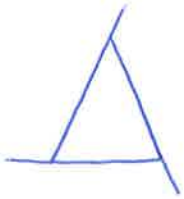
Geometry H
Section 4.1 – 4.7 Quiz Review

Name : Key
Date : _____ Period : ____

1. Is each of the following statements true or false? Explain your reasoning.



a. Every equilateral triangle is acute. True, each angle in an equilateral Δ is 60°.

b. A triangle can have two obtuse angles. False, a triangle can have at most one obtuse angle

c. A triangle can have two acute exterior angles. False, if a Δ is acute, all ext. angles will be obtuse
If a Δ is obtuse, only one ext angle will be acute

d. A triangle can have at most one right angle. True

2. In ΔDEF, $m\angle D = (12x-6)°$, $m\angle E = (5x+2)°$, and $m\angle F = 6x°$. Classify ΔDEF by its angles.

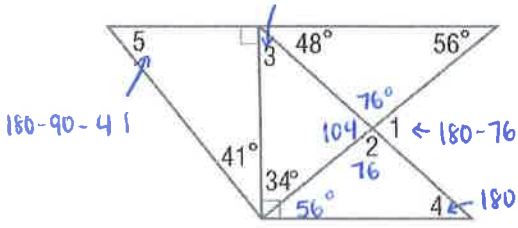
$23x - 4 = 180$
$23x = 184$
$x = 8$

$m\angle D = 90°$
$m\angle E = 42°$
$m\angle F = 48°$
> Right Δ

3. A triangle has side lengths of 4 inches, 6 inches, and 8 inches. Classify the triangle by its side lengths.

Scalene because all side lengths are different

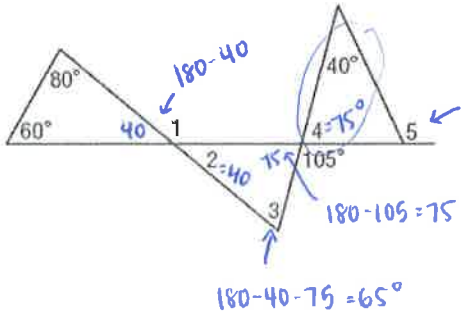
4. Using the diagram below, please find the measure of all numbered angles. (NOTE: Diagram not drawn to scale)



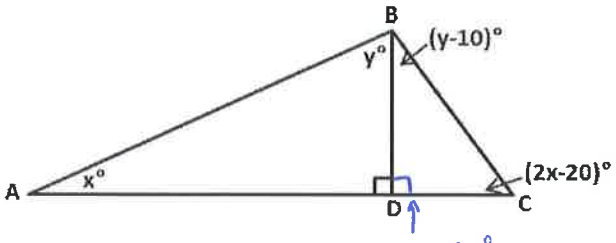
$m\angle 2 = 76°$ by VAT
$m\angle 4 = 48°$
$m\angle 5 = 49°$
$m\angle 1 = 104°$
$m\angle 3 = 42°$

5. Using the diagram below, please find the measure of the following angles:

a. $m\angle 1 = 140°$
b. $m\angle 2 = 40°$ (by VAT)
c. $m\angle 3 = 65°$
d. $m\angle 4 = 75°$ (by VAT)
e. $m\angle 5 = 115°$



6. Using the diagram below, please solve for x and y.



$m\angle BDC = 90°$ by LPP

$\triangle ABD$: $x + y + 90 = 180$

$x + y = 90$

$\triangle BDC$: $y - 10 + 2x - 20 + 90 = 180$

$2x + y + 60 = 180$

$2x + y = 120$

System: $\begin{cases} x + y = 90 \\ 2x + y = 120 \end{cases}$ $\cdot(-1)$

$\Rightarrow -x - y = -90$

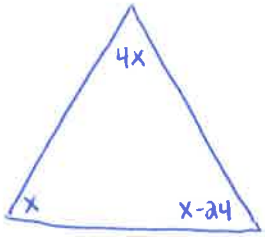
$2x + y = 120$

$x = 30$

$30 + y = 90$

$y = 60$

7. In a triangle, the measure of the second angle is four times the measure of the first angle. The third angle is twenty-four less than the first angle. Find the measure of each angle and classify the triangle by its angle measures ***and*** by its side lengths.



$x + 4x + x - 24 = 180$

$6x - 24 = 180$

$6x = 204$

$x = 34$

First angle = 34°

Second = 136°

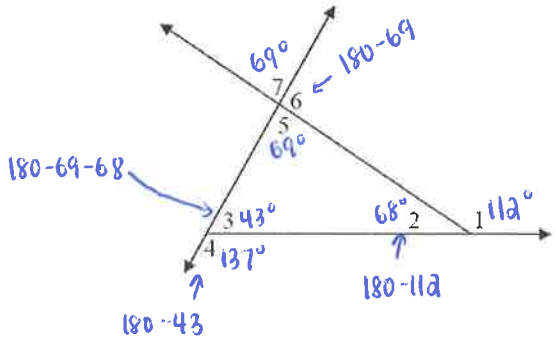
Third = 10°

Obtuse scalene

↑ one angle greater than 90°

↑ all angles are diff which means all sides are different

8. Given $m\angle 1 = 112°$ and $m\angle 7 = 69°$, find the measures of the other numbered angles.



$m\angle 1 = 112°$

$m\angle 2 = 68°$

$m\angle 3 = 43°$

$m\angle 4 = 137°$

$m\angle 5 = 69°$

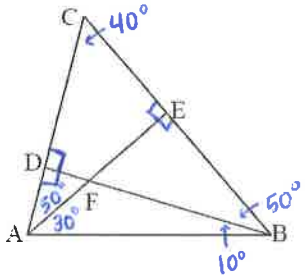
$m\angle 6 = 111°$

$m\angle 7 = 69°$

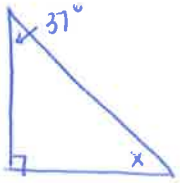
9. In the diagram below, $m\angle CAB = 80°$ and $m\angle CBA = 60°$. If $\overline{BD} \perp \overline{AC}$ and $\overline{AE} \perp \overline{BC}$, find $m\angle ACB$ and $m\angle AFB$.

$m\angle ACB = 40°$

$m\angle AFB = 140°$



10. One acute angle of a right triangle measures 37°. Find the measure of the other acute angle.



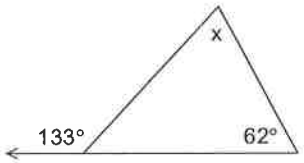
$x + 37 = 90$

$x = 53°$

The other acute angle is 53°.

11. Use the diagrams below, please solve for x.

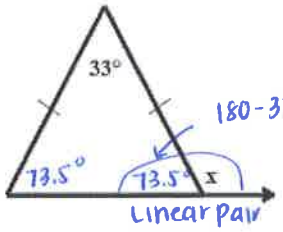
a.



$133 = x + 62$

$x = 71$

b.

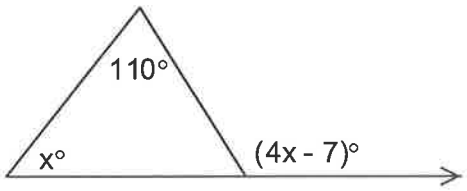


$180 - 33 = 147 \div 2$ base angles $= 73.5$

$x + 73.5 = 180$

$x = 106.5$

12. Using the diagram below, please find the measure of the **exterior angle**.



$4x - 7 = x + 110$

$3x - 7 = 110$

$3x = 117$

$x = 39$

Ext angle $= 4(39) - 7$

$= 149°$

13. If $m\angle PST = (x+3y)°$, $m\angle RPS = 45°$, $m\angle PRS = 2y°$, and $m\angle PSR = 5x°$, find $m\angle PST$.

ΔPRS: $2y + 6x + 45 = 180$

$2y + 5x = 135$

Linear pair: $5x + x + 3y = 180$

$6x + 3y = 180$

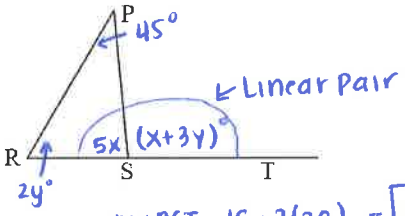
System: $\begin{cases} (5x + 2y = 135)3 \\ (6x + 3y = 180)-2 \end{cases} \Rightarrow$ $15x + 6y = 405$, $-12x - 6y = -360$

$3x = 45 \Rightarrow x = 15$

$5(15) + 2y = 135$

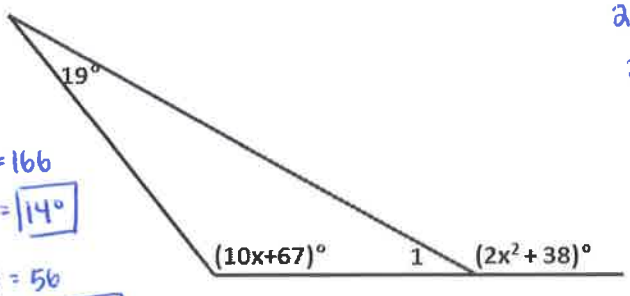
$2y = 60$

$y = 30$



$m\angle PST = 15 + 3(30) = 105°$

14. Find **all** possibilities for $m\angle 1$ in the diagram below. (NOTE: Diagram not drawn to scale)



$2x^2 + 38 = 10x + 67 + 19$

$2x^2 + 38 = 10x + 86$

$2x^2 - 10x - 48 = 0$

$\frac{2(x^2 - 5x - 24) = 0}{2}$

$x^2 - 5x - 24 = 0$

$(x - 8)(x + 3) = 0 \Rightarrow x = 8$ or $x = -3$

Ext angle:

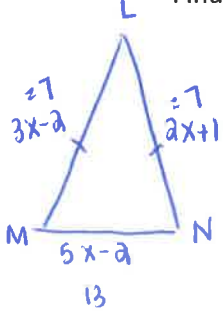
$x = 8$: $2(64) + 38 = 166$

$m\angle 1 = 180 - 166 = 14°$

$x = -3$: $2(9) + 38 = 56$

$m\angle 1 = 180 - 56 = 124°$

✱ 15. Given ΔLMN is isosceles, $\overline{LN}$ and $\overline{LM}$ are the legs, LM = 3x – 2, LN = 2x + 1, and MN = 5x – 2. Find the value of x. and find the perimeter



$3x - 2 = 2x + 1$

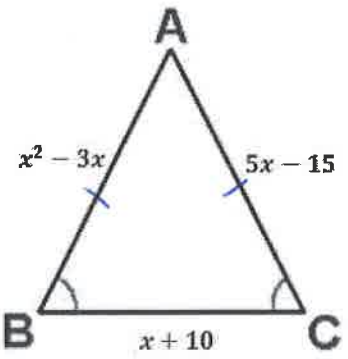
$x - 2 = 1$

$x = 3$

$P = 7 + 7 + 13$

$P = 27$ units

16. Using the diagram below, find the value of x.



$x^2 - 3x = 5x - 15$

$x^2 - 8x + 16 = 0$

$(x-5)(x-3) = 0$

$\boxed{x=5}$ $x=3$ ↑ not a solution

Check: $x=5$:

$AB = 25 - 3(5) = 10$ ✓

$AC = 25 - 15 = 10$

$x=3$:

$AB: 9-9=0$

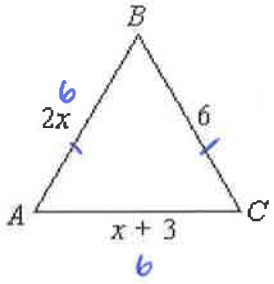
$BC = 15-15 = 0$ → can't have zero side lengths

17. Given that $\overline{AB} \cong \overline{BC}$, find the value of x and classify ΔABC by its side lengths.

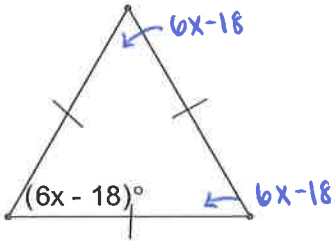
$2x = 6$

$\boxed{x=3}$

Equilateral Δ



18. Given the diagram below, please find the value of x.



$6x-18+6x-18+6x-18 = 180$

$18x - 54 = 180$

$18x = 234$

$\boxed{x=13}$

OR

$6x - 18 = 60$

$6x = 78$

$\boxed{x=13}$

19. Given the information listed in the diagram below, $m\angle BAE = 12°$, $m\angle ABC = 52°$, and $m\angle BCE = 26°$, please find the values of x and y.

Smaller Δ: $y + 5y + x = 180$

$6y + x = 180$

Big Δ: $5a + 1a + y + x + a6 = 180$

$y + x + 90 = 180$

$y + x = 90$

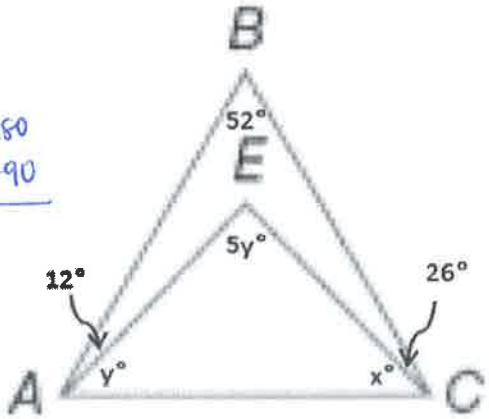
System: $\begin{cases} 6y + x = 180 \\ -1((y + x = 90) \Rightarrow -y - x = -90 \end{cases}$

$5y = 90$

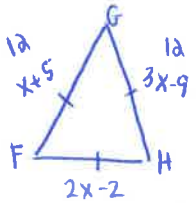
$\boxed{y=18}$

$18 + x = 90$

$\boxed{x=72}$



20. ΔFGH is equilateral with FG = x + 5, GH = 3x – 9, and FH = 2x – 2. Find the perimeter of ΔFGH.



$x+5 = 2x-2$

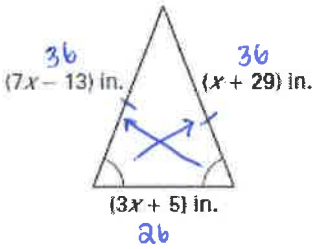
$5 = x-2$

$x = 7$

$P = 12+12+12$

$P = 36$ units

21. Using the diagram below, please find perimeter of the triangle.



$7x-13 = x+29$

$6x-13 = 29$

$6x = 42$

$x = 7$

$P = 36+36+26$

$P = 98$ inches

A triangle has the given vertices. Graph the triangle, find each side length in simplest radical form, and classify the triangle by its side lengths. Determine if the triangle is a right triangle.

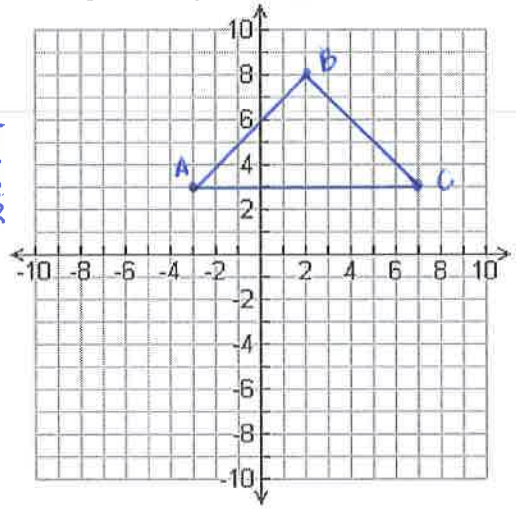
22. A(-3, 3), B(2, 8), C(7, 3)

$AB = \sqrt{(2+3)^2+(8-3)^2} = \sqrt{(5)^2+(5)^2} = \sqrt{25+25} = \sqrt{50} = 5\sqrt{2}$

$BC = \sqrt{(7-2)^2+(3-8)^2} = \sqrt{(5)^2+(-5)^2} = \sqrt{25+25} = \sqrt{50} = 5\sqrt{2}$

$AC = \sqrt{(7+3)^2+(3-3)^2} = \sqrt{(10)^2+(0)^2} = \sqrt{100} = 10$

isosceles



$m_{\overline{AB}} = \frac{8-3}{2+3} = \frac{5}{5} = 1$

$m_{\overline{BC}} = \frac{3-8}{7-2} = \frac{-5}{5} = -1$

Since $\overline{AB} \perp \overline{BC}$, ΔABC is a right triangle

$m_{\overline{AC}} = \frac{3-3}{7+3} = \frac{0}{10} = 0$

Right Isosceles

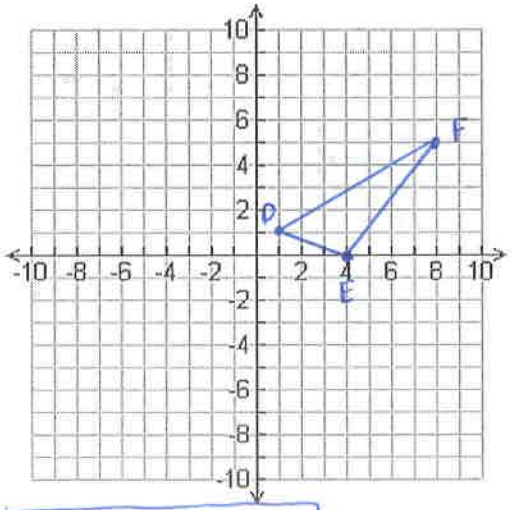
23. D(1, 1), E(4, 0) F(8, 5)

$DE = \sqrt{(4-1)^2+(0-1)^2} = \sqrt{(3)^2+(-1)^2} = \sqrt{9+1} = \sqrt{10}$

$EF = \sqrt{(8-4)^2+(5-0)^2} = \sqrt{(4)^2+(5)^2} = \sqrt{16+25} = \sqrt{41}$

$FD = \sqrt{(8-1)^2+(5-1)^2} = \sqrt{(7)^2+(6)^2} = \sqrt{49+36} = \sqrt{85}$

Scalene



$m_{\overline{DE}} = \frac{0-1}{4-1} = \frac{-1}{3}$

$m_{\overline{EF}} = \frac{5-0}{8-4} = \frac{5}{4}$

$m_{\overline{FD}} = \frac{5-1}{8-1} = \frac{4}{7}$

since none of the slopes are opp. reciprocals, ΔDEF is not a right triangle

Scalene Non-Right

24. G(1, -3), H(2, -6), I(-1, -5)

$GH = \sqrt{(2-1)^2+(-6+3)^2} = \sqrt{(1)^2+(-3)^2} = \sqrt{1+9} = \sqrt{10}$

$HI = \sqrt{(-1-2)^2+(-5+6)^2} = \sqrt{(-3)^2+(1)^2} = \sqrt{9+1} = \sqrt{10}$

$IG = \sqrt{(-1-1)^2+(-5+3)^2} = \sqrt{(-2)^2+(-2)^2} = \sqrt{4+4} = \sqrt{8} = 2\sqrt{2}$

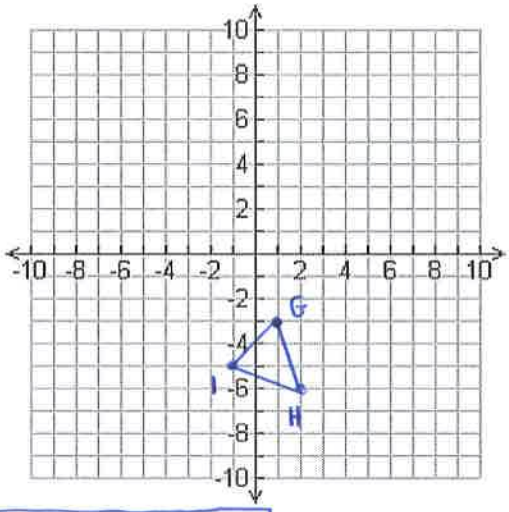
} Isosceles

$m_{\overline{GH}} = \frac{-6+3}{2-1} = \frac{-3}{1} = -3$

$m_{\overline{HI}} = \frac{-5+6}{-1-2} = \frac{1}{-3}$

$m_{\overline{IG}} = \frac{-5+3}{-1-1} = \frac{-2}{-2} = 1$

} Since none of the slopes are opp. reciprocals, ΔGHI is not a right triangle



Isosceles Non-Right

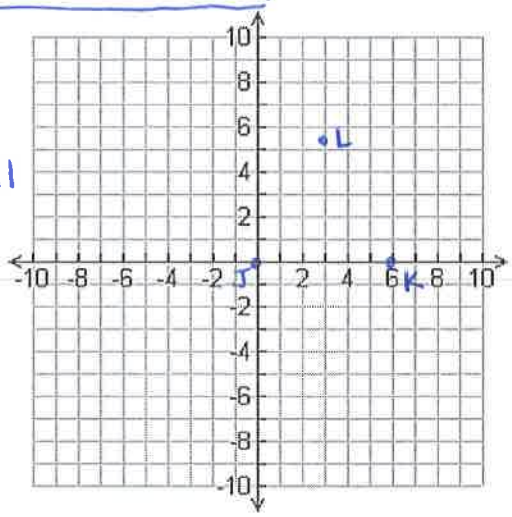
25. J(0, 0), K(6, 0), L(3, $\sqrt{27}$)

$JL = \sqrt{(3-0)^2+(\sqrt{27}-0)^2} = \sqrt{(3)^2+(\sqrt{27})^2} = \sqrt{9+27} = \sqrt{36} = 6$

$LK = \sqrt{(3-6)^2+(\sqrt{27}-0)^2} = \sqrt{(-3)^2+(\sqrt{27})^2} = \sqrt{9+27} = \sqrt{36} = 6$

$JK = \sqrt{(6-0)^2+(0-0)^2} = \sqrt{(6)^2} = \sqrt{36} = 6$

} Equilateral



$m_{\overline{JL}} = \frac{\sqrt{27}-0}{3-0} = \frac{\sqrt{27}}{3}$

$m_{\overline{LK}} = \frac{\sqrt{27}-0}{3-6} = -\frac{\sqrt{27}}{3}$

$m_{\overline{JK}} = \frac{0-0}{6-0} = \frac{0}{6} = 0$

} Since none of the slopes are opp. reciprocals, ΔJKL is not a right triangle.
It could never be a right Δ since all angles have measures of 60° in an equilateral triangle

Equilateral

Answer Key :

1) a. True, each angle in an equilateral triangle is always $60°$

b. False, if a triangle had more than one obtuse angle, the interior angle sum would be greater than 180°

c. False, an angle would have to have two obtuse angles in order to have two acute exterior angles

d. True, if a triangle had more than one right angle, the interior angle sum would be greater than 180°

2) $x = 8$, right triangle

3) Scalene triangle

4) $m\angle 1 = 104°,\ m\angle 2 = 76°,\ m\angle 3 = 42°,\ m\angle 4 = 48°,\ m\angle 5 = 49°$

5) $m\angle 1 = 140°,\ m\angle 2 = 40°,\ m\angle 3 = 65°,\ m\angle 4 = 75°,\ m\angle 5 = 115°$

6) $x = 30,\ y = 60$

7) Angles : $34°,\ 136°,\ 10°$, Obtuse Scalene

8) $m\angle 1 = 112°,\ m\angle 2 = 68°,\ m\angle 3 = 43°,\ m\angle 4 = 137°,\ m\angle 5 = 69°,\ m\angle 6 = 111°,\ m\angle 7 = 69°$

9) $m\angle ACB = 40°,\ m\angle AFB = 140°$

10) $53°$

11) a. $x = 71$ b. $x = 106.5$

12) $149°$

13) $x = 15,\ y = 30,\ m\angle PST = 105°$

14) $m\angle 1 = 14°,$ OR $m\angle 1 = 124°$

15) $x = 3$

16) $x = 5$

17) $x = 3$, Equilateral

18) $x = 13$

19) $x = 72,\ y = 18$

20) $P = 36$ units

21) $P = 98$ inches

22) Right Isosceles Triangle

23) Obtuse Scalene Triangle

24) Acute Isosceles Triangle

25) Equilateral Triangle