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Class: X
Subject: Mathematics
Topic: ASK1510UT02
No. of Questions: 30

Q1. If an equilateral triangle of area X and a square of area y have the same perimeter, then –

(a) X > Y
(b) X < Y
(c) X = Y
(d) None of these

Sol. (b)

If the perimeter of the polygons is the same, the polygon with greater sides has the greater area.

Q2. ABCE is a triangle. If D is a point in the plane of the triangle such that the perpendicular distance from D to the three sides of the triangle are all equal, then there exist(s) –

(a) Just one such point as D
(b) Three such point as D
(c) Four such points as D
(d) None of the above

Sol. (a)

A point which is equidistant from the sides of a triangle is the incentre and such a point is one and only one is the plane of the triangle

Q3. If any two sides of a triangle are produced its base and the exterior angles thus obtained are bisected, then these bisectors will include an angle equal to –

(a) Half the sum of the base angles
(b) Sum of the base angles
(c) Half the difference of the base angles
(d) Difference of the base angles

Sol. (a)

Half the sum of the base angles.

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Q4. If x is the length of the median of an equilateral triangle, then its area is

(a) x^2
(b) $\frac{\sqrt{3}}{2}x^2$
(c) $\frac{\sqrt{3}}{3}x^2$
(d) $\frac{1}{2}x^2$

Sol. (c)

Q5. An isosceles triangle has a 10 inch base and two 13 inch sides. What other value can the base have and still yield a triangle with the same area -

(a) 18”
(b) 19”
(c) 24”
(d) 27”

Sol. (c)

Two (5 inch × 12 inch × 13 inch) right triangles can be put together in two ways to form an isosceles triangle with equal 1.3 inch sides. One way involves a base of 10 inches, the other 24 inches. Naturally the area is the same in either case.

Q6. If $\Delta ABC \sim \Delta QRP, \frac{ar\,(ABC)}{ar(PQR)} = \frac{9}{4}, AB = 18 \text{ cm and } BC = 15 \text{ cm}$; then PR is equal to

(a) 10 cm
(b) 12 cm
(c) $\frac{20}{3}$ cm
(d) 8 cm

Sol. (a)

Q7. It is given that $\Delta ABC \sim \Delta PQR$ with $\frac{BC}{QR} = \frac{1}{3}$. then $\frac{ar\ (\Delta PRQ)}{ar(BCA)}$ is equal to

(a) 9
(b) 3
(c) 1/3
(d) 1/9

Sol. (a)

Since, $\Delta ABC \sim \Delta PQR$

$$\therefore \frac{ar\ (\Delta PRQ)}{ar\ (\Delta BCA)} = \frac{PR^2}{AC^2} = \frac{QR^2}{BC^2} = \frac{9}{1}\left[\because \frac{QR^2}{BC^2} = \frac{3}{1}\right] = 9$$

Q8. The area of a right angled isosceles triangle whose hypotenuse is equal to 270 m is –

(a) 19000 m^2
(b) 18225 m^2
(c) 17256 m^2
(d) 18325 m^2

Sol. (b)

Hypotenuse = 270 m

$$\Rightarrow \text{Hypotenuse}^2 = \text{side}^2 + \text{side}^2 = 2\text{side}^2$$

$$\Rightarrow \text{side}^2 = \frac{(270)^2}{2} = \frac{72900}{2} = 36450 \text{ or side} = 190.91 \text{ m}$$

$$\Rightarrow \text{Required Area} = \frac{1}{2} \times 190.91 \times 190.91$$

$$= \frac{36446.6}{2} = 18225 \text{ m}^2 \text{ (approx).}$$

Q9. The perimeters of two similar triangles ABC and PQR are respectively 38 cm and 24 cm. If PQ = 10 cm, then AB =

(a) 10 cm
(b) 20 cm
(c) 25 cm
(d) 15 cm

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Sol. (d)

Q10. A certain right angled triangle has its area numerically equal to its perimeter. The length of its each side is an even integer. What is the perimeter?

(a) 24 units
(b) 36 units
(c) 32 units
(d) 30 units

Sol. (a)

Q11. $\cos 1° . \cos 2° . \cos 3° \ldots \ldots \cos 179°$ to equal to –

(a) -1
(b) 0
(c) 1
(d) $1/\sqrt{2}$

Sol. (b)

Q12. $\sin^2 \theta + \text{cosec}^2\theta$ is always –

(a) Greater than 1
(b) Less than 1
(c) Greater than or equal to 2
(d) Equal to 2

Sol. (b)

Q13. $\sin\theta + \cos\theta = a$ and $\frac{\sin\theta + \cos\theta}{\sin\theta\cos\theta} = b$, then

(a) $b = \frac{2a}{a^2 - 1}$

(b) $a = \frac{2b}{b^2 - 1}$

(c) $ab = b^2 - 1$
(d) $a + b = 1$

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Sol. (a)

Q14. The value of $\left(\sin^2 7\frac{1}{2}^\circ + cos^2 7\ \frac{1}{2}^\circ\right) - (\sin^2 \cos30^\circ + \cos^2 30^\circ) + (\sin^2 7^\circ + \sin^2 83^\circ)$ is equal to

(a) 3
(b) $3\frac{1}{2}$
(c) 2
(d) 1

Sol. (d)

$\sin 83^\circ = \cos 7^\circ$

∴ the given expression is 1-1+1 = 1

Q15. If tan 15° = $2 - \sqrt{3}$, then value of $\cot^2 75^\circ$ is

(a) $7 + \sqrt{3}$
(b) $7 - 2\sqrt{3}$
(c) $7 - 4\sqrt{3}$
(d) $7 + 4\sqrt{3}$

Sol. (c)

$\cot^2 75^\circ = \left(2 - \sqrt{3}\right)^3 = 7 - 4\sqrt{3}$

Q16. if $x = p\sec\theta$ and $y = q\tan\theta$ then –

(a) $x^2 - y^2 = p^2q^2$
(b) $x^2q^2 - y^2p^2 = pq$
(c) $x^2q^2 - y^2p^2 = \frac{1}{p^2q^2}$
(d) $x^2q^2 - y^2p^2 = p^2q^2$

Sol. (d)

We know $\sec^2\theta - \tan^2\theta = 1$ and $\sec\theta = \frac{x}{p}$, $\tan\theta = \frac{y}{q}$

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$\therefore \quad x^2q^2 - p^2y^2 = p^2q^2$

Q17. If $\sin\theta = \frac{24}{25}$ and θ lies in the second quadrant, then $\sec\theta + \tan\theta =$

(a) -7
(b) 6
(c) 4
(d) -5

Sol. (a)

$\sec\theta + \tan\theta = \frac{-25}{7} + \frac{-24}{7} = -7$

Q18. $\cot x - \tan x =$

(a) Cot 2x
(b) $2\cot^2 x$
(c) 2 cot 2x
(d) $\cot^2 2x$

Sol. (c)

$\cot x - \tan x \frac{\cos^2 x - \sin^2 x}{\sin x \cos x} = 2\cot 2x$

Q19. $\tan 9° \times \tan 27° \times \tan 63° \times \tan 81° =$

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

Sol. (d)

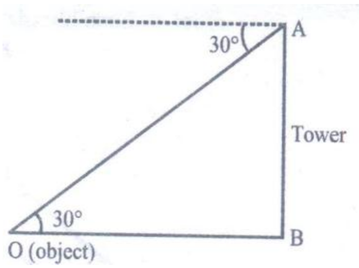
Q20. If the angle of depression of an object from a 75m higher tower is 30° , then the distance of the object from the tower is

(a) $25\sqrt{3}$ m

(b) $50\sqrt{3}$ m
(c) $75\sqrt{3}$m
(d) 150 m

Sol. (c)

Hint: $\tan 30° = \frac{AB}{OB}$



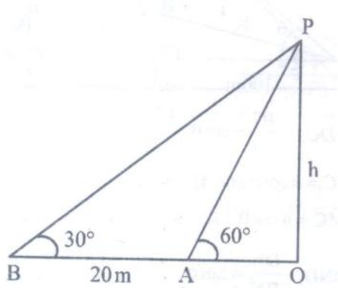
$\Rightarrow \frac{1}{\sqrt{3}} = \frac{75m}{OB}$

$\Rightarrow OB = 75\sqrt{3}$ m

Q21. The angle of elevation of the top of a tower at point on the ground is 30°. If on walking 20 metres towards the tower, the angle of elevation become 60°, then the height of the tower is

(a) 10 metre
(b) $\frac{10}{\sqrt{3}}$ meter
(c) $10\sqrt{3}$ meter
(d) None of these

Sol. (c)



$OA = h\cot 60°, OB = h\cot 30°$

$OB - OA = 20 = h(\cot 30° - \cot 60°)$

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$\Rightarrow\ h = \frac{20}{\left(\sqrt{3}-\frac{1}{\sqrt{3}}\right)} = \frac{20\sqrt{3}}{2} = 10\sqrt{3}$

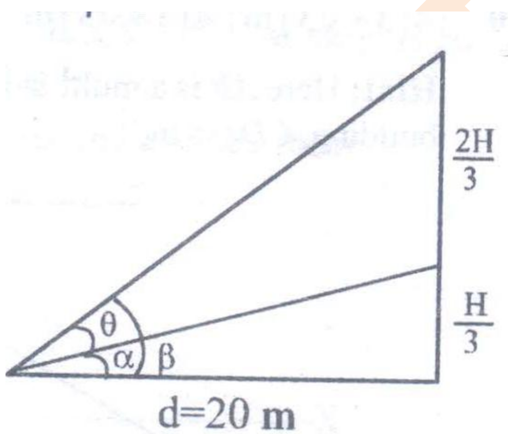
Q22. A vertical pole consists of two parts, the lower part being one third of the whole. At a point in the horizontal plane through the base of the pole and distance 20 meters from it, the upper part of the pole subtends an angle whose tangent is $\frac{1}{2}$. The Possible of the pole are

(a) 20 m and $20\sqrt{3}$
(b) 20 m and 60 m
(c) 16 m and 48 m
(d) None of these

Sol. (b)

$\frac{H}{3}\cot\alpha = d$ and $H\cot ß = d$

or $\frac{H}{3d} = \tan\alpha$ and $\frac{H}{d} = \tan ß$



$\tan(ß-\alpha) = \frac{1}{2} = \frac{\frac{H}{d}-\frac{H}{3d}}{1+\frac{H^2}{3d^2}}$

$\Rightarrow\ H^2 - 4dH + 3d^2 = 0 \Rightarrow H^2 - 80\,H + 3(400) = 0$

$\Rightarrow H = 20$ or 60 m

Q23. An aeroplane flying horizontally 1 km. above the ground is observed at an elevation of 60° and after 10 seconds the elevation is observed to be 30°. The uniform speed of the aeroplane in km/h is

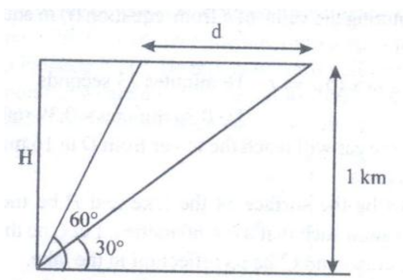
(a) 240
(b) $240\sqrt{3}$
(c) $60\sqrt{3}$
(d) None of these

Sol. (b)

$d = H\cot 30° - H\cot 60°$

Time taken = 10 second

$\text{Speed} = \frac{\cot 30° - \cot 60°}{10} \times 60 \times 60 = 240\sqrt{3}$



Q24. A 25m ladder is placed against a vertical wall of a building. The foot of the ladder is 7 m from the base of the building. If the top of the ladder slips 4m , then the foot of the ladder will slide

(a) 5 m
(b) 8 m
(c) 9 m
(d) 15 m

Sol. (b)

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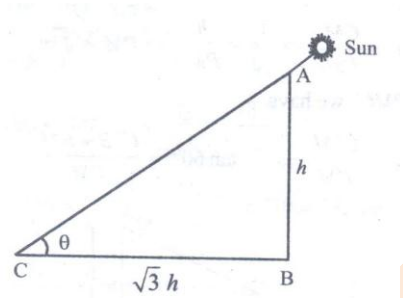
Q25. If the length of the shadow of a tower is $\sqrt{3}$ times that of its height, then the angle of elevation of the sum is

(a) 15°
(b) 30°
(c) 45°
(d) 60°

Sol. (b)

Hint: Let height of tower (AB) be h meters, then length of its shadow (BC) = $\sqrt{3}$ h meters.



Let angle of elevation be θ,

Then $\tan\theta = \frac{h}{\sqrt{3}h} = \frac{1}{\sqrt{3}}$

$\Rightarrow \quad \theta = 30°$

Q26. The angles of elevation of the top of a tower from two points at distance m and n metres aare complementary. If the two points and the base of the tower are on the same straight line, then the height of the tower is

(a) $\sqrt{mn}$
(b) Mn
(c) $\frac{m}{n}$
(d) None of these

Sol. (a)

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Q27. The Qutab Minar casts a shadow 150 m long at the same time when the Vikas Minar casts a shadow of 120 m long on the ground. If the height of the Vikas Minar is 80m, find the height of the Qutab Minar.

(a) 180 m
(b) 100 m
(c) 150 m
(d) 120 m

Sol. (a)

Q28. From the bottom of a pole of height h, the angle of elevation of the top of a tower is α. The pole subtends an angle ß at the top of a tower. The height of the tower is

(a) $\frac{h\tan\alpha}{\tan\alpha - \tan\beta}$

(b) $\frac{h\sin\alpha\cos(\alpha-\beta)}{\sin\beta}$

(c) $\frac{h\sin\alpha\sin(\alpha+\beta)}{\cos\beta}$

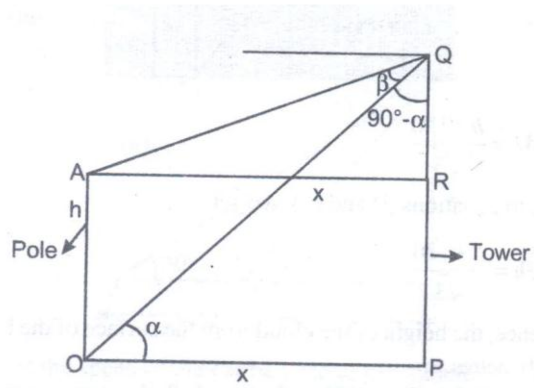
(d) $\frac{h\sin\alpha\sin(\alpha-\beta)}{\sin\beta}$

Sol. (b)

Q29. An aeroplane at a height of 600 m pass vertically above another aeroplane at an instant when their angles of elevation at the same observing point are 60° and 45° respectively. How many metres higher is the one form the other.

(a) 286. 53 m
(b) 274. 53 m
(c) 253.58 m
(d) 263. 83 m

Sol. (b)

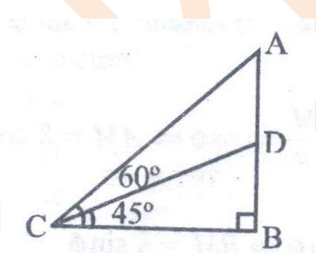


Q30. ΔPSR is a triangle right angled at S.D is the mid-point of SR. If the bisector of ∠PSR and perpendicular bisector of SR meet at O, then triangle ΔOSD is –

(a) Isosceles
(b) Equilateral
(c) Isosceles right angled
(d) Acute –angled

Sol. (c)

Let the aeroplane are at point A and D respectively. Aeroplane A is flying 600 m above the ground.



So, AB = 600.

$\angle ACB = 60°, \angle DCB = 45°$

From $\Delta ABC, \frac{AB}{BC} = \tan 45° \Rightarrow BC = \frac{600}{\sqrt{3}} = 200\sqrt{3}$

From $\Delta DCB, \frac{DB}{BC} = \tan 45° \Rightarrow DB = 200\sqrt{3}$

$\text{so, the distance } AD = AB - BD = 600 - 200\sqrt{3}$

$= 200\left(3 - \sqrt{3}\right) = 200\,(3 - 107321) = 253.58\text{ m}$