CLAIMS

What is claimed is:

1. A lens for preventing myopia or reducing the progression of myopia, the lens comprising:

an optical portion extending outwardly from a lens center to an outer periphery of the optical portion, the optical portion having a central vision region and a peripheral region; and

a carrier portion connected to the outer periphery of the optical portion by a blending zone of the carrier portion, the carrier portion extending outwardly from the outer periphery of the optical portion to an outer periphery of the carrier portion, and wherein the lens has a power profile that creates on-axis and off-axis myopic defocus to reduce or remove on-axis and off-axis defocus created by optics in the eye of a person wearing the lens, the profile creating the on-axis and off-axis defocus by providing an increase in positive (plus) power for light rays passing through the central vision and peripheral regions of the optical portion.

2. The lens of claim 1, wherein the power profile is defined by a compound mathematical function comprising at least first and second error functions.

3. The lens of claim 1, wherein the increase in positive (plus) power provided for light rays passing through the central vision region of the optical portion is less than the increase in positive (plus) power provided for light rays passing through the peripheral region of the optical portion.

4. The lens of claim 1, wherein the power profile has a first increase in positive (plus) power that ranges from a minimum first positive (plus) power of about 0.5 diopters to a maximum first positive (plus) power of about 1.5 diopters over a radial distance from the lens center ranging from a first radial distance of about 1.5 mm to a second radial distance of about 3.0 mm, and wherein the power profile has a second minimum increase in positive (plus) power that is equal to the first maximum positive (plus) power at the second radial distance and has a second maximum increase in positive (plus) power that is at least 0.5 diopters greater than the first maximum positive (plus)

power at a third radial distance, wherein the third radial distance is at least 0.5 mm greater than the second radial distance.

5. The lens of claim 1, wherein the power profile is defined by a compound mathematical function comprising at least first and second functions, the first function being an error function, the second function being a function other than an error function.

6. The lens of claim 5, wherein the second function is a cosine function.

7. The lens of claim 6, wherein the power profile has a first increase in positive (plus) power that ranges from a maximum first positive (plus) power of about 1.5 diopters at a location corresponding substantially to the lens center to a minimum first positive (plus) power of about 0 diopters at a radial distance from the lens center ranging from a first radial distance of about 1.0 mm to a second radial distance of about 2.0 mm, and wherein the profile has a second increase in positive (plus) power that ranges from a second minimum positive (plus) power that is equal to the first minimum positive (plus) power at the second radial distance and a second maximum positive (plus) power that is equal to or greater than about 2.0 diopters at a third radial distance that is equal to or greater than about 2.0 mm.

8. A lens for preventing myopia or reducing the progression of myopia, the lens comprising:

a optical portion extending outwardly from a lens center to an outer periphery of the optical portion, the optical portion having a central vision region and a peripheral region; and

a carrier portion connected to the outer periphery of the optical portion by a blending zone of the carrier portion, the carrier portion extending outwardly from the outer periphery of the optical portion to an outer periphery of the carrier portion, and wherein the lens has a power profile that is defined by a compound mathematical function, and wherein the profile defined by the compound mathematical function is designed to create on-axis and off-axis myopic defocus for reducing or removing on-axis and off-axis hyperopic

defocus created by optics of an eye, and wherein the profile creates the on-axis and off-axis defocus by providing an increase in positive (plus) power for light rays passing through the central vision and peripheral regions of the optical portion.

9. The lens of claim 8, wherein the first and second functions are first and second error functions, respectively.

10. The lens of claim 9, wherein the power profile has a first increase in positive (plus) power that ranges from a minimum first positive (plus) power of about 0.5 diopters to a maximum first positive (plus) power of about 1.5 diopters over a radial distance from the lens center ranging from a first radial distance of about 1.5 mm to a second radial distance of about 3.0 mm, and wherein the power profile has a second minimum increase in positive (plus) power that is equal to the first maximum positive (plus) power at the second radial distance and has a second maximum increase in positive (plus) power that is at least 0.5 diopters greater than the first maximum positive (plus) power at a third radial distance, wherein the third radial distance is at least 0.5 mm greater than the second radial distance.

11. The lens of claim 8, wherein the first function is an error function and the second function is a function other than an error function.

12. The lens of claim 11, wherein the second function is a cosine function.

13. The lens of claim 12, wherein the power profile has a first increase in positive (plus) power that ranges from a maximum first positive (plus) power of about 1.5 diopters at a location corresponding substantially to the lens center to a minimum first positive (plus) power of about 0 diopters at a radial distance from the lens center ranging from a first radial distance of about 1.0 mm to a second radial distance of about 2.0 mm, and wherein the profile has a second increase in positive (plus) power that ranges from a second minimum positive (plus) power that is equal to the first minimum positive (plus) power at the second radial distance and a second maximum positive (plus) power that

is equal to or greater than about 2.0 diopters at a third radial distance that is equal to or greater than about 2.0 mm.

14. The lens of claim 8, wherein the increase in positive (plus) power provided for light rays passing through the central vision region of the optical portion is less than the increase in positive (plus) power provided for light rays passing through the peripheral region of the optical portion.

15. A method for preventing or slowing the progression of myopia, the method comprising:

selecting a first mathematical function for use in defining a first part of a power profile for the lens;

selecting a second mathematical function for use in defining a second part of the power profile for the lens; and

combining the first and second mathematical functions to produce a compound function, wherein the profile defined by the compound mathematical function is designed to create on-axis and off-axis myopic defocus for reducing or removing on-axis and off-axis hyperopic defocus created by optics of an eye, and wherein the profile creates the on-axis and off-axis defocus by providing an increase in positive (plus) power for light rays passing through the central vision and peripheral regions of the optical portion.

16. The method of claim 15, wherein at least one of the first and second mathematical functions selected during the selecting steps is an error function.

17. The method of claim 15, wherein the power profile has a first increase in positive (plus) power that ranges from a minimum first positive (plus) power of about 0.5 diopters to a maximum first positive (plus) power of about 1.5 diopters over a radial distance from the lens center ranging from a first radial distance of about 1.5 mm to a second radial distance of about 3.0 mm, and wherein the power profile has a second minimum increase in positive (plus) power that is equal to the first maximum positive (plus) power at the second radial distance and has a second maximum increase in positive (plus) power that is at least 0.5 diopters greater than the first maximum positive (plus) power at a third radial distance, wherein the third radial distance is at least 0.5 mm greater than the second radial distance.

18. The method of claim 15, wherein one of the first and second mathematical functions selected during the selecting steps is an error function and wherein one of the first and second mathematical functions selected during the selecting steps is a cosine function.

19. The method of claim 18, wherein the power profile has a first increase in positive (plus) power that ranges from a maximum first positive (plus) power of about 1.5 diopters at a location corresponding substantially to the lens center to a minimum first positive (plus) power of about 0 diopters at a radial distance from the lens center ranging from a first radial distance of about 1.0 mm to a second radial distance of about 2.0 mm, and wherein the profile has a second increase in positive (plus) power that ranges from a second minimum positive (plus) power that is equal to the first minimum positive (Plus) power at the second radial distance and a second maximum positive (Plus) power that is equal to or greater than about 2.0 diopters at a third radial distance that is equal to or greater than about 2.0 mm.

20. The method of claim 15, wherein the increase in positive (plus) power provided for light rays passing through the central vision region of the optical portion is less than the increase in positive (plus) power provided for light rays passing through the peripheral region of the optical portion.

What is claimed is:

1. A lens for preventing myopia or reducing the progression of myopia, the lens comprising:

an optical portion extending outwardly from a lens center to an outer periphery of the optical portion, the optical portion having a central vision region and a peripheral region; and

a carrier portion connected to the outer periphery of the optical portion by a blending zone of the carrier portion, the carrier portion extending outwardly from the outer periphery of the optical portion to an outer periphery of the carrier portion, and wherein the lens has a power profile extending outwardly from the lens center that creates on-axis and off-axis myopic defocus to reduce or remove on-axis and off-axis hyperopic defocus created by optics in the eye of a person wearing the lens, the profile creating the on-axis and off-axis myopic defocus by providing an increase in positive (plus) power for light rays passing through the central vision and peripheral regions of the optical portion; and

wherein the power profile has a first increase in positive (plus) power that ranges from a minimum first positive (plus) power of about 0.5 diopters to a maximum first positive (plus) power of about 1.5 diopters over a radial distance from the lens center ranging from a first radial distance of about 1.5 mm to a second radial distance of about 3.0 mm, and wherein the power profile has a second minimum increase in positive (plus) power that is equal to the first maximum positive (plus) power at the second radial distance and has a second maximum increase in positive (plus) power that is at least 0.5 diopters greater than the first maximum positive (plus) power at a third radial distance, wherein the third radial distance is at least 0.5 mm greater than the second radial distance.

2. The lens of claim 1, wherein the power profile is defined by a compound mathematical function comprising at least first and second error functions.

3. The lens of claim 1, wherein the increase in positive (plus) power provided for light rays passing through the central vision region of the optical portion is less than the increase in positive (plus) power provided for light rays passing through the peripheral region of the optical portion.

4. The lens of claim 1, wherein the power profile is defined by a compound mathematical function comprising at least first and second functions, the first function being an error function, the second function being a function other than an error function.

5. The lens of claim 4, wherein the second function is a cosine function.

6. A lens for preventing myopia or reducing the progression of myopia, the lens comprising:

a optical portion extending outwardly from a lens center to an outer periphery of the optical portion, the optical portion having a central vision region and a peripheral region; and

a carrier portion connected to the outer periphery of the optical portion by a blending zone of the carrier portion, the carrier portion extending outwardly from the outer periphery of the optical portion to an outer periphery of the carrier portion, and wherein the lens has a power profile extending outwardly from the lens center that is defined by a compound mathematical function, and wherein the profile defined by the compound mathematical function is designed to create on-axis and off-axis myopic defocus for reducing or removing on-axis and off-axis hyperopic defocus created by optics of an eye, and wherein the profile creates the on-axis and off-axis myopic defocus by providing an increase in positive (plus) power for light rays passing through the central vision and peripheral regions of the optical portion; and

wherein the power profile has a first increase in positive (plus) power that ranges from a minimum first positive (plus) power of about 0.5 diopters to a maximum first positive (plus) power of about 1.5 diopters over a radial distance from the lens center ranging from a first radial distance of about 1.5 mm to a second radial distance of about 3.0 mm, and wherein the power profile has a second minimum increase in positive (plus) power that is equal to the first maximum positive (plus) power at the second radial distance and has a second maximum increase in positive (plus) power that is at least 0.5 diopters greater than the first maximum positive (plus) power at a third radial distance, wherein the third radial distance is at least 0.5 mm greater than the second radial distance.

7. The lens of claim **6**, wherein the compound mathematical function comprises first and second functions and wherein the first and second functions are first and second error functions, respectively.

8. The lens of claim **6**, wherein the compound mathematical function comprises first and second functions and wherein the first function is an error function and the second function is a function other than an error function.

9. The lens of claim **8** wherein the second function is a cosine function.

10. The lens of claim **6** wherein the increase in positive (plus) power provided for light rays passing through the central vision region of the optical portion is less than the increase in positive (plus) power provided for light rays passing through the peripheral region of the optical portion.

11. A method for preventing or slowing the progression of myopia using a lens, the method comprising:

selecting a first mathematical function for use in defining a first part of a power profile for the lens;

selecting a second mathematical function for use in defining a second part of the power profile for the lens; and

combining the first and second mathematical functions to produce a compound function, wherein the profile defined by the compound mathematical function is designed to create on-axis and off-axis myopic defocus for reducing or removing on-axis and off-axis hyperopic defocus created by optics of an eye, and wherein the profile creates the on-axis and off-axis defocus by providing an increase in positive (plus) power for light rays passing through the central vision and peripheral regions of the optical portion; and

wherein the power profile has a first increase in positive (plus) power that ranges from a minimum first positive (plus) power of about 0.5 diopters to a maximum first positive (plus) power of about 1.5 diopters over a radial distance from the lens center ranging from a first radial distance of about 1.5 mm to a second radial distance of about 3.0 mm, and wherein the power profile has a second minimum increase in positive (plus) power that is equal to the first maximum positive (plus) power at the second radial distance and has a second maximum increase in positive (plus) power that is at least 0.5 diopters greater than the first maximum positive (plus) power at a third radial distance, wherein the third radial distance is at least 0.5 mm greater than the second radial distance.

12. The method of claim **11**, wherein at least one of the first and second mathematical functions selected during the selecting steps is an error function.

13. The method of claim **12**, wherein the first and second mathematical functions selected during the selecting steps are first and second respective error functions.

14. The method of claim 11, wherein one of the first and second mathematical functions selected during the selecting steps is an error function and wherein one of the first and second mathematical functions selected during the selecting steps is a cosine function.

15. The method of claim 11, wherein the increase in positive (plus) power provided for light rays passing through the central vision region of the optical portion is less than the increase in positive (plus) power provided for light rays passing through the peripheral region of the optical portion.