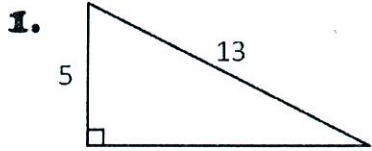


Unit 4

Solving Triangles Review

Pythagorean Theorem

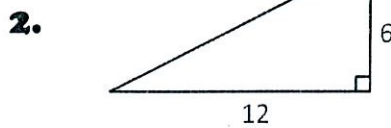


$$x^2 + 5^2 = 13^2$$

$$x^2 + 25 = 169$$

$$x^2 = 144$$

$x = 12$



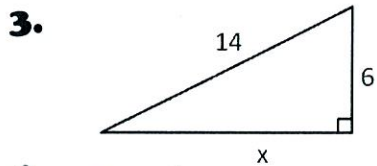
$$12^2 + 6^2 = x^2$$

$$144 + 36 = x^2$$

$$180 = x^2$$

$$180 = 2 \cdot 2 \cdot 3 \cdot 3 \cdot 5$$

$x = 6\sqrt{5}$

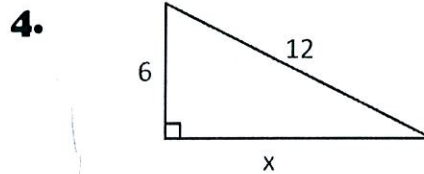


$$x^2 + 6^2 = 14^2$$

$$x^2 + 36 = 196$$

$$x^2 = 160$$

$x = 4\sqrt{10}$



$$x^2 + 6^2 = 12^2$$

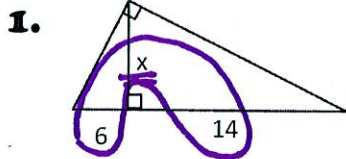
$$x^2 + 36 = 144$$

$$x^2 = 108$$

$x = 6\sqrt{3}$

$$108 = 2 \cdot 2 \cdot 3 \cdot 3 \cdot 3$$

Geometric Means

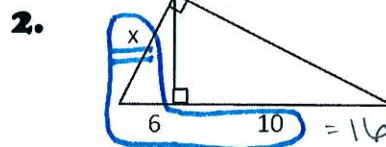


$$\frac{6}{x} = \frac{x}{14}$$

$$x^2 = 84$$

$x = 2\sqrt{21}$

$$84 = 2 \cdot 2 \cdot 3 \cdot 7$$

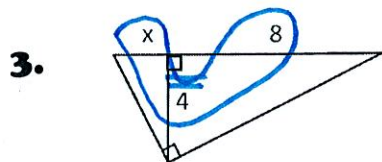


$$\frac{x}{6} = \frac{10}{x}$$

$$x^2 = 90$$

$x = 4\sqrt{6}$

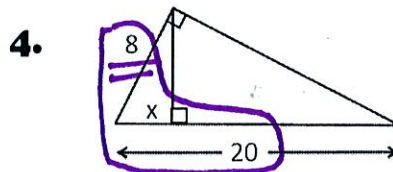
$$90 = 2 \cdot 3 \cdot 3 \cdot 5$$



$$\frac{x}{4} = \frac{4}{8}$$

$$8x = 16$$

$x = 2$

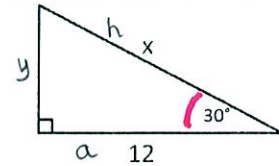


$$\frac{8}{x} = \frac{20}{8}$$

$$20x = 64$$

$x = 3.2$

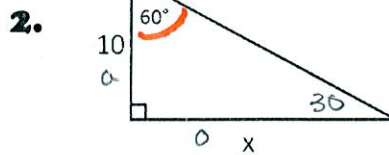
Trigonometric Ratios

1.  $12 = y\sqrt{3}$
 $y = \frac{12\sqrt{3}}{3} = 4\sqrt{3}$
 $x = 2(4\sqrt{3}) = 8\sqrt{3}$

$$\cos 30 = \frac{12}{x}$$

$$x = \frac{12}{\cos 30}$$

$$x = 13.9 \text{ or } x = 8\sqrt{3}$$

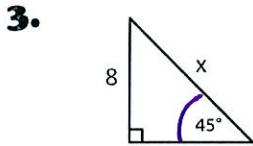


$$x = 10\sqrt{3} \leftarrow \text{special right } \triangle$$

$$\tan 60 = \frac{x}{10}$$

$$x = 10 \tan 60$$

$$x = 17.3 \text{ or } x = 10\sqrt{3}$$

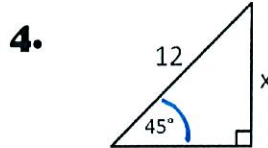


$$x = 8\sqrt{2} \leftarrow \text{special right } \triangle$$

$$\sin 45 = \frac{8}{x}$$

$$x = \frac{8}{\sin 45}$$

$$x = 11.3 \text{ or } x = 8\sqrt{2}$$



$$12 = x\sqrt{2}$$

$$x = \frac{12\sqrt{2}}{2} = 6\sqrt{2}$$

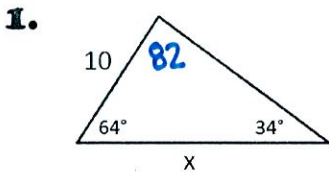
$$\sin 45 = \frac{x}{12}$$

$$x = 12 \sin 45$$

$$x = 8.5$$

$$x = 8.5 \text{ or } x = 6\sqrt{2}$$

Law of Sines & Cosines

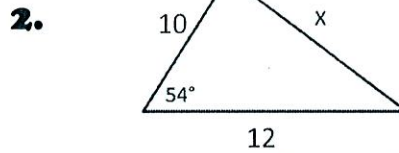


$$\frac{x}{\sin 82} = \frac{10}{\sin 34}$$

$$x \sin 34 = 10 \sin 82$$

$$x = \frac{10 \sin 82}{\sin 34}$$

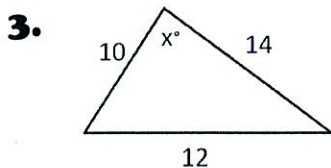
$$x = 17.7$$



$$x^2 = 12^2 + 10^2 - 2(10)(12) \cos 54$$

$$x^2 = 102.9$$

$$x = 10.1$$



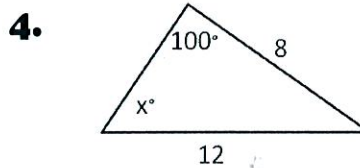
$$12^2 = 10^2 + 14^2 - 2(10)(14) \cos x$$

$$144 = 296 - 280 \cos x$$

$$-152 = -280 \cos x$$

$$\cos x = 0.5429$$

$$x = 57.1^\circ$$



$$\frac{\sin x}{8} = \frac{\sin 100}{12}$$

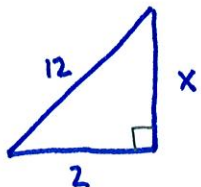
$$12 \sin x = 8 \sin 100$$

$$\sin x = \frac{8 \sin 100}{12}$$

$$x = 42.6^\circ$$

Unit 4 Applications Review

1. A 12 foot ladder is leaned against a wall. If the base of the ladder is 2 feet from the wall, how high up the wall does it reach?



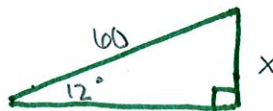
$$x^2 + 2^2 = 12^2$$

$$x^2 + 4 = 144$$

$$x^2 = 140$$

$$x = \underline{11.8 \text{ feet}}$$

2. A 60 foot ramp has an angle of elevation of 12° . Find the vertical rise of this ramp.

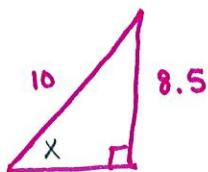


$$\sin 12 = \frac{x}{60}$$

$$x = \underline{12.5 \text{ feet}}$$

$$x = 60 \sin 12$$

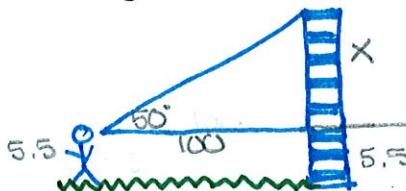
3. A 10 foot Ladder is leaned against a wall. If the ladder reaches 8.5 feet up the wall, find the angle of elevation of this ladder.



$$\sin x = \frac{8.5}{10}$$

$$x = \underline{58.2^\circ}$$

4. Mark has an eye-level of 5.5 feet. He is looking at the top of a tall tower with an angle of elevation equal to 50° . If Mark is standing 100 feet from the tower, find the height of the tower.



$$\tan 50 = \frac{x}{100}$$

$$x = 100 \tan 50$$

$$x = 119.2$$

Tower:
 $119.2 + 5.5$
 $= \underline{124.7 \text{ feet}}$

5. The following sides of a triangle are given: 4 cm, 12 cm, and 13 cm. Classify the given triangle.

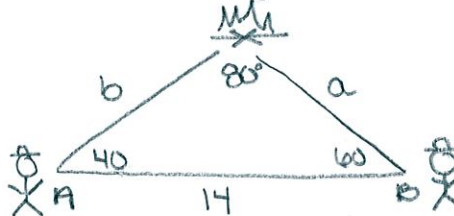
$$13^2 \text{ --- } 4^2 + 12^2$$

$$169 \text{ --- } 16 + 144$$

$$169 \geq 160$$

obtuse

6. Two rangers are 14 miles apart along a service road. They spot a fire north of the road. Ranger A spots the fire with a line of sight at 40° , while Ranger B at 60° . Find the distance each ranger is from the fire.



$$\frac{\sin 80}{14} = \frac{\sin 40}{a}$$

$$a \sin 80 = 14 \sin 40$$

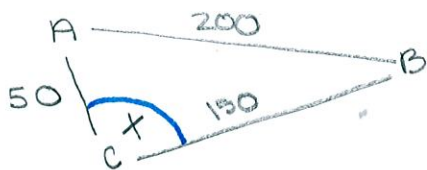
$$a = \underline{9.1 \text{ miles}}$$

$$\frac{\sin 80}{14} = \frac{\sin 60}{b}$$

$$b \sin 80 = 14 \sin 60$$

$$b = \underline{12.3 \text{ miles}}$$

7. A pilot normally flies 200 miles from city A to city B. To avoid a storm, she must first fly 50 miles to city C, and then 150 miles on to city B. What angle must she turn the plane at city C to arrive at city B?



$$200^2 = 50^2 + 150^2 - 2(50)(150)\cos X$$

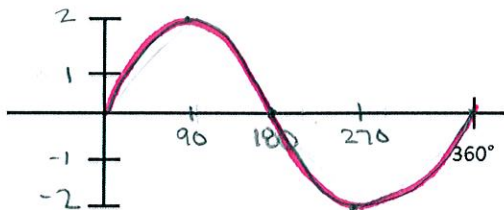
$$40000 = 25000 - 15000\cos X$$

$$15000 = -15000\cos X$$

$$\cos X = -1$$

$X = 180^\circ$
straight line

9. $y = 2\sin(x)$



Cycles: 1

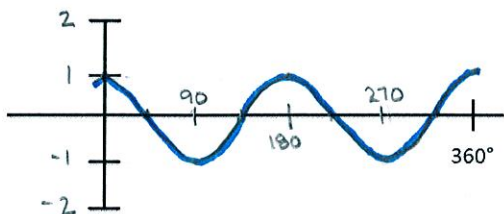
Period: 360

Amp: 2

Dom: $(-\infty, \infty)$

Ran: $[-2, 2]$

9. $y = \cos(2x)$



Cycles: 2

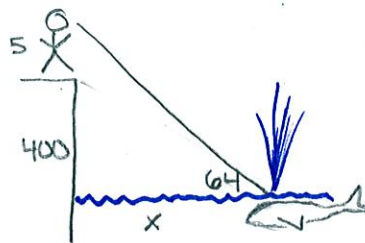
Period: 180

Amp: 1

Dom: $(-\infty, \infty)$

Ran: $[-1, 1]$

8. Jenny is standing on a 400 foot cliff looking down at a whale in the ocean. She looking down with an angle of depression at 64° . If her eye level is at 5 feet, estimate how far the whale is from the base of the cliff.

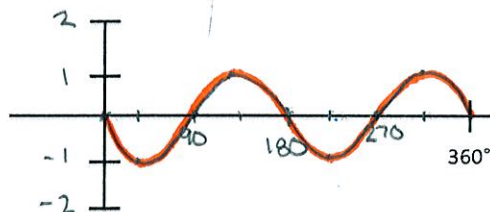


$$\tan 64 = \frac{405}{x}$$

$$x = \frac{405}{\tan 64}$$

$$x = 197.5 \text{ feet}$$

10. $y = -\sin(2x)$



Cycles: 2

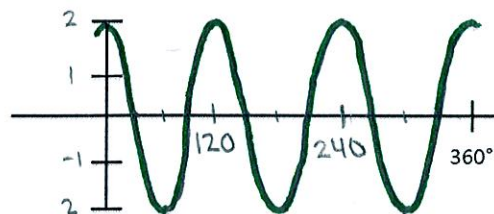
Period: 180

Amp: 1

Dom: $(-\infty, \infty)$

Ran: $[-1, 1]$

10. $y = 2\cos(3x)$



Cycles: 3

Period: 120

Amp: 2

Dom: $(-\infty, \infty)$

Ran: $[-2, 2]$