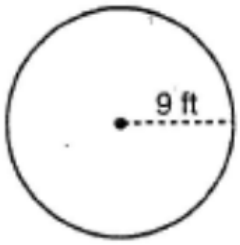
Name Key Period _____ Date _____

# Lengths, Areas, and Volumes

Use your MCAS Reference Sheet for the formulas needed to solve the following problems. In all cases:

- Write out the formula first (before you substitute in)
- Show all work/thinking
- Round to the nearest hundredth
- Use the approximation 3.14 in place of π
- Circle your final answer, include units

1. What is the circumference and area of the circle to the right?




$C = 2\pi r$
$C = 2\pi(9)$
$C = 56.52$ ft
Circumference

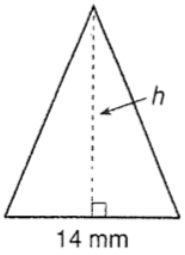
$A = \pi r^2$
$A = \pi(9)^2$
$A = 254.34$ ft$^2$
Area

2. If the area of a square is 324 cm$^2$, what is the perimeter?

$A = s^2$
$\sqrt{324} = \sqrt{s^2}$
$18 = s$

$P = 4s$
$P = 4(18)$
$P = 72$ cm

3. This triangle to the right has an area of 112mm$^2$, what is the height?

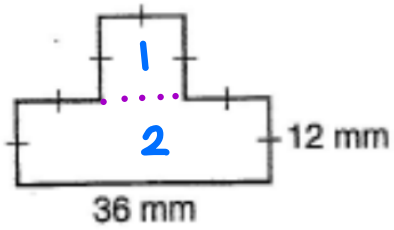



$A = \frac{1}{2}bh$
$112 = \frac{1}{2}b(14)$
$\frac{112}{7} = \frac{7b}{7}$
$16 = b$

Height = 16 mm

**Find the area of the following figures:**

4.




$A = l \cdot w$

① $A = 12^2$
$A = 144$

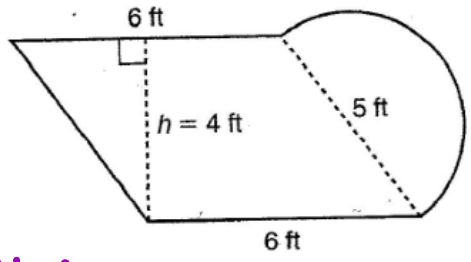
② $A = 36 \cdot 12$
$A = 432$

$144 + 432 = 576$ mm$^2$

5.


$A = \frac{1}{2}(b_1 + b_2)h$
$A = \frac{1}{2}(21 + 17)(12)$
$A = \frac{1}{2}(38)(12)$
$A = 228$ ft$^2$

6.




Half Circle:

$A = \frac{1}{2}\pi r^2$

$= \frac{1}{2}\pi (2.5)^2$

$= 9.81\ ft^2$

Parallelogram:

$A = b \cdot h$

$= 6 \cdot 4$

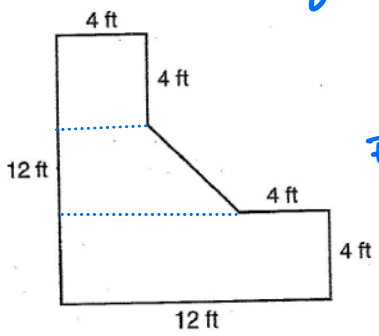
$= 24\ ft^2$

Total

$A = 9.81 + 24$

$= 33.81\ ft^2$

7.




Square: $A = L \cdot W$

$= 4 \cdot 4$

$= 16\ ft^2$

Parallelogram:

$A = \frac{1}{2}(b_1 + b_2)h$

$= \frac{1}{2}(8+4)(4)$

$= 24\ ft^2$

Rectangle:

$A = L \cdot W$

$= 12 \cdot 4$

$= 48\ ft^2$

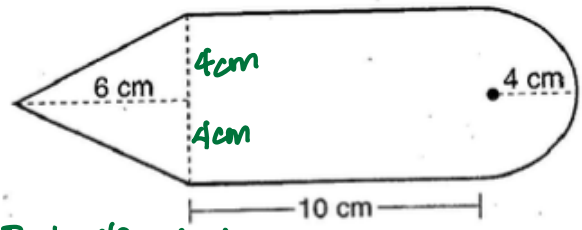
Total Area

$16 + 24 + 48$

$= 88\ ft^2$

**Find the area and perimeter of the following figures:**

8.




Rectangle $A = L \cdot W$

$= 10 \cdot 8$

$= 80\ cm^2$

Half Circle $A = \frac{1}{2}\pi r^2$

$= \frac{1}{2}(3.14)(4)^2$

$= 25.12\ cm^2$

Half circumference $= \frac{1}{2}(2\pi r)$

$= \frac{1}{2}(2)(3.14)(4)$

$= 12.56\ cm$

Triangle: $A = \frac{1}{2}bh$

$= \frac{1}{2}(8)(6)$

$= 24\ cm^2$

Length of hypotenuse:

$a^2 + b^2 = c^2$

$4^2 + 6^2 = c^2$

$16 + 36 = c^2$

$\sqrt{52} = \sqrt{c^2}$

$7.21 = c$

Area $= 80 + 24 + 25.12$

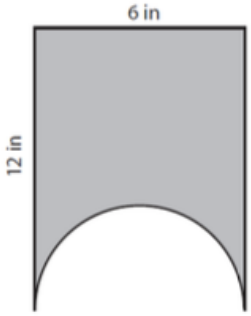
$= 129.12\ cm^2$

Perimeter

$= 10 + 7.21 + 7.21 + 10 + 12.56$

$= 46.98\ cm$

9.




Area of figure:

Area of Rectangle $- \frac{1}{2}$ circle

$= L \cdot W - \frac{1}{2}(\pi r^2)$

$= 12 \cdot 6 - \frac{1}{2}(3.14)(3)^2$

$= 72 - 14.13$

$= 57.87\ in^2$

Perimeter:

$= 12 + 6 + 12 + \frac{1}{2}(\pi)d$

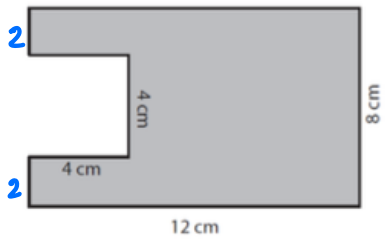
$= 12 + 6 + 12 + \frac{1}{2}(3.14)(6)$

$= 39.42\ in$

Area $= 57.87\ in^2$

Perimeter $= 39.42\ in$

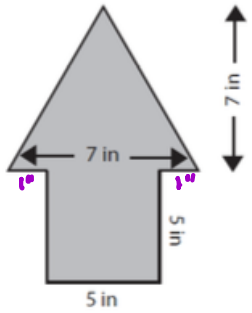
10.




A = Rectangle Area − Square Area
= 8·12 − 4·4
= 96 − 16
= 80 cm²

Perimeter
P = 2(12+8+4)
= 48 cm

11.




Area of Triangle:
$A = \frac{1}{2}bh$
$= \frac{1}{2}(7)(7)$
$= 24.5\ in^2$

Area of Square:
$A = L \cdot W$
$= 5 \cdot 5$
$= 25\ in^2$

Total Area
$49.5\ in^2$

Hypotenuse of Triangle:
$a^2 + b^2 = c^2$
$3.5^2 + 7^2 = c^2$
$12.25 + 49 = c^2$
$61.25 = c^2$
$7.83 = c$

Perimeter of figure:
$2(7.83) + 5 + 5 + 5 + 1 + 1$
$= 32.66\ in$

12. Which figure below has the greatest amount of shaded area?

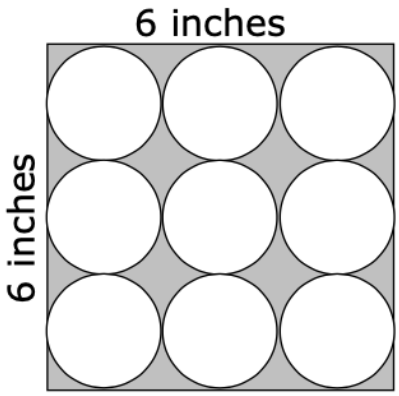



**Figure A**

Area of square:
$A = l \cdot w$
$= 6 \cdot 6$
$= 36\ in^2$

Area of one circle:
$A = \pi r^2$
$= 3.14(1)^2$
$= 3.14$

Total Area $= 36 - 9(3.14)$
$= 7.74\ in^2$

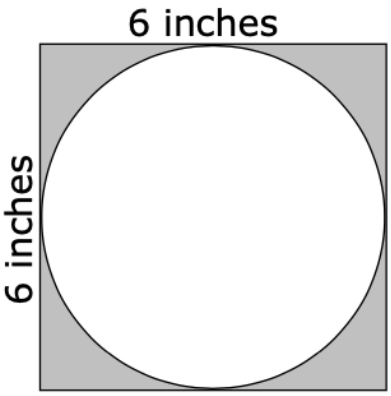



**Figure B**

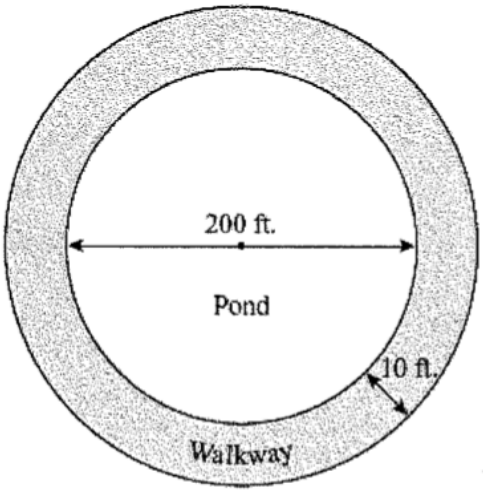
Area of square:
$A = l \cdot w$
$= 6 \cdot 6$
$= 36\ in^2$

Area of the circle:
$A = \pi r^2$
$= 3.14(3)^2$
$= 28.26$

Total Area $= 36 - 28.26$
$= 7.74\ in^2$

The areas are the SAME!

13. The diagram below shows the circular surface of a pond being designed for a park with a walkway around the pond.




a. What is the circumference of the pond?

$C = 2\pi r$
$= 2(3.14)(100)$
$= 628$ feet

b. What is the surface area of the pond?

$A = \pi r^2$
$= 3.14(100)^2$
$= 31{,}400\ ft^2$

c. A walkway 10 feet wide is being designed to go around the pond. What will be the area in square feet of the walkway?

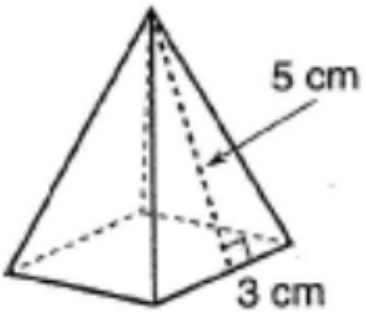
Total Area $= \pi r^2$
$= \pi(110)^2$
$= 37{,}994\ ft^2$

Area of Walkway = Total Area − Surface Area of Pool
$= 37{,}994 - 31{,}400$
$= 6{,}594\ ft^2$

14. What is the surface area of a cube with a side length equal to 11 feet?

$SA_{cube} = 6(L \cdot w)$
$= 6(11 \cdot 11)$
$= 726\ ft^2$

15. What is the surface area of the pyramid below?

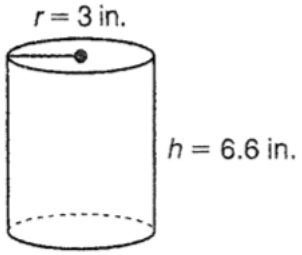



Area of base: $A = L \cdot w$
$= 3 \cdot 3$
$= 9\ cm^2$

Area of 1 side: $A = \frac{1}{2} b \cdot h$
$= \frac{1}{2}(3)(5)$
$= 7.5\ cm^2$

Total Area $= 9 + 4(7.5) = 39\ cm^2$

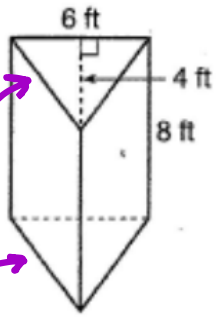
16. What is the volume and surface area of the cylinder?




$V = \pi r^2 h$
$= 3.14(3^2)(6.6)$
$= 185.52 \text{ in}^3$

$SA = 2(\pi r^2) + \pi d h$
$= 2(3.14)(3^2) + (3.14)(6)(6.6)$
$= 56.52 + 124.34$
$= 180.86 \text{ in}^2$

17. What is the volume and surface area of the triangular prism?

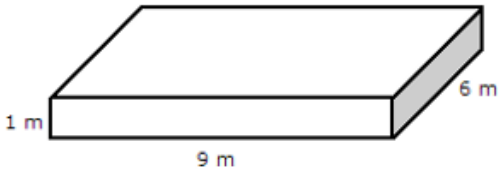



$a^2 + b^2 = c^2$
$3^2 + 4^2 = c^2$
$9 + 16 = c^2$
$25 = c^2$
$5 = c$

$V = Bh$
$= \frac{1}{2}(6 \cdot 4)(8)$
$= 96 \text{ ft}^3$

$SA = 2(\frac{1}{2}bh) + 6 \cdot 8 + 2(5 \cdot 8)$
$= 2(\frac{1}{2} \cdot 6 \cdot 4) + 128$
$= 152 \text{ ft}^2$

18. What is the volume and surface area of the rectangular prism?




$V = B \cdot h$
$= (6 \cdot 9)(1)$
$= 54 \text{ m}^3$

$SA = 2(1 \cdot 9) + 2(1 \cdot 6) + 2(9 \cdot 6)$
$= 138 \text{ m}^2$

19. A cylinder with a radius of 4 meters has a volume of 351.68 cubic meters. What is the height of the cylinder?

$V = \pi r^2 h$
$351.68 = 3.14(4^2)h$
$\frac{351.68}{50.24} = \frac{50.24h}{50.24}$
$7 = h$

The height of the cylinder is 7 meters

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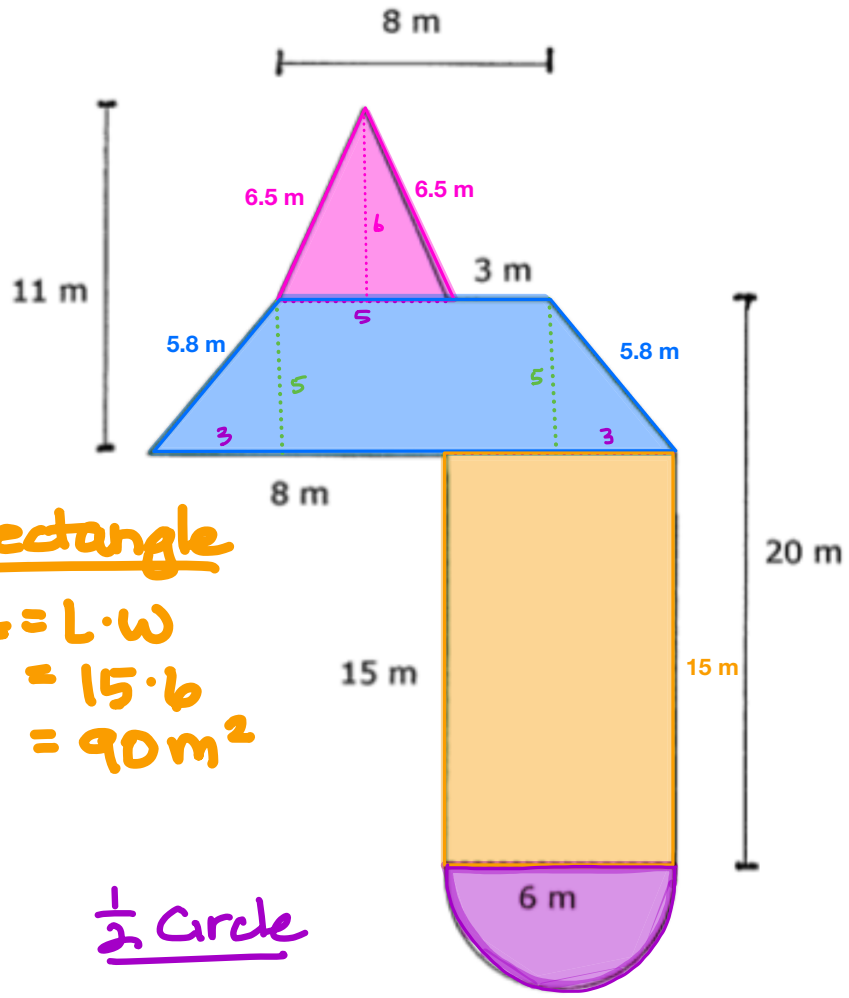
Calculate the area and perimeter of the figure below.




## Triangle

$A = \frac{1}{2}bh$

$= \frac{1}{2}(5)(6)$

$= 15\,m^2$

Hypotenuse:

$a^2+b^2=c^2$

$6^2+2.5^2=c^2$

$42.25=c^2$

$6.5=c$

## Rectangle

$A = L \cdot w$

$= 15 \cdot 6$

$= 90\,m^2$

## Trapezoid

$A = \frac{1}{2}(b_1+b_2)h$

$= \frac{1}{2}(8+14)(5)$

$= 55\,m^2$

Hypotenuse of ends

$a^2+b^2=c^2$

$3^2+5^2=c^2$

$9+25=c^2$

$34=c^2$

$5.8=c$

## $\frac{1}{2}$ Circle

$\frac{1}{2}$ Area $= \frac{1}{2}\pi r^2$

$= \frac{1}{2}\pi(3)^2$

$= 14.1\,m^2$

$\frac{1}{2}$ Circumference $= \frac{1}{2}\pi d$

$= \frac{1}{2}\pi(6)$

$= 9.4\,m$

**Total Area**

$14.1+55+90+15=$

$174.1\,m^2$

**Total Perimeter**

$9.4+8+2(5.8)+3+2(15)+2(6.5)$

$75\,m$