

5-3 Medians and Altitudes of Triangles	5-3 Medians and Altitudes of Triangles
Fill in the blanks to complete each definition.	Use the figure for Exercises 1–4. $GB = 12\frac{2}{3}$ and $CD = 10$ .
1. A median of a triangle is a segment whose endpoints are a vertex of the triangle	Find each length.
and the <u>midpoint</u> of the opposite side.	1. FG <u>3</u> 2. BF <u>19</u>
<ol> <li>An altitude of a triangle is a <u>perpendicular</u> segment from a vertex to the line containing the opposite side.</li> </ol>	3. $GD = \frac{3\frac{1}{3}}{3}$ 4. $CG = \frac{6\frac{2}{3}}{3}$
<ol> <li>The centroid of a triangle is the point where the three</li></ol>	5. A triangular compass needle will turn most easily if it is attached to the compass face
<ol> <li>The orthocenter of a triangle is the point where the three <u>altitudes</u> are concurrent.</li> </ol>	through its centroid. Find the coordinates $\begin{pmatrix} w \\ (0, 0) \\ (z, 0) \end{pmatrix}$ $\begin{pmatrix} 1 \\ (z, 0) \\ (z, 0) \end{pmatrix}$ $(1, 2)$
Use the Centroid Theorem and the figure for Exercises 5–8. $\overline{OU}$ , $\overline{RS}$ , and $\overline{PT}$ are medians of $\triangle PQR$ . $RS = 21$ and $VT = 5$ .	Find the orthocenter of the triangle with the given vertices.
5. $RV$ 14 6. $SV$ 7 $V$	<b>6.</b> $X(-5, 4), Y(2, -3), Z(1, 4)$ <b>7.</b> $A(0, -1), B(2, -3), C(4, -1)$
7. TP 15 8. VP 10	$(\underline{2}, \underline{5})$ $(\underline{2}, \underline{-3})$
	Use the figure for Exercises 8 and 9. $\overline{HL}$ , $\overline{IM}$ , and $\overline{JK}$ are medians of $\triangle HIJ$ .
The <i>centroid</i> is also called the center of gravity because it is the balance point of the triangle. By holding a tray at the center of gravity, a waiter can carry with one hand a large triangular tray	8. Find the area of the triangle. $36 \text{ m}^2$ 9. If the perimeter of the triangle is 49 meters, then find the
9. If the vertices of the trav have coordinates A(0, 0), B(9, 0), and C(0, 6), find the	length of <i>MH</i> . ( <i>Hint:</i> What kind of a triangle is it?) 2.5 m M
coordinates of the balance point (centroid) of the tray. ( <i>Hint:</i> The <i>x</i> -coordinate	10 Two medians of a triangle were cut apart at the controid to make the four
of the centroid is the average of the x-coordinates of the three vertices, and the y-coordinate of the centroid is the average of the y-coordinates	segments shown below. Use what you know about the Centroid to make the four
of the three vertices.) ( <u>3</u> , <u>2</u> )	to reconstruct the original triangle from the four segments shown. Measure the side lengths of your triangle to check that you constructed medians.
10. If the waiter's hand is at the balance point and the distance from his hand to A is 16 inches, find the distance from his hand to BC. 8 in.	( <i>Note:</i> There are many possible answers.)
Complete Exercises 11–15 to find the coordinates of the	$x = \frac{1}{2y}$
orthocenter of $\triangle DEF$ with vertices $D(0, 0)$ , $E(3, 6)$ , and $F(4, 0)$ .	↓ <u>v</u> <u>v</u> <u>v</u> <u>v</u>
<b>11.</b> Plot <i>D</i> , <i>E</i> , and <i>F</i> and draw $\triangle DEF$ .	Possible answer:
<ol> <li>Find the equation of a line perpendicular to DF through E. (Hint: A vertical line always takes the form x =)</li> </ol>	$ \qquad \qquad$
x = 3	
13. Find the slope of ED1	
14. Find the slope of a line perpendicular to $\overline{ED}$ . 2 $v = -\frac{1}{r} + 2$	
<b>15.</b> Find the equation of a line perpendicular to $\overline{ED}$ through F. $y = \frac{1}{2}x + \frac{1}{2}$	
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LESSON         Practice C           533         Medians and Altitudes of Triangles           1         In a cickt transfe, what kind of line connects the	TESSON Reteach Medians and Altitudes of Triangles
Itesson         Practice C <b>553</b> Medians and Altitudes of Triangles           1. In a right triangle, what kind of line connects the orthocenter and the circumcenter?         a median	TESSON       Reteach         533       Medians and Altitudes of Triangles         AH, BJ, and CG are medians       Artificity Triangles
Itesson         Practice C           Image: State of the second stat	LESSON       Reteach         533       Medians and Altitudes of Triangles         of a triangle. They each join a vertex and the midpoint of a vertex and the midpoint of       a vertex and the midpoint of       B
Itesson         Practice C           553         Medians and Altitudes of Triangles           1. In a right triangle, what kind of line connects the orthocenter and the circumcenter?         a median           After noticing a pattern with several triangles, Regina declares to her class that in any triangle, the x-coordinate of the centroid is the triangles.	Itesson       Reteach <b>53</b> Medians and Altitudes of Triangles         AH, BJ, and CG are medians of a triangle. They each join a vertex and the midpoint of the opposite side.       The point of intersection of the medians is called the centroid of ABC.
Itesson       Practice C         Image: State of the second	<b>Reteach</b> <b>Given Set Example 1</b> <b>Reteach</b> <b>Given Set Example 1</b> <b>Reteach</b> <b>Medians and Altitudes of Triangles</b> <b>Ati, BJ, and CG are medians</b> <b>of a triangle.</b> They each join a vertex and the midpoint of the opposite side. <b>Ati, BJ, and CG are medians</b> <b>of a triangle.</b> They each join <b>a vertex and the midpoint of</b> <b>the medians is called the</b> <b>centroid</b> of $\triangle ABC$ .
Itessent       Practice C         Image: State of the second	<b>Reteach</b> <b>Generalized Medians and Altitudes of Triangles</b> <i>AH, BJ,</i> and <i>CG</i> are <b>medians</b> of a triangle. They each join a vertex and the midpoint of the opposite side. <i>AH, BJ,</i> and <i>CG</i> are <b>medians</b> <i>AH, BJ,</i> and <i>CG</i> are <b>medians</b> <i>a</i> vertex and the midpoint of the medians is called the centroid of $\triangle ABC$ .
Itesson       Practice C         Image: State of the second state of the second state of the centroid state of the centroid is the average of the x-coordinate of the centroid is the average of the x-coordinate of the x-	Reteach         Image: State of the system       Medians and Altitudes of Triangles $AH, BJ, and CG are medians of a triangle. They each join a vertex and the midpoint of the opposite side.       The point of intersection of the medians is called the centroid of \triangle ABC.         Image: Theorem       Example         B       B   $
<b>Itesson Practice C</b> <b>Identify and Altitudes of Triangles</b> 1. In a right triangle, what kind of line connects the orthocenter and the circumcenter? <u>a median</u> After noticing a pattern with several triangles, Regina declares to her class that in any triangle, the <i>x</i> -coordinate of the centroid is the average of the <i>x</i> -coordinates of the vertices and the <i>y</i> -coordinate of the centroid is the average of the <i>y</i> -coordinates of the vertices. Regina used inductive reasoning to come to her conclusion. Use deductive reasoning to prove that Regina's conclusion is correct. 2. Given: $\triangle ABC$ with $A(0, 0), B(2b, 2c), C(2a, 0)$ Prove: The coordinates of the centroid are $\left(\frac{2a + 2b}{2}, \frac{2c}{2}\right)$ .	Reteach         Image: State of the system       Medians and Altitudes of Triangles         Image: AH, BJ, and CG are medians of a triangle. They each join a vertex and the midpoint of the opposite side.       The point of intersection of the medians is called the centroid of $\triangle ABC$ .         Image: Theorem       Example         Image: Centroid Theorem       B
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<b>Practice C</b> <b>Medians and Altitudes of Triangles</b> 1. In a right triangle, what kind of line connects the orthocenter and the circumcenter? <u>a median</u> After noticing a pattern with several triangles, Regina declares to her class that in any triangle, the x-coordinate of the centroid is the average of the x-coordinates of the vertices and the y-coordinate of the centroid is the average of the y-coordinates of the vertices. Regina used inductive reasoning to come to her conclusion. Use deductive reasoning to prove that Regina's conclusion is correct. 2. Given: $\triangle ABC$ with $A(0, 0)$ , $B(2b, 2c)$ , $C(2a, 0)$ Prove: The coordinates of the centroid are $\left(\frac{2a + 2b}{3}, \frac{2c}{3}\right)$ . The midpoint of $\overline{AC}$ is $(a, 0)$ . Name this point D. The midpoint of $\overline{AB}$ is $(b, c)$ . Name this point E.	LESSON       Reteach         Sector Reteach         Joint of CG are medians of a triangle. They each join a vertex and the midpoint of the opposite side.       The point of intersection of the medians is called the centroid of $\triangle ABC$ .         Theorem         Example         Centroid Theorem         The centroid of a triangle is located $\frac{2}{9}$ of the distance from restrict way to the midenite of
<b>Practice C</b> <b>Here is a median</b> <b>After noticing a pattern with several triangles, Regina declares to</b> her class that in any triangle, the x-coordinate of the centroid is the average of the x-coordinates of the vertices and the y-coordinates of the vertices. Regina used inductive reasoning to come to her conclusion. Use deductive reasoning to prove that Regina's conclusion is correct. 2. Given: $\triangle ABC$ with $A(0, 0), B(2b, 2c), C(2a, 0)$ Prove: The coordinates of the centroid are $\left(\frac{2a + 2b}{3}, \frac{2c}{3}\right)$ . The midpoint of $\overline{AC}$ is $(a, 0)$ . Name this point D. The midpoint of $\overline{AB}$ is $(b, c)$ . Name this point E. The standard of the centroid $\overline{AB}$ is $(b, c)$ . Name this point E.	These the second seco
<b>Practice C</b> <b>Big Definition</b> <b>Practice C</b> <b>I</b> In a right triangle, what kind of line connects the orthocenter and the circumcenter? <u>a median</u> After noticing a pattern with several triangles, Regina declares to her class that in any triangle, the x-coordinate of the centroid is the average of the x-coordinates of the y-coordinate of the centroid is the average of the x-coordinates of the y-coordinate of the centroid is the average of the x-coordinates of the y-coordinate of the centroid is the average of the x-coordinates of the y-coordinate of the centroid is the average of the y-coordinates of the vertices. Regina used inductive reasoning to come to her conclusion. Use deductive reasoning to prove that Regina's conclusion is correct. 2. Given: $\triangle ABC$ with $A(0, 0), B(2b, 2c), C(2a, 0)$ Prove: The coordinates of the centroid are $(\frac{2a+2b}{3}, \frac{2c}{3})$ . The midpoint of $\overline{AC}$ is $(a, 0)$ . Name this point D. The midpoint of $\overline{AB}$ is $(b, c)$ . Name this point E. The slope of $\overline{BD}$ is $\frac{2c}{2b-a}$ . Using $(a, 0)$ as a point on $\overline{BD}$ gives the average $a = \frac{2c}{2b-a}$ .	TESSON       Reteach         Medians and Altitudes of Triangles         Image: They each join a vertex and the midpoint of the opposite side.         Image: The point of intersection of the medians is called the centroid of $\triangle ABC$ .         Theorem         The centroid of a triangle is located $\frac{2}{3}$ of the distance from each vertex to the midpoint of the opposite side.         Given: $\overline{AH}$ , $\overline{CG}$ , and $\overline{BJ}$ are medians of $\triangle ABC$ .         Conclusion: $AN = \frac{2}{3}AH$ , $CN = \frac{2}{3}CG$ , $BN = \frac{2}{3}BJ$
<b>Practice C</b> <b>Basel Medians and Altitudes of Triangles</b> 1. In a right triangle, what kind of line connects the orthocenter and the circumcenter? <u>a median</u> After noticing a pattern with several triangles, Regina declares to her class that in any triangle, the <i>x</i> -coordinate of the centroid is the average of the <i>x</i> -coordinates of the vertices and the <i>y</i> -coordinate of the centroid is the average of the <i>y</i> -coordinates of the vertices. Regina used inductive reasoning to come to her conclusion. Use deductive reasoning to prove that Hegina's conclusion is correct. 2. Given: $\triangle ABC$ with $A(0, 0)$ , $B(2b, 2c)$ , $C(2a, 0)$ Prove: The coordinates of the centroid are $\left(\frac{2a+2b}{2}, \frac{2c}{3}, \frac{2}{3}\right)$ . The midpoint of $\overline{AC}$ is $(a, 0)$ . Name this point D. The midpoint of $\overline{AB}$ is $(b, c)$ . Name this point E. The slope of $\overline{BD}$ is $\frac{2c}{2b-a}$ . Using $(a, 0)$ as a point on $\overline{BD}$ gives the equation $y = \frac{2c}{2b-a}(x-a)$ . The slope of $\overline{CE}$ is $\frac{-c}{2a-b}$ .	<b>Reteach</b> <b>Given:</b> $\overline{AH}$ , $\overline{BJ}$ , and $\overline{CG}$ are medians of a triangle. They each join a vertex and the midpoint of the opposite side. Theorem The centroid of a triangle is located $\frac{2}{3}$ of the distance from each vertex to the midpoint of the opposite side. <b>Example</b> <b>Given:</b> $\overline{AH}$ , $\overline{CG}$ , and $\overline{BJ}$ are medians of $\triangle ABC$ . <b>Conclusion:</b> $AN = \frac{2}{3}AH$ , $CN = \frac{2}{3}CG$ , $BN = \frac{2}{3}BJ$ In $\triangle ABC$ above, suppose $AH = 18$ and $BN = 10$ . You can use the Centroid Theorem to find $AN$ and $BJ$ .
<b>Practice C</b> <b>Basel Medians and Altitudes of Triangles</b> 1. In a right triangle, what kind of line connects the orthocenter and the circumcenter? <u>a median</u> After noticing a pattern with several triangles, Regina declares to her class that in any triangle, the <i>x</i> -coordinate of the centroid is the average of the <i>y</i> -coordinate of the ventices and the <i>y</i> -coordinate of the centroid is the average of the <i>y</i> -coordinate of the ventices. Regina used inductive reasoning to come to her conclusion. Use deductive reasoning to prove that Hegina's conclusion is correct. 2. Given: $\triangle ABC$ with $A(0, 0)$ , $B(2b, 2c)$ , $C(2a, 0)$ Prove: The coordinates of the centroid are $\left(\frac{2a+2b}{2b}, \frac{2c}{2}\right)$ . The midpoint of $\overline{AC}$ is $(a, 0)$ . Name this point D. The midpoint of $\overline{AB}$ is $(b, c)$ . Name this point D. The slope of $\overline{BD}$ is $\frac{2c}{2b-a}$ . Using $(a, 0)$ as a point on $\overline{BD}$ gives the equation $y = \frac{2c}{2b-a}(x-a)$ . The slope of $\overline{CE}$ is $\frac{-c}{2a-b}$ . Using $(2a, 0)$ as a point on $\overline{CE}$ gives the equation $y = \frac{-c}{2a-b}(x-2a)$ .	<b>Reteach</b> <b>Medians and Altitudes of Triangles</b> AH, BJ, and CG are medians of a triangle. They each join a vertex and the midpoint of the opposite side. Theorem The centroid of a triangle is located $\frac{2}{3}$ of the distance from each vertex to the midpoint of the opposite side. Theorem Centroid Theorem The centroid of a triangle is located $\frac{2}{3}$ of the distance from each vertex to the midpoint of the opposite side. Theorem A Conclusion: $AN = \frac{2}{3}AH$ , $CN = \frac{2}{3}CG$ , $BN = \frac{2}{3}BJ$ In $\triangle ABC$ above, suppose $AH = 18$ and $BN = 10$ . You can use the Centroid Theorem to find AN and BJ. $AN = \frac{2}{3}AH$ Centroid Thm. $BN = \frac{2}{3}BJ$ Centroid Thm.
<b>Practice C</b> <b>Basel Medians and Altitudes of Triangles</b> 1. In a right triangle, what kind of line connects the orthocenter and the circumcenter? <u>a median</u> After noticing a pattern with several triangles, Regina declares to her class that in any triangle, the <i>x</i> -coordinate of the centroid is the average of the <i>y</i> -coordinate of the ventroes and the <i>y</i> -coordinate of the centroid is the average of the <i>y</i> -coordinate of the ventroes. Regina used inductive reasoning to come to her conclusion. Use deductive reasoning to prove that Regina's conclusion is correct. 2. Given: $\triangle ABC$ with $A(0, 0)$ , $B(2b, 2c)$ , $C(2a, 0)$ Prove: The coordinates of the centroid are $\left(\frac{2a+2b}{2b}, \frac{2c}{2}\right)$ . The midpoint of $\overline{AC}$ is $(a, 0)$ . Name this point D. The midpoint of $\overline{AB}$ is $(b, c)$ . Name this point E. The slope of $\overline{BD}$ is $\frac{2c}{2b-a}$ . Using $(a, 0)$ as a point on $\overline{BD}$ gives the equation $y = \frac{2c}{2b-a}(x-a)$ . The slope of $\overline{CE}$ is $\frac{-c}{2a-b}$ . Using $(2a, 0)$ as a point on $\overline{CE}$ gives the equation $y = \frac{-c}{2a-b}(x-2a)$ . The control will be the interception point of $\overline{AB}$ and $\overline{CE}$ are	<b>Reteach</b> <b>Solution</b> <b>Reteach</b> <b>Solution</b> <b>Reteach</b> <b>Solution</b> <b>A</b> <i>H</i> , <i>BJ</i> , and <i>CG</i> are <b>medians</b> of a triangle. They each join a vertex and the midpoint of the opposite side. <b>Theorem</b> <b>Theorem</b> <b>Theorem</b> <b>Theorem</b> <b>Theorem</b> <b>Theorem</b> <b>Theorem</b> <b>Theorem</b> <b>Theorem</b> <b>Theorem</b> <b>Example</b> <b>Centroid Theorem</b> The centroid of a triangle is located $\frac{2}{3}$ of the distance from each vertex to the midpoint of the opposite side. <b>Given:</b> $\overline{AH}$ , $\overline{CG}$ , and $\overline{BJ}$ are medians of $\triangle ABC$ . <b>Conclusion:</b> $AN = \frac{2}{3}AH$ , $CN = \frac{2}{3}CG$ , $BN = \frac{2}{3}BJ$ In $\triangle ABC$ above, suppose $AH = 18$ and $BN = 10$ . You can use the Centroid Theorem to find <i>AN</i> and <i>BJ</i> . $AN = \frac{2}{3}AH$ Centroid Thm. $AN = \frac{2}{3}(18)$ Substitute 18 for <i>AH</i> . <b>Theorem</b> <b>Theorem</b> <b>Theorem</b> <b>Theorem</b> <b>Theorem</b> <b>Theorem</b> <b>Theorem</b> <b>Theorem</b> <b>Theorem</b> <b>Theorem</b> <b>Theorem</b> <b>Theorem</b> <b>Theorem</b> <b>Theorem</b> <b>Theorem</b> <b>Theorem</b> <b>Theorem</b> <b>Theorem</b> <b>Theorem</b> <b>Theorem</b> <b>Theorem</b> <b>Theorem</b> <b>Theorem</b> <b>Theorem</b> <b>Theorem</b> <b>Theorem</b> <b>Theorem</b> <b>Theorem</b> <b>Theorem</b> <b>Theorem</b> <b>Theorem</b> <b>Theorem</b> <b>Theorem</b> <b>Theorem</b> <b>Theorem</b> <b>Theorem</b> <b>Theorem</b> <b>Theorem</b> <b>Theorem</b> <b>Theorem</b> <b>Theorem</b> <b>Theorem</b> <b>Theorem</b> <b>Theorem</b> <b>Theorem</b> <b>Theorem</b> <b>Theorem</b> <b>Theorem</b> <b>Theorem</b> <b>Theorem</b> <b>Theorem</b> <b>Theorem</b> <b>Theorem</b> <b>Theorem</b> <b>Theorem</b> <b>Theorem</b> <b>Theorem</b> <b>Theorem</b> <b>Theorem</b> <b>Theorem</b> <b>Theorem</b> <b>Theorem</b> <b>Theorem</b> <b>Theorem</b> <b>Theorem</b> <b>Theorem</b> <b>Theorem</b> <b>Theorem</b> <b>Theorem</b> <b>Theorem</b> <b>Theorem</b> <b>Theorem</b> <b>Theorem</b> <b>Theorem</b> <b>Theorem</b> <b>Theorem</b> <b>Theorem</b> <b>Theorem</b> <b>Theorem</b> <b>Theorem</b> <b>Theorem</b> <b>Theorem</b> <b>Theorem</b> <b>Theorem</b> <b>Theorem</b> <b>Theorem</b> <b>Theorem</b> <b>Theorem</b> <b>Theorem</b> <b>Theorem</b> <b>Theorem</b> <b>Theorem</b> <b>Theorem</b> <b>Theorem</b> <b>Theorem</b> <b>Theorem</b> <b>Theorem</b> <b>Theorem</b> <b>Theorem</b> <b>Theorem</b> <b>Theorem</b> <b>Theorem</b> <b>Theorem</b> <b>Theorem</b> <b>Theorem</b> <b>Theorem</b> <b>Theorem</b> <b>Theorem</b> <b>Theorem</b> <b>Theorem</b> <b>Theorem</b> <b>Theorem</b> <b>Theorem</b> <b>Theorem</b> <b>Theorem</b> <b>Theorem</b>
<b>Practice C</b> <b>Box Medians and Altitudes of Triangles</b> 1. In a right triangle, what kind of line connects the orthocenter and the circumcenter? <u>a median</u> After noticing a pattern with several triangles, Regina declares to her class that in any triangle, the <i>x</i> -coordinate of the centroid is the average of the <i>x</i> -coordinates of the vertices and the <i>y</i> -coordinate of the centroid is the average of the <i>y</i> -coordinates of the vertices. Regina used inductive reasoning to come to her conclusion. Use deductive reasoning to prove that Hegina's conclusion is correct. 2. Given: $\triangle ABC$ with $A(0, 0)$ , $B(2b, 2c)$ , $C(2a, 0)$ Prove: The coordinates of the centroid are $\left(\frac{2a+2b}{2b}, \frac{2c}{2}\right)$ . The midpoint of $\overline{AC}$ is $(a, 0)$ . Name this point D. The midpoint of $\overline{AB}$ is $(b, c)$ . Name this point D. The slope of $\overline{BD}$ is $\frac{2c}{2b-a}$ . Using $(a, 0)$ as a point on $\overline{BD}$ gives the equation $y = \frac{2c}{2b-a}(x-a)$ . The slope of $\overline{CE}$ is $\frac{-c}{2a-b}$ . Using $(2a, 0)$ as a point on $\overline{CE}$ gives the equation $y = \frac{-c}{2a-b}(x-2a)$ . The centroid will be the intersection point of $\overline{BD}$ and $\overline{CE}$ , so set the equations equal and simplify:	<b>Reteach</b> <b>Solution</b> <b>Reteach</b> <b>Solution</b> <b>Reteach</b> <b>Solution</b> <b>Reteach</b> <b>Solution</b> <b>Reteach</b> <b>Solution</b> <b>Reteach</b> <b>Reteach</b> <b>Reteach</b> <b>Reteach</b> <b>Reteach</b> <b>Reteach</b> <b>Reteach</b> <b>Reteach</b> <b>Reteach</b> <b>Reteach</b> <b>Reteach</b> <b>Reteach</b> <b>Reteach</b> <b>Reteach</b> <b>Reteach</b> <b>Reteach</b> <b>Reteach</b> <b>Reteach</b> <b>Reteach</b> <b>Reteach</b> <b>Reteach</b> <b>Reteach</b> <b>Reteach</b> <b>Reteach</b> <b>Reteach</b> <b>Reteach</b> <b>Reteach</b> <b>Reteach</b> <b>Reteach</b> <b>Reteach</b> <b>Reteach</b> <b>Reteach</b> <b>Reteach</b> <b>Reteach</b> <b>Reteach</b> <b>Reteach</b> <b>Reteach</b> <b>Reteach</b> <b>Reteach</b> <b>Reteach</b> <b>Reteach</b> <b>Reteach</b> <b>Reteach</b> <b>Reteach</b> <b>Reteach</b> <b>Reteach</b> <b>Reteach</b> <b>Reteach</b> <b>Reteach</b> <b>Reteach</b> <b>Reteach</b> <b>Reteach</b> <b>Reteach</b> <b>Reteach</b> <b>Reteach</b> <b>Reteach</b> <b>Reteach</b> <b>Reteach</b> <b>Reteach</b> <b>Reteach</b> <b>Reteach</b> <b>Reteach</b> <b>Reteach</b> <b>Reteach</b> <b>Reteach</b> <b>Reteach</b> <b>Reteach</b> <b>Reteach</b> <b>Reteach</b> <b>Reteach</b> <b>Reteach</b> <b>Reteach</b> <b>Reteach</b> <b>Reteach</b> <b>Reteach</b> <b>Reteach</b> <b>Reteach</b> <b>Reteach</b> <b>Reteach</b> <b>Reteach</b> <b>Reteach</b> <b>Reteach</b> <b>Reteach</b> <b>Reteach</b> <b>Reteach</b> <b>Reteach</b> <b>Reteach</b> <b>Reteach</b> <b>Reteach</b> <b>Reteach</b> <b>Reteach</b> <b>Reteach</b> <b>Reteach</b> <b>Reteach</b> <b>Reteach</b> <b>Reteach</b> <b>Reteach</b> <b>Reteach</b> <b>Reteach</b> <b>Reteach</b> <b>Reteach</b> <b>Reteach</b> <b>Reteach</b> <b>Reteach</b> <b>Reteach</b> <b>Reteach</b> <b>Reteach</b> <b>Reteach</b> <b>Reteach</b> <b>Reteach</b> <b>Reteach</b> <b>Reteach</b> <b>Reteach</b> <b>Reteach</b> <b>Reteach</b> <b>Reteach</b> <b>Reteach</b> <b>Reteach</b> <b>Reteach</b> <b>Reteach</b> <b>Reteach</b> <b>Reteach</b> <b>Reteach</b> <b>Reteach</b> <b>Reteach</b> <b>Reteach</b> <b>Reteach</b> <b>Reteach</b> <b>Reteach</b> <b>Reteach</b> <b>Reteach</b> <b>Reteach</b> <b>Reteach</b> <b>Reteach</b> <b>Reteach</b> <b>Reteach</b> <b>Reteach</b> <b>Reteach</b> <b>Reteach</b> <b>Reteach</b> <b>Reteach</b> <b>Reteach</b> <b>Reteach</b> <b>Reteach</b> <b>Reteach</b> <b>Reteach</b> <b>Reteach</b> <b>Reteach</b> <b>Reteach</b> <b>Reteach</b> <b>Reteach</b> <b>Reteach</b> <b>Reteach</b> <b>Reteach</b> <b>Reteach</b> <b>Reteach</b> <b>Reteach</b> <b>Reteach</b> <b>Reteach</b> <b>Reteach</b> <b>Reteach</b> <b>Reteach</b> <b>Reteach</b> <b>Reteach</b> <b>Reteach</b> <b>Reteach</b> <b>Reteach</b> <b>Reteach</b> <b>Reteach</b> <b>Reteach</b> <b>Reteach</b> <b>Reteach</b> <b>Reteach</b> <b>Reteach</b> <b>Reteach</b> <b>Rete</b>
<b>Practice C</b> <b>Herefore</b> <b>Medians and Altitudes of Triangles</b> 1. In a right triangle, what kind of line connects the orthocenter and the circumcenter? <u>a median</u> After noticing a pattern with several triangles, Regina declares to her class that in any triangle, the <i>x</i> -coordinate of the centroid is the average of the <i>x</i> -coordinates of the vertices. Regina used inductive reasoning to come to her conclusion. Use deductive reasoning to prove that Regina's conclusion is correct. 2. Given: $\triangle ABC$ with $A(0, 0)$ , $B(2b, 2c)$ , $C(2a, 0)$ Prove: The coordinates of the centroid are $\left(\frac{2a + 2b}{3}, \frac{2c}{3}\right)$ . The midpoint of $\overline{AC}$ is $(a, 0)$ . Name this point D. The midpoint of $\overline{AB}$ is $(b, c)$ . Name this point E. The slope of $\overline{BD}$ is $\frac{2c}{2b-a}$ . Using $(a, 0)$ as a point on $\overline{BD}$ gives the equation $y = \frac{2c}{2b-a}(x-a)$ . The slope of $\overline{CE}$ is $\frac{-c}{2a-b}$ . Using $(2a, 0)$ as a point on $\overline{CE}$ gives the equation $y = \frac{-c}{2a-b}(x-2a)$ . The centroid will be the intersection point of $\overline{BD}$ and $\overline{CE}$ , so set the equations equal and simplify: $\frac{2c}{2b-a}(x-a) = \frac{-c}{2a-b}(x-2a)$	Tesson       Reteach         Medians and Altitudes of Triangles         Medians and Altitudes of Triangles         The point of a triangle. They each join a vertex and the midpoint of the opposite side.         The point of intersection of the medians is called the centroid of $\triangle ABC$ .         Centroid Theorem         The centroid of a triangle is located $\frac{2}{3}$ of the distance from each vertex to the midpoint of the opposite side.         Civen: $\overline{AH}$ , $\overline{CG}$ , and $\overline{BJ}$ are medians of $\triangle ABC$ .         Conclusion: $AN = \frac{2}{3}AH$ , $CN = \frac{2}{3}CG$ , $BN = \frac{2}{3}BJ$ In $\triangle ABC$ above, suppose $AH = 18$ and $BN = 10$ . You can use the Centroid Theorem to find $AN$ and $BJ$ . $AN = \frac{2}{3}(18)$ Substitute 18 for $AH$ . $10 = \frac{2}{3}BJ$ Centroid Thm. $AN = \frac{2}{3}(18)$ Substitute 18 for $AH$ . $10 = \frac{2}{3}BJ$ Substitute 10 for $BN$ . $AN = 12$ Simplify. $15 = BJ$ Simplify.
<b>Practice C</b> <b>Herefore</b> <b>Practice C</b> <b>Herefore</b> <b>Atter noticing a pattern with several triangles, Regina declares to her class that in any triangle, the <i>x</i>-coordinate of the centroid is the average of the <i>x</i>-coordinates of the vertices and the <i>y</i>-coordinate of the centroid is the average of the <i>y</i>-coordinate of the vertices. Regina used inductive reasoning to come to her conclusion. Use deductive reasoning to prove that Regina's conclusion is correct. <b>2.</b> Given: <math>\triangle ABC</math> with <math>A(0, 0)</math>, <math>B(2b, 2c)</math>, <math>C(2a, 0)</math> <b>Prove:</b> The coordinates of the centroid are <math>\left(\frac{2a+2b}{3}, \frac{2c}{3}\right)</math>. The midpoint of <math>\overline{AC}</math> is <math>(a, 0)</math>. Name this point <math>D</math>. The slope of <math>\overline{BD}</math> is <math>\frac{2c}{2b-a}</math>. Using <math>(a, 0)</math> as a point on <math>\overline{BD}</math> gives the equation <math>y = \frac{2c}{2b-a}(x-a)</math>. The slope of <math>\overline{CE}</math> is <math>\frac{-c}{2a-b}</math>. Using <math>(2a, 0)</math> as a point on <math>\overline{CE}</math> gives the equation <math>y = \frac{-c}{2a-b}(x-2a)</math>. The centroid will be the intersection point of <math>\overline{BD}</math> and <math>\overline{CE}</math>, so set the equations equal and simplify: <math>\frac{2c}{2b-a}(x-a) = \frac{-c}{2a-b}(x-2a)</math>.</b>	<b>Reteach</b> <b>Medians and Altitudes of Triangles</b> AH, BJ, and CG are medians of a triangle. They each join a vertex and the midpoint of the opposite side. Theorem Theorem The centroid of a triangle is located $\frac{2}{3}$ of the distance from each vertex to the midpoint of the opposite side. Theorem Example Centroid of a triangle is located $\frac{2}{3}$ of the distance from each vertex to the midpoint of the opposite side. The centroid of a triangle is located $\frac{2}{3}$ of the distance from each vertex to the midpoint of the opposite side. The centroid of a triangle is located $\frac{2}{3}$ of the distance from each vertex to the midpoint of the opposite side. The centroid Theorem The centroid Theorem The centroid Theorem to find AN and BJ. $AN = \frac{2}{3}AH$ Centroid Thm. $AN = \frac{2}{3}BJ$ Centroid Thm. $AN = \frac{2}{3}BJ$ Centroid Thm. $AN = \frac{2}{3}BJ$ Substitute 18 for AH. $10 = \frac{2}{3}BJ$ Substitute 10 for BN. AN = 12 Simplify. 15 = BJ Simplify. AN = 12 Simplify. AN = 2 WX AN = 2 WX
<b>Practice C</b> <b>Herefore</b> <b>Practice C</b> <b>Herefore</b> <b>Atter noticing a pattern with several triangles, Regina declares to</b> her class that in any triangle, the <i>x</i> -coordinate of the centroid is the average of the <i>x</i> -coordinates of the vertices and the <i>y</i> -coordinate of the centroid is the average of the <i>y</i> -coordinates of the vertices. Regina used inductive reasoning to come to her conclusion. Use deductive reasoning to prove that Regina's conclusion is correct. <b>2.</b> Given: $\triangle ABC$ with $A(0, 0)$ , $B(2b, 2c)$ , $C(2a, 0)$ Prove: The coordinates of the centroid are $\left(\frac{2a+2b}{2b}, \frac{2}{2c}\right)$ . The midpoint of $\overline{AC}$ is $(a, 0)$ . Name this point <i>D</i> . The slope of $\overline{BD}$ is $\frac{2c}{2b-a}$ . Using $(a, 0)$ as a point on $\overline{BD}$ gives the equation $y = \frac{2c}{2b-a}(x-a)$ . The slope of $\overline{CE}$ is $\frac{-c}{2a-b}$ . Using $(2a, 0)$ as a point on $\overline{CE}$ gives the equation $y = \frac{-c}{2a-b}(x-2a)$ . The centroid will be the intersection point of $\overline{BD}$ and $\overline{CE}$ , so set the equations equal and simplify: $\frac{2c}{2b-a}(x-a) = \frac{-c}{2a-b}(x-2a)$ (4ac-2bc)(x-a) = (ac-2bc)(x-2a)	Reteach <b>Reteach Medians and Altitudes of Triangles</b> AH, BJ, and CG are medians of a triangle. They each join a vertex and the midpoint of the opposite side.       The point of intersection of the medians is called the centroid of $\triangle ABC$ . <b>Theorem</b> The centroid Theorem         The centroid of a triangle is located $\frac{2}{3}$ of the distance from each vertex to the midpoint of the opposite side. <b>Example</b> In $\triangle ABC$ above, suppose $AH = 18$ and $BN = 10$ . You can use the Centroid Theorem to find $AN$ and $BJ$ . <b>B</b> N = $\frac{2}{3}BJ$ Centroid Theorem $A = \frac{2}{3}AH$ Centroid Thm. $BN = \frac{2}{3}BJ$ Centroid Theorem $A = \frac{2}{3}AH$ Centroid Thm. $BN = \frac{2}{3}BJ$ Centroid Theorem $A = \frac{2}{3}AH$ Centroid Thm. $BN = \frac{2}{3}BJ$ Centroid Theorem $AN = \frac{2}{3}(18)$ Substitute 18 for $AH$ . $10 = \frac{2}{3}BJ$ Substitute 10 for $BN$ . $AN = 12$ Simplify. $15 = BJ$ Simplify.       In $\triangle QRS, RX = 48$ and $QW = 30$ . Find each length. $\frac{4}{4}$ <
<b>Practice C</b> <b>Present</b> <b>Practice C</b> <b>Medians and Altitudes of Triangles</b> 1. In a right triangle, what kind of line connects the orthocenter and the circumcenter? <u>a median</u> After noticing a pattern with several triangles, Regina declares to her class that in any triangle, the <i>x</i> -coordinate of the centroid is the average of the <i>x</i> -coordinates of the vertices and the <i>y</i> -coordinate of the centroid is the average of the <i>y</i> -coordinates of the vertices. Regina used inductive reasoning to come to her conclusion is correct. 2. Given: $\triangle ABC$ with $A(0, 0)$ , $B(2b, 2c)$ , $C(2a, 0)$ <b>Prove:</b> The coordinates of the centroid are $\left(\frac{2a+2b}{2b}, \frac{2c}{2}\right)$ . The midpoint of $\overline{AC}$ is $(a, 0)$ . Name this point <i>D</i> . The slope of $\overline{BD}$ is $\frac{2c}{2b-a}$ . Using $(a, 0)$ as a point on $\overline{BD}$ gives the equation $y = \frac{2c}{2b-a}(x-a)$ . The slope of $\overline{CE}$ is $\frac{-c}{2a-b}$ . Using $(2a, 0)$ as a point on $\overline{CE}$ gives the equation $y = \frac{-c}{2a-b}(x-2a)$ . The centroid will be the intersection point of $\overline{BD}$ and $\overline{CE}$ , so set the equations equal and simplify: $\frac{2c}{2b-a}(x-a) = \frac{-c}{2a-b}(x-2a)$ (4ac - 2bc)(x-a) = (ac - 2bc)(x-2a) $4acx - 2bcx - 4a^2c + 2abc = acx - 2bcx - 2a^2c + 4abc$	<b>Reteach</b> <b>Medians and Altitudes of Triangles</b> AH, BJ, and CG are medians of a triangle. They each join a vertex and the midpoint of the opposite side. The centroid of a triangle is located $\frac{2}{3}$ of the distance from each vertex to the midpoint of the opposite side. <b>Theorem</b> The centroid of a triangle is located $\frac{2}{3}$ of the distance from each vertex to the midpoint of the opposite side. <b>Centroid Theorem</b> The centroid of a triangle is located $\frac{2}{3}$ of the distance from each vertex to the midpoint of the opposite side. <b>Given:</b> $\overline{AH}, \overline{CG}, \text{ and } \overline{BJ} \text{ are medians of } \triangle ABC.$ <b>Conclusion:</b> $AN = \frac{2}{3}AH, CN = \frac{2}{3}CG, BN = \frac{2}{3}BJ$ In $\triangle ABC$ above, suppose $AH = 18$ and $BN = 10$ . You can use the Centroid Theorem to find $AN$ and $BJ$ . $AN = \frac{2}{3}AH$ Centroid Thm. $AN = \frac{2}{3}AH$ Centroid Thm. $AN = \frac{2}{3}BJ$ Centroid Thm. $AN = \frac{2}{3}(18)$ Substitute 18 for $AH$ . $10 = \frac{2}{3}BJ$ Substitute 10 for $BN$ . AN = 12 Simplify. <b>In</b> $\triangle QRS, BX = 48$ and $QW = 30$ . Find each length. 1. $RW$ 2. WX $\frac{32}{3}$ 3. OZ 4. WZ 4. WZ 4. WZ
<b>Practice C</b> <b>Herefore</b> <b>Practice C</b> <b>Medians and Altitudes of Triangles</b> 1. In a right triangle, what kind of line connects the orthocenter and the circumcenter? <u>a median</u> After noticing a pattern with several triangles, Regina declares to her class that in any triangle, the <i>x</i> -coordinate of the centroid is the average of the <i>x</i> -coordinates of the vertices and the <i>y</i> -coordinate of the centroid is the average of the <i>y</i> -coordinates of the vertices. Regina used inductive reasoning to come to her conclusion is correct. 2. Given: $\triangle ABC$ with $A(0, 0)$ , $B(2b, 2c)$ , $C(2a, 0)$ Prove: The coordinates of the centroid are $\left(\frac{2a+2b}{2b}, \frac{2c}{2}\right)$ . The midpoint of $\overline{AC}$ is $(a, 0)$ . Name this point <i>D</i> . The midpoint of $\overline{AB}$ is $(b, c)$ . Name this point <i>E</i> . The slope of $\overline{BD}$ is $\frac{2c}{2b-a}$ . Using $(a, 0)$ as a point on $\overline{BD}$ gives the equation $y = \frac{2c}{2b-a}(x-a)$ . The slope of $\overline{CE}$ is $\frac{-c}{2a-b}$ . Using $(2a, 0)$ as a point on $\overline{CE}$ gives the equation $y = \frac{-c}{2a-b}(x-2a)$ . The centroid will be the intersection point of $\overline{BD}$ and $\overline{CE}$ , so set the equations equal and simplify: $\frac{2c}{2b-a}(x-a) = \frac{-c}{2a-b}(x-2a)$ (4ac - 2bc)(x-a) = (ac - 2bc)(x-2a) $4acx - 2bcx - 4a^2c + 2abc = acx - 2bcx - 2a^2c + 4abc$ $3acx = 2a^2c + 2abc$	Reteach         Medians and Altitudes of Triangles         AH, BJ, and CG are medians of a triangle. They each join a vertex and the midpoint of the opposite side.         The point of intersection of the opposite side.         The centroid of a triangle is located $\frac{2}{3}$ of the distance from each vertex to the midpoint of the opposite side.         Given: $\overline{AH}$ , $\overline{CG}$ , and $\overline{BJ}$ are medians of $\triangle ABC$ . Conclusion: $AN = \frac{2}{3}AH$ , $CN = \frac{2}{3}CG$ , $BN = \frac{2}{3}BJ$ In $\triangle ABC$ above, suppose $AH = 18$ and $BN = 10$ . You can use the Centroid Theorem to find $AN$ and $BJ$ . $AN = \frac{2}{3}AH$ Centroid Thm. $AN = \frac{2}{3}(18)$ Substitute 18 for $AH$ . $10 = \frac{2}{3}BJ$ Centroid Thm. $AN = \frac{2}{3}(18)$ Substitute 18 for $AH$ . $10 = \frac{2}{3}BJ$ Substitute 10 for $BN$ . AN = 12 Simplify. $15 = BJ$ Simplify.         In $\triangle QRS, BX = 48$ and $QW = 30$ . Find each length. $1. RW$ 2. $WX$ $\frac{32}{45}$ $\frac{16}{2}$ $\frac{32}{45}$
<b>Practice C</b> <b>Basel Medians and Altitudes of Triangles</b> 1. In a right triangle, what kind of line connects the orthocenter and the circumcenter? <u>a median</u> After noticing a pattern with several triangles, Regina declares to her class that in any triangle, the x-coordinate of the centroid is the average of the y-coordinates of the vertices and the y-coordinate of the centroid is the average of the y-coordinates of the vertices. Regina used inductive reasoning to come to her conclusion. Use deductive reasoning to prove that Regina's conclusion is correct. 2. Given: $\triangle ABC$ with $A(0, 0)$ , $B(2b, 2c)$ , $C(2a, 0)$ <b>Prove:</b> The coordinates of the centroid are $\left(\frac{2a+2b}{2b}, \frac{2c}{3}\right)$ . The midpoint of $\overline{AC}$ is $(a, 0)$ . Name this point $D$ . The slope of $\overline{BD}$ is $\frac{2c}{2b-a}$ . Using $(a, 0)$ as a point on $\overline{BD}$ gives the equation $y = \frac{2c}{2b-a}(x-a)$ . The slope of $\overline{CE}$ is $\frac{-c}{2a-b}$ . Using $(2a, 0)$ as a point on $\overline{CE}$ gives the equation $y = \frac{-c}{2a-b}(x-2a)$ . The centroid will be the intersection point of $\overline{BD}$ and $\overline{CE}$ , so set the equations equal and simplify: $\frac{2c}{2b-a}(x-a) = \frac{-c}{2a-b}(x-2a)$ (4ac - 2bc)(x-a) = (ac - 2bc)(x - 2a) $4acx - 2bcx - 4a^2c + 2abc = acx - 2bcx - 2a^2c + 4abc$ $3acx = 2a^2c + 2abc$ $x = \frac{2a+2b}{3}$	Reteach         Medians and Altitudes of Triangles         AH, BJ, and CG are medians of a triangle. They each join a vertex and the midpoint of the opposite side.         The point of intersection of the medians is called the centroid of $\triangle ABC$ .         Theorem         Theorem         The centroid of a triangle is located $\frac{2}{3}$ of the distance from each vertex to the midpoint of the opposite side.         Diverse TAH, CG, and BJ are medians of $\triangle ABC$ . Conclusion: $AN = \frac{2}{3}AH$ , $CN = \frac{2}{3}CG$ , $BN = \frac{2}{3}BJ$ In $\triangle ABC$ above, suppose $AH = 18$ and $BN = 10$ . You can use the Centroid Theorem to find $AN$ and $BJ$ . $AN = \frac{2}{3}AH$ Centroid Thm. $BN = \frac{2}{3}BJ$ Centroid Thm. $AN = \frac{2}{3}(18)$ $BN = 48$ and $BN = 10$ . You can use the Centroid Theorem to find $AN$ and $BJ$ . $AN = \frac{2}{3}BJ$ Centroid Thm. $AN = \frac{2}{3}(18)$ Substitute 18 for $AH$ . $10 = \frac{2}{3}BJ$ Substitute 10 for $BN$ . AN = 12       Simplify.         16 $3$ . $OZ$ $4$ . $WZ$ $45$ $15$ In $\triangle HJK$ , $HD = 21$ and $BK = 18$ . Find each length.
<b>Practice C</b> <b>Big Determine the second set of the set of set of the set of the set of set of th</b>	ReteachThe seach join a vertex and the midpoint of the opposite side.The point of a triangle. They each join a vertex and the midpoint of the opposite side.The centroid of a triangle is located $\frac{2}{3}$ of the distance from each vertex to the midpoint of the opposite side.Centroid Theorem The centroid of a triangle is located $\frac{2}{3}$ of the distance from each vertex to the midpoint of the opposite side.Centroid Theorem Given: $\overline{AH}$ , $\overline{CG}$ , and $\overline{BJ}$ are medians of $\triangle ABC$ . Conclusion: $AN = \frac{2}{3}AH$ , $CN = \frac{2}{3}CG$ , $BN = \frac{2}{3}BJ$ In $\triangle ABC$ above, suppose $AH = 18$ and $BN = 10$ . You can use the Centroid Theorem to find $AN$ and $BJ$ . $AN = \frac{2}{3}AH$ Centroid Thm. $BN = \frac{2}{3}BJ$ Centroid Thm. $AN = \frac{2}{3}(18)$ Substitute 18 for $AH$ . $10 = \frac{2}{3}BJ$ Substitute 10 for $BN$ . $AN = 12$ Simplify. $15 = BJ$ Simplify.In $\triangle ABS$ , $RX = 48$ and $QW = 30$ . Find each length. 1. $RW$ $2.WX$ $\frac{32}{45}$ $15$ In $\triangle HJK$ , $HD = 21$ and $BK = 18$ . Find each length. 5. $HB$ $6.BD$
<b>Practice C</b> <b>Theorem 1</b> After noticing a pattern with several triangles, Regina declares to the critication of the control	ReteachThesamMedians and Altitudes of TrianglesAH, BJ, and CG are medians of a triangle. They each join a vertex and the midpoint of the opposite side.The point of intersection of the medians is called the centroid of $\triangle ABC$ .TheoremExampleOptimized and the midpoint of the opposite side.Centroid TheoremThe centroid of a triangle is located $\frac{2}{3}$ of the distance from each vertex to the midpoint of the opposite side.Given: $\overline{AH}$ , $\overline{CG}$ , and $\overline{BJ}$ are medians of $\triangle ABC$ . Conclusion: $AN = \frac{2}{3}AH$ , $CN = \frac{2}{3}CG$ , $BN = \frac{2}{3}BJ$ In $\triangle ABC$ above, suppose $AH = 18$ and $BN = 10$ . You can use the Centroid Theorem to find $AN$ and $BJ$ . $AN = \frac{2}{3}AH$ Centroid Thm. $BN = \frac{2}{3}BJ$ Centroid Thm. $AN = \frac{2}{3}(18)$ Substitute 18 for $AH$ . $10 = \frac{2}{3}BJ$ Substitute 10 for $BN$ . $AN = 12$ Simplify. $15 = BJ$ Simplify.In $\triangle ABS$ , $RX = 48$ and $QW = 30$ . Find each length. 1. $RW$ $2.WX$ $\frac{45}{45}$ $15$ In $\triangle HJK$ , $HD = 21$ and $BK = 18$ . Find each length. 5. $HB$ $6.BD$ $14$ $7$
<b>Practice C</b> <b>Herefore</b> <b>Atter</b> noticing a pattern with several triangles, Regina declares to her class that in any triangle, the x-coordinate of the centroid is the arrend and the viccumcenter? After noticing a pattern with several triangles, Regina declares to her class that in any triangle, the x-coordinate of the ventices. Regina used inductive reasoning to come to her conclusion. Use deductive reasoning to prove that Regina's conclusion is correct. <b>2.</b> Given: $\triangle ABC$ with $A(0, 0)$ , $B(2b, 2c)$ , $C(2a, 0)$ Prove: The coordinates of the centroid are $(\frac{2a+2b}{3}, \frac{2c}{3})$ . The midpoint of $\overline{AC}$ is $(a, 0)$ . Name this point D. The slope of $\overline{BD}$ is $\frac{2c}{2b-a}$ . Using $(a, 0)$ as a point on $\overline{BD}$ gives the equation $y = \frac{2c}{2b-a}(x-a)$ . The slope of $\overline{CE}$ is $\frac{-c}{2a-b}$ . Using $(2a, 0)$ as a point on $\overline{CE}$ gives the equation $y = \frac{-c}{2a-b}(x-2a)$ . The centroid will be the intersection point of $\overline{BD}$ and $\overline{CE}$ , so set the equations equal and simplify: $\frac{2c}{2b-a}(x-a) = \frac{-c}{2a-b}(x-2a)$ (4ac-2bc)(x-a) = (ac-2bc)(x-2a) $4acx - 2bcx - 4a^2c + 2abc = acx - 2bcx - 2a^2c + 4abc$ $3acx = 2a^2c + 2abc$ $x = \frac{2a+2b}{3}$ Substituting x into the equation of $\overline{BD}$ yields: $y = \frac{2c}{2b-a}(\frac{2a+2b}{a}, a)$ $= \frac{2c}{2b-a}(\frac{2b-a}{a})$	ReteachThesamMedians and Altitudes of TrianglesAH, BJ, and CG are medians of a triangle. They each join a vertex and the midpoint of the opposite side.The point of intersection of the medians is called the centroid of $\triangle ABC$ .TheoremThe centroid TheoremThe centroid of a triangle is located $\frac{2}{3}$ of the distance from each vertex to the midpoint of the opposite side.Orecleventex to the midpoint of the opposite side.Centroid TheoremTheoremExampleOrecleventex to the midpoint of the opposite side.Given: $\overline{AH}$ , $\overline{CG}$ , and $\overline{BJ}$ are medians of $\triangle ABC$ . Conclusion: $AN = \frac{2}{3}AH$ , $CN = \frac{2}{3}CG$ , $BN = \frac{2}{3}BJ$ In $\triangle ABC$ above, suppose $AH = 18$ and $BN = 10$ . You can use the Centroid Theorem to find $AN$ and $BJ$ . $AN = \frac{2}{3}(18)$ Substitute 18 for $AH$ . $BN = \frac{2}{3}BJ$ Substitute 10 for $BN$ . $AN = 12$ Simplify.In $\triangle ABS$ , $RX = 48$ and $QW = 30$ . Find each length. $1. RW$ $2. WX$ $AWZ$ $\underline{A5}$ $15$ In $\triangle ABK$ , $HD = 21$ and $BK = 18$ . Find each length. $5. HB$ $6. BD$ $\underline{14}$ $7$ $7. CK$ $8. CB$
<b>Practice C</b> <b>The determined of the second second</b>	ReteachMedians and Altitudes of TrianglesAH, BJ, and CG are medians of a triangle. They each join a vertex and the midpoint of the opposite side.The point of intersection of the medians is called the centroid of $\triangle ABC$ .Centroid Theorem The centroid of a triangle is located $\frac{2}{3}$ of the distance from each vertex to the midpoint of the opposite side.ExampleCentroid of a triangle is located $\frac{2}{3}$ of the distance from each vertex to the midpoint of the opposite side.Given: $\overline{AH}, \overline{CG}, \text{ and } \overline{BJ}$ are medians of $\triangle ABC$ . Conclusion: $AN = \frac{2}{3}AH$ , $CN = \frac{2}{3}CG$ , $BN = \frac{2}{3}BJ$ In $\triangle ABC$ above, suppose $AH = 18$ and $BN = 10$ . You can use the Centroid Theorem to find $AN$ and $BJ$ . $BN = \frac{2}{3}BJ$ Centroid Thm. $AN = \frac{2}{3}(18)$ Substitute 18 for $AH$ . $10 = \frac{2}{3}BJ$ Substitute 10 for $BN$ . $AN = 12$ Simplify.In $\triangle ABS, RX = 48$ and $QW = 30$ . Find each length. $1. RW$ $2. WX$ $a$ $a$ $\frac{32}{45}$ $15$ $15$ $a$ In $\triangle ABK, HD = 21$ and $BK = 18$ . Find each length. $5. HB$ $6. BD$ $7$ $14$ $7$ $7$ $7. CK$ $8. CB$ $7$ $27.$ $9$
<b>Practice C</b> <b>The argin triangle, what kind of line connects the orthocenter and the circumcenter?</b> After noticing a pattern with several triangles, Regina declares to the relass that in any triangle, the x-coordinate of the centroid is the average of the x-coordinate of the centroid is the average of the x-coordinates of the vertices and the y-coordinate of the centroid is the average of the x-coordinates of the vertices and the y-coordinate of the centroid is the average of the x-coordinates of the vertices. Regina used inductive reasoning to come to her conclusion. Use deductive reasoning to prove that Regina's conclusion is correct. 2. Given: $\triangle ABC$ with $A(0, 0)$ , $B(2b, 2c)$ , $C(2a, 0)$ Prove: The coordinates of the centroid are $\left(\frac{2a+2b}{3}, \frac{2c}{3}\right)$ . The midpoint of $\overline{AC}$ is $(a, 0)$ . Name this point $D$ . The midpoint of $\overline{AB}$ is $(b, c)$ . Name this point $E$ . The slope of $\overline{BD}$ is $\frac{2c}{2b-a}$ . Using $(a, 0)$ as a point on $\overline{BD}$ gives the equation $y = \frac{2c}{2b-a}(x-a)$ . The slope of $\overline{CE}$ is $\frac{-c}{2a-b}$ . Using $(2a, 0)$ as a point on $\overline{CE}$ gives the equation $y = \frac{-c}{2a-b}(x-2a)$ . The centroid will be the intersection point of $\overline{BD}$ and $\overline{CE}$ , so set the equations equal and simplify: $\frac{2c}{2b-a}(x-a) = \frac{-c}{2a-b}(x-2a)$ . $4acx - 2bcx - 4a^2c + 2abc = acx - 2bcx - 2a^2c + 4abc$ . $3acx = 2a^2c + 2abc$ $x = \frac{2a+2b}{3}$ . Substituting x into the equation of $\overline{BD}$ yields: $y = \frac{2c}{2b-a}\left(\frac{2a+2b}{3}-a\right)$ $= \frac{2c}{2b-a}\left(\frac{2b-a}{3}\right)$	Reteach <b>ReteachAMedians and Altitudes of Triangles</b> $AH, BJ, and CG are medians of a triangle. They each join a vertex and the midpoint of the opposite side.The point of intersection of the medians is called the centroid of \triangle ABC.TheoremExampleCentroid TheoremThe centroid of a triangle is located \frac{2}{3} of the distance from each vertex to the midpoint of the opposite side.OreclassionCentroid TheoremThe centroid of a triangle is located \frac{2}{3} of the distance from each vertex to the midpoint of the opposite side.OreclassionDiven: \overline{AH}, \overline{CG}, and \overline{BJ} are medians of \triangle ABC.Conclusion: AN = \frac{2}{3}AH, CN = \frac{2}{3}CG, BN = \frac{2}{3}BJIn \triangle ABC above, suppose AH = 18 and BN = 10. You can use the Centroid Theorem to find AN and BJ.AN = \frac{2}{3}AH Centroid Thm.AN = \frac{2}{3}BJ Substitute 10 for BN.AN = \frac{2}{3}(18) Substitute 18 for AH.10A = \frac{16}{3}3OZA = \frac{16}{3}COLSPAN = 48 and OW = 30. Find each length.1. RW2. MX\frac{16}{3}3. OZ4. WZ161. RW2. MX$