

Problems of Geometric optics. Spherical mirrors

1) A concave spherical mirror has a radius of curvature with a magnitude of 338 cm. Determine the image location if the object position is 169 cm in front of the mirror.

Answer: The object is at the focal point. The image is located infinitely far away from the mirror.

2) A spherical concave mirror has a radius of curvature of 70 cm and a magnification of 2.9. Find: **a)** Mirror's focal length. **b)** Object location. **c)** Image location.

Answer: **a)** 35 cm, **b)** 22.93 cm, **c)** -66.5 cm.

3) The magnification of a spherical mirror is -2.6. An object is placed in front of the mirror at distance of 80 cm. Find: **a)** Radius of curvature. Is the mirror convex or concave? **b)** Focal length. **c)** Image location.

Answer: **a)** 115.6 cm, concave, **b)** 57.78 cm, **c)** 208 cm.

4) An object is placed in front of a spherical mirror at distance of 180 cm. The mirror's magnification is 2.5. Calculate: **a)** Radius of curvature. Is the mirror convex or concave? **b)** Focal length. **c)** Image location.

Answer: **a)** 600 cm, concave, **b)** 300 cm, **c)** -450 cm.

5) A concave spherical mirror has a radius of curvature of 72 cm. An object has a height of 15 mm and is placed in front of the mirror at distance of 171 cm. Determine: **a)** Mirror's focal length. **b)** Image location. **c)** Image height and its description (real/virtual, upright/inverted).

Answer: **a)** 36 cm, **b)** 45.6 cm, **c)** -4 mm, real, demagnified and inverted.

6) The radius of curvature of a convex spherical mirror is 198 cm. An object has a height of 30 mm and is placed in front of the mirror at distance of 75 cm. Find: **a)** Mirror's focal length. **b)** Image location. **c)** Image height and its description (real/virtual, upright/inverted).

Answer: **a)** -99 cm, **b)** -42.67 cm, **c)** 17.1 mm, virtual, demagnified and upright.

7) A spherical mirror has a magnification of 0.43 when an object is placed in front of it at distance of 45 cm. Determine: **a)** Radius of curvature. Is the mirror convex or concave? **b)** Focal length. **c)** Image location.

Answer: **a)** -67.89 cm, convex, **b)** -33.95 cm, **c)** -19.3 cm.

8) The radius of curvature of a spherical concave mirror is 94 cm. An object has a height of 7 mm and is placed in front of the mirror at distance of 40 cm. Calculate: **a)** Mirror's focal length. **b)** Image location. **c)** Image height and its description (real/virtual, upright/inverted).

Answer: **a)** 47 cm, **b)** -268.6 cm, **c)** 47 mm, virtual, magnified and upright.

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9) A convex spherical mirror has a radius of curvature of 280 cm and its magnification is 0.79. Find:

a) Mirror's focal length. **b)** Object location. **c)** Image location.

Answer: **a)** -140 cm, **b)** 37.22 cm, **c)** -29.4 cm.

10) The magnification of a spherical mirror is -0.77. An object is placed in front of the mirror at distance of 120 cm. Find: **a)** Radius of curvature. Is the mirror convex or concave? **b)** Focal length. **c)** Image location.

Answer: **a)** 104.4 cm, concave, **b)** 52.2 cm, **c)** 92.4 cm.