# 6th to 7th Grade Intensive Summer Math Packet

This packet contains skills and concepts needed to be successful in Intensive 7th Grade Math. Intensive 7th Grade Math will include the 7th and 8th grade math curriculum, taught simultaneously, and concepts you learned in 6th grade must be very strong.

This material is to help keep you fresh on your math skills throughout the summer. It is strongly recommended that you **NOT** do all of the work in one sitting. Do a page every so often. NOTE: On the sections where you feel there is not enough room to show the entire process to solve a problem, please work problems on notebook paper and attach it to the back of the packet. This applies particularly to the equations, inequalities, and geometry Make sure to label each section and number your problems.

**The packet will be graded for accuracy along with how well you are able to show the process needed in order to solve a problem.** Examples of how to show work and the process involved are included. **WORK AND THE PROCESS USED TO OBTAIN YOUR ANSWERS MUST BE SHOWN. NO WORK MEANS NO CREDIT,** EVEN IF ALL THE ANSWERS ARE RIGHT!

**There will be a test on this material during the first week of school.**

# Solving One-Step Equations

1. Cancel out the number on the same side of the equal sign as the variable using inverse operations (addition/subtraction; multiplication/division)
2. Be sure to do the same thing to both sides of the equation!

ex: $-18 = 6j$

$$\frac{-18}{6} = \frac{6j}{6}$$

$-3 = j \rightarrow \boxed{j = -3}$

# Solving Two-Step Equations

1. Undo operations one at a time with inverse operations, using the order of operations in reverse (i.e. undo addition/subtraction before multiplication/division)
2. Be sure to always do the same thing to both sides of the equation!

ex: $\frac{a}{7} - 12 = -9$

$$\frac{a}{7} - 12 = -9$$
$$+12 \quad +12$$
$$7 \times \frac{a}{7} = 3 \times 7$$

$\boxed{a = 21}$

# Solving One-Step Inequalities

**Example 1**

**Solve $x + 9 \leq 12$. Represent the solution on a number line.**

| | |
|---|---|
| $x + 9 \leq 12$ | Write the inequality. |
| $-9 \quad -9$ | Subtract 9 from each side. |
| $x \leq 3$ | Simplify. |

The solution is $x \leq 3$. To graph it, draw a closed dot at 3 and draw an arrow to the left on the number line.

**Example 2**

**Solve $3x > 15$. Represent the solution on a number line.**

| | |
|---|---|
| $3x > 15$ | Write the inequality. |
| $\frac{3x}{3} > \frac{15}{3}$ | Divide each side by 3. |
| $x > 5$ | Simplify. |

The solution is $x > 5$. To graph it, draw an open dot at 5 and draw an arrow to the right on the number line.

# Solving Two-Step Inequalities

A **two-step inequality** is an inequality that contains two operations. To solve a two-step inequality, use inverse operations to undo each operation in reverse order of the order of operations.

**Example 1**
**Solve $4x - 2 \leq 18$. Graph the solution set on a number line.**

| | | | |
|---|---|---|---|
| $4x - 2$ | $\leq$ | $18$ | Write the inequality. |
| $+2$ | | $+2$ | Addition Property of Inequality |
| $4x$ | $\leq$ | $20$ | Simplify. |
| $\frac{4x}{4}$ | $\leq$ | $\frac{20}{4}$ | Division Property of Inequality |
| $x$ | $\leq$ | $5$ | Simplify. |

The solution is $x \leq 5$.

Graph the solution set.

Draw a closed dot at 5 with an arrow to the left.

| | | |
|---|---|---|
| **Check** | $4x - 2 \leq 18$ | Write the inequality. |
| | $4(3) - 2 \leq 18$ | Replace $x$ with a number less than or equal to 5. |
| | $10 \leq 18$ | This statement is true. |

# Adding and Subtracting Integers

1. Change all double negatives to positive.
   Ex: $5 - (-4) = \longrightarrow 5 + 4 = 9$
   Ex: $-2 - (-3) = \longrightarrow -2 + 3 = 1$
2. If the signs are the same : ADD
3. If the signs are different: SUBTRACT
4. Always keep the sign of the bigger number

# Multiplying and Dividing Integers

1. Multiply or Divide ; depending on the operation
2. If the signs are the same : Answer will be positive
3. If the signs are different: Answer will be negative

# Area and Circumference

## Rectangles:

The **area** of a figure is the number of square units needed to cover a surface.

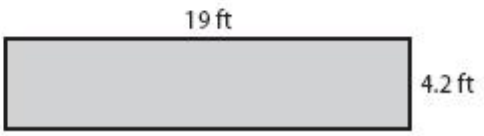
- A **rectangle** is a quadrilateral with opposite sides parallel and equal in length.
- The formula for finding the area of a rectangle is $A = \ell w$, where $\ell$ represents the length of the rectangle, and $w$ represents the width of the rectangle.
- A **square** is a rectangle with all sides congruent.
- The formula for finding the area of a square can be written as $A = s^2$, where $s$ is the length of the side of the square.

**Example**

**Write an equation to determine the area of the rectangle.**

| | |
|---|---|
| $A = \ell w$ | Area of a rectangle |
| $A = 19 \cdot 4.2$ | Replace $\ell$ with 19 and $w$ with 4.2. |
| $A = 79.8$ | Multiply. |

The area is 79.8 square feet.

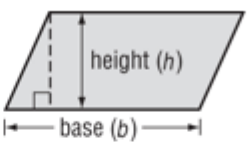



## Parallelograms:

**Words** The area $A$ of a parallelogram is the product of any base $b$ and its height $h$.

**Symbols** $A = bh$

**Model**

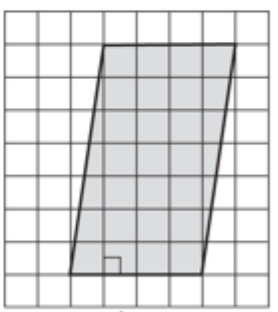



**Example**

**Determine the area of the parallelogram.**

| | |
|---|---|
| $A = bh$ | Area of parallelogram |
| $A = 4 \times 7$ | Replace $b$ with 4 and $h$ with 7. |
| $A = 28$ | Multiply. |

The area is 28 square units or 28 units$^2$.

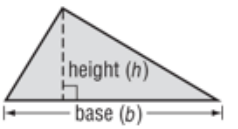


The base is 4 units, and the height is 7 units.

## Area of Triangles

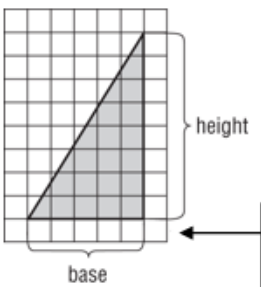
| | |
|---|---|
| **Words** | The area $A$ of a triangle is one half the product of any base $b$ and its height $h$. |
| **Symbols** | $A = \frac{1}{2}bh$ or $A = \frac{bh}{2}$ |

**Model**




**Examples**

**1. Determine the area.**

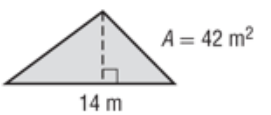



The measure of the base is 5 units, and the height is 8 units.

| | |
|---|---|
| $A = \frac{bh}{2}$ | Area of a triangle |
| $A = \frac{5 \times 8}{2}$ | Replace $b$ with 5 and $h$ with 8. |
| $A = \frac{40}{2}$ | Simplify the numerator. |
| $A = 20$ | Divide. |

The area is 20 square units.

**2. Determine the height.**



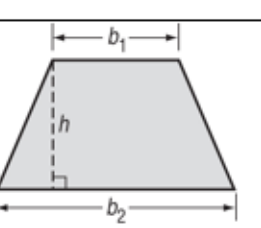

| | |
|---|---|
| $A = \frac{bh}{2}$ | Area of a triangle |
| $42 = \frac{14 \cdot h}{2}$ | Replace $A$ with 42 and $b$ with 14. |
| $42(2) = \frac{14 \cdot h}{2}(2)$ | Multiply both sides by 2. |
| $84 = 14 \bullet h$ | Simplify. |
| $\frac{84}{14} = \frac{14 \cdot h}{14}$ | Divide by 14. |
| $6 = h$ | Simplify. |

The height is 6 meters.

## Area of Trapezoids

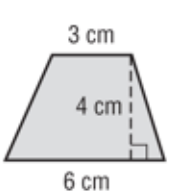
A trapezoid has two bases, $b_1$ and $b_2$. The height of a trapezoid is the distance between the two bases. The area $A$ of a trapezoid equals half the product of the height $h$ and the sum of the bases $b_1$ and $b_2$.

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




**Example**

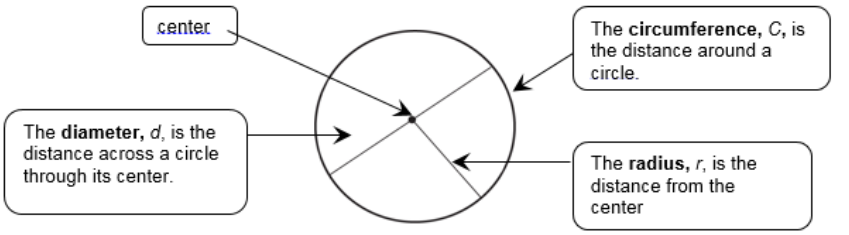
**Determine the area of the trapezoid.**




| | |
|---|---|
| $A = \frac{1}{2}h(b_1 + b_2)$ | Area of a trapezoid |
| $A = \frac{1}{2}(4)(3 + 6)$ | Replace $h$ with 4, $b_1$ with 3, and $b_2$ with 6. |
| $A = \frac{1}{2}(4)(9)$ | Add 3 and 6. |
| $A = 18$ | Simplify. |

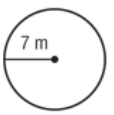
The area of the trapezoid is 18 square centimeters.

## Circumference




| | |
|---|---|
| The diameter of a circle is twice its radius. | $d = 2r$ |
| The radius is half the diameter. | $r = \frac{d}{2}$ |
| The circumference of a circle is equal to $\pi$ times its diameter or $\pi$ times twice its radius. | $C = \pi d$<br>$C = 2\pi r$ |

**Example 1**
**The radius of a circle is 7 meters. Determine the diameter.**




| | |
|---|---|
| $d = 2r$ | |
| $d = 2 \cdot 7$ | Replace $r$ with 7. |
| $d = 14$ | Multiply. |

The diameter is 14 meters.

**Example 2**
**Determine the circumference of a circle with a radius that is 13 inches. Use 3.14 for $\pi$. Round to the nearest tenth.**

| | |
|---|---|
| $C = 2\pi r$ | Write the formula. |
| $C \approx 2 \times 3.14 \times 13$ | Replace $r$ with 13 and $\pi$ with 3.14. |
| $C \approx 81.64$ | Multiply. |

Rounded to the nearest tenth, the circumference is about 81.6 inches.

# Area of Circles

The area $A$ of a circle equals the product of pi ($\pi$) and the square of its radius $r$. $\boldsymbol{A = \pi r^2}$

**Example 1**
**Determine the area of the circle. Use 3.14 for $\pi$.**

| | |
|---|---|
| $A = \pi r^2$ | Area of circle |
| $A \approx 3.14 \cdot 5^2$ | Replace π with 3.14 and $r$ with 5. |
| $A \approx 3.14 \cdot 25$ | $5^2 = 5 \cdot 5 = 25$ |
| $A \approx 78.5$ | |

The area of the circle is approximately 78.5 square centimeters.

The formula for the area of a semicircle or half a circle is $A = \frac{1}{2}\pi r^2$ and the formula for the area of a quarter circle is $A = \frac{1}{4}\pi r^2$.

**Example 2**
**Determine the area of a semicircle that has a diameter of 9.4 millimeters. Use 3.14 for $\pi$. Round to the nearest tenth.**

| | |
|---|---|
| $A = \frac{1}{2}\pi r^2$ | Area of semicircle |
| $A = \frac{1}{2} \cdot 3.14 \cdot 4.7^2$ | Replace $\pi$ with 3.14 and $r$ with 9.4 ÷ 2 or 4.7. |
| $A \approx 34.7$ | Multiply. |

The area of the semicircle is approximately 34.7 square millimeters.

# ONE-STEP EQUATIONS

- Remember to show the PROCESS to solving the equation, not just the answer.
- Be sure to box your answer.
- ***PROCESS:*** 37 = x + 15
- - 15 - 15

22 = x

***CALCULATIONS:***

Use this space to show your calculations. They are to be shown separate from the process.

1) $v - 10 = -9$

2) $v - 10 = -3$

3) $x - 3 = 4$

4) $\frac{x}{5} = 2$

5) $22 = -11k$

6) $-13m = -377$

7) $b - 7 = -1$

8) $-8 = p - 13$

9) $-40 = -5p$

10) $418 = -22a$

11) $\frac{a}{29} = 5$

12) $-2 = \frac{m}{16}$

# TWO-STEP EQUATIONS

- Remember to show the PROCESS to solving the equation, not just the answer.
- Be sure to box your answer.
- ***PROCESS:*** ½ x − 18 = 30

  Re-write $\frac{x}{2} - 18 = 30$

  $+18 \quad +18$

  $(2)\ \frac{x}{2} = 48\ (2)$

  **x = 96**

***CALCULATIONS:***

Use this space to show your calculations. They are to be shown separate from the process.

1) $\frac{r}{10} + 4 = 5$

2) $\frac{n}{2} + 5 = 3$

3) $3p - 2 = -29$

4) $1 - r = -5$

5) $\frac{p}{4} + 8 = 7$

6) $9 + \frac{n}{4} = 15$

7) $\frac{m}{16} - 9 = -8$

8) $-7 + 4r = -15$

9) $\frac{m - 13}{2} = -8$

10) $-5x + 13 = -17$

# ONE-STEP INEQUALITIES

- Remember to show the PROCESS to solving, not just the answer.
- Be sure to box your answer.
- ***PROCESS:*** $x + 12 \leq 20$

  $-12 \quad -12$

  $\boxed{x \leq 8}$

***CALCULATIONS:***

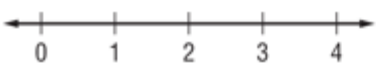
Use this space to show your calculations. They are to to be shown separate from the process.

## *Solve One-Step Inequalities*

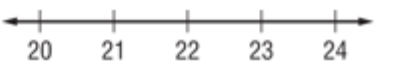
***< or > Open circle*** ***≤ or ≥ Closed circle***

**Solve each inequality. Represent the solution on a number line.**

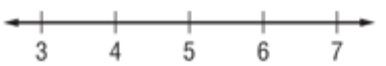
**1.** $8x > 16$



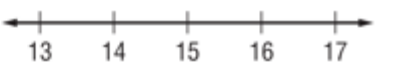

**2.** $h - 9 > 13$



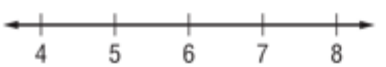

**3.** $t + 7 \leq 12$



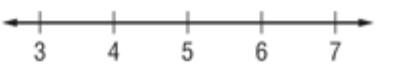

**4.** $\frac{r}{3} \geq 5$



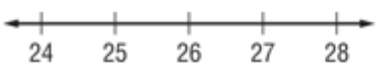

**5.** $j + 4 < 10$



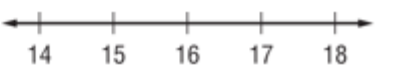

**6.** $7y < 35$



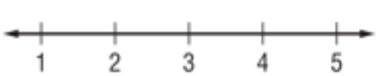

**7.** $b - 15 > 11$



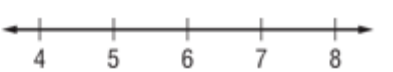

**8.** $\frac{n}{4} < 4$




**9.** $4b \geq 12$




**10.** $z + 8 \geq 14$



# TWO-STEP INEQUALITIES

- Remember to show the PROCESS to solving, not just the answer.
- ***PROCESS:*** $2x + 12 \leq 20$

$$\begin{array}{r} -12 \quad -12 \\ \hline \frac{2x}{2} \leq \frac{8}{2} \end{array}$$

$$\boxed{x \leq 4}$$

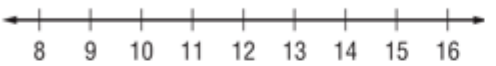
***CALCULATIONS:***

Use this space to show your calculations. They are to to be shown separate from the process.

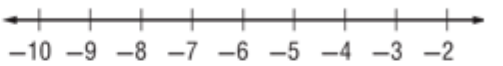
## *Solve and Write Two-Step Inequalities*

**Solve each inequality. Graph the solution set on a number line.**

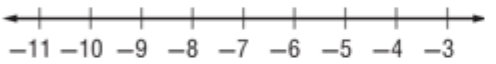
**1.** $\frac{x}{2} - 1 < 5$



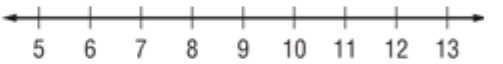

**2.** $13 \geq -x + 7$



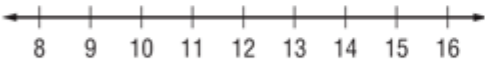

**3.** $-2 + 3x > -23$



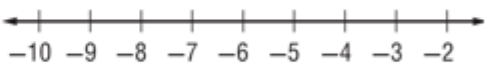

**4.** $3x - 4 \leq 23$



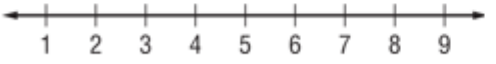

**5.** $10 \geq \frac{x}{3} + 6$



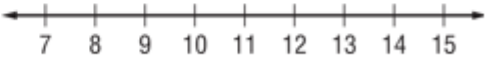

**6.** $-2x + 4 < 16$



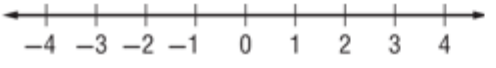

**7.** $13 > 3 + 2x$



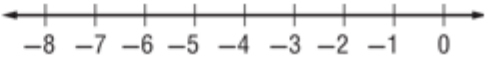

**8.** $11x - 1 \leq 120$




**9.** $-4 + \frac{x}{5} < -4$




**10.** $6x - 4 \geq -28$



# OPERATIONS WITH INTEGERS

**Note:** Show all work and BOX your answers!! Calculations may be shown underneath the problems in an organized manner.

EXAMPLE: 15 – 27= - 27

+ 15

- 12

**1.** 34 + 22

**2.** –29 + 30

**3.** 9 + (–32)

**4.** –6 – (–8)

**5.** –20 – 10

**6.** –28 – (–13)

**7.** –33 – 33

**8.** 28 – 14

**9.** 13 – (–63)

**10.** 4(–7)

11. –14(5)

**12.** 9(–12)

**13.** –6(–8)

**14.** 27(–3)

**15.** –11(–13)

**16.** 42 ÷ (–7)

**17.** 45 ÷ (–5)

**18.** –9 ÷ 3

**19.** –64 ÷ (–8)

**20.** –39 ÷ (–13)

**21.** –121 ÷ 11

**22.** $\left(\frac{27}{-9}\right) - 4$

**23.** $-8(-7) - 60$

**24.** $10(-4) + 18$

**25.** $-3\left(\frac{48}{8}\right) - (-4)$

**26.** $\left(\frac{96}{-12}\right) - (-20)$

**27.** $-13(2) + (-40)$

**28.** $(-7)(7)(2) + (-13)$

**29.** $(-3)(-12)(-5) - (-26)$

**30.** $\left(\frac{-45}{5}\right) + (-4)$

**31.** $\left(\frac{-28}{4}\right) + 8$

**32.** $\left(\frac{-144}{-12}\right) - (-16)$

**33.** $2(-8)(-3) + (-40)$

**34.** $2\left(\frac{45}{-9}\right) - (-7)$

**35.** $\left(\frac{-77}{7}\right) - 11$

**36.** $\left(\frac{-60}{12}\right) + 5$

# CIRCUMFERENCE AND AREA

- ✓ WRITE THE FORMULA ON EVERY PROBLEM
- ✓ LIST ALL MEASUREMENTS GIVEN
- ✓ PLUG NUMBERS INTO THE FORMULA
- ✓ SHOW YOUR CALCULATIONS ON THE SIDE, NOT WITHIN THE PROCESS.
- ✓ EXAMPLE: Find the area of a circle with a radius of 5.
  - ✓ $A = \pi r^2$
  - ✓ r = 5 in.

$$A = \pi r^2$$
$$3.14 \cdot 5^2$$
$$3.14 \cdot 25$$
$$A = 78.5\ in^2$$

CALCULATIONS GO IN THIS AREA.

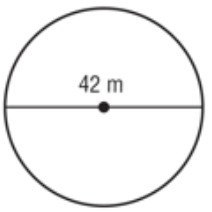
## *Circumference*

**Determine the radius or diameter of each circle with the given dimensions.**

**1.** $d = 18$ in. **2.** $d = 29$ m **3.** $r = 21$ ft **4.** $r = 13$ mm

**Determine the circumference of each circle. Use 3.14 or $\frac{22}{7}$ for $\pi$. Round to the nearest tenth if necessary.**

**5.**

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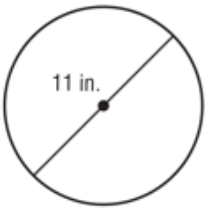


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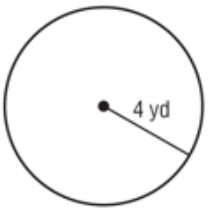
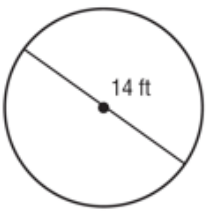



**8.**

**9.**

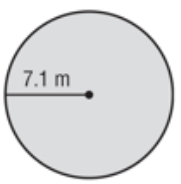



**10.**

## *Area of Circles*

**Determine the area of each circle. Use 3.14 or $\frac{22}{7}$ for $\pi$. Round to the nearest tenth.**

**11.**

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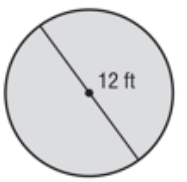


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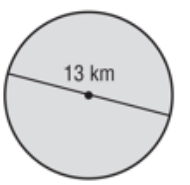
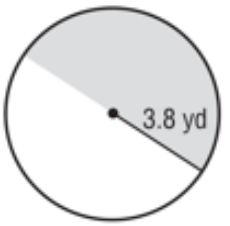


## Area of Circles

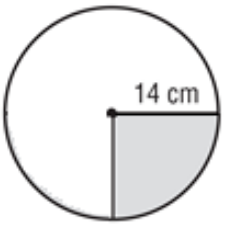
**Determine the area of each semicircle or quarter circle. Use 3.14 for $\pi$. Round to the nearest tenth.**

**14.**




**15.**

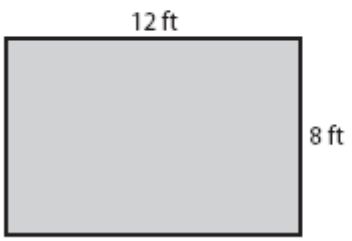
**16.**




## Area of Rectangles

**Write an equation to determine the area of each rectangle.**

**17.**

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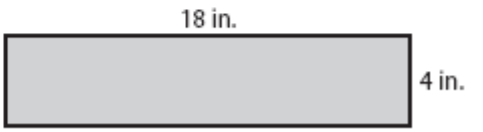
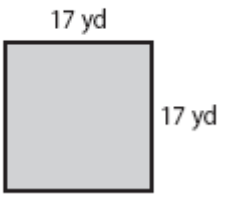


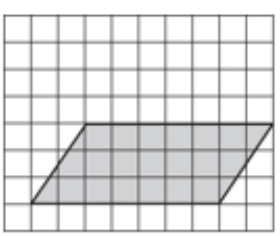

**19.**



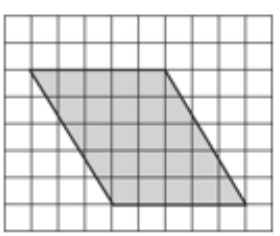

## Area of Parallelograms

**Determine the area of each parallelogram.**

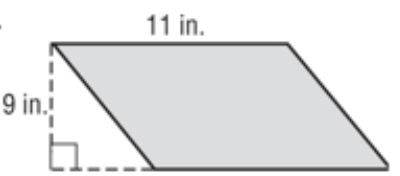
**20.**



**21.**



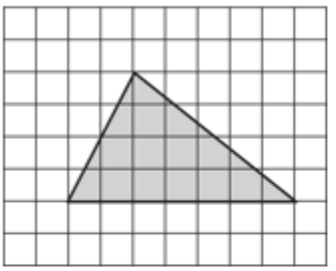
**22.**



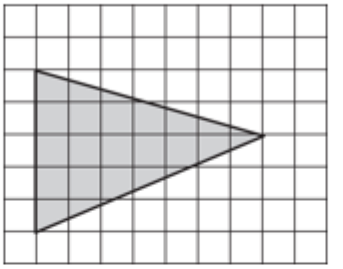
## *Area of Triangles*

**Determine the area of each triangle.**

**21.**



**22.**



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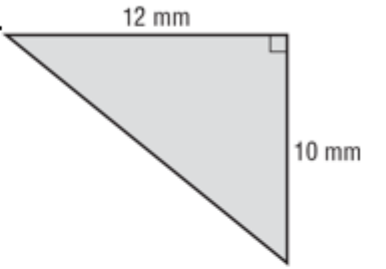
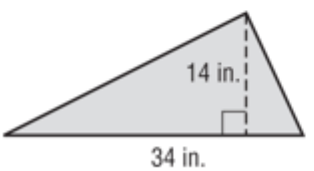



**24.**

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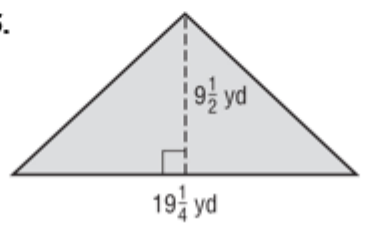


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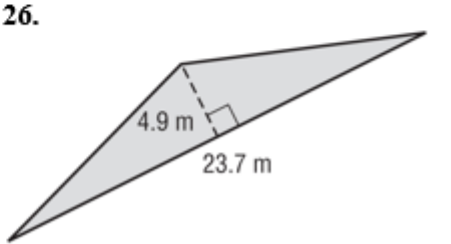
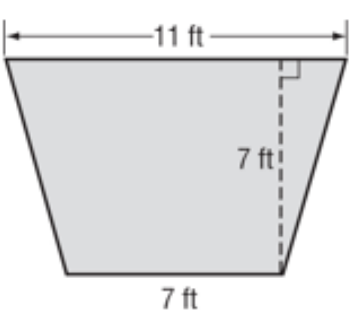


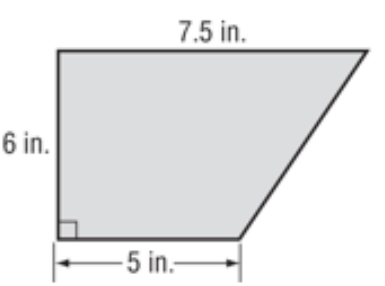

## *Area of Trapezoids*

**Determine the area of each figure. Round to the nearest tenth if necessary.**

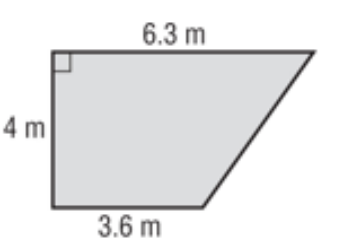
**27.**




**28.**




**29.**

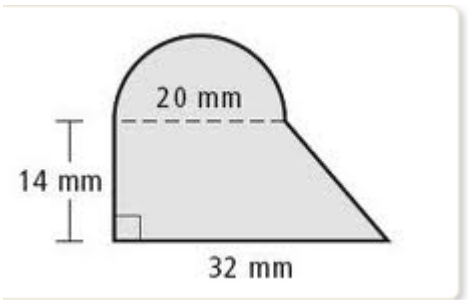


# AREA OF COMPOSITE FIGURES

A composite figure is "composed" of more than one geometric shape.
To find the area of a composite figure:

- ✓ WRITE THE FORMULA ON EVERY PROBLEM
- ✓ LIST ALL MEASUREMENTS GIVEN
- ✓ PLUG NUMBERS INTO THE FORMULA
- ✓ SHOW YOUR CALCULATIONS ON THE SIDE, NOT WITHIN THE PROCESS.

EXAMPLE: Find the area of the composite figure below.




**Area of semi-circle**: $\frac{\pi r^2}{2}$

d = 20

r = 10 mm

$\frac{3.14 \cdot 10^2}{2}$

$\frac{3.14 \cdot 100}{2}$

$\frac{314}{2}$

Area = 157 mm$^2$

**Area of trapezoid**: $\frac{1}{2}(b1 + b2)h$

b1 = 20mm

b2 = 32 mm

h = 14 mm

$\frac{1}{2}(20 + 32)14$

$\frac{1}{2}(52)(14)$

(26) (14)

A = 364 mm$^2$

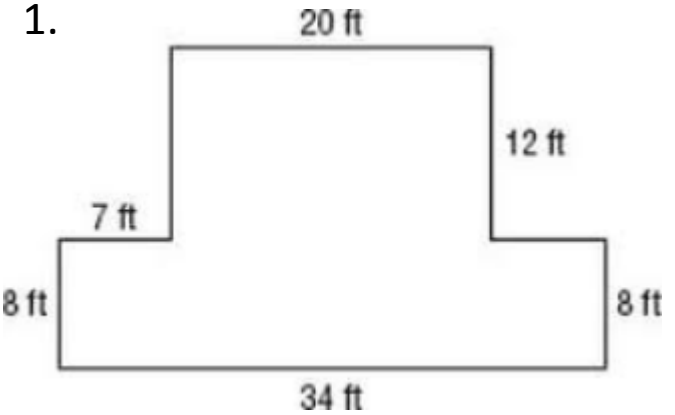
Area of semicircle: 157 mm$^2$

Area of trapezoid: + 364 mm$^2$

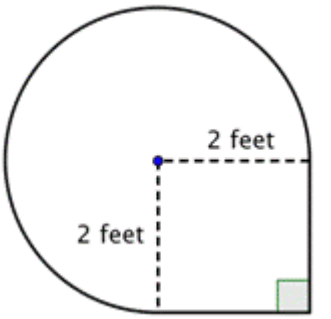
Area of composite figure: 521 mm$^2$

Find the area of the following composite figures. Round your answer to the nearest tenth if necessary.

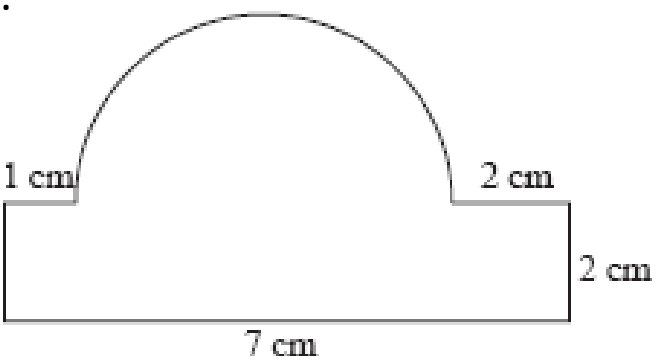
1.



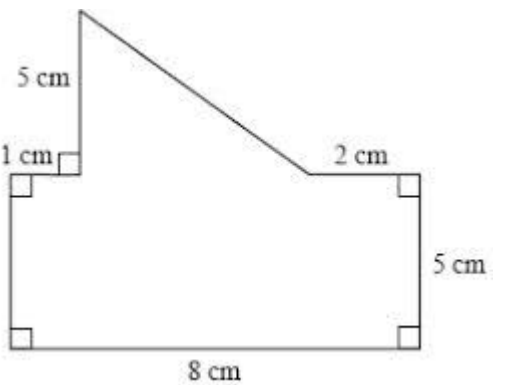

2.



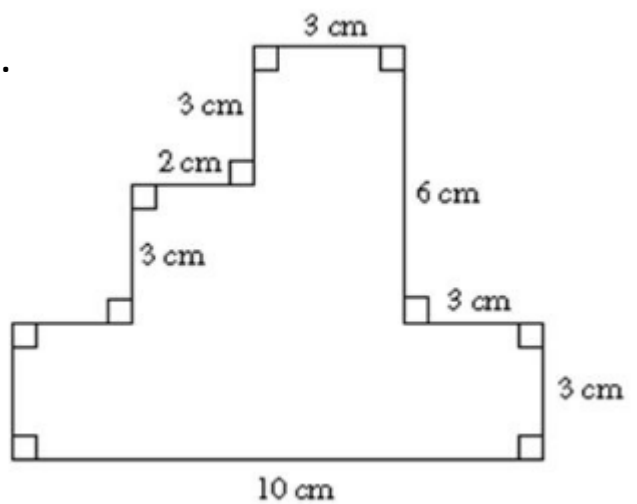

3.

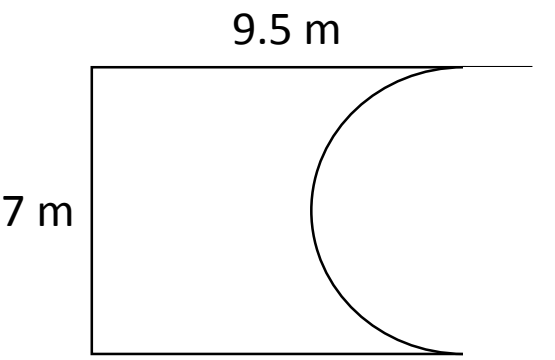



4.




5.




6.