ويكي العربية تقدم

تمارين حول المثلثات

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حل المثلثات التالية

1. ABC ($\angle A = 30°$,$\angle B = 20°$,$c = 12$)
2. ABC ($\angle A = 30°$,$\angle B = 60°$,$b = 7$)
3. ABC ($\angle A = 30°$,$\angle B = 50°$,$a = 3$)
4. ABC ($\angle B = 45°$,$a = 3$,$c = 2$)
5. ABC ($\angle B = 15°$,$b = 5$,$c = 7$)
6. ABC ($\angle B = 60°$,$a = 2$,$b = 4$)
7. ABC ($a = 3$,$b = 4$,$c = 5$)
8. ABC ($\angle A = 30°$,$\angle B = 30°$,$b = 2$)
9. ABC ($\angle A = 15°$,$\angle B = 90°$,$c = 1$)
10. ABC ($a = 5$,$b = 5$,$c = 5$)
11. ABC ($\angle C = 30°$,$a = 4$,$b = 4$)
12. ABC ($a = 1$,$b = 2$,$c = 3$)

ملاحظة: هناك مثلث وحيد غير قابل للحل يرجى ذكر السبب, وحالات أخرى تقبل أكثر من حل

الحل

1. ABC (∠A = 30° ,∠B = 20° ,c = 12)

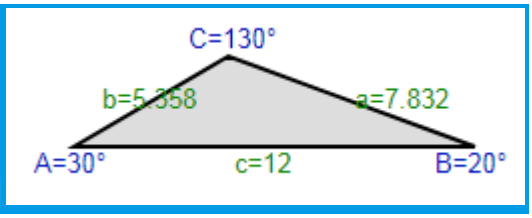


Fig 1.1

∠C = 180° - A - B = 2.26893 rad = 13/18π = 130°

a = c·sin(A)/sin(C) = 7.83244

b = c·sin(B)/sin(C) = 5.35771

Side a = 7.83244

Side b = 5.35771

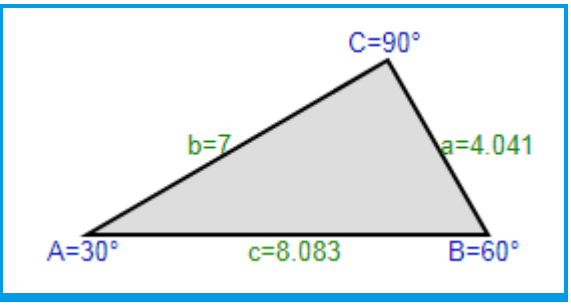
Side c = 12

Angle ∠A = 30° = 0.5236 rad = π/6

Angle ∠B = 20° = 0.34907 rad = π/9

Angle ∠C = 130° = 2.26893 rad = 13/18π

2. ABC (∠A = 30° ,∠B = 60° ,b = 7)



Fin 1.2

∠C = 180° - A - B = 1.5708 rad = π/2 = 90°

a = b·sin(A)/sin(B) = 4.04145

c = b·sin(C)/sin(B) = 8.0829

Side a = 4.04145

Side b = 7

Side c = 8.0829

Angle ∠A = 30° = 0.5236 rad = π/6

Angle ∠B = 60° = 1.0472 rad = π/3

Angle ∠C = 90° = 1.5708 rad = π/2

3. ABC (∠A = 30° ,∠B = 50° ,a = 3)

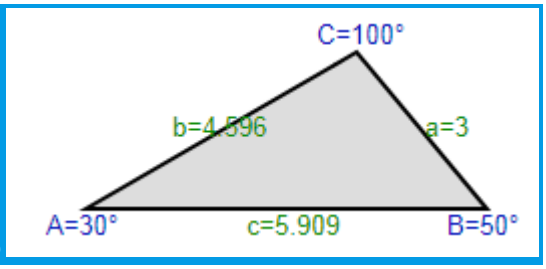


Fig 1.3

∠C = 180° - A - B = 1.74533 rad = 5/9π = 100°

b = a·sin(B)/sin(A) = 4.59627

c = a·sin(C)/sin(A) = 5.90885

Side a = 3

Side b = 4.59627

Side c = 5.90885

Angle ∠A = 30° = 0.5236 rad = π/6

Angle ∠B = 50° = 0.87266 rad = 5/18π

Angle ∠C = 100° = 1.74533 rad = 5/9π

4. ABC (∠B = 45° ,a = 3 ,c = 2)

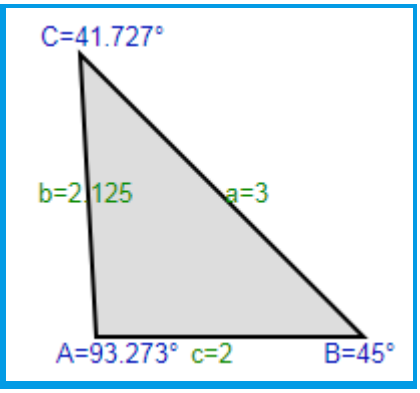


Fig 1.4

b = √[a2 + c2 - 2ac·cos(B)] = 2.12479

∠A = arccos((b2 + c2 - a2)/2bc)

= 1.62793 rad = 93.273° = 93°16'24"

∠C = arccos((b2 + a2 - c2)/2ba)

= 0.72827 rad = 41.727° = 41°43'36"

Side a = 3

Side b = 2.12479

Side c = 2

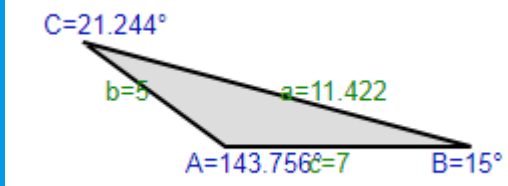
Angle ∠A = 93.273° = 93°16'24" = 1.62793 rad

Angle ∠B = 45° = 0.7854 rad = π/4

Angle ∠C = 41.727° = 41°43'36" = 0.72827 rad

5. ABC (∠B = 15° ,b = 5 ,c = 7)

Solution A:



∠C = arcsin(c·sin(B)/b)

= 0.37078 rad = 21.244° = 21°14'40"

∠A = 180° - B - C = 2.50901 rad = 143.756° = 143°45'20"

a = b·sin(A)/sin(B)

= 11.4217

Side a = 11.4217

Side b = 5

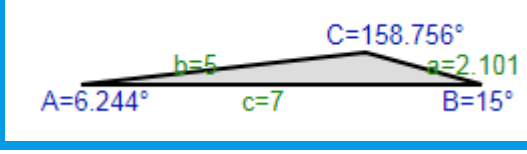
Side c = 7

Angle ∠A = 143.756° = 143°45'20" = 2.50901 rad

Angle ∠B = 15° = 0.2618 rad = π/12

Angle ∠C = 21.244° = 21°14'40" = 0.37078 rad

Solution B:



∠C = 180° - arcsin(c·sin(B)/b)

= 2.77081 rad = 158.756° = 158°45'20"

∠A = 180° - B - C = 0.10899 rad = 6.244° = 6°14'40"

a = b·sin(A)/sin(B)

= 2.10126

Side a = 2.10126

Side b = 5

Side c = 7

Angle ∠A = 6.244° = 6°14'40" = 0.10899 rad

Angle ∠B = 15° = 0.2618 rad = π/12

Angle ∠C = 158.756° = 158°45'20" = 2.77081 rad

6. ABC (∠B = 60° ,a = 2 ,b = 4)

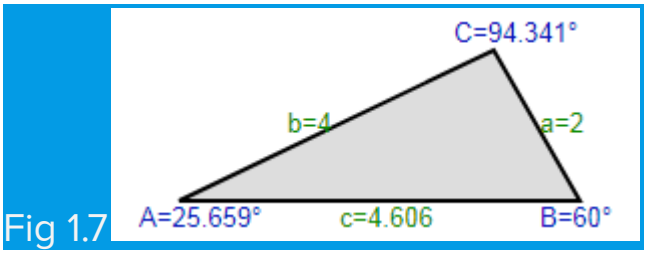


Fig 1.7

Side a = 2

Side b = 4

Side c = 4.60555

Angle ∠A = 25.659° = 25°39'32" = 0.44783 rad

Angle ∠B = 60° = 1.0472 rad = π/3

Angle ∠C = 94.341° = 94°20'28" = 1.64656 rad

7. ABC (a = 3 ,b = 4 ,c = 5)

∠A = arccos((b2 + c2 - a2)/2bc)

= 0.6435 rad = 36.87° = 36°52'12"

∠B = arccos((a2 + c2 - b2)/2ac)

= 0.9273 rad = 53.13° = 53°7'48"

∠C = arccos((a2 + b2 - c2)/2ab)

= 1.5708 rad = π/2 = 90°

8. ABC (∠A = 30° ,∠B = 30° ,b = 2)

∠C = 180° - A - B = 2.0944 rad = 2/3π = 120°

a = b·sin(A)/sin(B) = 2

c = b·sin(C)/sin(B) = 3.4641 = 2√3

9. ABC (∠A = 15° ,∠B = 90° ,c = 1)

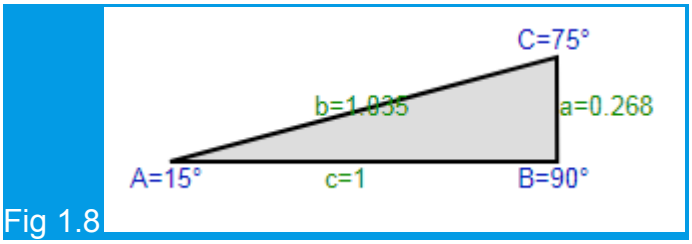


Fig 1.8

∠C = 180° - A - B = 1.309 rad = 5/12π = 75°

a = c·sin(A)/sin(C) = 0.26795

$b = c \cdot \sin(B)/\sin(C) = 1.03528$

10. ABC (a = 5 ,b = 5 ,c = 5)

Equilateral Triangle

Side a = 5

Side b = 5

Side c = 5

Angle ∠A = 60° = 1.0472 rad = π/3

Angle ∠B = 60° = 1.0472 rad = π/3

Angle ∠C = 60° = 1.0472 rad = π/3

11. ABC (∠C = 30° ,a = 4 ,b = 4)

Acute Isosceles Triangle

Angle ∠A = ∠B (180-30)/2 = 75° = 1.309 rad = 5/12π

$c = \sqrt{[b^2 + a^2 - 2ba \cdot \cos(C)]} = 2.07055$

12. ABC (a = 1 ,b = 2 ,c = 3)

المسألة مستحيلة الحل. من شروط المثلث أن يكون مجموع طولي أي ضلعين فيه أكبر من طول الضلع الثالث (1+2 =3)