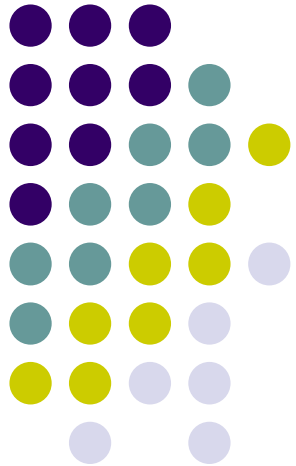
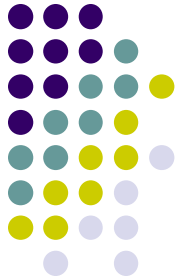
Optics Quiz 3

This quiz is intended to be taken after completion of Chapters 10-15



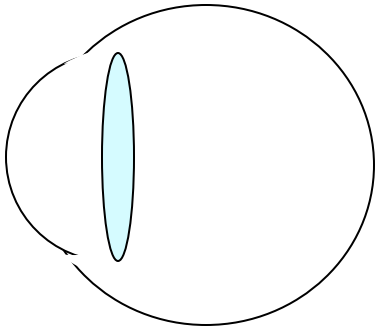


No, you can’t use a calculator (and you don’t need one anyway)

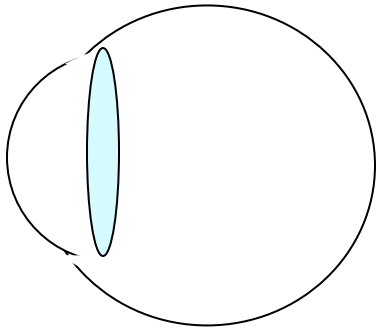
Note that some questions are callbacks from previous quizzes

Draw the appropriate error lens (if any) within each eye

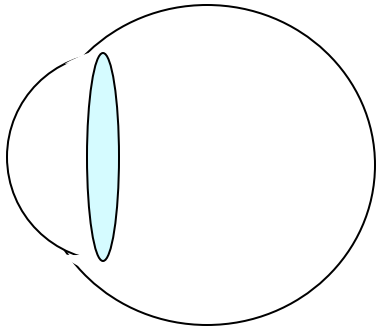
The Hyperopic Eye



The Emmetropic Eye

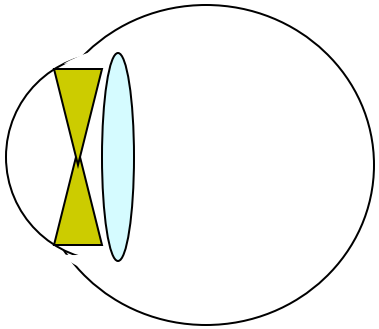


The Myopic Eye

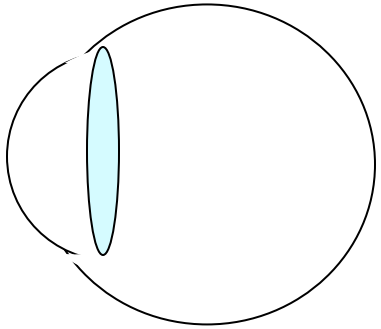


Draw the appropriate error lens (if any) within each eye

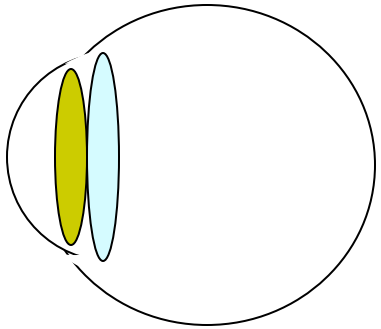
The Hyperopic Eye



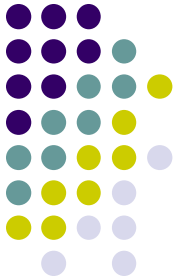
The Emmetropic Eye



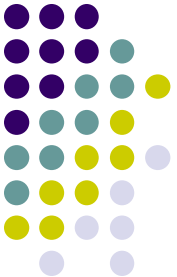
The Myopic Eye



A pt is a +2 hyperope. He is capable of a total of 6D of accommodation. Absent corrective lenses or surgery:
a) Where is his near point *relative to the corneal plane?*
b) His range of clear vision is from where *to* where*?*



A pt is a +2 hyperope. He is capable of a total of 6D of accommodation. Absent corrective lenses or surgery:
a) Where is his near point *relative to the corneal plane?*
b) His range of clear vision is from where *to* where*?*

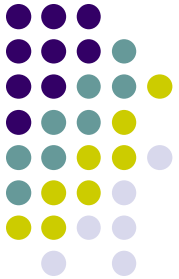


a) To see clearly at distance, this +2 hyperope must first employ 2D of accommodation. To focus at his near point, he will crank in the remaining 4D of accommodation. Thus he will be focused at 1/4 = .25m (25 cm) anterior to the corneal plane.

A pt is a +2 hyperope. He is capable of a total of 6D of accommodation. Absent corrective lenses or surgery:

a) Where is his near point *relative to the corneal plane?*

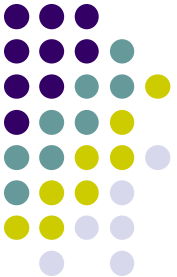
b) His range of clear vision is from where *to* where*?*



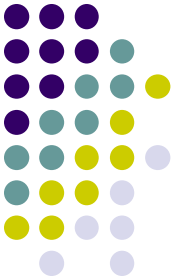
a) To see clearly at distance, this +2 hyperope must first employ 2D of accommodation. To focus at his near point, he will crank in the remaining 4D of accommodation. Thus he will be focused at 1/4 = .25m (25 cm) anterior to the corneal plane.

b) His range of clear vision is from infinity to 25 cm anterior to the corneal plane.

A pt is a -2 myope. She is capable of a total of 3D of accommodation. Absent corrective lenses or surgery:
a) Where is her near point *relative to the corneal plane?*
b) Her range of clear vision is from where *to* where*?*



A pt is a -2 myope. She is capable of a total of 3D of accommodation. Absent corrective lenses or surgery:
a) Where is her near point *relative to the corneal plane?*
b) Her range of clear vision is from where *to* where*?*

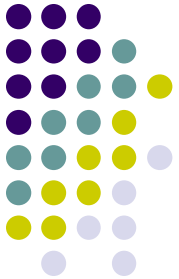


a) This pt has a +2 error lens. When she cranks in her 3D of accommodative ability, she has a total of +5D in play. This puts her near point at 1/5 = 0.20m (20 cm) anterior to the corneal plane.

A pt is a -2 myope. She is capable of a total of 3D of accommodation. Absent corrective lenses or surgery:

a) Where is her near point *relative to the corneal plane?*

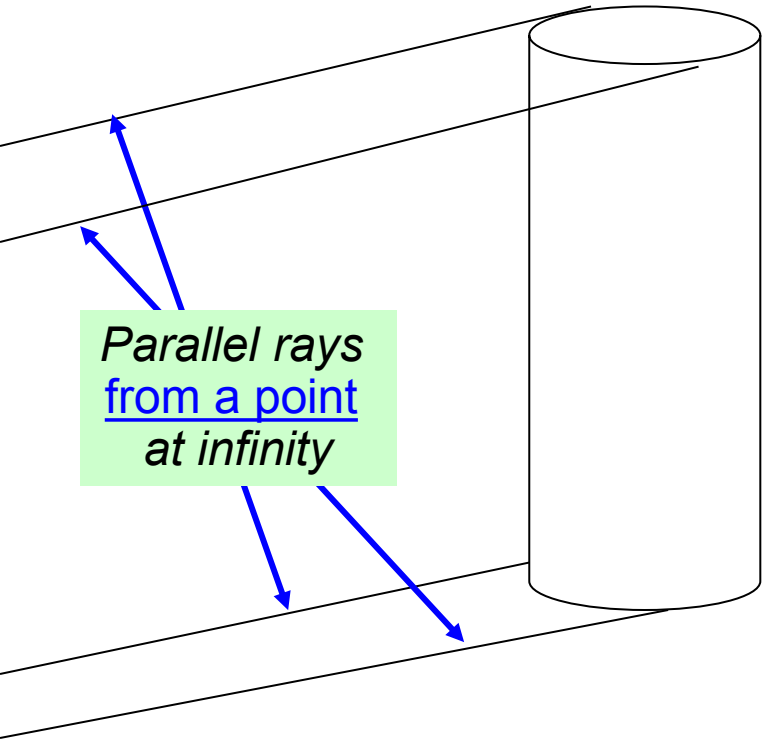
b) Her range of clear vision is from where *to* where*?*



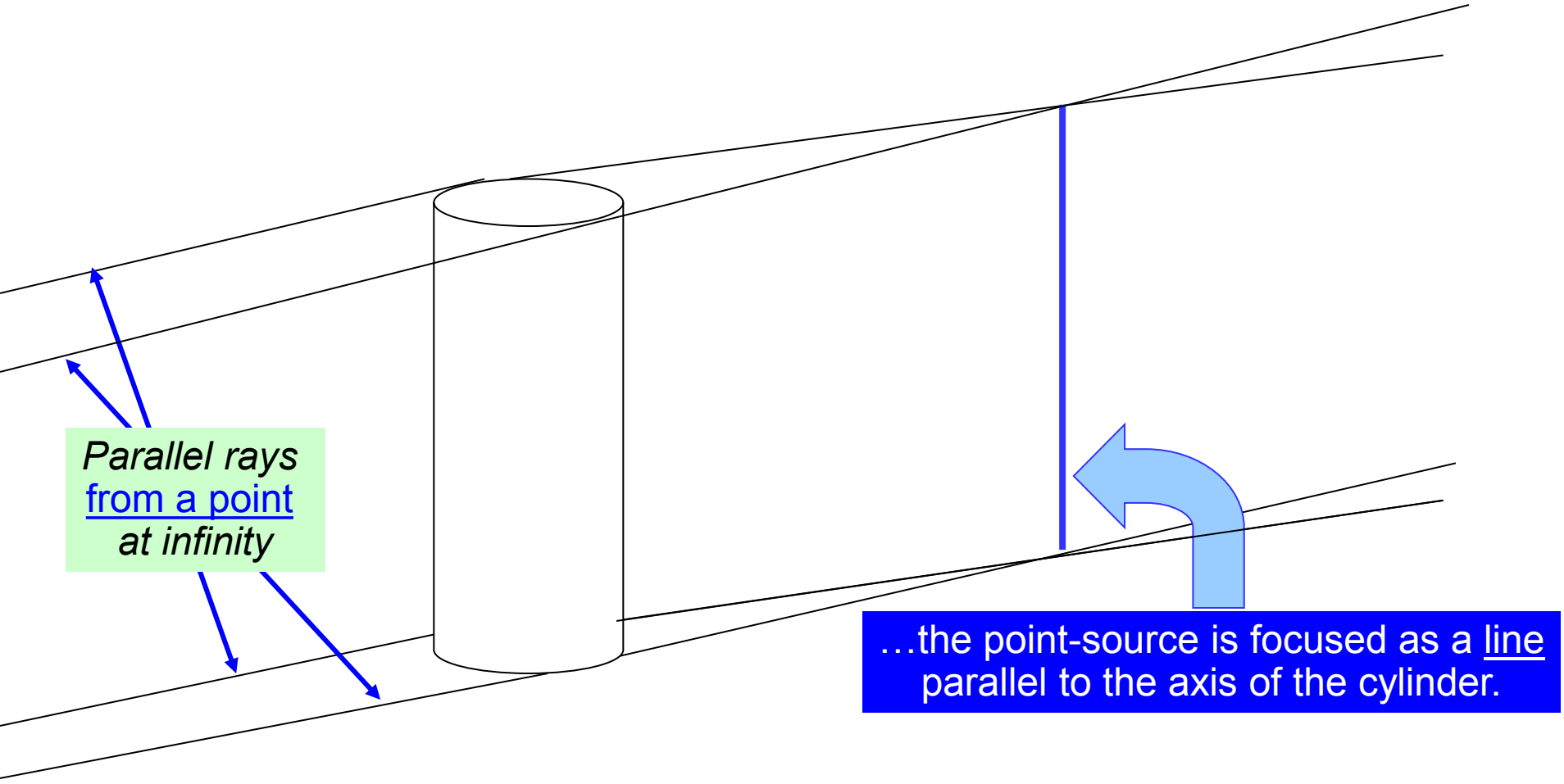
a) This pt has a +2 error lens. When she cranks in her 3D of accommodative ability, she has a total of +5D in play. This puts her near point at 1/5 = 0.20m (20 cm) anterior to the corneal plane.

b) Because of her error lens, this pt cannot see clearly at distance. The farthest point at which she can see clearly is her far point, which is located at 1/2 = 0.50m (50 cm) anterior to the corneal plane. As noted above, her near point is at 20 cm. Therefore, her range of clear vision is from 50 to 20 cm anterior to the corneal plane.

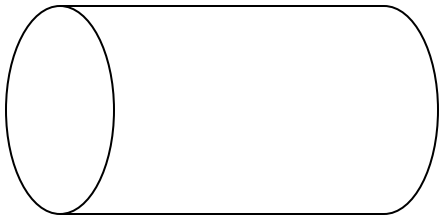
Complete the drawing to indicate how the point-at-infinity would be imaged by the cylinder

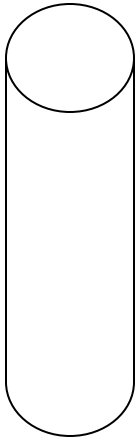


Complete the drawing to indicate how the point-at-infinity would be imaged by the cylinder



One of these cylinders has a dioptric power of +2; the other,+1.
a) Which is which?
b) How can you tell?
c) For each, label the **axis** *of power and the* **meridian** *of power*



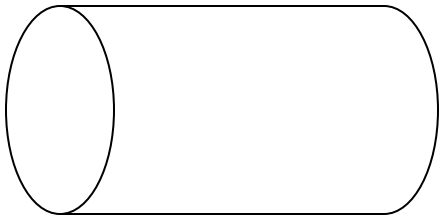


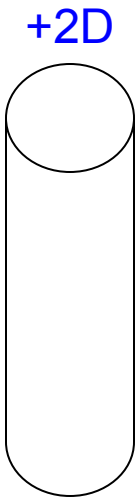
One of these cylinders has a dioptric power of +2; the other,+1.

a) Which is which?

b) How can you tell?

c) For each, label the **axis** *of power and the* **meridian** *of power*





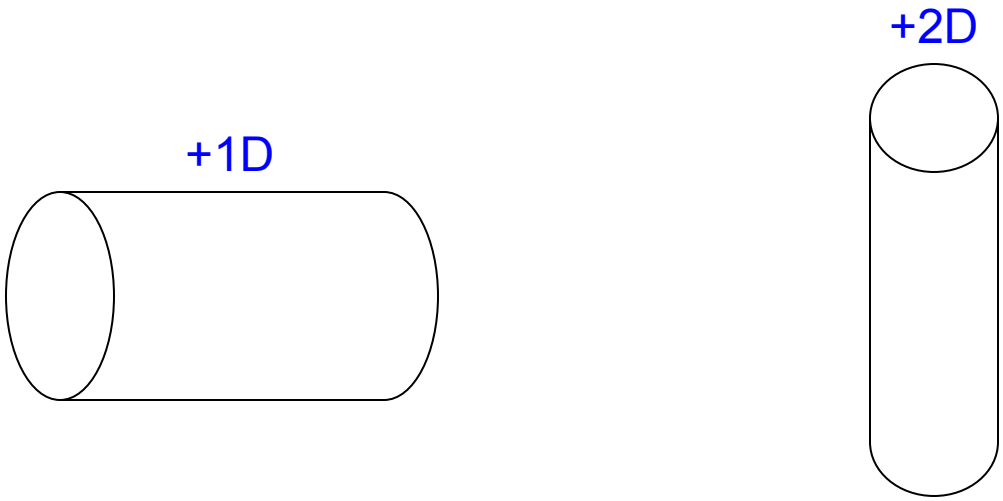
One of these cylinders has a dioptric power of +2; the other,+1.

a) Which is which?

b) How can you tell?

c) For each, label the **axis** *of power and the* **meridian** *of power*

b) The more steeply curved cylinder must be the higher-power one.



One of these cylinders has a dioptric power of +2; the other,+1.

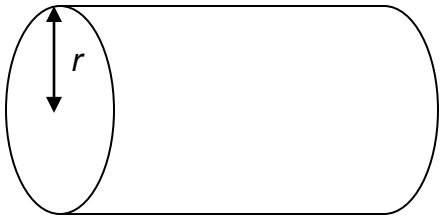
a) Which is which?

b) How can you tell?

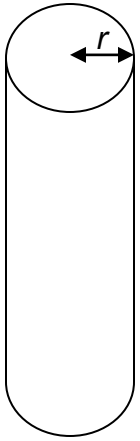
c) For each, label the **axis** *of power and the* **meridian** *of power*

b) The more steeply curved cylinder must be the higher-power one.
Another way to know: The one with the *shorter* radius-of-curvature is more plus.

+1D



+2D



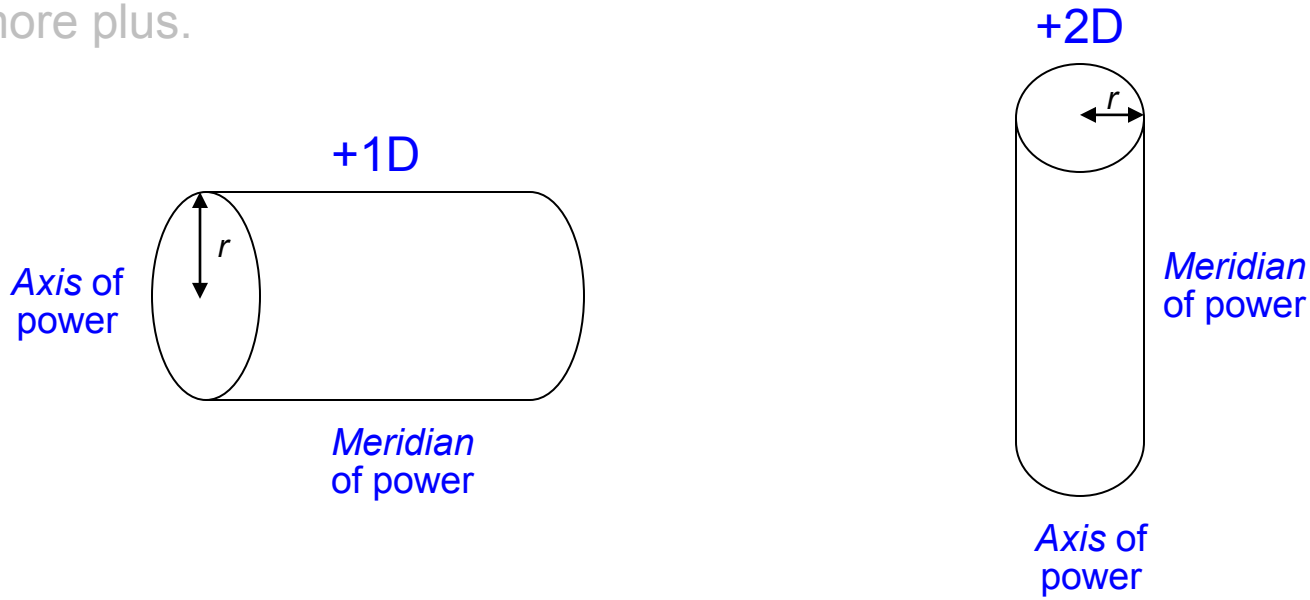
One of these cylinders has a dioptric power of +2; the other,+1.

a) Which is which?

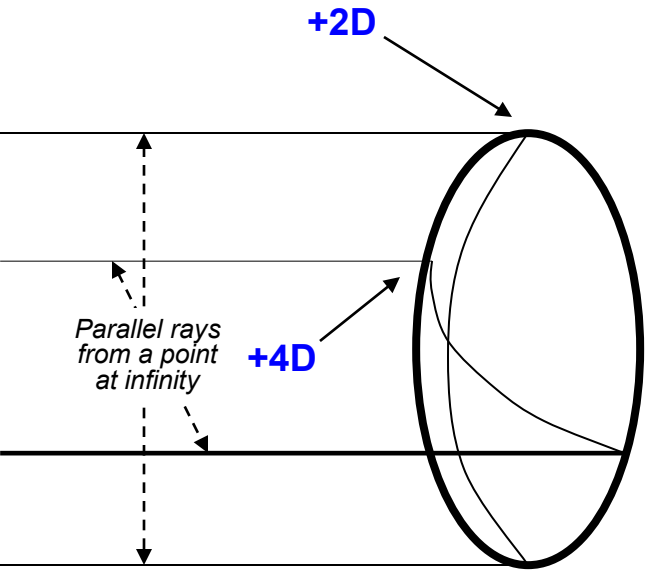
b) How can you tell?

c) For each, label the **axis** *of power and the* **meridian** *of power*

b) The more steeply curved cylinder must be the higher-power one. Another way to know: The one with the *shorter* radius-of-curvature is more plus.



Complete the drawing by sketching the Conoid of Sturm. Indicate:
a) The locations of the focal lines (make sure you're clear re the orientation of each)
b) The lens<->line distance for each focal line
c) The location of the Circle of Least Confusion (CoLC)
d) The lens<->CoLC distance
e) What is the spherical equivalent for this lens?
(Note: The arrows are pointing to the **meridia** *of power, not the axes)*



Complete the drawing by sketching the Conoid of Sturm. Indicate:

a) The locations of the focal lines (make sure you're clear re the orientation of each)

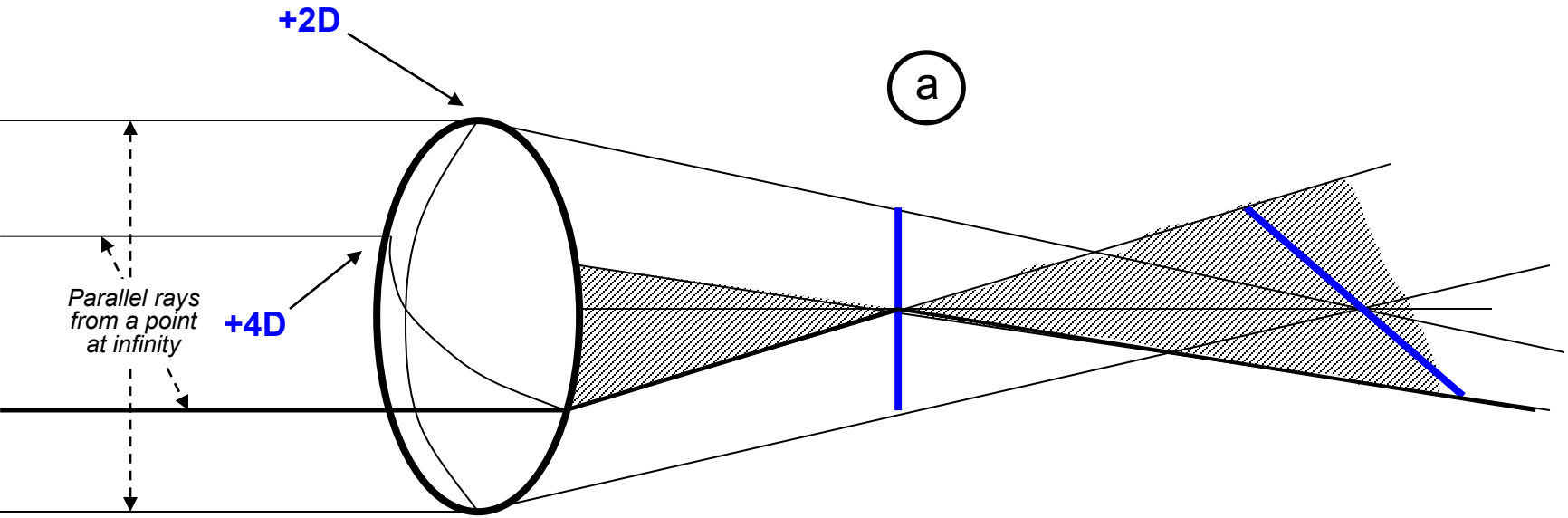
b) The lens<->line distance for each focal line

c) The location of the Circle of Least Confusion (CoLC)

d) The lens<->CoLC distance

e) What is the spherical equivalent for this lens?

(Note: The arrows are pointing to the ***meridia*** *of power, not the axes)*



Complete the drawing by sketching the Conoid of Sturm. Indicate:

a) The locations of the focal lines (make sure you're clear re the orientation of each)

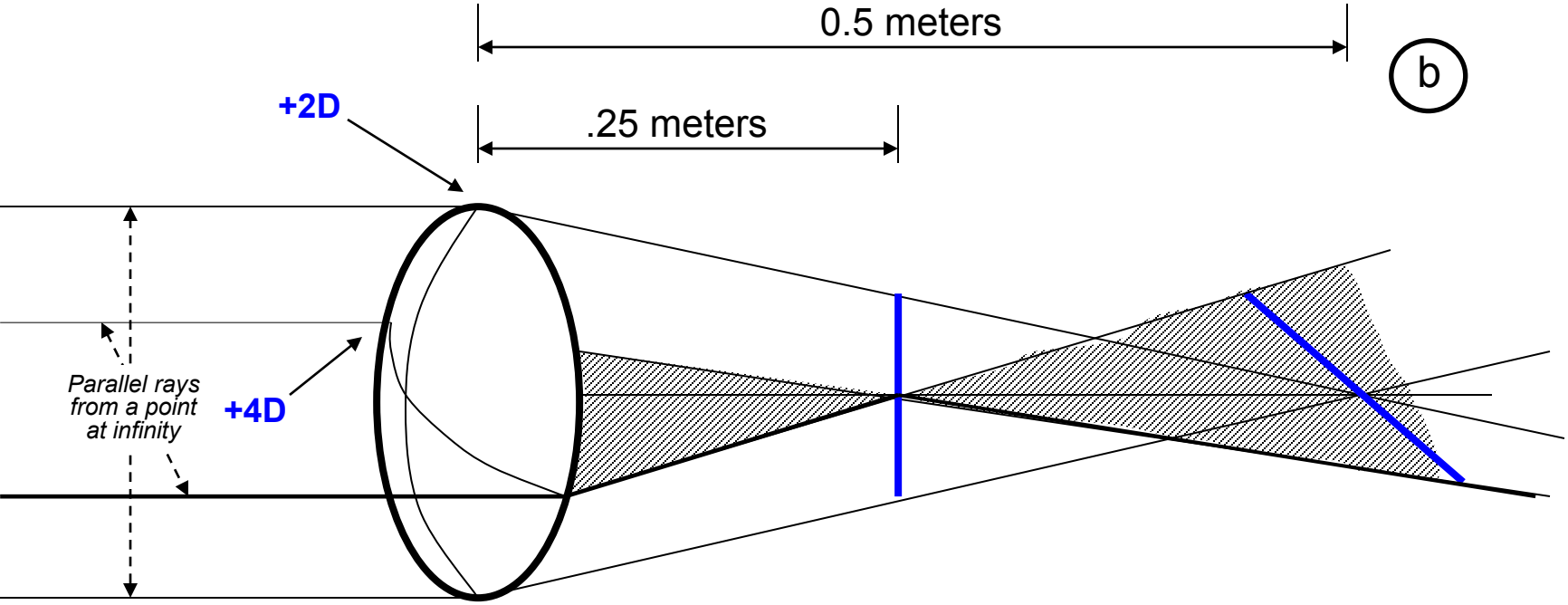
b) The lens<->line distance for each focal line

c) The location of the Circle of Least Confusion (CoLC)

d) The lens<->CoLC distance

e) What is the spherical equivalent for this lens?

(Note: The arrows are pointing to the ***meridia*** *of power, not the axes)*



Complete the drawing by sketching the Conoid of Sturm. Indicate:

a) The locations of the focal lines (make sure you're clear re the orientation of each)

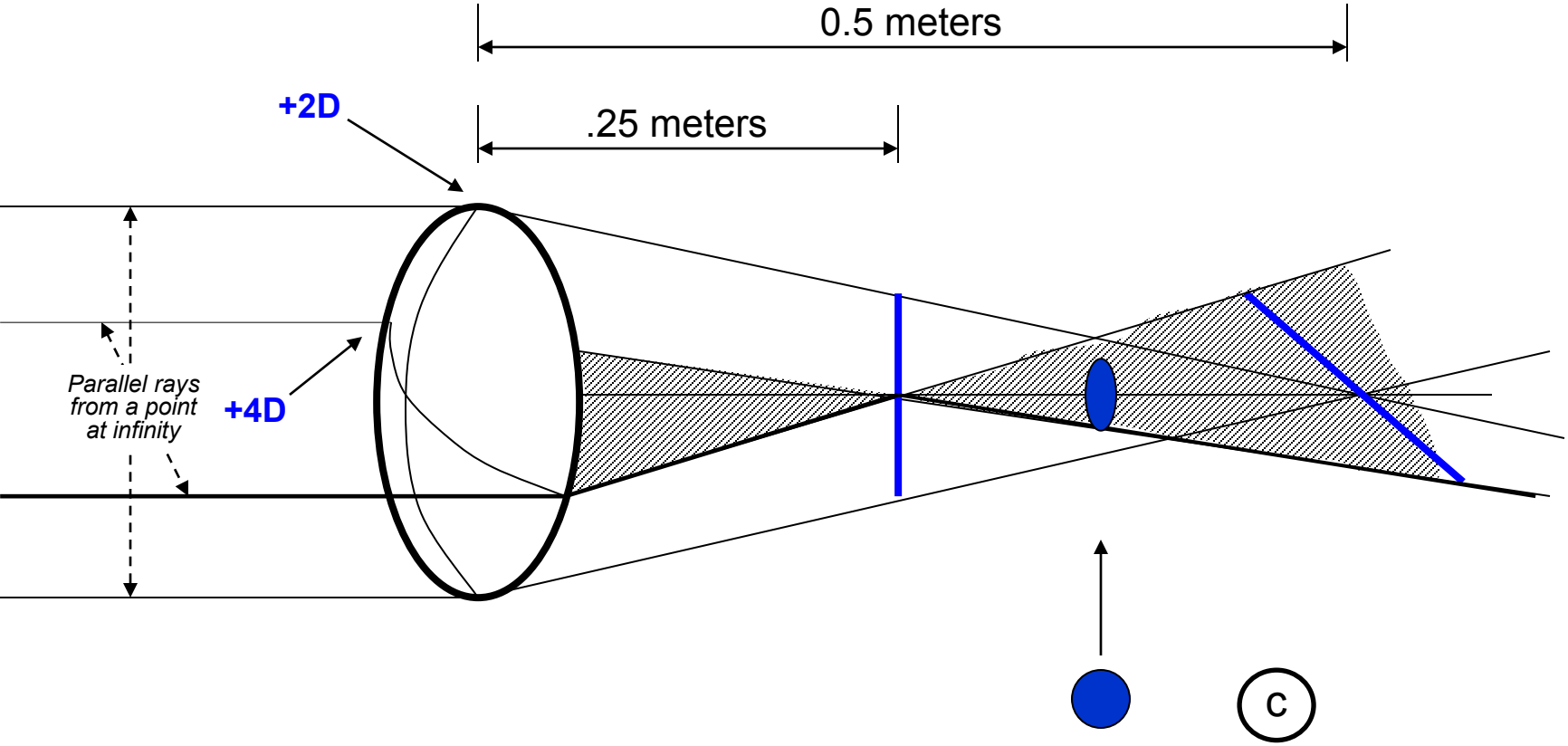
b) The lens<->line distance for each focal line

c) The location of the Circle of Least Confusion (CoLC)

d) The lens<->CoLC distance

e) What is the spherical equivalent for this lens?

(Note: The arrows are pointing to the ***meridia*** *of power, not the axes)*



Complete the drawing by sketching the Conoid of Sturm. Indicate:

a) The locations of the focal lines (make sure you're clear re the orientation of each)

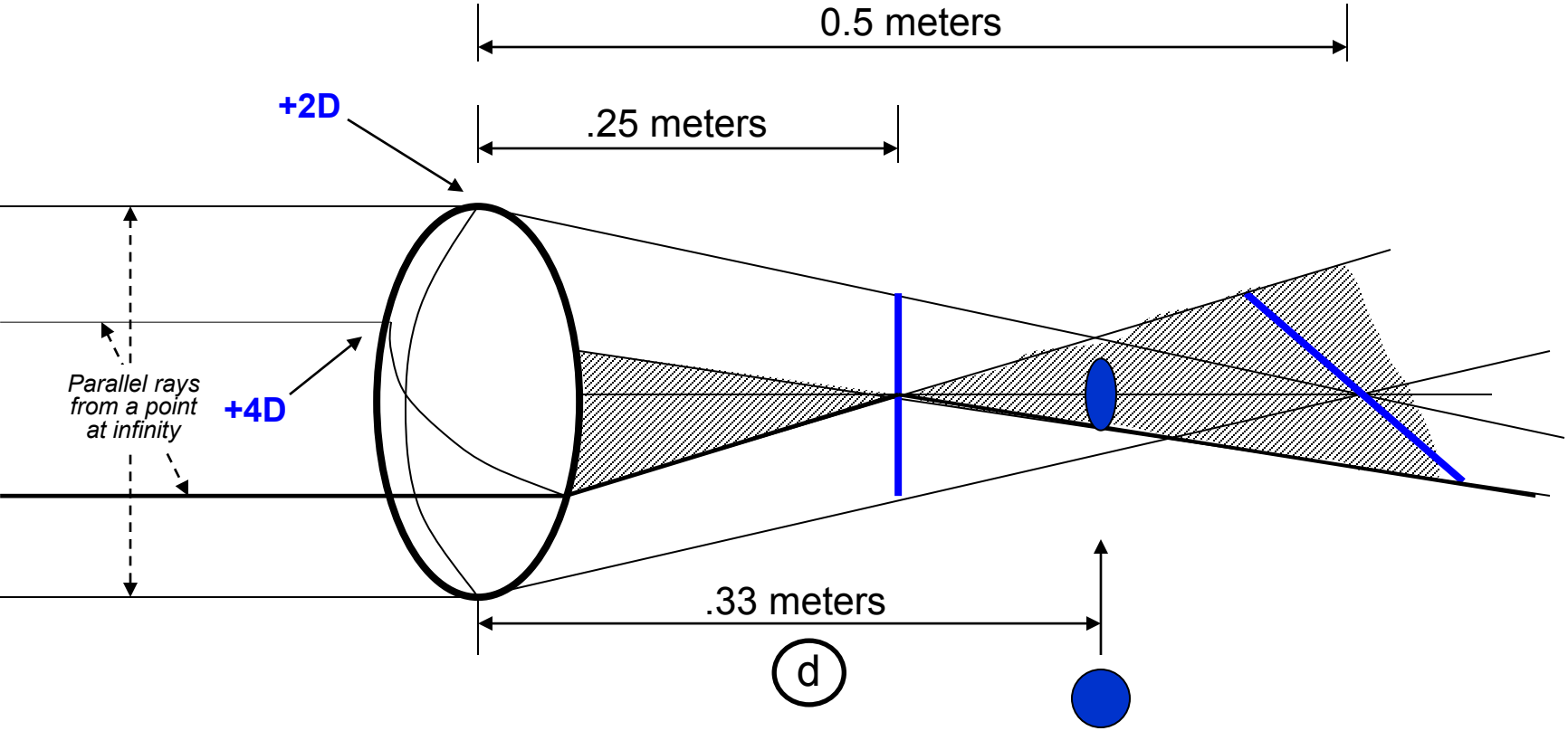
b) The lens<->line distance for each focal line

c) The location of the Circle of Least Confusion (CoLC)

d) The lens<->CoLC distance

e) What is the spherical equivalent for this lens?

(Note: The arrows are pointing to the ***meridia*** *of power, not the axes)*



Complete the drawing by sketching the Conoid of Sturm. Indicate:

a) The locations of the focal lines (make sure you're clear re the orientation of each)

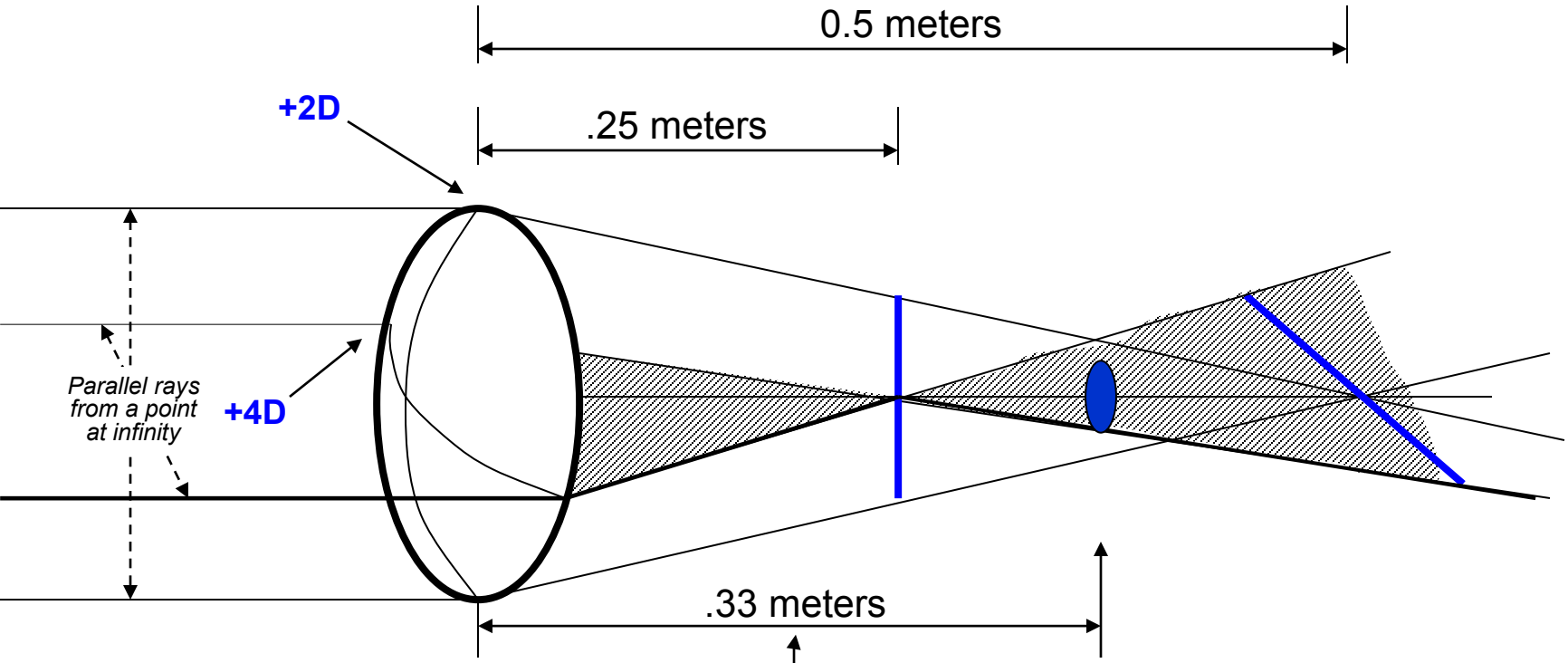
b) The lens<->line distance for each focal line

c) The location of the Circle of Least Confusion (CoLC)

d) The lens<->CoLC distance

e) What is the spherical equivalent for this lens?

(Note: The arrows are pointing to the ***meridia*** *of power, not the axes)*



Remember, the CoLC is located at the *dioptric* midpoint of the conoid, not the *geometric* midpoint

e) $SE = \frac{(+4) + (+2)}{2} = +3$

Complete the drawing by sketching the Conoid of Sturm. Indicate:

a) The locations of the focal lines (make sure you're clear re the orientation of each)

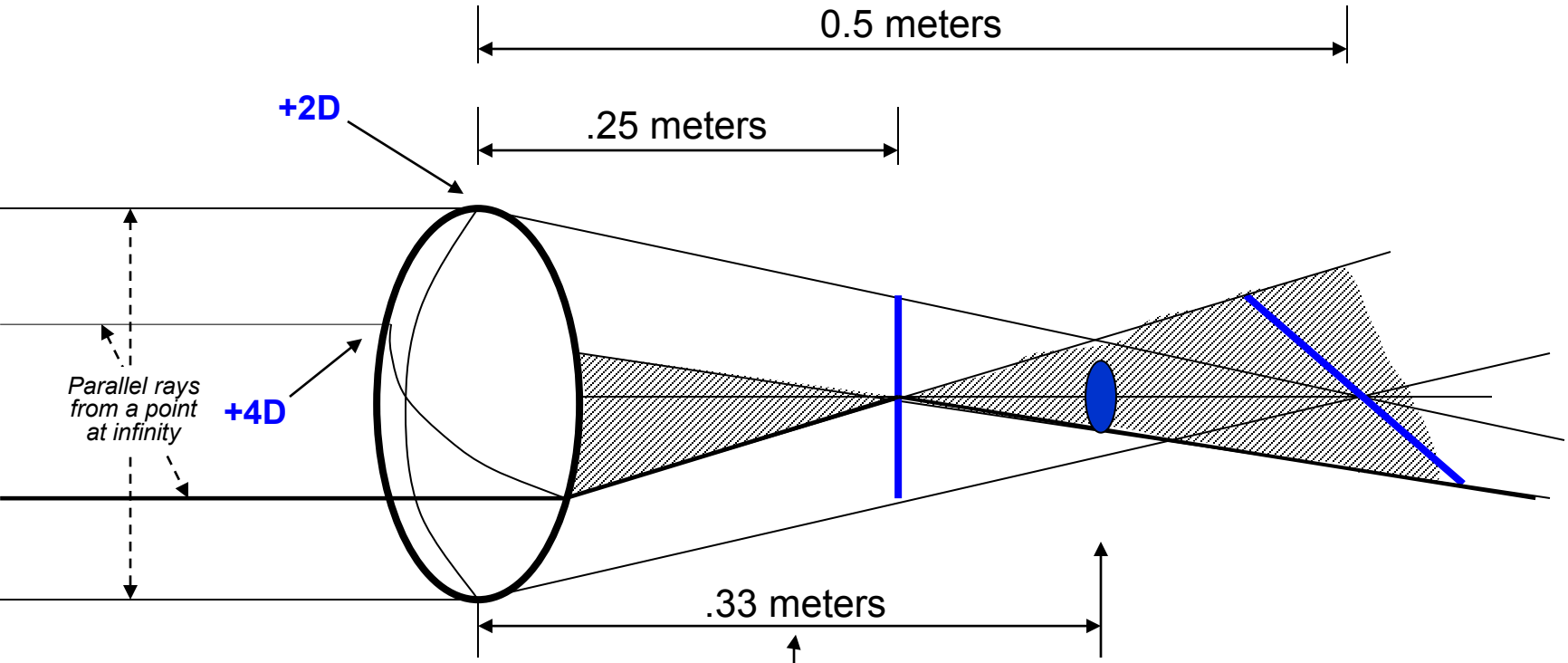
b) The lens<->line distance for each focal line

c) The location of the Circle of Least Confusion (CoLC)

d) The lens<->CoLC distance

e) What is the spherical equivalent for this lens?

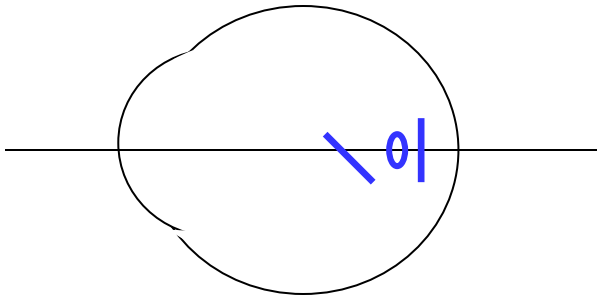
(Note: The arrows are pointing to the ***meridia*** *of power, not the axes)*

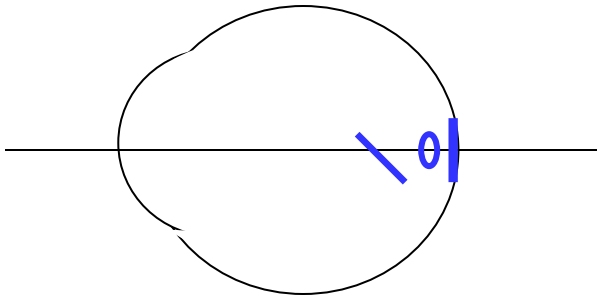


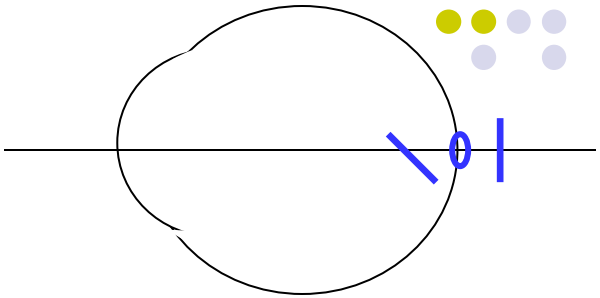
Remember, the CoLC is located at the *dioptric* midpoint of the conoid, not the *geometric* midpoint, and that 'spherical equivalent' is just another way of saying 'dioptric midpoint.'

e) $SE = \frac{(+4) + (+2)}{2} = +3$

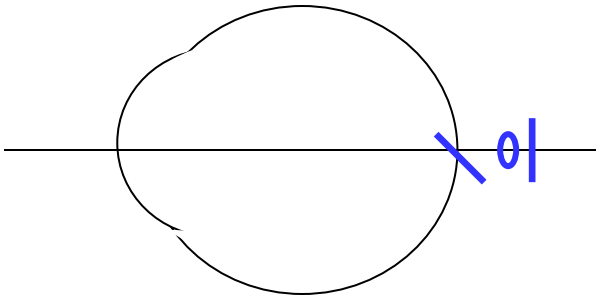
Identify the types of astigmatism

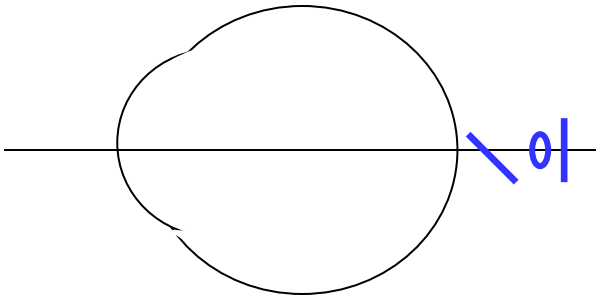




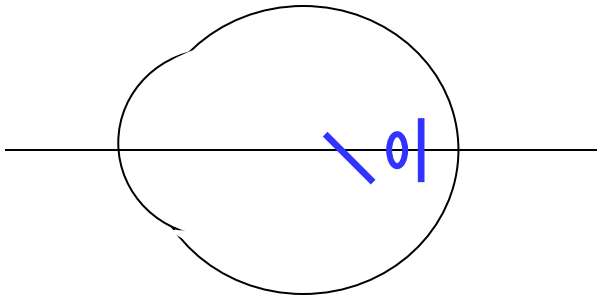


Types of Astigmatism

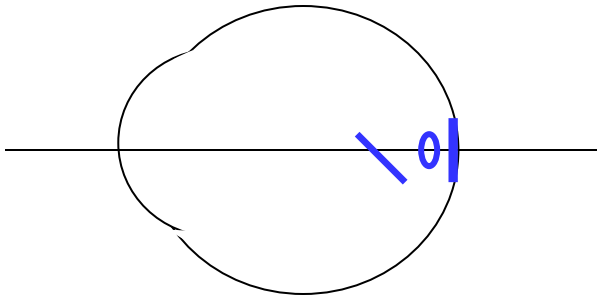




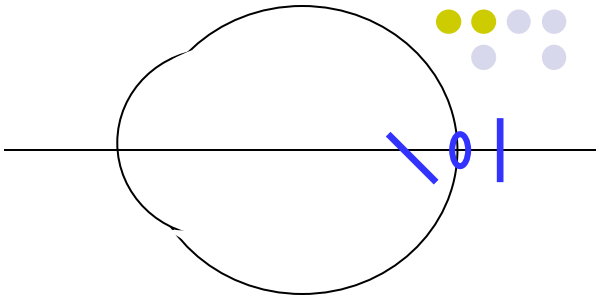
Identify the types of astigmatism



Compound Myopic

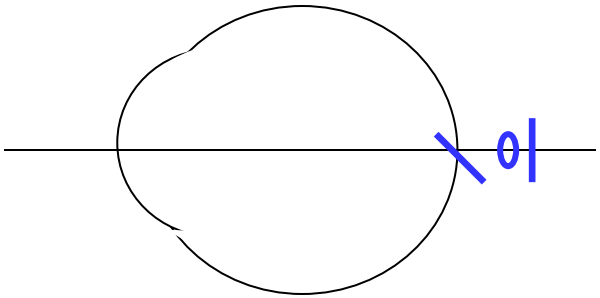


Simple Myopic

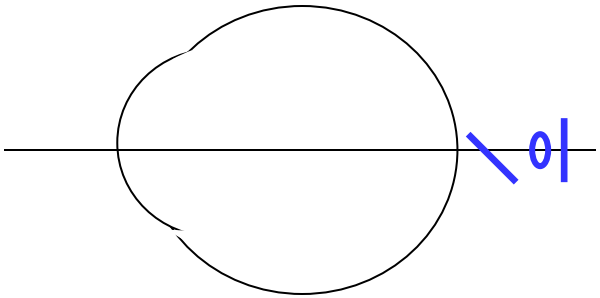


Mixed

Types of Astigmatism



Simple Hyperopic



Compound Hyperopic

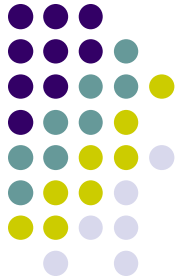
Fill in the blanks

--A Jackson cross lens is a spherocylindrical lens containing _____ cylinders of _____ powers oriented_____

Fill in the blanks

--A Jackson cross lens is a spherocylindrical lens containing plus ***and*** minus cylinders of equal-but-opposite powers oriented 90^{o} apart

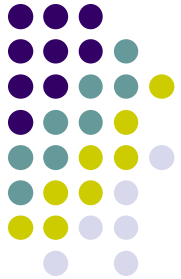
Fill in the blanks



--A Jackson cross lens is a spherocylindrical lens containing plus ***and*** minus cylinders of equal-but-opposite powers oriented 90^{o} apart

--A Jackson cross lens has a spherical equivalent power of ____

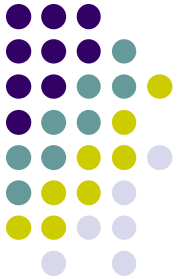
Fill in the blanks



--A Jackson cross lens is a spherocylindrical lens containing plus ***and*** minus cylinders of equal-but-opposite powers oriented 90^{o} apart

--A Jackson cross lens has a spherical equivalent power of zero

Fill in the blanks, and ***short answer***

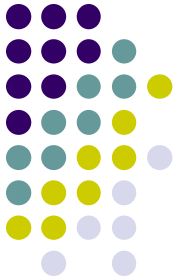


--A Jackson cross lens is a spherocylindrical lens containing plus ***and*** minus cylinders of equal-but-opposite powers oriented 90^{o} apart

--A Jackson cross lens has a spherical equivalent power of zero

--When placed before an astigmatic eye, what effect does a Jackson cross lens have on the location of the Circle of Least Confusion?

Fill in the blanks, and ***short answer***



--A Jackson cross lens is a spherocylindrical lens containing plus ***and*** minus cylinders of equal-but-opposite powers oriented 90^{o} apart

--A Jackson cross lens has a spherical equivalent power of zero

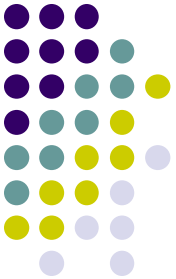
--When placed before an astigmatic eye, what effect does a Jackson cross lens have on the location of the Circle of Least Confusion?

None (ie, the CoLC will not move)

Fill in the blanks

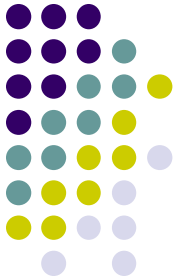
	Retinoscopic	***Jackson Cross***
Step 1	Use sphere to place _____ on the retina	Use sphere to place the _____ on the retina
Step 2	Use cylinder to place the _____ on the retina	Use cross to simultaneously _____
Result	_____ _____	_____ _____

Fill in the blanks



	Retinoscopic	***Jackson Cross***
Step 1	Use sphere to place **one focal line** on the retina	Use sphere to place the **Circle of Least Confusion** on the retina
Step 2	Use cylinder to place the **other focal line** on the retina	Use cross to simultaneously **collapse both focal lines**
Result	**Conoid collapsed to a point on the retina**	**Conoid collapsed to a point on the retina**

Determine the type of astigmatism present for each of the following refractions:



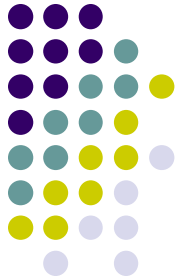
+3.0 -2.0 x 080

+1.0 -4.0 x 080

-5.0 +9.0 x 090

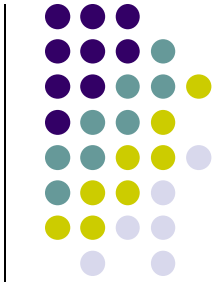
-2.5 +1.5 x 128

Determine the type of astigmatism present for each of the following refractions:



+3.0 -2.0 x 080	In plus cylinder: *+1.0 +2.0 x 170.* The spherical component is *plus* in both plus- and minus-cylinder formats; therefore, it is compound hyperopia
+1.0 -4.0 x 080	In plus cylinder: *-3.0 +4.0 x 170.* The spherical component is *minus* in plus-cyl but plus in minus-cyl formats; therefore, it is mixed astigmatism
-5.0 +9.0 x 090	In minus cyl: *+4.0 -9.0 x 180.* The spherical component is *minus* in plus-cyl but plus in minus-cyl formats; therefore, it is mixed astigmatism
-2.5 +1.5 x 128	In minus cyl: *-1.0 -1.5 x 180.* The spherical component is *minus* in both plus- and minus-cyl formats; therefore, it is compound myopia

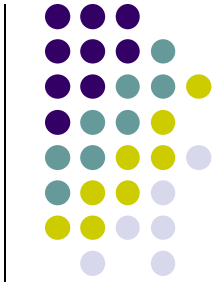
Fill in the blanks



--With-the-rule astigmatism: Cornea is shaped like a football _____

--Against-the-rule astigmatism: Cornea is shaped like a football _____

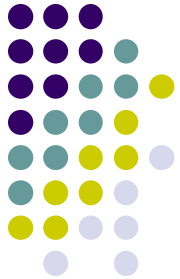
Fill in the blanks



--With-the-rule astigmatism: Cornea is shaped like a football lying on the ground

--Against-the-rule astigmatism: Cornea is shaped like a football standing on a tee

Fill in the blanks, and ***short answer***



--With-the-rule astigmatism: Cornea is shaped like a football lying on the ground

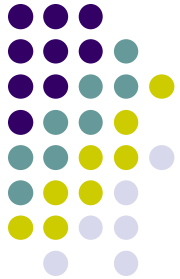
--Against-the-rule astigmatism: Cornea is shaped like a football standing on a tee

--Which is more common in…

a) Young people?

b) The elderly?

Fill in the blanks, and ***short answer***



--With-the-rule astigmatism: Cornea is shaped like a football lying on the ground

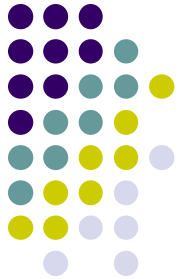
--Against-the-rule astigmatism: Cornea is shaped like a football standing on a tee

--Which is more common in…

a) Young people? With-the-rule

b) The elderly? Against-the-rule

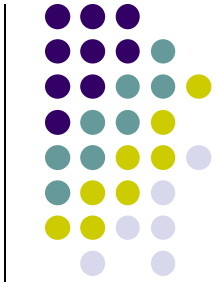
Fill in the blanks



What's the difference between a power cross and a prescription?

A prescription is written in _____ *form, whereas a power cross is written in* _____ *form.*

Fill in the blanks



What's the difference between a power cross and a prescription?

A prescription is written in ***spherocylindrical*** *form, whereas a power cross is written in* ***cylinder*** *form.*

Fill in the blank

When performing retinoscopy in ***plus*** cyl, most will first get to a state of _____ before introducing the correcting cylinder.

(fill in the blank with a type of astigmatism)

Fill in the blank

When performing retinoscopy in ***plus*** cyl, most will first get to a state of *simple hyperopic astigmatism* before introducing the correcting cylinder.

(fill in the blank with a type of astigmatism)