Geometry H
Unit 3 Review

Name : Key
Date : _____ Period : ____

For each statement below, determine if it is always true, sometimes true or never true.

1. The legs of an isosceles triangle are perpendicular to the base never

2. The acute angles of a right triangle are congruent. sometimes

3. An equiangular triangle is also equilateral. always

4. If one of the exterior angles of an isosceles triangle is 120°, then the triangle is equilateral. always

5. **TRUE OR FALSE:**

If in ΔABC, $m\angle A$ is 30° more than $m\angle B$, and $m\angle B$ is 24 less than $m\angle C$, then ΔABC is acute.

$m\angle A = x-24+30$
$m\angle B = x-24$
$m\angle C = x$

$x+6+x-24+x=180$
$3x-18=180$
$3x=198 \Rightarrow \boxed{x=66}$

$m\angle A = 66+6 = 72°$
$m\angle B = 66-24 = 42°$
$m\angle C = 66°$

$\boxed{\text{acute } \Delta}$

6. **MULTIPLE CHOICE:**

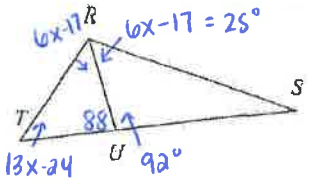
Which of the following triangles does not exist?

I. acute isosceles II. right scalene
III. obtuse equilateral IV. obtuse scalene

a. I only b. II only c. III only d. II and III e. II, III, IV

7. $\overline{RU}$ bisects $\angle TRS$. If $m\angle RTU = (13x-24)°$, $m\angle TRS = (12x-34)°$, and $m\angle RUS = 92°$, find $m\angle RSU$.

each half must be $(6x-17)°$

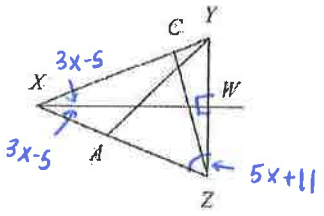


$\Delta RTU: 13x-24+88+6x-17=180$
$19x+47=180$
$19x=133$
$\boxed{x=7}$

$\Delta RSU: 25+92+m\angle RSU=180$
$117+m\angle RSU=180$
$\boxed{m\angle RSU=63°}$

8. $\overline{XW}$ bisects $\angle ZXY$. If $m\angle WZX = (5x+11)°$, $m\angle ZXY = (6x-10)°$, and $\overline{XW} \perp \overline{ZY}$, find $m\angle WXY$.

each half is $(3x-5)°$

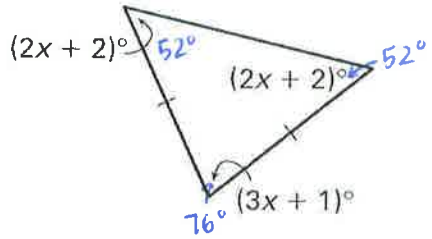


$\Delta XZW: 3x-5+5x+11+90=180$
$8x+96=180$
$8x=84$
$\boxed{x=10.5}$

$m\angle WXY = 3(10.5)-5$
$\boxed{m\angle WXY = 26.5°}$

Find the value of x. Then classify the triangle by its angles.

9.



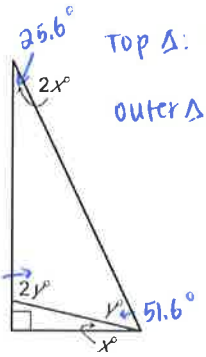
$7x+5=180$

$7x=175$

$x=25$

The Δ is acute since all ∠'s are less than 90°.

10.



Top Δ: $3y+2x=180$

outer Δ: $3x+y+90=180$

$3x+y=90$

$2x+3y=180$

$-3(3x+y=90)$

$2x+3y=180$

$-9x-3y=-270$

$-7x=-90$

$x=12.8$

Top Δ: obtuse

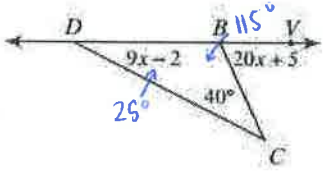
Sm Δ: Right

$3(12.8)+y=90$

$38.4+y=90$

$y=51.6$

11.



$20x+5=9x-2+40$

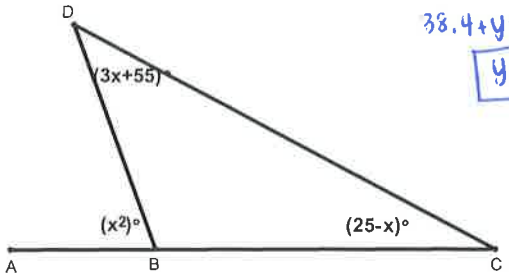
$20x+5=9x+38$

$11x+5=38$

$11x=33 \Rightarrow x=3$

since $m\angle DBC=115°$, the Δ is obtuse

12.



$x^2=3x+55+25-x$

$x^2=2x+80$

$x^2-2x-80=0$

$(x-10)(x+8)=0$

$x=10, x=-8$

When $x=10$:

$m\angle C=15°$

$m\angle D=85°$

$m\angle DBC=80°$ → acute

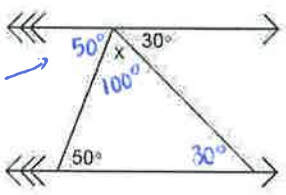
When $x=-8$:

$m\angle C=33°$

$m\angle D=31°$

$m\angle PBC=116°$ → obtuse

13. Note: Triangle not drawn to scale!



alt. int. angles

$50+x+30=180$

$x+80=180$

$x=100$

The Δ is obtuse

14. If $m\angle DCA=[(x-2)^2]°$, $m\angle A=(5x)°$, and $m\angle B=(3x+4)°$, please find the value of x and classify ΔABC by its sides and its angles.

$(x-2)^2=5x+3x+4$

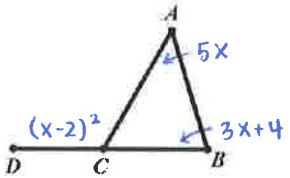
$x^2-4x+4=8x+4$

$x^2-12x=0$

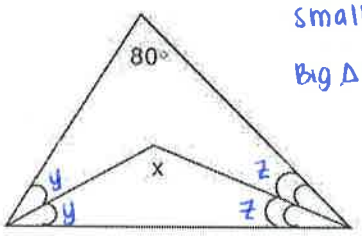
$x(x-12)=0 \Rightarrow x=0, x=12$

Check: $x=0$: $m\angle A=5(0)=0$ ↑ can't have 0° angle measures

$x=12$: $m\angle A=60°$, $m\angle B=40°$, $m\angle ACB=80°$ → acute scalene



15. Solve for x.



Small Δ: $x+y+z=180 \Rightarrow y=180-x-z$

Big Δ: $80+2y+2z=180 \Rightarrow 80+2(180-x-z)+2z=180$

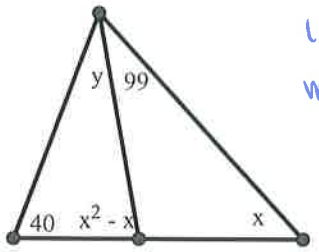
$80+360-2x-2z+2z=180$

$440-2x=180$

$-2x=-260$

$x=130$

16. Find the values of x and y.



Left Δ: $x^2 - x + y + 40 = 180$ ⇒ $x^2 - x + 41 - x + 40 = 180$

Whole Δ: $y + 99 + x + 40 = 180$

$x + y = 41$

$y = 41 - x$

$x^2 - 2x + 81 = 180$

$x^2 - 2x - 99 = 0$

$(x - 11)(x + 9) = 0$

$x = 11$ ~~$x = -9$~~ ← can't have lower right ∠ as negative

$y = 41 - 11$

$\boxed{y = 30}$

17. Given : $\overline{AB} \perp \overline{BC}$, $\overline{BD}$ bisects $\angle ABC$, $m\angle ABD = (x + 5y)°$, $m\angle DBC = (2x + 2y + 3)°$. Find the values of x and y.

↳ each half must be 45°

$x + 5y = 45$

$2x + 2y + 3 = 45$

$2x + 2y = 42$

$-2(x + 5y = 45)$

$2x + 2y = 42$ ⇒

$-2x - 10y = -90$

$2x + 2y = 42$

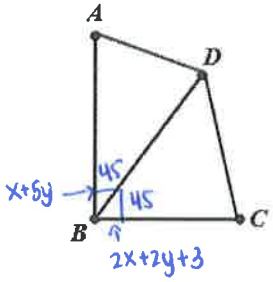
$-8y = -48$

$\boxed{y = 6}$

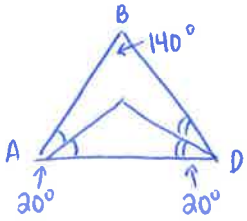
$x + 5(6) = 45$

$x + 30 = 45$

$\boxed{x = 15}$



18. $\overline{AO}$ and $\overline{DO}$ are the angle bisectors of $\angle DAB$ and $\angle BDA$, respectively. $\overline{CD} \cong \overline{BD} \cong \overline{AB}$, and $m\angle C = 40°$. Find $m\angle BAO$.

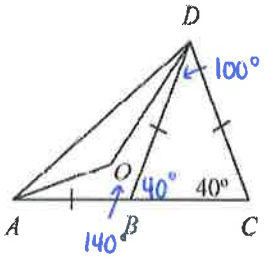


$m\angle A = 180 - 140$ $\quad$ $m\angle D = 180 - 140$

$= 40 \div 2$ $\quad$ $= 40 \div 2$

$= 20°$ $\quad$ $= 20°$

Both angles are bisected so each half is $\boxed{10°}$



19. A triangle has vertices $A(1, 1)$, $B(3, 0)$ and $C(2, 3)$. Graph the triangle and classify it by its sides and determine if it is a right triangle. Show all work. Justify your answer.

$AB = \sqrt{(3-1)^2 + (0-1)^2} = \sqrt{(2)^2 + (-1)^2} = \sqrt{4+1} = \sqrt{5}$

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

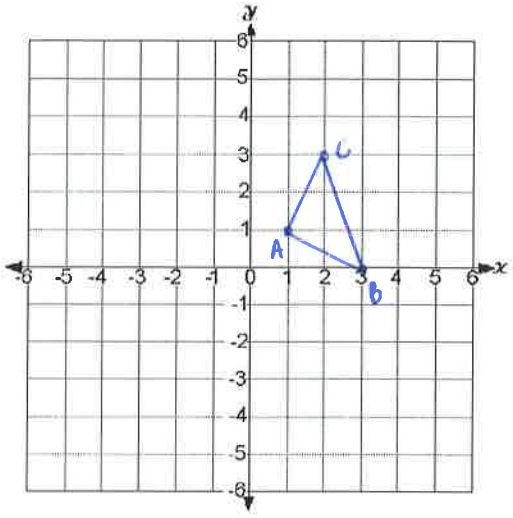
$AC = \sqrt{(2-1)^2 + (3-1)^2} = \sqrt{(1)^2 + (2)^2} = \sqrt{1+4} = \sqrt{5}$

⟩ Isosceles

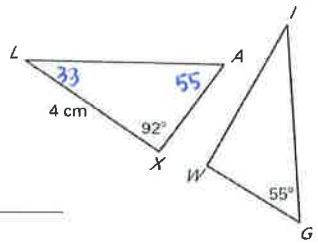
$m_{\overline{AB}} = \frac{0-1}{3-1} = \frac{-1}{2}$

$m_{\overline{AC}} = \frac{3-1}{2-1} = \frac{2}{1}$

⟩ since $\overline{AB}$ and $\overline{AC}$ have opp. reciprocal slopes, $\triangle ABC$ is a right Δ



20. In the diagram, $\Delta ALX \cong \Delta GIW$. Complete the following.



a. $\overline{LX} \cong$ $\overline{IW}$

b. $\angle I \cong$ $\angle L$

c. $\angle A \cong$ $\angle G$

d. $\overline{WG} \cong$ $\overline{XA}$

e. $m\angle A =$ $55°$

f. $m\angle W =$ $92°$

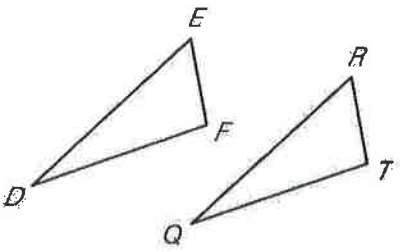
g. $m\angle I =$ $33°$

h. $m\angle L =$ $33°$

i. $IW =$ $4cm$

j. $\Delta LAX \cong$ ΔIGW

State the congruence that is needed to prove $\Delta DEF \cong \Delta QRT$ using the given postulate or theorem.



21. Given: $\angle D \cong \angle Q$, $\angle F \cong \angle T$ using AAS

Either $\overline{EF} \cong \overline{RT}$ OR $\overline{DE} \cong \overline{QR}$

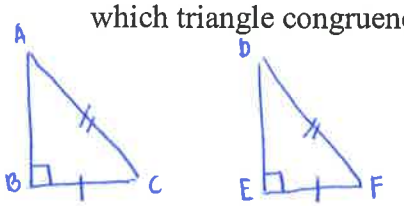
22. Given: $\angle E \cong \angle R$, $\overline{EF} \cong \overline{RT}$ using ASA

$\angle F \cong \angle T$

23. Given: $\overline{DE} \cong \overline{QR}$, $\angle D \cong \angle Q$ using SAS

$\overline{DF} \cong \overline{QT}$

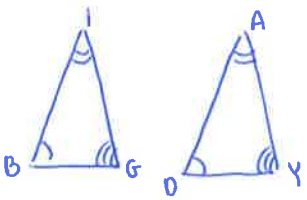
24. In ΔABC and ΔDEF, $\overline{AB} \perp \overline{BC}$, $\overline{DE} \perp \overline{EF}$, $\overline{CB} \cong \overline{EF}$, and $\overline{AC} \cong \overline{DF}$. $\Delta ABC \cong \Delta DEF$ by which triangle congruency postulate? (HINT: It may be helpful to draw a picture!)



By H-L

25. If $\Delta BIG \cong \Delta DAY$, all of the following are true EXCEPT:

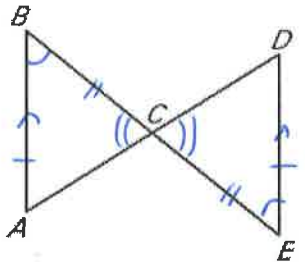
A. $\Delta DYA \cong \Delta BGI$ B. $\Delta GIB \cong \Delta YAD$ C. $\overline{YD} \cong \overline{GB}$ (D) $\angle IGB \cong \angle YAD$ E. $\overline{GI} \cong \overline{YA}$



Complete the following proofs.

26. Given: $\overline{AB} \parallel \overline{DE}$, $\overline{AB} \cong \overline{DE}$

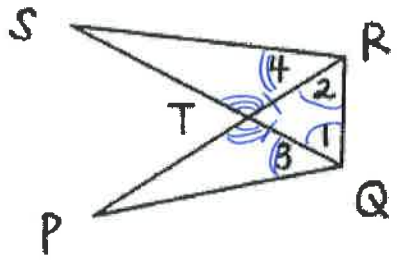
Prove: C is midpoint of $\overline{BE}$



Statements	Reasons
1. $\overline{AB} \parallel \overline{DE}$	1. Given
2. $\angle B \cong \angle E$	2. Alt. Int. Angles Thm
3. $\overline{AB} \cong \overline{DE}$	3. Given
4. $\angle BCA \cong \angle ECD$	4. VAT
5. $\triangle BCA \cong \triangle ECD$	5. AAS
6. $\overline{BC} \cong \overline{EC}$	6. CPCTC
7. C is the midpoint of $\overline{BE}$	7. Def. of midpoint

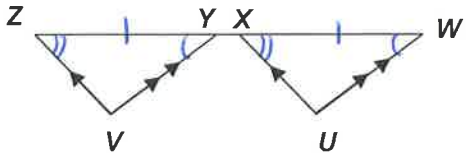
27. Given: $\angle 1 \cong \angle 2$, $\angle 3 \cong \angle 4$

Prove: $\overline{ST} \cong \overline{PT}$



Statements	Reasons
1. $\angle 1 \cong \angle 2$	1. Given
2. $\overline{RT} \cong \overline{QT}$	2. Base Angles Converse
3. $\angle 3 \cong \angle 4$	3. Given
4. $\angle QTP \cong \angle RTS$	4. VAT
5. $\triangle QTP \cong \triangle RTS$	5. ASA
6. $\overline{ST} \cong \overline{PT}$	6. CPCTC

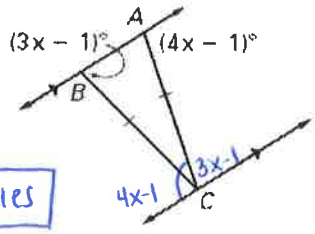
28. Given : $\overline{WU} \| \overline{YV}$, $\overline{XU} \| \overline{ZV}$, $\overline{WX} \cong \overline{YZ}$
Prove : $\Delta WXU \cong \Delta YZV$



Statements	Reasons
1. $\overline{WU} \| \overline{YV}$	1. Given
2. $\angle ZYV \cong \angle XWU$	2. Corresponding Angles Postulate
3. $\overline{XU} \| \overline{ZV}$	3. Given
4. $\angle YZV \cong \angle WXU$	4. corresponding Angles Postulate
5. $\overline{WX} \cong \overline{YZ}$	5. Given
6. $\Delta WXU \cong \Delta YZV$	6. ASA
7.	7.

Find the value of x and classify the triangle by its sides.

29.



$3x-1+4x-1=180$

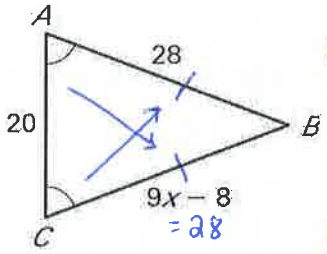
$7x-2=180$

$7x=182$

$x=26$

Isosceles

30.



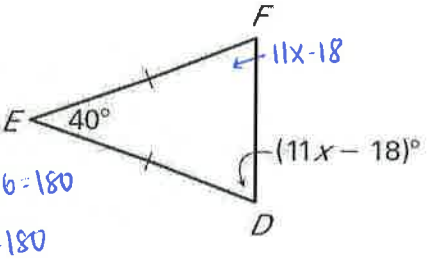
$28=9x-8$

$9x=36$

$x=4$

Isosceles

31.



$40+22x-36=180$

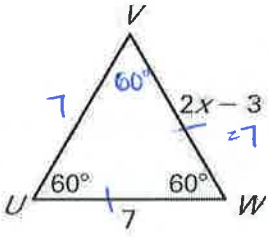
$22x+4=180$

$22x=176$

$x=8$

Isosceles

32.



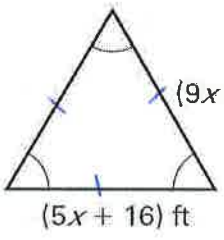
$2x-3=7$

$2x=10$

$x=5$

Equilateral

33.



$9x-11=5x+16$

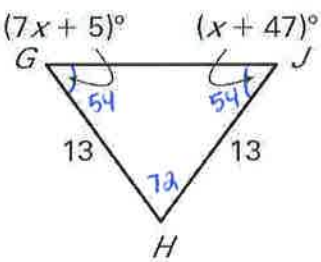
$4x-11=16$

$4x=27$

$x=6.75$

Equilateral

34.



$x+47=7x+5$

$47=6x+5$

$42=6x$

$x=7$

Isosceles

35. In triangle DEF, $m\angle D = (4x + 2)°$, $m\angle E = (6x - 30)°$, and $m\angle F = 3x°$. Classify the triangle by angles and sides. Explain your reasoning.

$4x+2+6x-30+3x=180$

$13x-28=180$

$13x=208$

$x=16$

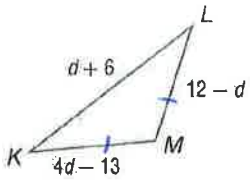
$m\angle D = 66°$

$m\angle E = 66°$

$m\angle F = 48°$

Isosceles Acute

36. Find the measures of the sides of isosceles ΔKLM with base $\overline{KL}$.



$12-d=4d-13$

$12=5d-13$

$25=5d$

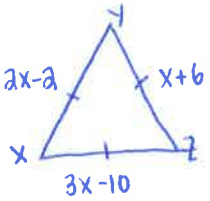
$d=5$

$KL = 5+6 = 11$

$LM = 12-5 = 7$

$KM = 4(5)-13 = 20-13 = 7$

37. ΔXYZ is equilateral. $\overline{XY}$ is two less than two times a number, $\overline{YZ}$ is six more than the number, and $\overline{XZ}$ is ten less than three times the number. Find the measure of all sides of ΔXYZ.



$x+6=3x-10$

$6=2x-10$

$16=2x$

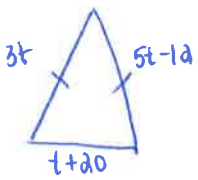
$x=8$

$XY = 14$

$YZ = 14$

$XZ = 14$

38. The lengths of the sides of a triangle are $3t$, $5t - 12$, and $t + 20$. Find the values of t that make the triangle isosceles (there are three different answers). Find the perimeter of the triangle using the smallest value of t.

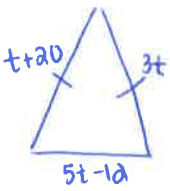


$3t=5t-12$

$-2t=-12$

$t=6$

OR

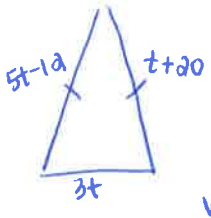


$t+20=3t$

$20=2t$

$t=10$

OR



$5t-12=t+20$

$4t=32$

$t=8$

when $t=6$:

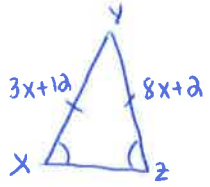
$3(6)=18$

$5(6)-12=18$

$6+20=26$

$P = 62$ units

39. In ΔXYZ, $\angle X \cong \angle Z$. If $XY = 3x+12$ and $YZ = 8x+2$, find the value of x.



$3x+12=8x+2$

$12=5x+2$

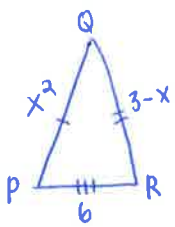
$10=5x$

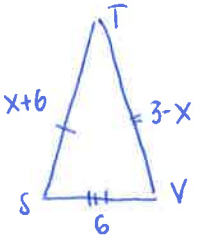
$x=2$

40. $\Delta PQR \cong \Delta STV$

$PQ=x^2$, $SV = 6$, $ST = x + 6$, $TV = 3 - x$

Find all possible values for x. Then find the perimeter of ΔPQR.





$x^2 = x+6$

$x^2-x-6=0$

$(x-3)(x+2)=0$

$x=3$, $x=-2$

$x=3$: $PQ = 9$

$QR = 0$ ← can't have zero side lengths

$PR = 6$

$x=-2$: $PQ = 4$

$QR = 5$

$PR = 6$

$P = 15$ units