* = questions similar to test questions !!

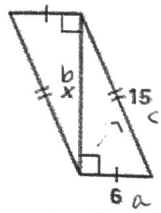
Geometry

Chapter 8 Review Right Triangles and Trigonometry

Name Key Date

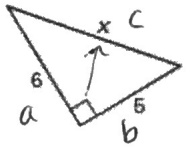
(8.1) Find the unknown side length. Tell whether the side lengths form a Pythagorean triple.

1.



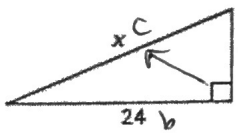
$a^2+b^2=c^2$
$6^2+x^2=15^2$
$36+x^2=225$
$-36 \quad -36$
$\sqrt{x^2}=\sqrt{189} \rightarrow \sqrt{9\cdot 21}$
$x=3\sqrt{21}$
not PT!

2.



$a^2+b^2=c^2$
$6^2+5^2=x^2$
$36+25=x^2$
$\sqrt{61}=\sqrt{x^2}$
$\sqrt{61}=x$
not PT!

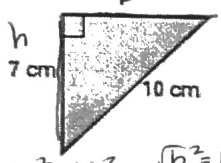
3.



$a^2+b^2=c^2$
$10^2+24^2=x^2$
$100+576=x^2$
$\sqrt{676}=\sqrt{x^2}$
$26=x$
yes PT!

(8.1) Find the area of the triangle. ($A=\frac{1}{2}b*h$) *you can skip #4-6 !!

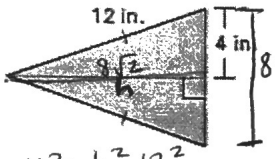
4.



$A=\frac{1}{2}bh$
$A=\frac{1}{2}(\sqrt{51})(7)$
$A=3.5\sqrt{51}$
$A\approx 25\ un^2$

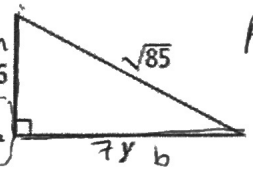
$7^2+b^2=10^2$
$49+b^2=100$
$-49 \quad -49$
$\sqrt{b^2}=\sqrt{51}$
$b=\sqrt{51}$

5.



$A=\frac{1}{2}bh$
$A=\frac{1}{2}(8)(8\sqrt{2})$
$A=32\sqrt{2}$
$A\approx 45.25\ in^2$

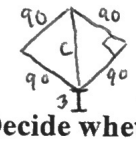
$4^2+h^2=12^2$
$16+h^2=144$
$-16 \quad -16$
$\sqrt{h^2}=\sqrt{128} \rightarrow \sqrt{64\cdot 2}$
$h=8\sqrt{2}$



$A=\frac{1}{2}bh$
$A=\frac{1}{2}(7)(6)$
$A=21\ un^2$

$6^2+y^2=\sqrt{85}^2$
$36+y^2=85$
$-36 \quad -36$
$\sqrt{y^2}=\sqrt{49}$
$y=7$

(8.1/8.2) 7. Each base on a standard baseball diamond lies 90 feet from the next. Find the distance the catcher must throw a baseball from 3 feet behind home plate to second base.



$90^2+90^2=c^2$
$8100+8100=c^2$
$\sqrt{16200}=\sqrt{c^2}$
$\sqrt{8100\cdot 2}$
$c=90\sqrt{2}$ ft. $+3$ ft. $\rightarrow 90\sqrt{2}+3$ ft
≈ 130.28 ft.

(8.1) Decide whether the numbers can represent side lengths of a triangle. If they can, then classify the triangle as right, acute, or obtuse.

8. $\sqrt{8}, 4, 6$ (a, b, c)

$\sqrt{8}+4>6$ ✓
$4+6>\sqrt{8}$ ✓
$\sqrt{8}+6>4$ ✓

$c^2 \_\_ a^2+b^2$
$6^2 \_\_ \sqrt{8}^2+4^2$
$36 \_\_ 8+16$
$36 > 24$ obtuse

9. 14, 48, 50 (a, b, c)

$14+48>50$ ✓
$14+50>48$ ✓
$48+50>14$ ✓

$c^2 \_\_ a^2+b^2$
$50^2 \_\_ 14^2+48^2$
$2500 \_\_ 196+2304$
$2500 = 2500$ right

10. 20, 21, 28 (a, b, c)

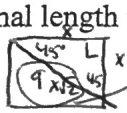
$20+21>28$ ✓
$21+28>20$ ✓
$20+28>21$ ✓

$c^2 \_\_ a^2+b^2$
$28^2 \_\_ 20^2+21^2$
$784 \_\_ 400+441$
$784 < 841$ acute

(8.2) 11. A square has side length 10 yd. What is the length of a diagonal of the square? Express in simplest radical form.

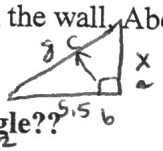
$\rightarrow x=10$
diagonal $= 10\sqrt{2}$ yd.

(8.2) 12. A square has diagonal length 9 m. What is the side length of the square, to the nearest centimeter?



$\frac{9}{\sqrt{2}}=\frac{x\sqrt{2}}{\sqrt{2}}$
$x=\frac{9}{\sqrt{2}}\cdot\frac{\sqrt{2}}{\sqrt{2}}$
$x=\frac{9\sqrt{2}}{2}$ m $\rightarrow 6.36396$ m ≈ 636 cm

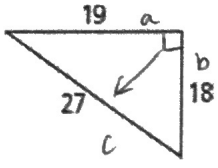
(8.1) 13. A repairman leans the top of an 8-ft ladder against the top of a stone wall. The base of the ladder is 5.5 ft from the wall. About how tall is the wall? Round to the nearest tenth of a foot.



$x^2+5.5^2=8^2$
$x^2+30.25=64$
$-30.25 \quad -30.25$
$\sqrt{x^2}=\sqrt{33.75}$
$x=5.8$ ft.

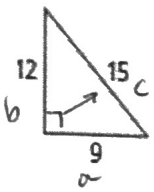
(8.1) Is each triangle a right triangle??

14.



$a^2+b^2=c^2$
$19^2+18^2=27^2$
$361+324=729$
$685 \neq 729$
not right Δ!

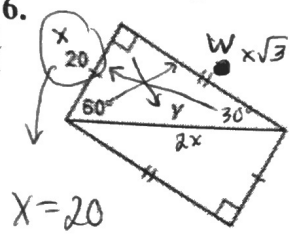
15.



$a^2+b^2=c^2$
$9^2+12^2=15^2$
$81+144=225$
$225=225$
yes right Δ!

(8.2) In these special right triangles, find the value of each variable. Leave in radical form.

16.



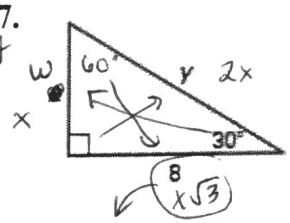
$x = 20$

$w = 20\sqrt{3}$

$y = 2(20)$

$y = 40$

17.



8 = x√3

$\frac{8}{\sqrt{3}} = \frac{x\sqrt{3}}{\sqrt{3}}$

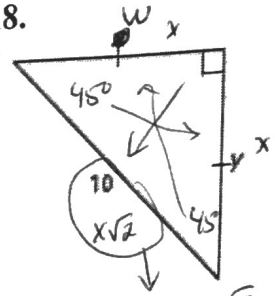
$x = \frac{8}{\sqrt{3}} \cdot \frac{\sqrt{3}}{\sqrt{3}} = \frac{8\sqrt{3}}{3}$

$w = \frac{8\sqrt{3}}{3}$

$y = 2\left(\frac{8\sqrt{3}}{3}\right)$

$y = \frac{16\sqrt{3}}{3}$

18.



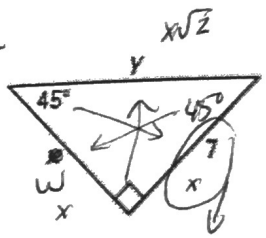
$\frac{10}{\sqrt{2}} = \frac{x\sqrt{2}}{\sqrt{2}}$

$x = \frac{10}{\sqrt{2}} \cdot \frac{\sqrt{2}}{\sqrt{2}} = \frac{10\sqrt{2}}{2}$

$x = 5\sqrt{2}$

$w = 5\sqrt{2}$ $y = 5\sqrt{2}$

19.



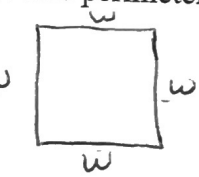
$x = 7$

$w = 7$

$y = 7\sqrt{2}$

(8.2) Sketch the figure that is described. Find the requested length.

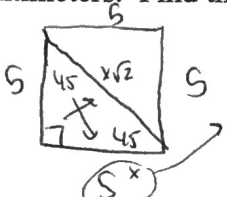
20. The perimeter of a square is 20 centimeters. Find the length of a diagonal.



$4w = 20$

$\frac{4}{4} \quad \frac{4}{4}$

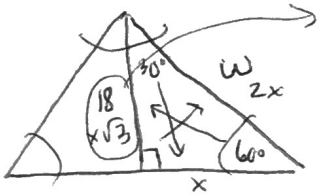
$w = 5$



$x = 5$

diagonal = $5\sqrt{2}$ cm.

21. The altitude of an equilateral triangle is 18 inches. Find the length of a side.



$\frac{18}{\sqrt{3}} = \frac{x\sqrt{3}}{\sqrt{3}}$

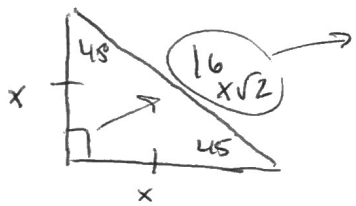
$x = \frac{18}{\sqrt{3}} \cdot \frac{\sqrt{3}}{\sqrt{3}} = \frac{18\sqrt{3}}{3}$

$x = 6\sqrt{3}$

$w = 2(6\sqrt{3})$

$w = 12\sqrt{3}$ in.

22. The hypotenuse of an isosceles right triangle is 16 centimeters. Find the length of a side.



$\frac{16}{\sqrt{2}} = \frac{x\sqrt{2}}{\sqrt{2}}$

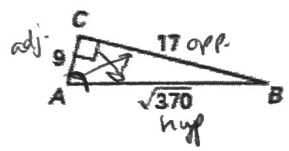
$x = \frac{16}{\sqrt{2}} \cdot \frac{\sqrt{2}}{\sqrt{2}} = \frac{16\sqrt{2}}{2}$

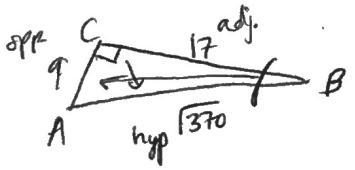
$x = 8\sqrt{2}$ cm.

(8.3)

Find the sine, the cosine, and the tangent of the acute angles of the triangle. Express each answer as a decimal rounded to four places.

23.





$\sin A = \frac{17}{\sqrt{370}} \cdot \frac{\sqrt{370}}{\sqrt{370}} = \frac{17\sqrt{370}}{370} = .8838$

$\cos A = \frac{9}{\sqrt{370}} \cdot \frac{\sqrt{370}}{\sqrt{370}} = \frac{9\sqrt{370}}{370} = .4679$

$\tan A = \frac{17}{9} = 1.8889$

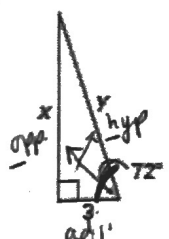
$\sin B = \frac{9}{\sqrt{370}} \cdot \frac{\sqrt{370}}{\sqrt{370}} = \frac{9\sqrt{370}}{370} = .4679$

$\cos B = \frac{17}{\sqrt{370}} \cdot \frac{\sqrt{370}}{\sqrt{370}} = \frac{17\sqrt{370}}{370} = .8838$

$\tan B = \frac{9}{17} = .5294$

(8.3) Find the value of each variable. SOH CAH TOA

24.



$\cos 72 = \frac{3}{y}$

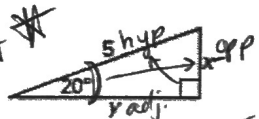
$y = \frac{3}{\cos 72}$

$y = 9.71$

$3 \cdot \tan 72 = \frac{x}{3} \cdot 3$

$x = 9.23$

25.



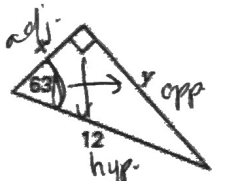
$5 \cdot \sin 20 = \frac{x}{5} \cdot 5$

$x = 1.71$

$5 \cdot \cos 20 = \frac{y}{5} \cdot 5$

$y = 4.70$

26.



$12 \cdot \cos 63 = \frac{x}{12} \cdot 12$

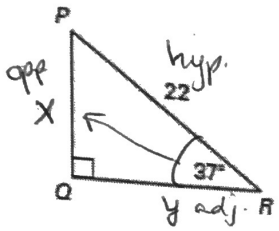
$x = 5.45$

$12 \cdot \sin 63 = \frac{y}{12} \cdot 12$

$y = 10.69$

(8.3) Solve the right triangle. Round decimals to the nearest tenth.

27.

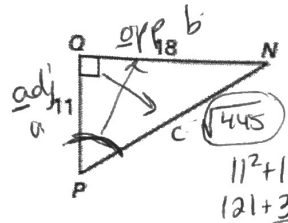


$m\angle P = 53°$ ← 180 − 90 − 37

$\frac{PQ}{22} = \sin 37 = \frac{x}{22}$ · 22 → $PQ = 13.2$

$\frac{QR}{22} = \cos 37 = \frac{y}{22}$ · 22 → $QR = 17.6$

28.



$11^2 + 18^2 = c^2$

$121 + 324 = c^2$

$445 = c^2$

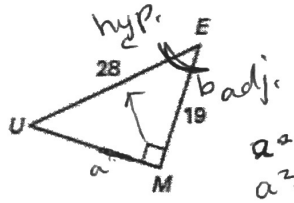
$PN = \sqrt{445} = 21.1$

$\tan P = \frac{18}{11}$ → $P = 58.6°$

$m\angle N = 180 - 90 - 58.6°$

$N = 31.4°$

29.



$a^2 + 19^2 = 28^2$

$a^2 + 361 = 784$

$-361 \quad -361$

$\sqrt{a^2} = \sqrt{423}$

$a = \sqrt{423}$

$MU = \sqrt{423} = 20.6$

$\cos E = \frac{19}{28}$ → $E = 47.3°$

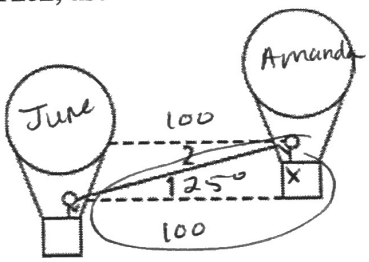
$m\angle U = 180 - 90 - 47.3°$

$U = 42.7°$

(8.4) For Exercises 30 and 31, describe each angle as it relates to the diagram. Then, use the diagram for Exercise 32.

30. ∠1 angle of elevation

31. ∠2 angle of depression

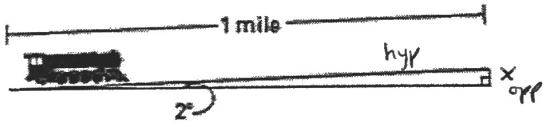


32. June and Armando are each in a hot air balloon. Armando's balloon is at a slightly higher elevation than June's. The two balloons are 100 ft apart. June notices she must look up at an angle of 25° to see Armando in his balloon. How much higher is Armando than June?

$100 \cdot \tan 25 = \frac{x}{100} \cdot 100$

$x = 46.6$ ft. higher

(8.3) 33. ***Train*** **A train is traveling up a slight grade with an angle of inclination of only 2°. After traveling 1 mile what is the vertical change in feet?**

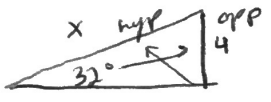


$1 \cdot \sin 2 = \frac{x}{1} \cdot 1$

$x = .0348994967 \text{ mi.} \cdot \frac{5280 \text{ ft}}{1 \text{ mi}}$

$= 184.3$ ft.

(8.3) 34. ***Ramp*** **A ramp was built by the loading dock. The height of the loading platform is 4 feet. Determine the length of the ramp if it makes a 32° angle with the ground.**

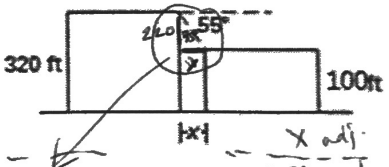


$\sin 32 = \frac{4}{x}$

$x = \frac{4}{\sin 32}$

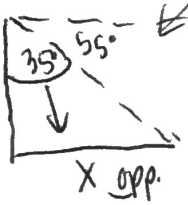
$x = 7.5$ ft.

(8.4) 35. ***Office Buildings*** **The angle of depression from the top of a 320 foot office building to the top of a 100 foot office building is 55°. How far apart are the two buildings?**



$220 \cdot \tan 35° = \frac{x}{220} \cdot 220$

154.0 ft. apart



or →

$\tan 55 = \frac{220}{x}$

$x = \frac{220}{\tan 55}$ $x = 154.$