MiniPAC 2023

Professional Advancement Conferences

Multi station workshop:

Under the lens 2: Virtual Dispensing Escape Room

Answers

Specsavers

Challenge 1: Safe Effectivity

When you look at the dusty safe you see some numbers scribbled on the side.

Correctly move the dials on the combination locks using Effectivity to reveal the code that unlocks the safe!

Rx R -8.50/-3.00x46
L -6.25/-4.50x98 BVD 12mm

Change the vertex distance to 9mm

Lock 1: R [ ] / [ ] x 41 L [ ] / [ ] X 98

Cross Cyl R -11.50x46 / -8.50x136 L -6.25x8 / -10.75x98

R EYE: -11.50x 46 F / 1 - (d F) = -11.116 Power -11.00D
-8.50x 136 F / 1 - (d F) = -8.289 Power -8.25D
L EYE: -6.25x 131 F / 1 - (d F) = -6.135 Power -6.25D
-10.75x 88 F / 1 – (d F) = -10.414 Power -10.50D

= New Rx: R **-8.25** / **-2.75** x 41 L **-6.25** / **-4.25** x 98

Rx R +7.25/+2.00x35
L +8.00/+1.75x140 BVD 8mm

Change the vertex distance to 13mm

Lock 2: R [ ] / [ ] x 35 L [ ] / [ ] X 140

Cross Cyl R +7.25x125/ +9.25x35 L +8.00x50 / +9.75x40

R EYE: +7.25x 125 F / 1 - (d F) = +6.996 Power +7.00D
+9.25x 35 F / 1 - (d F) = +8.841 Power +8.75D
L EYE: +8.00x 131 F / 1 - (d F) = +7.692 Power +7.75D
+9.75x 88 F / 1 – (d F) = +9.297 Power +9.25D

= New Rx: R **+7.00** / **+1.75** x 35 L **+7.75** / **+1.50** x 140

Challenge 2: Spiders Web Step Along – part 1

You spot a key behind the spider's web.

Using step along, identify the correct sector of the cobweb to continue to Part 2

Thick Lens

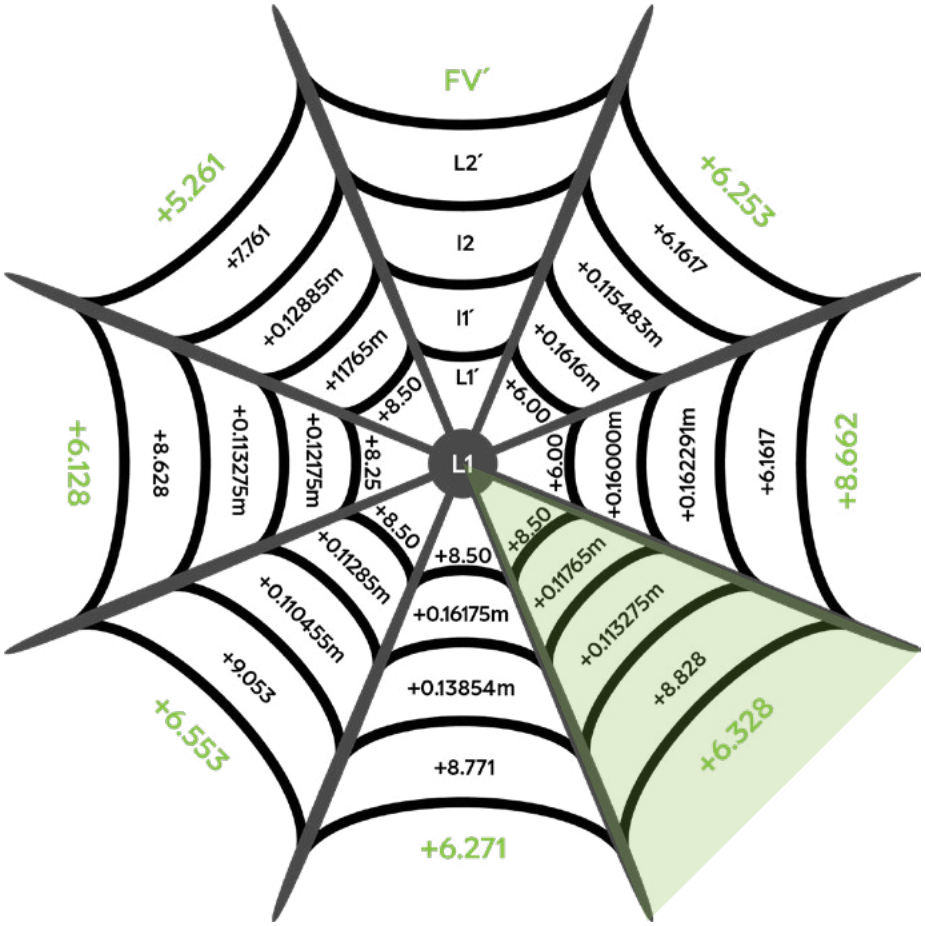
F = +6.00

F1 = +8.50

L2 = -2.50

t= 7mm

n= 1.6



L1 = 0

L1' = L1 + F1 = 0 +8.50 = +8.50

= I1'= 1/L1' = 1/+8.50 = 0.11765m

= I2 = I1'-(t/n) = 0.11765m – (0.007/1.6) = 0.113275m

L2 = 1/I2 = + 8.828

L2'/FV' = L2 + F2 = +8.828 + -2.50

= +6.328

Challenge 2: Spiders Web Step Along – part 2

Using step along, identify the correct sector of the cobweb to retrieve the key.

Thick Lens

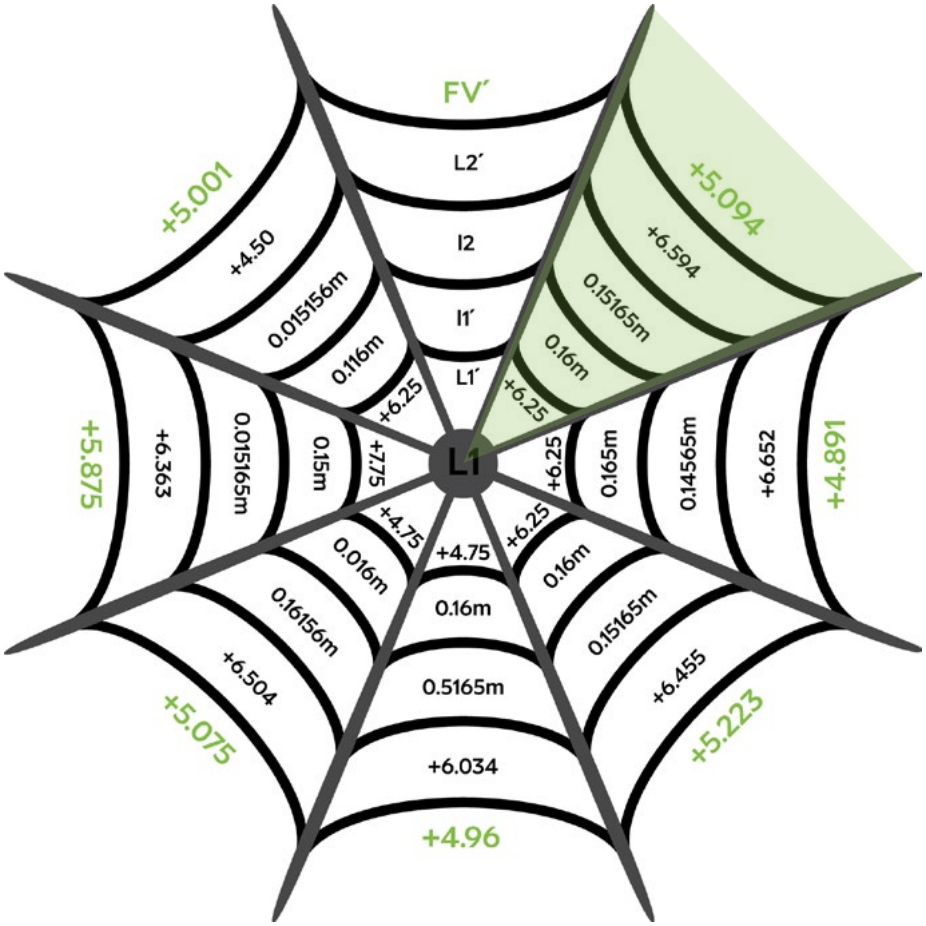
F = +4.75

F1 = +6.25

L2 = -1.50

t= 5mm

n= 1.67



L1 = 0

L1' = L1 + F1 = 0 +6.25= +6.25

= I1'= 1/L1' = 1/+6.25 = 0.16m

= I2 = I1'-(t/n) = 0.16m – (0.005/1.67) = 0.15165m

L2 = 1/I2 = +6.594

L2'/FV' = L2 + F2 = +6.594 + -1.50

= +5.094

Challenge 3: Drinks Cabinet

Snell's Law:

You look at the Drinks Cabinet and see a beam of light reflecting through the classes of liquid. Using Snell's Law, follow the beam to the keys hiding place.

n Sin i = n' Sin i'
n / n' x Sin i = Sin i'

A ray of light is incident on the surface of the glass of 1.9 at an angle of 30 degrees. Calculate the angle of refraction from the ray.

1/1.9 x Sin30 = 0.2632
Sin^-1 0.2632 = 15.2575

The light is now leaving the glass and entering the surface of liquid refractive index 1.33. Calculate the angle of refraction from the ray.

1.9/1.33 x Sin15.2575 = 0.37593
Sin^-1 0.2632 = 22.0818

The light is now leaving the liquid and entering the other side a glass of 1.8. Calculate the angle of refraction from the ray.

1.33/1.8 x Sin 22.0818 = 0.27770
Sin^-1 0.27777 = 16.1272

Turn the inner dial clockwise to the nearest degree of the angle of refraction from the ray entering the other side of the glass.

= 16 Degrees

Challenge 4: Bookcase

Spec Mag

On the bookcase you find a set of magnifying glasses, calculate the magnification required to read the book concealing the key.

Calculate the spectacle magnification of a real +6.00D (FV') lens with refractive index (n) 1.5 an axial thickness (t) of 5mm, vertex distance (d) 11mm and a +9.67D compensated front surface (F1).

[ ] **X** (Enter your answer to 4 significant figures)

1 / 1 - (dFV') x 1 / (t / n) F1

1 / 1 - (0.011 x +6.00) x 1 / (0.005 / 1.5) x +9.67

1 / 1 - +0.066 x 1 / - (0.003 x +9.67)

1 / +0.934 x 1 / +0.9678

1.071 x 1.033

= 1.106x

Clues for facilitators

Challenge 1 Clue:

Are the following REAL or FAKE optics formula?

s = r - √ r2 – y2	**Real**
P = c F / V	**Real**
R = a / F2	**Fake**
R = n' – n / F	**Real**
s = Y2 F / 2000 (n-1)	**Real**
J = a / (Y2 - Z)	**Fake**
P = 100 Tan d	**Real**
d = (n - 1) a	**Real**
n' sin i = n sin i'	**Fake**
n sin i = n' sin I'	**Real**

Clue: Effectivity F / (1 – d F)

Challenge 2 Clue:

Are the following REAL or FAKE theories and laws used in optics?

Pythagoras' Theory	**Real**
O'Toole's Rule	**Fake**
Apprentice's Rule	**Fake**
Prentice's rule	**Real**
Snell's law	**Real**
Wolowitz Coefficient	**Fake**
Bloke's Construction	**Fake**
Thick Lens Theory	**Real**
Fresnel's Equations	**Real**
Brewster's Angle	**Real**

Clue: Step Along

L1 = 0
L1' = L1 + F1
l1'= 1/L1'
l2 = l1'-(t/n)
L2 = 1/l2
L2'/FV' = L2 + F2

Challenge 3 Clue:

Are the following TRUE or FALSE statements?

When light travels from a low-density material into a higher density material, the light is refracted towards the normal.

When calculating Prism using Prentice's rule, the value for c should always be in cm.

The cylindrical power of an astigmatic lens is along the meridian 90 degrees to its axis.

When completing Toric transposition, the Cyl sign, and base curve must be the same (both +/ both -).

The amount of Transverse Chromatic Aberration deemed to be tolerable is +/- 0.1 Prism.

All True

Clue: Snell's Law

n Sin i = n' Sin i'
n / n' x Sin i = Sin i'

Challenge 4 Clue:

If the following prisms were placed in contact in front of a patient's right eye what would be the resultant prismatic effect?

Horizontal	Vertical
2.3Δ IN	5.1Δ UP
1.5Δ IN	2.1Δ DOWN
4.7Δ OUT	3Δ DOWN
2Δ OUT	0.5Δ DOWN

Horizontal = 2.3 + 1.5 = 3.8 – 4.7 – 2 = 2.9 OUT
Vertical = 5.1 - 2.1 - 3 - 0.5 = 0.5 DOWN

Answer : **2.9Δ OUT 0.5Δ DOWN**

Clue: Where thickness is considered (real lens). We use SM = power factor x shape factor.

power factor = 1 / 1 - (dFV')
shape factor = 1 / 1 - (t / n) F1