



ENTANGLED TIMES

THE LIGHT
ISSUE

TABLE OF CONTENTS

1. WHAT IS LIGHT?
2. HOW LIGHT TRAVELS?
3. REFLECTION
& REFRACTION
4. COLOURS
5. HOW WE USE LIGHT
6. EXPERIMENTS
7. QUIZ



WHAT IS LIGHT?



LIGHT IS A TYPE OF ENERGY THAT HELPS US SEE THE WORLD AROUND US. IT MOVES INCREDIBLY FAST—ABOUT 300,000 KILOMETERS PER SECOND! LIGHT CAN ACT LIKE A WAVE AND A TINY PARTICLE AT THE SAME TIME. THIS IS WHAT MAKES IT SO SPECIAL! THE STUDY OF LIGHT IS CALLED OPTICS, AND SCIENTISTS HAVE BEEN LEARNING ABOUT IT FOR HUNDREDS OF YEARS.

THE LIGHT ISSUE

HOW LIGHT TRAVELS

LIGHT MOVES IN STRAIGHT LINES, BUT IT CAN BE REFLECTED, BENT, OR SPREAD OUT WHEN IT MEETS DIFFERENT OBJECTS. THAT'S WHY WE SEE SHADOWS WHEN SOMETHING BLOCKS LIGHT. SOME MATERIALS, LIKE GLASS AND WATER, LET LIGHT PASS THROUGH THEM, WHILE OTHERS, LIKE WOOD AND METAL, STOP LIGHT COMPLETELY.

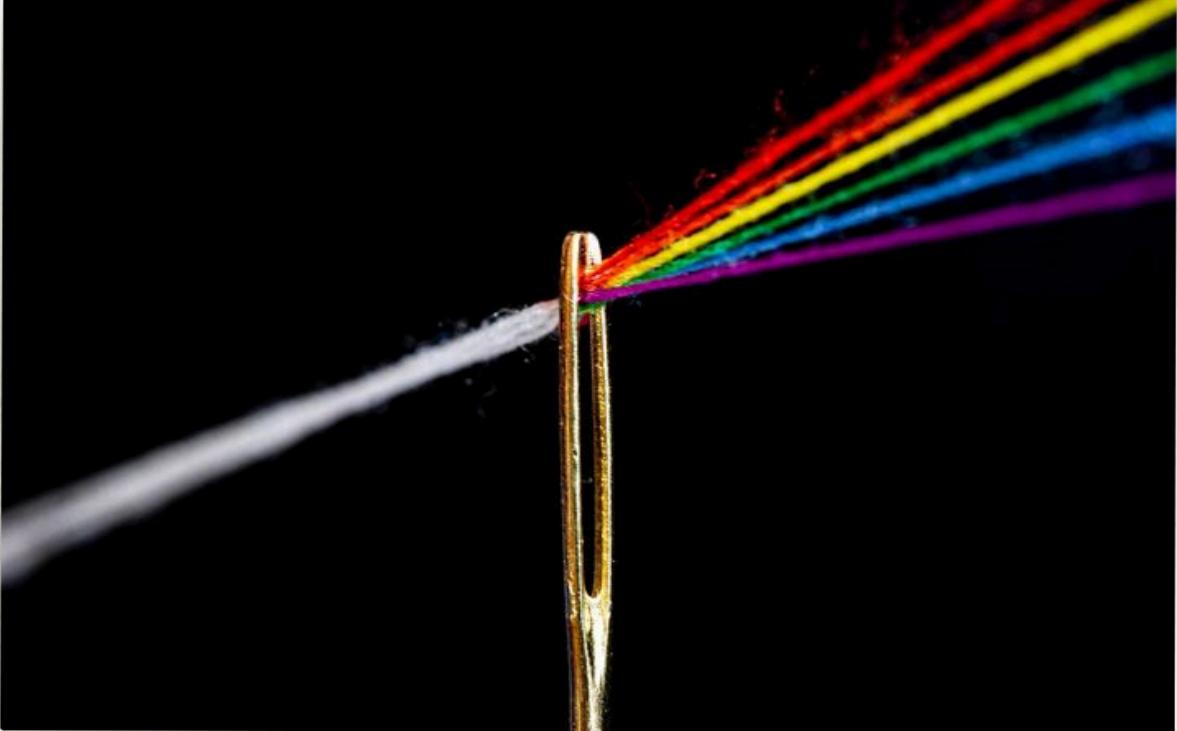
REFLECTION AND REFRACTION

WHEN LIGHT HITS A SURFACE, IT CAN BOUNCE BACK. THIS IS CALLED REFLECTION. A MIRROR IS A GREAT EXAMPLE—IT REFLECTS LIGHT, SO YOU CAN SEE YOURSELF! SMOOTH, SHINY SURFACES REFLECT LIGHT BEST, WHILE ROUGH SURFACES SCATTER IT.

LIGHT CAN ALSO BEND WHEN IT MOVES FROM ONE MATERIAL TO ANOTHER, LIKE FROM AIR TO WATER. THIS BENDING IS CALLED REFRACTION. HAVE YOU EVER NOTICED HOW A STRAW IN A GLASS OF WATER LOOKS BROKEN OR BENT? THAT'S REFRACTION AT WORK! THIS IS ALSO WHY A PENCIL DIPPED IN A GLASS OF WATER LOOKS LIKE IT'S SPLIT IN TWO.

COLOURS

DID YOU KNOW THAT WHITE LIGHT IS ACTUALLY MADE OF MANY COLOURS? WHEN LIGHT PASSES THROUGH A PRISM OR RAINDROPS, IT SPLITS INTO A RAINBOW! THIS HAPPENS BECAUSE DIFFERENT COLORS OF LIGHT BEND AT DIFFERENT ANGLES. RED LIGHT BENDS THE LEAST, AND VIOLET BENDS THE MOST. THAT'S WHY A RAINBOW ALWAYS HAS THE SAME ORDER OF COLORS!



HOW WE USE LIGHT

- FLASHLIGHTS & LAMPS: HELP US SEE IN THE DARK.
- MIRRORS: REFLECT LIGHT SO WE CAN SEE OURSELVES.
- EYEGLASSES & MAGNIFYING GLASSES: BEND LIGHT TO HELP PEOPLE SEE BETTER.
- CAMERAS & PROJECTORS: USE LIGHT TO CAPTURE AND DISPLAY IMAGES.
- FIBER OPTICS: TINY GLASS TUBES THAT SEND LIGHT SIGNALS FOR THE INTERNET!
- LASERS: SPECIAL LIGHT BEAMS USED IN MEDICINE, CUTTING MATERIALS, AND EVEN READING
- BARCODES!

EXPERIMENTS

- MIRROR MAGIC: HOLD A MIRROR AND SHINE A FLASHLIGHT AT IT. WATCH HOW THE LIGHT BOUNCES OFF! TRY CHANGING THE ANGLE TO SEE WHAT HAPPENS.

BENDING LIGHT:
PUT A STRAW IN
A GLASS OF
WATER AND SEE
HOW IT LOOKS
BENT. THAT'S
REFRACTION!

MAKE A RAINBOW: TAKE
A GLASS OF WATER
OUTSIDE ON A SUNNY DAY.
HOLD IT AT AN ANGLE AND
SEE IF YOU CAN CREATE A
RAINBOW!

SHADOW SHAPES: USE A FLASHLIGHT TO MAKE
DIFFERENT SHADOW SHAPES ON A WALL. MOVE
OBJECTS CLOSER AND FARTHER TO SEE HOW THE
SHADOW CHANGES.

QUIZ YOURSELF!

FILL IN THE BLANKS WITH THE CORRECT WORDS:

LIGHT TRAVELS IN A ----- LINE.

A ----- REFLECTS LIGHT, HELPING US SEE OUR OWN IMAGE.

THE BENDING OF LIGHT WHEN IT PASSES FROM AIR TO WATER IS CALLED -----.

WHITE LIGHT IS MADE UP OF DIFFERENT -----.

THE STUDY OF LIGHT IS CALLED -----.

MATCH THE PAIRS:

MATCH THE LIGHT-RELATED TERMS TO THEIR CORRECT DESCRIPTIONS:

REFLECTION → (A) THE BENDING OF LIGHT

REFRACTION → (B) SPLITTING OF LIGHT INTO COLORS

PRISM → (C) LIGHT BOUNCING OFF A SURFACE

RAINBOW → (D) A TOOL THAT SPLITS LIGHT

DRAW & LEARN:

DRAW A SIMPLE RAINBOW WITH ALL THE COLORS IN THE CORRECT ORDER.

SKETCH A LIGHT RAY HITTING A MIRROR AND BOUNCING OFF. SHOW THE ANGLES!

ILLUSTRATE A LIGHT BEAM BENDING AS IT ENTERS A GLASS OF WATER.

ABOUT THE AUTHORS

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MY NAME IS ISHAAN KAPOOR AND I'M AN IBDP GRADE 11 STUDENT WITH A PASSION FOR PHYSICS. I SPECIFICALLY ENJOY THE STUDY OF ELECTRICITY AND WAVES. IN MY FREE TIME I ENJOY WATCHING FORMULA 1 AND CONDUCTING EXPERIMENTS

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