

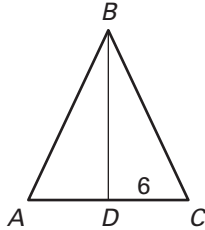
LESSON
5.4

Practice A

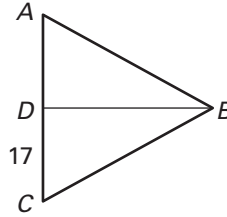
For use with pages 332–341

\overline{BD} is a median of $\triangle ABC$. Find the length of \overline{AD} .

1.

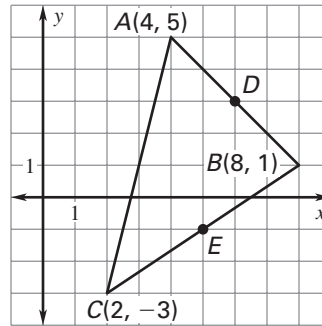


2.



Use the graph shown.

3. Find the coordinates of D , the midpoint of \overline{AB} .
4. Find the length of the median \overline{CD} .
5. Find the coordinates of E , the midpoint of \overline{BC} .
6. Find the length of the median \overline{AE} .

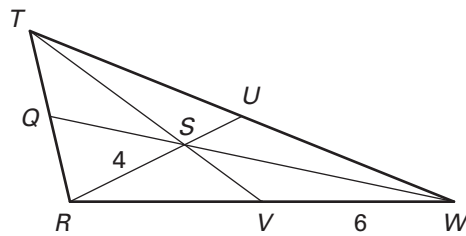


Copy and complete the statement for $\triangle MNP$ with medians \overline{MT} , \overline{NR} , and \overline{PS} , and centroid Q .

7. $QR = \underline{\quad} NR$
8. $MQ = \underline{\quad} MT$

S is the centroid of $\triangle RTW$, $RS = 4$, $VW = 6$, and $TV = 9$. Find the length of the segment.

9. \overline{RV}
10. \overline{SU}
11. \overline{RU}
12. \overline{RW}
13. \overline{TS}
14. \overline{SV}

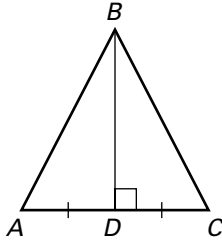


LESSON
5.4

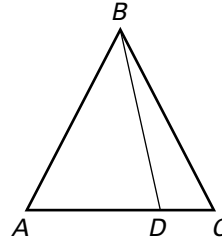
Practice A *continued*
For use with pages 332–341

Is \overline{BD} a median of $\triangle ABC$? Is \overline{BD} an altitude? a perpendicular bisector?

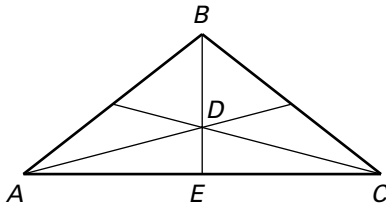
15.



16.



17. **Error Analysis** D is the centroid of $\triangle ABC$. Your friend wants to find DE . The median BE has length 24. Find and correct the error. *Explain* your reasoning.



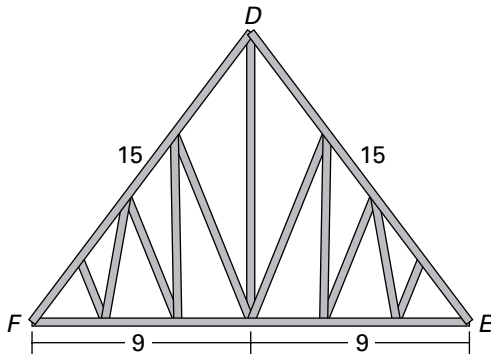
$$DE = \frac{2}{3}BE$$

$$DE = \frac{2}{3}(24)$$

$$DE = 16$$

In Exercises 18 and 19, use the following information.

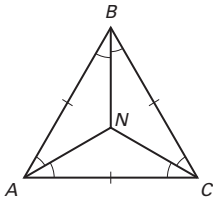
Roof Trusses Some roofs are built using several triangular wooden trusses.



- 18. Find the altitude (height) of the truss.
- 19. How far down from D is the centroid of $\triangle DEF$?

Lesson 5.3, continued

6. First draw equilateral $\triangle ABC$, with incenter N .



Because the triangle is equilateral, it is also equiangular. So, the angle bisectors of the triangle form six congruent angles. From the figure you can see that $\triangle ABN \cong \triangle CBN \cong \triangle ACN$ by the ASA Congruence Postulate. Then you can conclude that $\overline{AN} \cong \overline{BN} \cong \overline{CN}$ because corresponding parts of congruent triangles are congruent. Therefore, the incenter N is equidistant from the vertices of the triangle.

7. $N\left(\frac{5}{2}, \frac{5}{2}\right)$ 8. $N\left(\frac{7\sqrt{2} - \sqrt{5}}{\sqrt{2} + 2\sqrt{5}}, \frac{7\sqrt{2} - \sqrt{5}}{\sqrt{2} + 2\sqrt{5}}\right)$

Lesson 5.4

Practice Level A

1. 6 2. 17 3. (6, 3) 4. $2\sqrt{13}$ 5. (5, -1)
 6. $\sqrt{37}$ 7. $\frac{1}{3}$ 8. $\frac{2}{3}$ 9. 6 10. 2 11. 6
 12. 12 13. 6 14. 3 15. yes; yes; yes
 16. no; no; no 17. The equation should be
 $BD = \frac{2}{3}BE$, so $BD = \frac{2}{3}(24) = 16$ and
 $DE = 24 - 16 = 8$. 18. 12 19. 8

Practice Level B

1. 8 2. 16 3. 5 4. 15 5. 12 6. 6
 7. a. $M(2, 4); P(2, 1)$ b. $N(0, 1); KP = 4$ and
 $KN = 6$ therefore $KP = \frac{2}{3}KN$. 8. (-3, -1)
 9. (5, -2) 10. yes; yes; yes 11. no; no; no
 12. no; yes; no 13. 12; 78° 14. 6.5; 15
 15. $\frac{1}{3}$ 16. $\frac{1}{2}$ 17. $\frac{2}{3}$ 18. 7 19. 5 20. 3
 21. sometimes 22. sometimes 23. always
 24. sometimes 25. 36 in.; By Theorem 5.8, the
 distance from the vertex to the centroid is $\frac{2}{3}$ times
 the length of the median (\overline{AB}). 26. 8 mm; yes

Practice Level C

1. 10 2. 5 3. 12 4. 6.5 5. 13 6. $\frac{2}{3}$ 7. $\frac{1}{3}$
 8. a. (6, 6) b. (6, 3) c. (4, 0); $BG = 2\sqrt{13}$ and
 $BE = 3\sqrt{13}$ therefore $BG = \frac{2}{3}BE$. 9. 2 10. 2
 11. 8 12. (5, 2) 13. (-5, 6) 14. always
 15. always 16. 3 in.²; altitude 17. 1. $\triangle ABC$ is
 isosceles, \overline{BD} is a median to base \overline{AC} ; (Given)
 2. D is the midpoint of \overline{AC} ; (Definition of
 median) 3. $\overline{AD} \cong \overline{CD}$; (Definition of midpoint)
 4. $\overline{AB} \cong \overline{CB}$; (Definition of isosceles triangle)
 5. $\overline{BD} \cong \overline{BD}$; (Reflexive Property of Congruence)
 6. $\triangle BDC \cong \triangle BDA$; (SSS Congruence
 Postulate) 7. $\angle BDC \cong \angle BDA$; (Corresponding
 parts of congruent triangles are congruent.)
 8. $\angle BDC$ and $\angle BDA$ are a linear pair.; (Definition
 of linear pair) 9. $\overline{BD} \perp \overline{AC}$; (If two lines intersect
 to form a linear pair of congruent angles, then the
 lines are perpendicular.) 10. \overline{BD} is also an
 altitude.; (Definition of altitude)

Review for Mastery

1. $RU = 6, RS = 4$ 2. 26 3. (5, 2) 4. (-5, 6)
 5. (2, 6) 6. (3, 2)

Problem Solving Workshop: Using Alternative Methods

1. (7, 5) 2. (5, 6) 3. $PD = 600$ ft, $PN = 300$ ft,
 $MD = 480$ ft, $ED = 960$ ft, $PM = 380$ ft,
 $FM = 1140$ ft

Challenge Practice

1. $x = 3.5$ or $x = -2$ 2. $x = 5.5$ or $x = -1$
 3. $x = 2$ 4. $x = 7$ or $x = 1$ 5. $\frac{16\sqrt{5}}{3}$
 6. $\frac{8\sqrt{1794}}{3}$ 7. $\frac{4\sqrt{2.816}}{3}$ 8. $\frac{4\sqrt{317.2136}}{3}$
 9. Midpoint of \overline{AB} : $\left(\frac{a}{2}, 0\right)$;
 midpoint of \overline{BC} : $\left(\frac{b}{2}, \frac{c}{2}\right)$;
 midpoint of \overline{CA} : $\left(\frac{a+b}{2}, \frac{c}{2}\right)$