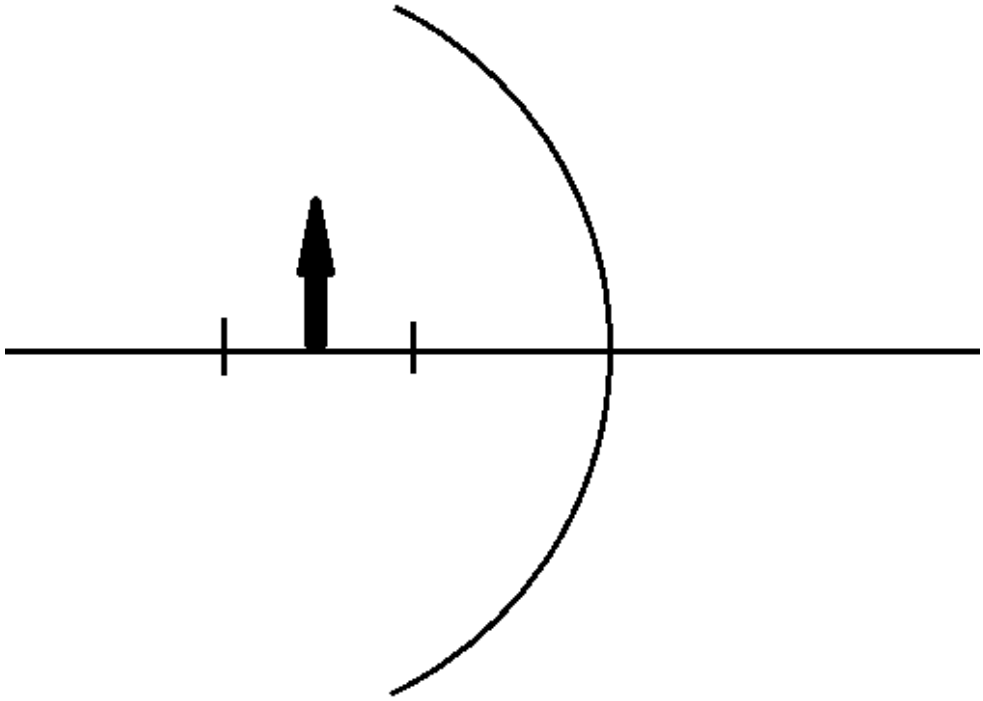
Geometric Optics

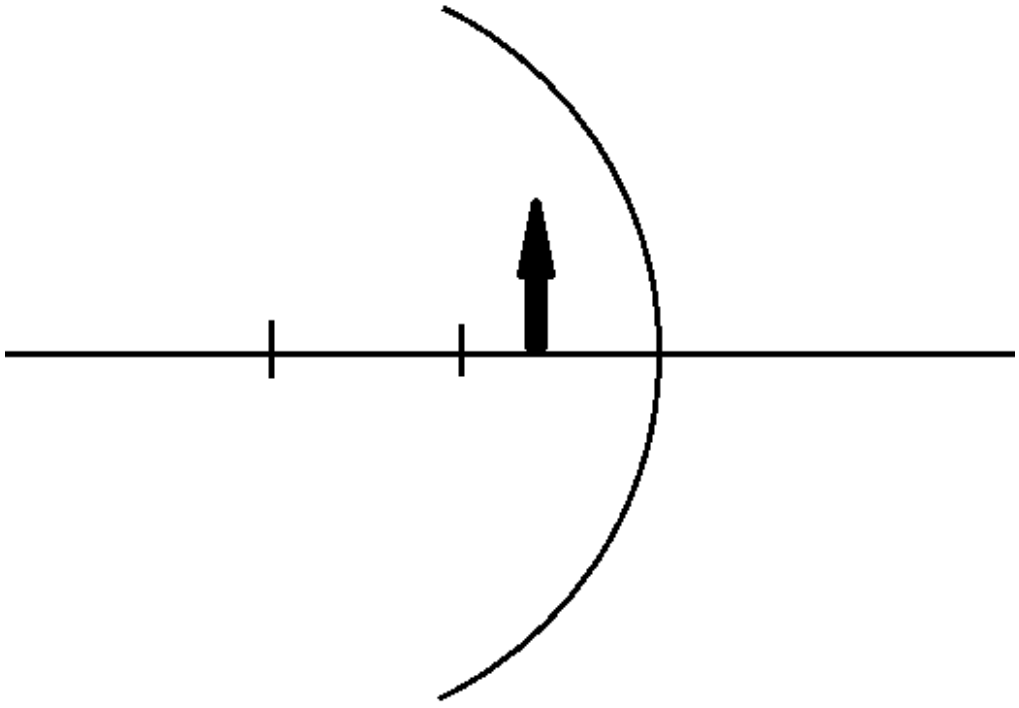
Practice Problems

Ray Tracing - Draw at least two principle rays and show the image created by the lens or mirror.

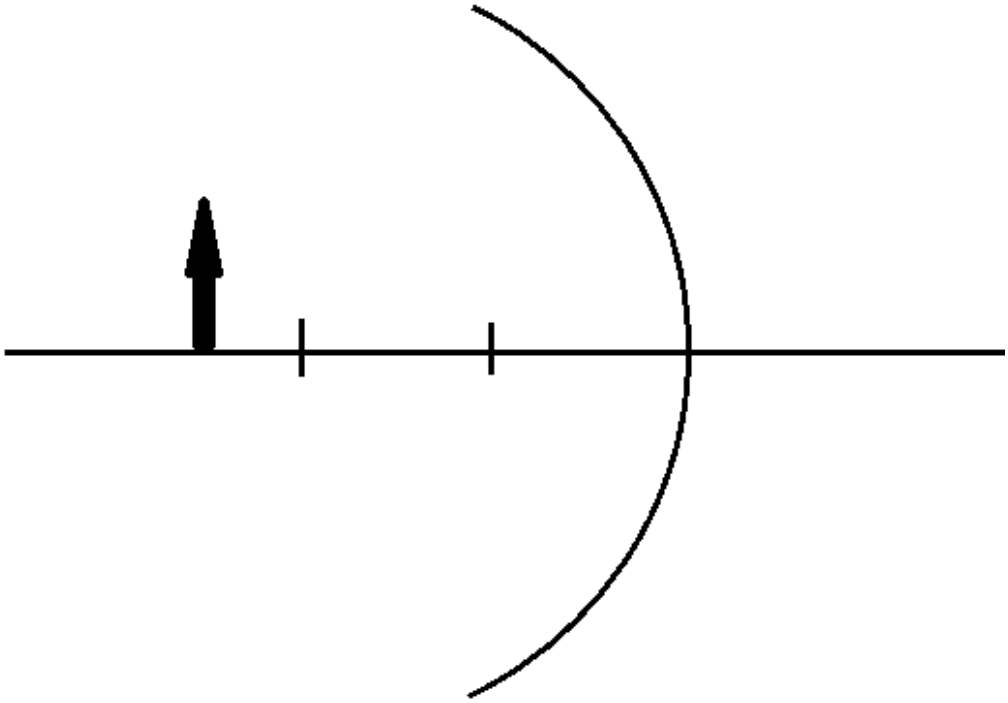
1.



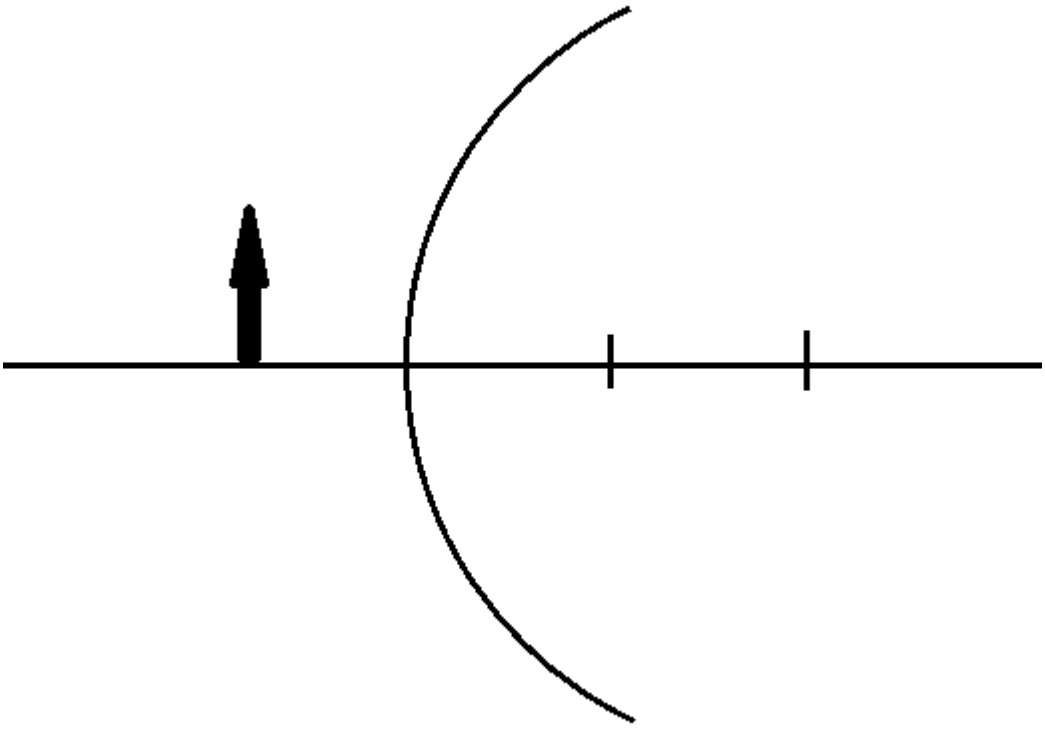
2.



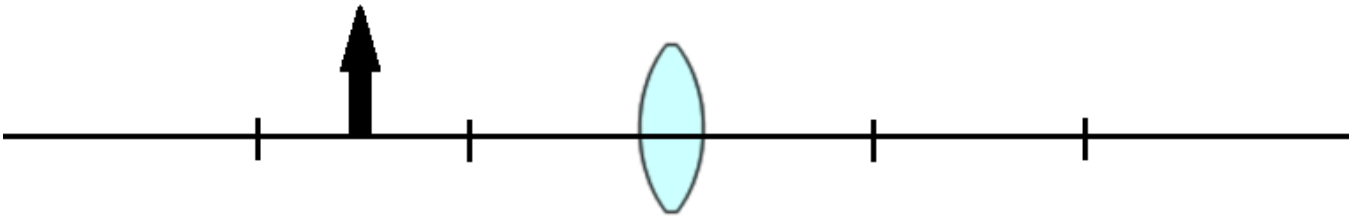
3.



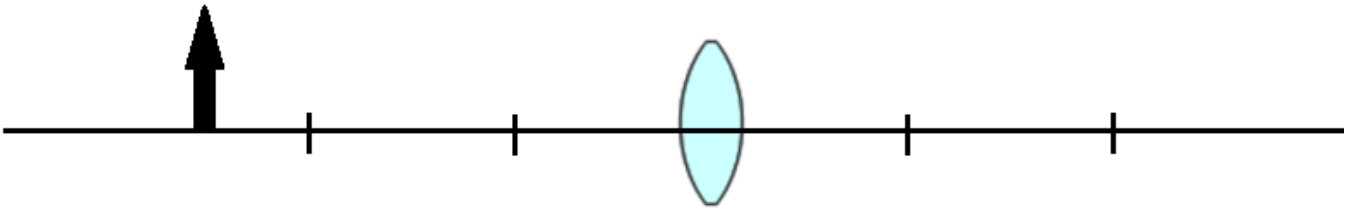
4.



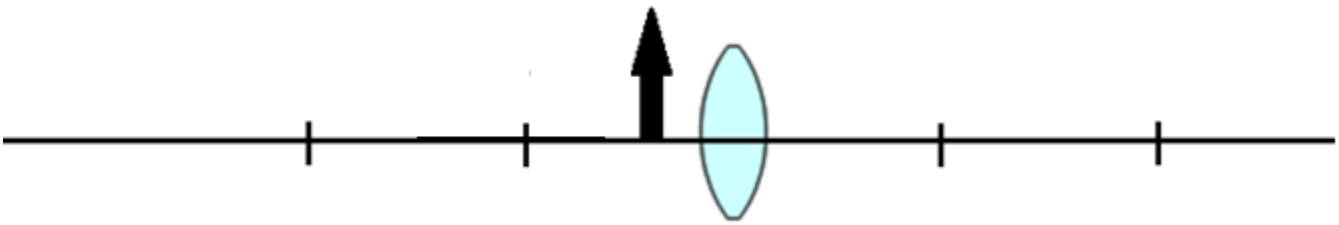
5.



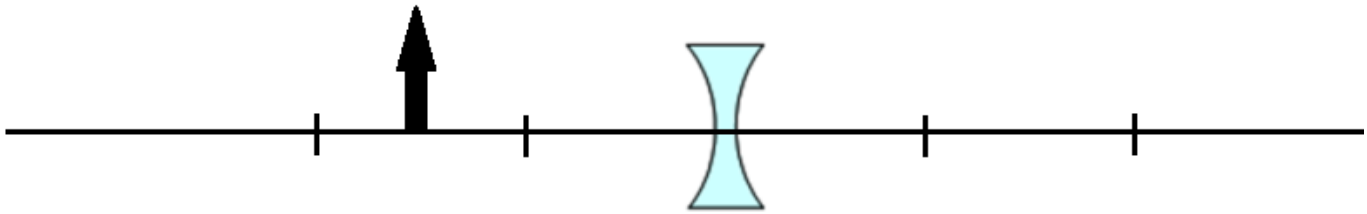
6.



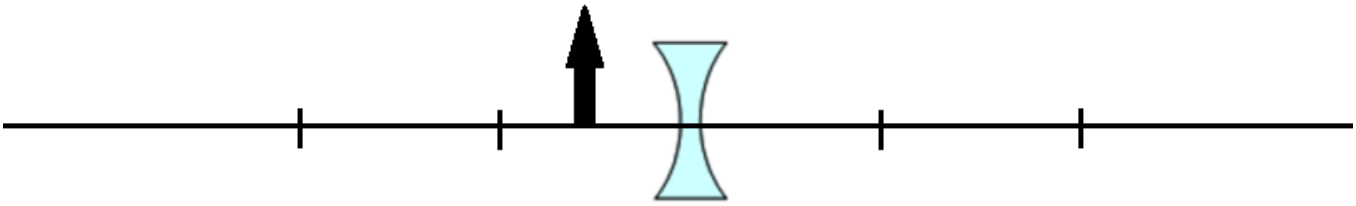
7.



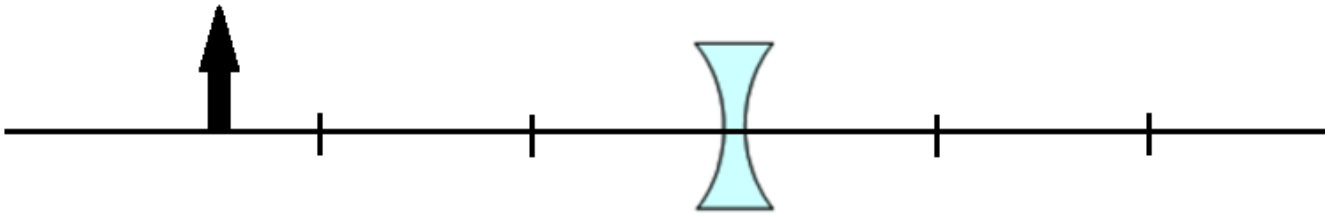
8.



9.



10.



Practice Problems - Mirrors
Classwork

11. A candle is placed at a distance of 12 cm from of a concave mirror with a focal length of 8 cm. The candle is 5 cm tall.
    a. Where is the image located?
    b. What is the height of the image?

12. A candle is placed at a distance of 14 cm from of a concave mirror with a focal length of 6 cm. The candle is 7 cm tall.
    a. Where is the image located?
    b. What is the height of the image?

13. A candle is placed at a distance of 5 cm from of a concave mirror with a focal length of 10 cm. The candle is 6 cm tall.
    a. Where is the image located?
    b. What is the height of the image?

14. An object is placed at a distance of 6 cm from a concave mirror and an image is produced at a distance of 14 cm from the mirror. What is the focal length?

Homework

15. A candle is placed at a distance of 18 cm from of a concave mirror with a focal length of 12 cm. The candle is 9 cm tall.
    a. Where is the image located?
    b. What is the height of the image?

16. A candle is placed at a distance of 15 cm from of a concave mirror with a focal length of 5 cm. The candle is 8 cm tall.
    a. Where is the image located?
    b. What is the height of the image?

17. A candle is placed at a distance of 4 cm from of a concave mirror with a focal length of 12 cm. The candle is 10 cm tall.
    a. Where is the image located?
    b. What is the height of the image?

18. An object is placed at a distance of 12 cm from a concave mirror and an image is produced at a distance of 8 cm from the mirror. What is the focal length?

Practice Problems - Lenses
Classwork

19. An object is placed at a distance of 60 cm from a converging lens with a focal length of 20 cm.
    a. Where is the image located?
    b. What is the magnification of the lens?

20. An object is placed at a distance of 20 cm from a converging lens with a focal length of 30 cm.
    a. Where is the image located?
    b. What is the magnification of the lens?

21. An object is placed at a distance of 60 cm from a converging lens with a focal length of 40 cm.
    a. Where is the image located?
    b. What is the magnification of the lens?

Homework

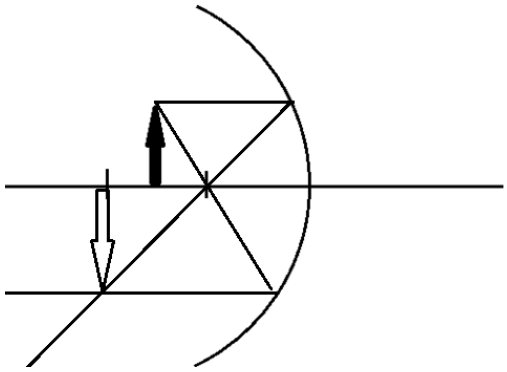
22. An object is placed at a distance of 40 cm from a converging lens with a focal length of 15 cm.
    a. Where is the image located?
    b. What is the magnification of the lens?

23. An object is placed at a distance of 15 cm from a converging lens with a focal length of 20 cm.
    a. Where is the image located?
    b. What is the magnification of the lens?

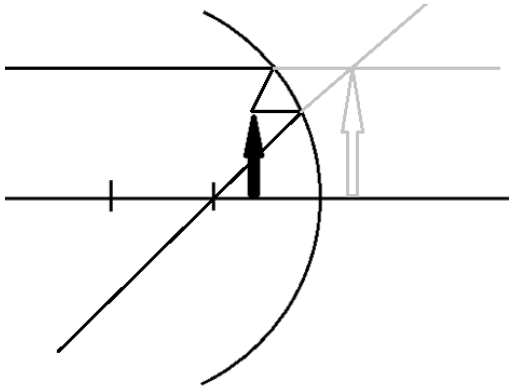
24. An object is placed at a distance of 50 cm from a converging lens with a focal length of 30 cm.
    a. Where is the image located?
    b. What is the magnification of the lens?

Answers

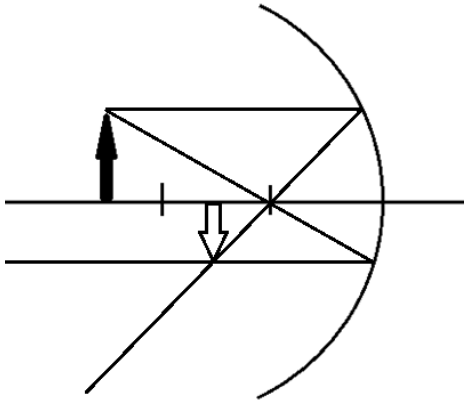
1.



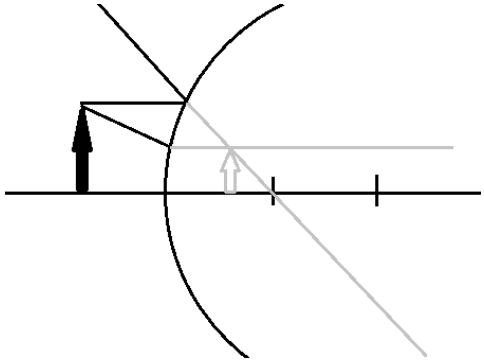
2.



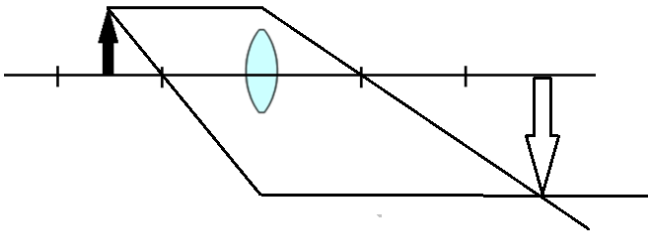
3.



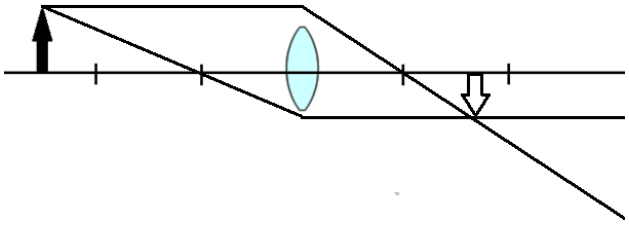
4.



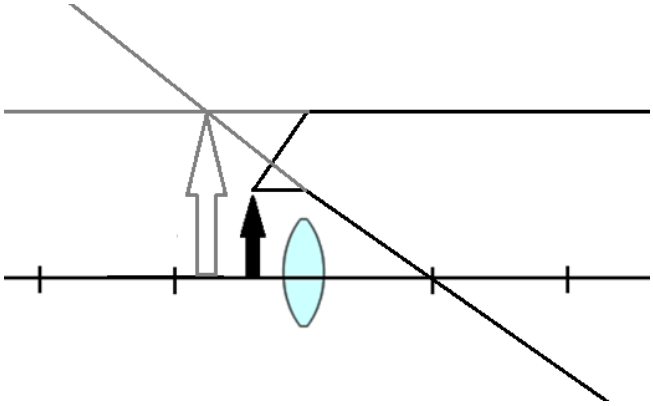
5.



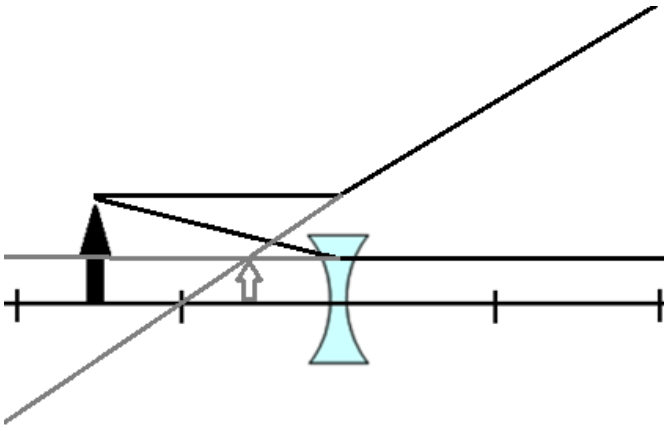
6.



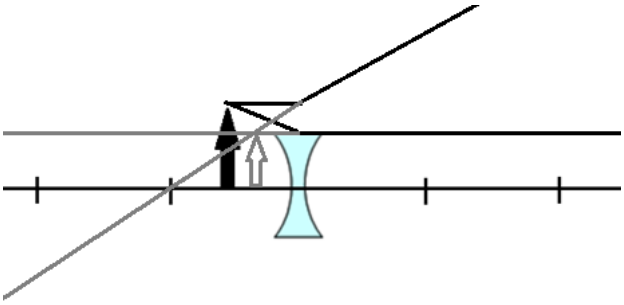
7.



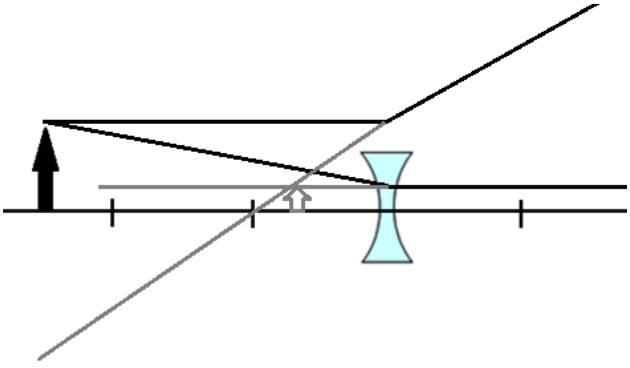
8.



9.



10.



11. a) 24 cm b) 10 cm

12. a) 10.5 cm b) 6.1 cm

13. a) -10 cm b) 12 cm

14. 4.2 cm

15. a) 36 cm b) 18 cm

16. a) 7.5 cm b) 4 cm

17. a) -6 cm b) 15 cm

18. 4.8 cm

19. a) 30 cm b) 0.5

20. a) -60 cm b) 3

21. a) 120 cm b) 2

22. a) 24 cm b) 0.6

23. a) -60 cm b) 4

24. a) 75 cm b) 1.5