

# Light & Radiation Homework Week 1



This Homework requires **GRAPH PAPER!**



In your jotter write the DATE in the margin.

Now add a TITLE for your homework.

Your title should be the name of the Homework: Light & Radiation Homework Week 1

## Question 1.

Read the following information.

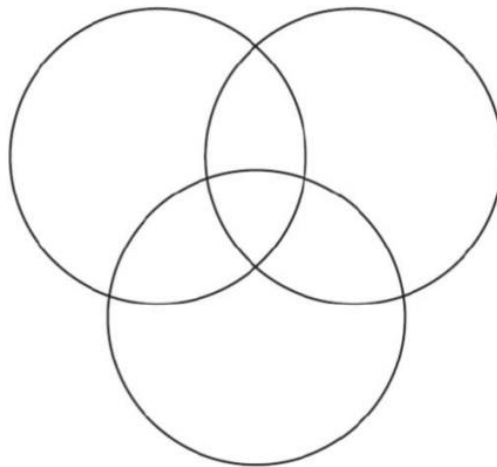
Red, blue and green light can be mixed to produce **white** light.

Red and blue light mixed together make up **magenta** light

Red and green light mixed together make **yellow** light.

Blue and green light mixed together make **cyan** light.

a) In your jotter, copy and complete the diagram to show this information.



## Question 2.

Light travels in straight lines, but changes direction when it passes from one substance to another.

The refractive index of a substance measures how much light changes direction.

Substance	Refractive Index
Air	1.0
Water	1.3
Sugar Solution	1.4
Glass	1.5
Sapphire	1.8
Diamond	2.4
Cinnabar	3.0

Use the information provided above and in the table to answer the questions which follow.

a)

- i) Use the information in the table to plot a bar chart.
- ii) Calculate the average refractive index of the substances shown in the table.
- iii) The lens in spectacles is made from glass. Diamond would produce thinner lenses. Why do opticians not use diamond to produce lenses for spectacles?
- iv) Sapphire is a blue gem stone and could also be used. Why would sapphire be unsuitable for producing lenses for spectacles?

b)

- i) Gallium Arsenide has a refractive index of 3.9. How many times greater is its refractive index than water?
- ii) Express the refractive index of sapphire to that of diamond as a simple whole number ratio.
- iii) Joshua Siler, a research scientist has developed self-adjusting, water filled glasses which are now offered as a cheap alternative to glass lenses in developing countries.

Use the information in the table to explain why water can be a useful alternative to glass in making lenses.

### Question 3.

A measure of how much a surface reflects sunlight is called the 'albedo'.

Use the information in the table to answer the following questions.

Surface	Albedo
forest	0.06–0.14
crops	0.15–0.25
dry soil	0.24–0.35
ice	0.33–0.38
dry sand	0.36–0.44
old snow	0.42–0.60
new concrete	0.50–0.60
fresh snow	0.80–0.90

- a) Which of the surfaces has the biggest range of albedo values?

The albedo of different surfaces on Earth has a range of values from 0 (no reflection) to 1 (total reflection).

- b) The scientists suggest that value for a number of surfaces will change over the next 50 years.

- (i) Which surface do you think is likely to change most over the next 50 years?
- (ii) State whether you expect the value to increase or decrease.
- (iii) Explain what will cause the albedo of your chosen category to change.



A marking guide for this Homework is available (password required).