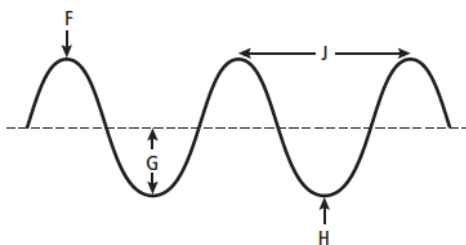


**Optics**

1. Name each of the following for the diagram below:

- a) F: Crest
- b) G: Amplitude
- c) H: Trough
- d) J: Wavelength



2. State the law of reflection:

*Angle of incidence = Angle of reflection*

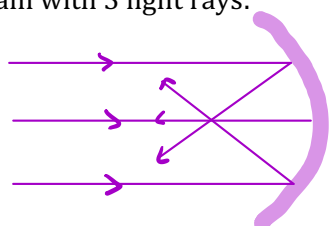
3. What size and orientation does an image seem to have in a plane mirror?

Size:

Orientation:

**Concave Mirror**

Diagram with 3 light rays:



Opaque, translucent or transparent?

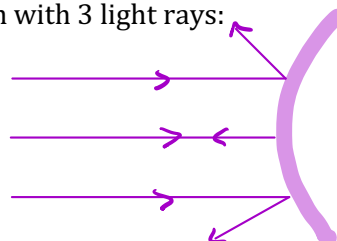
*Opaque*

Light converges/diverges?

*Converges*

**Convex Mirror**

Diagram with 3 light rays:



Opaque, translucent or transparent?

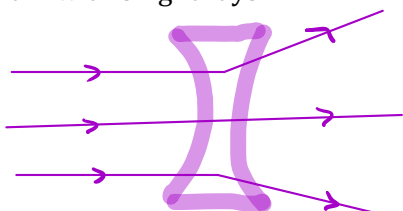
*Opaque*

Light converges/diverges?

*Diverges*

**Concave Lens**

Diagram with 3 light rays:



Opaque, translucent or transparent?

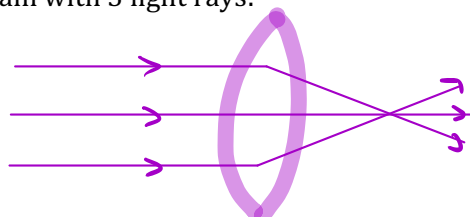
*Transparent*

Light converges/diverges?

*Diverges*

**Convex Lens**

Diagram with 3 light rays:



Opaque, translucent or transparent?

*Transparent*

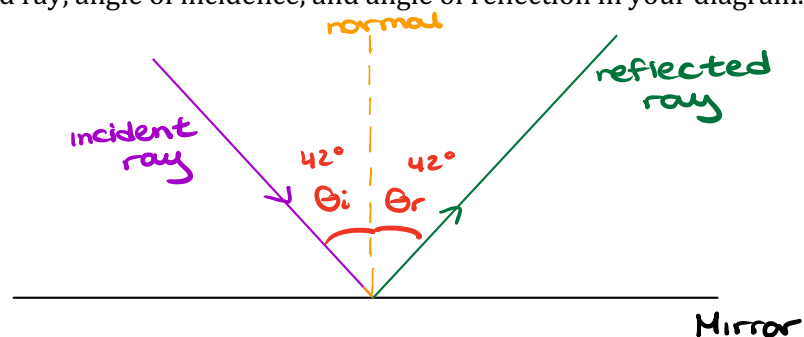
Light converges/diverges?

*Converges*

4. Match the term with the descriptor. Each descriptor can only be used once.

Term	Descriptor
<u>b</u> lens	<del>A.</del> Equal to angle of reflection for a plane mirror
<u>m</u> mirror	<del>B.</del> A piece of transparent material that bends light
<u>f</u> convex lens	<del>C.</del> Light rays spreading apart
<u>q</u> concave lens	<del>D.</del> Material that scatters light
<u>c</u> diverging	<del>E.</del> Material that curves outwards and reflects light
<u>o</u> converging	<del>F.</del> A lens that is thicker in the middle than at the edge
<u>h</u> upright	<del>G.</del> How an image appears when looking at a faraway object through a convex lens
<u>g</u> inverted	<del>H.</del> Material that curves inwards and reflects light
<u>h</u> concave mirror	<del>I.</del> Point where the converging light rays meet
<u>e</u> convex mirror	<del>J.</del> Material that is flat and smooth and reflects light
<u>j</u> plane mirror	<del>K.</del> How an image appears when looking through a concave lens
<u>o</u> opaque	<del>L.</del> Measured between the refracted ray and the normal
<u>n</u> transparent	<del>M.</del> A material that reflects light
<u>d</u> translucent	<del>N.</del> Material that allows all light rays to pass through
<u>i</u> focal point	<del>O.</del> Light rays coming together
<u>p</u> normal	<del>P.</del> An imaginary line that passes through the materials at a right angle
<u>l</u> angle of refraction	<del>Q.</del> A lens that is thinner in the middle than at the edge
<u>r</u> angle of reflection	<del>R.</del> Angle between reflected ray and the normal
<u>a</u> angle of incidence	<del>S.</del> Material that absorbs or reflects light

5. Draw a line representing a flat mirror. Draw a light ray approaching and then touching the mirror. Then add a normal. Complete the ray diagram showing the ray's reflection. Label the incident ray, normal, reflected ray, angle of incidence, and angle of reflection in your diagram.

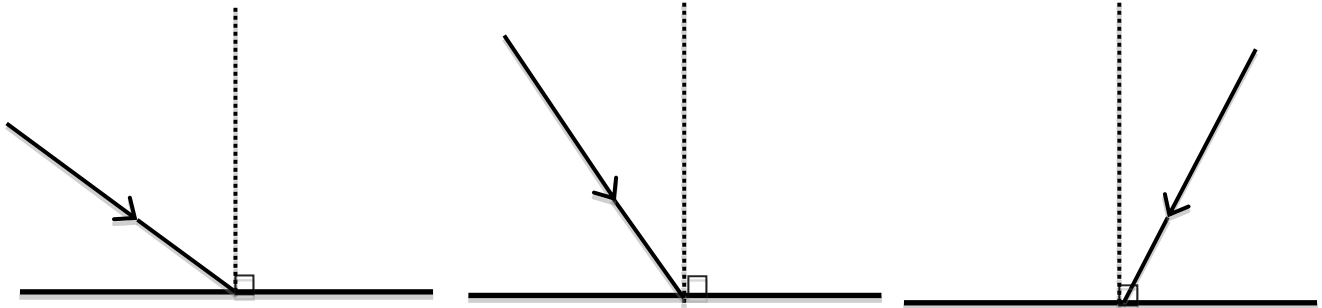


6. Measuring Angles:

A) Angle: 53°

B) Angle: 35°

C) Angle: 29°



7. Use the following diagram to fill in the table below:

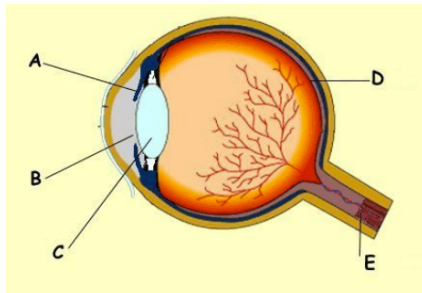


Diagram	Structure	Function
A	Iris	Colour of the eye Muscle that controls pupil
B	Pupil	Opening where light enters the eye
C	Lens	Focuses light towards the retina
D	Retina	screen at the back of the eye where the image is formed
E	Optic nerve	sends visual signals to the brain

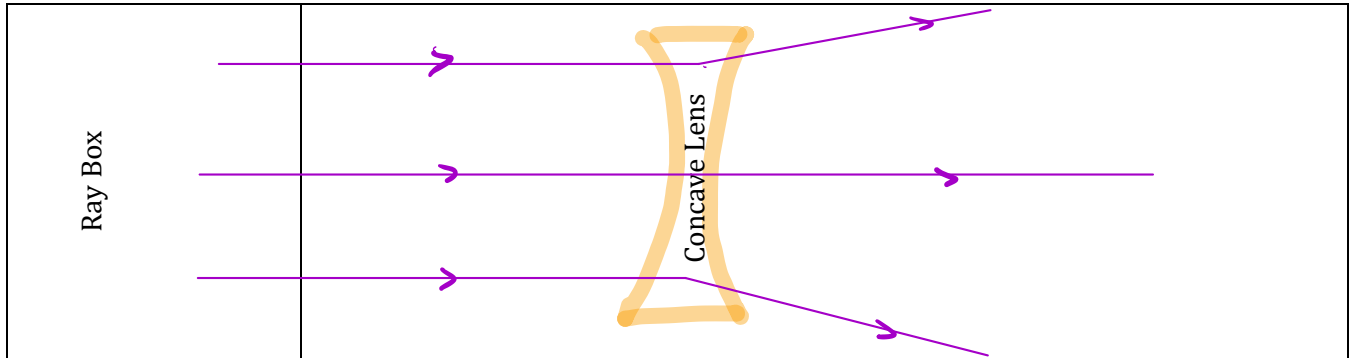
8. Vision problems:

Type of vision problem	Description	Diagram	Diagram of how to fix problem with the appropriate lens
Near-sighted vision	Close objects are clear, but far objects are fuzzy		
Far-sighted vision	Far objects are clear, but closer objects are fuzzy		

For the following, draw the rays that emerge from the ray box and through the concave or convex lens. Make sure to use a ruler for all straight lines.

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### Concave Lens



Are the rays converging or diverging? *Diverging*

Where is the focal point? *In front of the lens*

---

Now take a **circular concave lens** and answer the following questions.

- Hold the lens a few inches from your eye to look at an object. Make sure the image is focused.
- Does the object look smaller or larger?  
*Smaller*
- Does the object look upright or inverted (upside down)?

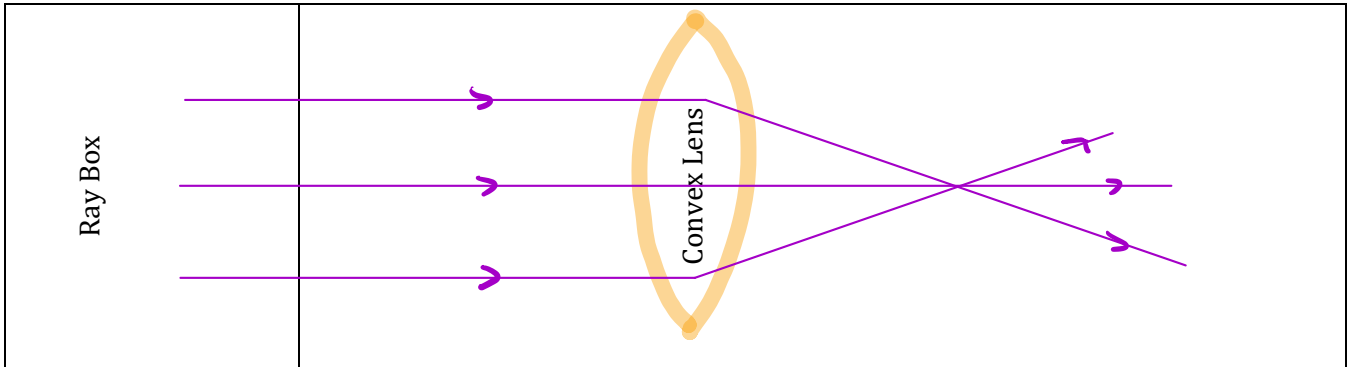
*Upright*

---

Now comparing to a concave MIRROR...

- Do the rays converge or diverge? *Converge*
- If the object is far from the concave mirror, it will appear... *upside down & smaller*
- If the object is close to the concave mirror, it will appear... *upright & larger*

# Convex Lens



- The focal length is the distance between the lens and the focal point. Can you measure the focal length? Yes/No      If so, what is the focal length in cm? \_\_\_\_\_
- Are the rays converging or diverging?

*Converging*

Now take a **circular convex lens** and answer the following questions.

- Look through the lens at an object on the other side of the classroom.
  - Does the object look smaller or larger?

*Smaller*

- Does the object look upright or inverted (upside down)?

*Inverted*

- Now look through the lens at the text on this paper. Make sure the text is in focus.
  - Does the text look smaller or larger?

*Upright*

- Does the text look upright or inverted (upside down)?

*Larger*

Now comparing to a convex MIRROR...

- Do the rays converge or diverge? Diverge
- If the object is far from the convex mirror, it will appear... upright & smaller
- If the object is close to the convex mirror, it will appear... upright & smaller