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Class: X
Subject: Math
Topic: ASK1510UT04
No. of Questions: 30
Maximum Marks: 100

Q1. C is the mid-point of PQ, if P is (4, x), C is (y-1) and Q is (–2, 4), then x and y respectively are –

(a) – 6 and 1
(b) – 6 and 2
(c) 6 and – 1
(d) 6 and –2

Sol. (a)

Since C (y –1) is the mid-point of P (4, x) and Q (–2, 4).

We have, $\frac{4-2}{2} = y \; and \; \frac{4+x}{2} = -1$

$\therefore$ y = 1 and x = – 6

Q2. Ratio in which the line $3x + 4y = 7$ divides the line segment joining the points (1, 2) and (–2, 1) is

(a) 3 : 5
(b) 4 : 6
(c) 4 : 9
(d) 4 : 6

Sol. (c)

$\frac{3(1)+4(2)-7}{3(-2)+4(1)-7} = -\frac{4}{9} = \frac{4}{9}$

Q3. The point on the X-axis which is equidistant from the points A (–2, 3) and (5, 4) is

(a) (0, 2)
(b) (2, 0)
(c) (3, 0)
(d) (– 2, 0)

Sol. (b)

Hint Let $P(x, 0)$ be a point on X-axis such that AP = BP

$\Rightarrow AP^2 = BP^2$

$\Rightarrow (x+2)^2 + (0-3)^2 = (x-5)^2 + 0(0+4)^2$

$\Rightarrow x^2 + 4x + 4 + 9 \Rightarrow x^2 - 10x + 25 + 16$

$\Rightarrow 14x = 28 \Rightarrow x = 2$

Q4. The point which divides the line joining the points A (1, 2) and B (–1, 1) internally in the ratio 1 : 2 is

(a) $\left(\frac{-1}{3}, \frac{5}{3}\right)$
(b) $\left(\frac{1}{3}, \frac{5}{3}\right)$
(c) $(-1, 5)$
(d) $(1, 5)$

Sol. (b)

Q5. The angle made by the line $\sqrt{3}x - y + 3 = 0$ with the positive direction of X-axis is

(a) 30°
(b) 45°
(c) 60°
(d) 90°

Sol. (c)

Q6. Equation of a straight line out of the following:

(a) $y = 2x^2$
(b) $x^2 + y^2 = a^2$
(c) $\frac{x}{a} + \frac{y}{b} = 1$
(d) $\frac{x^2}{a^2} + \frac{y^2}{b^2} = 1$

Sol. (c)

Q7. The sum of the areas of two circles, which touch each other externally, is 153 π. If the sum of their radii is 15, than the ratio of the larger to the smaller radius is

(a) 4 : 1
(b) 2 : 1
(c) 3 : 1
(d) None of these

Sol. (a)

Let the radii of the 2 circles be r_1 and r_2, then

$r_1 + r_2 = 15$ (given) ......(1)

And $\pi r_1^2 + \pi r_2^2 = 153\pi$ (given) ....(2)

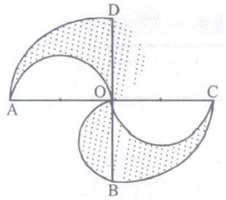
$\Longrightarrow \pi_1^2 + \pi_2^2 = 153$ $\therefore r_1^2 + (15 - r_1^2) = 153$

On solving, we get

$r_1 = 12, r_2 = 3$

Required ration $= 12 : 3 = 4 : 1$

Q8. In the given figure below, the boundary of the shaded region comprises of four semicircles and two quarter circles. If OA = OB = OC = OD = 7 cm and the straight lines AC and BD are perpendicular to each other, then the length of the boundary is



(a) 68 cm
(b) 49 cm
(c) 66 cm
(d) 44 cm

Sol. (c)

Boundary of shaded region = Circumference of four semicircles (two circles, r = 7/2) + Circumference of two quarter circles (one semi-circles, r = 7)

$$\Longrightarrow (2 \times 2\pi r) + \pi \times 2r = (4 \times 22/7 \times 7/2) + (22/7 \times 7)$$

$$= 44 + 22 = 66\ cm.$$

Q9. A race track is in the form of a ring whose inner and outer circumference are 437 m and 503m respectively. The area of the track is

(a) 66 sq. cm
(b) 4935 sq. cm
(c) 9870 sq. cm
(d) None of these

Sol. (b)

$$2\pi r_1 = 503\ and\ 2\pi r_2 = 437$$

$$\therefore\ r_1 \frac{503}{2\pi}\ and\ r_2 = \frac{437}{2\pi}$$

$$\text{Area of ring} = \pi(r_1 + r_2)(r_1 - r_2)$$

$$p = \left(\frac{503+437}{2p}\right)\left(\frac{503-437}{2p}\right)$$

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$= \frac{940}{2}\left(\frac{66}{2\pi}\right) = 235 \times \frac{66}{2} \times 7 = 235 \times 21 = 4935\ sq.cm.$

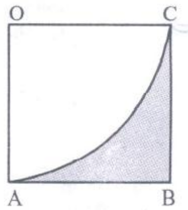
Q10. Given XY has been divided into 5 congruent segments and semicircles have been drawn. But suppose XY divided into millions of congruent segments and semicircles were drawn, what would the sum of the lengths of the arcs be?

(a) 2YX
(b) 5XY
(c) XY
(d) None of these

Sol. (c)

Should be XY since you divided XY into millions of congruent portions, each portion which is the diameter of the semicircle is very small. So the sum of the all the arcs should be XY.

Q11. In the adjoining figure, OABC is a square of side 7 cm. OA is a quadrant of a circle with O as centre. The area of the shaded region is



(a) $10.5\ cm^2$
(b) $38.5\ cm^2$
(c) $49\ cm^2$
(d) $11.5\ cm^2$

Sol. (a)

Required area $= \left(7^2 - \frac{1}{4} \times \frac{22}{7} \times 7^2\right)\ cm^2$

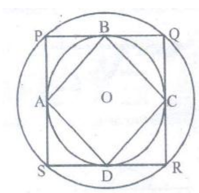
$= (49 - 38.5)\ cm^2$

Q12. The area of a sector of angle P (in degrees) of a circle with radius R is

(a) $\frac{p}{360} \times 2\pi R$
(b) $\frac{p}{180} \times \pi R^2$
(c) $\frac{p}{720} \times 2\pi R$
(d) $\frac{p}{720} \times 2\pi R^2$

Sol. (d)

Q13. The figure below shows two concentric circles with centre O. PQRS is a square inscribed in the outer circle. It also circumscribes the inner circle, touching it at point B, C, D and A. The ratio of the perimeter of the outer circle to that of polygon ABCD is



(a) $\frac{\pi}{4}$
(b) $\frac{3\pi}{2}$
(c) $\frac{\pi}{2}$
(d) π

Sol. (c)

Joining B to O and C to O

Let the radius of the outer circle be r

$\therefore$ perimeter $= 2\pi r$

But $OQ = BC = r$ [diagonals of the square BQCO]

$\therefore$ Perimeter of ABCD $= 4r$.

Hence, ratio $= \frac{2\pi r}{4r} = \frac{\pi}{2}$

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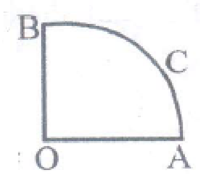
Q14. In the adjoining figure, OACB is a quadrant of a circle of radius 7 cm. The perimeter of the quadrant is



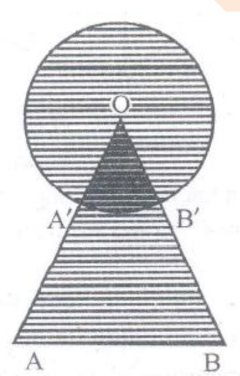
(a) 11 m
(b) 18 m
(c) 25 m
(d) 36 m

Sol. (c)

Perimeter $= \frac{1}{4} \times 2\pi r + 2r = \left(\frac{1}{2} \times \frac{22}{7} \times 7 + 2 \times 7\right)\ cm$

$= 25\ m$

Directions: Study the given paragraph (s) and answer the following questions.



In the above given figure, a circular arc of radius 6 cm has been drawn with vertex O of an equilateral triangle OAB of side 12 cm as centre.

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Q15. The area of the sector A'OB' is

(a) $6\pi\, cm^2$
(b) $\pi\, cm^2$
(c) $6\, cm^2$
(d) $(6+\pi) cm^2$

Sol. (a) $\angle AOB = 60°$

Area of the sector A' OB' $= \frac{60}{360}\pi(6)^2 = 6\pi\, cm^2$

Q16. The area of the shaded region is

(a) $156.522\, cm^2$
(b) $156.552\, cm^2$
(c) $165.552\, cm^2$
(d) $561.552\, cm^2$

Sol. (b)

Area of shaded region

= area of circle + area of ΔOAB – area of sector A' OB'

$= \pi\,(6)^2 + \frac{\sqrt{3}}{4}(12)^2 - 6\pi = 36\pi + \frac{\sqrt{3}}{4}(144) - 6\pi$

$= 94.2 + 62.352 = 156.552\, cm^2$

Q17. The diameter of hollow cone is equal to the diameter of a spherical ball. If the ball is placed at the based of the cone, what portion of the ball will be outside the cone?

(a) 50%
(b) Less than 50%
(c) More than 50%
(d) 100%

Sol. (c)

Thought it is given that diameter of the cone is equal to the diameter of the spherical ball. But the ball will not fit into the cone because of its slant shape. Hence more that 50% of the portion of the ball will be outside the cone.

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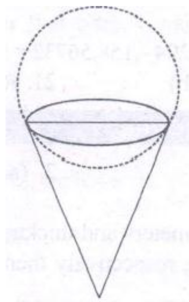


Q18. A slab of ice 8 inches I length, 11 inches in breadth, and 2 inches thick was melted and rresolidified in the form of a rod of 8 inches diameter. The length of such a rod, in inches, is nearest to

(a) 3
(b) 3.5
(c) 4
(d) 4.5

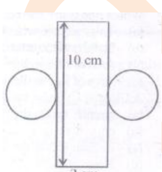
Sol. (b)

Volume of the given ice cuboid $= 8 \times 11 \times 2 = 176$

Let the length of the required rod is ℓ.

$\therefore \pi \ell \frac{8^2}{4} = 176 \qquad \therefore \ell = 3.5$ inches

Q19. The diagram shows the pats of a right cylinder. The volume of the cylinder, in cm^3 is



(a) $\frac{20}{\pi}$
(b) $\frac{50}{\pi}$
(c) $\frac{25}{\pi}$
(d) 40π

Sol. (b)

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Q20. If the perimeter of one face of a cube is 20 cm, then its surface area is

(a) $120cm^2$
(b) $150\ cm^2$
(c) $125\ cm^2$
(d) $400\ cm^2$

Sol. (b)

Hint. Edgd of cube $= \frac{20}{4} cm = 5\ cm,$

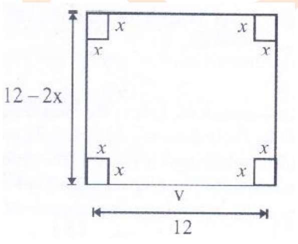
Surface area $= 6 \times 5^2\ cm^2 = 150\ cm^2$

Q21. A cube of side 12 cm. is painted red on all the faces and then cut into smaller cubes, each of side 3 cm. What is the total number of smaller cubes having none of their face painted?

(a) 16
(b) 8
(c) 12
(d) 24

Sol. (b)

Q22. A square tin sheet of side 12 inches is converted into a box with open top in the following steps – The sheet is placed horizontally. Then, equal sized squares, each of side x inches, are cut from the four corners of the sheet. Finally, the fur resulting sides are bent vertically upwards in the shape of a box. If x is an integer, then what value of x maximizes the volume of the box?



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

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Sol. (d)

$\therefore$ volume of the box will be $v = (12 - 2x)^2 . x$

For V to be maximum $\frac{dV}{dx} = 0$

This will give $x = 2, 6$. X cannot be 6.

Q23. If h be the height and α the semi-vertical angle of a right circular cone, then its volume is given by –

(a) $\frac{1}{3}\pi h^3 \tan^2 \alpha$
(b) $\frac{1}{3}\pi h^2 \tan^2 \alpha$
(c) $\frac{1}{3}\pi h^2 \tan^3 \alpha$
(d) $\frac{1}{3}\pi h^3 \tan^3 \alpha$

Sol. (a)

Q24. If the radius of the sphere is increased by 100%, the volume of the corresponding sphere is increased by –

(a) 200%
(b) 500%
(c) 700%
(d) 800%

Sol. (c)

When the radius is increased by 100%, the corresponding volume becomes 800% and thus increases is 700%

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Q25. If length, breadth and height of a cuboid is increased by $x\%$, y% and z% respectively then its volume is increased by –

(a) $\left[x+y+z+\frac{xy+xz+yz}{100}+\frac{xyz}{(100)^2}\right]\%$

(b) $\left[x+y+z+\frac{xy+xz+yz}{100}\right]\%$

(c) $\left[x+y+z+\frac{xyz}{(100)^2}\right]\%$

(d) None of these

Sol. (a)

% change in volume

$$=\frac{100^2(x+y+z)+100(xy+xz+yz)+xyz}{100^3}\times 100$$

$$=\left[x+y+z+\frac{xy+xz+yz}{100}+\frac{xyz}{(100)^2}\right]\%$$

Q26. A sphere is melted and half of the molten liquid is used to form 11 identical cubes, whereas the remaining half is used to form 7 identical smaller spheres. The ratio of the side of the cube to the radius of the new small sphere is –

(a) $\left(\frac{4}{3}\right)^{1/3}$

(b) $\left(\frac{8}{3}\right)^{1/3}$

(c) $(3)^{1/3}$

(d) 2

Sol. (b)

As per the given conditions,

$11a^3=7\times\frac{4}{3}\times\pi\times r^3$ $\quad\therefore \frac{a}{r}=\left(\frac{8}{3}\right)^{1/3}$

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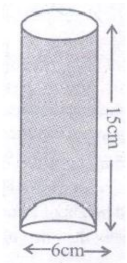
Q27. In the adjoining figure, the bottom of the glass has a hemispherical raised portion. If the glass is filled with orange juice, the quantity of juice which a person will get is



(a) $135\,\pi\; cm^3$
(b) $117\,\pi\; cm^3$
(c) $99\,\pi\; cm^3$
(d) $36\,\pi\; cm^3$

Sol. (b)

Hint. Quantity of juice $= \left(\pi \times 3^2 \times 15 - \frac{2}{3}\pi \times 3^3\right)\; cm^3$

Q28. The base of a right prism is an equilateral triangle of edge 12 m. If the volume of the prism is 288 $\sqrt{3}\; m^3$, then its height is

(a) 6 m
(b) 8 m
(c) 10 m
(d) 12 m

Sol. (b)

Q29. The bases of a right prism is a square of perimeter 20 cm and its height is 30 cm. The volume of the prism is

(a) $700\; cm^3$
(b) $750\; cm^3$
(c) $800\; cm^3$
(d) $850\; cm^3$

Sol. (b)

Q30. The base of a right pyramid is an equilateral triangle of perimeter 8 dm and the height of the pyramid $30\sqrt{3}\ cm$. The volume of the pyramid is

(a) $16000\ cm^3$
(b) $1600\ cm^3$
(c) $\frac{16000}{3} cm^3$
(d) $\frac{5}{4}\ cm^3$

Sol. (c)