Chapter 7 TestA
Trigonometry

56

Best Wishes to Key

1. Determine whether ΔSTU is a right triangle given the following vertices: $S(-3, 2)$, $T(2, 7)$, $U(-1, 1)$. Explain your answer by showing your work.

$ST = \sqrt{(-3-2)^2+(2-7)^2} = \sqrt{25+25} = \sqrt{50}$ (1)

$TU = \sqrt{(2+1)^2+(7-1)^2} = \sqrt{9+36} = \sqrt{45}$ (1)

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

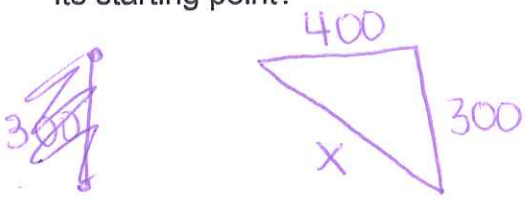
$(\sqrt{45})^2 + (\sqrt{5})^2 = (\sqrt{50})^2$

$45 + 5 = 50$

$50 = 50$ (1)

yes

2. A helicopter rose vertically 300 m and then flew west 400 m. How far was the helicopter from its starting point?



$x^2 = 400^2 + 300^2$ (1)

$x^2 = 250{,}000$

$x = 500$ m (1)

Determine whether each set of measures are the sides of a right triangle. Then state whether they form a Pythagorean triple.

0.5 ~~2 of 6~~ 1.1, 1.2

3. $\frac{\sqrt{7}}{5}, \frac{\sqrt{11}}{3}, \frac{\sqrt{338}}{15}$

$\left(\frac{\sqrt{11}}{3}\right)^2 + \left(\frac{\sqrt{338}}{15}\right)^2 = \left(\frac{\sqrt{7}}{5}\right)^2$

$\frac{11}{9} + \frac{338}{225} = \frac{7}{25}\ \frac{338}{225}$ (3)

~~NO~~ ~~not both~~ yes RT Δ no P.T.

4. 20, 48, 52

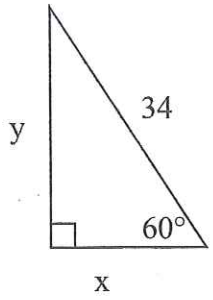
$20^2 + 48^2 = 52^2$

$2704 = 2704$ (3)

yes to both

For problems 7-10, write your answers as <u>leave as exact answers (no decimals!)</u>.

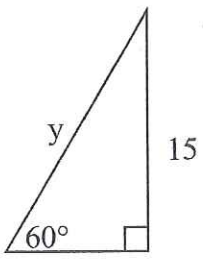
5.



x = 17 y = $17\sqrt{3}$

(2)

6.



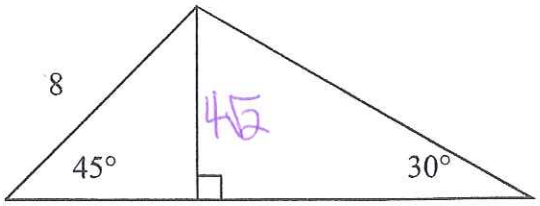
$\frac{15\sqrt{3}}{3}$

x = ~~15~~ $5\sqrt{3}$ y = $10\sqrt{3}$

(2)

16

7.



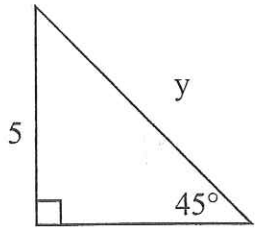
$8\sqrt{2}/2$

$4\sqrt{2}$

x = $4\sqrt{2}$ y = $4\sqrt{6}$

2

8.

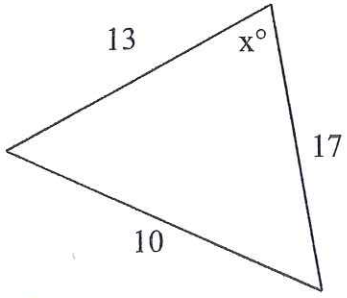


x = 5 y = $5\sqrt{2}$

2

Find x. Round to the nearest tenth.

9.



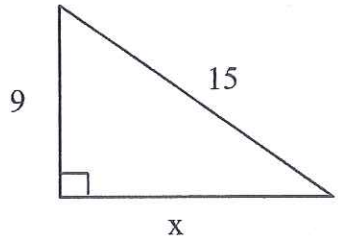
$10^2 = 13^2 + 17^2 - 2(13)(17)\cos x$ (1)

$100 = 458 - 442\cos x$

$-358 = -442\cos x$ (1)

$x = 35.9°$ (1)

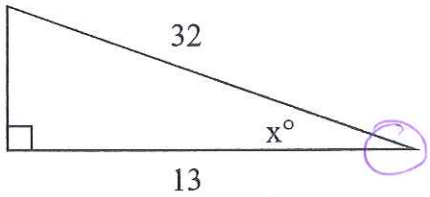
10.



$x^2 = 15^2 - 9^2 = 144$ (1)

$x = 12$ (1)

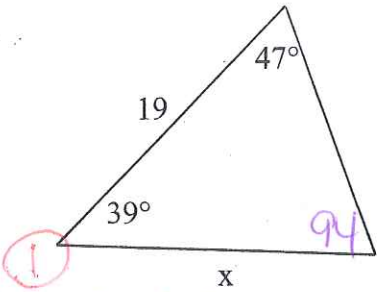
11.



$\cos x = \frac{13}{32}$ (1)

$x = 66.0°$ (1)

12.



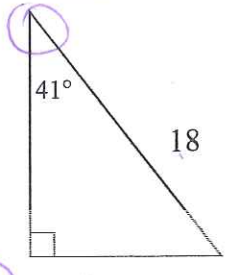
(1)

$\frac{\sin 47}{x} = \frac{\sin 94}{19}$

$x = \frac{19\sin 47}{\sin 94}$ (1)

$x = 13.9$

13.



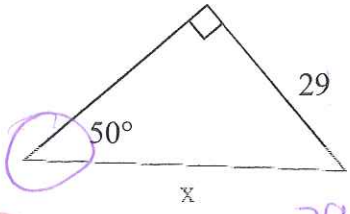
(1)

$\sin 41 = \frac{x}{18}$

$x = 11.8$

(1)

14.



(1)

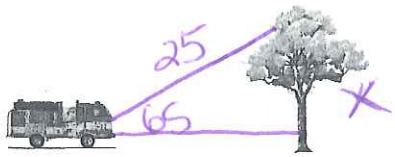
$\sin 50 = \frac{29}{x}$

(1) $x = 37.9$

17

65°

15. The fire department gets called to a local family home to help rescue a cat that is stuck up in the tree. The firemen stretch a ladder 25ft from the front bottom of the fire truck to the cat's location. If the ladder forms a 95° angle with the ground, how far up in the tree is the cat stuck?

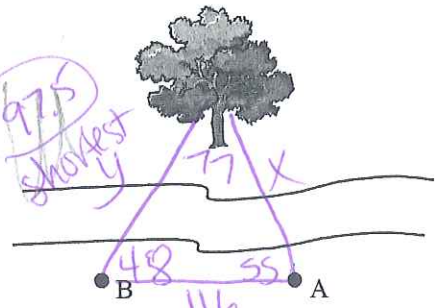


$\sin 65 = \frac{x}{25}$

$x = 22.7$ (2)

16. Tim and Lauren are trying to decide at which point of the river to cross over to the other side to have a picnic beneath a tree. They look at the tree from their first choice and measure an angle of 55°. Then they walk along the river bank 116ft, passing the tree on the other side, to a second point of entry and measure an angle of 48° to the same tree. At which point would give them the shorter distance to cross the river, and what would that distance be? (1)

3/ 97.5 shortest



$\frac{\sin 77}{116} = \frac{\sin 55}{y} = \frac{\sin 48}{x}$

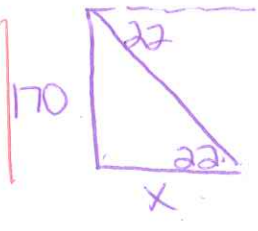
$y = \frac{116 \sin 55}{\sin 77} = 97.5$ (1)

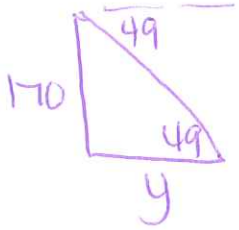
$x = \frac{116 \sin 48}{\sin}$ (1)

88.5

17. Carlos is in a lighthouse on a cliff 170 feet above sea level. He observes two sailboats due east of the lighthouse. The angles of depression are 22° and 49°. Find the distance between the two sailboats to the nearest foot.

3/





$\tan 22 = \frac{170}{x}$ (1) $\quad 420.8$

$\tan 49 = \frac{170}{y}$ (1) $\quad 147.8$

273 feet (1)

18. Ms. Parnell is buying some property that is shaped like quadrilateral ABCD. Find the perimeter of the property.

3/

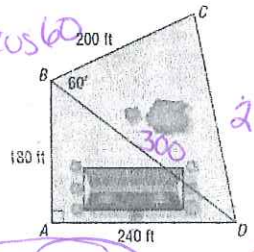
$180^2 + 240^2 = x^2$

$x = 300$ (1)

$x^2 = 200^2 + 300^2 - 2(200)(300)\cos 60$

$x^2 = 70000$

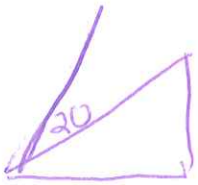
$x = 264.6$ (1)

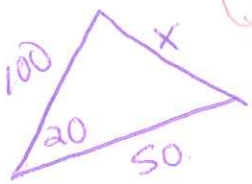


$180 + 240 + 200 + 264.6 = 884.6$ ft (1)

19. Two airplanes leave an airport at the same point, and the angle between their flight paths is 20°. An hour later, one plane has traveled 100 miles while the other has traveled 50 miles. How far apart are the planes at this time?

2/





(1) $x^2 = 100^2 + 50^2 - 2(100)(50)\cos 20$

$x^2 = 3103.07$

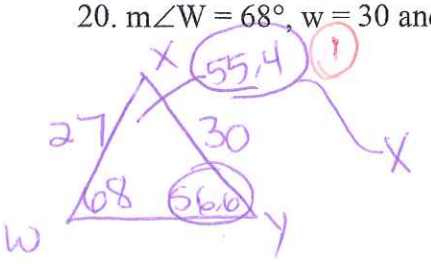
(1) 55.7 miles

13

10/

Solve each ΔWXY. Round all answers to the nearest tenth.

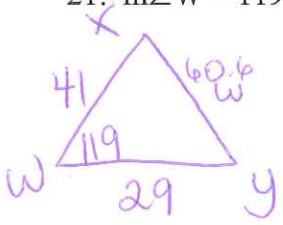
20. $m\angle W = 68°$, $w = 30$ and $y = 27$.



$\frac{\sin 68}{30} = \frac{\sin Y}{27} = \frac{\sin 55.4}{x}$

$y = 56.6°$ $\quad x = 26.6$

21. $m\angle W = 119°$, $x = 29$ and $y = 41$.



$w^2 = 41^2 + 29^2 - 2(41)(29)\cos 119$

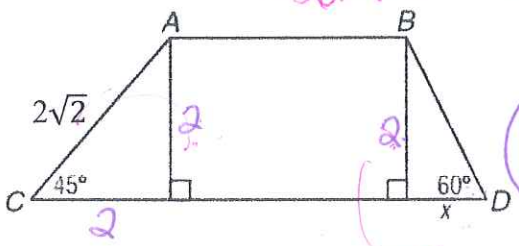
$w^2 = 3674.9$

$w = 60.6$

$\frac{\sin 119}{60.6} = \frac{\sin Y}{41} = \frac{\sin X}{29}$

$y = 36.7$ $\quad x = 25.0$ $\quad 24.7$

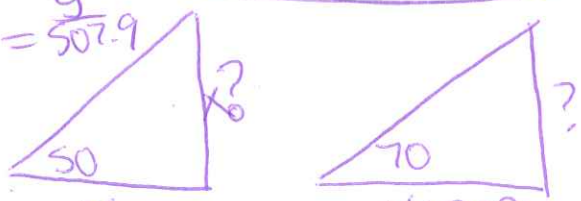
22. Find x. Leave as an exact answer.



$x = \frac{2\sqrt{3}}{3}$

Extra Credit:

A surveyor looks up at a mountain at an angle of elevation of 50 degrees. She then walks forward 200 feet and the new angle of elevation to the top of the mountain is 70 degrees. What is the height of the mountain? 605.3 feet



$\tan 50 = \frac{y}{507.9}$

$x(\tan 50 - \tan 70) = 200\tan 70$

$x = 507.9$

$\tan 50 = \frac{y}{x}$ $\quad \tan 70 = \frac{y}{x+200}$

$x\tan 50 = y$ $\quad (x+200)\tan 70 = y$

$x\tan 50 = (x+200)\tan 70$

$x\tan 50 = x\tan 70 + 200\tan 70$

Chapter 7 TestB
Trigonometry

54

Best Wishes to Key

1. Determine whether ΔSTU is a right triangle given the following vertices: $S(-2, 2)$, $T(2, 5)$, $U(-3, 1)$. Explain your answer by showing your work.

$ST = \sqrt{(-2-2)^2+(2-5)^2} = \sqrt{16+9} = \sqrt{25}$

$TU = \sqrt{(2+3)^2+(5-1)^2} = \sqrt{25+16} = \sqrt{41}$

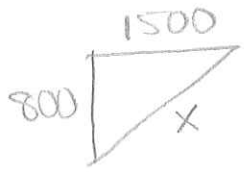
$SU = \sqrt{(-2+3)^2+(2-1)^2} = \sqrt{1+1} = \sqrt{2}$

$25+2 \neq 41$

NO

4

2. A helicopter rose vertically 800 m and then flew east 1500 m. How far was the helicopter from its starting point?



$x^2 = 1500^2 + 800^2$

$= 2890000$

$x = 1700$ m

2

Determine whether each set of measures are the sides of a right triangle. Then state whether they form a Pythagorean triple.

3. $\frac{2}{5}, \frac{5}{3}, \frac{\sqrt{661}}{15}$

1.71

.4 1.67

yes; NO

$\left(\frac{2}{5}\right)^2 + \left(\frac{5}{3}\right)^2 = \left(\frac{\sqrt{661}}{15}\right)^2$

$\frac{4}{25} + \frac{25}{9} = \frac{661}{225}$

$\frac{661}{225}$

3

4. 10, 16, 25

$10^2 + 16^2 = 25^2$

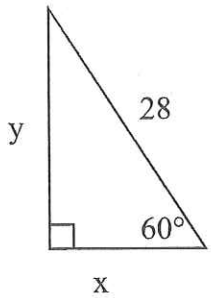
$356 \neq 625$

NO

3

For problems 7-10, write your answers as simplified radicals.

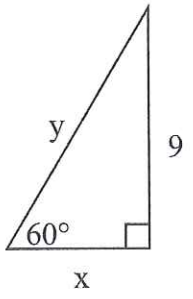
5.



2

x = 14 y = $14\sqrt{3}$

6.

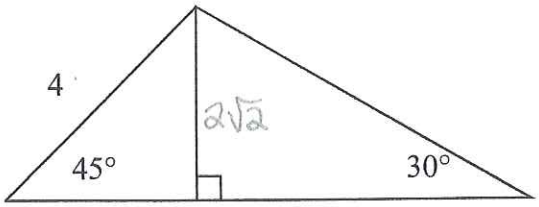


2

$\frac{9\sqrt{3}}{3}$

x = $3\sqrt{3}$ y = $6\sqrt{3}$

7.

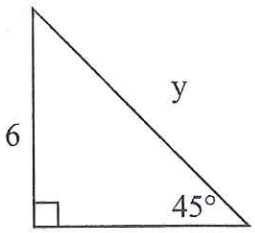


$\frac{4\sqrt{2}}{2}$

x = $2\sqrt{2}$ y = $2\sqrt{6}$

2

8.

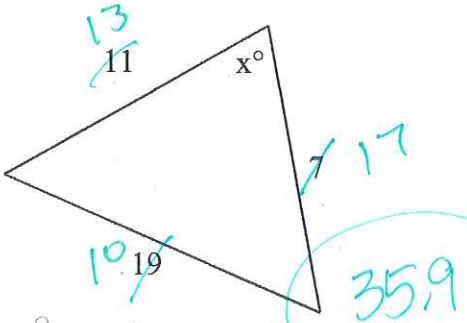


x = 6 y = $6\sqrt{2}$

2

Find the missing measurements using Pythagorean Theorem, Trigonometric Ratios, Law of Sines or Law of Cosines. Round to the nearest tenth.

9.



13 17 10

35.9

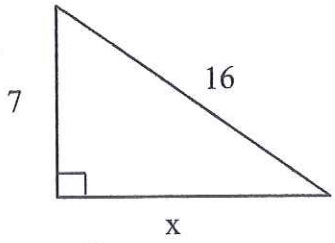
$19^2 = 11^2 + 7^2 - 2(11)(7)\cos x$

$361 = 170 - 154\cos x$

$191 = -154\cos x$

3

10.

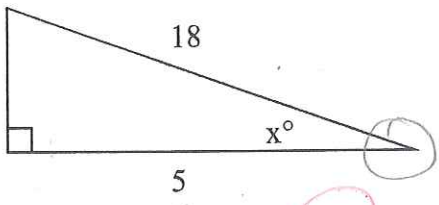


$x^2 = 16^2 - 7^2 = 207$

2

$x = 14.4$

11.

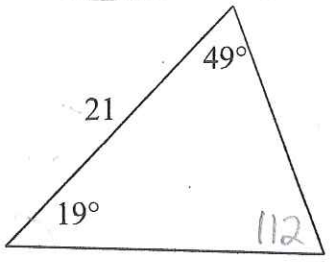


$\cos x = \frac{5}{18}$

2

$x = 73.9$

12.



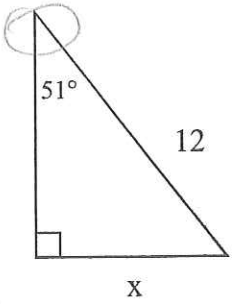
2

$\frac{\sin 112}{21} = \frac{\sin 49}{x}$

$x = 17.1$

13.

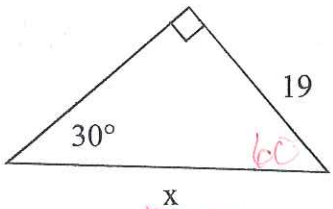
2



$\sin 51 = \frac{x}{12}$

$x = 9.3$

14.



short

19.2

= 38

~~tan~~ hyp

2

65°

Pick 3 out of the 5 story problems to complete. <u>Circle the 3 that you want graded.</u>

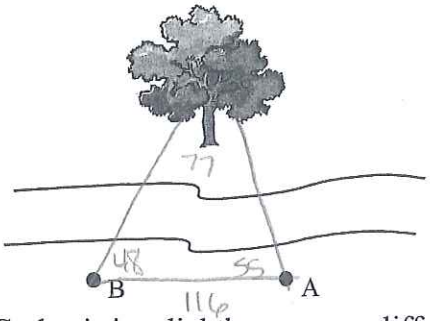
15. The fire department gets called to a local family home to help rescue a cat that is stuck up in the tree. The firemen stretch a ladder 25ft from the front bottom of the fire truck to the cat's location. If the ladder forms a ~~95°~~ 65° angle with the ground, how far up in the tree is the cat stuck?

$\sin 65 = \frac{x}{25}$

$x = 22.7$ ft

(7)

16. Tim and Lauren are trying to decide at which point of the river to cross over to the other side to have a picnic beneath a tree. They look at the tree from their first choice and measure an angle of 55°. Then they walk along the river bank 116ft, passing the tree on the other side, to a second point of entry and measure an angle of 48° to the same tree. At which point would give them the shorter distance to cross the river, and what would that distance be?



$\frac{\sin 77}{116} = \frac{\sin 55}{a} = \frac{\sin 48}{b}$

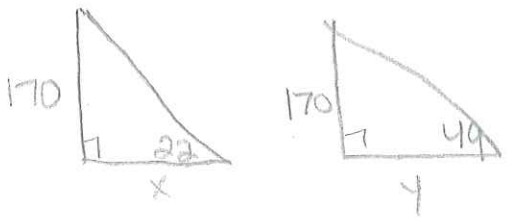
$a = 97.5$

$b = \frac{116 \sin 48}{\sin 77}$

$b = 88.5$

(3)

17. Carlos is in a lighthouse on a cliff 170 feet above sea level. He observes two sailboats due east of the lighthouse. The angles of depression are 22° and 49°. Find the distance between the two sailboats to the nearest foot.



$\tan 22 = \frac{170}{x}$

$x = 420.8$

$\tan 49 = \frac{170}{y}$

$y = 147.8$

(3)

1273 feet

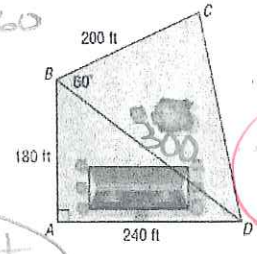
18. Ms. Parnell is buying some property that is shaped like quadrilateral ABCD. Find the perimeter of the property.

$x^2 = 180^2 + 240^2$

$x = 300$

$x^2 = 200^2 + 300^2 - 2(200)(300)\cos 60$

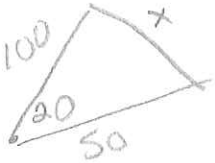
$x = 264.6$



(3)

$264.6 + 200 + 180 + 240 = 884.6$ ft

19. Two airplanes leave an airport at the same point, and the angle between their flight paths is 20°. An hour later, one plane has traveled 100 miles while the other has traveled 50 miles. How far apart are the planes at this time?



$x^2 = 100^2 + 50^2 - 2(100)(50)\cos 20$

$x = 55.7$ mi

(7)

Solve each ΔWXY. Round all answers to the nearest tenth.

20. $m\angle W = 68°$, $w = 30$ and $y = 27$.

$y = 56.6$

$x = 26.6$

$x = 55.4$

3

21. $m\angle W = 119°$, $x = 29$ and $y = 41$.

$x = \cancel{23}$ 25.0

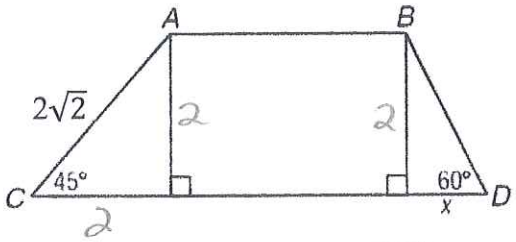
$y = \cancel{17.5}$ 36.7

$w = 60.6$

3

22. Find x. Leave as an exact answer.

4



$x = \frac{2\sqrt{3}}{3}$

Extra Credit:

A surveyor looks up at a mountain at an angle of elevation of 50 degrees. She then walks forward 200 feet and the new angle of elevation to the top of the mountain is 70 degrees. What is the height of the mountain?

+3

605.3 feet