THIRD TERM EXAMINATION

MATHEMATICS

(Class X)

(Application of trigonometry, Circles, Areas related to Circle, Surface Area and Volume, Probability)

Solution

1)

(c) $5cm$

2)

(a) $10.5cm$

3)

(b) 14

4)

(d) $1:2:3$

5)

(c) $90°$

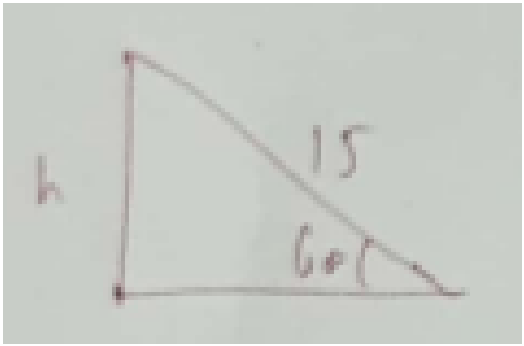
6)

$Sin60 = \frac{h}{15}$

$\frac{\sqrt{3}}{2} = \frac{h}{15}$

$\frac{15\sqrt{3}}{2} = h$

$h = 7.5\sqrt{3}m$



7)

$115°$

8)

$\frac{13}{49}$

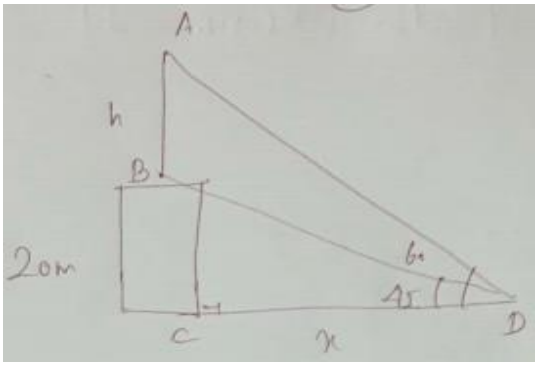
9)

$l = \sqrt{12^2 + 4^2 + 3^2} = \sqrt{144 + 16 + 25} = \sqrt{169} = 13$

10)

P (ejecting tail (on heal) $= \frac{2}{8} = \frac{1}{4}$

11)



$tan45 = \frac{20}{r}$

$x = 20m$

$tan60 = \frac{h + 20}{x}$

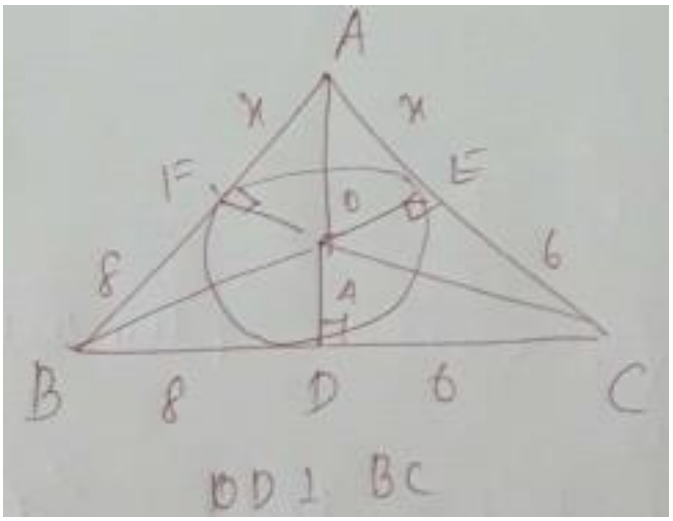
$\sqrt{3} = \frac{h + 20}{20}$

$20\sqrt{3} = h + 20$

$h = 20\sqrt{3} - 20$

$h = 20(\sqrt{3} - 1)$

12)



$OD \perp BC$

$OE \perp AC$

$OF \perp AB$ [$by\ then\ 10.1\ radius\ through\ the\ point\ of\ contact\ is\ \perp^r$]

Join OB, OC, OA

$BD = BF = 8cm$

$CD = CE = 6cm$

$AF = AE = xcm$

$a_r(ABC) = a_r(BOC) + a_r(AOC) + a_r(AOB)$

$84 = \frac{1}{2} \times 14 \times 4 + \frac{1}{2} \times (x+6) \times 4 + \frac{1}{2}(x+8) \times 4$

$84 = 28 + 2(x+6) + 2(x+8)$

$= 28 + 2x + 12 + 2x + 16$

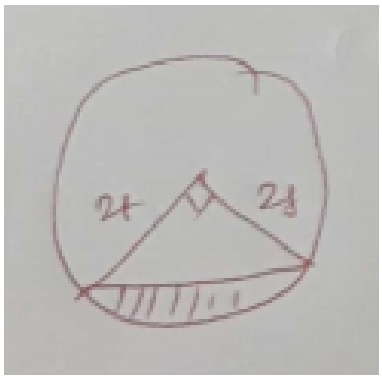
$84 = 56 + 4x$

$21 = 14 + x$

$x = 7$

$AC = 13cm \quad AB = 14cm$

13)



Area of minor segment

$= \frac{90}{360} \times \frac{22}{7} \times 28 \times 28 - \frac{1}{2} \times 28 \times 28$

$= 616 - 392$

$= 224cm^2$

Area of major sector $= \frac{270}{360} \times \frac{22}{7} \times 28 \times 28$

$= 3 \times 22 \times 28$

$= 1848cm^2$

14)

(i) P (Prime no)

2, 3, 5, 7, 11, 13, 17

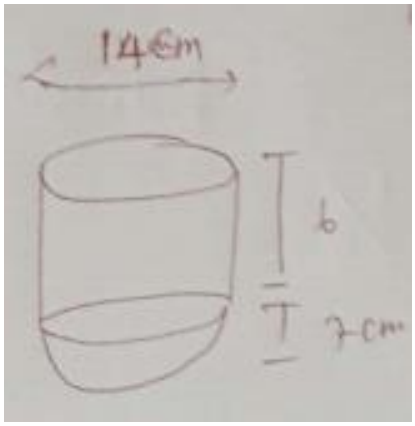
P (Prime no) $= \frac{7}{17}$

(ii) P (Divisible by 3)

3, 6, 9, 12, 15

P (Divisible by 3) $= \frac{5}{17}$

15)



Inner CSA = CSA of height of sphere + CSA of cylinder

$= 2\pi r^2 + 2\pi rh$

$= 2\pi r(h + r)$

$= 2 \times \frac{22}{7} \times 7 \times [7 + 6]$

$= 44 \times 13$

$= 572cm^2$

16)

Total outcomes

(1, 1) (1, 2) …… (6, 6)

$\therefore Total\ no.of\ outcomes = 36$

(i) Same no. on both dice

(1, 1) (2, 2) (3, 3) (4, 4) (5, 5) (6, 6)

$= \frac{6}{36} = \frac{1}{6}$

(ii) Different no. on both dice

$= 1 - \frac{1}{6}$

$= \frac{5}{6}$

17)

AQ = AR

BQ = BP (tangents from external points)

CR = CP

$P.of\ \Delta ABC = AB + BC + AC$

$= AB + BP + CP + AC$

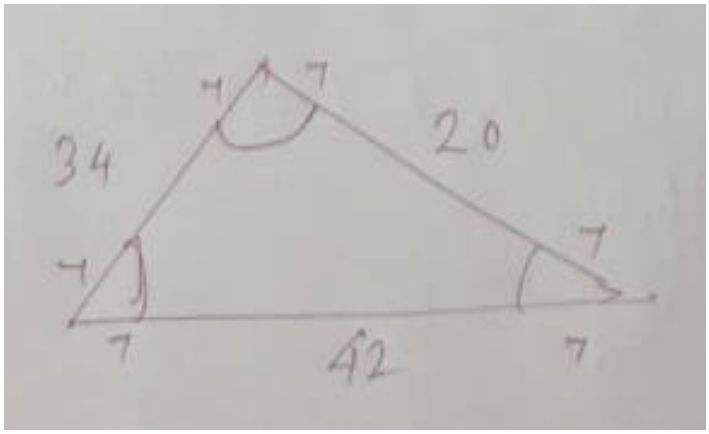
$= AB + BQ + CR + AC$

$= AQ + AR$

$P.of\ \Delta ABC = 2AQ$

$AQ = \frac{1}{2}(P.of\ \Delta ABC)$

18)



Area of the horse grazed $= \frac{Q_1}{360} \times \pi r^2 + \frac{Q_2}{360} \times \pi r^2 + \frac{Q_3}{360} \times \pi r^2$

$= \frac{180}{360} \times \frac{22}{7} \times 7 \times 7$

$= 77m^2$

Area ungrazed $=$ Area of $\Delta^{le} -$ Area base grazed

$A = \sqrt{S(s-a)(s-b)(s-c)}$

$S = \frac{a+b+c}{2}$

$A = \sqrt{48 \times 28 \times 14 \times 6}$

$= \sqrt{112896}$

$= 336m^2$

Area of remaining field $= 336 - 77 = 259m^2$

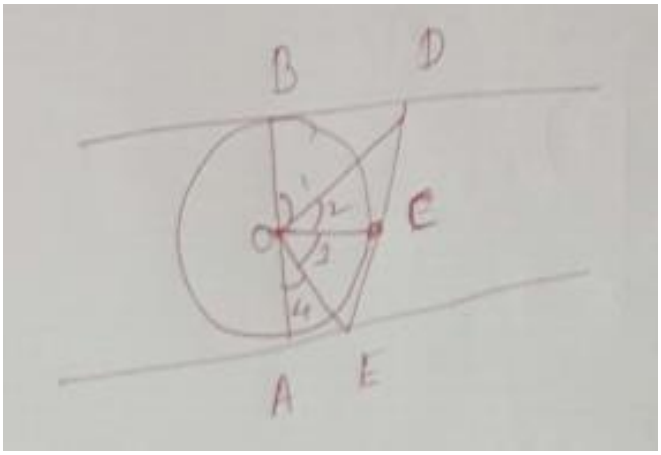
19)

$No.of\ cones = \frac{V.\ of\ Vessel}{V.\ of\ one\ ice\ cream}$

$= \frac{\pi \times 6 \times 6 \times 15}{\left(\frac{1}{3} \times \pi \times 3 \times 3 \times 12\right) + \left(\frac{2}{3} \times \pi \times 3 \times 3 \times 3\right)}$

$= \frac{\pi \times 6 \times 6 \times 15}{36\pi + 18\pi} = \frac{\pi \times 6 \times 6 \times 15}{54\pi} = 10\ Cones$

20)



Join OC

$\Delta DOC \cong \Delta DOB \qquad (by\ SSS \cong)$

by CPCT

$\angle 1 = \angle 2$

$\Delta COE \cong \Delta AOE \qquad (by\ SSS \cong)$

by CPCT

$\angle 3 = \angle 4$

$\angle 1 + \angle 2 + \angle 3 + \angle 4 = 180$

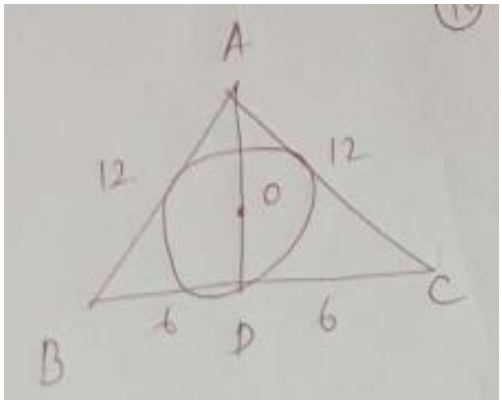
$2\angle 2 + 2\angle 3 = 180$

$\angle 2 + \angle 3 = 90°$

$\angle DOE = 90°$

Hence Proved

21)



$AD = \sqrt{12^2 - 6^2}$

$= \sqrt{144 - 36}$

$= \sqrt{108}$

$= 6\sqrt{3}cm$

$OA = OD = 2:1$

$2x + x = AD$

$3x = 6\sqrt{3}$

$x = 2\sqrt{3}$

$OD = radius = x = 2\sqrt{3}$

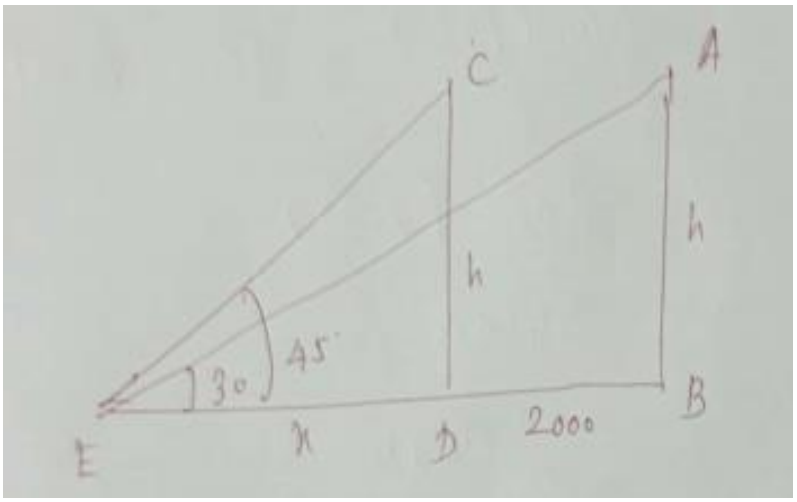
Area of shaded part $= \frac{\sqrt{3}}{4} \times 12 \times 12 - \pi\left(2\sqrt{3}\right)^2$

$1.73 \times 3 \times 12 - 3.14 \times 4 \times 3$

$= 62.28 - 37.68$

$= 24.6cm^2$

22)



$\text{Speed} = 360\text{kmph}$

$= 360 \times \frac{5}{18} mpQS$

$= 100mpsa$

$DB = CA = Distance = Speed \times T$

$= 100 \times 20$

$= 2000m$

$tan30 = \frac{h}{x + 2000}$

$\sqrt{3}h = x + 2000$

$\sqrt{3}h - 2000 = x \qquad (1)$

$tan45 = \frac{h}{x}$

$h = x$

$h = \sqrt{3}h - 2000$

$2000 = \sqrt{3}h - h$

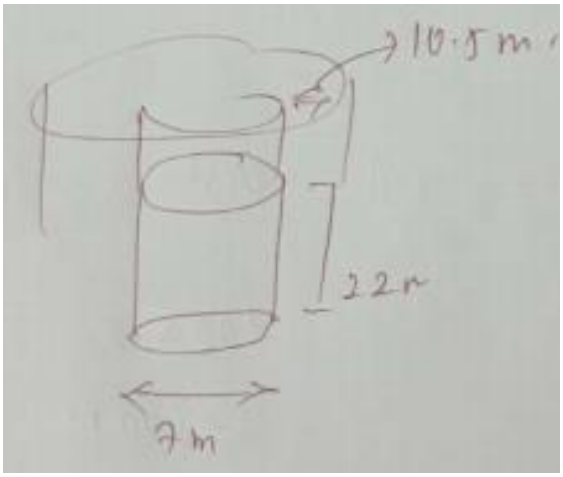
$h = \frac{2000}{\sqrt{3} - 1} \times \frac{\sqrt{3} + 1}{\sqrt{3} + 1}$

$= \frac{2000(\sqrt{3} + 1)}{2} = 1000(\sqrt{3} + 1)$

$= 2000(2.73)$

$= 5460m$

23)



V. of well = V. of embarkment

$\pi r^2 h = \pi(R^2 - r^2) \times H$

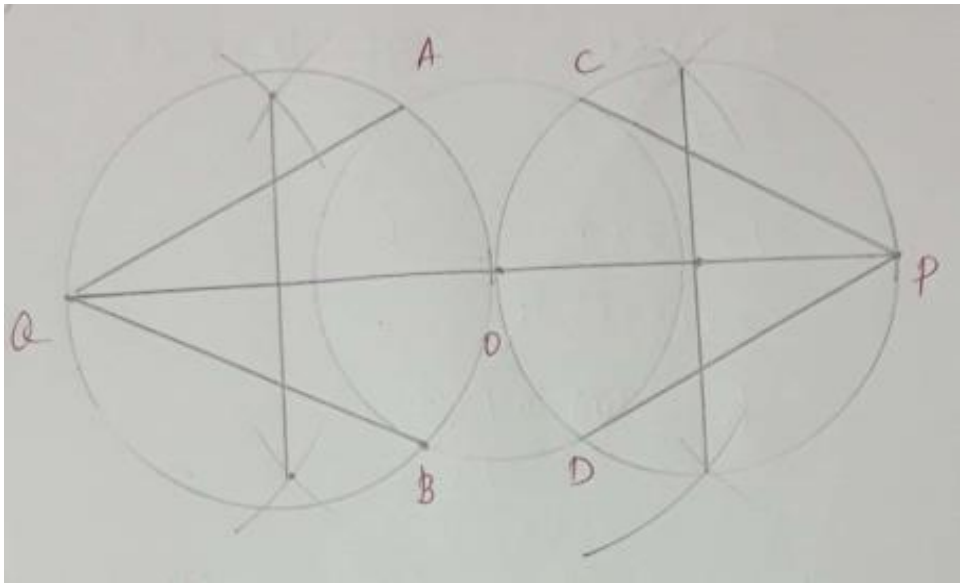
$= \frac{7}{2} \times \frac{7}{2} \times 22 = (14 + 3.5)(14 - 3.5) \times h$

$= \frac{7 \times 7 \times 11}{2 \times 17.5 \times 10.5} = h$

$= \frac{11}{7.5} = h$

$h = 1.46m$

24)



AQ = QB

CP = DP