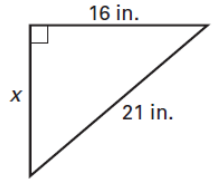
Geometry – Chapter 7 Review Name Key

For question 1, find the exact unknown side length in simplified radical form. Does the triangle form a Pythagorean Triple?

1a.

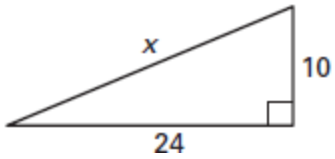


$21^2 = x^2 + 16^2$
$441 = x^2 + 256$
$\sqrt{185} = \sqrt{x^2}$
$\sqrt{185} = x$

x = $\sqrt{185}$

Is it a Pythagorean triple? no

1b.

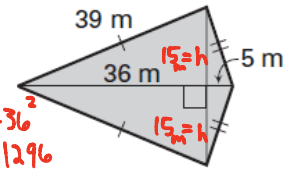


$x^2 = 10^2 + 24^2$
$x^2 = 100 + 576$
$\sqrt{x^2} = \sqrt{676}$
$x = 26$

x = 26

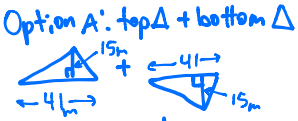
Is it a Pythagorean triple? yes

2. Find the area of the shape below.



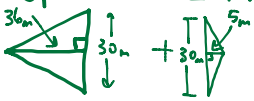
$39^2 = h^2 + 36^2$
$1521 = h^2 + 1296$
$225 = h^2$
$15\text{ m} = h$

Option A: top Δ + bottom Δ



$\frac{1}{2}bh + \frac{1}{2}bh$
$\frac{1}{2}(41\text{m})(15\text{m}) + \frac{1}{2}(41\text{m})(15\text{m}) = 615\text{m}^2$

Option B: left Δ + right Δ



$\frac{1}{2}bh + \frac{1}{2}bh$
$\frac{1}{2}(30\text{m})(36\text{m}) + \frac{1}{2}(30\text{m})(5\text{m}) = 540\text{m}^2 + 75\text{m}^2 = 615\text{m}^2$

Area = 615 m^2

3a. ***Multiple Choice*** Let the numbers represent the lengths of the sides of a triangle. Which of the triangles are acute triangles?

I. 10, 24, 26 — $26^2 = 10^2 + 24^2$ Right
II. 6, 8, 9.5 — $9.5^2 < 6^2 + 8^2$ acute
III. 12, 17, 22 — $22^2 > 12^2 + 17^2$ Obtuse
IV. 45, 60, 75 — $75^2 = 45^2 + 60^2$ Right

(A) I and II (B) II (C) II and III
(D) III (E) III and IV

Must have $c^2 < a^2 + b^2$

So answer is (B) II

3b. ***Multiple Choice*** Which set of numbers can represent the side lengths of an obtuse triangle?

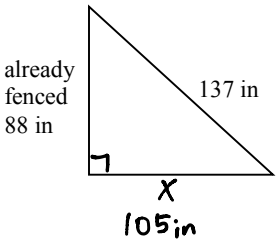
(A) 2, 3, 4 — $4^2 > 2^2 + 3^2$ Obtuse
(B) 3, 5, $\sqrt{34}$ — $(\sqrt{34})^2 = 3^2 + 5^2$ Right
(C) 3, 7, 7.5 — $7.5^2 < 3^2 + 7^2$ Acute
(D) 12, 15, $3\sqrt{41}$ — $(3\sqrt{41})^2 = 12^2 + 15^2$ Right
(E) none of these

Must have $c^2 > a^2 + b^2$

So answer is (A) 2, 3, 4

4) You have a garden that is in the shape of a right triangle with one side that runs along a fence that measures 88 inches and another side that runs on the diagonal of the yard that measures 137 inches.

a.) What is the total perimeter of your garden?



$137^2 = 88^2 + x^2$
$18{,}769 = 7744 + x^2$
$\sqrt{11{,}025} = \sqrt{x^2}$
$105 = x$

Perimeter $= 88_{in} + 105_{in} + 137_{in}$
$= 330$ in

b.) Only one side of the garden is fenced. You plan to fence the rest of the garden to keep out the rabbits. You will need a fence post every 15 inches. If each post costs $1.25 and each foot of fencing costs $.70, how much will it cost to enclose the garden?

the 88 in is already fenced in, So $105_{in} + 137_{in} = 242$ in is left to fence in

$242\text{ in} \div 15\ \frac{\text{in}}{\text{post}} = 16.1\overline{3}$ posts $\Rightarrow$ we need 17 posts

$242\text{ in} \div 12\ \frac{\text{in}}{\text{ft}} = 20.1\overline{6}$ ft ↓ need 21 ft of fence

17 posts ($1.25 per post) + 21 ft ($0.70 per foot)
$21.25 + $14.70
= $35.95

c.) What will be the square footage of your enclosed garden?

$A = \frac{1}{2}bh = \frac{1}{2}(105_{in})(88_{in}) = \frac{4620\text{ in}^2}{1} \cdot \frac{1\text{ ft}}{12\text{ in}} \cdot \frac{1\text{ ft}}{12\text{ in}} = 32.08\overline{3}\text{ ft}^2$

5a) . ***Multiple Choice*** Find the values of x and y.

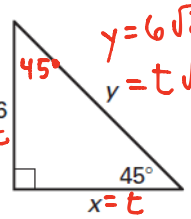
(A) $x = 6, y = 6\sqrt{3}$

(B) $x = 3\sqrt{2}, y = 6\sqrt{2}$

(C) $x = 2\sqrt{3}, y = 4\sqrt{3}$

(D) $x = 6, y = 6\sqrt{2}$

(E) $x = 6\sqrt{2}, y = 6$



5b) ***Multiple Choice*** Find the values of a and b.

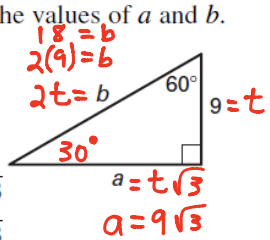
(A) $a = 9, b = 9\sqrt{2}$

(B) $a = 18, b = 9\sqrt{3}$

(C) $a = 9\sqrt{3}, b = 18$

(D) $a = 3\sqrt{3}, b = 6\sqrt{3}$

(E) $a = 6\sqrt{3}, b = 3\sqrt{3}$



5c.) ***Multiple Choice*** Find the values of m and n.

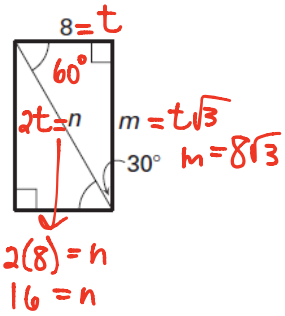
(A) $m = \frac{16\sqrt{3}}{3}, n = \frac{8\sqrt{3}}{3}$

(B) $m = 16, n = 8\sqrt{3}$

(C) $m = \frac{8\sqrt{3}}{3}, n = \frac{16\sqrt{3}}{3}$

(D) $m = 16\sqrt{3}, n = 16$

(E) $m = 8\sqrt{3}, n = 16$

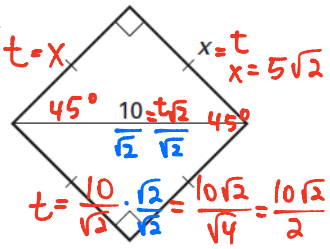


5d) . ***Multiple Choice*** Find the value of x.

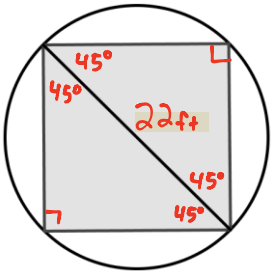
(A) $\frac{5\sqrt{2}}{2}$ (B) $10\sqrt{2}$

(C) $5\sqrt{2}$ (D) 5

(E) $\frac{10}{\sqrt{2}}$



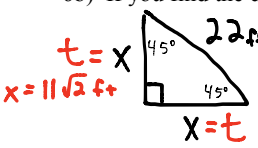
6) You want to build a square shed on an old concrete circular patio in your backyard. You want to maximize the amount of square footage in your shed by making sure your shed is square. Your friend told you to measure the diameter of the circular patio to find the dimensions of the square shed.



6a) Explain how this will help you find the length of the walls for your square shed.

It is the length of the hypotenuse of a 45°-45°-90° triangle where the legs are the sides of the square shed which we can solve for using our 45°-45°-90° Special right triangle rules

6b) If you find the diameter of your circular patio is 22 feet, what will be the length of each wall?



$\frac{22}{\sqrt{2}} = \frac{t\sqrt{2}}{\sqrt{2}}$

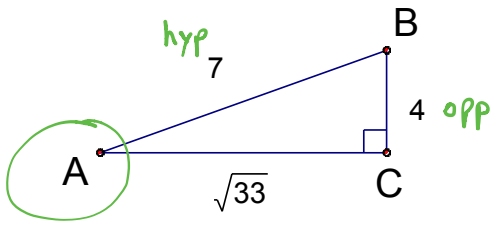
$t = \frac{22}{\sqrt{2}} \cdot \frac{\sqrt{2}}{\sqrt{2}} = \frac{22\sqrt{2}}{\sqrt{4}} = \frac{22\sqrt{2}}{2} = 11\sqrt{2}\text{ ft} \approx 15.56\text{ ft}$

7). Find the exact value of the indicated trig ratio given the triangle at the right as a fraction in simplified radical form.

a. $\sin A = \frac{4}{7}$ b. $\cos B = \frac{4}{7}$

c. $\tan A = \frac{4\sqrt{33}}{33}$ $\frac{4}{\sqrt{33}} \cdot \frac{\sqrt{33}}{\sqrt{33}} = \frac{4\sqrt{33}}{33}$ d. $\sin B = \frac{\sqrt{33}}{7}$

e. $\cos A = \frac{\sqrt{33}}{7}$ f. $\tan B = \frac{\sqrt{33}}{4}$



7a) ***Multiple Choice*** Find the cosine of $\angle B$.

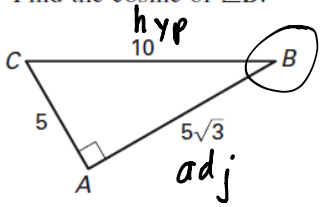
(A) 1.7321

(B) 0.8660

(C) 2

(D) 1.1547

(E) 0.5774

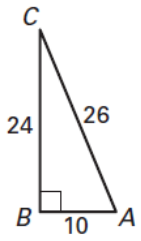


7b) ***Multiple Choice*** Find the sine of $\angle A$.

(A) 0.3846 (B) 0.4167

(C) 0.9231 (D) 1.0833

(E) 2.4

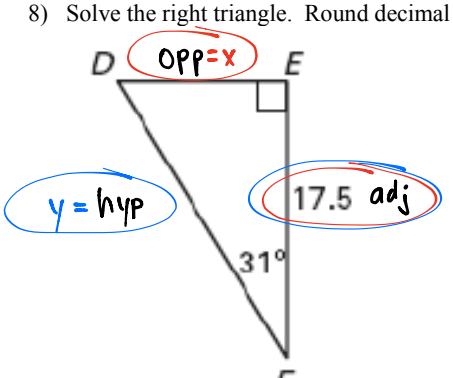


$\frac{24}{26} = \frac{12}{13} \approx 0.9231$

SOH CAH TOA

$\cos(B) = \frac{5\sqrt{3}}{10} = \frac{\sqrt{3}}{2} \approx 0.8660$

8) Solve the right triangle. Round decimal answers to the nearest tenth



$m\angle D = 90° - 31° = 59°$

$\tan(31°) = \frac{x}{17.5}$

$17.5\tan 31° = x$

$10.5151 \approx x$

$\cos(31°) = \frac{17.5}{y}$

$y\cos(31°) = 17.5$

$\frac{y\cos(31°)}{\cos(31°)} = \frac{17.5}{\cos(31°)}$

$y = \frac{17.5}{\cos(31°)}$

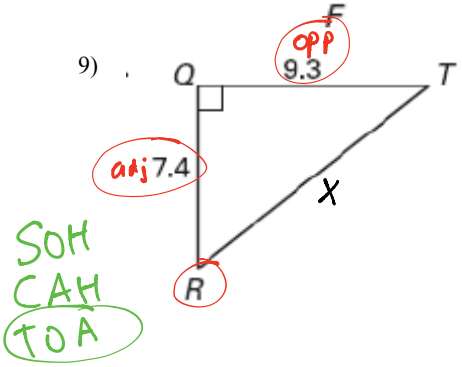
$y \approx 20.4161$

DF = 20.4

DE = 10.5

m∠D = 59°

9)



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$7.4^2 + 9.3^2 = x^2$

$54.76 + 86.49 = x^2$

$141.25 = x^2$

$\sqrt{141.25} = x$

$11.8849 \approx x$

$\tan(R) = \frac{9.3}{7.4}$

$\tan^{-1}(\tan(R)) = \tan^{-1}\left(\frac{9.3}{7.4}\right)$

$R = \tan^{-1}\left(\frac{9.3}{7.4}\right)$

$R \approx 51.4908°$

$T \approx 90° - 51.4908° = 38.5092°$

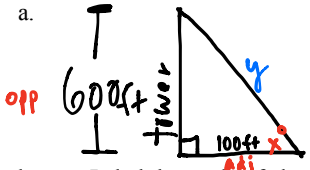
RT = 11.9

m∠T = 38.5°

m∠R = 51.5°

10). A wire cable is to be run from the top of a 600 ft tower to the ground. The horizontal distance from the base of the tower to the point where the cable is anchored is 100 ft. Draw a picture a picture below and label everything the problem has told you.

a.



$x°$ = angle of elevation

y = length of cable

b. Label the angle of elevation in the picture above as $x°$. What is the angle of elevation of the cable? (accurate to the nearest tenth of a degree) Write the equation you will use below.

SOH CAH TOA

$\tan x° = \frac{600}{100}$

$\tan^{-1}(\tan x°) = \tan^{-1}\left(\frac{600}{100}\right)$

$x° = \tan^{-1}\left(\frac{600}{100}\right)$

$x° \approx 80.5377°$

Equation: $\tan x° = \frac{600}{100}$

angle of elevation = 80.5°

c. Cable is sold by the foot. Five extra feet of cable are required on each end of the cable to make the attachments. What is the length of the cable required to connect the cable to the tower?

$y^2 = 100^2 + 600^2$

$y^2 = 10{,}000 + 360{,}000$

$y^2 = 370{,}000$

$y = \sqrt{370{,}000} \approx 608.2763$

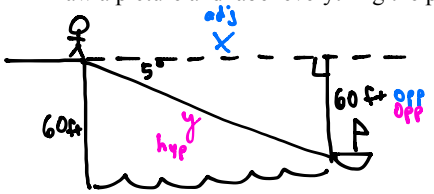
$608.2763_{ft} + 5_{ft} + 5_{ft} = 618.2763_{ft}$

⇒ since it is sold by the foot, we need 619 feet

length of cable = 619 ft

11) A lighthouse keeper is standing on the edge of a cliff and looking at boat. The keeper measures the angle of depression as 5° and knows that the cliff is 60 feet tall.

a. Draw a picture and label everything the problem has told you.



b. How far away is the boat horizontally from the keeper? What is the line of sight distance from the keeper to the boat? Both answers should be accurate to the nearest tenth of a foot.

SOH CAH TOA

$\tan(5°) = \frac{60}{x}$

$x \cdot \tan(5°) = 60$

$\frac{x\cdot\tan(5°)}{\tan(5°)} = \frac{60}{\tan(5°)}$

$x = \frac{60}{\tan(5°)} \approx 685.8\ ft$

$\sin(5°) = \frac{60}{y}$

$y \cdot \sin(5°) = 60$

$\frac{y\cdot\sin(5°)}{\sin(5°)} = \frac{60}{\sin(5°)}$

$y = \frac{60}{\sin(5°)} \approx 688.4\ ft$

Horizontal distance = 685.8 ft

Line of sight distance = 688.4 ft