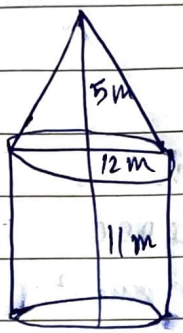
Ch-14
Exercise 14.2

Q.1



r of cylinder = R of cone = $\frac{24}{2}$ 12 = 12 m

h of cylinder = 11 m

Total height = 16 m

H of cone = 16 − 11 = 5m

L of cone = $\sqrt{H^2 + R^2}$ = $\sqrt{5^2 + 12^2}$

= $\sqrt{25 + 144}$ = $\sqrt{169}$

= 13 m

Area of canvas = CSA of cone + CSA of cylinder

= $\pi RL + 2\pi rh$

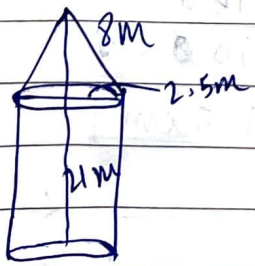
= $\left(\frac{22}{7} \times 12 \times 13\right) + \left(2 \times \frac{22}{7} \times 12 \times 11\right)$

= $\frac{22}{7} \times 12 \left[13 + (2 \times 11)\right]$

= $\frac{22}{7} \times 12 (13 + 22)$ = $\frac{22}{7} \times 12 \times 35$

= 1320 m^2

Q.2



R of cylinder = R of cone = 2.5 m = $\frac{5}{2}$ m

r of cylinder = 21 m

L of cone = 8 m

H of cone = $\sqrt{L^2 - R^2} = \sqrt{8^2 - \left(\frac{5}{2}\right)^2}$

$= \sqrt{64 - \frac{25}{4}} = \sqrt{\frac{256 - 25}{4}} = \sqrt{\frac{231}{4}}$

$= 7.59$ m

TSA of rocket = CSA of cone + CSA of cylinder + Area of base of cylinder

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

$= \pi (RL + 2rh + r^2)$

$= \frac{22}{7}\left[\left(\frac{5}{2} \times 8\right) + \left(2 \times \frac{5}{2} \times 21\right) + \left(\frac{5}{2} \times \frac{5}{2}\right)\right]$

$= \frac{22}{7} \times \frac{5}{2}\left[8 + (2 \times 21) + \frac{5}{2}\right]$

$= \frac{55}{7}\left(8 + 42 + \frac{5}{2}\right) = \frac{55}{7}\left(\frac{16 + 84 + 5}{2}\right)$

$= \frac{55}{7} \times \frac{105}{2} = 412.5 \text{ m}^2$

Vol. of rocket = Vol. of cone + Vol. of cylinder

$= \frac{1}{3}\pi R^2 H + \pi r^2 h$

$= \frac{22}{7} \times \frac{5}{2} \times \frac{5}{2}\left[\left(\frac{1}{3} \times 7.59\right) + 21\right]$

$= \frac{11 \times 5 \times 5}{7 \times 2}\left[\frac{7.59}{3} + 21\right]$

$$= \frac{11 \times 5 \times 5}{7 \times 2} \left[2.53 + 21 \right]$$

$$= \frac{11 \times 5 \times 5 \times 23.53}{7 \times 2}$$

$$= \frac{6470.75}{14} = \boxed{462.19 \text{ cm}^3}$$

Q.3 r of cylinder = R of cone = $\frac{36}{2}$ 18 = 18m = 180 dm

Total height of tent = 77 dm

h of cylinder = 44 dm

H of cone = 77 − 44 = 33 dm

L of cone = $\sqrt{R^2 + H^2} = \sqrt{180^2 + 33^2}$

$= \sqrt{32400 + 1089} = \sqrt{33489}$

= 183 dm

Canvas required = CSA of cone + CSA of cylinder

$= \pi R L + 2\pi r h$

$= \frac{22}{7} \times 180 \left[183 + (2 \times 44) \right]$

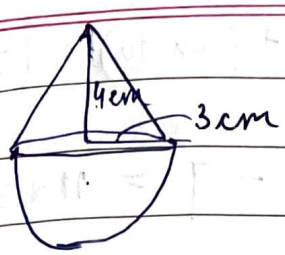
$= \frac{22}{7} \times 180 \left[183 + 88 \right] = \frac{22}{7} \times 180 \times 271$

$= \frac{1073160}{7} \text{ dm}^2 = \frac{10731.60}{7} \text{ m}^2$

Cost of canvas @ ₹3.50/m² = $\frac{10731.60}{7} \times 0.50$

$= \boxed{₹ 5365.80}$

Q.4



r of cone = R of hemisphere

$= \frac{6}{2} 3 = 3\text{ cm}$

h of cone = 4 cm

l of cone $= \sqrt{r^2 + h^2} = \sqrt{3^2 + 4^2}$

$= \sqrt{9 + 16} = \sqrt{25} = 5\text{ cm}$

SA of toy = CSA of cone + CSA of hemisphere

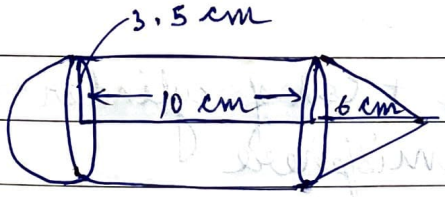
$= \pi rl + 2\pi R^2$

$= 3.14 \times 3 [5 + (2 \times 3)]$

$= 3.14 \times 3 \times [5 + 6] = 3.14 \times 3 \times 11$

$= \boxed{103.62\text{ cm}^2}$

Q.5



r of common base = 3.5 cm

r of cone = 6 cm

H of cylinder = 10 cm

l of cone $= \sqrt{r^2 + r^2} = \sqrt{6^2 + 3.5^2}$

$= \sqrt{36 + 12.25} = \sqrt{48.25}$

$= 6.94\text{ cm}$

TSA of solid = CSA of cone + CSA of cylinder + CSA of hemisphere

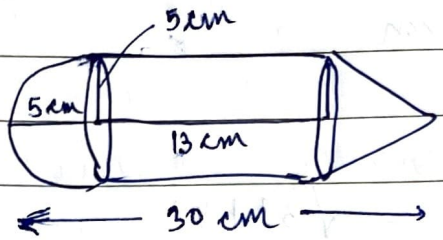
$= \pi rl + 2\pi rH + 2\pi r^2$

$$\therefore = \frac{22}{7} \times 3.5 \left[6.94 + (2 \times 10) + (2 \times 3.5)\right]$$

$$= 11 \left[6.94 + 20 + 7\right] = 11 \times 33.94$$

$$= \boxed{373.34 \text{ cm}^2}$$

Q.6



r of common base = 5 cm

H of cylinder = 13 cm

Total height = 30 cm

h of cone = Total height − [H of cylinder + r of common base]

$= 30 - (13 + 5) = 30 - 18 = 12$ cm

l of cone $= \sqrt{h^2 + r^2} = \sqrt{12^2 + 5^2}$

$= \sqrt{144 + 25} = \sqrt{169} = 13$ cm

SA of toy = CSA of cone + CSA of cylinder + CSA of hemisphere

$= \pi r l + 2\pi r H + 2\pi r^2$

$= \frac{22}{7} \times 5 \left[13 + (2 \times 13) + (2 \times 5)\right]$

$= \frac{22}{7} \times 5 \left[13 + 26 + 10\right] = \frac{22}{7} \times 5 \times 49$

$= \boxed{770 \text{ cm}^2}$

Q.7

h of cylinder = 9.8 cm

r of cylinder = 5 cm

R of hemisphere & cone = 3.5 cm

H of cone = 5 cm

Vol. of water left in cylinder = Vol. of cylinder - [Vol. of cone + Vol. of hemisphere]

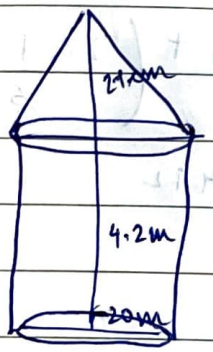
$= \pi r^2 h - \left[\frac{1}{3}\pi R^2 H + \frac{2}{3}\pi r^3\right]$

$= \frac{22}{7} \times 5 \times 5 \times 9.8 - \left[\left(\frac{1}{3} \times \frac{22}{7} \times 3.5 \times 3.5 \times 5\right) - \left(\frac{2}{3} \times \frac{22}{7} \times 3.5 \times 3.5 \times 3.5\right)\right]$

$= (22 \times 5 \times 5 \times 1.4) - [64.16 + 89.83]$

$= 770 - 153.99 = \boxed{616\ cm^3}$ ✓

Q.8



r of common base = 20 m

h of cone = 2.1 cm

H of cylinder = 4.2 cm

Vol. of tent = Vol. of cone + Vol. of cylinder

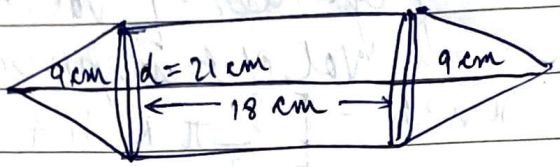
$= \frac{1}{3}\pi r^2 h + \pi r^2 H$

$= \frac{22}{7} \times 20 \times 20 \left[\left(\frac{1}{3} \times 2.1\right) + 4.2\right]$

$= \frac{22}{7} \times 20 \times 20 \times 4.9 \quad 0.7$

$= \boxed{6160\ m^3}$ ✓

Q.9



r of common base = $\frac{21}{2}$ cm

r of cone = 9 cm

H of cylinder = 18 cm

Vol. of tank = Vol. of cylinder + 2(Vol. of cone)

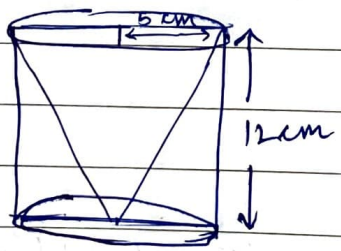
$= \pi r^2 H + 2\left(\frac{1}{3}\pi r^2 h\right)$

$= \frac{22}{7} \times \frac{21}{2} \times \frac{21}{2} \left[18 + \left(2 \times \frac{1}{3} \times 9\right)\right]$

$= \frac{22^{11}}{7} \times \frac{21^{3}}{2} \times \frac{21}{2} \times 24^{12}$

$= \boxed{8316 \text{ cm}^3}$ ✓

Q.10



r of common base = 5 cm

h of cylinder = H of cone

= 12 cm

l of cone = $\sqrt{r^2 + H^2} = \sqrt{5^2 + 12^2}$

$= \sqrt{25 + 144} = \sqrt{169}$

= 13 cm

SA of remaining cylinder = CSA of cone + CSA of cylinder + Area of base

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

$= \frac{22}{7} \times 5 \left[13 + (2 \times 12) + 5 \right]$

$= \frac{22}{7} \times 5 \times 46$

$= \boxed{660 \text{ cm}^2}$ ✓

Vol. of remaining cylinder = Vol. of cylinder − Vol. of cone

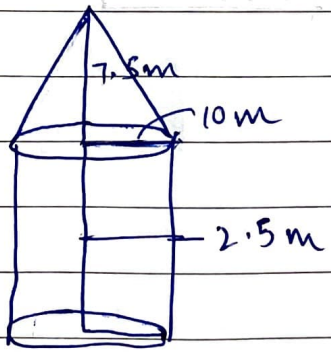
$= \pi r^2 h - \frac{1}{3} \pi r^2 H$

$= \frac{22}{7} \times 5 \times 5 \times 12 \left[1 - \frac{1}{3} \right]$

$= \frac{22}{7} \times 5 \times 5 \times 12 \times \frac{2}{3}$

$= \frac{4400}{7} = \boxed{628.57 \text{ cm}^3}$ ✓

Q-11



r of cylinder = R of cone

= 10 m

h of cylinder = 2.5m

H of cone = 7.5 m

L of cone $= \sqrt{H^2 + R^2} = \sqrt{7.5^2 + 10^2} = \sqrt{56.25 + 100}$

$= \sqrt{156.25} = 12.5 \text{ m}$

Capacity of tent = Vol. of cone + Vol. of cylinder

$$= \frac{1}{3}\pi r^2 H + \pi r^2 h$$

$$= \frac{22}{7} \times 10 \times 10 \left[\left(\frac{1}{3} \times 7.5\right) + 2.5\right]$$

$$= \frac{22}{7} \times 10 \times 10 \times 5$$

$$= \frac{11000}{7} = \boxed{1571.42 \text{ m}^3}$$

Canvas required = CSA of cone + CSA of cylinder

$$= \pi r l + 2\pi r h$$

$$= \frac{22}{7} \times 10 \left[12.5 + (2 \times 2.5)\right]$$

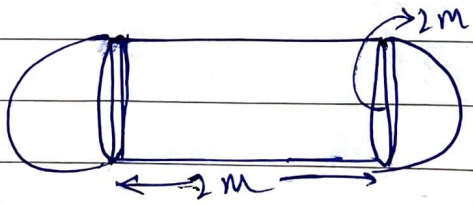
$$= \frac{22}{7} \times 10 \times 17.5 \; 2.5$$

$$= 550 \text{ m}^2$$

Cost of canvas @ ₹100/m² = 100 × 550

= ₹55000

Q.12



r of common base = $\frac{2}{2}$ = 1 m

h of cylinder = 2 m

Vol. of boiler = Vol. of cylinder + 2(Vol. of hemisphere)

$$= \pi r^2 h + 2\left(\frac{2}{3}\pi r^3\right)$$

$= \frac{22}{7} \times 1 \times 1 \left[2 + \left(\frac{4}{3} \times 1\right)\right]$

$= \frac{22}{7} \times \left[\frac{6+4}{3}\right] = \frac{22}{7} \times \frac{10}{3}$

$= \boxed{10.47 \text{ m}^3}$ ✓

Q.13 r of common base $= \frac{3.5}{2}$ m

h of cylinder $= \frac{14}{3}$ m

Vol. of vessel = Vol. of cylinder + Vol. of hemisphere

$= \pi r^2 h + \frac{2}{3}\pi r^3$

$= \frac{22}{7} \times \frac{3.5}{2} \times \frac{3.5}{2} \left[\frac{14}{3} + \left(\frac{2}{3} \times \frac{3.5}{2}\right)\right]$

$= \frac{11 \times 3.5}{2 \times 2} \left[\frac{14}{3} + \frac{3.5}{3}\right] = \frac{11 \times 3.5}{2 \times 2} \times \frac{17.5}{3}$

$= \frac{673.75}{12} = \boxed{56.14 \text{ m}^3}$ ✓

Internal surface area = CSA of cylinder + CSA of hemisphere

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

$= 2 \times \frac{22}{7} \times \frac{3.5}{2} \times \left[\frac{14}{3} + \frac{3.5}{3}\right]$

$= \frac{22}{7} \times \frac{3.5}{2} \times \frac{17.5}{3}$

$= \frac{192.5}{3} = \boxed{64.16 \text{ m}^2}$ ✓

Q.14 r of common base = 7 cm

whole length = 104 cm

h of cylinder = $104 - (7+7) = 104 - 14 = 90$ cm

SA of solid = CSA of cylinder + 2 (CSA of hemisphere)

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

$= 2 \times \frac{22}{7} \times 7 \left[90 + (2 \times 7)\right]$

$= 44 \times 104 = 4576 \text{ cm}^2$

$= 45.76 \text{ dm}^2$

Cost of polish @ ₹ 10/dm² = 45.76 × 10

= ₹ 457.6

Q. 15 Common height = 42 cm

Outer $r = \frac{16}{2} 8 = 8$ cm

Inner $R = \frac{14}{2} 7 = 7$ cm

Vol. of cork dust = Vol. of outer cylinder − Vol. of inner cylinder

$= \pi r^2 h - \pi R^2 h$

$= \frac{22}{7} \times 42 \times 6 \left[(8 \times 8) - (7 \times 7)\right]$

$= 22 \times 6 \left[64 - 49\right] = 22 \times 6 \times 15$

$= 1980 \text{ cm}^3$

Q. 16 Internal $r = \frac{54}{2} 27 = 27$ cm

Thickness = 9 cm

External R = 27 + 9 = 36 cm

Length of roller = 1 m = 100 cm

Vol. of iron $= \pi h (R^2 - r^2)$

$= 3.14 \times 100 \left[36^2 - 27^2\right]$

$= 314 \ (36+27)(36-27)$

$= 314 \times 63 \times 9$

$= \boxed{178038 \text{ cm}^3}$

Mass of 1 cm^3 of iron $= 7.8$ gm

Mass of roller $= 178038 \times 7.8$

$= 1388696.4$ gm

$= \boxed{1388.6964 \text{ kg}}$ ✓

Q.17 r of common base $= \frac{14}{2} = 7$ cm

Total height $= 13$ cm

h of cylinder $= 13 - 7 = 6$ cm

Inner SA of vessel = CSA of cylinder + CSA of hemisphere

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

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

$= 44 \times 13 = \boxed{572 \text{ cm}^2}$ ✓

Q.18 r of common base $= 3.5$ cm

Total height of toy $= 15.5$ cm

h of cone $= 15.5 - 3.5 = 12$ cm

l of cone $= \sqrt{h^2 + r^2} = \sqrt{12^2 + 3.5^2}$

$= \sqrt{144 + 12.25} = \sqrt{156.25}$

$= 12.5$ cm

TSA of toy = CSA of cone + CSA of hemisphere

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

$= \frac{22}{7} \times 3.5 \ [12.5 + (2 \times 3.5)]$

$= 11 \times 19.5$

$= \boxed{214.5 \text{ cm}^2}$ ✓

Q.19 Let the inner & outer radii be r & R respectively.

h of pipe $= 14$ cm

ATQ,

$2\pi h(R-r) = 44 \text{ cm}^2$

$2 \times \frac{22}{7} \times 14 (R-r) = 44$

$R - r = \frac{44 \times 7}{2 \times 22 \times 14}$

$R - r = \frac{1}{2}$ ——— (1)

Vol. $= 99 \text{ cm}^3$

$\pi h(R^2 - r^2) = 99$

$\frac{22}{7} \times 14 (R+r)(R-r) = 99$

$22 \times 2 \times \frac{1}{2} (R+r)$

$R + r = \frac{99}{2 \times 2}$

$R + r = \frac{9}{2}$ ——— (2)

Add (1) & (2),

$R - r = \frac{1}{2}$

$(+) \quad R + r = \frac{9}{2}$

$2R = \frac{10}{2}$

$\boxed{R = \frac{5}{2} \text{ cm}}$ ✓

Putting value of R in ①

$$R - r = \frac{1}{2}$$

$$\frac{5}{2} - r = \frac{1}{2}$$

$$r = \frac{5}{2} - \frac{1}{2}$$

$$r = \frac{4}{2}$$

$$\boxed{r = 2 \text{ cm}}$$ ✓

Q.20 r of cylinder $= 6$ cm
h of cylinder $= 15$ cm
R of ice cream cone $= 3$ cm
H of ice cream cone $= 12$ cm

No. of ice cream cones $=$ $\frac{\text{Vol. of cylinder}}{\text{Total vol. of ice cream cone}}$

$$= \frac{\pi r^2 h}{\frac{1}{3}\pi R^2 H + \frac{2}{3}\pi R^3}$$

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

$$= \frac{\pi \times 6 \times 6 \times 15}{\pi \times 3 \times 3 \times 6}$$

$$= \boxed{10 \text{ cones}}$$ ✓

Q.21 r of common base $= \frac{12}{2} 6 = 6$ cm

h of cylinder $= 110$ cm

H of cone = 9 cm

Vol. of iron pole = Vol. of cone + Vol. of cylinder

$$= \frac{1}{3}\pi r^2 H + \pi r^2 h$$

$$= \frac{22}{7} \times 6 \times 6 \left[\left(\frac{1}{3} \times 3\right) + 110\right]$$

$$= \frac{22}{7} \times 6 \times 6 \times 113$$

$$= \frac{89496}{7} = 12785.14 \text{ cm}^3$$

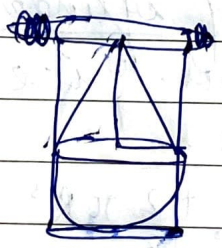
Mass of 1 cm^3 of iron = 8 gm

Mass of iron pole = 12785.14×8

$= 102281.12$ gm

$= \boxed{102.28112 \text{ kg}}$

Q.22



r of common base = $\frac{4}{2} 2 = 2$ cm

h of cone = 2 cm

H of cylinder = 2 + 2 = 4 cm

Required space = Vol. of cylinder − Vol. of toy

$$= \pi r^2 H - \left[\frac{2}{3}\pi r^3 + \frac{1}{3}\pi r^2 h\right]$$

$$= \left(\pi \times 2 \times 2 \times 4\right) - \left\{\pi \times 2 \times 2 \left[\left(\frac{2}{3} \times 2\right) + \left(\frac{1}{3} \times 2\right)\right]\right.$$

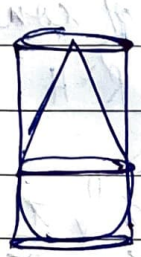
$$= 16\pi - \left[4\pi\left(\frac{4}{3} + \frac{2}{3}\right)\right]$$

$$= 16\pi - [4\pi \times 2]$$

$$= 16\pi - 8\pi = 8\pi$$

$$= \frac{8 \times 22}{7} = \frac{176}{7} = \boxed{25.14 \text{ cm}^3}$$

Q.23



r of common base = 60 cm

h of cone = 120 cm

H of cylinder = 180 cm

Water left = Vol. of cylinder − Vol. of solid

$$= \pi r^2 H - \left[\frac{2}{3}\pi r^3 + \frac{1}{3}\pi r^2 h\right]$$

$$= (\pi \times 60 \times 60 \times 180) - \left\{\pi \times 60 \times 60\left[\left(\frac{2}{3} \times \frac{20}{60}\right) + \left(\frac{1}{3} \times \frac{40}{120}\right)\right]\right\}$$

$$= (\pi \times 60 \times 60 \times 180) - \{\pi \times 60 \times 60 \times 80\}$$

$$= \pi \times 60 \times 60\,[180 - 80]$$

$$= \pi \times 60 \times 60 \times 100 = \frac{22}{7} \times 3600 \times 100$$

$$= \frac{7920000}{7} = 1131428.57 \text{ cm}^3$$

$$= \boxed{1.1314 \text{ m}^3}$$

Q. 24 r of vessel $= \frac{10}{2} = 5$ cm

h of vessel $= 10.5$ cm

R of cone $= \frac{7}{2}$ cm

H of cone $= 6$ cm

(i) Vol. of water displaced out = Vol. of cone

$= \frac{1}{3}\pi R^2 H$

$= \frac{1}{3} \times \frac{22}{7} \times \frac{7}{2} \times \frac{7}{2} \times 6$

$= \boxed{77 \text{ cm}^3}$

(ii) Vol. of water left = Vol. of vessel − Vol. of cone

$= \pi r^2 h - 77$

$= \left(\frac{22}{7} \times 5 \times 5 \times 10.5\right) - 77$

$= 825 - 77 = \boxed{748 \text{ cm}^3}$

Q. 25 Side of cube = 21 cm

= Diameter of hemisphere

r of hemisphere $= \frac{21}{2}$ cm

Vol. of remaining block = Vol. of cube − Vol. of hemisphere

$= (s)^3 - \left(\frac{2}{3}\pi r^3\right)$

$= (21 \times 21 \times 21) - \left(\frac{2}{3} \times \frac{22}{7} \times \frac{21}{2} \times \frac{21}{2} \times \frac{21}{2}\right)$

$= 9261 - 2425.5 = \boxed{6835.5 \text{ cm}^3}$

TSA of remaining block = (TSA of cube + CSA of hemisphere) − area of top of cube

$= [6(s)^2 + 2\pi r^2] - \pi r^2$

$= 6(s)^2 + 2\pi r^2 - \pi r^2 = 6(s)^2 + \pi r^2$

$= (6 \times 21 \times 21) + \left(\frac{22}{7} \times \frac{21}{2} \times \frac{21}{2} \right)$

$= 2646 + 346.5 = \boxed{2992.5 \text{ cm}^2}$

Q.26 r of common base = 21 cm

Let the height of cone be h

ATQ,

Vol. of cone = $\frac{2}{3}$ × Vol. of hemisphere

$\frac{1}{3}\pi r^2 h = \frac{2}{3} \times \frac{2}{3}\pi r^3$

$\frac{1}{3} \times 21 \times 21 \times h = \frac{4}{9} \times 21 \times 21 \times 21$

$h = \frac{4 \times 21 \times 21 \times 21 \times 3}{9 \times 21 \times 21}$

$\boxed{h = 28 \text{ cm}}$

l of cone = $\sqrt{h^2 + r^2} = \sqrt{28^2 + 21^2} = \sqrt{784 + 441}$

$= \sqrt{1225} = 35 \text{ cm}$

TSA of toy = CSA of cone + CSA of hemisphere

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

$= \frac{22}{7} \times 21 \times 3 [35 + (2 \times 21)] = 22 \times 3 [35 + 42]$

$= 22 \times 3 \times 77 = \boxed{5082 \text{ cm}^2}$