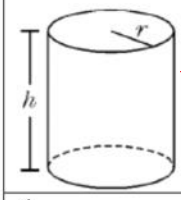
Name:_____ Date:_____

HW Math 8 Section 9.3 Volume of Cylinders

1. Given each cylinder, find the volume:

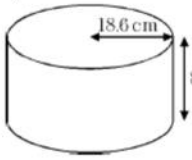
a) $h = 5cm,\ r = 3cm$



r = 3
$r^2 = 9$
$\pi r^2 = 9\pi$
$9\pi \times 5 = 45\pi$
Volume: $45\pi\ cm^3$

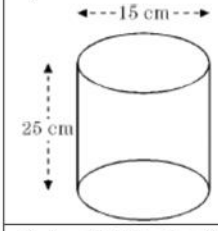
r = 3
$r^2 = 9$
$\pi r^2 = 28.26$
$28.26 \times 5 = 141.3$
Volume: $141.3\ cm^3$

b)



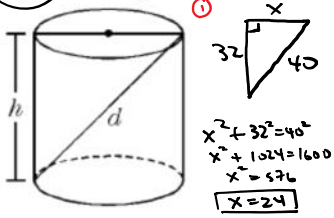
r = 18.6
$r^2 = 345.96$
$\pi r^2 = 345.96\pi$
345.96×8.3
Volume: $2,871.468\pi\ cm^3$

c)



$15 \div 2 = 7.5$
$7.5 \times 7.5 \times 25 =$
$1406.25\pi\ cm^3$

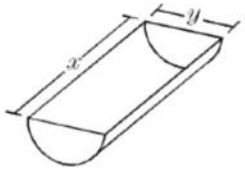
d) $h = 32cm,\ d = 40cm$



① $x^2 + 32^2 = 40^2$
$x^2 + 1024 = 1600$
$x^2 = 576$
$x = 24$

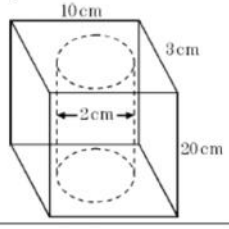
② DIAMETER = 24
RADIUS = 12
③ AREA of CIRCLE
$A = \pi(12^2) = 144\pi$
$Vol = 144\pi \times 32$
$= 4608\pi\ cm^3$

e) $x = 15cm,\ y = 4cm$



$\frac{(r^2 \times h)\pi}{2} = \frac{(2^2 \times 15)\pi}{2}$
$\frac{60\pi}{2} = 30\pi$

f)



$10 \times 3 \times 20 = 6000$
$1 \times 20 = 20$
Volume = $6000 - 20\pi$

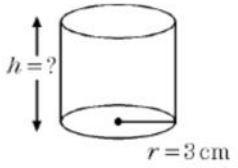
2. There are two cylinders that carry candy in them. One cylinder is 25cm tall and has a radius of 15cm. The second cylinder has a height of 15cm tall and a radius of 15cm. Which cylinder has a bigger volume?

1st Cylinder = $R^2 \times \pi \times h = 15^2 \times \pi \times 25 = 225\pi \times 25 = 5625\pi\ cm^3$

2nd cylinder = $R^2 \times \pi \times h = 15^2 \times \pi \times 15 = 225\pi \times 15 = 3375\pi\ cm^3$

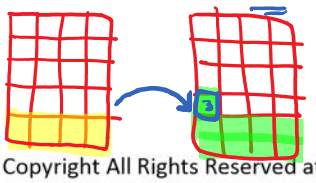
1st cylinder has a bigger volume.

3. If the volume of the following cylinder is $108cm^3$, then what is the height?



$V = 108\ cm^3$
$V = r \times r \times \pi \times h$
$3 \times 3 = 9\pi$
$108 \div 9\pi = 12$
$h = 12cm$

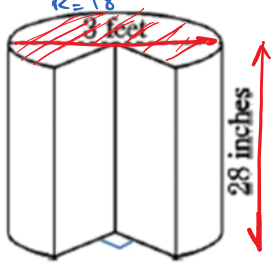
4. A cylindrical water tank is 1/5 full. If three liters were added, the tank would be 1/4 full. How many liters does the tank hold when it is full? If the height of the cylinder is 50cm, what is the radius of the cylinder? [Note: $1L = 1000ml = 1000cm^3$]



· 20 boxes
· Each box → 3L
Total ⇒ 60 000mL
$= 60\,000\ cm^3$

$60,000 = \pi R^2 \times 50$
$1200 = \pi R^2$
$\frac{1200}{\pi} = R^2$
$382.162 = R^2$
$19.549 = R_{cm}$

5. What is the volume of the solid below if a right triangle



Ht = 12"
3ft = 36"
D = 36"
R = 18"

$Vol = \pi R^2 \times h \times \frac{3}{4}$

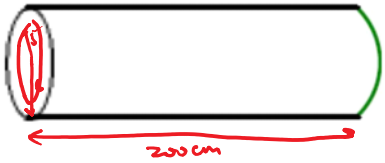
$= \pi (18)(18)(28) \times \frac{3}{4}$

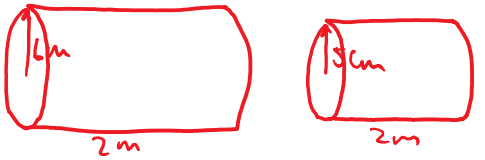
$= \pi (6804)\ in^3$

$= 21{,}364.56\ in^3$

324 × 7 = 2268

6. A pipe is 2 meters long and has inside radius of 5 cm and outside radius of 6 cm. Find the volume of metal contained in the pipe to the nearest cubic centimetre





$\pi(6)^2(200) - \pi(5)^2(200)$

$7200\pi\ cm^3 \quad 5000\pi\ cm^3$

$= 2200\pi\ cm^3$

7. The lateral surface area of a cylindrical tube with a height of 6 cm is 48π cm^2. In cubic centimeters, what is the tube's volume? Express your answer in terms of π.

$V = \pi \times (R^2) \times H$

$\pi \times (4)^2 \times 6$

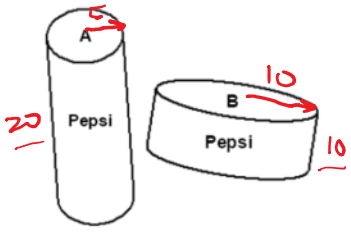
$= 96\pi\ cm^3 = 301.44\ cm^3$

$2\pi R$

$48\pi\ cm^2$ 6

$R = 4$ cm

8. A soft drink company has two different cans. One container is twice as wide as another but only half as tall. Which container has a bigger volume? A or B? Do they hold the same amount?



$Vol A = \pi(5^2) \times 20$

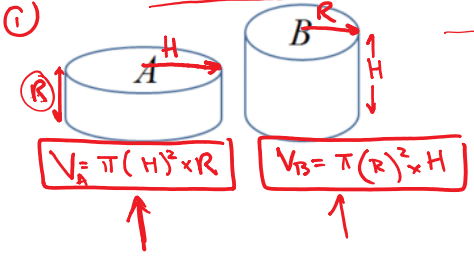
$= 500\pi\ cm^3$

$Vol B = \pi(10^2)(10)$

$Vol B = 1000\pi\ cm^3$

9. Challenge: Cylinder B's height is equal to the radius of cylinder A and cylinder B's radius is equal to the height (*h*) of cylinder A. If the volume of cylinder A is twice the volume of cylinder B, the volume of cylinder A can be written as $V = N \times \pi \times h^3$ cubic units. What is the value of N?

(i)



$V_A = 2 \times V_B$

$\pi \times H^2 \times R = 2 \times \pi (R^2) \times H$

$H = 2 \times R$

$Vol = \pi(H)^2 \times R \quad H = 2R$

$Vol = \pi(2 \times R)^2 \times R$

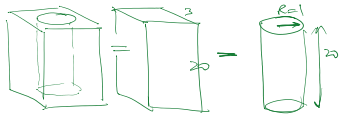
$= \pi (2 \times R)(2 \times R)(R)$

$= \pi (4)(R^3)$

$V = \pi \times N \times h^3$

By: Jessica Radius = r

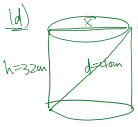
#1) f)



$V = 10 \times 20 \times 3 = 600\text{mm}^3$ $V = \pi(1)^2 \times 20 = 20\pi$

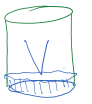
$V_{TOTAL} = 600 - 20\pi = 600 - 62.8 = 537.2\text{ cm}^3$

d)



① let x be diameter
$x^2 + h^2 = d^2$
$x^2 + 32^2 = 40^2$
$x^2 = 40^2 - 32^2$
$x^2 = 576$
$x = 24$
② $r = 12\text{cm}$
③ $Vol = \pi(12)^2 \times 32 =$

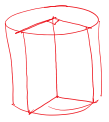
#4)



① Beginning $Vol = V(\frac{1}{5})$
② Add 3L.
$Vol = V(\frac{1}{5}) + 3$
$Vol = V(\frac{1}{4})$

$20\left[\frac{1}{5}(V)\right] + [3]20 = \left[\frac{1}{4}(V)\right]20$ ③ $60 \times \frac{1}{5} =$ ⑫L
$4V + 60 = 5V$ ④ $12 + 3 = 15$L.
$60 = V$ ⑤ $\pi R^2 \times h = 60$
$\frac{\pi R^2 \times 50}{50\pi} = \frac{60}{50\pi}$
$R^2 = \frac{60}{50\pi}$
$R = \sqrt{\frac{60}{50\pi}}$

5)



$Vol = \frac{2}{3} \times \pi R^2 h$

1. a)

$3.14 \times (3 \times 3) \times 5$
$= 3.14 \times 9 \times 5$
$= 28.26 \times 5$
$\approx 141.3\text{ cm}^3$

b)

$3.14 \times (18.6 \times 18.6) \times 8.3$
$= 3.14 \times 345.96 \times 8.3$
$= 1086.3144 \times 8.3$
$= 9016.40952\text{ cm}^3$

c)

$r = 15 \div 2 = 7.5$
$3.14 \times (7.5 \times 7.5) \times 25$
$= 3.14 \times 56.25 \times 25$
$= 176.625 \times 25$
$\approx 4415.625\text{ cm}^3$

d)

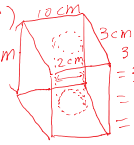
$40^2 - 32^2 = a^2$
$1600 - 1024 = a^2$
$576 = a^2$
$\sqrt{576} = a$
$24 = a$
$r = 24 \div 2 = 12$

$3.14 \times (12 \times 12) \times 32$
$= 3.14 \times 144 \times 32$
$= 452.16 \times 32$
$= 14469.12\text{ cm}^3$

e)

$r = 4 \div 2 = 2$
$3.14 \times (2 \times 2) \times 15$
$= 3.14 \times 4 \times 15$
$= 12.56 \times 15$
$= 188.4$
$188.4 \div 2 = 94.2\text{ cm}^3$

f)



$2 \div 2 = 1$
$3.14 \times (1 \times 1) \times 20$
$= 3.14 \times 1 \times 20$
$= 3.14 \times 20$
$= 62.8$

$10 \times 3 \times 20 = 600$
$600 - 62.8 = 537.2\text{ cm}^3$

2. ① $3.14 \times (15 \times 15) \times 25$
$= 3.14 \times 225 \times 25$
$= 706.5 \times 25$
$= 17662.5$

② $3.14 \times (15 \times 15) \times 15$
$= 3.14 \times 225 \times 15$
$= 706.5 \times 15$
$= 10597.5$

$17662.5 > 10597.5$
Answer: the first cylinder has bigger volume

3.

$108 = 3.14 \times (3 \times 3) \times h$
$108 = 3.14 \times 9 \times h$
$h = 108 \div 9 \div 3.14 \approx 3.82$
Answer: about 3.82 cm

4. Find the common multiple of 5 & 4 first : 20
① $\frac{1}{5} = \frac{4}{20}$, $\frac{1}{4} = \frac{5}{20}$, $\frac{5}{20} - \frac{4}{20} = \frac{1}{20}$, this means it increases $\frac{1}{20}$ when adding 3L of water. Volume = V, $V \times \frac{1}{20} = 3$, $3 \div \frac{1}{20} = 3 \times \frac{20}{1} = \frac{60}{1} = 60$
② 60L = 60,000 ml = 60,000 cm³

$60{,}000 = 3.14 \times r^2 \times 50$
$r^2 = 60{,}000 \div 50 \div 3.14 \approx 382.2$
$r = \sqrt{382.2} \approx 19.55$
Answer: ① 60L when full
② Radius of cylinder: about 19.55 cm

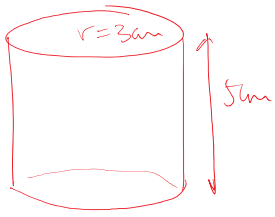
5.

1 feet = 12 inches
$3 \times 12 = 36$
$36 \div 2 = 18$
$3.14 \times (18 \times 18) \times 28$
$= 3.14 \times 324 \times 28$
$= 1017.36 \times 28$
$= 28486.08$

$28486.08 \times \frac{3}{4} = \frac{85458.24}{4} = 21364.56$
Answer: 21364.56 inches³

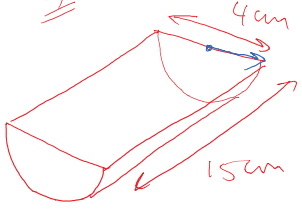
6.

#1a)



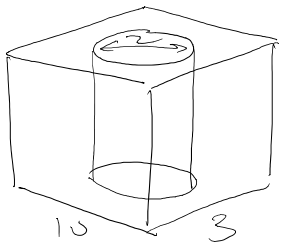
$Vol = (\pi R^2) \times H$
$= \pi(9) \times 5$
$= 45\pi$

1e)



$R = 2\text{cm}$
$H = 15\text{cm}$
$V = \frac{\pi R^2 \times H}{2} = \frac{\pi \times R \times R \times H}{2}$
$= \frac{\pi(2)^2 \times 15}{2}$
$= \frac{60\pi}{2} = 30\pi\text{ cm}^3$

f)



$Vol = V_{prism}$
$= (20)(1$
$= 60$
$V = 60$
$=$

)

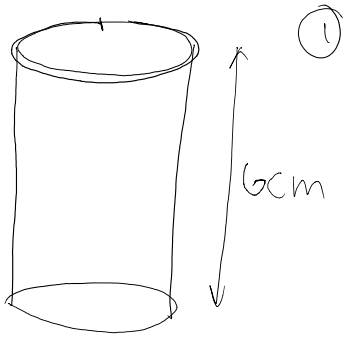
$- V_{cylinder}$

$)(3) - \pi(R^2)(H)$

$0\ cm^3 - \pi(1)(1)(20)$

$0 - 20\pi$

7)



① LATERAL S.A. $= 2\pi R(H) = 48\pi \text{ cm}^2$

$2\pi R(6) = 48\pi \text{ cm}^2$

$12 \times R \times \pi = 48\pi \text{ cm}^2$

$R = 4$

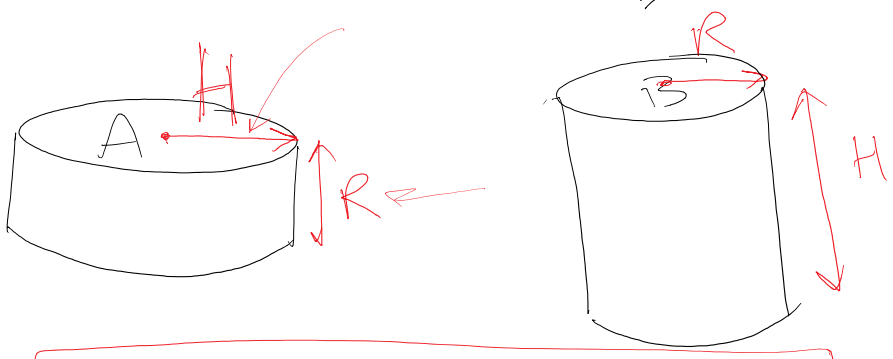
② Vol = (AREA of CIRCLE) × (HEIGHT)

$= \pi R^2 \times H$

$= \pi (4)(4) \times 6$

$= 96\pi \text{ cm}^3$

8)



$\text{Vol}(A) = 2 \times \text{Vol}(B)$

$\pi(H^2)(R) = 2 \times \pi R^2 \cdot H$

$H \times H \times R = 2 \times R \times R \times H$

$H = 2 \times R$

$\text{Vol}\,A = \pi(H^2)(R)$

$= \pi(2R)^2 \cdot R$

$= \pi(4)R^2 \cdot R$

$(2R)^2 = (2R)(2R)$

$= 4R^2$

$R^3 = R \times R \times R$