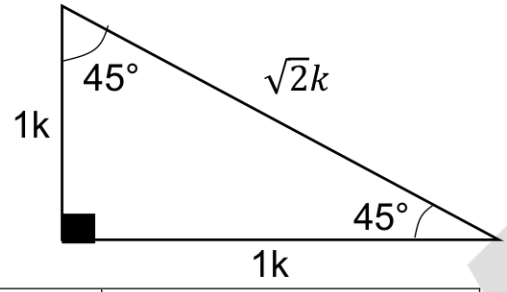
ACADEMIAS PROYECTO PIÑA

TRIGONOMETRÍA-

TRIÁNGULOS NOTABLES

TEMA : TRIÁNGULOS NOTABLES

(*) Triángulo notable de 30° y 60°



Función trigonométrica	45°
sen	$1/\sqrt{2}$
cos	$1/\sqrt{2}$
tag	1
cot	1
sec	$\sqrt{2}$
csc	$\sqrt{2}$

01. Determinar: $\sqrt{2}(sen45° + cos45°) + sec^2 45°$

a) 1 b) 4 c) 6 d) 8

Solución:

$$\sqrt{2}(sen45° + cos45°) + sec^2 45° = \sqrt{2}\left(\frac{1}{\sqrt{2}} + \frac{1}{\sqrt{2}}\right) + \sqrt{2}^2 = \sqrt{2}\left(\frac{2}{\sqrt{2}}\right) + 2 = 4$$

Rpta. b

02. Determinar: $tag^2 45° + cot^2 45° + sec^2 45° + csc^2 45°$

a) 2 b) 6 c) 7 d) 8

Solución:

$$tag^2 45° + cot^2 45° + sec^2 45° + csc^2 45° =$$

$$1^2 + 1^2 + \sqrt{2}^2 + \sqrt{2}^2 = 1 + 1 + 2 + 2 = 6 \quad Rpta.b$$

03. Determinar: $E = tag45° + sec^2 45° + \sqrt{2}cos45°$

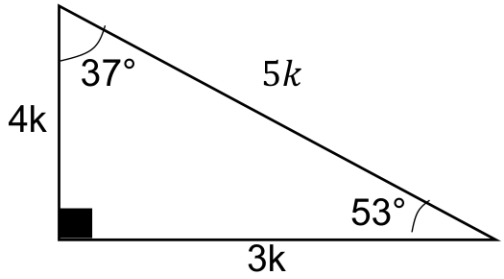
a) 3 b) 4 c) 6 d) 5

Solución:

$$E = tag45° + sec^2 45° + \sqrt{2}cos45°$$

$$E = 1 + \sqrt{2}^2 + \sqrt{2}\left(\frac{1}{\sqrt{2}}\right) = 1 + 2 + 1 = 4 \quad Rpta.b$$

(*) Triángulo notable de 37° y 53°



Función trigonométrica	37°	53°
sen	3/5	4/5
cos	4/5	3/5
tag	3/4	4/3
cot	4/3	3/4
sec	5/4	5/3
csc	5/3	5/4

04. $Calcular: 5sen37° + 4cot53°$

a) 4 b) 6 c) 9 d) 8

Solución:

$$5sen37° + 4cot53° = 5\left(\frac{3}{5}\right) + 4\left(\frac{3}{4}\right) = 3 + 3 = 6 \quad Rpta.b$$

05. Determinar: $E = 4csc53° - 3sec53° + 4tag37° - 5cos53°$

a) 0 b) 1 c) 2 d) 3

Solución:

$$E = 4csc53° - 3sec53° + 4tag37° - 5cos53°$$

$$= 4\left(\frac{5}{4}\right) - 3\left(\frac{5}{3}\right) + 4\left(\frac{3}{4}\right) - 5\left(\frac{3}{5}\right) = 5 - 5 + 3 - 3 = 0 \quad Rpta.a$$

06. Determinar: $P = sen37° - sec53° + 4tag37°$

a) 29/15 b) 15/29 c) 1/2 d) 2

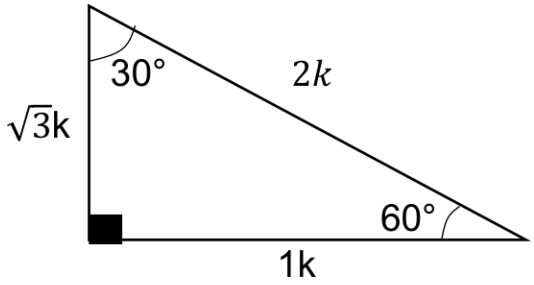
Solución:

$$P = sen37° - sec53° + 4tag37°$$

$$= \frac{3}{5} - \frac{5}{3} + 4\left(\frac{3}{4}\right)$$

$$= \frac{9 - 25}{15} + 3 = \frac{-16}{15} + 3 = \frac{-16 + 45}{15} = \frac{29}{15} \quad Rpta.a$$

(*) Triángulo notable de 30° y 60°



Función trigonométrica	30°	60°
sen	1/2	$\sqrt{3}/2$
cos	$\sqrt{3}/2$	1/2
tag	$1/\sqrt{3}$	$\sqrt{3}$
cot	$\sqrt{3}$	$1/\sqrt{3}$
sec	$2/\sqrt{3}$	2
csc	2	$2/\sqrt{3}$

07. Determine el valor de "x", en: $2xsen30° - sec60° = 0$

a) 1 b) 2 c) 3 d) 4

Solución:

$$2xsen30° - sec60° = 0$$

$$2x\left(\frac{1}{2}\right) - 2 = 0 \rightarrow x = 2 \quad Rpta.b$$

08. Reducir: $cot^2 30° + tag^2 60° - 4sen30° - 2cos60°$

a) 0 b) 1 c) 3 d) 4

Solución:

$$cot^2 30° + tag^2 60° - 4sen30° - 2cos60° =$$

$$\sqrt{3}^2 + \sqrt{3}^2 - 4\left(\frac{1}{2}\right) - 2\left(\frac{1}{2}\right) = 3 + 3 - 2 - 1 = 3 \quad Rpta.c$$

09. Calcular: $E = 25^{sen30°} + 49^{cos60°} + \sqrt{7}^{sec60°}$

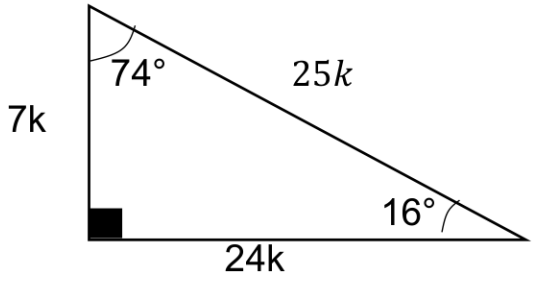
a) 19 b) 20 c) 21 d) 22

Solución:

$$E = 25^{sen30°} + 49^{cos60°} + \sqrt{7}^{sec60°} \rightarrow E = 25^{1/2} + 49^{1/2} + \sqrt{7}^2$$

$$E = \sqrt{25} + \sqrt{49} + 7 = 5 + 7 + 7 = 19 \quad Rpta.a$$

(*) Triángulo notable de 74° y 16°



Función trigonométrica	16°	74°
sen	7/25	24/25
cos	24/25	7/25
tag	7/24	24/7
cot	24/7	7/24
sec	25/24	25/7
csc	25/7	25/24

10. Calcular: $E = 25sen16° + 7tag74° - 24tag16°$

a) 7 b) 12 c) 6 d) 15

Solución:

$$E = 25sen16° + 7tag74° - 24tag16°$$
$$E = 25\left(\frac{7}{25}\right) + 7\left(\frac{24}{7}\right) - 24\left(\frac{7}{24}\right)$$
$$E = 7 + 7 - 7$$
$$E = 7 \quad Rpta.a$$

11. Calcular: $E = 48csc74° - 14cot16° + 25sen16°$

a) 7 b) 9 c) 12 d) 14

Solución:

$$E = 48csc74° - 14cot16° + 25sen16°$$
$$E = 48\left(\frac{25}{24}\right) - 14\left(\frac{24}{7}\right) + 25\left(\frac{7}{25}\right)$$
$$E = 50 - 48 + 7$$
$$E = 9 \quad Rpta.b$$

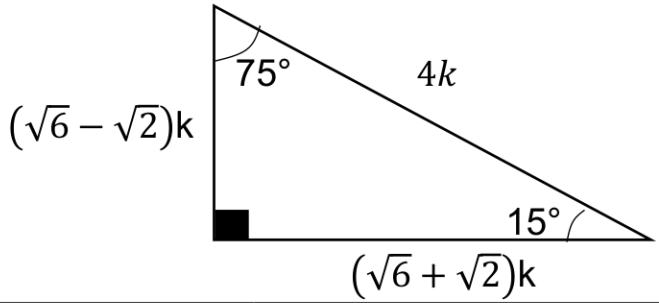
12. Determinar: $E = \sqrt{7tag74° + 1}$

a) 2 b) 3 c) 4 d) 5

Solución:

$$E = \sqrt{7tag74° + 1} = \sqrt{7\left(\frac{24}{7}\right) + 1} = \sqrt{25} = 5 \qquad Rpta.d$$

(*) Triángulo notable de 15° y 75°



Función trigonométrica	15°	75°
sen	$\frac{(\sqrt{6}-\sqrt{2})}{4}$	$\frac{(\sqrt{6}+\sqrt{2})}{4}$
cos	$\frac{(\sqrt{6}+\sqrt{2})}{4}$	$\frac{(\sqrt{6}-\sqrt{2})}{4}$
tag	$\frac{(\sqrt{6}-\sqrt{2})}{(\sqrt{6}+\sqrt{2})}$	$\frac{(\sqrt{6}+\sqrt{2})}{(\sqrt{6}-\sqrt{2})}$
cot	$\frac{(\sqrt{6}+\sqrt{2})}{(\sqrt{6}-\sqrt{2})}$	$\frac{(\sqrt{6}-\sqrt{2})}{(\sqrt{6}+\sqrt{2})}$
sec	$\frac{4}{(\sqrt{6}+\sqrt{2})}=\sqrt{6}-\sqrt{2}$	$\frac{4}{(\sqrt{6}-\sqrt{2})}=\sqrt{6}+\sqrt{2}$
csc	$\frac{4}{(\sqrt{6}-\sqrt{2})}=\sqrt{6}+\sqrt{2}$	$\frac{4}{(\sqrt{6}+\sqrt{2})}=\sqrt{6}-\sqrt{2}$

13. Determinar: $E = sec^2 16 + csc^2 16$

a) 14 b) 16 c) 20 d) 24

Solución:

$$E = sec^2 16 + csc^2 16 = \left(\sqrt{6}-\sqrt{2}\right)^2 + \left(\sqrt{6}+\sqrt{2}\right)^2 = 2\left(\sqrt{6}^2 + \sqrt{2}^2\right) = 2(6+2)$$
$$= 16 \qquad Rpta.b$$

14. Determinar: $E = csc^2 16 - sec^2 16$

a) $4\sqrt{3}$ b) $6\sqrt{3}$ c) $8\sqrt{3}$ d)$110\sqrt{3}$

Solución:

$$E = csc^2 16 - sec^2 16 = \left(\sqrt{6}+\sqrt{2}\right)^2 - \left(\sqrt{6}-\sqrt{2}\right)^2 = 4\left(\sqrt{6}\right)\left(\sqrt{2}\right) = 4\sqrt{12}$$
$$= 4\left(\sqrt{(4)(3)}\right) = 8\sqrt{3} \qquad Rpta.c$$

PROBLEMAS RESUELTOS TRIÁNGULOS NOTABLES

01. Calcular el valor de: $A = sen37°.tg60°.cosec53°.tg30°.cotg45°$

a) 1/2 b) 2/3 c) 3/4 d) 8

Solución:

$$A = \frac{3}{5}x\sqrt{3}x\frac{5}{4}x\frac{1}{\sqrt{3}}x1$$

$$A = \frac{3}{4} \quad Rpta.c$$

02. Hallar el valor de:

$$E = \frac{Tg15° + Tg60°}{Csc30°}$$

a) 1/2 b) 1 c) 2 d) 4/3

Solución:

$$E = \frac{2 - \sqrt{3} + \sqrt{3}}{2} = \frac{2}{2} = 1 \quad Rpta.b$$

03. Si: $cos2\theta.\csc(\theta + 45) - 1 = 0$. Calcular: $\sqrt{3}cos2\theta.sec4\theta$

a) 0,5 b) 1 c) 2 d) 3

Solución:

$$cos2\theta.\csc(\theta + 45) = 1$$

$$cos2\theta = \frac{1}{\csc(\theta + 45)}$$

$$cos2\theta = sen(\theta + 45)$$

Es un caso de cofunción:

$$2\theta + \theta + 45 = 90$$

$$3\theta = 90 - 45$$

$$3\theta = 45$$

$$\theta = 15°$$

Piden: $\sqrt{3}cos2\theta.sec4\theta = \sqrt{3}cos2(15°).sec4(15°) =$

$$\sqrt{3}cos30°.sec60° = \sqrt{3}.\frac{\sqrt{3}}{2}.\frac{2}{1} = 3 \quad Rpta.d$$

04. Calcular el valor de "x" en:

$$\frac{xcos60° + tg45°}{xcos60° - tg45°} = csc53°$$

a) 12 b) 14 c) 16 d) 18

Solución:

$$\frac{xcos60° + tg45°}{xcos60° - tg45°} = csc53°$$

$$\frac{x\left(\frac{1}{2}\right) + 1}{x\left(\frac{1}{2}\right) - 1} = \frac{5}{4}$$

$$\frac{\frac{x+2}{2}}{\frac{x-2}{2}} = \frac{5}{4}$$

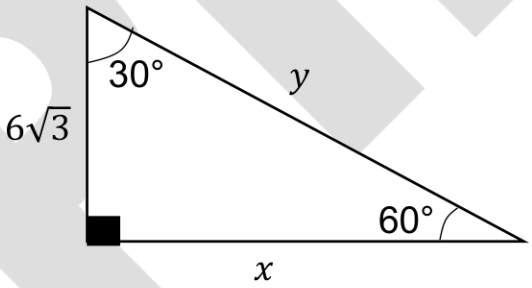
$$\frac{x+2}{x-2} = \frac{5}{4}$$

$$4x + 8 = 5x - 10$$

$$10 + 8 = 5x - 4x$$

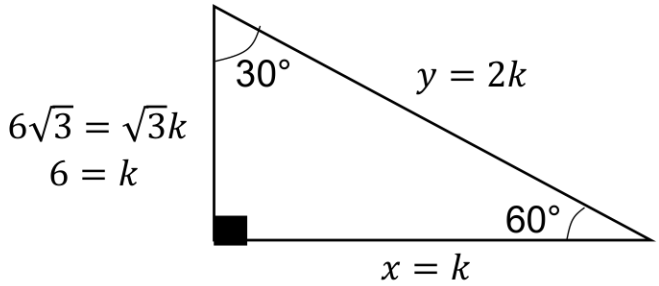
$$18 = x \qquad \text{Rpta. d}$$

05. Determina $x + y$



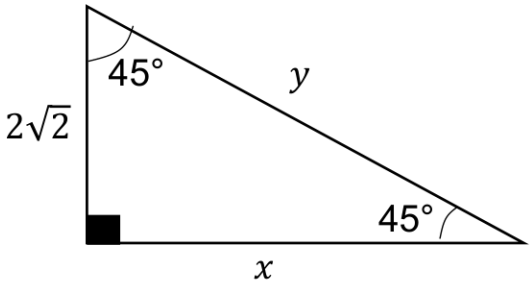
a) 18 b) 22 c) 24 d) 26

Solución:



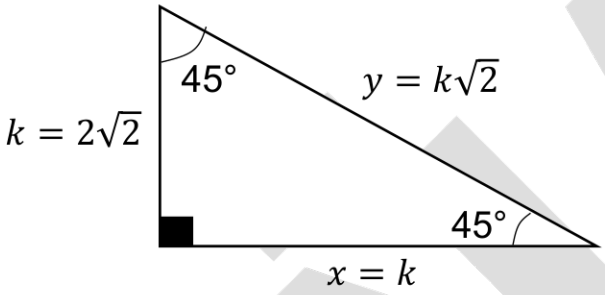
Por lo tanto: $x + y = k + 2k = 3k = 3(6) = 18 \qquad Rpta.a$

06. Determina $\sqrt{2}x + y$



a) 16 b) 12 c) 6 d) 8

Solución:



$\therefore \sqrt{2}x + y = \sqrt{2}(k) + k\sqrt{2} = \sqrt{2}(2\sqrt{2}) + (2\sqrt{2})\sqrt{2} = 4 + 4 = 8 \quad Rpta.d$

07. Si: $sen(x + 10) = \cos(x + 40)$. Halle: $E = tg3x + 4\sqrt{3}.sen(x + 10)$

a) $\sqrt{3}$ b) $2\sqrt{3}$ c) $3\sqrt{3}$ d) $4\sqrt{3}$

Solución:

Es un caso de cofunción:

$$x + 10 + x + 40 = 90$$
$$2x + 50 = 90$$
$$2x = 90 - 50$$
$$2x = 40$$
$$x = 20$$

Piden: $E = tg3x + 4\sqrt{3}.sen(x + 10)$

$$E = tg(3x20) + 4\sqrt{3}sen(20 + 10)$$
$$E = tg60° + 4\sqrt{3}sen30°$$
$$E = \sqrt{3} + 4\sqrt{3}.\left(\frac{1}{2}\right)$$
$$E = \sqrt{3} + 2\sqrt{3}$$
$$E = 3\sqrt{3} \quad \text{Rpta. c}$$

08. Si: $sen\alpha.cosec4\beta = 1$; $tg\alpha.tg2\beta = 1$

Calcular: $E = sen^2(\alpha - \beta) + cos^2(\alpha - 2\beta)$

a) 1/2 b) 5/4 c) 1/3 d) 5/3

Solución:

De: $sen\alpha.cosec4\beta = 1 \rightarrow \alpha = 4\beta$

De: $tg\alpha.tg2\beta = 1 \rightarrow tg\alpha = cot2\beta$

Es un caso de cofunción: $\alpha + 2\beta = 90°$

$$4\beta + 2\beta = 90°$$

$$6\beta = 90°$$

$$\beta = 15°$$

Luego: $\alpha = 4(15°) = 60°$

Tenemos: $E = sen^2(\alpha - \beta) + cos^2(\alpha - 2\beta)$

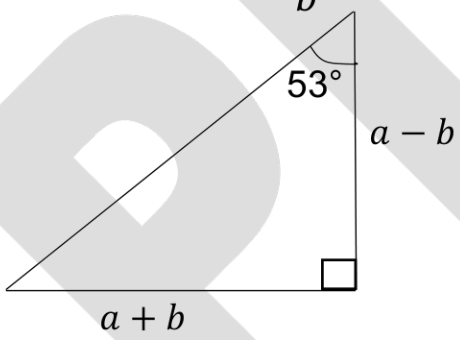
$$E = sen^2(60° - 15°) + cos^2(60° - 30°)$$

$$E = sen^2 45° + cos^2 30°$$

$$E = \left(\frac{1}{\sqrt{2}}\right)^2 + \left(\frac{\sqrt{3}}{2}\right)^2$$

$$E = \frac{1}{2} + \frac{3}{4} = \frac{2+3}{4} = \frac{5}{4} \qquad Rpta.\ b$$

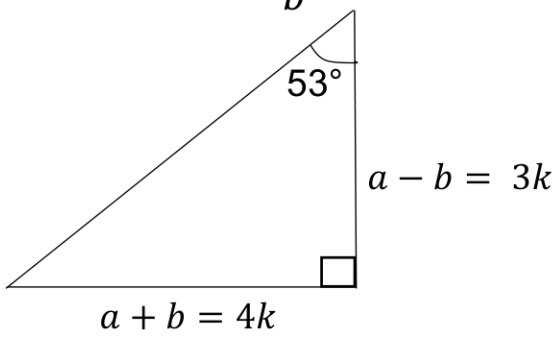
09. De la figura. Hallar $\frac{a}{b}$



a) 7 b) 6 c) 4 d) 3

Solución:

(*) De la figura. Hallar $\frac{a}{b}$



$$De\ donde: a = \frac{4k + 3k}{2} = \frac{7k}{2}$$

$$b = \frac{4k - 3k}{2} = \frac{k}{2}$$

$$Entonces: \frac{a}{b} = \frac{\frac{7k}{2}}{\frac{k}{2}} = 7 \qquad Rpta.a$$

10. Calcular "x": $x(sen90°) - x(sec^2 45°.cos180°) = cot^2 30°$

a) 1 b) 2 c) 3 d) 4

Solución:

$$x(1) - x\left(\sqrt{2}^2.(-1)\right) = \sqrt{3}^2$$

$$x - x(-2) = 3$$

$$x + 2x = 3$$

$$3x = 3$$

$$x = 1 \quad \text{Rpta. a}$$

FUNCIONES TRIGONOMÉTRICAS DE 0°; 90°; 180°; 270° y 360°

	$0°; 360°$	$90°$	$180°$	$270°$
sen	0	1	0	-1
cos	1	0	-1	0
tag	0	∞	0	∞
$cotg$	∞	0	∞	0
sec	1	∞	-1	∞
csc	∞	1	∞	-1

11. Determina el valor de "x", en: $-xsen270° - 20cos360° = 0$

a) 20 b) 16 c) 12 d) 24

Solución:

$$-xsen270° - 20cos360° = 0$$

$$-x(-1) - 20(1) = 0$$

$$x - 20 = 0$$

$$x = 20 \quad Rpta.a$$

12. Determina: $tag(2\pi) + tag\pi - cos\pi - sen(3\pi/2) - csc(3\pi/2)$

a) 1 b) 2 c) 3 d) 4

Solución:

$$tag(2\pi) + tag\pi - cos\pi - sen\left(\frac{3\pi}{2}\right) - csc\left(\frac{3\pi}{2}\right) =$$

Cuando se trata de ángulos: $\pi = 180°$

$$tag360° + tag180° - cos180° - sen270° - csc270° =$$

$$0 + 0 - (-1) - (-1) - (-1) = 1 + 1 + 1 = 3 \quad Rpta.c$$

13. Determinar el resultado de:

$$\frac{cos0° + sen\frac{\pi}{2} - sen\frac{3\pi}{2} + sec2\pi}{\frac{tg\frac{\pi}{4}}{cot\pi} + sec^2\frac{\pi}{3} + csc\frac{3\pi}{2}}$$

a) $tg53°$ b) $ctg53°$ c) $sec53°$ d) $csc53°$

Solución:

$No\ olvide\ que: \frac{N}{\infty} = 0$

Tenemos: $\pi\ rad = 180°$

$$\frac{cos0° + sen\frac{180°}{2} - sen\frac{3(180°)}{2} + sec2(180°)}{\frac{tg\frac{180°}{4}}{cot180°} + sec^2\frac{180°}{3} + csc\frac{3(180°)}{2}}$$

$$\frac{1 + sen90° - sen270° + sec360°}{\frac{tg45°}{cot180°} + sec^260° + csc270°}$$

$$\frac{1 + 1 - (-1) + 1}{\frac{1}{\infty} + 2^2 - 1} = \frac{4}{3} = tg53° \quad Rpta.a$$

14. Determinar el resultado de:

$E = (sen90° + cos0° - cos180° + sec360°)^{sen30°}$

a) 1 b) 2 c) 3 d) 4

Solución:

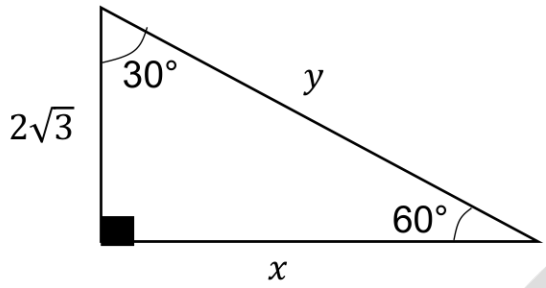
$$E = (sen90° + cos0° - cos180° + sec360°)^{sen30°}$$

$$E = (1 + 1 - (-1) + 1)^{\frac{1}{2}}$$

$$E = \sqrt{4} \rightarrow E = 2 \quad \text{Rpta. b}$$

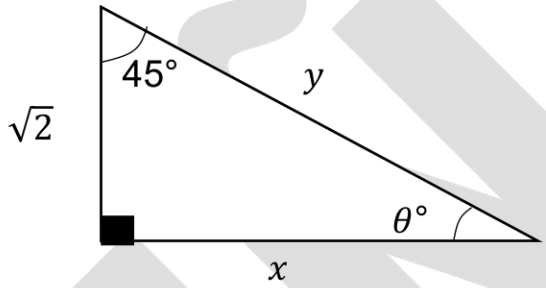
ACADEMIAS PROYECTO PIÑA- PROBLEMAS PROPUESTOSTRIÁNGULOS NOTABLES

01. Calcular "$x + y$"



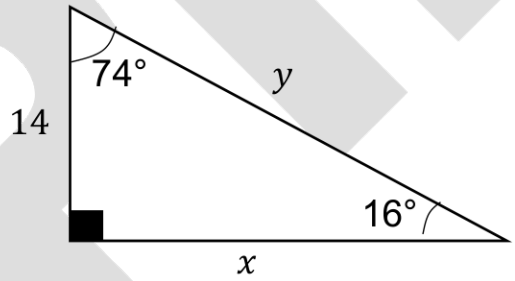
a) 6 b) 9 c) 7 d) 8

02. Determina $\sqrt{2}x + y$



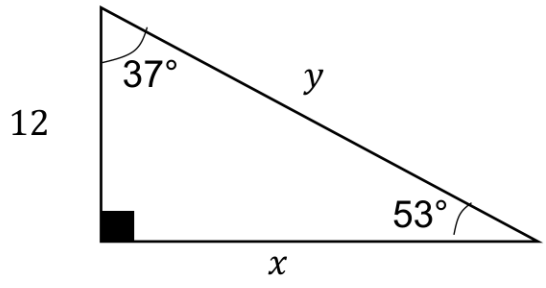
a) 4 b) 6 c) 12 d) 15

03. Calcular "$x + y$"



a) 98 b) 90 c) 97 d) 80

04. Calcular "$x + y$"



a) 96 b) 99 c) 97 d) 98

05. Determina el valor de "x": $sen(6x) = \cos(3x)$

a) 12 b) 16 c) 14 d) 10

06. Determinar "x": $tag(2x + 10) = cotg(3x - 20)$

a) 19 b) 20 c) 21 d) 22

07. Determinar "x": $\csc(6x - 40) = \sec(4x + 30)$

a) 9 b) 12 c) 14 d) 10

08. Desarrollar:

$$E = \frac{tag1° + tag2° + tag3°}{cot89° + cot88° + cot87°}$$

a) 1 b) 2 c) 3 s d) 4

09. Desarrollar:

$$E = 2(sen30°)\left(\frac{tag10°}{cot80°}\right) + 3(tag53°)\left(\frac{sen20°}{cos70°}\right) + sen90°$$

a) 6 b) 4 c) 3 d) 5

10. Sea el triángulo rectángulo ABC, recto en C y sus lados respectivos opuestos a cada ángulo: $a; b\ y\ c$. Donde "c" es el mayor lado. Si se cumple que: $a^2(sen^2 1 + cos^2 1) + b^2(2sen30°) = 16$ ¿Cuál es el valor de la hipotenusa?

a) 2 b) 3 c) 4 d) 5

11. Se tiene que: $sen(4x - 10).\csc(3x + 20)$. Determinar "x"

a) 12 b) 20 c) 30 d) 26

12. Se tiene que: $tag(5x - 10).cotg(4x + 40)$. Determinar "x"

a) 20 b) 30 c) 40 d) 50

13. Se tiene que: $\cos(2w + x + 10).\sec(2w + 2x - 60)$. Determinar "x"

a) 40 b) 60 c) 70 d) 80

14. Calcular: $E = (csc15°)^{sen90°}(csc75°)^{cos360°}$

a) 2 b) 4 c) 6 d) 8

15. Calcular: $E = 2sen30° + 4tag37° + 15(tag^2 45° + cot^2 45°) - 25sen74°$

a) 9 b) 12 c) 7 d) 10

16. Si: $sen37°.tg60°.cosec53°.tg30°.cotg45° = a/b$ .Determina: $a + b$

a) 7 b) 6 c) 9 d) 8

17. Hallar el valor de:

$$E = \frac{Tg15° + Tg60°}{Csc30°} + sen90° + sen270°$$

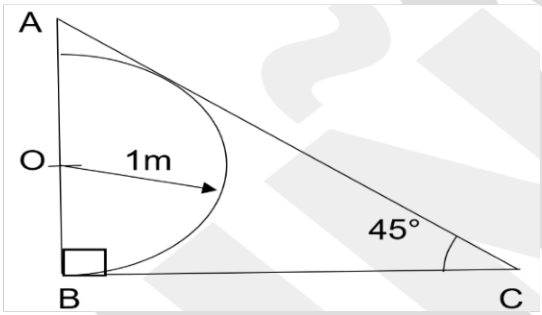
a) 1/2 b) 1 c) 2 d) 4/3

18. Si: $cos2\theta.\csc(\theta + 45) - 1 = 0$. Calcular: $\sqrt{3}cos2\theta.sec4\theta + cos360°$

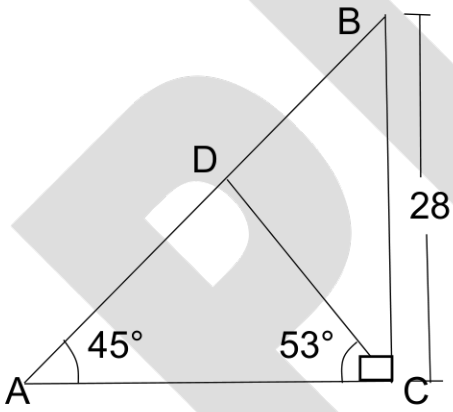
a) 0,5 b) 1 c) 2 d) 4

19. Del gráfico. Hallar $\overline{BC}$

a) $\sqrt{2} + 1$
b) $\sqrt{2} - 1$
c) $2\sqrt{2} + 1$
d) $2\sqrt{2} - 1$



20. Del gráfico. Hallar $\overline{CD}$



a) 12 b) 16 c) 20 c) 24

Siempre seremos PROYECTO PIÑA