CBSE Board Class 10 Maths Chapter 8- Introduction to Trignometry
Objective Questions

Introduction

1. In a right triangle ABC, the right angle is at B. Which of the following is true about the other two angles A and C?

(A) There is no restriction on the measure of the angles
(B) Both the angles should be obtuse
(C) Both the angles should be acute
(D) One of the angles is acute and the other is obtuse

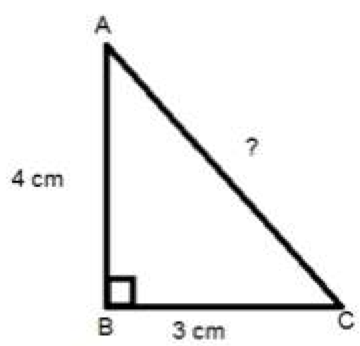
Answer: (C) Both the angles should be acute

Solution: In triangle ABC, $\angle A + \angle B + \angle C = 180^\circ$

$\angle A + \angle C = 180^\circ - 90^\circ = 90^\circ \Rightarrow$ None of the angles can be $\geq 90^\circ$

$\therefore$ The other 2 angles must be acute angles.

2. In a right triangle ABC, the right angle is at B. What is the length of missing side in the figure?



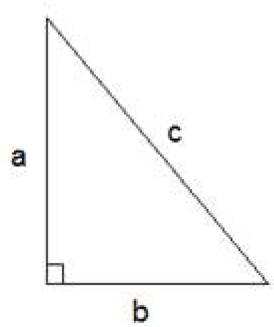
(A) 25 cm
(B) 12cm
(C) 7cm
(D) 5cm

Answer: (D) 5cm

Solution: Pythagoras theorem: In a right angled triangle,

Hypotenuse^2 = Sum of squares of other 2 sides

That is,



$c^2=a^2+b^2$

Here a = 4 cm and b = 3 cm,

So the missing side = c = $\sqrt{3^2+4^2}$ = 5 cm

3. Which of the following numbers can form sides of a right angled triangle?

(A) 13 cm , 27 cm , 15 cm
(B) 4 cm , 5 cm , 9 cm
(C) 2 cm , 17 cm , 9 cm
(D) 10 cm , 6 cm , 8 cm

Answer: (D) 10 cm, 6 cm, 8 cm

Solution: The basic condition for any type of triangle is:

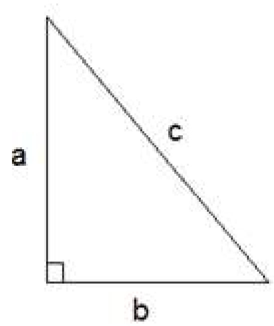
(i) The sum of 2 sides of a triangle should be greater than the third side
(ii) The difference of any 2 sides should be less than the third side.

For a triangle to be a right angled triangle, there is an additional condition.

Pythagoras theorem: In a right angled triangle,
Hypotenuse^2= Sum of squares of other 2 sides

That is, $c^2=a^2+b^2$; Also note that the hypotenuse is the largest side in a right triangle.

Considering each of the given options,



$10^2=6^2+8^2$
$17^2\neq2^2+9^2$
$9^2\neq5^2+4^2$
$27^2\neq13^2+15^2$

So, A is the correct option.

4. Which of the following are Pythagorean triplets?

(A) 4 cm , 6 cm , 8 cm
(B) 24 cm , 10 cm , 26 cm
(C) 13 cm , 27 cm , 30 cm
(D) 2 cm , 17 cm , 9 cm

Answer: (B) 24 cm, 10 cm, 26 cm

Solution: Pythagorean triplets are those set of numbers which satisfy the Pythagoras theorem.

Considering the options given to us –

$8^2\neq4^2+6^2$

$17^2\neq2^2+9^2$

$26^2=24^2+10^2$

$30^2\neq27^2+13^2$

Therefore, 24, 10 and 26 are Pythagorean triplets.

Trigonometric Identities

5. If secθ + tanθ = x, then tanθ is:

(A) $(x^2-1) / 2x$
(B) $(x^2+1) / 2x$
(C) $(x^2-1) / x$
(D) $(x^2+1) / x$

Answer: (A) $(x^2-1) / 2x$

Solution: We know that, $\sec^2\theta - \tan^2\theta = 1$

Therefore, (secθ + tanθ) (secθ - tanθ) = 1

Since, (secθ + tanθ) = x

Thus, (secθ - tanθ) = 1/x

Solving both equations

We get tan θ = $(x^2-1) / 2x$

6. If p cotθ = $\sqrt{q^2 - p^2}$ then the value of sinθ is ____. (θ being an acute angle)

(A) q/3p
(B) q/2p
(C) p/q
(D) 0

Answer: (C) p/q

Given, p cotθ = $\sqrt{q^2 - p^2}$

∴ cot θ = ($\sqrt{q^2 - p^2}$)/ 2

Using the identity, $\text{cosec}^2\theta = 1 + \cot^2\theta$

$$= 1 + \frac{\sqrt{q^2 - p^2}}{p^2}$$

= q^2/ p^2

Hence, cosecθ = q/p

∴ sin θ = p/q

7. If sin A = 8/17, find the value of secA cosA + cosecA cosA.

(A) 23/8
(B) 15/8
(C) 8/15
(D) 6/23

Answer: (A) 23/8

Solution: sin A = 8/17

cosec A = 17/8

$$cosA = \sqrt{1 - sin^2A}$$

$$= \sqrt{1 - \frac{64}{289}} = \sqrt{\frac{225}{289}}$$

= 15/17

sec A = 17/15

secA cosA + cosecA cosA = (17/15) * (15/17) + (17/15) * (15/17)

= 1 + (15/8)

= 23/8

8. $(\sin A - 2\sin^3 A) / (2\cos^3 A - \cos A) =$

(A) tan A
(B) cot A
(C) sec A
(D) 1

Answer: (A) tan A

Solutions: $(\sin A - 2\sin^3 A) / (2\cos^3 A - \cos A) = (\sin A(1 - 2\sin^2 A)) / (\cos A(2\cos^2 A - 1))$

$= (\sin A(\sin^2 A + \cos^2 A - 2\sin^2 A)) / (\cos A(2\cos^2 A - (\sin^2 A + \cos^2 A))$

$= (\sin A(\cos^2 A - \sin^2 A)) / (\cos A(\cos^2 A - \sin^2 A))$

$= \tan A$

Trigonometric Ratios

9. $(\cos A / \cot A) + \sin A =$ ____________

(A) cot A
(B) 2 sin A
(C) 2 cos A
(D) sec A

Answer: (B) 2 sin A

Solution: $(\cos A / \cot A) + \sin A$

$= \cos A / (\cos A / \sin A) + \sin A$

$= \sin A + \sin A$

$= 2\sin A$

10. If $5\tan\theta = 4$, then value of $(5\sin\theta - 4\cos\theta)/(5\sin\theta + 4\cos\theta)$ is:

(A) 1/6
(B) 5/6
(C) 0
(D) 5/3

Answer: (C) 0

Solution: Divide both numerator and denominator by cos θ and solve

(5 sin θ- 4 cos θ)/ (5 sin θ + 4 cos θ)

$$= \frac{\frac{(5sin\theta - 4cos\theta)}{cos\theta}}{\frac{(5sin\theta + 4cos\theta)}{cos\theta}}$$

$$= \frac{5tan\theta - 4}{5tan\theta + 4}$$

$$= \frac{4-4}{4+4}$$

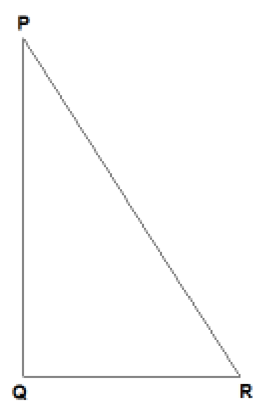
$= 0$ (Since, given that 5 tan θ = 4)

11. In △PQR, PQ = 12 cm and PR = 13 cm. ∠Q=90° Find tan P - cot R

(A) –(119/60)
(B) 119/60
(C) 0
(D) 1

Answer: (C) 0

Solution:



Given that in △ PQR, PQ = 12 cm and PR = 13 cm.

Now, from Pythagoras theorem,

$PQ^2+QR^2=PR^2$

$\Rightarrow QR^2=PR^2-PQ^2$

$\Rightarrow QR^2=13^2-12^2$

$\Rightarrow QR^2=169-144=25$

$\Rightarrow QR= \sqrt{25} = 5$ cm

Now, tan P= opposite side/ adjacent side = QR/PQ= 5/12

cot R= adjacent side/ opposite side = QR/PQ = 5/12

∴tan P−cot R= (5/12)-(5/12) = 0

12. If tanθ= (x sinϕ) / (1−xcosϕ) and, tan ϕ = (y sin θ)/ (1−y cos θ) then x/y =

(A) sinθ / (1−cosϕ)
(B) sinθ / (1−cosθ)
(C) sinθ/sinϕ
(D) sinϕ / sinθ

Answer: (C) sinθ/sinϕ

Solution: We have**,** tanθ = (x sinϕ)/ (1−xcosϕ)

⇒ (1−xcos ϕ) / (x sin ϕ) = 1/ tanθ ⇒ (1/ xsin ϕ) −cotϕ=cotθ

⇒ 1/ xsin ϕ= =cot θ+cot ϕ

and tan ϕ = y sinθ / (1−y cosθ) ⇒ (1−y cosθ)/ y sinθ = 1/ tan ϕ

⇒ (1/y sin θ) – cot θ = cotϕ⇒ (1/ y sin θ) =cot ϕ+cot θ

⇒ (1/y sin θ) = (1/ x sin ϕ) ⇒ x/y = sin θ/ sin ϕ

Trigonometric Ratios of Complementary Angles

13. The value of tan1° × tan2° × tan3° ×……× tan 89° is :

(A) ½
(B) 2
(C) 1
(D) 0

Answer: (C) 1

Solution: $\tan\theta\cot\theta=1$,

$\tan(90-\theta)=\cot\theta$

and $\tan 45°=1$

Given: tan1°.tan2°,tan3° ....tan88°. tan89°

= (tan1°. tan89°),(tan2°. tan88°).....(tan44°.tan46°) (tan45°)

= [(tan1°. tan (90°−1°)]. [(tan 2°. tan(90°−2°)].......... [(tan44°. tan(90°−44°)].1

= (tan1°. cot1°). (tan2°. cot2°) .... (tan44°. cot44°)

= 1

14. If tan2A = cot(A-18°), then value of A is:

(A) 27°
(B) 24°
(C) 36°
(D) 18°

Answer: (C) 36°

Solution: Given, tan 2A = cot (A - 18°)

⇒ tan 2A = tan (90 - (A - 18°)

⇒ tan 2A = tan (108° - A)

⇒ 2A = 108° - A

⇒ 3A = 108°

⇒ A = 36°

15. If tan 4θ=cot(θ−10°), where 4θ and(θ−10°) are acute angles then the value of θ in degrees is

(A) 16°
(B) 20°
(C) 32°
(D) 40°

Answer: (B) 20°

Solution: Given, tan 4θ=cot(θ−10°)

This can be written as

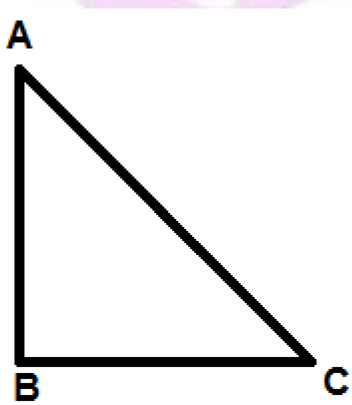
cot(90°− 4θ)=cot(θ−10°) -----(i)

(∵ Tan θ = Cot(90°− θ))

Hence, from (i) we have

⇒90°− 4θ= θ−10°
⇒5θ =100°
⇒θ =20°

16. In the given triangle right angled at B, which pair of angles are complementary?



(A) None of these
(B) C and A
(C) A and B
(D) B and C

Answer: (B) C and A

Solution: Two angles are said to be complementary, if their sum is 90°. The triangle is right angled at B. With angle sum property of the triangle, ∠A+∠B+∠C=180°

∠A+∠C=90°, Hence angle A and C are complementary.

Trigonometric Ratios of Specific Angles

17. Which of the following is correct for some θ, such that 0° ≤θ< 90°

(A) 1/ cos θ < 1
(B) sec θ = 0
(C) 1/ sec θ < 1
(D) 1/ sec θ> 1

Answer: (C) 1/ sec θ < 1

Solution: 1/ sec θ = cos θ. And value of cos θ ranges from 0 to 1

18. The value $\cot^2 30° - 2\cos^2 60° - 3/4\sec^2 45° - 4\sin^2 30°$ is

(A) 2
(B) -1
(C) 1
(D) 0

Answer: (D) 0

Solution: $\cot^2 30° - 2\cos^2 60° - 3/4\ (\sec^2 45°) - 4\sin^2 30°$

$$= (\sqrt{3})^2 - 2(\frac{1}{2})^2 - \frac{3}{4}(\sqrt{2})^2 - 4(\frac{1}{2})^2)$$

= 3- (1/2) – (3/2) -1 =0

19. If Cosec (A+ B) = $\frac{2}{\sqrt{3}}$ sec(A-B)= $\frac{2}{\sqrt{3}}$

0°<A+B≤90°,
Find A and B.

(A) 25°,35°
(B) 30°, 30°
(C) 45°, 15°
(D) 10°,50°

Answer: (C) 45°, 15°

Solution: If A+B lies in this range 0°<A+B≤90°

cosec (A+B) = $\frac{2}{\sqrt{3}}$ only when A+B=60° .... (1)

sec (A-B) = $\frac{2}{\sqrt{3}}$ only when A−B=30° ....(2)

By Solving equation 1 and equation 2
A=45° and B=15°

20. cos 1° × cos 2° × cos 3° ×........× cos 180° is equal to:

(A) 0
(B) 1
(C) ½
(D) -1

Answer: (A) 0

Solution: Since cos 90° = 0
The given expression

cos 1° × cos 2° × cos 3° ×....× cos 90° ×........× cos 180°

reduces to zero as it contains cos 90° which is equal to 0