Name _____ *Answers* _____   Date _____

Geometry – Area of Polygons

Formulas

1) The area of a parallelogram is:

$$A = bh$$

2) The area of a triangle is:

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

3) The area of a trapezoid is:

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

Show the following steps
1) Write the formula
2) Plug-in the necessary information
3) Solve for the missing value

Find the area of the polygon.

4) A parallelogram with a base of 3.5 cm and a height of 12 cm.

$$A = bh$$
$$= 3.5 \times 12$$
$$= 42 \, cm^2$$

A = $42 \, cm^2$

5) A triangle with a base of 6mm and a height of 15mm.

$$A = \tfrac{1}{2}bh$$
$$= \tfrac{1}{2} \cdot 6 \cdot 15$$
$$= 45 \, mm^2$$
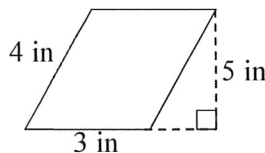
A = $45 \, mm$

6) A trapezoid with a height of 7 ft and bases that measure 10 ft and 8 ft.

$$A = \tfrac{1}{2}(b_1 + b_2)h$$
$$A = \tfrac{1}{2}(10+8)\,7$$
$$= \tfrac{1}{2}(18)\,7$$
$$= 9 \cdot 7$$
$$= 63$$

A = $63 ft^2$

7)

4 in, 5 in, 3 in

$$A = bh$$
$$= 3 \cdot 5$$
$$= 15 \, in^2$$

8)

5.5 cm, 4 cm, 5 cm
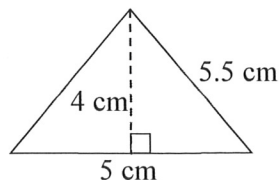
$$A = \tfrac{1}{2}bh$$
$$= \tfrac{1}{2} \cdot 5 \cdot 4$$
$$= \tfrac{1}{2} \cdot 20$$
$$= 10 \, cm^2$$

9)

9 in, 7 in, 7.5 in, 11 in
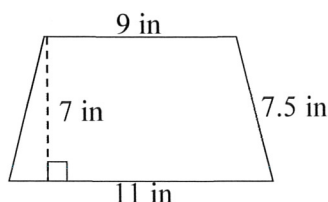
$$A = \tfrac{1}{2}(b_1 + b_2)h$$
$$= \tfrac{1}{2}(9+11)\,7$$
$$= \tfrac{1}{2}(20)\,7$$
$$= 10 \cdot 7$$
$$= 70 \, in^2$$

10)

6 in

4 in

5 in

Area of rectangle:

$A = bh$
$= 6 \cdot 4$
$= 24 \, in^2$
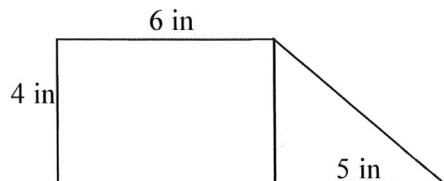
Area of triangle:

$A = \frac{1}{2} bh$
$= \frac{1}{2} \cdot 5 \cdot 4$
$= \frac{1}{2} \cdot 20$
$= 10 \, in^2$

Total Area = $24 + 10$
$= \boxed{34 \, in^2}$

10)

9 in

7 in

16 in

13 in
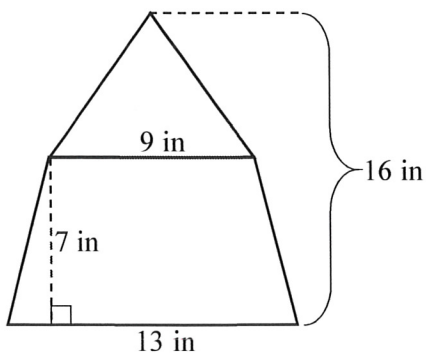
Area of trapezoid:

$A = \frac{1}{2} (b_1 + b_2) h$
$= \frac{1}{2} (9 + 13) 7$
$= \frac{1}{2} \cdot 20 \cdot 7$
$= 10 \cdot 7$
$= 70 \, in^2$

Area of triangle:

$A = \frac{1}{2} bh$
$= \frac{1}{2} \cdot 9 \cdot 9$
$= \frac{9}{2} \; 40.5 \, in^2$

Total Area = $70 + 40.5$
$= 110.5 \, in^2$

Find the missing dimension

14) The area of a parallelogram is $96 \, cm^2$. Find the height of the parallelogram if the base is 8 cm.

$A = bh$
$96 = 8h$
$\frac{96}{8} \quad \frac{8h}{8}$
$\boxed{12 \, cm = h}$

15) The area of a triangle is $15 \, ft^2$. Find the base of the triangle if the height is 6 ft.

$A = \frac{1}{2} bh$
$15 = \frac{1}{2} \cdot 6 \cdot b$
$15 = 3b$
$\frac{15}{3} \quad \frac{3b}{3}$
$\boxed{5 \, ft = b}$

Pg. 553 #2, 4, 7, 9-12, 14-17, 19, 21

2. the distance from the center to any point on the circle; This phrase describes the radius of a circle, whereas the other phrases describe the circumference of a circle.

4. 14 mm

7. 4 in.

9. about 31.4 in.

10. about 44 in.

11. about 56.52 in.

12. *Sample answer:* A lawn game has two circular targets with 28-inch diameters. You lost one. You want to use a length of wire to make a replacement.

$$C = \pi d \approx \frac{22}{7} \cdot 28 = 88$$
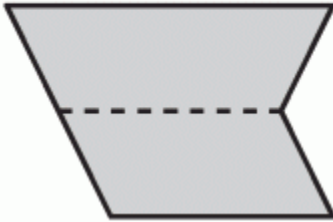
You need a piece of wire 88 inches long.

14. **a.** *D*

   b. *B*

15. about 7.71 ft

16. about 102.8 cm

17. about 31.4 cm; about 62.8 cm

19. about 69.08 m; about 138.16 m

21. about 200.96 cm

Pg. 568-569 #1, 2, 7, 12, 13, 15, 17

1. no; The perimeter of the composite figure does not include the measure of the shared side.

2. *Sample answer:*

7. 19 units

12. The length of the rectangle was counted twice.
$$\text{Perimeter} = 4 + 3 + 4 + 5 + 4$$
$$= 20 \text{ in.}$$

13. about 26.85 in.

15. about 36.84 ft

17. See *Taking Math Deeper.*

Pg. 574-575 #1, 5, 8, 9, 10, 13, 15, 16a, 16b, 20

1. Divide the diameter by 2 to get the radius. Then use the formula $A = \pi r^2$ to find the area.

5. about 314 in.²

8. about 1.76625 ft²

9. about 2461.76 mm²

10. about 78.5 ft²

13. about 628 cm²

15. about 1.57 ft²

16. **a.**

2	4π in.	4π in.²
4	8π in.	16π in.²
8	16π in.	64π in.²
16	32π in.	256π in.²

b. The circumference doubles; The area becomes four times as great.

c. The circumference triples; The area becomes 9 times as great.

20. about 17.415 m²; Subtract the area of a circle with a 9-meter diameter from the area of the square.

Pg. 574-575 #2, 3, 5, 9, 10, 14, 16

2. *Sample answer:* You can think of the trapezoid
as a rectangle and
two triangles.

3. 28.5 units^2

5. 25 units^2

9. 132 cm^2

10. about 236.625 ft^2

14. about 21.87 ft^2

16. $P =$ about 94.2 ft
$A =$ about 628 ft^2

Pg. 591 - 592 #1, 7-13 odd, 16, 19

1. *Sample answer:* 1) Use a net. 2) Use the formula
   $S = 2\ell w + 2\ell h + 2wh.$

7. 324 m²

9. 49.2 yd²

11. 136 m²

13. 294 yd²

16. The area of the 3 × 5 face is used 4 times rather than
    just twice.

    $S = 2(3)(5) + 2(3)(4) + 2(5)(4)$
    $= 30 + 24 + 40$
    $= 94$ in.²

19. yes; Because you do not need to frost the bottom of the cake, you only need 249 square inches of frosting.

Pg. 598, #1, 2, 7-13 odd, 14-16

1. no; The lateral faces of a pyramid are triangles.

2. Knowing the slant height helps because it represents the height of the triangle that makes up each lateral face. So, the slant height helps you to find the area of each lateral face.

7. 144 ft²

9. 170.1 yd²

11. 1240.4 mm²

13. 6 m

14. 165 ft²

15. 283.5 cm²

16. 281 ft²

Pg. 612-613 #1, 3, 4, 5 – 17 odd

3. The volume of an object is the amount of space it occupies. The surface area of an object is the sum of the areas of all its faces.

4. 729 in.^{3}

5. 288 cm^3

7. 210 yd^3

9. 420 mm^3

11. 645 mm^3

13. The area of the base is wrong.

$$V = \frac{1}{2}(7)(5) \cdot 10$$

$$= 175 \text{ cm}^3$$

15. 225 in.^{3}

17. 7200 ft^3

Pg. 618-619, #1, 3, 4, 5-15 odd

1. The volume of a pyramid is $\frac{1}{3}$ times the area of the base times the height. The volume of a prism is the area of the base times the height.

3. 3 times

4. $1\frac{1}{3}$ ft^3

5. 20 mm^3

7. 80 in.^{3}

9. 252 mm^3

11. 700 mm^3

13. 156 ft^3

15. 340.4 in.^{3}

Pg. 604-605, #7-9, 11-14, 17, 22

7. $156\pi \approx 489.8 \text{ ft}^2$

8. $90\pi \approx 282.6 \text{ cm}^2$

9. $120\pi \approx 376.8 \text{ ft}^2$

11. $28\pi \approx 87.9 \text{ m}^2$

12. The area of only one base is added. The first term should have a factor of 2;

$$S = 2\pi r^2 + 2\pi rh$$
$$= 2\pi (5)^2 + 2\pi (5)(10.6)$$
$$= 50\pi + 106\pi$$
$$= 156\pi \approx 489.8 \text{ yd}^2$$

13. $432\pi \approx 1356.48 \text{ ft}^2$

14. about 36.4%

17. See *Taking Math Deeper*.

22. C