

Topic 6 Waves Extended Writing Questions

Name: _____

Class: _____

Date: _____

Time: **24 minutes**

Marks: **24 marks**

Comments:

Q1. The data given in the table below was obtained from an investigation into the refraction of light at an air to glass boundary.

Angle of incidence	Angle of refraction
20°	13°
30°	19°
40°	25°
50°	30°

Describe an investigation a student could complete in order to obtain similar data to that given in the table above.

Your answer should consider any cause of inaccuracy in the data.

A labelled diagram may be drawn as part of your answer.

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

(Total 6 marks)

Q2. Lenses can be used to correct visual defects.

Figure 1 shows a child wearing glasses.
Wearing glasses allows a lens to correct a visual defect.

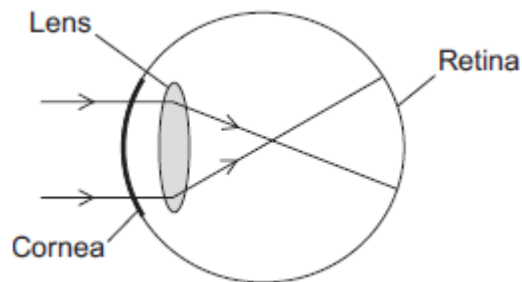
Figure 1



© monkeybusinessimages/iStock/Thinkstock

- (a) **Figure 2** shows rays of light entering a child's eye and being focused at a point. This point is not on the retina so the child sees a blurred image.

Figure 2



- (i) What is the visual defect of this eye?

.....

(1)

- (ii) Use the correct answer from the box to complete the sentence.

converging	convex	diverging
------------	--------	-----------

The type of lens used to correct this visual defect is a lens.

(1)

- (b) Visual defects may be corrected with eye surgery. A laser may be used in eye surgery.

Use the correct answer from the box to complete the sentence.

light	sound	X-rays
-------	-------	--------

A laser is a concentrated source of

(1)

- (c) **In this question you will be assessed on using good English, organising information clearly and using specialist terms where appropriate.**

Lasers can be used to correct a visual defect by changing the shape of the cornea.

A knife is used to cut a flap in the cornea. The laser vaporises a portion of the cornea and permanently changes its shape. The flap is then replaced.

Most patients are back at work within a week. Driving may be unsafe for one to two weeks. Tinted glasses with ultraviolet protection are needed when out in the sun for the first three months.

Many people in their mid-40s need reading glasses. This is because the eye lens becomes less flexible with age. Laser surgery cannot cure this.

Laser surgery for both eyes costs £1000. A pair of glasses costs £250.

Describe the advantages and disadvantages of:

- having laser surgery to correct visual defects
- wearing glasses to correct visual defects.

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

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

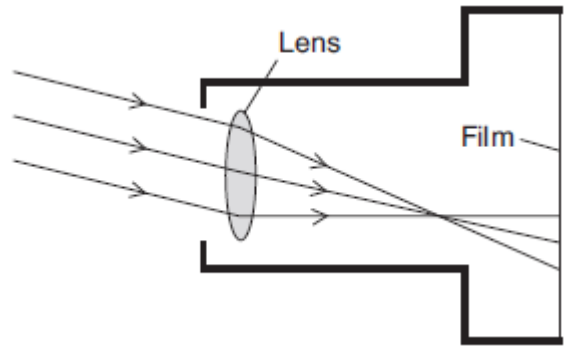
Extra space

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

(6)

(d) **Figure 3** shows parallel rays of light, from a point on a distant object, entering a camera.

Figure 3



Describe the adjustment that has to be made to focus the image on the film.

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

(2)
(Total 11 marks)

Q3.Waves may be longitudinal or transverse.

(a) Describe the differences between longitudinal waves and transverse waves.

.....

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

(3)

(b) Radio waves are electromagnetic waves.

Describe how radio waves are different from sound waves.

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

(4)

(Total 7 marks)

M1.Level 3 (5–6 marks):

A detailed and coherent plan covering all the major steps is provided. The steps in the method are logically ordered. The method would lead to the production of valid results.

A source of inaccuracy is provided.

Level 2 (3–4 marks):

The bulk of a method is described with mostly relevant detail. The method may not be in a completely logical sequence and may be missing some detail.

Level 1 (1–2 marks):

Simple statements are made. The response may lack a logical structure and would not lead to the production of valid results.

0 marks:

No relevant content.

Indicative content

place a glass block on a piece of paper

draw around the glass block and then remove from the paper

draw a line at 90° to one side of the block (the normal)

use a protractor to measure and then draw a line at an angle of 20° to the normal

replace the glass block

using a ray box and slit point the ray of light down the drawn line

mark the ray of light emerging from the block

remove the block and draw in the refracted ray

measure the angle of refraction with a protractor

repeat the procedure for a range of values of the angle of incidence

possible source of inaccuracy

the width of the light ray

which makes it difficult to judge where the centre of the ray is

[6]

M2.(a) (i) short sight

accept myopia

1

(ii) diverging

1

(b) light

1

(c) Marks awarded for this answer will be determined by the quality of communication as well as the standard of the scientific response. Examiners should also apply a 'best-fit' approach to the marking.

0 marks

No relevant content

Level 1 (1–2 marks)

There is a basic description of one advantage **or** disadvantage of using **either** of the methods

Level 2 (3–4 marks)

There is a *description* of some advantages **and / or** disadvantages of using **both** methods

or

a full, detailed description of the advantages and disadvantages of using **either** of the methods.

Level 3 (5–6 marks)

There is a *clear description* of the advantages and disadvantages of using **both** methods.

examples of the points made in the response

extra information

laser surgery

advantages:

- *appearance*
- *permanent effect*
- no glasses which need changing

disadvantages:

- risks associated with surgery
- large cost
- not able to drive etc straightaway
- (still) might need glasses for reading

wearing glasses

advantages:

- able to function straightaway
- any problems easy to sort out

disadvantages:

- *easily broken*
- *easily lost*
- need changing
- overall cost might be greater if several changes in vision
- might eventually need two pairs of glasses

6

(d) move lens

1

closer to film

1

[11]

M3.(a) the oscillation / vibration (causing the wave)

a movement causes the wave is insufficient

1

for a transverse wave is perpendicular to the direction of energy transfer
accept direction of wave travel

1

and for a longitudinal wave is parallel to the direction of energy transfer
accept direction of wave travel

*if no marks awarded allow 1 mark for correctly linking
 perpendicular with transverse and parallel with longitudinal
 the marks may be scored by the drawing of two correctly
 labelled diagrams*

1

(b) for radio waves:

accept converse for each mark

are transverse

1

travel at speed of light / higher speed

1

have greater frequencies

1

can travel through vacuum

accept sound waves are not electromagnetic for 1 mark

1

[7]