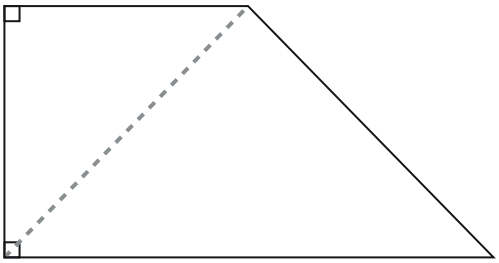
Name: _____ Date: _____

Lesson 10.4 Area of Composite Figures

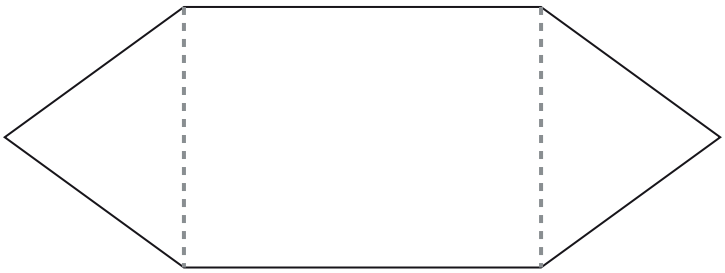
Divide each plane figure into other polygons.

Example

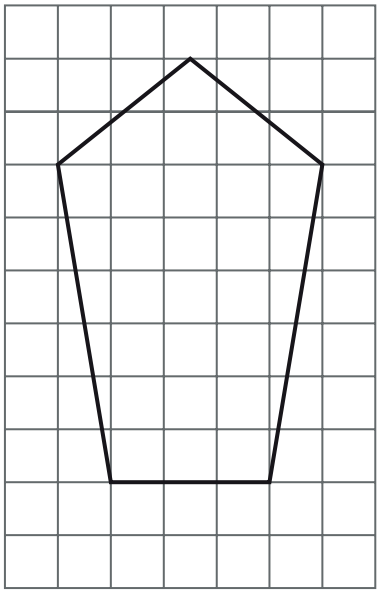
a) Divide the trapezoid into two triangles.



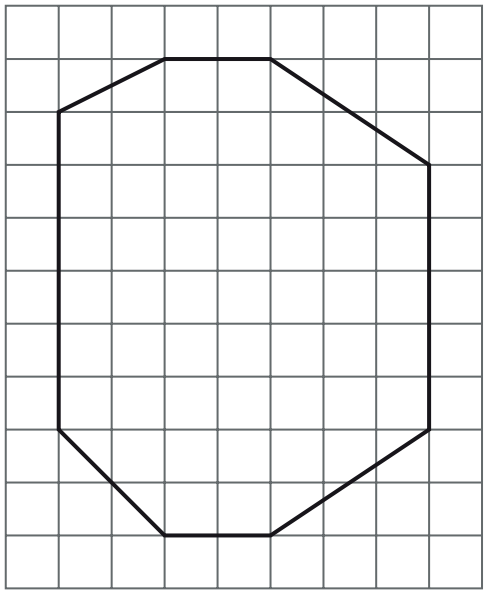
b) Divide the hexagon into two triangles and a rectangle.



1. Divide the pentagon into a triangle and a trapezoid.



2. Divide the octagon into two trapezoids and a rectangle.



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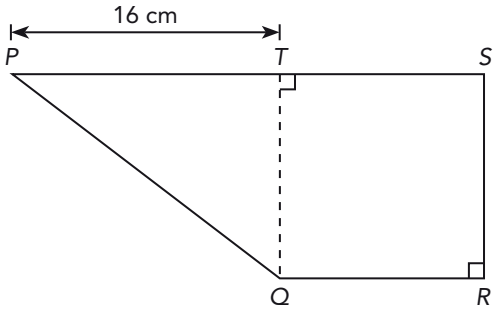
Solve. Show your work.

Example

Trapezoid *PQRS* is made up of square *QRST* and triangle *PQT*. The area of square *QRST* is 144 square centimeters. *PT* is 16 centimeters. Find the area of triangle *PQT*, and trapezoid *PQRS*.



Area of square = ℓ^2

A square is a rectangle where the length is the same as its width.

144 = ℓ^2

$\sqrt{144}$ = ℓ

12 = ℓ

Area of triangle = $\frac{1}{2}bh$

= $\frac{1}{2}$ · 16 · 12

= 96 cm^2

The side length of the square is also the height of triangle *PQT*.

The area of triangle *PQT* is 96 square centimeters.

Area of trapezoid *PQRS*

= area of square *QRST* + area of triangle *PQT*

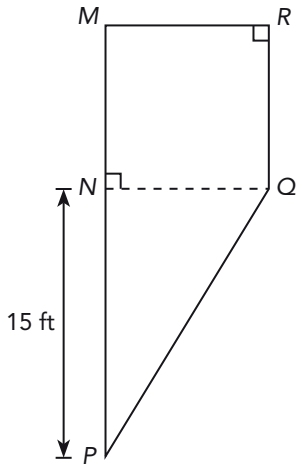
= 144 + 96

= 240 cm^2

The area of trapezoid *PQRS* is 240 square centimeters.

Name: _____ Date: _____

3. Trapezoid *MPQR* is made up of square *MNQR* and triangle *NPQ*. The area of square *MNQR* is 81 square feet. *NP* is 15 feet.



a) Find the area of triangle *NPQ*.

Area of square = ℓ^2

_____ = ℓ^2

_____ = ℓ

_____ = ℓ

Area of triangle = $\frac{1}{2}bh$

= $\frac{1}{2}$ · _____ · _____

= _____ ft^2

The area of triangle *NPQ* is _____ square feet.

b) Find the area of trapezoid *MPQR*.

Area of trapezoid *MPQR*

= area of square *MNQR* + area of triangle *NPQ*

= _____ + _____

= _____ ft^2

The area of trapezoid *MPQR* is _____ square feet.

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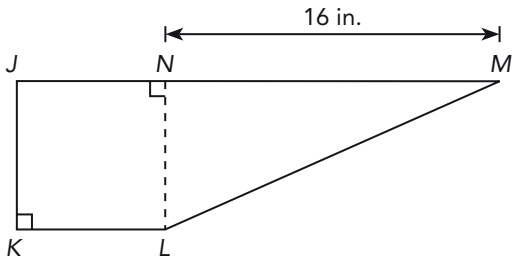
4. Trapezoid *JKLM* is made up of square *JKLN* and triangle *LMN*. The area of triangle *LMN* is 56 square inches. *NM* is 16 inches.



a) Find the height of triangle *LMN*.

b) Find the area of square *JKLN*.

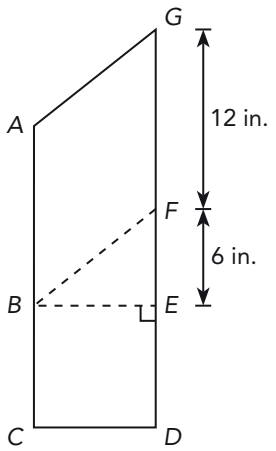
c) Find the area of trapezoid *JKLM*.

Name: _____ Date: _____

Solve. Show your work.

Example

Trapezoid *ACDG* is made up of parallelogram *ABFG*, triangle *BEF*, and square *BCDE*. The area of trapezoid *ABEG* is 120 square inches. Find the area of trapezoid *ACDG*.



Area of trapezoid *ABEG* = $\frac{1}{2}h(b_1 + b_2)$

$\underline{120} = \frac{1}{2} \cdot h \cdot (\underline{12} + \underline{12} + \underline{6})$

$\underline{120} = \frac{1}{2} \cdot h \cdot \underline{30}$

$\underline{120} = \frac{1}{2} \cdot \underline{30} \cdot h$

$\underline{120} = \underline{15} \cdot h$

$\underline{120} \div \underline{15} = \underline{15} \cdot h \div \underline{15}$

$\underline{8} = h$

Area of square *BCDE* = ℓ^2

$= \underline{8} \times \underline{8}$

$= \underline{64}$ in.^{2}

Area of trapezoid *ACDG* = area of trapezoid *ABEG* + area of square *BCDE*

$= \underline{120} + \underline{64}$

$= \underline{184}$ in.^{2}

The area of trapezoid *ACDG* is $\underline{184}$ square inches.

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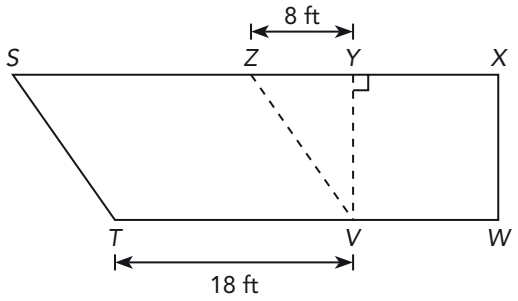
5. Trapezoid *STWX* is made up of parallelogram *STVZ*, triangle *ZVY*, and square *VWXY*. The area of trapezoid *STVY* is 242 square feet. Find the area of trapezoid *STWX*.



Area of trapezoid *STVY* = $\frac{1}{2}h(b_1 + b_2)$

_____ = $\frac{1}{2}$ · *h* · (_____ + _____ + _____)

_____ = $\frac{1}{2}$ · *h* · _____

_____ = $\frac{1}{2}$ · _____ · *h*

_____ = _____ · *h*

_____ ÷ _____ = _____ · *h* ÷ _____

_____ = *h*

Area of square *VWXY* = ℓ^2

= _____ × _____

= _____ ft^2

Area of trapezoid *STWX*

= area of trapezoid *STVY* + area of square *VWXY*

= _____ + _____

= _____ ft^2

The area of trapezoid *STWX* is _____ square feet.

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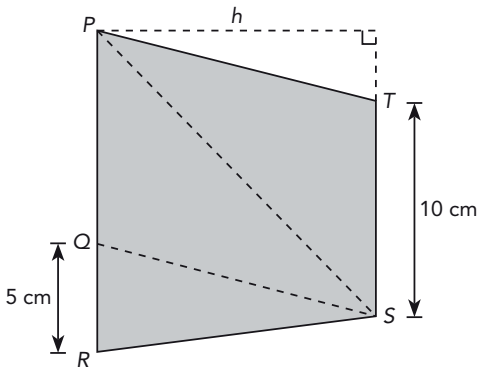
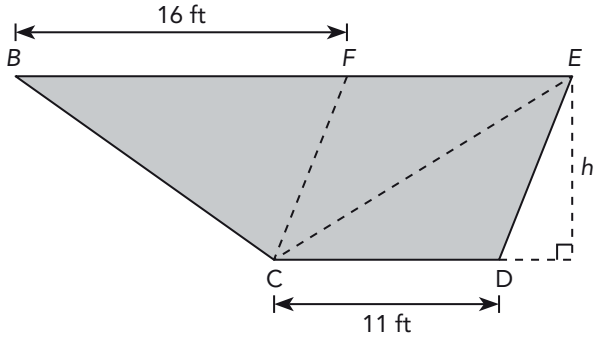
6. In the figure below, trapezoid *PRST* is made up of three triangles, and figure *PQST* is a parallelogram. Find the area of triangle *PQS* if the area of trapezoid *PRST* is 162.5 square centimeters.



7. In the figure below, trapezoid *BCDE* is made up of three triangles, and figure *CDEF* is a parallelogram. Find the area of triangle *CEF* if the area of trapezoid *BCDE* is 171 square feet.



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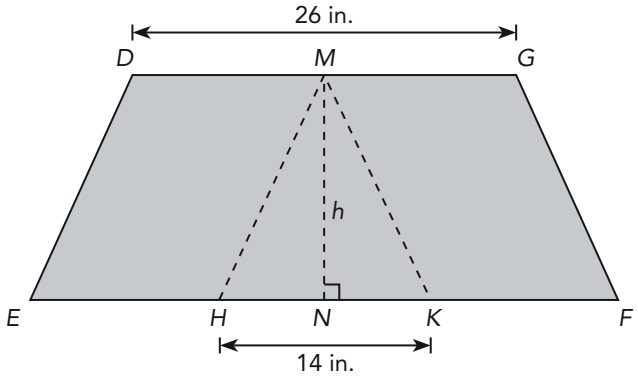
8. In the figure below, trapezoid *DEFG* is made up of triangle *MHK* and two identical parallelograms *DEHM* and *MKFG*. The area of triangle *MHK* is 105 square inches. Find the area of trapezoid *DEFG*.



8. Area of trapezoid $WXYZ = \frac{1}{2}h(b_1 + b_2)$

$$\underline{540} = \frac{1}{2} \cdot h \cdot (\underline{22} + \underline{38})$$
$$\underline{540} = \frac{1}{2} \cdot h \cdot \underline{60}$$
$$\underline{540} = \frac{1}{2} \cdot \underline{60} \cdot h$$
$$\underline{540} = \underline{30} \cdot h$$
$$\underline{540} \div \underline{30} = \underline{30} \cdot h \div \underline{30}$$
$$\underline{18} = h$$

The height of trapezoid *WXYZ* is 18 inches.

9. 34 meters **10.** 23 feet

11. a) Area of trapezoid $CDEF = \frac{1}{2}h(b_1 + b_2)$

$$\underline{832} = \frac{1}{2} \cdot h \cdot (\underline{28.6} + \underline{13})$$
$$\underline{832} = \frac{1}{2} \cdot h \cdot \underline{41.6}$$
$$\underline{832} = \frac{1}{2} \cdot \underline{41.6} \cdot h$$
$$\underline{832} = \underline{20.8} \cdot h$$
$$\underline{832} \div \underline{20.8} = \underline{20.8} \cdot h \div \underline{20.8}$$
$$\underline{40} = h$$

The height of trapezoid *CDEF* is 40 feet.

b) Area of triangle $FDE = \frac{1}{2}bh$

$$= \frac{1}{2} \cdot \underline{13} \cdot \underline{40}$$
$$= \underline{260} \text{ ft}^2$$

The area of triangle *FDE* is 260 square feet.

Lesson 10.3

1. Area of triangle $= \frac{1}{2}bh$

$$= \frac{1}{2} \cdot \underline{14} \cdot \underline{9.6}$$
$$= \underline{67.2} \text{ cm}^2$$

Area of pentagon
$= \underline{5} \cdot$ area of triangle
$= \underline{5} \times \underline{67.2}$
$= \underline{336} \text{ cm}^2$

The area of the pentagon is 336 square centimeters.

2. 97.5 square inches

3. Area of triangle $= \frac{1}{2}bh$

$$= \frac{1}{2} \cdot \underline{20} \cdot \underline{17.3}$$
$$= \underline{173} \text{ cm}^2$$

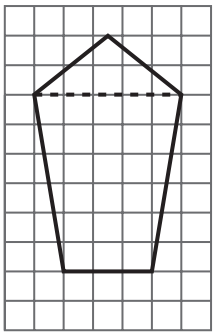
Area of hexagon
$= \underline{6} \cdot$ area of triangle
$= \underline{6} \times \underline{173}$
$= \underline{1{,}038} \text{ cm}^2$

The area of the tablemat is 1,038 square centimeters.

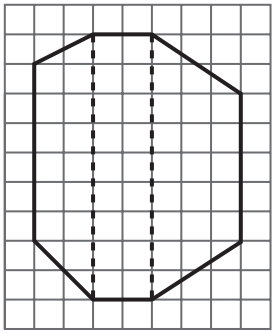
4. 940.5 square inches

Lesson 10.4

1.



2.



3. a) Area of square $= \ell^2$

$$\underline{81} = \ell^2$$
$$\underline{\sqrt{81}} = \ell$$
$$\underline{9} = \ell$$

Area of triangle $= \frac{1}{2}bh$

$$= \frac{1}{2} \cdot \underline{15} \cdot \underline{9}$$
$$= \underline{67.5} \text{ ft}^2$$

The area of the triangle *NPQ* is 67.5 square feet.

b) Area of trapezoid *MPQR*
= area of square *MNQR* + area of triangle *NPQ*
$= \underline{81} + \underline{67.5}$
$= \underline{148.5} \text{ ft}^2$

The area of trapezoid *MPQR* is 148.5 square feet.

4. a) 7 inches

b) 49 square inches

c) 105 square inches

5. Area of trapezoid $STVY = \frac{1}{2}h(b_1 + b_2)$

$$\underline{242} = \frac{1}{2} \cdot h \cdot (\underline{18} + \underline{18} + \underline{8})$$
$$\underline{242} = \frac{1}{2} \cdot h \cdot \underline{44}$$
$$\underline{242} = \frac{1}{2} \cdot \underline{44} \cdot h$$
$$\underline{242} = \underline{22} \cdot h$$
$$\underline{242} \div \underline{22} = \underline{22} \cdot h \div \underline{22}$$
$$\underline{11} = h$$

Area of square $VWXY = \ell^2$

$= \underline{11} \cdot \underline{11}$

$= \underline{121}$ ft^2

Area of trapezoid $STWX$

= area of trapezoid $STVY$ + area of square $VWXY$

$= \underline{242} + \underline{121}$

$= \underline{363}$ ft^2

The area of trapezoid $STWX$ is $\underline{363}$ square feet.

6. 65 square centimeters

7. 49.5 square feet

8. 495 square inches

Chapter 11

Lesson 11.1

1. 3.236 **2.** 5.051 **3.** 4.65

4. 7.755 **5.** 18.48 **6.** 18.84

7. 3.56 **8.** 0.34 **9.** 22

10. 60 **11.** 20.1 **12.** 1.0

13. $\overline{JM}$ and $\overline{KN}$.

14. $\overline{HK}$. It does not pass through the center O.

15. $\overline{OJ}$, $\overline{OK}$, $\overline{OL}$, $\overline{OM}$, and $\overline{ON}$.

16. Diameter = radius × 2

$= \underline{13} \times \underline{2}$

$= \underline{26}$ ft

The diameter of the circle is $\underline{26}$ feet.

17. 6.5 feet

18. Radius = diameter ÷ 2

$= \underline{32} \div \underline{2}$

$= \underline{16}$ in.

The radius of the circle is $\underline{16}$ inches.

19. 12.3 centimeters

20. Circumference = πd

$\approx \frac{22}{7} \cdot \underline{21}$

$= \underline{22} \cdot \underline{3}$

$= \underline{66}$ in.

The circumference of the wheel is approximately $\underline{66}$ inches.

21. 125.6 millimeters

22. Circumference = πd

$\approx \underline{3.14} \cdot \underline{15}$

$= \underline{47.1}$ in.

Length of semicircular arc

$= \frac{1}{2} \times$ circumference

$= \frac{1}{2} \times \underline{47.1}$

$= \underline{23.55}$ in.

The length of the ruler is approximately $\underline{23.55}$ inches.

23. 64.25 centimeters

24. Circumference = $2\pi r$

$\approx 2 \cdot \underline{3.14} \cdot \underline{25}$

$= \underline{157}$ in.

Length of arc of quadrant

$= \frac{1}{4} \times$ circumference

$= \frac{1}{4} \times \underline{157}$

$= \underline{39.25}$ in.

The length of the arc of the quadrant is approximately $\underline{39.25}$ inches.

25. 77 millimeters

26. Circumference = πd

$\approx \underline{3.14} \cdot \underline{26}$

$= \underline{81.64}$ cm

Length of arc of quadrant

$= \frac{1}{4} \times$ circumference

$= \frac{1}{4} \times \underline{81.64}$

$= \underline{20.41}$ cm

Distance around the figure

$= \text{length of arc of quadrant} + 6 \cdot \frac{26}{2} + 2 \cdot \underline{26}$

$= 20.41 + \underline{78} + \underline{52}$

$= \underline{150.41}$ cm

The distance around the figure is approximately $\underline{150.41}$ centimeters.

27. 50 inches **28.** 58.5 feet

Lesson 11.2

1. Area = πr^2

$\approx \underline{3.14} \cdot \underline{5} \cdot \underline{5}$

$= \underline{78.5}$ cm^2

The area of the circle is approximately $\underline{78.5}$ square centimeters.

2. 12,474 square millimeters

3. Radius = diameter ÷ 2

$= \underline{56} \div 2$

$= \underline{28}$ ft

Area of circle = πr^2

$\approx \frac{22}{7} \times \underline{28} \times \underline{28}$

$= \underline{2{,}464}$ ft^2

The area of the circle is approximately $\underline{2{,}464}$ square feet.

4. 34,650 square meters