Name Key   **Date**
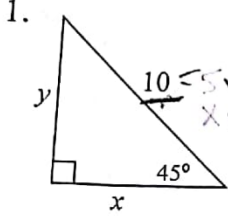
ICM – Basic Trigonometry Review

Find the value of each variable. Write your answer in simplest radical form

1.

$x = \sqrt{6}$ $y = 2\sqrt{3}$

$10 = 5\sqrt{2}$ $x\sqrt{2}$

$45°$

x

$\sin 45 = \dfrac{y}{10}$

$\cos 45 = \dfrac{x}{10}$ $\dfrac{10 = x\sqrt{2}}{\sqrt{2} \cdot \sqrt{2}}$

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

$x = \dfrac{10}{\sqrt{2}} \cdot \dfrac{\sqrt{2}}{\sqrt{2}} = \dfrac{10\sqrt{2}}{2} = \dfrac{5\sqrt{2}}{2}$ 5

$\boxed{5\sqrt{2}}$

2.

$\sqrt{6}$ x $45°$ $45°$

$\cos 45 = \dfrac{\sqrt{6}}{y}$

$y \cdot \cos 45 = \sqrt{6}$ $\dfrac{\cos 45}{\cos 45}$ $\cos 45$

$\sin 45 = \dfrac{y'}{}$

$x = \boxed{12}$ $\sqrt{2}$ $\boxed{2\sqrt{6}}$ $\dfrac{2\sqrt{6}}{\sqrt{2}}$

$\dfrac{\sqrt{6}}{\sqrt{2}} \cdot \dfrac{\sqrt{6}}{\sqrt{2}}$

3.

$x\sqrt{3}$

6 x y $2x$ $\tan 60 = \dfrac{x}{}$

$60°$ $\dfrac{\sin 90}{2 \cdot 2\sqrt{3}} \ \dfrac{\sin 2\sqrt{3}}{Y} = \dfrac{\sin 2\sqrt{3}}{2\sqrt{3}}$ $4\sqrt{3}$

$2\sqrt{3}$ x $X = 2\sqrt{3} \cdot \sqrt{3}$

$X = 2\sqrt{9} = 2 \cdot 3 = 6$

$x = \underline{6}$ $y = \underline{4\sqrt{3}}$ $Y = 2 \cdot 6 = 12$

$(2x)$ $60°$ y x

$30°$ 15 $x\sqrt{3}$
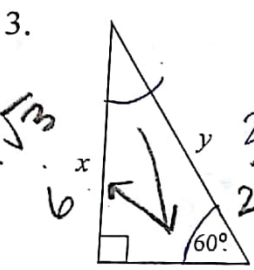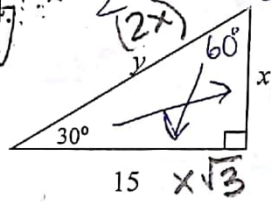
$x = \underline{5\sqrt{3}}$ $y = \underline{10\sqrt{3}}$

$2(5\sqrt{3})$
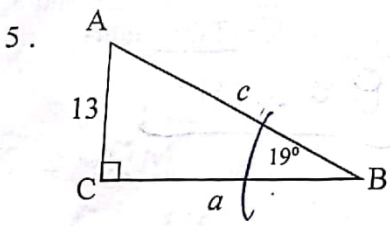
$\boxed{Y = 10\sqrt{3}}$

$\dfrac{x \cdot \sqrt{3}}{\sqrt{3}} = \dfrac{15}{\sqrt{3}}$

$X = \dfrac{15}{\sqrt{3}} \cdot \dfrac{\sqrt{3}}{\sqrt{3}}$

$X = \dfrac{15\sqrt{3}}{3}$

$\boxed{X = 5\sqrt{3}}$

Solve each right triangle. Round to the nearest tenth.

5.

A 13 c $19°$ B a C

$a = 16.2$

6.

B 25 $a = 16.2$ A 19

$A = \underline{71°}$ $a = \underline{37.8}$ $c = \underline{39.9}$

$\tan 19 = \dfrac{13}{a}$

$\sin 19 = \dfrac{13}{C}$
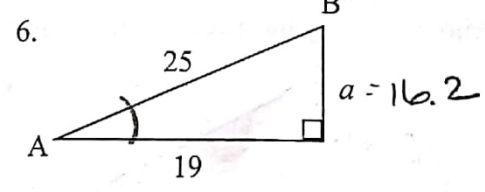
$A = \underline{40.5°}$ $B = \underline{49.5°}$ $a = \underline{16.2}$
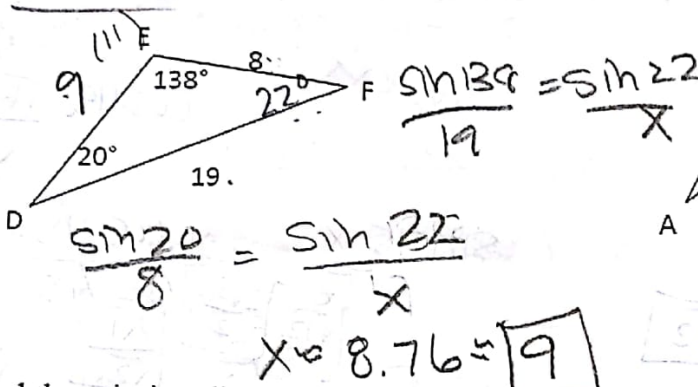
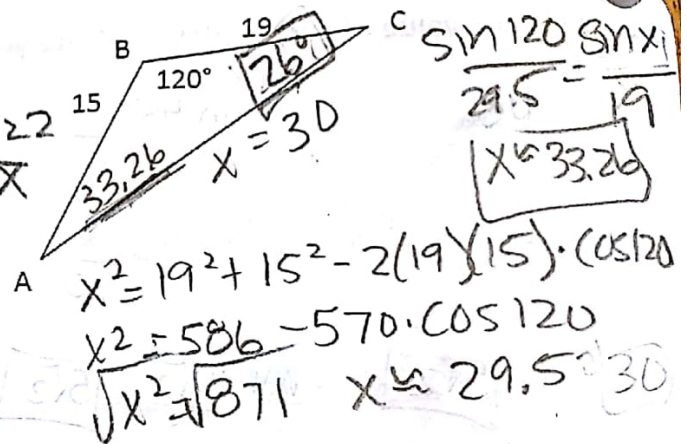$19^2 + x^2 = 25^2$

$x \approx 16.24$

$\sin^{-1}(16.2/25)$

Use the Law of Sines and Law of Cosines to find missing dimensions.

$m\angle C = 26°$

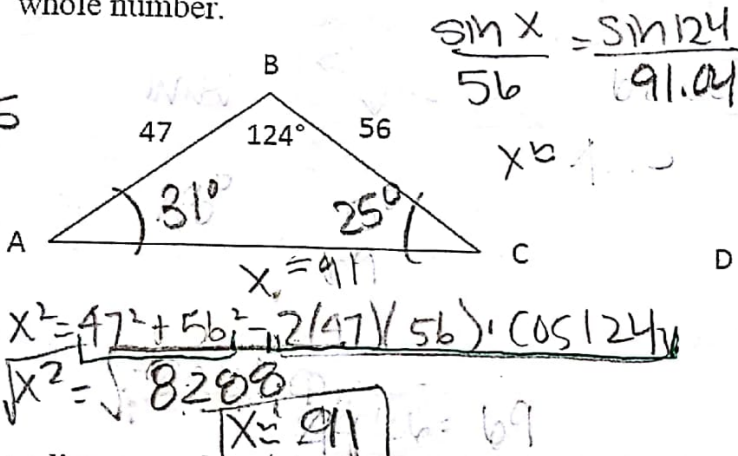7. Find the missing dimensions of the triangle below. Round your answers to the nearest whole number.

9

111 E

138°   8.   22°   F

20°

19.

D

$\dfrac{\sin 138}{19} = \dfrac{\sin 22}{X}$

$\dfrac{\sin 20}{8} = \dfrac{\sin 22}{X}$

$X \approx 8.76 \approx \boxed{9}$

8. Find the $m\angle C$ to the nearest whole degree.

B   120°   26°   C

19

15

33.26   X = 30

A

$\dfrac{\sin 120}{29.5} = \dfrac{\sin x}{19}$

$\boxed{X \approx 33.26}$

$X^2 = 19^2 + 15^2 - 2(19)(15) \cdot \cos 120$

$X^2 = 586 - 570 \cdot \cos 120$

$\sqrt{X^2} = \sqrt{871}$ $X \approx 29.5 \approx 30$

9. Find the missing dimensions of the triangle below. Round your answers to the nearest whole number.

5345

B

47   124°   56

31°   25°

A   C

X = 91

$\dfrac{\sin X}{56} = \dfrac{\sin 124}{91.04}$

X ≈

$X^2 = 47^2 + 56^2 - 2(47)(56) \cdot \cos 124$

$\sqrt{X^2} = \sqrt{8288}$

$\boxed{X \approx 91}$ 69

10. Find the f to the nearest whole number.

$\boxed{\angle F \approx 102°}$

E

f 42.3°   62

36°   101.6°

D   F

71

$\dfrac{\sin 36}{62} = \dfrac{\sin x}{71}$

$\sin^{-1} .673 \approx \boxed{42.3}$
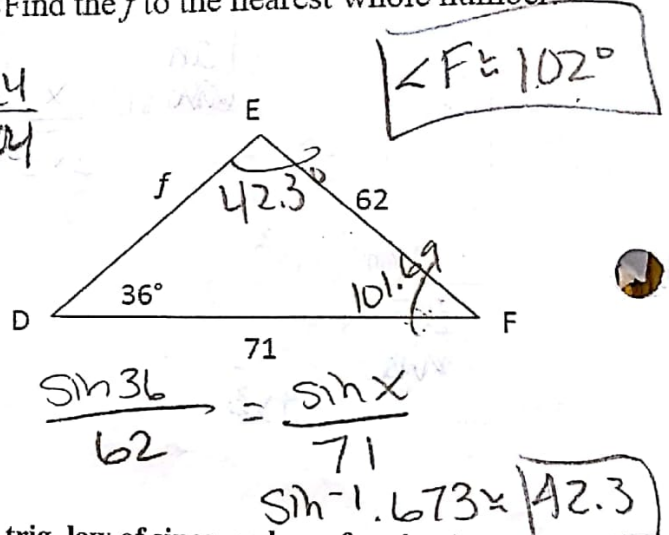
Draw a diagram and use trig as appropriate (right triangle trig, law of sines, or law of cosines) to solve. Show work!

11. Flying at an altitude of 9 kilometers, an airplane starts to descend when its ground distance from the landing field is 175 kilometers. To the nearest tenth, what is the angle of depression for this portion of the flight?

9 km

θ

175 km
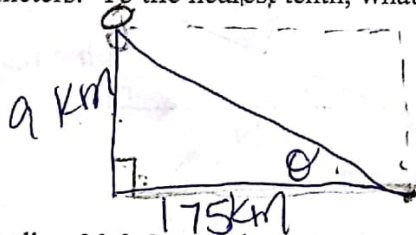
$\tan\theta = \dfrac{9}{175} = \boxed{\theta \approx 2.94°}$

$81 + 30625 =$

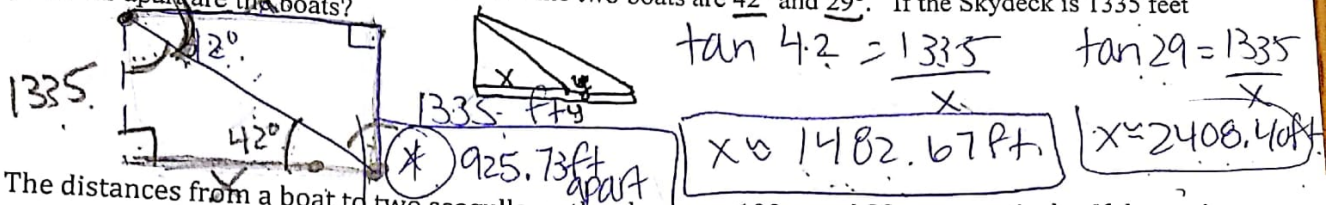$\dfrac{\sin 90}{175.23...} = \dfrac{\sin x}{9}$

12. A person standing 30 ft from a flagpole can see the top of the pole at a 35° angle of elevation. The person's eye level is 5 ft from the ground. Find the height of the flagpole to the nearest foot.

X

35°

5ft   30ft.
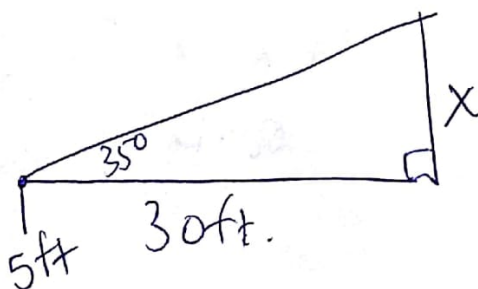
$\tan 35 = \dfrac{x}{30}$

$X \approx 21.006 + 5 =$

$\boxed{\approx 26 \text{ ft}}$

Carol is in the Skydeck of the Sears Tower overlooking Lake Michigan. She sights two sailboats going due east from the tower. The angles of depression to the two boats are 42° and 29°. If the Skydeck is 1335 feet high, how far apart are the boats?

$\tan 42 = \dfrac{1335}{x}$ $\tan 29 = \dfrac{1335}{x}$

$x = 1482.67 \text{ ft.}$ $x = 2408.40 \text{ ft.}$

1335

42°   925.73 ft apart

14. The distances from a boat to two seagulls on the shore are 100m and 80m respectively. If the angle between the two lines of sight is 55°, how far would one seagull have to walk to meet the other seagull?

100m   55°   x   80m

$= 7222.77$

$x = 84.99 m$

$x^2 = 100^2 + 80^2 - 2(80)(100)\cos 55°$
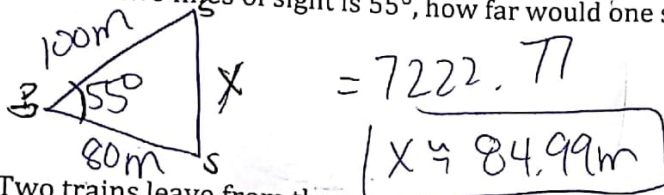
15. Two trains leave from the same point and travel along straight tracks that differ in direction by 65°. If their speeds are 100mph and 80mph respectively, approximate how far apart they will be after 30 minutes.

$80(\tfrac{1}{2})$ $65°$ $100(\tfrac{1}{2})$ X

$x^2 = 40^2 + 50^2 - 2(40)(50)\cos 65$

$= 2407$

49.09 mw
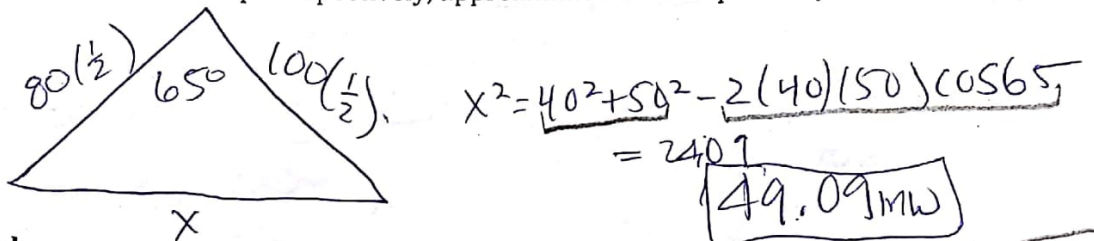
Find each exact value.

16. $\cos \dfrac{3\pi}{2}$ 0

17. $\tan \dfrac{11\pi}{3}$ $\dfrac{-\frac{\sqrt{3}}{2}}{\frac{1}{2}} = \dfrac{-\frac{\sqrt{3}}{2} \cdot \frac{2}{1}} = -\sqrt{3}$

$\tan 660$

18. $\csc \pi$ $\dfrac{1}{0} = \text{undefined}$

19. $\cot -135° = \dfrac{\cos}{\sin} = +1$

20. $\sin \dfrac{31\pi}{6}$ $-\dfrac{1}{2}$

21. $\sec\left(-\dfrac{5\pi}{4}\right)$ $\dfrac{1}{\cos 135} = \dfrac{1}{-\frac{\sqrt{2}}{2}} = 1 \cdot \dfrac{2}{\sqrt{2}} = $

$\dfrac{-2}{\sqrt{2}} \cdot \dfrac{\sqrt{2}}{\sqrt{2}} = \dfrac{-2\sqrt{2}}{2} = -\sqrt{2}$

22. Find all values of x, $0° \le \theta \le 360°$, that satisfy the equation $2\cos x = 2$.

$\dfrac{2\cos x}{2} = \dfrac{2}{2}$

$\cos x = 1$

$\cos^{-1} 1 =$

$\cos^{-1} 1 = 0°, 360°$

23. Find all values of x, $0° \le \theta \le 360°$, that satisfy the equation $\tan x - \sqrt{3} = 0$.

$\tan x = \sqrt{3}$ $+\sqrt{3}$ $+\sqrt{3}$

$\tan^{-1} \sqrt{3} = 60°$ $240°$