For Supervisor's use only

2

90768

NEW ZEALAND QUALIFICATIONS AUTHORITY
MANA TOHU MĀTAURANGA O AOTEAROA

National Certificate of Educational Achievement
TAUMATA MĀTAURANGA Ā-MOTU KUA TAEA

Level 2 Science, 2005

90768 Use physics concepts and principles to describe the behaviour of light

Credits: Four
2 pm Friday 18 November 2005

Check that the National Student Number (NSN) on your admission slip is the same as the number at the top of this page.

You should answer ALL the questions in this booklet.

If you need more space for any answer, use the page(s) provided at the back of this booklet and clearly number the question.

Check that this booklet has pages 2–7 in the correct order and that none of these pages is blank.

YOU MUST HAND THIS BOOKLET TO THE SUPERVISOR AT THE END OF THE EXAMINATION.

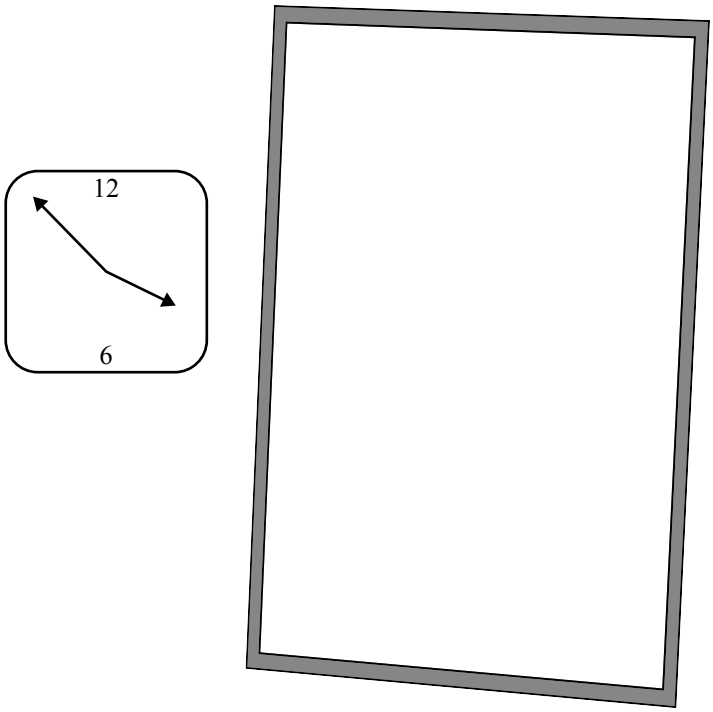
For Assessor's use only	**Achievement Criteria**		
Achievement	**Achievement with Merit**	**Achievement with Excellence**
Use physics concepts and principles to describe the behaviour of light.	Use physics concepts and principles to explain the behaviour of light.	Use physics concepts and principles to discuss the behaviour of light.
Overall Level of Performance		

You are advised to spend 40 minutes answering the questions in this booklet.

Assessor's use only

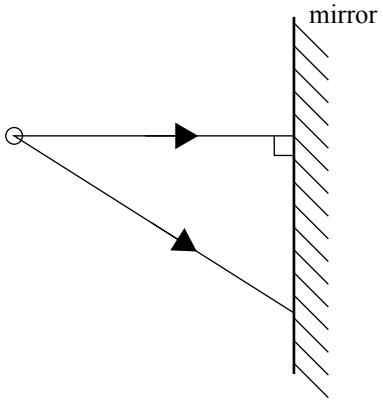
QUESTION ONE

(a) The diagram below shows a mirror. The clockface faces the mirror. Sketch the **image** of the clockface in the mirror.



In the following diagram, the spot ○ represents a source of light, such as a light bulb, from which two light rays have been drawn to the mirror.

(b) Accurately draw in the paths of the reflected light rays.



(c) In the above diagram, also draw in the **position of the image** of the light source and draw in **lines to show how it was formed**.

QUESTION TWO

Assessor's use only

The security mirrors in shops are convex and spherical. The photograph on the right shows a security mirror in a grocer shop.

(a) Describe TWO **features** of an image in the security mirror.

_____

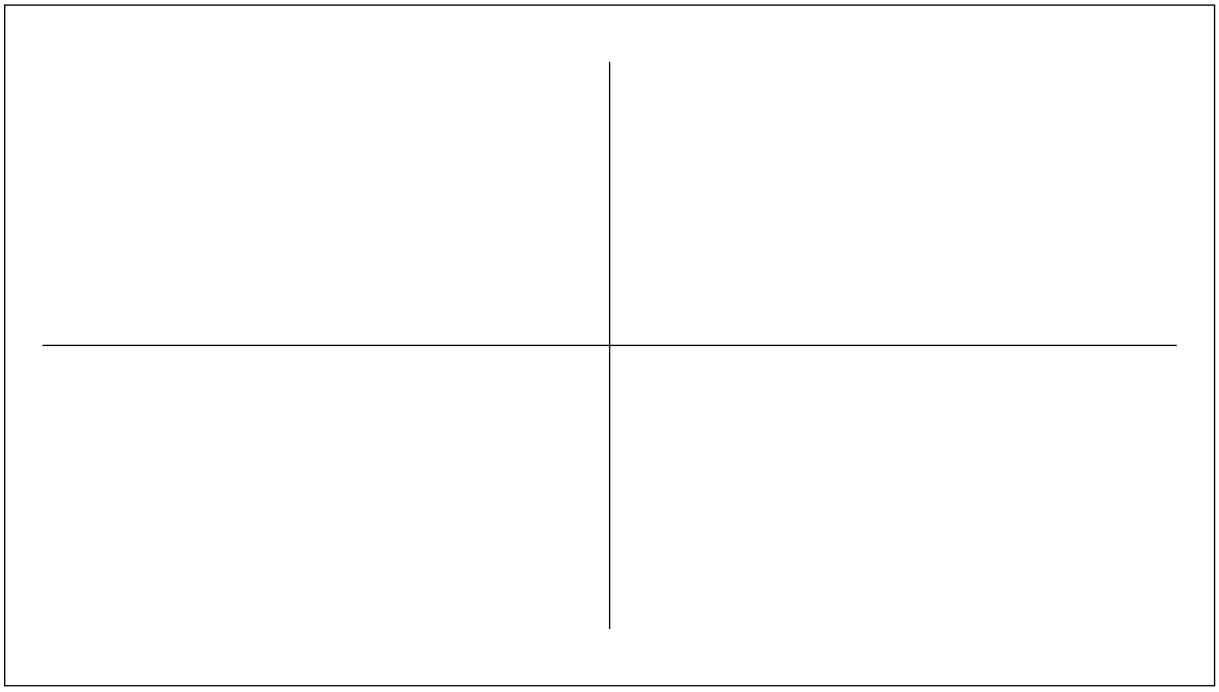
_____

_____

_____

_____

(b) In the space below draw a ray diagram showing how the image described in part (a) is formed.

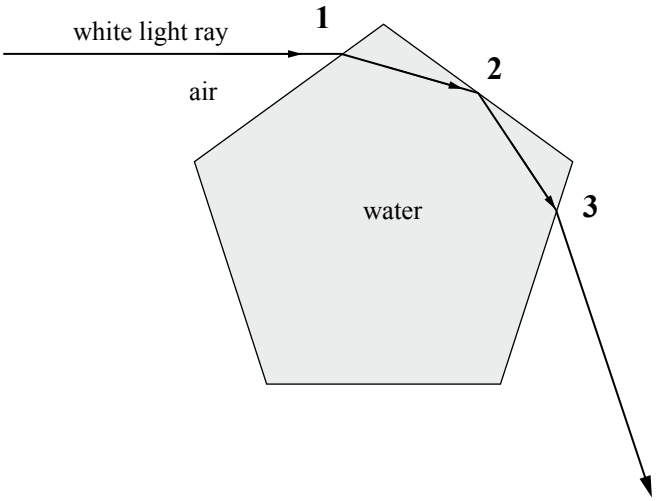


QUESTION THREE

Assessor's use only

This prism ornament consists of two hollow glass pentagonal (5-sided) prisms joined together and filled with water. It is hung where the sun can shine on it and reflects light sending out a spectrum: the colours of the rainbow.

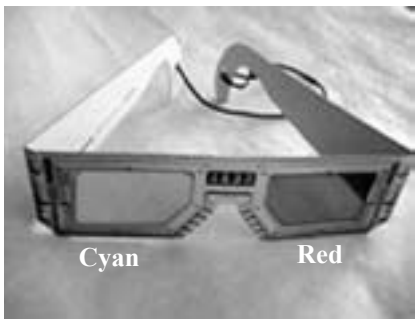
The diagram below shows a cross section of one of the prisms with a light ray, accurately drawn, entering one face and leaving another. The glass sides are so thin that they can be neglected, so that the light ray can be considered to be passing directly from air to water.



Discuss what happens to the light ray at each of the points 1, 2 and 3 in the diagram. Include the following key words in your answer.

Key words: total internal reflection, refraction, spectrum.

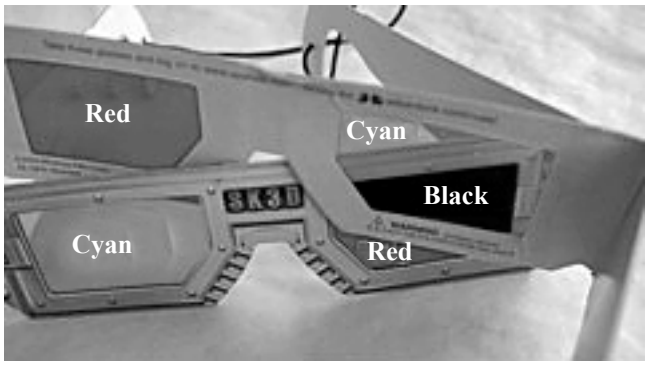
QUESTION FOUR



3D ‘glasses’ used to watch 3D movies consist of a red filter and a cyan filter. (Cyan is a blue-green colour.)

(a) Describe what happens to white light as it passes through the **red** filter.

Two of these 3D glasses are crossed as shown. Where the red and cyan filters overlap, the glasses appear black.



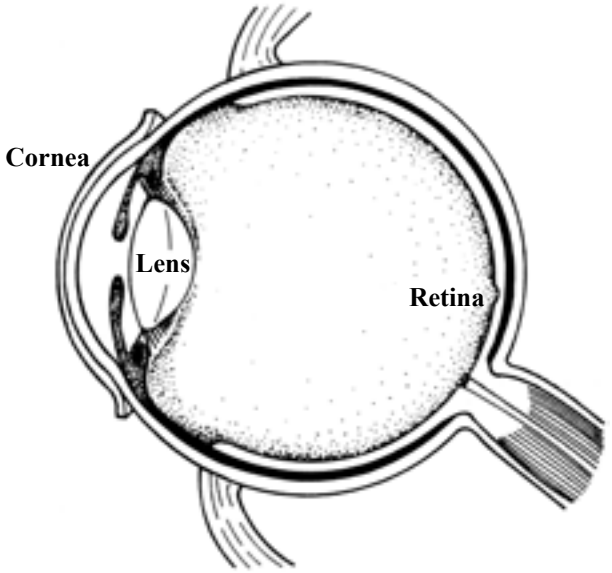
(b) Explain why this happens.

Note that Question Five is on Page 6.

QUESTION FIVE

Assessor's use only

In the human eye, the *cornea* and *lens* together focus light to form images on the *retina*. Since the image distance is the diameter of the eyeball it must remain constant. So, to focus on objects at different distances, the lens changes its shape to change the eye's focal length.



When the eye is focussed on an **object 100 mm distant,** its **focal length is 20 mm**.

Draw below, to scale, an accurate ray diagram of an **object 40 mm in height,** and use it to find the size of the image on the retina, the nature of the image and the diameter of the eyeball (image distance).

Size of image = _____

Nature of image = _____ , _____

Diameter of eyeball (image distance) = _____

Extra paper for continuation of answers if required.
Clearly number the question.

Assessor's use only

Question number	