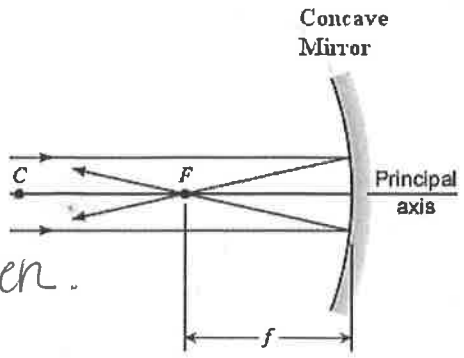
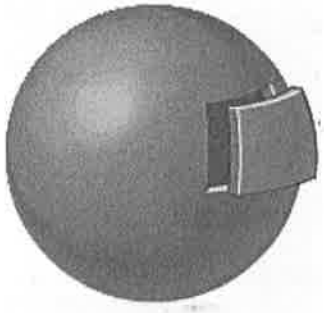
Real focal point = ⊕ focal length  Virtual focal point = ⊖ focal length

## Curved Mirrors

Source
Source of Parallel Rays: very far away



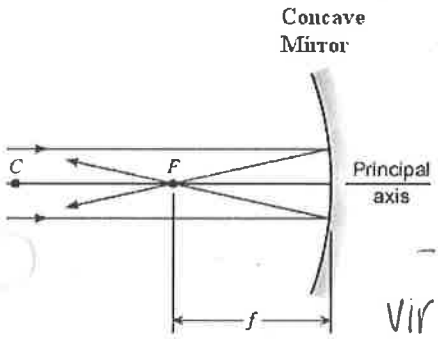



Method of locating focal point:
Allowing light from a distant object to come into focus on a screen.

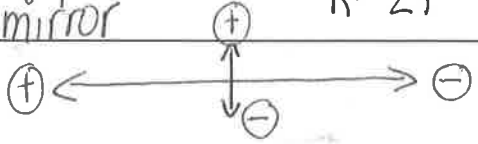
Principal Axis: diameter of sphere
Center of Curvature (C): center of sphere
Radius of Curvature (R): radius of sphere
Focal Point (F): point where rays cross the principal axis
Focal Length (f): distance from focal point to mirror

Relationship between radius of curvature and focal length
$R = 2f$

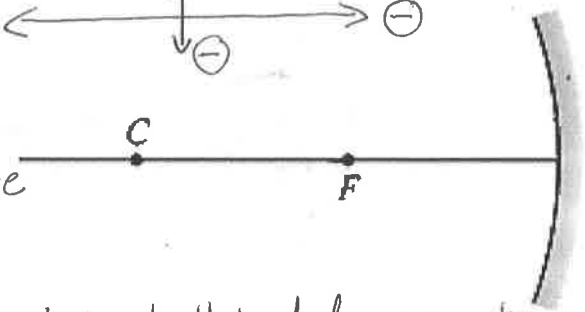
### Converging Mirror




Shape: concave
Focal Point: real
Focal Length: ⊕

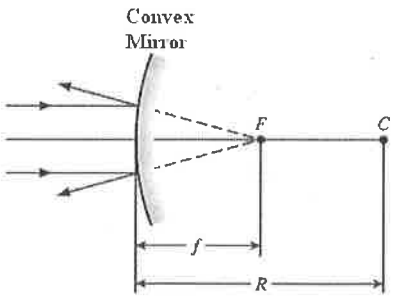



Images: real - smaller / same size / larger
- no image
virtual image - larger

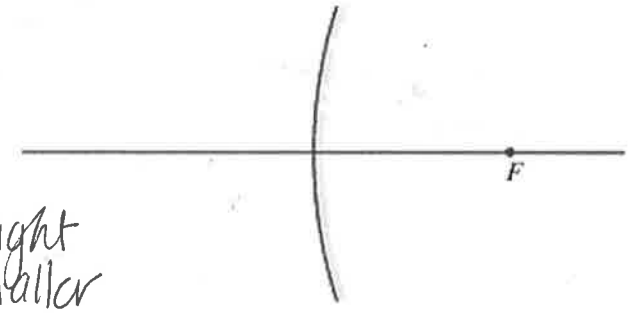



Examples: satellite dish, cosmetic mirror

### Diverging Mirror




Shape: convex
Focal Point: virtual
Focal Length: ⊖




Images: virtual - upright
smaller

Examples: security mirror, rear view mirrors

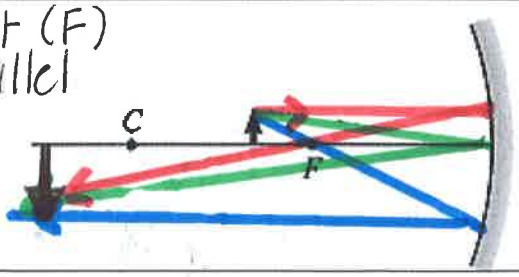
## Real and Virtual Images

**Real image:** → Formed where light rays actually converge.
Properties:
1) always projected on to a screen
2) image always inverted

**Virtual image:** Formed where light rays appear to converge or intersect.
Properties:
1) cannot be projected on a screen
2) always upright

## Ray Tracing (3-Ray diagrams) to Locate Images

Ray #1: In parallel, out through focal pt (F)
Ray #2: In through Focal point, out parallel
Ray #3: In center of mirror, out at equal angle.

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object beyond center

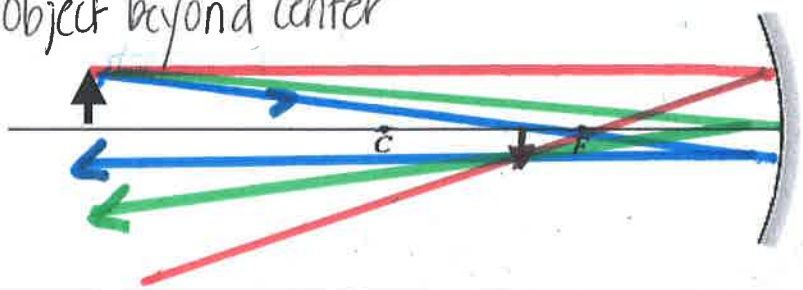


**Image Properties**
**Case 1:**
- inverted
- smaller
- real

---

object at center or 2f

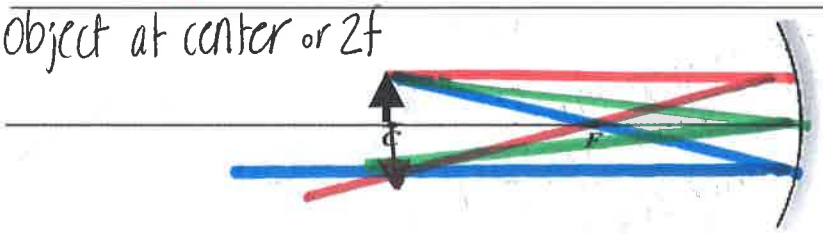


**Image Properties**
**Case 2:**
- inverted
- same size
- real

---

object between center and focal point

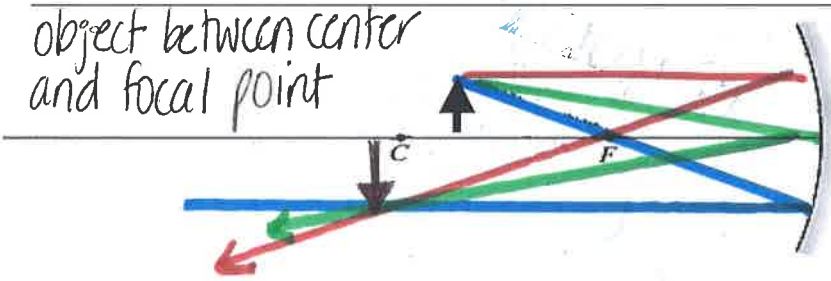


**Image Properties**
**Case 3:**
- inverted
- real
- larger

---

object at focal point

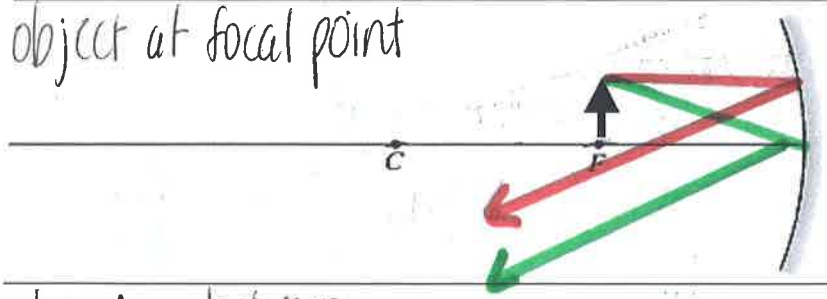


**Image Properties**
**Case 4:**
- no image

---

object is between focal pt. & mirror

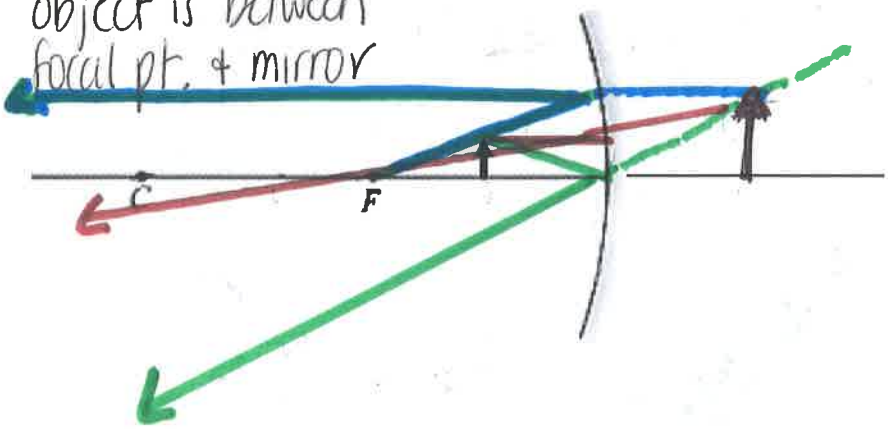


**Image Properties**
**Case 5:**
- upright
- larger
- virtual

Application: