Geometry H
Unit 5 Review

Name: Key
Date: _____ Period: ___

1. Tell whether a triangle with given lengths is acute, right or obtuse. If a triangle can't be formed, write *not possible*

a. $2, 6, 3\sqrt{7}$ (a, b, c)

(a) $c^2 = a^2 + b^2$
$(3\sqrt{7})^2 = 2^2 + 6^2$
$3^2(\sqrt{7})^2 = 4 + 36$
$9(7) = 40$
$63 > 40$
Obtuse

b. 8, 15, 17 (a, b, c)

(b) $17^2 = 8^2 + 15^2$
$289 = 64 + 225$
$289 = 289$
Right

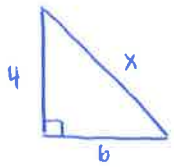
c. 6, 8, 15 (a, b, c)

(c) $6 + 8 > 15$
$14 > 15$
not a Δ

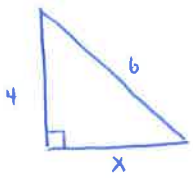
d. 0.7, 0.8, 0.9 (a, b, c)

(d) $0.9^2 = 0.7^2 + 0.8^2$
$0.81 = 0.49 + 0.64$
$0.81 < 1.13$
acute

2. Two sides of a right triangle have side lengths 4 and 6. Find all the possible lengths of the missing side. Leave answers in simplest radical form.

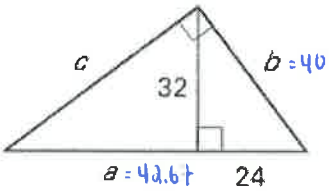


$4^2 + b^2 = x^2$
$16 + 36 = x^2$
$52 = x^2$
$x = \sqrt{52}$
$x = 2\sqrt{13}$ hyp



$4^2 + x^2 = 6^2$
$16 + x^2 = 36$
$x^2 = 20$
$x = \sqrt{20}$
$x = 2\sqrt{5}$ Leg

3. Solve for a, b, c

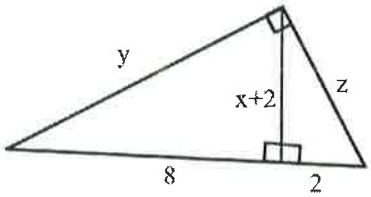


$\frac{a}{32} = \frac{32}{24}$
$1024 = 24a$
$a = 42.67$

$\frac{24}{b} = \frac{b}{66.67}$
$b^2 = 1600.08$
$b = 40$

$\frac{42.67}{c} = \frac{c}{66.67}$
$c^2 = 2844.8089$
$c = 53.33$

4. Solve for x, y, z.



$\frac{8}{y} = \frac{y}{10}$
$y^2 = 80$
$y = 4\sqrt{5}$

$\frac{2}{z} = \frac{z}{10}$
$z^2 = 20$
$z = 2\sqrt{5}$

$\frac{8}{x+2} = \frac{x+2}{2}$
$16 = (x+2)(x+2)$
$16 = x^2 + 4x + 4$
$0 = x^2 + 4x - 12$
$0 = (x+6)(x-2)$
$x \neq -6, x = 2$

5. ΔABC is an isosceles right triangle whose hypotenuse is $\overline{AC}$. (legs / sides are ≅)

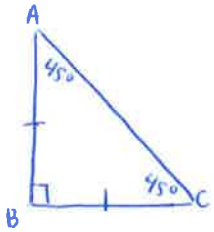
a. If AB = 5, then BC = ? and AC = ?

hyp = leg · √2
BC = 5
$AC = 5\sqrt{2}$

b. If AC = 10, then AB = ? and BC = ?

hyp = leg · √2
$10 = AB\sqrt{2}$
$AB = \frac{10 \cdot \sqrt{2}}{\sqrt{2} \cdot \sqrt{2}} = \frac{10\sqrt{2}}{2} = 5\sqrt{2}$
$AB = 5\sqrt{2}$
$BC = 5\sqrt{2}$

c. If $BC = 3\sqrt{2}$, then AC = ? and AB = ?



$AB = 3\sqrt{2}$
hyp = leg · √2
$AC = 3\sqrt{2}\sqrt{2}$
$AC = 3\sqrt{4}$
$AC = 3(2)$
$AC = 6$

6. Refer to the diagram at the right.

a. If t = 14, then j = ? and k = ?

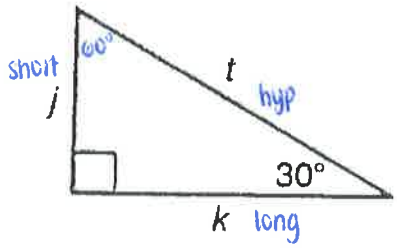
hyp = short · 2 → $14 = j \cdot 2$ → $j = 7$

long = short · $\sqrt{3}$ → $k = 7\sqrt{3}$

b. If $j = 3\sqrt{2}$, then t = ? and k = ?

hyp = short · 2 → $t = 3\sqrt{2} \cdot 2$ → $t = 6\sqrt{2}$

long = short · $\sqrt{3}$ → $k = 3\sqrt{2} \cdot \sqrt{3}$ → $k = 3\sqrt{6}$



c. If k = 3, then t = ? and j = ?

long = short · $\sqrt{3}$ → $3 = j\sqrt{3}$ → $j = \frac{3}{\sqrt{3}} = \frac{3\sqrt{3}}{3} \Rightarrow j = \sqrt{3}$

hyp = short · 2 → $t = 2\sqrt{3}$

7. Find the value of x in each figure.

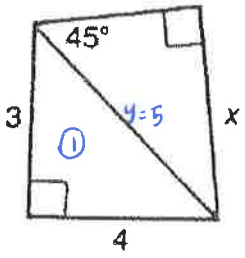
a.

Triangle 1: $3^2 + 4^2 = y^2$

$9 + 16 = y^2$

$25 = y^2$

$y = 5$



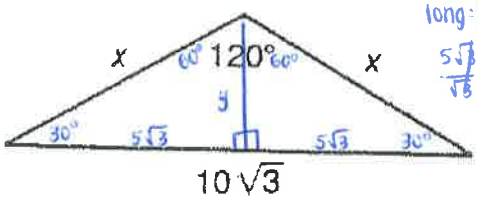
hyp = leg · $\sqrt{2}$

$5 = x\sqrt{2}$

$x = \frac{5 \cdot \sqrt{2}}{\sqrt{2} \cdot \sqrt{2}}$

$x = \frac{5\sqrt{2}}{2}$

b.



long = short · $\sqrt{3}$ → $\frac{5\sqrt{3}}{\sqrt{3}} = \frac{y\sqrt{3}}{\sqrt{3}}$ → $y = 5$

hyp = short · 2 → $x = 5 \cdot 2$ → $x = 10$

8. Give each ratio in simplest radical form:

a. sin A → $\frac{2}{\sqrt{13}} = \frac{2\sqrt{13}}{13}$

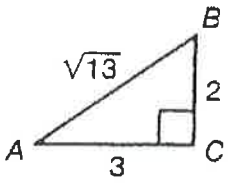
b. cos B = $\frac{2}{\sqrt{13}} = \frac{2\sqrt{13}}{13}$

c. sin B → $\frac{3}{\sqrt{13}} = \frac{3\sqrt{13}}{13}$

d. tan B = 3/2

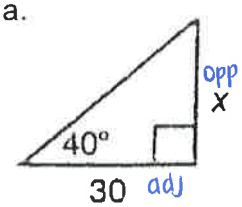
e. tan A = 2/3

f. cos A = $\frac{3}{\sqrt{13}} = \frac{3\sqrt{13}}{13}$



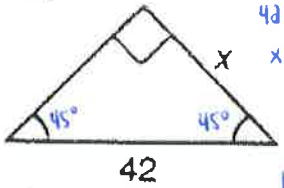
9. Solve for the variable.

a.



$\tan 40 = \frac{x}{30} \Rightarrow x = 30\tan 40 \Rightarrow x = 25.2$

b.



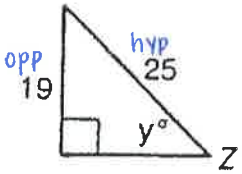
$42 = x\sqrt{2}$

$x = \frac{42 \cdot \sqrt{2}}{\sqrt{2} \cdot \sqrt{2}}$

$x = \frac{42\sqrt{2}}{2}$

$x = 21\sqrt{2}$

c.



$\sin y = \frac{19}{25}$

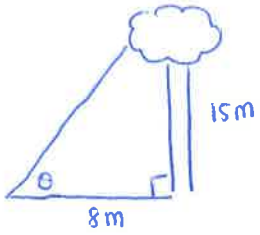
$y = \sin^{-1}\left(\frac{19}{25}\right)$

$y = 49.5°$

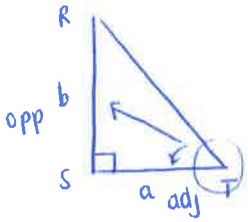
10. A 15 m high tree casts a shadow that is 8 m long. To the nearest degree, what is the angle of elevation of the sun?

$\tan\theta = \frac{15}{8}$

$\theta = \tan^{-1}\left(\frac{15}{8}\right) \Rightarrow \theta = 61.9° \approx 62°$



11. In ΔRST, where $\overline{RS}$ is perpendicular to $\overline{ST}$, if $\tan(R) = \frac{a}{b}$, then tan(T) = ?



$\tan T = \frac{\text{opp}}{\text{adj}} = \frac{b}{a}$

$\frac{a}{b} \leftarrow$ opp

$\frac{b}{a} \leftarrow$ adj

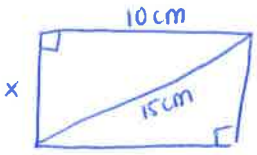
12. Simplify:

a. $\sqrt{72} = \sqrt{36}\sqrt{2}$

$= \boxed{6\sqrt{2}}$

b. $\frac{9}{\sqrt{27}} \cdot \frac{\sqrt{27}}{\sqrt{27}} = \frac{9\sqrt{27}}{27} = \frac{9\sqrt{9}\sqrt{3}}{27} = \frac{9(3)\sqrt{3}}{27} = \frac{27\sqrt{3}}{27} = \boxed{\sqrt{3}}$

13. The length of a rectangle is 10 cm. The diagonals are 15 cm long. Find the width of the rectangle.



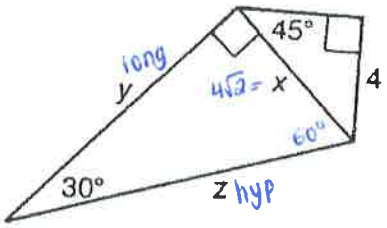
$x^2 + 10^2 = 15^2$

$x^2 + 100 = 225$

$x^2 = 125$

$x = \sqrt{125} = \boxed{5\sqrt{5}}$

14. Find the values of x, y and z.



hyp = leg · √2

$x = \boxed{4\sqrt{2}}$

long = short · √3

$y = 4\sqrt{2}\sqrt{3}$

$\boxed{y = 4\sqrt{6}}$

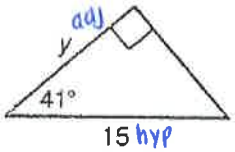
hyp = short · 2

$z = 4\sqrt{2} \cdot 2$

$\boxed{z = 8\sqrt{2}}$

15. Find the measure of y.

a.



$\frac{\cos 41}{1} = \frac{y}{15}$

$y = 15\cos 41$

$\boxed{y = 11.3}$

b.

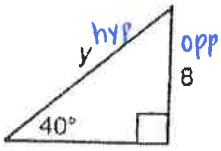
$\frac{\tan 26}{1} = \frac{20}{y}$

$20 = y\tan 26$

$y = \frac{20}{\tan 26}$

$\boxed{y = 41}$

c.



$\frac{\sin 40}{1} = \frac{8}{y}$

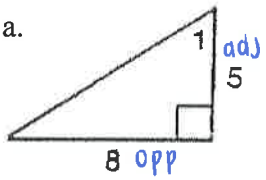
$8 = y\sin 40$

$y = \frac{8}{\sin 40}$

$\boxed{y = 12.4}$

16. Find m∠1.

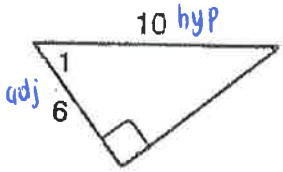
a.



$\tan(\angle 1) = \frac{8}{5}$

$m\angle 1 = \tan^{-1}\left(\frac{8}{5}\right) = \boxed{58°}$

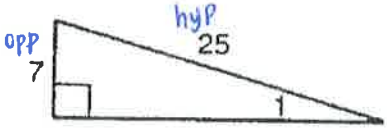
b.



$\cos(\angle 1) = \frac{6}{10}$

$m\angle 1 = \cos^{-1}\left(\frac{6}{10}\right) = \boxed{53.1°}$

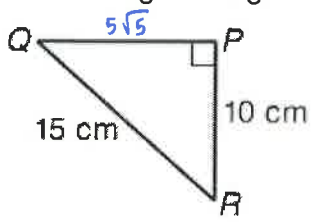
c



$\sin(\angle 1) = \frac{7}{25}$

$m\angle 1 = \sin^{-1}\left(\frac{7}{25}\right) = \boxed{16.3°}$

17. Solve the right triangle.



$QP^2 + 10^2 = 15^2$

$QP^2 + 100 = 225$

$QP^2 = 125$

$\boxed{QP = 5\sqrt{5}}$

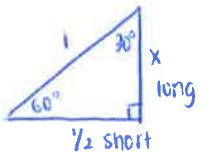
$\sin Q = \frac{10}{15}$

$m\angle Q = \sin^{-1}\left(\frac{10}{15}\right)$

$\boxed{m\angle Q = 41.8°}$

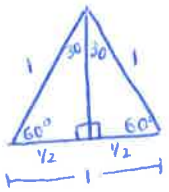
$\boxed{m\angle R = 48.2°}$

18. Find the altitude of an equilateral triangle whose perimeter is 3.



long = short $\sqrt{3}$

$x = \frac{1}{2} \cdot \frac{\sqrt{3}}{1} \Rightarrow$ $x = \frac{\sqrt{3}}{2}$



19. Solve for x.

a. $\frac{\sin 38°}{1} = \frac{x}{8}$

$x = 8 \sin 38 =$ **4.9**

b. $\frac{\tan 15°}{1} = \frac{x}{30}$

$x = 30 \tan 15 =$ **8.0**

c. $\frac{\cos 45°}{1} = \frac{5}{x}$

$5 = x \cos 45 \Rightarrow x = \frac{5}{\cos 45} =$ **7.1**

d. $\sin x° = .586$

$x = \sin^{-1}(0.586)$

$x = 35.9°$

e. $\cos x° = \frac{4}{9}$

$x = \cos^{-1}\left(\frac{4}{9}\right)$

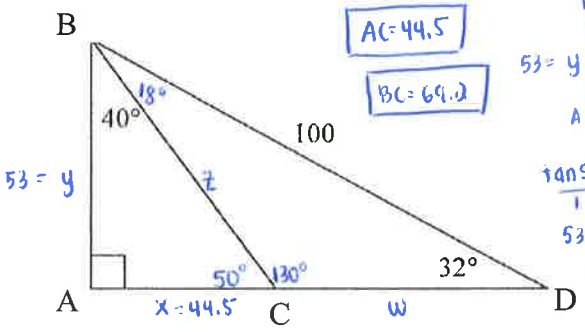
$x = 63.6°$

f. $\tan x° = \frac{25}{20}$

$x = \tan^{-1}\left(\frac{25}{20}\right)$

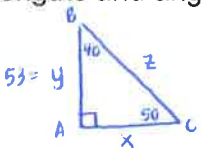
$x = 51.3°$

20. Find the measures of all missing side lengths and angles



AC = 44.5

BC = 69.3



$\frac{\tan 50}{1} = \frac{53}{x}$

$53 = x \tan 50$

$x = \frac{53}{\tan 50}$

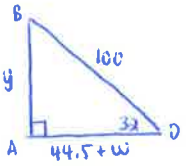
$x = 44.5$

$\frac{\sin 50}{1} = \frac{53}{z}$

$53 = z \sin 50$

$z = \frac{53}{\sin 50}$

$z = 69.3$



$\frac{\sin 32}{1} = \frac{y}{100}$

$y = 100 \sin 32$

$y = 53$

AB = 53

$\frac{\cos 32}{1} = \frac{44.5 + w}{100}$

$44.5 + w = 100 \cos 32$

$44.5 + w = 84.8$

$w = 40.3$

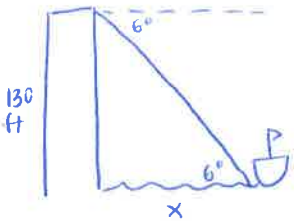
CD = 40.3

21. The angle of depression from a 130-foot lighthouse to a boat in the ocean is 6°. Find the distance from the base of the lighthouse to the boat.

$\frac{\tan 6}{1} = \frac{130}{x}$

$130 = x \tan 6$

$x = \frac{130}{\tan 6} =$ **1236.9 ft**



22. Two buildings are 35 feet apart. The angle of elevation from the top of the smaller building to the top of the taller building is 42°. The smaller building is 32 feet high. Find the height of the taller building.

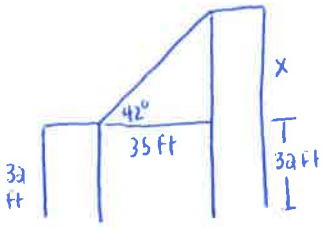
$\frac{\tan 42}{1} = \frac{x}{35}$

$x = 35 \tan 42$

$x = 31.5$

height = 31.5 + 32

= **63.5 ft**



23. An isosceles triangle has two sides of length 27.8 cm. The angle opposite the base is 64°. Find the length of the base of the isosceles triangle.

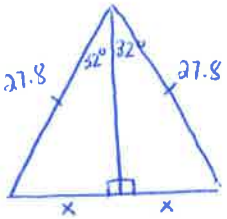
$\frac{\sin 32}{1} = \frac{x}{27.8}$

$x = 27.8 \sin 32$

$x = 14.7$

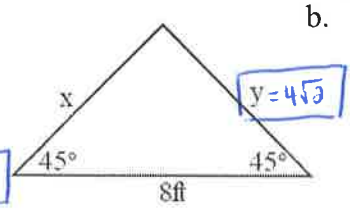
Base = 14.7 + 14.7

= **29.4 cm**



24. Find the lengths of the missing sides of the triangles below.

a.



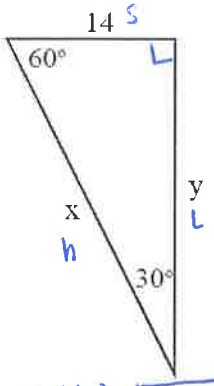
$8 = x\sqrt{2}$

$x = \frac{8}{\sqrt{2}} \cdot \frac{\sqrt{2}}{\sqrt{2}}$

$x = \frac{8\sqrt{2}}{2} \Rightarrow x = 4\sqrt{2}$

$y = 4\sqrt{2}$

b.

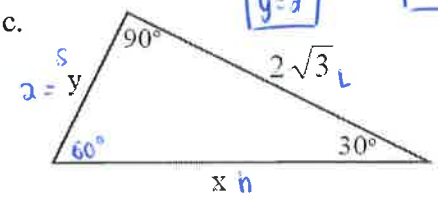


$x = 14 \cdot \frac{1}{2}$

$x = 7$

$y = 14\sqrt{3}$

c.



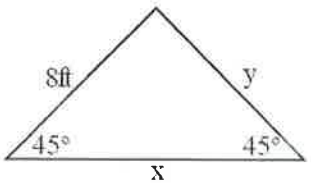
$\frac{2\sqrt{3}}{\sqrt{3}} = \frac{y \cdot \sqrt{3}}{\sqrt{3}}$

$y = 2$

$x = 2 \cdot 2$

$x = 4$

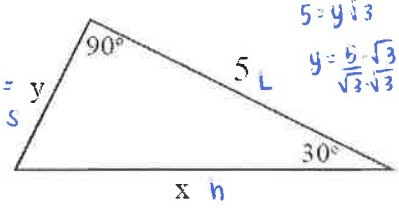
d.



$y = 8$

$x = 8\sqrt{2}$

e.



$5 = y\sqrt{3}$

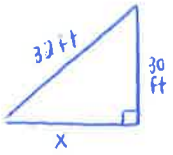
$y = \frac{5}{\sqrt{3}} \cdot \frac{\sqrt{3}}{\sqrt{3}} = \frac{5\sqrt{3}}{3} = y$

$\frac{5\sqrt{3}}{3} = y$

$x = \frac{5\sqrt{3}}{3} \cdot \frac{2}{1}$

$x = \frac{10\sqrt{3}}{3}$

25. Michael has two ladders set up to clean the gutters of his house. The top of each ladder reaches the base of his gutter, 30 feet above the ground. One of the ladders is 32 feet long. The other ladder is 33 feet long. How much further from the base of the house is the longer ladder than the shorter ladder?

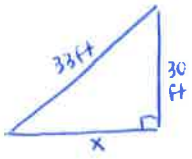


$x^2 + 30^2 = 32^2$

$x^2 + 900 = 1024$

$x^2 = 124$

$x = 11.1$



$x^2 + 30^2 = 33^2$

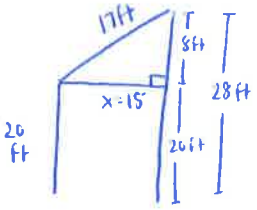
$x^2 + 900 = 1089$

$x^2 = 189$

$x = 13.7$

$13.7 - 11.1 =$ 2.6 ft farther

26. A 17 foot wire connects the top of a 28-foot pole to the top of a 20-foot pole. What is the shortest length of wire that you could use to attach the top of the short pole to the bottom of the tall pole?

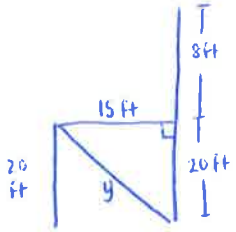


$x^2 + 8^2 = 17^2$

$x^2 + 64 = 289$

$x^2 = 225$

$x = 15$



$y^2 = 15^2 + 20^2$

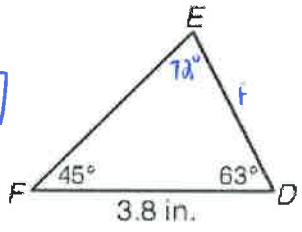
$y^2 = 225 + 400$

$y^2 = 625$

$y = 25$

The wire would be 25 ft long

27. Find DE to the nearest tenth.



$\frac{\sin 72}{3.8} = \frac{\sin 45}{f}$

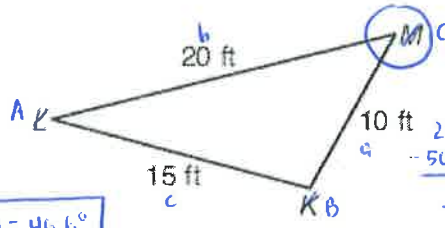
$3.8 \sin 45 = f \sin 72$

$f = \frac{3.8 \sin 45}{\sin 72}$

$f = 2.8$ in

DE = 2.8 in

28. Find the measure of $\angle M$ to nearest degree.



$c^2 = a^2 + b^2 - 2ab\cos C$

$15^2 = 10^2 + 20^2 - 2(10)(20)\cos C$

$225 = 500 - 400\cos C$

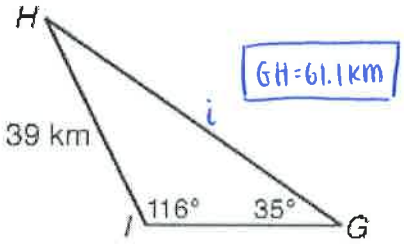
$-275 = -400\cos C$

$0.6875 = \cos C$

$m\angle C = \cos^{-1}(0.6875) = 46.6°$

$m\angle M = 46.6°$

29. Find the measure of GH.



$\frac{\sin 35}{39} = \frac{\sin 116}{i}$

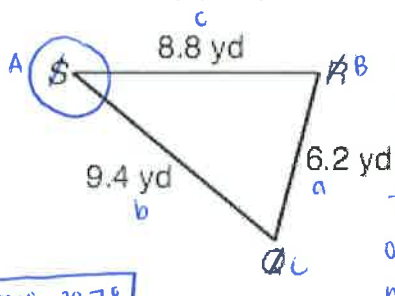
$39 \sin 116 = i \cdot \sin 35$

$i = \frac{39 \sin 116}{\sin 35}$

$i = 61.1$

GH = 61.1 km

30. Find the measure of $\angle S$.



$a^2 = b^2 + c^2 - 2bc\cos A$

$6.2^2 = 9.4^2 + 8.8^2 - 2(9.4)(8.8)\cos A$

$38.44 = 165.8 - 165.44\cos A$

$-127.36 = -165.44\cos A$

$0.7698 = \cos A$

$m\angle A = \cos^{-1}(0.7698)$

$m\angle A = 39.7°$

$m\angle S = 39.7°$