optics	$v = f \lambda$	$f = \frac{1}{T}$
	$m = \frac{v}{u}$	$m = \frac{\text{height of image}}{\text{height of object}}$
	$\eta = \frac{\text{speed of light (air)}}{\text{speed of light (medium)}}$	$\eta = \frac{\text{real depth}}{\text{apparent depth}}$
Forces and Motion	$W = mg$	$v^2 = u^2 + 2as$
	$v = u + at$	$s = ut + \frac{1}{2} a t^2$
	Average speed = $\frac{\text{Total Distance}}{\text{Total time}}$	$s = \frac{(u+v)}{2} t$

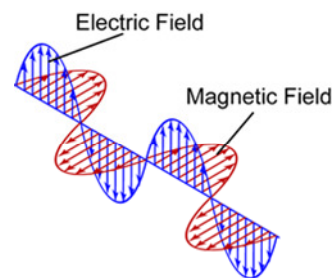
For examiner's use:

Number	1	2	3	4	5	6	7	8	Total
Maximum mark	8	8	8	8	8	15	15	15	85
Actual mark									

	Total Theory	Total Practical	Final Mark
Actual Mark			
Maximum Mark	85	15	100

SECTION A

This section carries 40 marks.



1. *This question is about the electromagnetic spectrum.*

Fill in the blanks using **some** of the words below.

<i>frequency</i>	<i>speed</i>	<i>ultraviolet</i>	<i>X-rays</i>	<i>wavelength</i>
<i>infra-red</i>	<i>vacuum</i>	<i>gamma rays</i>	<i>transverse</i>	<i>longitudinal</i>

Electromagnetic waves are all _____ waves. They are able to travel through a _____.

They all travel at the same _____. However they all have a different _____ and _____.

To detect fractures in bones we use _____. Night vision cameras make use of _____.

Skin tanning is caused by _____. [8]

2. *This question is about sound.*



State whether the statement about sound is TRUE or FALSE.

	True / False
a) Sound is made up of longitudinal waves.	
b) A reflected sound is called an echo.	
c) Particles move up and down as sound travels through a medium.	
d) Sound travels faster in liquids than in gases.	
e) A quiet and a loud sound travel at the same speed.	
f) Sound can travel through a vacuum.	
g) Ultrasound is sound with a frequency higher than 10,000 Hz.	
h) Sound travels faster than light.	

[8]

3. This question is about fibre optics.

Fibre optics are very thin solid pipes used to transmit light from one place to another.



Figure 1

- a) Draw on Figure 1 the path taken by the incident ray. [2]
- b) The ray undergoes total _____ reflection, because the _____ angle is exceeded. [2]
- c) The speed of light inside the fibre optic is _____ than that in air. [1]
- d) Figure 2 shows how fibre optics can be used to transmit sunlight inside a building. The light from the sun is channelled to different parts of the building. State one advantage and one disadvantage of using such a system.

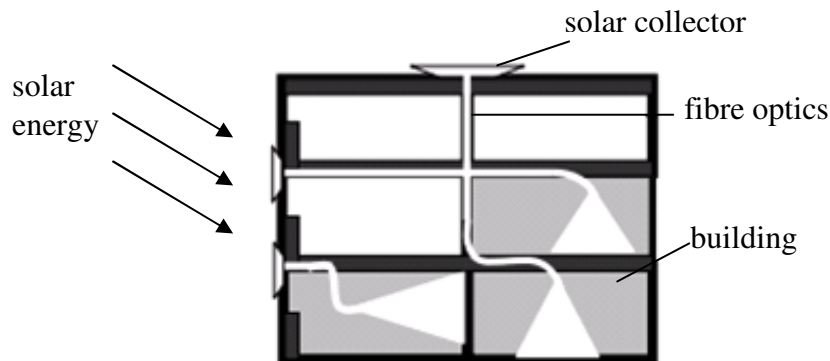


Figure 2

(i) Advantage _____

[1]

(ii) Disadvantage _____

[1]

e) Name one **other** use of fibre optics.

[1]

4. This question is about water waves.

Figure 3 shows water wavefronts approaching a harbour's breakwater. The water depth inside and outside the harbour is the same.

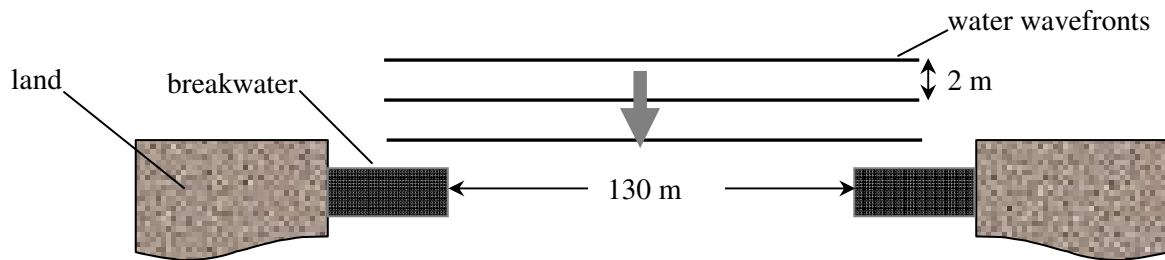


Figure 3

a) Water waves are _____ waves. [1]

b) The wavelength of the waves = _____ m. [1]

c) Draw on Figure 3 the wavefronts **after** they pass through the gap. [2]

d) What is the effect shown called?
 _____ [1]

e) Describe what would happen to the waves if the gap is much narrower.
 _____ [1]

f) Calculate the frequency of the water waves if 24 waves hit the breakwater every 60 seconds.

 _____ [2]

5. This question is about reflection in a plane mirror.

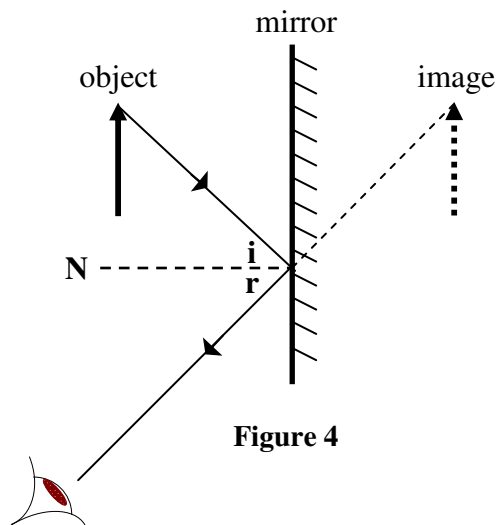
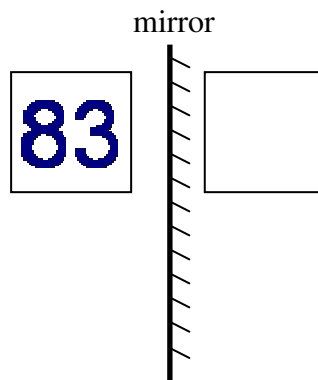


Figure 4

An image can be formed in a plane mirror as shown in Figure 4.

- a) The mirror is said to be plane because it is _____ . [1]
- b) The angle 'i' is called the angle of _____ while the angle 'r' is the angle of _____. N is called the _____. [3]
- c) The distance between the object and the mirror is always _____ to the distance between the image and the mirror. [1]
- d) The image obtained in a plane mirror cannot form on a screen because it is _____. [1]
- e) It is difficult to read words and numbers formed in a plane mirror because they are laterally inverted. In the space below draw the number 83 laterally inverted.



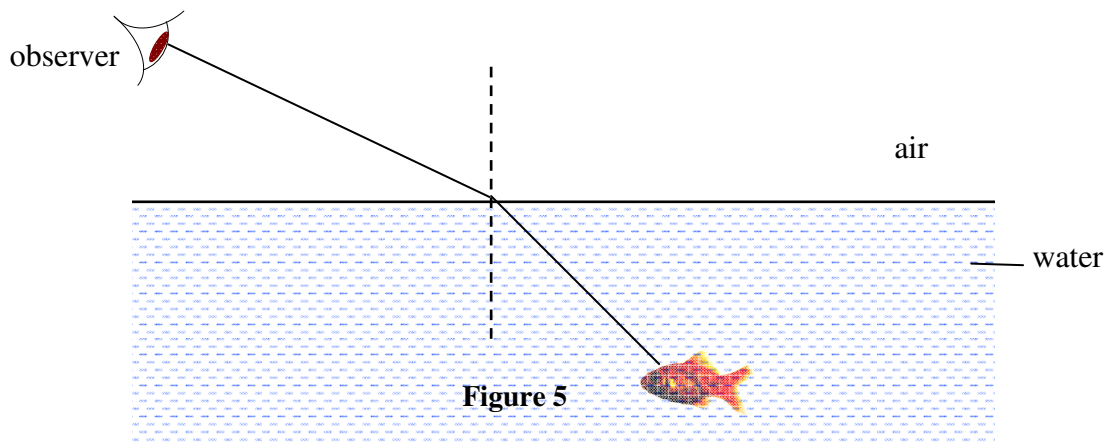
[2]

SECTION B

This section carries 45 marks.

6. This question is about refraction of light.

A fish appears to be at a different depth when observed as shown in Figure 5. The observer can see the fish because light from it enters the observer’s eyes.



- a) On Figure 5:
- (i) Use arrows to determine the direction of the rays of light.
 - (ii) label the refracted ray.
 - (iii) label with letter ‘i’ the angle of incidence.
 - (iv) mark with letter ‘X’ the position where the fish appears to be. [4]

b) Fill in the blanks with the correct word in the brackets.

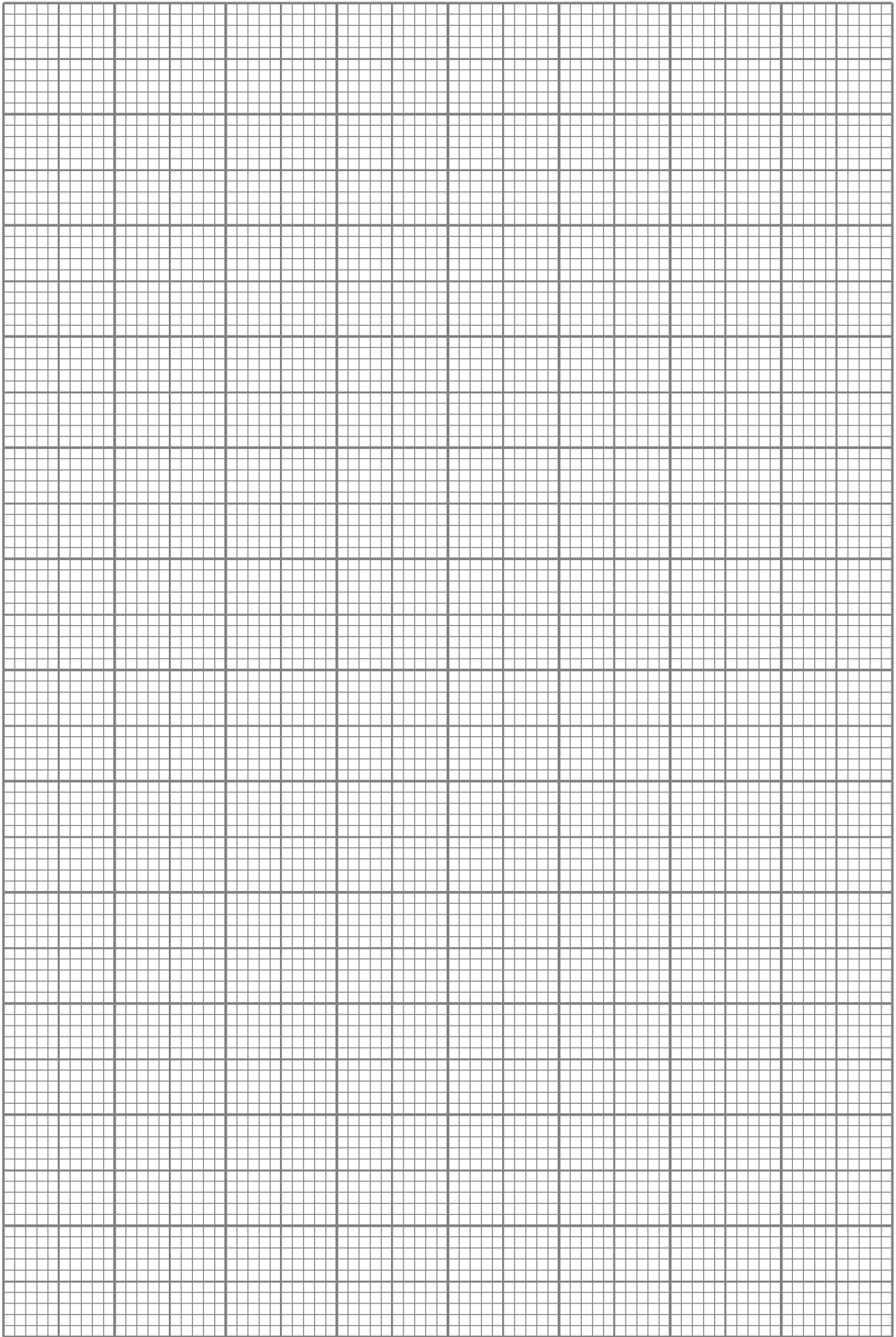
When a ray of light travels from water to air it is refracted _____ (**away from, towards**) the normal. This is because air is _____ (**less, more**) dense than water. In air, light travels _____ (**slower, faster**) than in water. [3]

c) The table below shows how the real and apparent depths of the fish change.

Real depth (cm)	10	20	30	40	50	60
Apparent depth (cm)	7.5	15.0	22.5	30.0	37.5	45

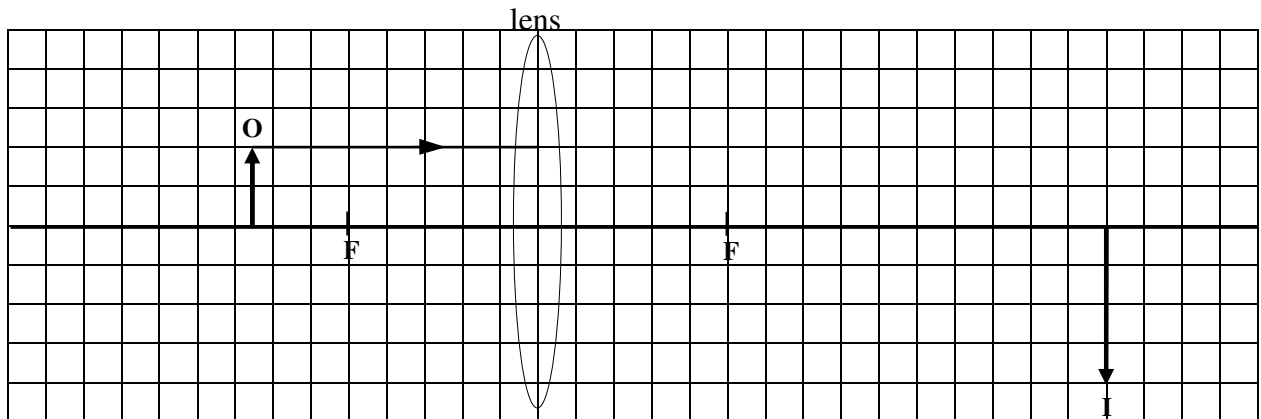
- (i) Plot a graph of **apparent depth** (on y-axis) against **real depth** (on x-axis). [5]
- (ii) The graph obtained is a straight line graph. This shows that the apparent depth and real depth are _____ proportional. [1]
- (iii) When the fish at a depth of 32 cm it appears to be at a depth of _____ cm. [1]
- (iv) Use the formula $\eta = \frac{\text{Real Depth}}{\text{Apparent Depth}}$ to calculate the refractive index of water

_____ [1]



7. This question is about lenses and the electromagnetic spectrum.

a) The diagram below shows how a lens can be used to produce an enlarged image.



(i) The lens used is a _____ (**concave, convex**) lens. [1]

(ii) Complete the ray diagram by drawing missing rays to show how the image forms. [3]

(iii) Measure with your ruler the:

• focal length = _____ cm [1]

• object distance = _____ cm [1]

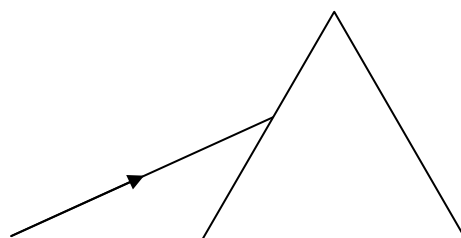
• image distance = _____ cm [1]

(iv) Calculate the magnification of the lens.

_____ [2]

b) When white light is passed through a prism, white light is dispersed into seven different colours. The order of the colours is _____, orange, yellow, _____, blue, indigo and _____ [3]

c) Complete the diagram below to show how the red and violet colours are dispersed when passing through the prism. [3]



8. This question is about object in motion.



a) Complete the table by adding the missing symbol or unit.

	SYMBOL	UNIT
acceleration	a	
distance		m
initial velocity		m/s
final velocity		

[5]

b) Starting **from rest** a car reaches a speed of 24 m/s in 6 seconds.

(i) What is the initial velocity of the car?

_____ [1]

Calculate the:

(ii) acceleration of the car.

_____ [2]

(iii) distance travelled by the car.

_____ [2]

c) The car then kept the same velocity for another 10 seconds.

(i) During these 10 seconds, the car moved at _____ velocity. [1]

(ii) Calculate the distance travelled during this part of the journey

_____ [2]

(iii) Calculate the total distance travelled during the whole journey

_____ [2]

END OF PAPER