XINMIN SECONDARY SCHOOL

新民中学

SEKOLAH MENENGAH XINMIN

Preliminary Examination 1998

SCIENCE (PHYSICS) 5142 / PAPER 5
SECONDARY 4 EXPRESS / 5 NORMAL
TUESDAY, 15 SEPTEMBER 1998
SETTER: M SHONE
VETTER: CHIA KH

Name: _____ ( ) Class: _____

QUESTION & ANSWER BOOKLET

INSTRUCTIONS TO CANDIDATES

1 Fill in your name, index number and class in the space above.

2 Time allowed: 1 hour 30 mins. for both papers.

3 Show all workings and calculations in the spaces provided.

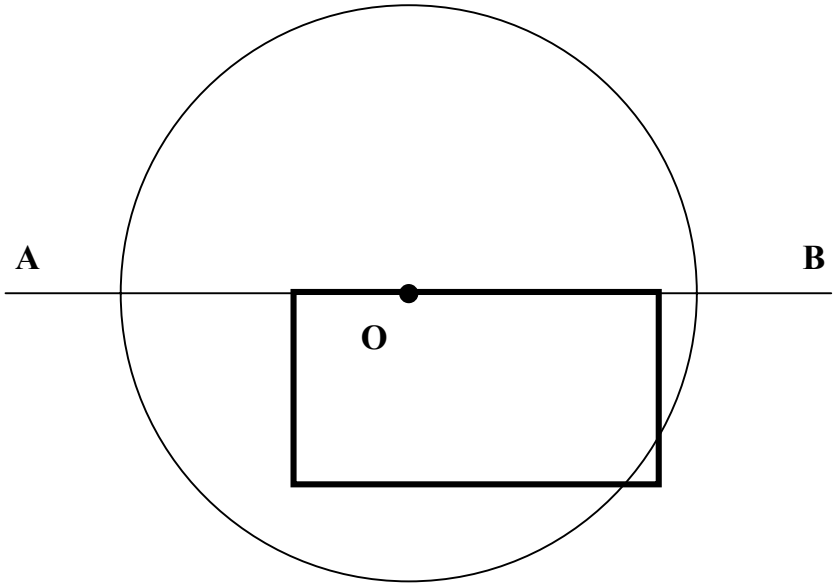
4 Calculators may be used.

5 This booklet consists of 6 numbered pages.

1 ***In this question you will be finding the refractive index of a block of glass.***

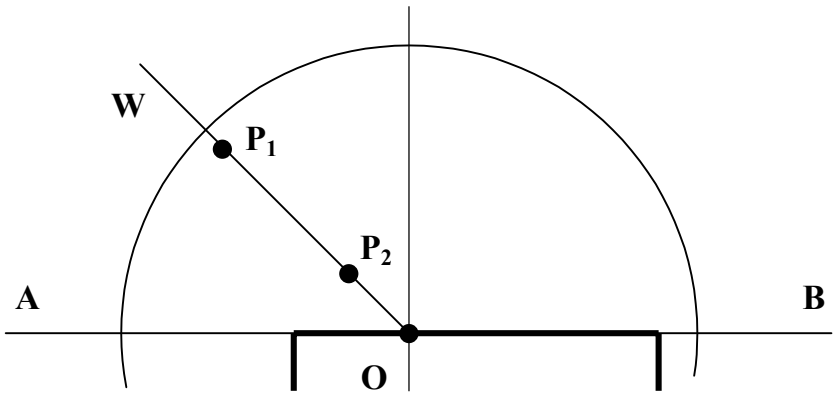
(a) (i) Place page 6 of the answer booklet on top of the corkboard. (*The page may be removed from the booklet but must be reattached at the end of the practical.*)

(ii) Place the glass block along the line **AB** as shown below and trace the outline of the block.



(iii) Draw a normal through the midpoint **O** such that it cuts through the top and bottom of the circle. Label this line **CD**.

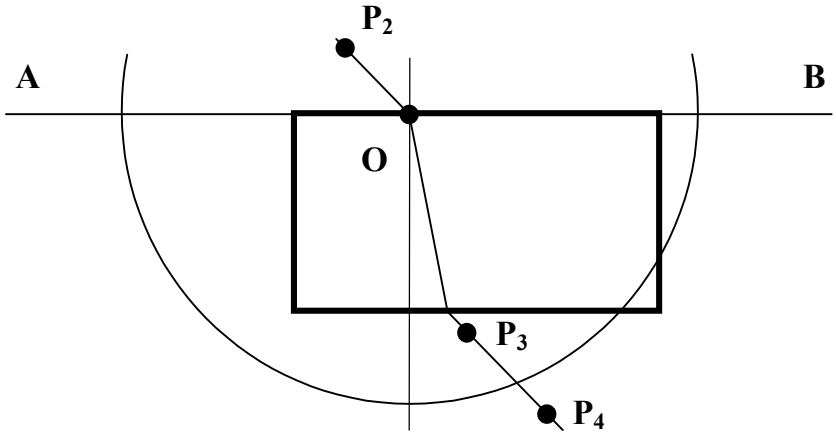
(b) (i) Draw a line from **O** through a point **W** at an angle of about 45° to the normal. Label the point where the line cuts through the circle as **W**. Place two pins, $\mathbf{P_1}$ and $\mathbf{P_2}$, on this line as shown.



Measure and record the angle of incidence the ray **WO** makes with the normal to the glass block.

Record of the angle of incidence, **i**: _____

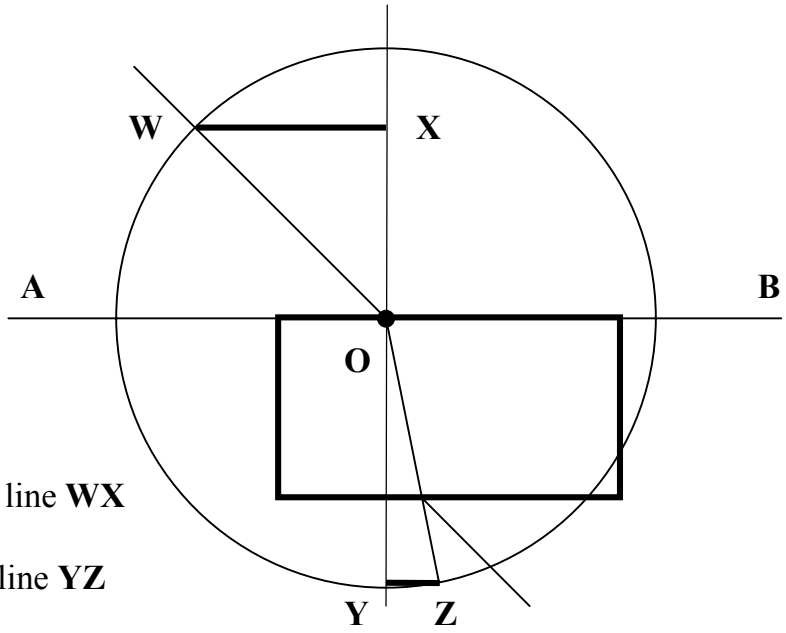
(ii) By looking through the glass block from the side opposite of $\mathbf{P_1}$ and $\mathbf{P_2}$, and using the other two pins, $\mathbf{P_3}$ and $\mathbf{P_4}$, determine the path of the ray of light **WO** as it continues through the glass block.



Measure and record the angle of refraction, **r**, of the ray as it enters the glass block.

Record of angle of refraction, **r**: _____

(iii) Extend the ray passing through the glass block until it reaches the circumference of the circle then draw the two lines, **WX** and **YZ**, both of which are parallel to the line **AB**.



$\mathbf{L_{WX}}$ = Length of line **WX**

$\mathbf{L_{YZ}}$ = Length of line **YZ**

Measure and record the lengths $\mathbf{L_{WX}}$ and $\mathbf{L_{YZ}}$.

Record of length $\mathbf{L_{WX}}$: _____

Record of length $\mathbf{L_{YZ}}$: _____

(c) Repeat **(b)** for four more sets of readings of incident angles, **i**, between 10° and 70°. Record values of **i**, **r,** $\mathbf{L_{WX}}$ and $\mathbf{L_{YZ}}$ in the table below.

i (°)	**r** (°)	$\mathbf{L_{WX}}$ **(cm)**	$\mathbf{L_{YZ}}$ **(cm)**

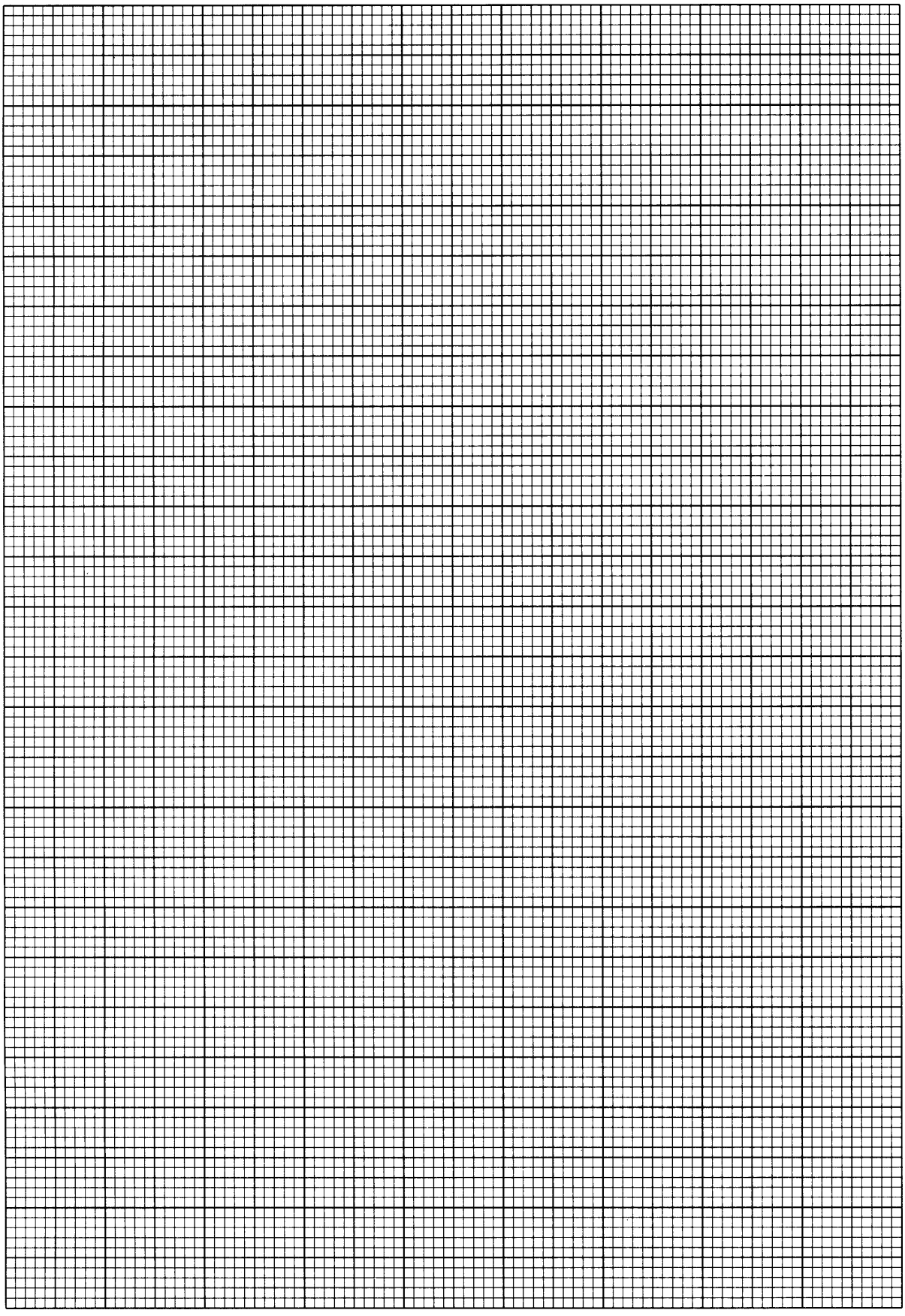
(d) (i) Plot a graph (*on page 5 of this booklet*) of $\mathbf{L_{WX}}$ against $\mathbf{L_{YZ}}$.

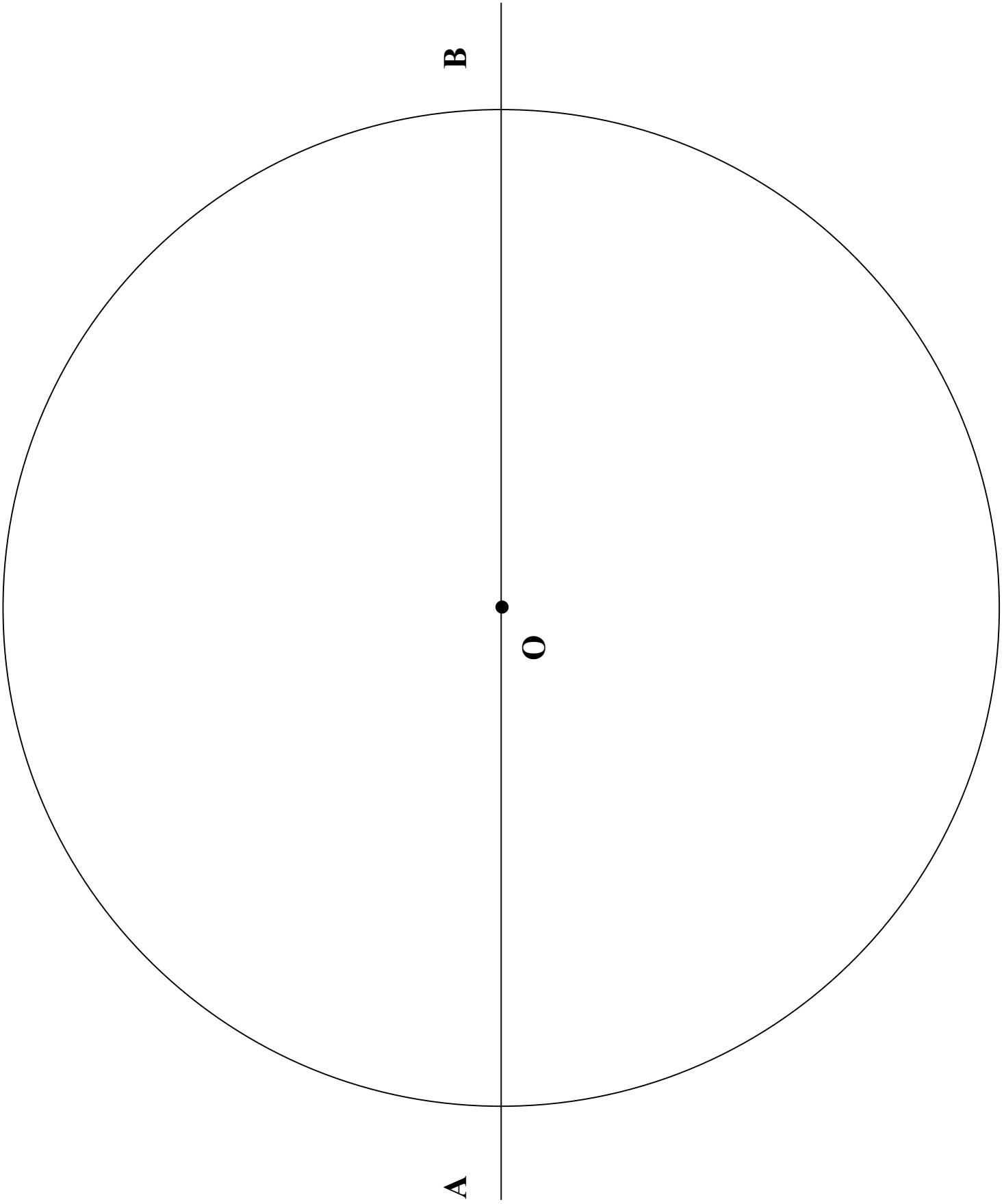
(ii) Find the gradient of the graph, **G**. This is equal to the refractive index of the glass, **n**.

Calculation of gradient of graph, **G**:

Record of gradient, **G**: _____

Value for refractive index of glass, **n**: _____




B
O
A