# 6ᵗʰ to 7ᵗʰ Grade Intensive Summer Math Packet

This packet is made to keep you fresh on your math skills throughout the summer. It is strongly recommended NOT to do your assignment in one sitting. Do a page every so often.

This packet will be graded for accuracy. WORK MUST BE SHOWN. NO WORK MEANS NO CREDIT, EVEN IF ALL THE ANSWERS ARE RIGHT!

This packet will contain skills and concepts needed to be successful in Intensive 7ᵗʰ grade Math. These are some concepts you learned in 6ᵗʰ grade and must be strong in for 7ᵗʰ grade and some extended concepts to help with the 8ᵗʰ grade math that will be covered in 7ᵗʰ grade. This class will be a blend of 7ᵗʰ and 8ᵗʰ grade math.

There will be a test (not a quiz) on this material on the third day of school.

STAAR GRADE 7 MATHEMATICS REFERENCE MATERIALS
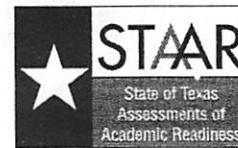
LINEAR EQUATIONS

Slope-intercept form	$y = mx + b$
Constant of proportionality	$k = \dfrac{y}{x}$

CIRCUMFERENCE

Circle	$C = 2\pi r$	or	$C = \pi d$

AREA

Triangle	$A = \dfrac{1}{2}bh$
Rectangle or parallelogram	$A = bh$
Trapezoid	$A = \dfrac{1}{2}(b_1 + b_2)h$
Circle	$A = \pi r^2$

VOLUME

Prism	$V = Bh$
Pyramid	$V = \dfrac{1}{3}Bh$

ADDITIONAL INFORMATION

Pi	$\pi \approx 3.14$	or	$\pi \approx \dfrac{22}{7}$
Distance			$d = rt$
Simple interest			$I = Prt$
Compound interest			$A = P(1 + r)^t$
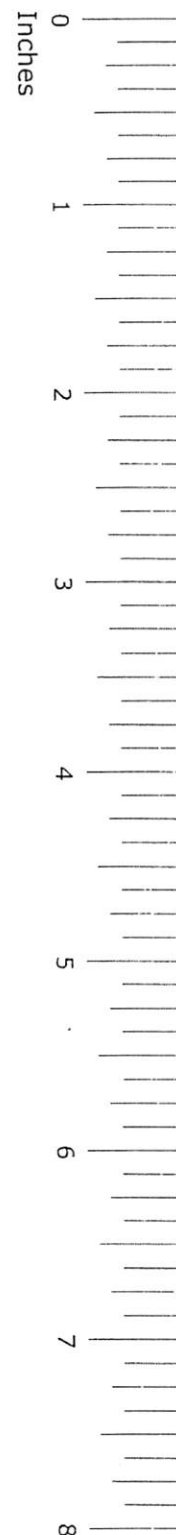
Inches
0
1
2
3
4
5
6
7
8

STAAR GRADE 7 MATHEMATICS REFERENCE MATERIALS

LENGTH

Customary	Metric
1 mile (mi) = 1,760 yards (yd)	1 kilometer (km) = 1,000 meters (m)
1 yard (yd) = 3 feet (ft)	1 meter (m) = 100 centimeters (cm)
1 foot (ft) = 12 inches (in.)	1 centimeter (cm) = 10 millimeters (mm)

VOLUME AND CAPACITY

Customary	Metric
1 gallon (gal) = 4 quarts (qt)	1 liter (L) = 1,000 milliliters (mL)
1 quart (qt) = 2 pints (pt)	
1 pint (pt) = 2 cups (c)	
1 cup (c) = 8 fluid ounces (fl oz)	

WEIGHT AND MASS

Customary	Metric
1 ton (T) = 2,000 pounds (lb)	1 kilogram (kg) = 1,000 grams (g)
1 pound (lb) = 16 ounces (oz)	1 gram (g) = 1,000 milligrams (mg)

Centimeters

STAAR GRADE 8 MATHEMATICS REFERENCE MATERIALS

★ STAAR
State of Texas
Assessments of
Academic Readiness
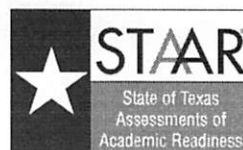
LINEAR EQUATIONS

Slope-intercept form	$y = mx + b$
Direct variation	$y = kx$
Slope of a line	$m = \dfrac{y_2 - y_1}{x_2 - x_1}$

CIRCUMFERENCE

Circle	$C = 2\pi r$	or	$C = \pi d$

AREA

Triangle	$A = \dfrac{1}{2}bh$
Rectangle or parallelogram	$A = bh$
Trapezoid	$A = \dfrac{1}{2}(b_1 + b_2)h$
Circle	$A = \pi r^2$

SURFACE AREA

	Lateral	Total
Prism	$S = Ph$	$S = Ph + 2B$
Cylinder	$S = 2\pi rh$	$S = 2\pi rh + 2\pi r^2$

VOLUME

Prism or cylinder	$V = Bh$
Pyramid or cone	$V = \dfrac{1}{3}Bh$
Sphere	$V = \dfrac{4}{3}\pi r^3$

ADDITIONAL INFORMATION

Pythagorean theorem	$a^2 + b^2 = c^2$
Simple interest	$I = Prt$
Compound interest	$A = P(1 + r)^t$

Evaluating Algebraic Expressions

1. Substitute the given values for the variables in the expression

2. Evaluate the expression using the order of operations
   - Parentheses/Brackets (inside to outside)
   - Exponents
   - Multiplication/Division (left to right)
   - Addition/Subtraction (left to right)

ex: $9x^2 - 4(y + 3z)$
for $x = -3, y = 2, z = 5$

$9(-3)^2 - 4(2 + 3 \cdot 5)$

$9(-3)^2 - 4(2 + 15)$

$9(-3)^2 - 4 \cdot 17$

$9 \cdot 9 - 4 \cdot 17$

$81 - 4 \cdot 17$

$81 - 68 = \boxed{13}$

The Distributive Property

1. Multiply the number outside the parentheses by each term in the parentheses.

2. Keep the addition/subtraction sign between each term.

ex: $5(8x - 3)$

$5(8x - 3)$

$5(8x) - 5(3)$

$\boxed{40x - 15}$

Simplifying Algebraic Expressions

1. Clear any parentheses using the Distributive Property

2. Add or subtract like terms (use the sign in front of each term to determine whether to add or subtract)

ex: $2(3x - 4) - 12x + 9$

$2(3x - 4) - 12x + 9$

$6x - 8 - 12x + 9$

$\boxed{-6x + 1}$

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: $-18 = 6j$

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

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

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: $\dfrac{a}{7} - 12 = -9$

$$\dfrac{a}{7} - 12 = -9$$
$$\phantom{\dfrac{a}{7}} + 12 \ + 12$$
$$\overline{}$$
$$7 \times \dfrac{a}{7} = 3 \times 7$$

$\boxed{a = 21}$

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.
$\underline{-9 \ -9}$	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.
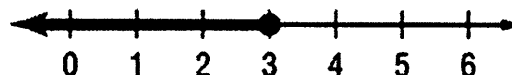
Example 2

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

$3x > 15$	Write the inequality.
$\dfrac{3x}{3} > \dfrac{15}{3}$	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.

1 2 3 4 5 6 7 8 9
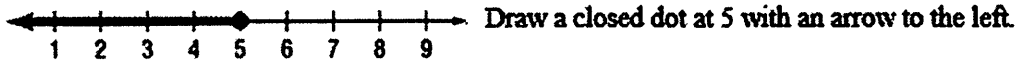
Check	$4x - 2 \leq 18$	Write the inequality.
	$4(3) - 2 \leq 18$	Replace x with a number less than or equal to 5.
	$10 \leq 18$	This statement is true.

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 ℓ 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 ℓ with 19 and w with 4.2.
$A = 79.8$	Multiply.

The area is 79.8 square feet.

19 ft

4.2 ft
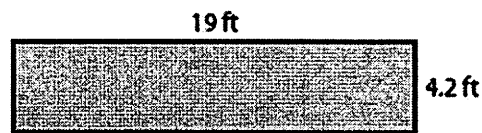
Parallelograms:

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

Model

height (h)

base (b)
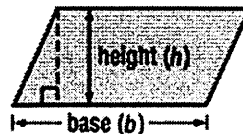
Example
Determine the area of the parallelogram.

$A = bh$	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.
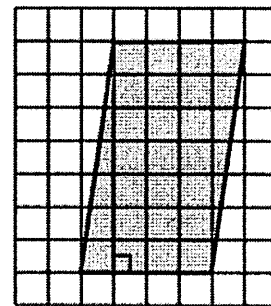
The base is 4 units, and the height is 7 units.

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
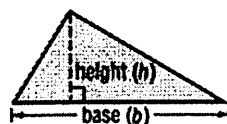
Examples

1. Determine the area.

height

base

	The measure of the base is 5 units, and the height is 8 units.
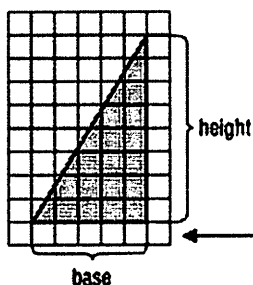
$A = \frac{bh}{2}$ Area of a triangle

$A = \frac{5 \times 8}{2}$ 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.

$A = 42 \text{ m}^2$

14 m
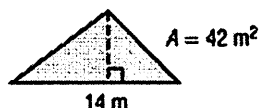
$A = \frac{bh}{2}$ Area of a triangle

$42 = \frac{14 \cdot h}{2}$ Replace A with 42 and b with 14.

$42(2) = \frac{14 \cdot h}{2}(2)$ Multiply both sides by 2.

$84 = 14 \cdot h$ 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.

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

b_1

h

b_2
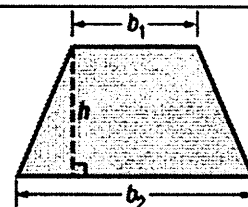
Example
Determine the area of the trapezoid.

3 cm

4 cm

6 cm

$A = \frac{1}{2}h(b_1 + b_2)$ 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.
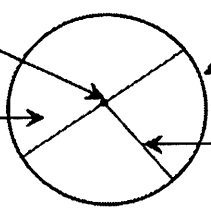
$A = 18$ Simplify.

The area of the trapezoid is 18 square centimeters.
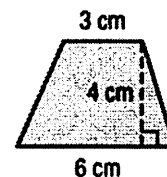
Circumference

The diameter of a circle is twice its radius.

The radius is half the diameter.

The circumference of a circle is equal to π times its diameter or π times twice its radius.

$d = 2r$

$r = \frac{d}{2}$

$C = \pi d$
$C = 2\pi r$

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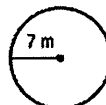
Example 2
Determine the circumference of a circle with a radius that is 13 inches. Use 3.14 for π. Round to the nearest tenth.

$C = 2\pi r$ Write the formula.

$C \approx 2 \times 3.14 \times 13$ Replace r with 13 and π 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 (π) and the square of its radius r. $A = \pi r^2$

Example 1
Determine the area of the circle. Use 3.14 for π.

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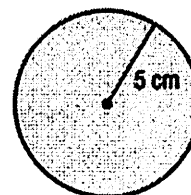
The formula for the area of a semicircle or half a circle is $A = \frac{1}{2}\pi r^2$ and the formula for the area of a quarter circle is $A = \frac{1}{4}\pi r^2$.

Example 2
Determine the area of a semicircle that has a diameter of 9.4 millimeters. Use 3.14 for π. 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 π 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.

Evaluate each expression for a = 9, b = -3, c = -2, d = 7. Show your work.

1. a - cd	2. $2b^3 + c^2$	3. $\dfrac{a + d - c}{b}$	4. $(a - b)^2 + d(a + c)$
5. 4c – (b – a)	6. $\dfrac{a}{b} \cdot 5a$	7. 2bc + d(12 – 5)	8. b + 0.5[8 – (2c + a)]

Simplify each expression using the Distributive Property.

9. 5(2g – 8)	10. 7(y + 3)	11. -3(4w – 3)	12. (6r + 3)2

Simplify each expression, showing all work.

13. 8(x + 1) – 12x	14. 6w – 7 + 12w – 3z	15. 9n – 8 + 3(2n – 11)	16. 3(7x + 4y) – 2(2x + y)
17. (15 + 8d)(-5) – 24d + d	18. 9(b – 1) – c + 3b + c	19. 20f – 4(5f + 4) + 16	20. 8(h – 4) – h – (h + 7)

Evaluate each expression for $a = 9$, $b = -3$, $c = -2$, $d = 7$. Show your work.

1. $a \cdot cd$	2. $2b^3 + c^2$	3. $\dfrac{a + d - c}{b}$	4. $(a - b)^2 + d(a + c)$
5. $4c - (b - a)$	6. $\dfrac{a}{b} - 5a$	7. $2bc + d(12 - 5)$	8. $b + 0.5[8 - (2c + a)]$

Simplify each expression using the Distributive Property.

9. $5(2g - 8)$	10. $7(y + 3)$	11. $-3(4w - 3)$	12. $(6r + 3)2$

Simplify each expression, showing all work.

13. $8(x + 1) - 12x$	14. $6w - 7 + 12w - 3z$	15. $9n - 8 + 3(2n - 11)$	16. $3(7x + 4y) - 2(2x + y)$
17. $(15 + 8d)(-5) - 24d + d$	18. $9(b - 1) - c + 3b + c$	19. $20f - 4(5f + 4) + 16$	20. $8(h - 4) - h - (h + 7)$

Solve each equation, showing all work.

21. $f - 64 = -23$	22. $-7 = 2d$	23. $\dfrac{b}{-12} = -6$	24. $13 = m + 21$
25. $5x - 3 = -28$	26. $\dfrac{w + 8}{-3} = -9$	27. $-8 + \dfrac{h}{4} = 13$	28. $22 = 6y + 7$
29. $8x - 4 = 3x + 1$	30. $-2(5d - 8) = 20$	31. $7r + 21 = 49r$	32. $-9g - 3 = -3(3g + 2)$
33. $5(3x - 2) = 5(4x + 1)$	34. $3d - 4 + d = 8d - (-12)$	35. $f - 6 = -2f + 3(f - 2)$	36. $-2(y - 1) = 4y - (y + 2)$

One-Step Inequalities

- Remember to show the steps to solving, not just the answer.
- Ex: $x + 12 \leq 20$

  $-12 \quad -12$

  _____

  $x \leq 8$

Solve One-Step Inequalities

$< \text{ or } > \textit{Open circle}$ $\qquad \leq \text{ or } \geq \textit{Closed circle}$

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

1. $8x > 16$
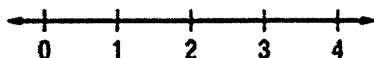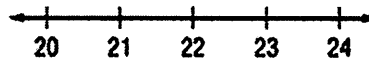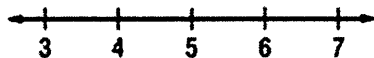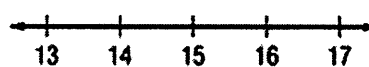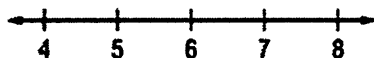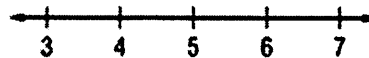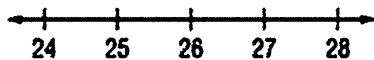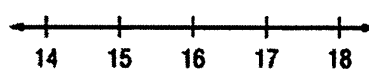
0 1 2 3 4

2. $h - 9 > 13$

20 21 22 23 24

3. $t + 7 \leq 12$

3 4 5 6 7

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

13 14 15 16 17

5. $j + 4 < 10$

4 5 6 7 8

6. $7y < 35$

3 4 5 6 7

7. $b - 15 > 11$

24 25 26 27 28

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

14 15 16 17 18

9. $4b \geq 12$

1 2 3 4 5

10. $z + 8 \geq 14$

4 5 6 7 8
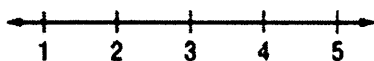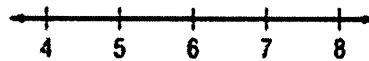
Two-Step Inequalities

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

$$\begin{array}{c} -12 \quad -12 \\ \hline 2x \leq 8 \\ \hline 2 \qquad 2 \end{array}$$

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

Solve and Write Two-Step Inequalities

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

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

2. $13 \geq -x + 7$

| | | | | | | | | |
|8|9|10|11|12|13|14|15|16|

| | | | | | | | | |
|−10|−9|−8|−7|−6|−5|−4|−3|−2|

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

4. $3x - 4 \leq 23$

| | | | | | | | | |
|−11|−10|−9|−8|−7|−6|−5|−4|−3|

| | | | | | | | | |
|5|6|7|8|9|10|11|12|13|

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

6. $-2x + 4 < 16$

| | | | | | | | | |
|8|9|10|11|12|13|14|15|16|

| | | | | | | | | |
|−10|−9|−8|−7|−6|−5|−4|−3|−2|

7. $13 > 3 + 2x$

8. $11x - 1 \leq 120$

| | | | | | | | | |
|1|2|3|4|5|6|7|8|9|

| | | | | | | | | |
|7|8|9|10|11|12|13|14|15|

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

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

| | | | | | | | | |
|−4|−3|−2|−1|0|1|2|3|4|

| | | | | | | | | |
|−8|−7|−6|−5|−4|−3|−2|−1|0|
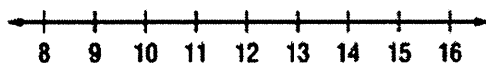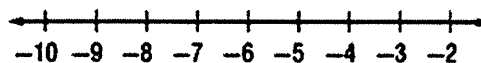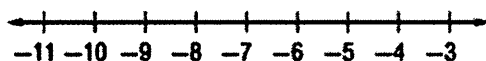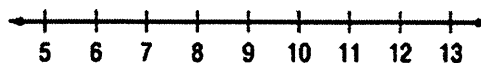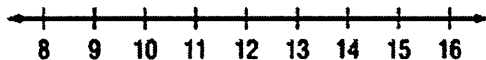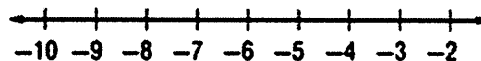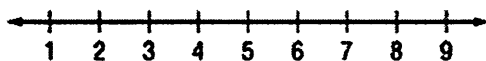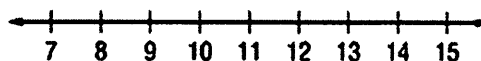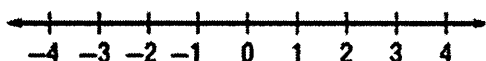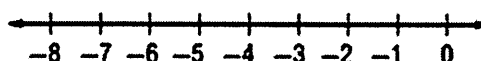
Integers: Mixed Operations

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. $42 \div (-7)$

17. $45 \div (-5)$

18. $-9 \div 3$

19. $-64 \div (-8)$

20. $-39 \div (-13)$

21. $-121 \div 11$

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

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

24. $10(-4) + 18$

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

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

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

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

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

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

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

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

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

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

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

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

*Remember to always write the formula down , plug in your measurements and show your work.

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 π. Round to the nearest tenth if necessary.

5.

42 m

6.

11 in.

7.

4 yd

8.

4.5 mm

9.

14 ft

10.

31.5 cm
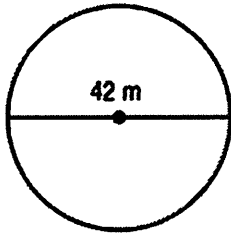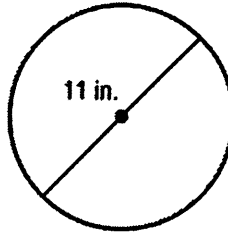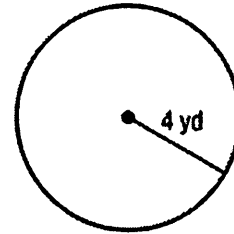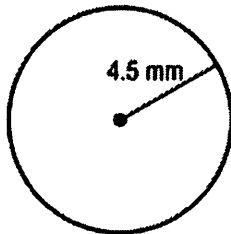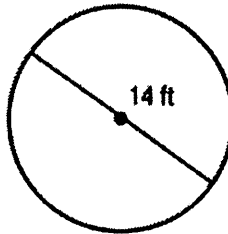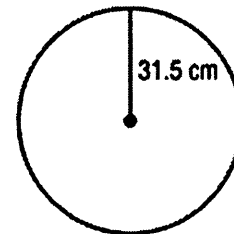
Area of Circles

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

11.

7.1 m

12.

12 ft

13.

13 km
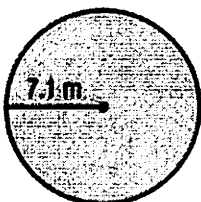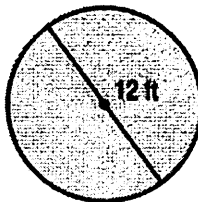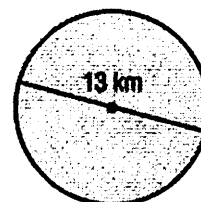
Area of Circles

Determine the area of each semicircle or quarter circle. Use 3.14 for π. Round to the nearest tenth.

14.

3.8 yd

15.

6.1 m

16.

14 cm
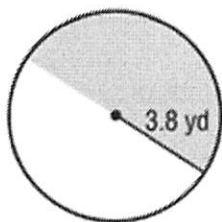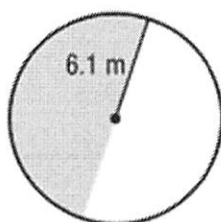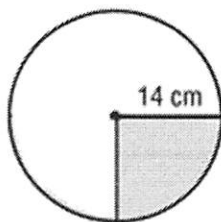
Area of Rectangles
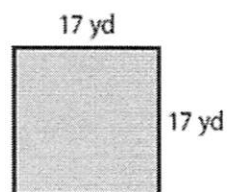
Write an equation to determine the area of each rectangle.
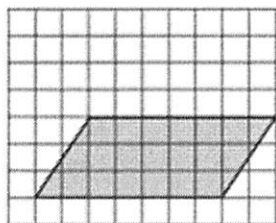
17.

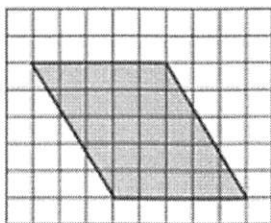12 ft

8 ft

18.

18 in.

4 in.

19.

17 yd

17 yd
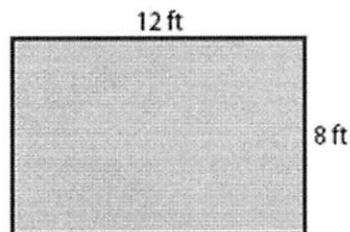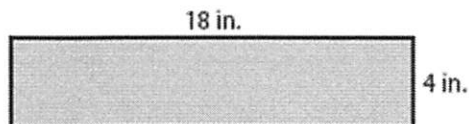
Area of Parallelograms
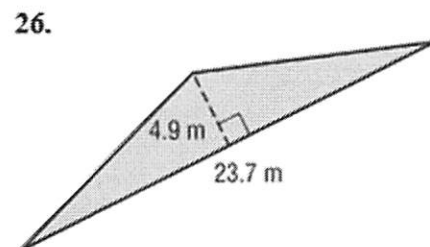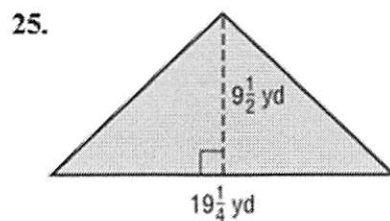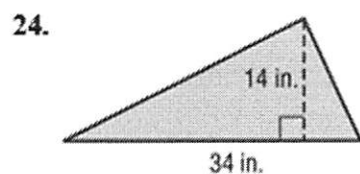
Determine the area of each parallelogram.

20.

21.

22.

11 in.

9 in.
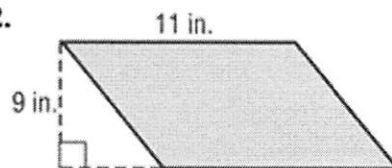
Area of Triangles

Determine the area of each triangle.

21.

22.

23.

12 mm

10 mm

24.

14 in.

34 in.

25.

$9\frac{1}{2}$ yd

$19\frac{1}{4}$ yd

26.

4.9 m

23.7 m
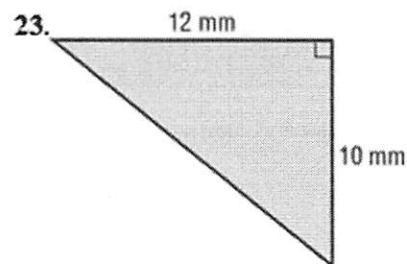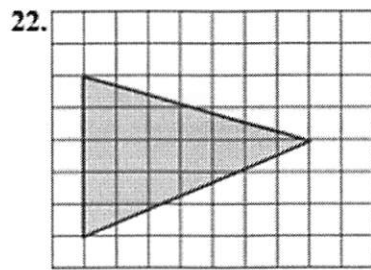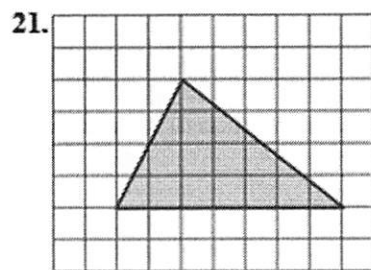
Area of Trapezoids

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

27.

11 ft

7 ft

7 ft

28.

7.5 in.

6 in.

5 in.

29.

6.3 m

4 m

3.6 m