Name: **Key**   Date: _____   Period: _____

## 6.3 Medians and Altitudes of Triangles CYU

| CONCEPTS | BASIC | INTERMEDIATE | ADVANCED |
|---|---|---|---|
| Properties of the centroid of a triangle | 1 – 4, 9 - 12 | 5 - 8 | 13 – 16 |
| Location of the orthocenter | 17 – 20 | | |
| Sketching special segments and their POC's | 21 | 22 | |
| Sometimes, Always, or Never | | | 23 – 28 |
| Critical thinking | | | 29 |

*1 – 4: Point P is the centroid of ΔLMN. Find PN and QP.*

1. QN = 9    2. QN = 21    3. QN = 30    4. QN = 42
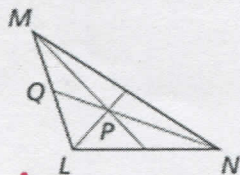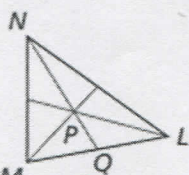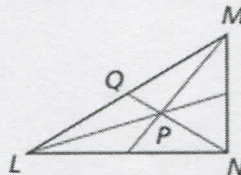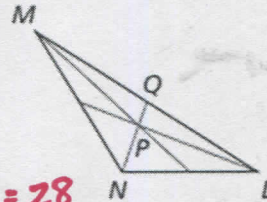
PN = 6    PN = 14    PN = 20    PN = 28
QP = 3    QP = 7    QP = 10    QP = 14

*5 – 8: Point D is the centroid of ΔABC. Find CD and CE.*

5. DE = 5    6. DE = 11    7. DE = 9    8. DE = 15
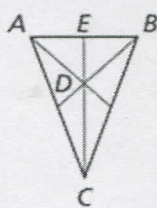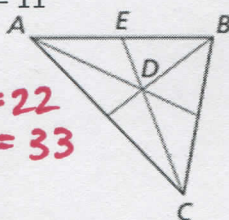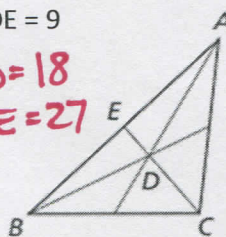
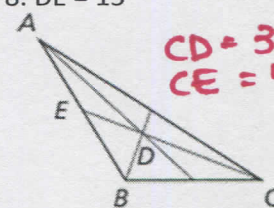CD = 10    CD = 22    CD = 18    CD = 30
CE = 15    CE = 33    CE = 27    CE = 45

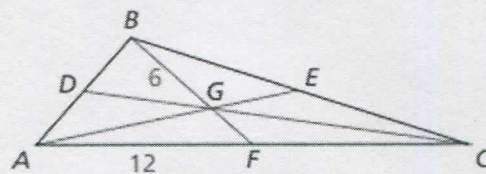*9 – 12: Use the diagram to answer the following four questions, point G is the centroid of ΔABC. BG = 6, AF = 12, and AE = 15. Find the length of the segment.*

9. $\overline{FC}$  **12**    10. $\overline{BF}$  **9**

11. $\overline{AG}$  **10**    12. $\overline{GE}$  **5**

*13 – 18: Find the coordinates of the centroid of the triangle with given vertices.*

13. A(2, 3), B(8, 1), C(5, 7)

$\left(5, \dfrac{11}{3}\right)$

14. F(1, 5), G(- 2, 7), H(- 6, 3)

$\left(-\dfrac{7}{3}, 5\right)$

15. S(5, 5), T(11, - 3), U(- 1, 1)
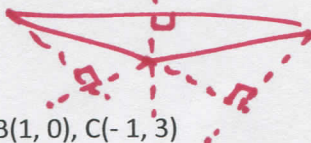
$(5, 1)$

16. X(1, 4), Y(7, 2), Z(2, 3)

$\left(\dfrac{10}{3}, 3\right)$

*17 - 20: Tell whether the orthocenter is INSIDE, ON, or OUTSIDE the triangle. Then find the coordinates of the orthocenter. Sketch a visual.*
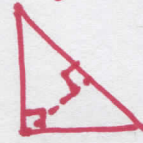
17. L(0, 5), M(3, 1), N(8, 1)
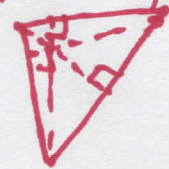
**outside; (0, -5)**

18. X(- 3, 2), Y(5, 2), Z(- 3, 6)

**on; (-3, 2)**

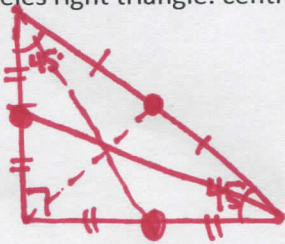19. A(- 4, 0), B(1, 0), C(- 1, 3)

**inside, (-1, 2)**

20. T(- 2, 1), U(2, 1), V(0, 4)
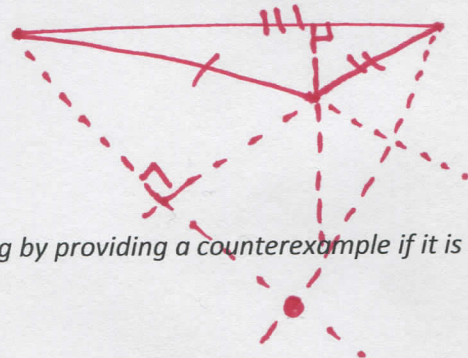
**inside, (0, $\frac{7}{3}$)**

*21 – 22: Draw the indicated triangle with the special segments to show the location of the POC indicated.*

21. isosceles right triangle: centroid

22. Obtuse scalene triangle: orthocenter

*23 – 28: SOMETIMES, ALWAYS, or NEVER. Explain your reasoning by providing a counterexample if it is NOT an always.*

23. The centroid is __N__ on the triangle. **balance point**

24. The orthocenter is __S__ outside the triangle. **right △**

25. A median is __S__ the same line segment as a perpendicular bisector.

26. An altitude is __S__ the same line segment as an angle bisector.

27. The centroid and orthocenter are __S__ the same point.

28. The centroid is __A__ formed by the intersection of the three medians. **no counterexample**

29. **CRITICAL THINKING:** In what type(s) of triangles can a vertex be one of the points of concurrency (POC) of the triangle? Explain your reasoning.

**Right △; The orthocenter of a right △ is the vertex of the right △.**

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**CYU Reflection:** *How far can you go: basic, intermediate, or advanced?*
**Rate your mastery level!**
How confident are you with the skills this CYU covered? Circle the score you would give yours elf.

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

Basic          Intermediate          Advanced   Solved ALL!