Name: KEY
Date: _____

Math 8

Lesson M2 Part 3 ~ Calculating Surface Area of Right Cylinders

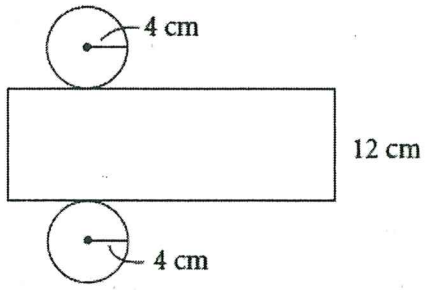
Surface area of cylinder = 2 × area of one circle + area of the rectangle

$= 2 \times \pi r^2 + 2\pi r \times h$

- Developing:

1. Determine the area of each net, to the nearest square centimetre.

a)



Area of net = 2 × area of one circle
+ area of the rectangle

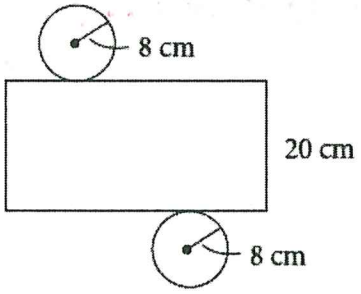
$= 2 \times \pi r^2 + 2\pi r \times h$

$= 2 \times \pi \times$ 4x4 $+ 2 \times \pi \times$ 4 $\times$ 12

$\doteq$ 401.92 (or 384)

The area of the net is 402, to the nearest square centimetre.

b)



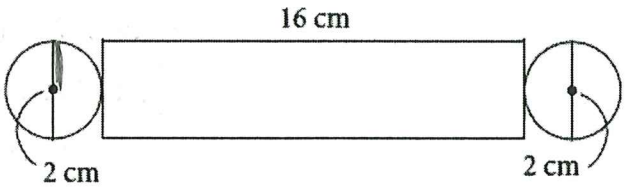
Area of net = 2 × area of one circle
+ area of the rectangle

$= 2 \times \pi r^2 + 2\pi r \times h$

$= 2 \times \pi \times$ 8x8 $+ 2 \times \pi \times$ 8 $\times$ 20

$\doteq$ 1406.72 (or 1344) cm²

c)



The diameter of each circle is 2 cm, so the radius of each circle is 1 cm.

Area of net = 2 × area of one circle
+ area of the rectangle

$= 2 \times \pi r^2 + 2\pi r \times h$

$= 2 \times \pi \times$ 1x1 $+ 2 \times \pi \times$ 1 $\times$ 16

$\doteq$ 106.76 (or 102) cm²

2. Calculate the surface area of each cylinder, to the nearest square unit.

a) radius 8 cm, height 12 cm

Surface area of cylinder = 2 × area of one circle + area of the rectangle

$= 2 \times \pi r^2 + 2\pi r \times h$

$= 2 \times \pi \times$ 8 $^2 + 2 \times \pi \times$ 8 $\times$ 12

$\doteq$ 1004.8 (or 960) cm^2

The surface area is 1005, to the nearest square cm.

b) diameter 9 m, height 6.8 m

The diameter of each circle is 9, so the radius of each circle is 4.5.

Surface area of cylinder = 2 × area of one circle + area of the rectangle

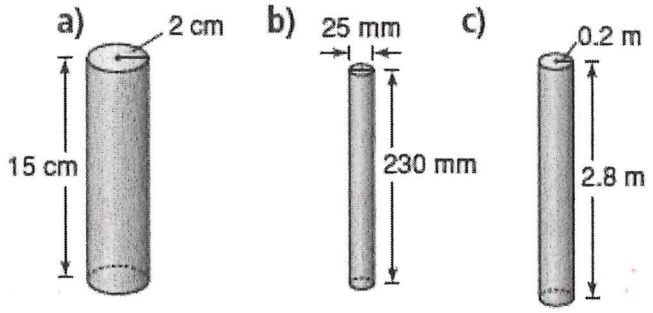
$= 2 \times \pi r^2 + 2\pi r \times h$

$= 2 \times \pi \times$ 4.5 $^2 + 2 \times \pi \times$ 4.5 $\times$ 6.8

$\doteq$ 319.338 (or 305.1)

The surface area is 319, to the nearest square m.

8. Calculate the surface area of each cylinder.



a) SA = 2×π×2×2 + 2×π×2×15

= 25.12 + 188.4

= 213.62 cm^2 (or 204)

b) SA = 2×π×12.5^2 + 2×π×12.5×230

= 981.25 + 18055

= 19 036.25 mm^2

(or 18 187.5)

c) SA = 2×π×0.2^2 + 2×π×0.2×2.8

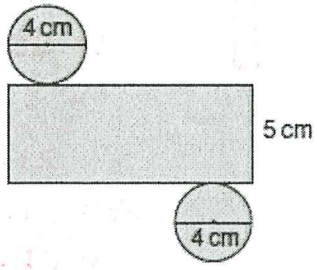
= 0.2512 + 3.5168

= 3.768 m^2 (or 3.6)

- Proficient:

4. Find the area of each net.

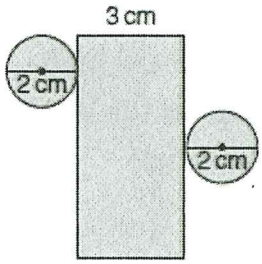
a)



$SA = 2\times\pi\times 2^2 + 2\times\pi\times 2\times 5$

$= \boxed{87.92\ cm^2}$ (or 84)

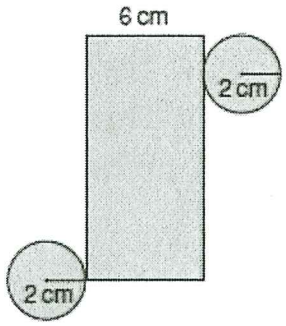
b)



$= 2\times\pi\times 1^2 + 2\times\pi\times 1\times 3$

$= \boxed{25.12\ cm^2}$ (or 24)

c)



$= 2\times\pi\times 2^2 + 2\times\pi\times 2\times 6$

$= \boxed{100.48\ cm^2}$ (or 96)

9. A cylindrical tank has diameter 3.8 m and length 12.7 m. What is the surface area of the tank?

$r = 3.8 \div 2 = 1.9$ m

$SA = 2\times\pi\times 1.9\times 1.9 + 2\times\pi\times 1.9\times 12.7$

$= \boxed{174.2072\ m^2}$ (or 166.44 m^2)

11. A wooden toy kit has different painted solids. One solid is a cylinder with diameter 2 cm and height 14 cm.

a) What is the surface area of the cylinder?

$r = 1$ cm

$SA = 2\times\pi\times 1^2 + 2\times\pi\times 1\times 14$

$SA = \boxed{94.2\ cm^2}$ (or 90)

$\div 10000$ or

$= \boxed{0.00942\ m^2}$

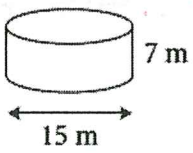
b) One can of paint covers 40 m^2. Each cylinder is painted with one coat of paint. How many cylinders can be painted with one can of paint?

$40 \div 0.00942 = 4246.28$

↳ You can paint **4246 cylinders.**

3. Calculate the outside surface area each cylinder, to one decimal place. The cylinders are open at one end.

a)

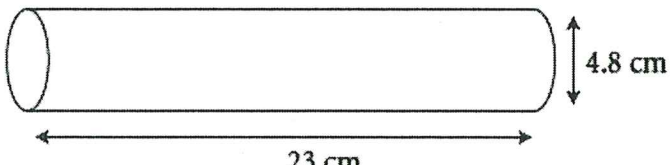


$SA = \pi\times 7.5^2 + 2\times\pi\times 7.5\times 7$

$= \boxed{506.325\ m^2}$ (or 483.75)

$= 483.8$

b)



$SA = \pi\times 2.4^2 + 2\times\pi\times 2.4\times 23$

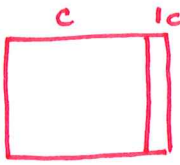
$= 364.7424\ cm^2$

$= \boxed{364.7\ cm^2}$ (or 348.5)

- Extending:

12. Assessment Focus

A soup can has diameter 6.6 cm.
The label on the can is 8.8 cm high.
There is a 1-cm overlap on the label.
What is the area of the label?



$C = \pi d$
$C = \pi \times 6.6$
$C = 20.724$ cm
$+ 1$
21.724 cm
$A = 21.724 \times 8.8$
$= 191.1712$ cm^2

13. A hot water tank is cylindrical.
Its interior is insulated to reduce heat loss. The interior has height 1.5 m (150 cm) and diameter 65 cm. What is the surface area of the interior of the tank? Give the answer in two different square units.

(0.65 m ÷ 2 = 0.325 m)

$SA = 2 \times \pi \times 32.5^2 + 2 \times \pi \times 32.5 \times 150$
$= 37\,248.25$ cm^2

$SA = 2 \times \pi \times 0.325^2 + 2 \times \pi \times 0.325 \times 1.5$
$= 3.724825$ m^2

16. Take It Further
The curved surface area of a solid cylinder is 660 cm^2.
The cylinder has height 10 cm.

a) What is the circumference of the cylinder?
b) What is the radius of the cylinder?
c) What is the area of one circular base?
d) What is the surface area of the cylinder?

a) $2 \times \pi \times r \times h = 660$
$2 \times \pi \times r \times 10 = 660$
$C = 66$ cm

b) $\frac{2 \times \pi \times r}{2 \times \pi} = \frac{66}{2 \times \pi}$
$r = 10.5$ cm

c) $A = \pi \times r \times r$
$A = \pi \times 10.5 \times 10.5$
$A = 346.185$ cm^2

d) $SA = 2(346.185) + 660$
$SA = 1352.37$ cm^2

17. Take It Further Benny places a glass cylinder, open at one end, over a rose cutting in his garden. The cylinder has diameter 9 cm and height 20 cm.
To make sure animals cannot knock the cylinder over, Benny covers the bottom 5 cm of the cylinder with soil. What is the surface area of the cylinder exposed to the sun?

$SA = 1 \times \pi \times r \times r + 2 \times \pi \times r \times h$
$SA = \pi \times 4.5^2 + 2 \times \pi \times 4.5 \times (20 - 5)$
$SA = 487.485$ cm^2